

Draft Programmatic Environmental Impact Statement for
**Solar Energy Development
in Six Southwestern States**



Volume 3, Part 1

Chapter 9: California Proposed Solar Energy Zones

On the cover:

Typical Solar Fields for Various Technology Types (clockwise from upper left):
Solar Parabolic Trough (Source: Hosoya et al. 2008),
Solar Power Tower (Credit: Sandia National Laboratories. Source: NREL 2010a),
Photovoltaic (Credit: Arizona Public Service. Source: NREL 2010b), and
Dish Engine (Credit: R. Montoya. Source: Sandia National Laboratories 2008).
Reference citations are available in Chapter 1.

Background photo: Parabolic trough facility from an elevated viewpoint
(Credit: Argonne National Laboratory)

Draft Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development in Six Southwestern States (DES 10-59; DOE/EIS-0403)

Responsible Agencies: The U.S. Department of the Interior (DOI) Bureau of Land Management (BLM) and the U.S. Department of Energy (DOE) are co-lead agencies. Nineteen cooperating agencies participated in the preparation of this PEIS: U.S. Department of Defense; U.S. Bureau of Reclamation; U.S. Fish and Wildlife Service; U.S. National Park Service; U.S. Environmental Protection Agency, Region 9; U.S. Army Corps of Engineers, South Pacific Division; Arizona Game and Fish Department; California Energy Commission; California Public Utilities Commission; Nevada Department of Wildlife; N-4 Grazing Board, Nevada; Utah Public Lands Policy Coordination Office; Clark County, Nevada, including Clark County Department of Aviation; Dona Ana County, New Mexico; Esmeralda County, Nevada; Eureka County, Nevada; Lincoln County, Nevada; Nye County, Nevada; and Saguache County, Colorado.

Locations: Arizona, California, Colorado, Nevada, New Mexico, and Utah.

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Abstract: The BLM and DOE are considering taking actions to facilitate solar energy development in compliance with various orders, mandates, and agency policies. For the BLM, these actions include the evaluation of a new BLM Solar Energy Program applicable to all utility-scale solar energy development on BLM-administered lands in six southwestern states (Arizona, California, Colorado, Nevada, New Mexico, and Utah). For DOE, they include the evaluation of developing new program guidance relevant to DOE-supported solar projects. The Draft PEIS assesses the environmental, social, and economic effects of the agencies' proposed actions and alternatives.

For the BLM, the Draft PEIS analyzes a no action alternative, under which solar energy development would continue on BLM-administered lands in accordance with the terms and conditions of the BLM's existing solar energy policies, and two action alternatives for implementing a new BLM Solar Energy Program. Under the solar energy development program alternative (BLM's preferred alternative), the BLM would establish a new Solar Energy Program of administration and authorization policies and required design features and would exclude solar energy development from certain BLM-administered lands. Under this alternative, approximately 22 million acres of BLM-administered lands would be available for right-of-way (ROW) application. A subset of these lands, about 677,400 acres, would be identified as solar energy zones (SEZs), or areas where the BLM would prioritize solar energy and associated transmission infrastructure development. Under the SEZ program alternative, the same policies and design features would be adopted, but development would be excluded from all BLM-administered lands except those located within the SEZs.

For DOE, the Draft PEIS analyzes a no action alternative, under which DOE would continue to conduct environmental reviews of DOE-funded solar projects on a case-by-case basis, and one action alternative, under which DOE would develop programmatic guidance to further integrate environmental considerations into its analysis and selection of solar projects that it will support.

The EPA Notice of Availability (NOA) of the Draft PEIS was published in the *Federal Register* on December 17, 2010. Comments on the Draft PEIS are due by March 17, 2011.

SOLAR PEIS CONTENTS

VOLUME 1

Reader's Guide

Executive Summary

Chapter 1: Introduction

Chapter 2: Description of Alternatives and Reasonably Foreseeable Development Scenario

Chapter 3: Overview of Solar Energy Power Production Technologies, Development, and Regulation

Chapter 4: Affected Environment

Chapter 5: Impacts of Solar Energy Development and Potential Mitigation Measures

Chapter 6: Analysis of BLM's Solar Energy Development Alternatives

Chapter 7: Analysis of DOE's Alternatives

Chapter 14: Consultation and Coordination Undertaken To Support Preparation of the PEIS

Chapter 15: List of Preparers

Chapter 16: Glossary

VOLUME 2

Chapter 8: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in Arizona

VOLUME 3, Parts 1 and 2

Chapter 9: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in California

VOLUME 4

Chapter 10: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in Colorado

VOLUME 5, Parts 1 and 2

Chapter 11: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in Nevada

VOLUME 6

Chapter 12: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in New Mexico

VOLUME 7

Chapter 13: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in Utah

VOLUME 8

Appendix A: Current and Proposed Bureau of Land Management Solar Energy Development Policies and Design Features

Appendix B: Active Solar Applications

Appendix C: Proposed BLM Land Use Plan Amendments under the BLM Action Alternatives of the Solar Energy Development Programmatic Environmental Impact Statement

Appendix D: Summary of Regional Initiatives and State Plans for Solar Energy Development and Transmission Development to Support Renewable Energy Development

Appendix E: Methods for Estimating Reasonably Foreseeable Development Scenarios for Solar Energy Development

Appendix F: Solar Energy Technology Overview

Appendix G: Transmission Constraint Analysis

Appendix H: Federal, State, and County Requirements Potentially Applicable to Solar Energy Projects

Appendix I: Ecoregions of the Six-State Study Area and Land Cover Types of the Proposed Solar Energy Zones

Appendix J: Special Status Species Associated with BLM's Alternatives in the Six-State Study Area

Appendix K: Government-to-Government and Cultural Resource Consultations

Appendix L: GIS Data Sources and Methodology

Appendix M: Methodologies and Data Sources for the Analysis of Impacts of Solar Energy Development on Resources

Appendix N: Viewshed Maps for Proposed Solar Energy Zones

Reader's Guide

The detailed analysis of the proposed solar energy zones (SEZs) in California, provided in Sections 9.1 through 9.4, will be used to inform BLM decisions regarding the size, configuration, and/or management of these SEZs. These sections also include proposed mitigation requirements (termed "SEZ-specific design features"). Please note that the SEZ-specific summaries of Affected Environment use the descriptions of Affected Environment for the six-state study area presented in Chapter 4 of the PEIS as a basis. Also note that the SEZ-specific design features have been proposed with consideration of the general impact analyses for solar energy facilities presented in Chapter 5, and on the assumption that all programmatic design features presented in Appendix A, Section A.2.2, will be required for projects that will be located within the SEZs.

BLM will implement its SEZ-specific decisions through the BLM Record of Decision for the Final PEIS. Comments received during the review period for the Draft PEIS will inform BLM decisions.

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VOLUME 3, PART 1 CONTENTS

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

NOTATION.....	xxv
ENGLISH/METRIC AND METRIC/ENGLISH EQUIVALENTS	xxxvii
9 AFFECTED ENVIRONMENT AND IMPACT ASSESSMENT FOR PROPOSED SOLAR ENERGY ZONES IN CALIFORNIA	9.1-1
9.1 Imperial East	9.1-1
9.1.1 Background and Summary of Impacts.....	9.1-1
9.1.1.1 General Information.....	9.1-1
9.1.1.2 Development Assumptions for the Impact Analysis	9.1-3
9.1.1.3 Summary of Major Impacts and SEZ-Specific Design Features.....	9.1-5
9.1.2 Lands and Realty	9.1-21
9.1.2.1 Affected Environment.....	9.1-21
9.1.2.2 Impacts.....	9.1-21
9.1.2.2.1 Construction and Operations.....	9.1-21
9.1.2.2.2 Transmission Facilities and Other Off-Site Infrastructure	9.1-22
9.1.2.3 SEZ-Specific Design Features and Design Feature Effectiveness.....	9.1-23
9.1.3 Specially Designated Areas and Lands with Wilderness Characteristics.....	9.1-25
9.1.3.1 Affected Environment.....	9.1-25
9.1.3.2 Impacts.....	9.1-27
9.1.3.2.1 Construction and Operations.....	9.1-27
9.1.3.2.2 Transmission Facilities and Other Off-Site Infrastructure	9.1-29
9.1.3.3 SEZ-Specific Design Features and Design Feature Effectiveness.....	9.1-30
9.1.4 Rangeland Resources	9.1-31
9.1.4.1 Livestock Grazing.....	9.1-31
9.1.4.1.1 Affected Environment.....	9.1-31
9.1.4.1.2 Impacts	9.1-31
9.1.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness.....	9.1-31
9.1.4.2 Wild Horses and Burros.....	9.1-31
9.1.4.2.1 Affected Environment.....	9.1-31
9.1.4.2.2 Impacts	9.1-33
9.1.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness.....	9.1-33
9.1.5 Recreation	9.1-35
9.1.5.1 Affected Environment.....	9.1-35

CONTENTS (Cont.)

1			
2			
3			
4		9.1.5.2	Impacts..... 9.1-35
5		9.1.5.3	SEZ-Specific Design Features and Design Feature
6			Effectiveness..... 9.1-36
7	9.1.6		Military and Civilian Aviation..... 9.1-37
8		9.1.6.1	Affected Environment..... 9.1-37
9		9.1.6.2	Impacts..... 9.1-37
10		9.1.6.3	SEZ-Specific Design Features and Design Feature
11			Effectiveness..... 9.1-37
12	9.1.7		Geologic Setting and Soil Resources..... 9.1-39
13		9.1.7.1	Affected Environment..... 9.1-39
14			9.1.7.1.1 Geologic Setting..... 9.1-39
15			9.1.7.1.2 Soil Resources..... 9.1-50
16		9.1.7.2	Impacts..... 9.1-50
17		9.1.7.3	SEZ-Specific Design Features and Design Feature
18			Effectiveness..... 9.1-50
19	9.1.8		Minerals..... 9.1-55
20		9.1.8.1	Affected Environment..... 9.1-55
21		9.1.8.2	Impacts..... 9.1-55
22		9.1.8.3	SEZ-Specific Design Features and Design Feature
23			Effectiveness..... 9.1-55
24	9.1.9		Water Resources..... 9.1-57
25		9.1.9.1	Affected Environment..... 9.1-57
26			9.1.9.1.1 Surface Waters..... 9.1-57
27			9.1.9.1.2 Groundwater..... 9.1-59
28			9.1.9.1.3 Water Use and Water Rights
29			Management..... 9.1-60
30		9.1.9.2	Impacts..... 9.1-62
31			9.1.9.2.1 Land Disturbance Impacts on Water
32			Resources..... 9.1-62
33			9.1.9.2.2 Water Use Requirements for Solar
34			Energy Technologies..... 9.1-62
35			9.1.9.2.3 Off-Site Impacts: Roads and
36			Transmission Lines..... 9.1-67
37			9.1.9.2.4 Summary of Impacts on Water
38			Resources..... 9.1-67
39		9.1.9.3	SEZ-Specific Design Features and Design Feature
40			Effectiveness..... 9.1-68
41	9.1.10		Vegetation..... 9.1-71
42		9.1.10.1	Affected Environment..... 9.1-71
43		9.1.10.2	Impacts..... 9.1-78
44			9.1.10.2.1 Impacts on Native Species..... 9.1-79
45			9.1.10.2.2 Impacts from Noxious Weeds and
46			Invasive Plant Species..... 9.1-81

CONTENTS (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

9.1.10.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.1-81
9.1.11	Wildlife and Aquatic Biota	9.1-83
9.1.11.1	Amphibians and Reptiles	9.1-83
9.1.11.1.1	Affected Environment	9.1-83
9.1.11.1.2	Impacts	9.1-84
9.1.11.1.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.1-90
9.1.11.2	Birds	9.1-91
9.1.11.2.1	Affected Environment	9.1-91
9.1.11.2.2	Impacts	9.1-103
9.1.11.2.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.1-104
9.1.11.3	Mammals	9.1-105
9.1.11.3.1	Affected Environment	9.1-105
9.1.11.3.2	Impacts	9.1-106
9.1.11.3.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.1-115
9.1.11.4	Aquatic Biota	9.1-116
9.1.11.4.1	Affected Environment	9.1-116
9.1.11.4.2	Impacts	9.1-117
9.1.11.4.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.1-118
9.1.12	Special Status Species	9.1-119
9.1.12.1	Affected Environment	9.1-120
9.1.12.1.1	Species Listed under the ESA That Could Occur in the Affected Area	9.1-142
9.1.12.1.2	Species Proposed for Listing under the ESA That Could Occur in the Affected Area	9.1-142
9.1.12.1.3	BLM-Designated Sensitive Species	9.1-143
9.1.12.1.4	State-Listed Species	9.1-147
9.1.12.1.5	Rare Species	9.1-147
9.1.12.2	Impacts	9.1-147
9.1.12.2.1	Impacts on Species Listed under the ESA	9.1-148
9.1.12.2.2	Impacts on Species Proposed for Listing under the ESA	9.1-149
9.1.12.2.3	Impacts on BLM-Designated Sensitive Species	9.1-150
9.1.12.2.4	Impacts on State-Listed Species	9.1-158
9.1.12.2.5	Impacts on Rare Species	9.1-158

CONTENTS (Cont.)

1			
2			
3			
4		9.1.12.3	SEZ-Specific Design Features and Design Feature
5			Effectiveness..... 9.1-158
6	9.1.13		Air Quality and Climate..... 9.1-161
7		9.1.13.1	Affected Environment..... 9.1-161
8			9.1.13.1.1 Climate..... 9.1-161
9			9.1.13.1.2 Existing Air Emissions..... 9.1-163
10			9.1.13.1.3 Air Quality..... 9.1-165
11		9.1.13.2	Impacts..... 9.1-167
12			9.1.13.2.1 Construction..... 9.1-167
13			9.1.13.2.2 Operations..... 9.1-171
14			9.1.13.2.3 Decommissioning/Reclamation..... 9.1-173
15		9.1.13.3	SEZ-Specific Design Features and Design Feature
16			Effectiveness..... 9.1-173
17	9.1.14		Visual Resources..... 9.1-175
18		9.1.14.1	Affected Environment..... 9.1-175
19		9.1.14.2	Impacts..... 9.1-179
20			9.1.14.2.1 Impacts on the Proposed Imperial
21			East SEZ..... 9.1-181
22			9.1.14.2.2 Impacts on Lands Surrounding the
23			Proposed Imperial East SEZ..... 9.1-182
24			9.1.14.2.3 Summary of Visual Resource Impacts
25			for the Proposed Imperial East SEZ..... 9.1-198
26		9.1.14.3	SEZ-Specific Design Features and Design Feature
27			Effectiveness..... 9.1-199
28	9.1.15		Acoustic Environment..... 9.1-201
29		9.1.15.1	Affected Environment..... 9.1-201
30		9.1.15.2	Impacts..... 9.1-202
31			9.1.15.2.1 Construction..... 9.1-202
32			9.1.15.2.2 Operations..... 9.1-204
33			9.1.15.2.3 Decommissioning/Reclamation..... 9.1-206
34		9.1.15.3	SEZ-Specific Design Features and Design Feature
35			Effectiveness..... 9.1-207
36	9.1.16		Paleontological Resources..... 9.1-209
37		9.1.16.1	Affected Environment..... 9.1-209
38		9.1.16.2	Impacts..... 9.1-209
39		9.1.16.3	SEZ-Specific Design Features and Design Feature
40			Effectiveness..... 9.1-210
41	9.1.17		Cultural Resources..... 9.1-211
42		9.1.17.1	Affected Environment..... 9.1-211
43			9.1.17.1.1 Prehistory..... 9.1-211
44			9.1.17.1.2 Ethnohistory..... 9.1-212
45			9.1.17.1.3 History..... 9.1-216
46			

CONTENTS (Cont.)

1			
2			
3			
4		9.1.17.1.4	Traditional Cultural Properties—
5			Landscape..... 9.1-218
6		9.1.17.1.5	Cultural Surveys and Known
7			Archaeological and Historic
8			Resources 9.1-219
9		9.1.17.2	Impacts..... 9.1-220
10		9.1.17.3	SEZ-Specific Design Features and Design Feature
11			Effectiveness 9.1-221
12	9.1.18		Native American Concerns 9.1-223
13		9.1.18.1	Affected Environment..... 9.1-223
14		9.1.18.1.1	Territorial Boundaries 9.1-224
15		9.1.18.1.2	Plant Resources 9.1-226
16		9.1.18.1.3	Other Resources 9.1-227
17		9.1.18.2	Impacts..... 9.1-228
18		9.1.18.3	SEZ-Specific Design Features and Design Feature
19			Effectiveness 9.1-229
20	9.1.19		Socioeconomics 9.1-231
21		9.1.19.1	Affected Environment..... 9.1-231
22		9.1.19.1.1	ROI Employment 9.1-231
23		9.1.19.1.2	ROI Unemployment 9.1-233
24		9.1.19.1.3	ROI Urban Population..... 9.1-233
25		9.1.19.1.4	ROI Urban Income 9.1-234
26		9.1.19.1.5	ROI Population..... 9.1-235
27		9.1.19.1.6	ROI Income 9.1-235
28		9.1.19.1.7	ROI Housing 9.1-236
29		9.1.19.1.8	ROI Local Government Organizations 9.1-237
30		9.1.19.1.9	ROI Community and Social Services 9.1-237
31		9.1.19.1.10	ROI Social Structure and Social
32			Change..... 9.1-239
33		9.1.19.1.11	ROI Recreation..... 9.1-240
34		9.1.19.2	Impacts..... 9.1-242
35		9.1.19.2.1	Common Impacts 9.1-243
36		9.1.19.2.2	Technology-Specific Impacts..... 9.1-244
37		9.1.19.3	SEZ-Specific Design Features and Design Feature
38			Effectiveness 9.1-253
39	9.1.20		Environmental Justice..... 9.1-255
40		9.1.20.1	Affected Environment..... 9.1-255
41		9.1.20.2	Impacts..... 9.1-260
42		9.1.20.3	SEZ-Specific Design Features and Design Feature
43			Effectiveness 9.1-260
44	9.1.21		Transportation..... 9.1-261
45		9.1.21.1	Affected Environment..... 9.1-261
46		9.1.21.2	Impacts..... 9.1-263

CONTENTS (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

	9.1.21.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.1-264
	9.1.22	Cumulative Impacts	9.1-265
	9.1.22.1	Geographic Extent of the Cumulative Impacts Analysis	9.1-265
	9.1.22.2	Overview of Ongoing and Reasonably Foreseeable Future Actions.....	9.1-267
		9.1.22.2.1 Energy Production and Distribution.....	9.1-267
		9.1.22.2.2 Other Actions	9.1-277
	9.1.22.3	General Trends.....	9.1-278
		9.1.22.3.1 Population Growth	9.1-278
		9.1.22.3.2 Energy Demand.....	9.1-278
		9.1.22.3.3 Water Availability	9.1-279
		9.1.22.3.4 Climate Change.....	9.1-280
	9.1.22.4	Cumulative Impacts on Resources.....	9.1-281
		9.1.22.4.1 Lands and Realty	9.1-282
		9.1.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics	9.1-282
		9.1.22.4.3 Rangeland Resources	9.1-283
		9.1.22.4.4 Recreation	9.1-283
		9.1.22.4.5 Military and Civilian Aviation	9.1-283
		9.1.22.4.6 Soil Resources	9.1-284
		9.1.22.4.7 Minerals.....	9.1-284
		9.1.22.4.8 Water Resources.....	9.1-284
		9.1.22.4.9 Vegetation	9.1-285
		9.1.22.4.10 Wildlife and Aquatic Biota	9.1-287
		9.1.22.4.11 Special Status Species	9.1-288
		9.1.22.4.12 Air Quality and Climate	9.1-289
		9.1.22.4.13 Visual Resources	9.1-289
		9.1.22.4.14 Acoustic Environment.....	9.1-291
		9.1.22.4.15 Paleontological Resources	9.1-291
		9.1.22.4.16 Cultural Resources	9.1-291
		9.1.22.4.17 Native American Concerns	9.1-292
		9.1.22.4.18 Socioeconomics.....	9.1-292
		9.1.22.4.19 Environmental Justice	9.1-293
		9.1.22.4.20 Transportation	9.1-293
	9.1.23	References.....	9.1-295
	9.2	Iron Mountain	9.2-1
	9.2.1	Background and Summary of Impacts.....	9.2-1
		9.2.1.1 General Information.....	9.2-1
		9.2.1.2 Development Assumptions for the Impact Analysis	9.2-3
		9.2.1.3 Summary of Major Impacts and SEZ-Specific Design Features.....	9.2-5

CONTENTS (Cont.)

1
2
3

4	9.2.2	Lands and Realty	9.2-21
5	9.2.2.1	Affected Environment.....	9.2-21
6	9.2.2.2	Impacts.....	9.2-21
7	9.2.2.2.1	Construction and Operations.....	9.2-21
8	9.2.2.2.2	Transmission Facilities and Other	
9		Off-Site Infrastructure	9.2-22
10	9.2.2.3	SEZ-Specific Design Features and Design	
11		Feature Effectiveness.....	9.2-23
12	9.2.3	Specially Designated Areas and Lands with Wilderness	
13		Characteristics.....	9.2-25
14	9.2.3.1	Affected Environment.....	9.2-25
15	9.2.3.2	Impacts.....	9.2-27
16	9.2.3.2.1	Construction and Operations.....	9.2-27
17	9.2.3.2.2	Transmission Facilities and Other	
18		Off-Site Infrastructure	9.2-32
19	9.2.3.3	SEZ-Specific Design Features and Design	
20		Feature Effectiveness.....	9.2-32
21	9.2.4	Rangeland Resources.....	9.2-33
22	9.2.4.1	Livestock Grazing.....	9.2-33
23	9.2.4.1.1	Affected Environment.....	9.2-33
24	9.2.4.1.2	Impacts	9.2-33
25	9.2.4.1.3	SEZ-Specific Design Features and	
26		Design Feature Effectiveness	9.2-33
27	9.2.4.2	Wild Horses and Burros.....	9.2-33
28	9.2.4.2.1	Affected Environment.....	9.2-33
29	9.2.4.2.2	Impacts	9.2-35
30	9.2.4.2.3	SEZ-Specific Design Features and	
31		Design Feature Effectiveness	9.2-35
32	9.2.5	Recreation.....	9.2-37
33	9.2.5.1	Affected Environment.....	9.2-37
34	9.2.5.2	Impacts.....	9.2-37
35	9.2.5.2.1	Construction and Operations.....	9.2-37
36	9.2.5.2.2	Transmission Facilities and Other	
37		Off-Site Infrastructure	9.2-38
38	9.2.5.3	SEZ-Specific Design Features and Design	
39		Feature Effectiveness.....	9.2-38
40	9.2.6	Military and Civilian Aviation.....	9.2-39
41	9.2.6.1	Affected Environment.....	9.2-39
42	9.2.6.2	Impacts.....	9.2-39
43	9.2.6.3	SEZ-Specific Design Features and Design	
44		Feature Effectiveness.....	9.2-39
45	9.2.7	Geologic Setting and Soil Resources.....	9.2-41
46	9.2.7.1	Affected Environment.....	9.2-41

CONTENTS (Cont.)

1			
2			
3			
4		9.2.7.1.1	Geologic Setting..... 9.2-41
5		9.2.7.1.2	Soil Resources..... 9.2-51
6		9.2.7.2	Impacts..... 9.2-51
7		9.2.7.3	SEZ-Specific Design Features and Design
8			Feature Effectiveness..... 9.2-55
9	9.2.8	Minerals.....	9.2-57
10		9.2.8.1	Affected Environment..... 9.2-57
11		9.2.8.2	Impacts..... 9.2-57
12		9.2.8.3	SEZ-Specific Design Features and Design
13			Feature Effectiveness..... 9.2-58
14	9.2.9	Water Resources.....	9.2-59
15		9.2.9.1	Affected Environment..... 9.2-59
16		9.2.9.1.1	Surface Waters..... 9.2-59
17		9.2.9.1.2	Groundwater..... 9.2-61
18		9.2.9.1.3	Water Use and Water Rights
19			Management..... 9.2-62
20		9.2.9.2	Impacts..... 9.2-63
21		9.2.9.2.1	Land Disturbance Impacts on Water
22			Resources..... 9.2-63
23		9.2.9.2.2	Water Use Requirements for Solar
24			Energy Technologies..... 9.2-64
25		9.2.9.2.3	Off-Site Impacts of Roads and
26			Transmission Lines..... 9.2-68
27		9.2.9.2.4	Summary of Impacts on Water
28			Resources..... 9.2-68
29		9.2.9.3	SEZ-Specific Design Features and Design
30			Feature Effectiveness..... 9.2-69
31	9.2.10	Vegetation.....	9.2-71
32		9.2.10.1	Affected Environment..... 9.2-71
33		9.2.10.2	Impacts..... 9.2-77
34		9.2.10.2.1	Impacts on Native Species..... 9.2-78
35		9.2.10.2.2	Impacts from Noxious Weeds and
36			Invasive Plant Species..... 9.2-79
37		9.2.10.3	SEZ-Specific Design Features and Design
38			Feature Effectiveness..... 9.2-80
39	9.2.11	Wildlife and Aquatic Biota.....	9.2-83
40		9.2.11.1	Amphibians and Reptiles..... 9.2-84
41		9.2.11.1.1	Affected Environment..... 9.2-84
42		9.2.11.1.2	Impacts..... 9.2-91
43		9.2.11.1.3	SEZ-Specific Design Features and
44			Design Feature Effectiveness..... 9.2-91
45		9.2.11.2	Birds..... 9.2-92
46		9.2.11.2.1	Affected Environment..... 9.2-92

CONTENTS (Cont.)

1			
2			
3			
4		9.2.11.2.2	Impacts 9.2-107
5		9.2.11.2.3	SEZ-Specific Design Features and
6			Design Feature Effectiveness 9.2-108
7	9.2.11.3	Mammals	9.2-109
8		9.2.11.3.1	Affected Environment..... 9.2-109
9		9.2.11.3.2	Impacts 9.2-110
10		9.2.11.3.3	SEZ-Specific Design Features and
11			Design Feature Effectiveness 9.2-119
12	9.2.11.4	Aquatic Biota	9.2-120
13		9.2.11.4.1	Affected Environment..... 9.2-120
14		9.2.11.4.2	Impacts 9.2-121
15		9.2.11.4.3	SEZ-Specific Design Features and
16			Design Feature Effectiveness 9.2-122
17	9.2.12	Special Status Species.....	9.2-123
18		9.2.12.1	Affected Environment..... 9.2-123
19		9.2.12.1.1	Species Listed under the ESA That
20			Could Occur in the Affected Area 9.2-149
21		9.2.12.1.2	BLM-Designated Sensitive Species..... 9.2-149
22		9.2.12.1.3	State-Listed Species 9.2-153
23		9.2.12.1.4	Rare Species 9.2-154
24		9.2.12.2	Impacts..... 9.2-154
25		9.2.12.2.1	Impacts on Species Listed under
26			the ESA 9.2-155
27		9.2.12.2.2	Impacts on BLM-Designated
28			Sensitive Species 9.2-157
29		9.2.12.2.3	Impacts on State-Listed Species..... 9.2-166
30		9.2.12.2.4	Impacts on Rare Species 9.2-167
31		9.2.12.3	SEZ-Specific Design Features and Design
32			Feature Effectiveness 9.2-167
33	9.2.13	Air Quality and Climate.....	9.2-169
34		9.2.13.1	Affected Environment..... 9.2-169
35		9.2.13.1.1	Climate 9.2-169
36		9.2.13.1.2	Existing Air Emissions..... 9.2-172
37		9.2.13.1.3	Air Quality 9.2-173
38		9.2.13.2	Impacts..... 9.2-175
39		9.2.13.2.1	Construction 9.2-175
40		9.2.13.2.2	Operations 9.2-178
41		9.2.13.2.3	Decommissioning/Reclamation 9.2-180
42		9.2.13.3	SEZ-Specific Design Features and Design
43			Feature Effectiveness 9.2-180
44	9.2.14	Visual Resources.....	9.2-181
45		9.2.14.1	Affected Environment..... 9.2-181
46		9.2.14.2	Impacts..... 9.2-187

CONTENTS (Cont.)

1				
2				
3				
4		9.2.14.2.1	Impacts on the Proposed Iron Mountain SEZ	9.2-188
5				
6		9.2.14.2.2	Impacts on Lands Surrounding the Proposed Iron Mountain SEZ.....	9.2-188
7				
8		9.2.14.2.3	Summary of Visual Resource Impacts for the Proposed Iron Mountain SEZ.....	9.2-232
9				
10		9.2.14.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.2-232
11				
12	9.2.15	Acoustic Environment		9.2-237
13		9.2.15.1	Affected Environment.....	9.2-237
14		9.2.15.2	Impacts.....	9.2-237
15				
16		9.2.15.2.1	Construction	9.2-238
17		9.2.15.2.2	Operations	9.2-240
18		9.2.15.2.3	Decommissioning/Reclamation	9.2-243
19		9.2.15.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.2-243
20	9.2.16	Paleontological Resources		9.2-245
21		9.2.16.1	Affected Environment.....	9.2-245
22		9.2.16.2	Impacts.....	9.2-245
23		9.2.16.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.2-246
24				
25	9.2.17	Cultural Resources		9.2-247
26		9.2.17.1	Affected Environment.....	9.2-247
27				
28		9.2.17.1.1	Prehistory	9.2-247
29		9.2.17.1.2	Ethnohistory	9.2-248
30		9.2.17.1.3	History.....	9.2-252
31		9.2.17.1.4	Traditional Cultural Properties—Landscape	9.2-254
32		9.2.17.1.5	Cultural Surveys and Known Archaeological and Historic Resources	9.2-255
33				
34		9.2.17.2	Impacts.....	9.2-258
35		9.2.17.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.2-259
36				
37				
38	9.2.18	Native American Concerns.....		9.2-261
39		9.2.18.1	Affected Environment.....	9.2-261
40				
41		9.2.18.1.1	Territorial Boundaries	9.2-262
42		9.2.18.1.2	Plant Resources	9.2-263
43		9.2.18.1.3	Other Resources	9.2-265
44		9.2.18.2	Impacts.....	9.2-266
45		9.2.18.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.2-267
46	9.2.19	Socioeconomics		9.2-269

CONTENTS (Cont.)

1			
2			
3			
4	9.2.19.1	Affected Environment.....	9.2-269
5		9.2.19.1.1 ROI Employment	9.2-269
6		9.2.19.1.2 ROI Unemployment.....	9.2-271
7		9.2.19.1.3 ROI Urban Population.....	9.2-271
8		9.2.19.1.4 ROI Urban Income	9.2-273
9		9.2.19.1.5 ROI Population.....	9.2-274
10		9.2.19.1.6 ROI Income	9.2-275
11		9.2.19.1.7 ROI Housing	9.2-275
12		9.2.19.1.8 ROI Local Government Organizations	9.2-277
13		9.2.19.1.9 ROI Community and Social Services	9.2-277
14		9.2.19.1.10 ROI Social Change.....	9.2-277
15		9.2.19.1.11 ROI Recreation.....	9.2-280
16	9.2.19.2	Impacts.....	9.2-281
17		9.2.19.2.1 Common Impacts	9.2-282
18		9.2.19.2.2 Technology-Specific Impacts.....	9.2-283
19	9.2.19.3	SEZ-Specific Design Features and Design	
20		Feature Effectiveness	9.2-292
21	9.2.20	Environmental Justice.....	9.2-293
22		9.2.20.1 Affected Environment.....	9.2-293
23		9.2.20.2 Impacts.....	9.2-298
24		9.2.20.3 SEZ-Specific Design Features and Design	
25		Feature Effectiveness	9.2-298
26	9.2.21	Transportation.....	9.2-299
27		9.2.21.1 Affected Environment.....	9.2-299
28		9.2.21.2 Impacts.....	9.2-299
29		9.2.21.3 SEZ-Specific Design Features and Design	
30		Feature Effectiveness.....	9.2-303
31	9.2.22	Cumulative Impacts	9.2-305
32		9.2.22.1 Geographic Extent of the Cumulative	
33		Impacts Analysis.....	9.2-305
34		9.2.22.2 Overview of Ongoing and Reasonably	
35		Foreseeable Future Actions	9.2-305
36		9.2.22.2.1 Energy Production and Distribution.....	9.2-307
37		9.2.22.2.2 Other Actions	9.2-316
38		9.2.22.3 General Trends.....	9.2-317
39		9.2.22.3.1 Population Growth	9.2-317
40		9.2.22.3.2 Energy Demand.....	9.2-318
41		9.2.22.3.3 Water Availability	9.2-318
42		9.2.22.3.4 Climate Change.....	9.2-319
43		9.2.22.4 Cumulative Impacts on Resources.....	9.2-320
44		9.2.22.4.1 Lands and Realty.....	9.2-321
45		9.2.22.4.2 Specially Designated Areas and	
46		Lands with Wilderness Characteristics	9.2-322

CONTENTS (Cont.)

1			
2			
3			
4	9.2.22.4.3	Rangeland Resources	9.2-322
5	9.2.22.4.4	Recreation	9.2-322
6	9.2.22.4.5	Military and Civilian Aviation	9.2-323
7	9.2.22.4.6	Soil Resources	9.2-323
8	9.2.22.4.7	Minerals.....	9.2-323
9	9.2.22.4.8	Water Resources.....	9.2-324
10	9.2.22.4.9	Vegetation	9.2-325
11	9.2.22.4.10	Wildlife and Aquatic Biota	9.2-326
12	9.2.22.4.11	Special Status Species	9.2-327
13	9.2.22.4.12	Air Quality and Climate	9.2-328
14	9.2.22.4.13	Visual Resources	9.2-329
15	9.2.22.4.14	Acoustic Environment.....	9.2-330
16	9.2.22.4.15	Paleontological Resources	9.2-330
17	9.2.22.4.16	Cultural Resources	9.2-331
18	9.2.22.4.17	Native American Concerns	9.2-331
19	9.2.22.4.18	Socioeconomics.....	9.2-331
20	9.2.22.4.19	Environmental Justice	9.2-332
21	9.2.22.4.20	Transportation	9.2-332
22	9.2.23	References.....	9.2-335
23			
24			

FIGURES

25			
26			
27			
28	9.1.1.1-1	Proposed Imperial East SEZ	9.1-2
29			
30	9.1.3.1-1	Specially Designated Areas in the Vicinity of the Proposed Imperial East SEZ.....	9.1-26
31			
32			
33	9.1.4.2-1	Wild Horse and Burro Herd Management Areas within the Analysis Area for the Proposed Imperial East SEZ.....	9.1-32
34			
35			
36	9.1.7.1-1	Physiographic Features in the Imperial Valley Region	9.1-40
37			
38	9.1.7.1-2	Geologic Map of the Imperial Valley Region.....	9.1-41
39			
40	9.1.7.1-3	General Terrain of the Proposed Imperial East SEZ	9.1-44
41			
42	9.1.7.1-4	Quaternary Faults and Volcanoes in Southern California	9.1-45
43			
44	9.1.7.1-5	Delineated Earthquake Fault Zones near the Proposed Imperial East SEZ.....	9.1-47
45			
46			

FIGURES (Cont.)

1

2

3

4 9.1.7.1-6 Soil Map for the Proposed Imperial East SEZ..... 9.1-51

5

6 9.1.9.1-1 Surface Water Features near the Proposed Imperial East SEZ..... 9.1-58

7

8 9.1.10.1-1 Land Cover Types within the Proposed Imperial East SEZ 9.1-73

9

10 9.1.10.1-2 Wetlands within the Proposed Imperial East SEZ..... 9.1-77

11

12 9.1.12.1-1 Known or Potential Occurrences of Species Listed as Endangered,
13 Threatened, or Proposed for Listing under the ESA That May
14 Occur in the Proposed Imperial East SEZ Affected Area..... 9.1-121

15

16 9.1.13.1-1 Wind Rose at 33-ft Height at Imperial Airport, Imperial, California,
17 2004–2007, 2009..... 9.1-162

18

19 9.1.14.1-1 Proposed Imperial East SEZ and Surrounding Lands..... 9.1-176

20

21 9.1.14.1-2 Approximately 180° Panoramic View of the Proposed Imperial
22 East SEZ, from Northwest Corner of the SEZ near I-8,
23 Looking South..... 9.1-177

24

25 9.1.14.1-3 Approximately 180° Panoramic View of the Proposed Imperial
26 East SEZ, from South-Central Portion of the SEZ near
27 State Route 98, Looking West 9.1-177

28

29 9.1.14.1-4 Visual Resource Inventory Values for the Proposed Imperial East
30 SEZ and Surrounding Lands..... 9.1-180

31

32 9.1.14.2-1 Viewshed Analyses for the Proposed Imperial East SEZ and
33 Surrounding Lands, Assuming Solar Technology Heights
34 of 24.6 ft, 38 ft, 150 ft, and 650 ft..... 9.1-183

35

36 9.1.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto
37 Combined 650-ft and 24.6-ft Viewsheds for the Proposed
38 Imperial East SEZ..... 9.1-185

39

40 9.1.14.2-3 Google Earth Visualization of the Proposed Imperial East SEZ
41 and Surrounding Lands, with Power Tower Wireframe Model,
42 as Seen from the North Algodones Dunes WA/ACEC 9.1-189

43

44 9.1.14.2-4 Google Earth Visualization of the Proposed Imperial East SEZ,
45 as Seen from Viewpoint on the Auto Route of the Juan Bautista
46 de Anza Trail within the SEZ 9.1-193

FIGURES (Cont.)

1

2

3

4 9.1.20.1-1 Minority Population Groups within the 50-mi Area Surrounding
5 the Proposed Imperial East SEZ 9.1-258

6

7 9.1.20.1-2 Low-Income Population Groups within the 50-mi Radius
8 Surrounding the Proposed Imperial East SEZ 9.1-259

9

10 9.1.21-1 Local Transportation Network Serving the Proposed Imperial
11 East SEZ..... 9.1-262

12

13 9.1.22.2-1 Locations of Renewable Energy Projects on Public Land within a
14 50-mi Radius of the Proposed Imperial East SEZ 9.1-271

15

16 9.2.1.1-1 Proposed Iron Mountain SEZ 9.2-2

17

18 9.2.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Iron
19 Mountain SEZ..... 9.2-26

20

21 9.2.4.2-1 Wild Horse and Burro Herd Management Areas within the SEZ
22 Region for the Proposed Iron Mountain SEZ 9.2-34

23

24 9.2.7.1-1 Physiographic Features in the Ward Valley Region 9.2-42

25

26 9.2.7.1-2 Geologic Map of the Ward Valley Region 9.2-43

27

28 9.2.7.1-3 General Terrain of the Proposed Iron Mountain SEZ..... 9.2-46

29

30 9.2.7.1-4 Quaternary Faults and Volcanoes in Southern California 9.2-47

31

32 9.2.7.1-5 Soil Map for the Proposed Iron Mountain SEZ..... 9.2-52

33

34 9.2.9.1-1 Surface Water Features near the Proposed Iron Mountain SEZ..... 9.2-60

35

36 9.2.10.1-1 Land Cover Types within the Proposed Iron Mountain SEZ 9.2-73

37

38 9.2.12.1-1 Known or Potential Occurrences of Species Listed as Endangered,
39 Threatened, or under Review for Listing under the ESA That May
40 Occur in the Proposed Iron Mountain SEZ Affected Area..... 9.2-125

41

42 9.2.13.1-1 Wind Rose at 33-ft Height at Blythe Airport, Blythe, California,
43 2005–2009..... 9.2-170

44

45 9.2.14.1-1 Proposed Iron Mountain SEZ and Surrounding Lands..... 9.2-182

46

FIGURES (Cont.)

1

2

3

4 9.2.14.1-2 Approximately 180° Panoramic View of the Proposed Iron
5 Mountain SEZ, Including Granite Mountains at Far Left,
6 Iron Mountains at Center, Old Woman Mountains at Right, and
7 Cadiz Road in Foreground 9.2-184
8

9 9.2.14.1-3 Approximately 180° Panoramic View of the Proposed Iron
10 Mountain SEZ, Including Turtle Mountains at Left and Center,
11 Railroad, Cadiz Road, and Arica Mountains at Right 9.2-184
12

13 9.2.14.1-4 Visual Resource Inventory Values for the Proposed Iron
14 Mountain SEZ and Surrounding Lands 9.2-186
15

16 9.2.14.2-1 Viewshed Analyses for the Proposed Iron Mountain SEZ and
17 Surrounding Lands, Assuming Solar Technology Heights
18 of 24.6 ft, 38 ft, 150 ft, and 650 ft..... 9.2-190
19

20 9.2.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto
21 Combined 650-ft and 24.6-ft Viewsheds for the Proposed Iron
22 Mountain SEZ..... 9.2-191
23

24 9.2.14.2-3 Google Earth Visualization of the Proposed Iron Mountain SEZ
25 and Surrounding Lands, with Power Tower Wireframe Models, as
26 Seen from Viewpoint within Joshua Tree National Park..... 9.2-196
27

28 9.2.14.2-4 Google Earth Visualization of the Proposed Iron Mountain SEZ
29 and Surrounding Lands, with Power Tower Wireframe Models, as
30 Seen from Viewpoint within the Big Maria Mountains WA 9.2-200
31

32 9.2.14.2-5 Google Earth Visualization of the Proposed Iron Mountain SEZ
33 and Surrounding Lands, with Power Tower Wireframe Models, as
34 Seen from Viewpoint within the Stepladder Mountains WA 9.2-202
35

36 9.2.14.2-6 Google Earth Visualization of the Proposed Iron Mountain SEZ and
37 Surrounding Lands, with Power Tower Wireframe Models, as Seen
38 from Viewpoint within the Sheephole Valley WA..... 9.2-206
39

40 9.2.14.2-7 Google Earth Visualization of the Proposed Iron Mountain SEZ and
41 Surrounding Lands, with Power Tower Wireframe Models, as Seen
42 from Viewpoint on Valley Floor within the Rice Valley WA..... 9.2-208
43

44 9.2.14.2-8 Google Earth Visualization of the Proposed Iron Mountain SEZ and
45 Surrounding Lands, with Power Tower Wireframe Models, as Seen
46 from an Elevated Viewpoint within the Rice Valley WA 9.2-210

FIGURES (Cont.)

1			
2			
3			
4	9.2.14.2-9	Google Earth Visualization of the Proposed Iron Mountain SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Granite Mountains in the Palen-McCoy WA.....	9.2-212
5			
6			
7			
8	9.2.14.2-10	Google Earth Visualization of the Proposed Iron Mountain SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Arica Mountains in the Palen-McCoy WA	9.2-214
9			
10			
11			
12	9.2.14.2-11	Google Earth Visualization of the Proposed Iron Mountain SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Granite Mountains Bajada in the Palen-McCoy WA.....	9.2-216
13			
14			
15			
16	9.2.14.2-12	Google Earth Visualization of the Proposed Iron Mountain SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Old Woman Mountains WA.....	9.2-219
17			
18			
19			
20	9.2.14.2-13	Google Earth Visualization of the Proposed Iron Mountain SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Southern Portion of the Old Woman Mountains WA.....	9.2-221
21			
22			
23			
24			
25	9.2.14.2-14	Google Earth Visualization of the Proposed Iron Mountain SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Western Portion of the Turtle Mountains WA	9.2-224
26			
27			
28			
29	9.2.14.2-15	Google Earth Visualization of the Proposed Iron Mountain SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Eastern Portion of the Turtle Mountains WA.....	9.2-226
30			
31			
32			
33	9.2.14.2-16	Google Earth Visualization of the Proposed Iron Mountain SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Ward Valley Floor in the Northern Portion of the Turtle Mountains WA.....	9.2-228
34			
35			
36			
37			
38	9.2.14.2-17	Areas within the Proposed Iron Mountain SEZ Affected by SEZ-Specific Distance-Based Visual Impact Design Features	9.2-235
39			
40			
41	9.2.20.1-1	Minority Population Groups within the 50-mi Radius Surrounding the Proposed Iron Mountain SEZ	9.2-296
42			
43			
44	9.2.20.1-2	Low-Income Population Groups within the 50-mi Radius Surrounding the Proposed Iron Mountain SEZ	9.2-297
45			
46			

FIGURES (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

9.2.21.1-1	Local Transportation Network Serving the Proposed Iron Mountain SEZ.....	9.2-300
9.2.22.2-1	Locations of Renewable Energy Proposals on Public Land within a 50-mi Radius of the Proposed Iron Mountain SEZ.....	9.2-309

TABLES

9.1.1.2-1	Proposed Imperial East SEZ—Development Acreages, Maximum Solar MW Output, Access Roads, and Transmission Line ROWs.....	9.1-4
9.1.1.3-1	Summary of Impacts of Solar Energy Development within the Proposed Imperial East SEZ and SEZ-Specific Design Features.....	9.1-6
9.1.7.1-1	Summary of Soil Map Units within the Proposed Imperial East SEZ.....	9.1-52
9.1.9.2-1	Estimated Water Requirements during the Peak Construction Year for the Proposed Imperial East SEZ.....	9.1-64
9.1.9.2-2	Estimated Water Requirements during Operations at Full Build-out Capacity at the Proposed Imperial East SEZ.....	9.1-65
9.1.10.1-1	Land Cover Types within the Potentially Affected Area of the Proposed Imperial East SEZ and Potential Impacts	9.1-74
9.1.10.1-2	Weed Species of the California Sonoran Desert Region	9.1-79
9.1.11.1-1	Representative Amphibians and Reptiles That Could Occur on or in the Affected Area of the Proposed Imperial East SEZ and Potential Impacts.....	9.1-85
9.1.11.2-1	Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Imperial East SEZ and Potential Impacts	9.1-92
9.1.11.3-1	Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Imperial East SEZ and Potential Impacts.....	9.1-107
9.1.12.1-1	Special Status Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Occur on or in the Affected Area of the Proposed Imperial East SEZ and Potential Impacts	9.1-122

TABLES (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

9.1.13.1-1	Annual Emissions of Criteria Pollutants and VOCs in Imperial County, California, Encompassing the Proposed Imperial East SEZ, 2002	9.1-164
9.1.13.1-2	NAAQS, CAAQS and Background Concentration Levels Representative of the Proposed Imperial East SEZ in Imperial County, California, 2004–2008.....	9.1-166
9.1.13.2-1	Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Imperial East SEZ	9.1-169
9.1.13.2-2	Annual Emissions from Combustion-Related Power Generation Displaced by Full Solar Development of the Proposed Imperial East SEZ.....	9.1-172
9.1.14.2-1	Selected Potentially Affected Sensitive Visual Resources within a 25-mi Viewshed of the Proposed Imperial East SEZ, Assuming a Viewshed Analysis Target Height of 650 ft	9.1-187
9.1.18-1	Federally Recognized Tribes with Traditional Ties to the Southeastern California SEZs	9.1-224
9.1.18.1-1	Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Imperial East SEZ	9.1-226
9.1.18.1-2	Animal Species Used by Native Americans Whose Range Includes the Proposed Imperial East SEZ	9.1-227
9.1.18.3-1	Federally Recognized Tribes Listed by the NAHC to Contact Regarding the Proposed Imperial East SEZ.....	9.1-230
9.1.19.1-1	ROI Employment in the Proposed Imperial East SEZ.....	9.1-231
9.1.19.1-2	ROI Employment in the Proposed Imperial East SEZ by Sector, 2006.....	9.1-232
9.1.19.1-3	ROI Unemployment Rates for the Proposed Imperial East SEZ.....	9.1-233
9.1.19.1-4	ROI Urban Population and Income for the Proposed Imperial East SEZ.....	9.1-234
9.1.19.1-5	ROI Population for the Proposed Imperial East SEZ	9.1-235

TABLES (Cont.)

1			
2			
3			
4	9.1.19.1-6	ROI Personal Income for the Proposed Imperial East SEZ.....	9.1-236
5			
6	9.1.19.1-7	ROI Housing Characteristics for the Proposed Imperial East SEZ	9.1-237
7			
8	9.1.19.1-8	ROI Local Government Organizations and Social Institutions in the	
9		Proposed Imperial East SEZ	9.1-238
10			
11	9.1.19.1-9	ROI School District Data for the Proposed Imperial East SEZ,	
12		2007.....	9.1-239
13			
14	9.1.19.1-10	Physicians in the Proposed Imperial East SEZ ROI, 2007	9.1-239
15			
16	9.1.19.1-11	Public Safety Employment in the Proposed Imperial East SEZ ROI	9.1-240
17			
18	9.1.19.1-12	County and ROI Crime Rates for the Proposed Imperial East	
19		SEZ ROI.....	9.1-241
20			
21	9.1.19.1-13	Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed	
22		Imperial East SEZ ROI	9.1-241
23			
24	9.1.19.1-14	ROI Recreation Sector Activity in the Proposed Imperial East	
25		SEZ, 2007	9.1-242
26			
27	9.1.19.2-1	ROI Socioeconomic Impacts Assuming Full Build-out of the	
28		Proposed Imperial East SEZ with Trough Facilities.....	9.1-246
29			
30	9.1.19.2-2	ROI Socioeconomic Impacts Assuming Full Build-out of the	
31		Imperial East SEZ with Power Tower Facilities.....	9.1-248
32			
33	9.1.19.2-3	ROI Socioeconomic Impacts Assuming Full Build-out of the	
34		Proposed Imperial East SEZ with Dish Engine Facilities	9.1-250
35			
36	9.1.19.2-4	ROI Socioeconomic Impacts Assuming Full Build-out of the	
37		Proposed Imperial East SEZ with PV Facilities	9.1-252
38			
39	9.1.20.1-1	Minority and Low-Income Populations within the 50-mi Radius	
40		Surrounding the Proposed Imperial East SEZ	9.1-257
41			
42	9.1.21.1-1	AADT on Major Roads near the Proposed Imperial East	
43		SEZ, 2008	9.1-263
44			
45	9.1.22.1-1	Geographic Extent of the Cumulative Impacts Analysis by	
46		Resource Area: Proposed Imperial East SEZ	9.1-266

TABLES (Cont.)

1

2

3

4 9.1.22.2-1 Reasonably Foreseeable Future Actions Related to Energy
5 Development and Distribution and Other Major Actions
6 near the Proposed Imperial East SEZ 9.1-268
7

8 9.1.22.2-2 Pending Renewable Energy Project ROW Applications on
9 BLM-Administered Land within 50 mi of the Proposed Imperial
10 East SEZ..... 9.1-273
11

12 9.1.22.2-3 ROI Population for the Proposed Imperial East SEZ 9.1-279
13

14 9.2.1.2-1 Proposed Iron Mountain SEZ—Assumed Development Acreages,
15 Maximum Solar MW Output, Access Roads, and Transmission
16 Line ROWs 9.2-4
17

18 9.2.1.3-1 Summary of Impacts of Solar Energy Development within the
19 Proposed Iron Mountain SEZ and SEZ-Specific Design Features 9.2-6
20

21 9.2.3.2-1 Specially Designated Areas Potentially within the Viewshed of
22 Solar Facilities within the Proposed Iron Mountain SEZ 9.2-28
23

24 9.2.7.1-1 Summary of Soil Series within the Proposed Iron Mountain SEZ 9.2-53
25

26 9.2.9.2-1 Estimated Water Requirements during the Peak Construction
27 Year for the Proposed Iron Mountain SEZ 9.2-65
28

29 9.2.9.2-2 Estimated Water Requirements during Operations at Full
30 Build-out Capacity at the Proposed Iron Mountain SEZ 9.2-67
31

32 9.2.10.1-1 Land Cover Types within the Potentially Affected Area of the
33 Proposed Iron Mountain SEZ and Potential Impacts..... 9.2-74
34

35 9.2.10.1-2 Problem Weeds of the Mojave Weed Management Area..... 9.2-77
36

37 9.2.11.1-1 Representative Amphibians and Reptiles That Could Occur on
38 or in the Affected Area of the Proposed Iron Mountain SEZ and
39 Potential Impacts..... 9.2-85
40

41 9.2.11.2-1 Representative Bird Species That Could Occur on or in the
42 Affected Area of the Proposed Iron Mountain SEZ and
43 Potential Impacts..... 9.2-93
44
45

TABLES (Cont.)

1

2

3

4 9.2.11.3-1 Representative Mammal Species That Could Occur on or in the

5 Affected Area of the Proposed Iron Mountain SEZ and Potential

6 Impacts..... 9.2-111

7

8 9.2.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special

9 Status Species That Could Be Affected by Solar Energy

10 Development on the Proposed Iron Mountain SEZ..... 9.2-126

11

12 9.2.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in San

13 Bernardino County, California, Encompassing the Proposed Iron

14 Mountain SEZ, 2002..... 9.2-172

15

16 9.2.13.1-2 NAAQS, CAAQS, and Background Concentration Levels

17 Representative of the Proposed Iron Mountain SEZ in San

18 Bernardino County, California, 2004–2008..... 9.2-174

19

20 9.2.13.2-1 Maximum Air Quality Impacts from Emissions Associated with

21 Construction Activities for the Proposed Iron Mountain SEZ..... 9.2-177

22

23 9.2.13.2-2 Annual Emissions from Combustion-Related Power Generation

24 Displaced by Full Solar Development of the Proposed Iron

25 Mountain SEZ..... 9.2-179

26

27 9.2.14.2-1 Selected Potentially Affected Sensitive Visual Resources within

28 25-mi Viewshed of the Proposed Iron Mountain SEZ, Assuming a

29 Target Height of 650 ft 9.2-194

30

31 9.2.14.3-1 VRM Management Class Objectives..... 9.2-233

32

33 9.2.18-1 Federally Recognized Tribes with Traditional Ties to the

34 Southeastern California SEZs 9.2-262

35

36 9.2.18.1-2 Plant Species Important to Native Americans Observed or Likely

37 To Be Present in the Proposed Iron Mountain SEZ..... 9.2-264

38

39 9.2.18.1-3 Animal Species Used by Native Americans Whose Range Includes

40 the Proposed Iron Mountain SEZ 9.2-265

41

42 9.2.18.3-1 Federally Recognized Tribes Listed by the NAHC to Contact

43 Regarding the Proposed Iron Mountain SEZ..... 9.2-268

44

45 9.2.19.1-1 ROI Employment in the Proposed Iron Mountain SEZ..... 9.2-269

46

TABLES (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

9.2.19.1-2	ROI Employment in the Proposed Iron Mountain SEZ by Sector, 2006	9.2-270
9.2.19.1-3	ROI Unemployment Rates for the Proposed Iron Mountain SEZ	9.2-271
9.2.19.1-4	ROI Urban Population and Income for the Proposed Iron Mountain SEZ.....	9.2-272
9.2.19.1-5	ROI Population for the Proposed Iron Mountain SEZ.....	9.2-274
9.2.19.1-6	ROI Personal Income for the Proposed Iron Mountain SEZ.....	9.2-275
9.2.19.1-7	ROI Housing Characteristics for the Proposed Iron Mountain SEZ.....	9.2-276
9.2.19.1-8	ROI Local Government Organizations and Social Institutions in the Proposed Iron Mountain SEZ	9.2-278
9.2.19.1-9	ROI School District Data for the Proposed Iron Mountain SEZ, 2007	9.2-279
9.2.19.1-10	Physicians in the Proposed Iron Mountain SEZ ROI, 2007	9.2-279
9.2.19.1-11	Public Safety Employment in the Proposed Iron Mountain SEZ ROI.....	9.2-279
9.2.19.1-12	County and ROI Crime Rates for the Proposed Iron Mountain SEZ	9.2-280
9.2.19.1-13	Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Iron Mountain SEZ ROI	9.2-281
9.2.19.1-14	Recreation Sector Activity in the Proposed Iron Mountain SEZ ROI, 2007.....	9.2-282
9.2.19.2-2	ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with Trough Facilities.....	9.2-285
9.2.19.2-3	ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with Power Tower Facilities.....	9.2-287
9.2.19.2-4	ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with Dish Engine Facilities.....	9.2-289

TABLES (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

9.2.19.2-5	ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with PV Facilities	9.2-291
9.2.20.1-1	Minority and Low-Income Populations within the 50-mi Radius Surrounding the Proposed Iron Mountain SEZ	9.2-295
9.2.21.1-1	AADT on Major Roads near the Proposed Iron Mountain SEZ, 2008.....	9.2-301
9.2.21.1-2	Airports Open to the Public in the Vicinity of the Iron Mountain SEZ....	9.2-302
9.2.22.1-1	Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Iron Mountain SEZ	9.2-306
9.2.22.2-1	Reasonably Foreseeable Future Actions Related to Energy Development and Distribution and Other Major Actions near the Proposed Iron Mountain SEZ	9.2-308
9.2.22.2-2	Pending Renewable Energy Project ROW Applications on BLM-Administered Land within 50 mi of the Proposed Iron Mountain SEZ.....	9.2-314
9.2.22.3-1	ROI Population for the Proposed Iron Mountain SEZ.....	9.2-318

1
2
3
4
5
6
7
8
9
10
11
12
13
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NOTATION

The following is a list of acronyms and abbreviations, chemical names, and units of measure used in this document. Some acronyms used only in tables may be defined only in those tables.

GENERAL ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
AC	alternating current
ACC	air-cooled condenser
ACEC	Area of Critical Environmental Concern
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AERMOD	AMS/EPA Regulatory Model
AFC	Application for Certification
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AMA	active management area
AML	animal management level
ANHP	Arizona National Heritage Program
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
AQCR	Air Quality Control Region
AQRV	air quality-related value
ARB	Air Resources Board
ARRA	American Recovery and Reinvestment Act of 2009
ARRTIS	Arizona Renewable Resource and Transmission Identification Subcommittee
ARS	Agricultural Research Service
ARZC	Arizona and California
ATSDR	Agency for Toxic Substances and Disease Registry
AUM	animal unit month
AVWS	Audio Visual Warning System
AWBA	Arizona Water Banking Authority
AWEA	American Wind Energy Association
AWRM	Active Water Resource Management
AZ DOT	Arizona Department of Transportation
AZDA	Arizona Department of Agriculture
AZGFD	Arizona Game and Fish Department
AZGS	Arizona Geological Survey

1	BA	biological assessment
2	BAP	base annual production
3	BEA	Bureau of Economic Analysis
4	BISON-M	Biota Information System of New Mexico
5	BLM	Bureau of Land Management
6	BMP	best management practice
7	BNSF	Burlington Northern Santa Fe
8	BO	biological opinion
9	BOR	U.S. Bureau of Reclamation
10	BPA	Bonneville Power Administration
11	BRAC	Blue Ribbon Advisory Council on Climate Change
12	BSE	Beacon Solar Energy
13	BSEP	Beacon Solar Energy Project
14	BTS	Bureau of Transportation Statistics
15		
16	CAA	Clean Air Act
17	CAAQS	California Air Quality Standards
18	Caltrans	California Department of Transportation
19	C-AMA	California-Arizona Maneuver Area
20	CAP	Central Arizona Project
21	CARB	California Air Resources Board
22	CAReGAP	California Regional Gap Analysis Project
23	CASQA	California Stormwater Quality Association
24	CASTNET	Clean Air Status and Trends NETwork
25	CAWA	Colorado Agricultural Water Alliance
26	CCC	Civilian Conservation Corps
27	CDC	Centers for Disease Control and Prevention
28	CDCA	California Desert Conservation Area
29	CDFG	California Department of Fish and Game
30	CDOT	Colorado Department of Transportation
31	CDOW	Colorado Division of Wildlife
32	CDPHE	Colorado Department of Public Health and Environment
33	CDWR	California Department of Water Resources
34	CEC	California Energy Commission
35	CEQ	Council on Environmental Quality
36	CES	constant elasticity of substitution
37	CESA	California Endangered Species Act
38	CESF	Carrizo Energy Solar Farm
39	CFR	<i>Code of Federal Regulations</i>
40	CGE	computable general equilibrium
41	CIRA	Cooperative Institute for Research in the Atmosphere
42	CLFR	compact linear Fresnel collector
43	CPC	Center for Plant Conservation
44	CNDDDB	California Natural Diversity Database
45	CNEL	community noise equivalent level
46	CNHP	Colorado National Heritage Program

1	Colorado DWR	Colorado Department of Water Resources
2	CPUC	California Public Utilities Commission
3	CPV	concentrating photovoltaic
4	CRBSCF	Colorado River Basin Salinity Control Forum
5	CREZ	competitive renewable energy zone
6	CRSCP	Colorado River Salinity Control Program
7	CSA	Candidate Study Area
8	CSC	Coastal Services Center
9	CSFG	carbon-sequestration fossil generation
10	CSP	concentrating solar power
11	CSQA	California Stormwater Quality Association
12	CSRI	Cultural Systems Research, Incorporated
13	CTG	combustion turbine generator
14	CTPG	California Transmission Planning Group
15	CTSR	Cumbres & Toltec Scenic Railroad
16	CUP	Conditional Use Permit
17	CVP	Central Valley Project
18	CWA	Clean Water Act
19	CWCB	Colorado Water Conservation Board
20	CWHR	California Wildlife Habitat Relationship System
21		
22	DC	direct current
23	DHS	U.S. Department of Homeland Security
24	DNA	Determination of NEPA Adequacy
25	DNI	direct normal insulation
26	DNL	day-night average sound level
27	DoD	U.S. Department of Defense
28	DOE	U.S. Department of Energy
29	DOI	U.S. Department of the Interior
30	DOL	U.S. Department of Labor
31	DOT	U.S. Department of Transportation
32	DRECP	California Desert Renewable Energy Conservation Plan
33	DSM	demand side management
34	DTC/C-AMA	Desert Training Center/California–Arizona Maneuver Area
35	DWMA	Desert Wildlife Management Area
36		
37	EA	environmental assessment
38	ECAR	East Central Area Reliability Coordination Agreement
39	ECOS	Environmental Conservation Online System (USFWS)
40	EERE	Energy Efficiency and Renewable Energy (DOE)
41	Eg	band gap energy
42	EIA	Energy Information Administration
43	EIS	environmental impact statement
44	EISA	Energy Independence and Security Act of 2007
45	EMF	electromagnetic field
46	E.O.	Executive Order

1	EPA	U.S. Environmental Protection Agency
2	EPRI	Electric Power Research Institute
3	EQIP	Environmental Quality Incentives Program
4	ERCOT	Electric Reliability Council of Texas
5	ERO	Electric Reliability Organization
6	ERS	Economic Research Service
7	ESA	Endangered Species Act of 1973
8	ESRI	Environmental Systems Research Institute
9		
10	FAA	Federal Aviation Administration
11	FBI	Federal Bureau of Investigation
12	FEMA	Federal Emergency Management Agency
13	FERC	Federal Energy Regulatory Commission
14	FHWA	Federal Highway Administration
15	FIRM	Flood Insurance Rate Map
16	FLPMA	Federal Land Policy and Management Act of 1976
17	FONSI	Finding of No Significant Impact
18	FR	<i>Federal Register</i>
19	FRCC	Florida Reliability Coordinating Council
20	FSA	Final Staff Assessment
21	FTE	full-time equivalent
22	FY	fiscal year
23		
24	G&TM	Generation and Transmission Modeling
25	GCRP	U.S. Global Climate Research Program
26	GDA	generation development area
27	GHG	greenhouse gas
28	GIS	geographic information system
29	GPS	global positioning system
30	GTM	Generation and Transmission Model
31	GUAC	Groundwater Users Advisory Council
32	GWP	global warming potential
33		
34	HA	herd area
35	HAP	hazardous air pollutant
36	HAZCOM	hazard communication
37	HCE	heat collection element
38	HCP	Habitat Conservation Plan
39	HMA	Herd Management Area
40	HMMH	Harris Miller Miller & Hanson, Inc.
41	HRSG	heat recovery steam generator
42	HSPD	Homeland Security Presidential Directive
43	HTF	heat transfer fluid
44	HVAC	heating, ventilation, and air-conditioning
45		
46		

1	I	Interstate
2	IARC	International Agency for Research on Cancer
3	IBA	important bird area
4	ICE	internal combustion engine
5	ICWMA	Imperial County Weed Management Area
6	IEC	International Electrochemical Commission
7	IFR	instrument flight rule
8	IID	Imperial Irrigation District
9	IM	Instruction Memorandum
10	IMPS	Iron Mountain Pumping Station
11	IMS	interim mitigation strategy
12	INA	Irrigation Non-Expansion Area
13	IOP	Interagency Operating Procedure
14	IOU	investor-owned utility
15	IPPC	Intergovernmental Panel on Climate Change
16	ISA	Independent Science Advisor; Instant Study Area
17	ISB	Intermontane Seismic Belt
18	ISCC	integrated solar combined cycle
19	ISDRA	Imperial Sand Dunes Recreation Area
20	ISEGS	Ivanpah Solar Energy Generating System
21	ITP	incidental take permit
22	IUCNNR	International Union for Conservation of Nature and Natural Resources
23	IUCNP	International Union for Conservation of Nature Pakistan
24		
25	KGA	known geothermal resources area
26	KML	keyhole markup language
27	KOP	key observation point
28	KSLA	known sodium leasing area
29		
30	LCC	Landscape Conservation Cooperative
31	LCOE	levelized cost of energy
32	L _{dn}	day-night average sound level
33	LDWMA	Low Desert Weed Management Area
34	L _{eq}	equivalent sound pressure level
35	LLA	limited land available
36	LLRW	low-level radioactive waste (waste classification)
37	LRG	Lower Rio Grande
38	LSA	lake and streambed alteration
39	LSE	load-serving entity
40	LTVA	long-term visitor area
41		
42	MAAC	Mid-Atlantic Area Council
43	MAIN	Mid-Atlantic Interconnected Network
44	MAPP	methyl acetylene propadiene stabilizer; Mid-Continent Area Power Pool
45	MCAS	Marine Corps Air Station
46	MCL	maximum contaminant level

1	MFP	Management Framework Plan
2	MIG	Minnesota IMPLAN Group
3	MLA	maximum land available
4	MOA	military operating area
5	MOU	Memorandum of Understanding
6	MPDS	maximum potential development scenario
7	MRA	Multiple Resource Area
8	MRI	Midwest Research Institute
9	MRO	Midwest Reliability Organization
10	MSDS	Material Safety Data Sheet
11	MSL	mean sea level
12	MTR	military training route
13	MWA	Mojave Water Agency
14	MWD	Metropolitan Water District
15	MWMA	Mojave Weed Management Area
16		
17	NAAQS	National Ambient Air Quality Standards
18	NADP	National Atmospheric Deposition Program
19	NAGPRA	Native American Graves Protection and Repatriation Act
20	NAHC	Native American Heritage Commission (California)
21	NAIC	North American Industrial Classification System
22	NASA	National Aeronautics and Space Administration
23	NCA	National Conservation Area
24	NCCAC	Nevada Climate Change Advisory Committee
25	NCDC	National Climatic Data Center
26	NCES	National Center for Education Statistics
27	NDCNR	Nevada Department of Conservation and Natural Resources
28	NDEP	Nevada Division of Environmental Protection
29	NDOT	Nevada Department of Transportation
30	NDOW	Nevada Department of Wildlife
31	NDWP	Nevada Division of Water Planning
32	NDWR	Nevada Division of Water Resources
33	NEAP	Natural Events Action Plan
34	NEC	National Electric Code
35	NED	National Elevation Database
36	NEP	Natural Events Policy
37	NEPA	National Environmental Policy Act of 1969
38	NERC	North American Electricity Reliability Corporation
39	NHA	National Heritage Area
40	NHNM	National Heritage New Mexico
41	NHPA	National Historic Preservation Act of 1966
42	NID	National Inventory of Dams
43	NM DOT	New Mexico Department of Transportation
44	NLCS	National Landscape Conservation System
45	NMAC	<i>New Mexico Administrative Code</i>
46	NMBGMR	New Mexico Bureau of Geology and Mineral Resources

1	NMDGF	New Mexico Department of Game and Fish
2	NMED	New Mexico Environment Department
3	NMED-AQB	New Mexico Environment Department-Air Quality Board
4	NMFS	National Marine Fisheries Service
5	NMOSE	New Mexico Office of the State Engineer
6	NMSU	New Mexico State University
7	NNHP	Nevada Natural Heritage Program
8	NNL	National Natural Landmark
9	NNSA	National Nuclear Security Administration
10	NOA	Notice of Availability
11	NOAA	National Oceanic and Atmospheric Administration
12	NOI	Notice of Intent
13	NPDES	National Pollutant Discharge Elimination System
14	NP	National Park
15	NPL	National Priorities List
16	NPS	National Park Service
17	NRA	National Recreation Area
18	NRCS	Natural Resources Conservation Service
19	NREL	National Renewable Energy Laboratory
20	NRHP	<i>National Register of Historic Places</i>
21	NRS	<i>Nevada Revised Statutes</i>
22	NSC	National Safety Council
23	NSO	no surface occupancy
24	NSTC	National Science and Technology Council
25	NTS	Nevada Test Site
26	NTTR	Nevada Test and Training Range
27	NVCRS	Nevada Cultural Resources Inventory System
28	NV DOT	Nevada Department of Transportation
29	NWCC	National Wind Coordinating Committee
30	NWI	National Wetlands Inventory
31	NWPP	Northwest Power Pool
32	NWR	National Wildlife Refuge
33	NWSRS	National Scenic River System
34		
35	O&M	operation and maintenance
36	ODFW	Oregon Department of Fish and Wildlife
37	OHV	off-highway vehicle
38	ONA	Outstanding Natural Area
39	ORC	organic Rankine cycle
40	OSE/ISC	Office of the State Engineer/Interstate Stream Commission
41	OSHA	Occupational Safety and Health Administration
42	OTA	Office of Technology Assessment
43		
44	PA	Programmatic Agreement
45	PAD	Preliminary Application Document
46	PAH	polycyclic aromatic hydrocarbon

1	PAT	peer analysis tool
2	PCB	polychlorinated biphenyl
3	PCM	purchase change material
4	PCS	power conditioning system
5	PCU	power converting unit
6	PEIS	programmatic environmental impact statement
7	PFYC	potential fossil yield classification
8	PIER	Public Interest Energy Research
9	P.L.	Public Law
10	PLSS	Public Land Survey System
11	PM	particulate matter
12	PM _{2.5}	particulate matter with a mean aerodynamic diameter of 2.5 µm or less
13	PM ₁₀	particulate matter with a mean aerodynamic diameter of 10 µm or less
14	POD	plan of development
15	POU	publicly owned utility
16	PPA	Power Purchase Agreement
17	PPE	personal protective equipment
18	PSD	Prevention of Significant Deterioration
19	PURPA	Public Utility Regulatory Policy Act
20	PV	photovoltaic
21	PVID	Palo Verde Irrigation District
22	PWR	public water reserve
23		
24	QRA	qualified resource area
25		
26	R&I	relevance and importance
27	RCI	residential, commercial, and industrial (sector)
28	RCRA	Resource Conservation and Recovery Act of 1976
29	RD&D	research, development, and demonstration; research, development, and
30		deployment
31	RDBMS	Relational Database Management System
32	RDEP	Restoration Design Energy Project
33	REA	Rapid Ecoregional Assessment
34	REAT	Renewable Energy Action Team
35	REDI	Renewable Energy Development Infrastructure
36	ReEDS	Regional Energy Deployment System
37	REPG	Renewable Energy Policy Group
38	RETA	Renewable Energy Transmission Authority
39	RETAAC	Renewable Energy Transmission Access Advisory Committee
40	RETI	Renewable Energy Transmission Initiative
41	REZ	renewable energy zone
42	RF	radio frequency
43	RFC	Reliability First Corporation
44	RFDS	reasonably foreseeable development scenario
45	RGP	Rio Grande Project
46	RGWCD	Rio Grande Water Conservation District

1	RMP	Resource Management Plan
2	RMPA	Rocky Mountain Power Area
3	RMZ	Resource Management Zone
4	ROD	Record of Decision
5	ROI	region of influence
6	ROS	recreation opportunity spectrum
7	ROW	right-of-way
8	RPG	renewable portfolio goal
9	RPS	Renewable Portfolio Standard
10	RRC	Regional Reliability Council
11	RSEP	Rice Solar Energy Project
12	RSI	Renewable Systems Interconnection
13	RTTF	Renewable Transmission Task Force
14	RV	recreational vehicle
15		
16	SAAQS	State Ambient Air Quality Standards
17	SAMHSA	Substance Abuse and Mental Health Services Administration
18	SCADA	supervisory control and data acquisition
19	SCE	Southern California Edison
20	SCRMA	Special Cultural Resource Management Area
21	SDRREG	San Diego Regional Renewable Energy Group
22	SDWA	Safe Drinking Water Act of 1974
23	SEGIS	Solar Energy Grid Integration System
24	SEGS	Solar Energy Generating System
25	SEI	Sustainable Energy Ireland
26	SEIA	Solar Energy Industrial Association
27	SES	Stirling Energy Systems
28	SETP	Solar Energy Technologies Program (DOE)
29	SEZ	solar energy zone
30	SHPO	State Historic Preservation Office(r)
31	SIP	State Implementation Plan
32	SLRG	San Luis & Rio Grande
33	SMA	Special Management Area
34	SMP	suggested management practice
35	SNWA	Southern Nevada Water Authority
36	SPP	Southwest Power Pool
37	SRMA	Special Recreation Management Area
38	SSA	Socorro Seismic Anomaly
39	SSI	self-supplied industry
40	ST	solar thermal
41	STG	steam turbine generator
42	SUA	special use airspace
43	SWAT	Southwest Area Transmission
44	SWIP	Southwest Intertie Project
45	SWPPP	Stormwater Pollution Prevention Plan
46	SWReGAP	Southwest Regional Gap Analysis Project
47		

1	TAP	toxic air pollutant
2	TCC	Transmission Corridor Committee
3	TDS	total dissolved solids
4	TEPPC	Transmission Expansion Planning Policy Committee
5	TES	thermal energy storage
6	TSA	Transportation Security Administration
7	TSCA	Toxic Substances Control Act of 1976
8	TSDF	treatment, storage, and disposal facility
9	TSP	total suspended particulates
10		
11	UACD	Utah Association of Conservation Districts
12	UBWR	Utah Board of Water Resources
13	UDA	Utah Department of Agriculture
14	UDEQ	Utah Department of Environmental Quality
15	UDNR	Utah Department of Natural Resources
16	UDOT	Utah Department of Transportation
17	UDWQ	Utah Division of Water Quality
18	UDWR	Utah Division of Wildlife Resources
19	UGS	Utah Geological Survey
20	UNEP	United Nations Environmental Programme
21	UNPS	Utah Native Plant Society
22	UP	Union Pacific
23	UREZ	Utah Renewable Energy Zone
24	USACE	U.S. Army Corps of Engineers
25	USC	<i>United States Code</i>
26	USDA	U.S. Department of Agriculture
27	USFS	U.S. Forest Service
28	USFWS	U.S. Fish and Wildlife Service
29	USGS	U.S. Geological Survey
30	Utah DWR	Utah Division of Water Rights
31	UTTR	Utah Test and Training Range
32	UWS	Underground Water Storage, Savings and Replenishment Act
33		
34	VACAR	Virginia-Carolinas Subregion
35	VCRS	Visual Contrast Rating System
36	VFR	visual flight rule
37	VOC	volatile organic compound
38	VRI	Visual Resource Inventory
39	VRM	Visual Resource Management
40		
41	WA	Wilderness Area
42	WAPA	Western Area Power Administration
43	WECC	Western Electricity Coordinating Council
44	WECC CAN	Western Electricity Coordinating Council – Canada
45	WEG	wind erodibility group
46	WGA	Western Governors’ Association

1	WGFD	Wyoming Game and Fish Department
2	WHA	wildlife habitat area
3	WHO	World Health Organization
4	WRAP	Water Resources Allocation Program; Western Regional Air Partnership
5	WRCC	Western Regional Climate Center
6	WREZ	Western Renewable Energy Zones
7	WRI	Water Resources Research Institute
8	WSA	Wilderness Study Area
9	WSC	wildlife species of special concern
10	WSMR	White Sands Missile Range
11	WSR	Wild and Scenic River
12	WSRA	Wild and Scenic Rivers Act of 1968
13	WWII	World War II
14		
15	YPG	Yuma Proving Ground
16		
17	ZITA	zone identification and technical analysis
18	ZLD	zero liquid discharge
19		
20		

21 **CHEMICALS**

23	CH ₄	methane	NO ₂	nitrogen dioxide
24	CO	carbon monoxide	NO _x	nitrogen oxides
25	CO ₂	carbon dioxide		
26	CO _{2e}	carbon dioxide equivalent	O ₃	ozone
27				
28	H ₂ S	hydrogen sulfide	Pb	lead
29	Hg	mercury		
30			SF ₆	sulfur hexafluoride
31	N ₂ O	nitrous oxide	SO ₂	sulfur dioxide
32	NH ₃	ammonia	SO _x	sulfur oxides
33				

35 **UNITS OF MEASURE**

37	ac-ft	acre-foot (feet)	°F	degree(s) Fahrenheit
38	bhp	brake horsepower	ft	foot (feet)
39			ft ²	square foot (feet)
40	°C	degree(s) Celsius	ft ³	cubic foot (feet)
41	cf	cubic foot (feet)		
42	cfs	cubic foot (feet) per second	g	gram(s)
43	cm	centimeter(s)	gal	gallon(s)
44			GJ	gigajoule(s)
45	dB	decibel(s)	gpcd	gallon per capita per day
46	dba	A-weighted decibel(s)	gpd	gallon(s) per day

1	gpm	gallon(s) per minute	Mgal	million gallons
2	GW	gigawatt(s)	mi	mile(s)
3	GWh	gigawatt hour(s)	mi ²	square mile(s)
4	GWh/yr	gigawatt hour(s) per year	min	minute(s)
5			mm	millimeter(s)
6	h	hour(s)	MMt	million metric ton(s)
7	ha	hectare(s)	MPa	megapascal(s)
8	Hz	hertz	mph	mile(s) per hour
9			MW	megawatt(s)
10	in.	inch(es)	MWe	megawatt(s) electric
11			MWh	megawatt-hour(s)
12	J	joule(s)		
13			ppm	part(s) per million
14	K	degree(s) Kelvin	psi	pound(s) per square inch
15	kcal	kilocalorie(s)	psia	pound(s) per square inch absolute
16	kg	kilogram(s)		
17	kHz	kilohertz	rpm	rotation(s) per minute
18	km	kilometer(s)		
19	km ²	square kilometer(s)	s	second(s)
20	kPa	kilopascal(s)	scf	standard cubic foot (feet)
21	kV	kilovolt(s)		
22	kVA	kilovolt-ampere(s)	TWh	terawatt hours
23	kW	kilowatt(s)		
24	kWh	kilowatt-hour(s)	VdB	vibration velocity decibel(s)
25	kWp	kilowatt peak		
26			W	watt(s)
27	L	liter(s)		
28	lb	pound(s)	yd ²	square yard(s)
29			yd ³	cubic yard(s)
30	m	meter(s)	yr	year(s)
31	m ²	square meter(s)		
32	m ³	cubic meter(s)	µg	microgram(s)
33	mg	milligram(s)	µm	micrometer(s)

ENGLISH/METRIC AND METRIC/ENGLISH EQUIVALENTS

The following table lists the appropriate equivalents for English and metric units.

Multiply	By	To Obtain
<i>English/Metric Equivalents</i>		
acres	0.004047	square kilometers (km ²)
acre-feet (ac-ft)	1,234	cubic meters (m ³)
cubic feet (ft ³)	0.02832	cubic meters (m ³)
cubic yards (yd ³)	0.7646	cubic meters (m ³)
degrees Fahrenheit (°F) -32	0.5555	degrees Celsius (°C)
feet (ft)	0.3048	meters (m)
gallons (gal)	3.785	liters (L)
gallons (gal)	0.003785	cubic meters (m ³)
inches (in.)	2.540	centimeters (cm)
miles (mi)	1.609	kilometers (km)
miles per hour (mph)	1.609	kilometers per hour (kph)
pounds (lb)	0.4536	kilograms (kg)
short tons (tons)	907.2	kilograms (kg)
short tons (tons)	0.9072	metric tons (t)
square feet (ft ²)	0.09290	square meters (m ²)
square yards (yd ²)	0.8361	square meters (m ²)
square miles (mi ²)	2.590	square kilometers (km ²)
yards (yd)	0.9144	meters (m)
<i>Metric/English Equivalents</i>		
centimeters (cm)	0.3937	inches (in.)
cubic meters (m ³)	0.00081	acre-feet (ac-ft)
cubic meters (m ³)	35.31	cubic feet (ft ³)
cubic meters (m ³)	1.308	cubic yards (yd ³)
cubic meters (m ³)	264.2	gallons (gal)
degrees Celsius (°C) +17.78	1.8	degrees Fahrenheit (°F)
hectares (ha)	2.471	acres
kilograms (kg)	2.205	pounds (lb)
kilograms (kg)	0.001102	short tons (tons)
kilometers (km)	0.6214	miles (mi)
kilometers per hour (kph)	0.6214	miles per hour (mph)
liters (L)	0.2642	gallons (gal)
meters (m)	3.281	feet (ft)
meters (m)	1.094	yards (yd)
metric tons (t)	1.102	short tons (tons)
square kilometers (km ²)	247.1	acres
square kilometers (km ²)	0.3861	square miles (mi ²)
square meters (m ²)	10.76	square feet (ft ²)
square meters (m ²)	1.196	square yards (yd ²)

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1 **9 AFFECTED ENVIRONMENT AND IMPACT ASSESSMENT FOR**
2 **PROPOSED SOLAR ENERGY ZONES IN CALIFORNIA**

3
4
5 **9.1 IMPERIAL EAST**

6
7
8 **9.1.1 Background and Summary of Impacts**

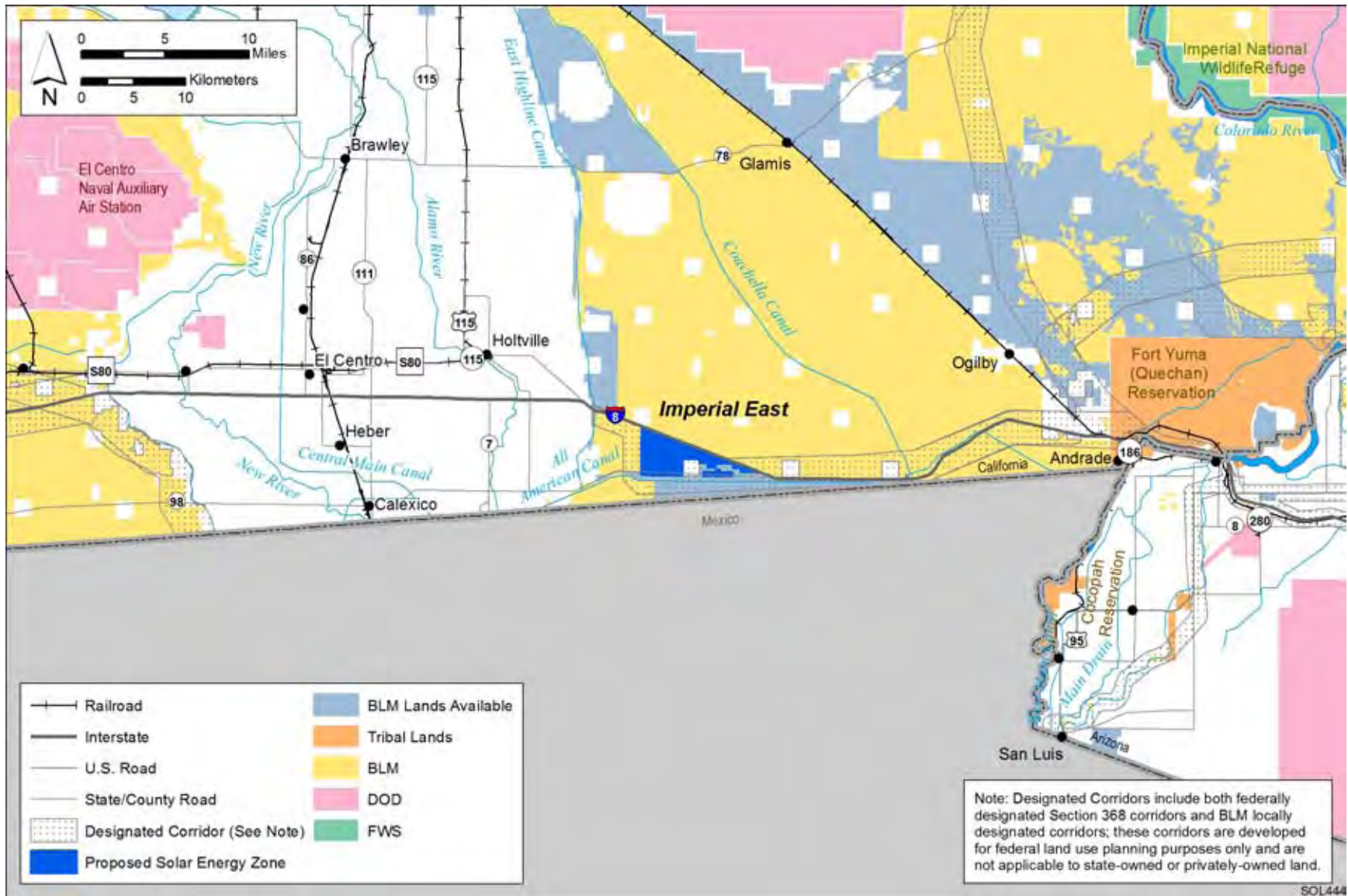
9
10
11 **9.1.1.1 General Information**

12
13 The proposed Imperial East solar energy zone (SEZ) has a total area of 5,722 acres
14 (23.2 km²) and is located in Imperial County in southeastern California, near the United States–
15 Mexico border (Figure 9.1.1.1-1). In 2008, the Imperial County population was 180,493, while
16 the two-county region—Imperial County and Yuma County, Arizona—surrounding the SEZ had
17 a total population of 387,798. Calexico (38,344) is located about 15 mi (24 km) to the west along
18 State Route 98, and El Centro (40,083) lies 19 mi (31 km) to the west along Interstate 8 (I-8) in
19 Imperial County. I-8 runs east–west along the northeast edge of the proposed SEZ, while State
20 Route 98, a two-lane highway, passes through the southern edge. San Diego lies 120 mi
21 (194 km) to the west, and Yuma, 29 mi (47 km) to the east via I-8. A branch line of the Union
22 Pacific Railroad (UP) serves Calexico and El Centro. Four small public airports lie within 34 mi
23 (55 km) of the proposed SEZ.

24
25 A 115-kV transmission line intersects the southwest corner of the SEZ, and a 500-kV line
26 is located about 0.4 mi (0.6 km) to the south, running east–west. It is assumed that the existing
27 115-kV transmission line could potentially provide access from the SEZ to the transmission grid
28 (see Section 9.1.1.2).

29
30 As of February 2010, two solar project applications were pending in the SEZ
31 (Resseguie 2010). Active pending solar lease applications within the SEZ are described in
32 Section 9.1.22 and are shown in Figure 9.1.22.2-1; the entire SEZ area is included in the lease
33 application areas. There is an operating geothermal plant about 3 mi (2.4 km) northwest of the
34 SEZ.

35
36 The proposed Imperial East SEZ lies in the East Mesa, which consists of gravel flats
37 within the California Desert Conservation Area (CDCA) within the Sonoran Desert. Surface
38 elevations range from 75 to 120 ft (22.9 to 36.6 m). Scrubland vegetation reflects the arid
39 climate, which produces an annual average rainfall of about 3 to 4 in. (7.6 to 10.2 cm). The
40 Imperial Valley groundwater basin underlies the area. The All-American Canal runs parallel to
41 the southern boundary of the SEZ, about 0.3 mi (0.5 km) from the boundary. Two hydropower
42 facilities exist along the canal, along with associated dams and substations. Little commercial or
43 industrial activity exists in the surrounding area, while agricultural areas lie about 3 mi (5 km)
44 to the west of the SEZ, across the border in Mexico. The Lake Cahuilla Area of Critical
45 Environmental Concern (ACEC), protected for its prehistoric resources, is located adjacent to the
46 western boundary of the SEZ. The East Mesa ACEC, protected for both wildlife habitat and
47 prehistoric resources, is located on the northeast boundary. The Imperial Sand Dunes Recreation



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FIGURE 9.1.1.1-1 Proposed Imperial East SEZ

1 Area (ISDRA) and National Natural Landmark (NNL), with its northern section protected in the
2 North Algodones ACEC and Wilderness Area (WA), is located approximately 8 mi (12.9 km)
3 east-northeast of the SEZ; this is the largest mass of sand dunes in California (BLM 2010a).
4

5 The proposed Imperial East SEZ and other relevant information are shown in
6 Figure 9.1.1.1-1. The criteria used to identify the SEZ as an appropriate location for solar
7 development included proximity to existing transmission lines or designated corridors, proximity
8 to existing roads, a slope of generally less than 2%, and an area of more than 2,500 acres
9 (10 km²). In addition, the area was identified as being relatively free of other types of conflicts,
10 such as USFWS-designated critical habitat for threatened and endangered species, Areas of
11 Critical Environmental Concern (ACECs), Special Recreation Management Areas (SRMAs),
12 and National Landscape Conservation System (NLCS) lands (see Section 2.2.2.2 for
13 the complete list of exclusions). Although these classes of restricted lands were excluded from
14 the proposed Imperial East SEZ, other restrictions might be appropriate. The analyses in the
15 following sections evaluate the affected environment and potential impacts associated with
16 utility-scale solar energy development in the proposed SEZ for important environmental,
17 cultural, and socioeconomic resources.
18

19 As initially announced in the *Federal Register* on June 30, 2009, the proposed Imperial
20 East SEZ encompassed 12,830 acres (52 km²). Subsequent to the study area scoping period, the
21 Imperial East boundaries were changed substantially to exclude lands along the All-American
22 Canal that are currently administered by the U.S. Bureau of Reclamation (BOR). The revised
23 SEZ is approximately 7,108 acres (29 km²) smaller than the original SEZ area as published in
24 June 2009.
25
26

27 **9.1.1.2 Development Assumptions for the Impact Analysis**

28
29 Maximum development of the proposed Imperial East SEZ was assumed to be 80% of
30 the total SEZ area over a period of 20 years, a maximum of 4,578 acres (18.5 km²). These values
31 are shown in Table 9.1.1.2-1, along with other development assumptions. Full development
32 of the Imperial East SEZ would allow development of facilities with an estimated total of
33 509 MW of electrical power capacity if power tower, dish engine, or photovoltaic (PV)
34 technologies were used, assuming 9 acres/MW (0.04 km²/MW) of land required, and an
35 estimated 916 MW of power if solar trough technologies were used, assuming 5 acres/MW
36 (0.02 km²/MW) of land required.
37

38 Availability of transmission from SEZs to load centers will be an important consideration
39 for future development in SEZs. The nearest existing transmission line is a 115-kV line adjacent
40 to the SEZ. It is possible that this existing line could be used to provide access from the SEZ to
41 the transmission grid, but the 115-kV capacity of that line would be inadequate for 509 to
42 916 MW of new capacity (note: a 500-kV line can accommodate approximately the load of one
43 700-MW facility). At full build-out capacity, it is clear that new transmission lines and/or
44 upgrades of existing transmission lines would be required to bring electricity from the proposed
45 Imperial East SEZ to load centers; however, at this time the location and size of such new
46 transmission facilities are unknown. Generic impacts of transmission and associated

TABLE 9.1.1.2-1 Proposed Imperial East SEZ—Development Acreages, Maximum Solar MW Output, Access Roads, and Transmission Line ROWs

Total Acreage and Assumed Developed Acreage (80% of Total)	Assumed Maximum SEZ Output for Various Solar Technologies	Distance to Nearest State, U.S., or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Transmission Line ROW and Road ROW	Distance to Nearest Designated Transmission Corridor ^d
5,722 acres and 4,578 acres ^a	509 MW ^b 916 MW ^c	Adjacent (State Route 98)	Within SEZ, and 1151 kV	0 acres and 0 acres	Crosses SEZ ^e

- ^a To convert acres to km², multiply by 0.004047.
- ^b Maximum power output if the SEZ were fully developed using power tower, dish engine, or PV technologies, assuming 9 acres/MW (0.04 km²/MW) of land required.
- ^c Maximum power output if the SEZ were fully developed using solar trough technologies, assuming 5 acres/MW (0.02 km²/MW) of land required.
- ^d BLM-designated corridors are developed for federal land use planning purposes only and are not applicable to state-owned or privately owned land.
- ^e A Section 368 federally designated 2-mi (3.2-km) wide energy corridor crosses the SEZ.

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infrastructure construction and of line upgrades for various resources are discussed in Chapter 5. Project-specific analyses would need to identify the specific impacts of new transmission construction and line upgrades for any projects proposed within the SEZ.

For the purposes of analysis in this PEIS, it was assumed that the existing 115-kV transmission line that intersects the southwest corner of the SEZ could provide access to the transmission grid, and thus no additional acreage disturbance for transmission line access was assessed. Access to the existing transmission line was assumed, without additional information on whether this line would be available for connection of future solar facilities. If a connecting transmission line were constructed in the future to connect facilities within the SEZ to a different off-site grid location from the one assumed here, site developers would need to determine the impacts from construction and operation of that line. In addition, developers would need to determine the impacts of line upgrades if they were needed.

Existing road access to the proposed Imperial East SEZ should be adequate to support construction and operation of solar facilities, because State Route 98 passes along the southern edge of the SEZ (although I-8 also runs along the northern boundary of the SEZ, no access to the SEZ from the interstate is available). Because of the site access provided by State Route 98, no additional road construction outside of the SEZ is assumed to be required to support solar development.

1 **9.1.1.3 Summary of Major Impacts and SEZ-Specific Design Features**
2

3 In this section, the impacts and SEZ-specific design features assessed in
4 Sections 9.1.2 through 9.1.21 for the proposed Imperial East SEZ are summarized in tabular
5 form. Table 9.1.1.3-1 is a comprehensive list of the impacts discussed in these sections; the
6 reader may reference the applicable sections for detailed support of the impact assessment.
7 Section 9.1.22 discusses potential cumulative impacts from solar energy development in the
8 proposed SEZ.
9

10 Only those design features specific to the Imperial East SEZ are included in
11 Sections 9.1.2 through 9.1.21 and in the summary table. The detailed programmatic design
12 features for each resource area to be required under BLM’s Solar Energy Program are presented
13 in Appendix A, Section A.2.2. These programmatic design features would also be required for
14 development in this and other SEZs.
15

TABLE 9.1.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Imperial East SEZ and SEZ-Specific Design Features^a

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the SEZ for utility-scale solar energy production (80% of the total area) could disturb up to 4,578 acres (18.5 km ²) and would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Since the SEZ is largely undeveloped and rural, utility-scale solar energy development would be a new and discordant land use to the area.	None.
	640 acres (2.6 km ²) of private land and approximately 980 acres (4 km ²) of BOR land located within or adjacent to the exterior boundaries of the SEZ, with land owner agreement, could be developed in the same or a complementary manner as the public lands.	None.
	A designated Section 368 energy corridor covers about 80% of the SEZ, potentially leaving less than 1,000 acres (4 km ²) available for solar development. Because of technical constraints, solar development could not occur under electrical transmission lines or over pipelines; thus it appears that either the transmission corridor would have to be modified or solar development precluded within the transmission corridor.	None.
Specially Designated Areas and Lands with Wilderness Characteristics	Lake Cahuilla ACECs C and D could be exposed to additional human traffic, resulting in an increased risk of loss of prehistoric resources.	Once construction of solar energy facilities begins, the BLM would monitor to determine whether increases in traffic in the ACECs occurs and whether additional management measures are required to protect the resources in these areas.
Rangeland Resources: Livestock Grazing	None.	None.
Rangeland Resources: Wild Horses and Burros	None.	None.

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Recreation	Recreational users would be excluded from the SEZ.	None.
Military and Civilian Aviation	<p>The development of any solar energy or transmission facilities that encroach into the airspace of MTRs/SUAs would create safety issues and could conflict with military training activities.</p> <p>Power tower facilities could pose some hazard to the operation of the Mexicali Airport in Mexico.</p>	<p>None.</p> <p>Should power tower facilities be proposed for the SEZ, coordination across the international border should be required to ensure that there is no airspace management concern associated with the Mexicali Airport.</p>
Geologic Setting and Soil Resources	Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase. Impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. These impacts may be impacting factors for other resources (e.g., air quality, water quality, and vegetation).	None.
Minerals (fluids, solids, and geothermal resources)	About 60% of the SEZ is included within a KGRA. Designation of the SEZ would prevent surface occupancy to develop geothermal resources in the KGRA.	To protect the option for geothermal leasing under solar energy facilities, ROW authorizations for solar energy facilities should specifically note the potential for geothermal leasing with no surface occupancy stipulations.

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Water Resources	<p>Ground-disturbance activities (affecting 35 to 52% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills.</p> <p>Construction activities may require up to 2,074 ac-ft (2.6 million m³) of water during peak construction year.</p> <p>Construction activities would generate as much as 74 ac-ft (91,300 m³) of sanitary wastewater.</p> <p>Assuming full development of the SEZ, the following amounts of water would be used during operations:</p> <ul style="list-style-type: none"> • For parabolic trough facilities (916-MW capacity), 654 to 1,387 ac-ft/yr (806,700 to 1.7 million m³/yr) for dry-cooled systems; and 4,591 to 13,746 ac-ft/yr (5.7 million to 17 million m³/yr) for wet-cooled systems; • For power tower facilities (509-MW capacity), 362 to 769 ac-ft/yr (446,500 to 948,500 m³/yr) for dry-cooled systems; and 2,549 to 7,635 ac-ft/yr (3.1 million to 9.4 million m³/yr) for wet-cooled systems; • For dish engine facilities (509-MW capacity), 260 ac-ft/yr (320,700 million m³/yr); and • For PV facilities (509-MW capacity), 26 ac-ft/yr (312,100 million m³/yr). <p>Assuming full development of the SEZ, operations would generate up to 13 ac-ft/yr (16,000 million m³/yr) of sanitary wastewater and up to 260 ac-ft/yr (320,700 million m³/yr) of blowdown water.</p>	<p>Water resource analysis indicates that wet-cooling options would not be feasible. Other technologies should incorporate water conservation measures.</p> <p>Land disturbance activities should avoid impacts in the vicinity of the existing and mitigation wetlands located along the southern boundary of the site.</p> <p>During site characterization, hydrologic investigations would need to identify 100-year floodplains and potential jurisdictional water bodies subject to Clean Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as being within a 100-year floodplain.</p> <p>During site characterization, coordination and permitting with CDFG regarding California’s Lake and Streambed Alteration Program would be required for any proposed alterations to surface water features (both perennial and ephemeral).</p> <p>The groundwater-permitting process should be in compliance with the Imperial County groundwater ordinance.</p> <p>Groundwater monitoring and production wells should be constructed in accordance with standards set forth by the State of California and Imperial County.</p>

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Water Resources (Cont.)	<p>Runoff of water and sediments from the proposed SEZ could adversely affect the existing wetlands along the AAC and the mitigation wetlands associated with the AAC lining project.</p> <p>High TDS values of groundwater could produce water that is nonpotable and corrosive to infrastructure.</p>	<p>Stormwater management plans and BMPs should comply with standards developed by the California Stormwater Quality Association.</p> <p>Water for potable uses should meet or be treated to meet the water quality standards of the California Safe Drinking Water Act.</p>
Vegetation ^b	<p>Up to 80% of the SEZ (4,578 acres [18.5 km²]) would be cleared of vegetation; dune habitats would likely be affected; re-establishment of plant communities in disturbed areas would likely be very difficult because of the arid conditions.</p> <p>Noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation.</p> <p>Grading could result in direct impacts on the wetlands within the SEZ and could potentially alter wetland plant communities and affect wetland function. In addition, project-related reductions in groundwater inflows to wetlands inside and outside the SEZ could alter wetland hydrologic characteristics and plant communities.</p>	<p>An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration should be approved and implemented to increase the potential for successful restoration of Sonoran Desert habitats, such as desert scrub and dunes, and minimize the potential for the spread of invasive species. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides.</p> <p>Wetland, riparian habitats, and desert dry washes that occur primarily within the western and southern portions of the SEZ, and sand dune habitats and sand transport areas, primarily in the northern and eastern portions of the SEZ, should be avoided to the extent practicable, and any impacts minimized or mitigated. A buffer area should be maintained around wetlands, riparian areas, and dry washes to reduce the potential for impacts on wetlands on or near the SEZ. Appropriate engineering controls should be used to minimize impacts on these areas resulting from surface water runoff, erosion, sedimentation, altered</p>

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Vegetation ^b (Cont.)		<p>hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.</p> <p>An appropriate buffer shall be maintained between project impacts and the wetland south of the Imperial Valley SEZ to ensure all impacts from construction, operations, and maintenance of solar facilities do not impair the current functions and values associated with wetland resource, including habitat support for sensitive species.</p> <p>Groundwater withdrawals should be limited to reduce the potential for indirect impacts on wetland habitats that are associated with groundwater discharge, such as the wetlands near the AAC and EHC.</p>
Wildlife: Amphibians and Reptiles ^b	<p>The red-spotted toad is the main amphibian expected to occur within the Imperial East SEZ, but its occurrence within the SEZ would be spatially limited. Several other amphibian species could inhabit the AAC immediately south of the SEZ and the EHC located about 2.8 mi (4.5 km) west of the SEZ. These species, which include the bullfrog, Colorado River toad, Rio Grande leopard frog, and Woodhouse's toad, would not be expected to occur within the SEZ.</p> <p>Twenty-seven reptile species (the desert tortoise, which is a federally listed species; 12 lizards; and 14 snakes) could occur within the SEZ.</p> <p>Direct impacts on amphibian and reptile species from SEZ development would be small. With implementation of proposed design features, indirect impacts would be expected to be negligible.</p>	<p>The potential for indirect impacts on several amphibian species could be reduced by maximizing the distance between solar energy development and the All-American Canal.</p> <p>Avoid wetlands located along the southern boundary of the SEZ, including those that are planned to be created or enhanced in the area.</p>

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Wildlife: Birds ^b	<p>Nearly 90 species of birds have a range that encompasses the SEZ. However, habitats for about 40 of these species either do not occur on or are limited within the SEZ (e.g., habitat for waterfowl and wading birds).</p> <p>Direct impacts from habitat disturbance and long-term habitat reduction/fragmentation would be small.</p> <p>Other impacts on birds could result from collision with vehicles and buildings, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.</p> <p>Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of proposed design features.</p>	<p>Pre-disturbance surveys should be conducted within the SEZ for bird species listed under the Migratory Bird Treaty Act. Impacts on potential nesting habitat of these species should be avoided particularly during the nesting season.</p> <p>Pre-disturbance surveys should be conducted within the SEZ for the following desert bird focal species: ash-throated flycatcher, black-tailed gnatcatcher, black-throated sparrow, burrowing owl, common raven, Costa’s hummingbird, crissal thrasher, ladder-backed woodpecker, Le Conte’s thrasher, phainopepla, and verdin. Impacts on potential nesting habitat of these species should be avoided.</p> <p>Plant species that positively influence the presence and abundance of the desert bird focal species should be avoided to the extent practicable. These species include Goodding’s willow, yucca, Joshua tree, mesquite, honey mesquite, screwbean, desert mistletoe, big saltbush, smoketree, and catclaw acacia.</p> <p>Wetland habitats along the southern boundary of the SEZ boundary should be avoided to the extent practicable.</p> <p>Take of golden eagles and other raptors should be avoided. Mitigation regarding the golden eagle should be developed in consultation with the USFWS and CDFG. A permit may be required under the Bald and Golden Eagle Protection Act.</p>

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Wildlife: Birds ^b (Cont.)		Pre-disturbance surveys should be conducted within the SEZ for bird species listed under the Migratory Bird Treaty Act. Impacts on potential nesting habitat of these species should be avoided, particularly during the nesting season.
Wildlife: Mammals ^b	<p>The bighorn sheep (a BLM sensitive species discussed below with the special status species) and mule deer are the only big game species whose ranges encompass the SEZ. The potential impacts on the mule deer are expected to be small. It is unlikely that impacts from solar energy development within the SEZ would represent an actual loss of occupied habitat for the mule deer, although direct impacts could occur to about 0.3% of potentially suitable habitat within the SEZ region.</p> <p>Direct impacts on small game, furbearers, and small mammals on the SEZ from habitat disturbance and long-term habitat reduction/fragmentation would be small, as 0.4% or less of potentially suitable habitats identified for the species would occur. Larger areas of suitable habitat for these species occur within the area of potential indirect effects immediately outside the SEZ.</p>	Ensure that solar project development does not prevent mule deer free access to the unlined section of the All-American Canal.
Aquatic Biota ^b	No permanent water bodies or streams are present within the boundaries of the Imperial East SEZ. The wetlands and dry lakes present within the SEZ and the man-made AAC and EHC within the area of potential indirect effects could be affected by runoff of water and sediment from the SEZ.	None.

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Special Status Species ^b	Potentially suitable habitat for 35 special status species occurs in the affected area of the Imperial East SEZ. For all special status species, less than 1% of the potentially suitable habitat in the region would be directly affected by development.	<p>Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species. Disturbance to occupied habitats for these species should be avoided or minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible for some species, translocation of individuals from areas of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that uses one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies.</p> <p>Disturbance of sand dunes and sand transport systems, desert riparian, wash, and wetland habitats should be avoided or minimized to the extent practicable. Avoiding or minimizing disturbance of these habitats could reduce impacts on 30 special status species.</p> <p>As California fully protected species, direct and indirect impacts on the California black rail and Yuma clapper rail should be completely avoided. This includes the complete avoidance of occupied and potentially suitable wetlands on and in the vicinity of the SEZ (particularly those seepage wetlands and enhanced wetlands associated with the All-American Canal). Consultations with the CDFG are required to address the potential for impacts on these species as required under the CESA.</p>

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Special Status Species ^b (Cont.)		<p data-bbox="1316 362 1871 706">Consultations with the USFWS and the CDFG should be conducted to address the potential for impacts on the Yuma clapper rail a species listed as endangered under the ESA and CESA. Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and to determine any addition mitigation requirements beyond those already afforded to the Yuma clapper rail as a California fully protected species.</p> <p data-bbox="1316 776 1885 992">Coordination with the USFWS and CDFG should be conducted to address the potential for impacts on the flat-tailed horned lizard, a species that is proposed for listing under the ESA. Coordination would identify an appropriate survey protocol, avoidance measures, and, potentially, translocation or compensatory mitigation (if necessary).</p> <p data-bbox="1316 1032 1877 1214">Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based on consultation with the USFWS and CDFG.</p>

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Air Quality and Climate	<p><i>Construction:</i> Temporary exceedances of AAQS for PM₁₀ and PM_{2.5} at the SEZ boundaries possible during construction; higher concentrations would be limited to the immediate area surrounding the SEZ boundary and would decrease quickly with distance. Modeling indicates that Class I PSD PM₁₀ increments at the nearest federal Class I area (Joshua Tree NP), located about 69 mi (111 km) from the SEZ, would not be exceeded. Construction emissions from the engine exhaust from heavy equipment and vehicles could cause impacts on air-quality-related values (e.g., visibility and acid deposition), but such impacts would be temporary.</p> <p><i>Operations:</i> Positive impacts due to avoided emission of air pollutants from combustion-related power generation: 0.8 to 1.5% of total emissions of SO₂, NO_x, Hg, and CO₂ from electric power systems in the state of California avoided (up to 205 tons/yr of SO₂, 337 tons/yr of NO_x, 0.003 tons/yr Hg, and 797,000 tons/yr CO₂).</p>	None.
Visual Resources	<p>The SEZ is in an area of low scenic quality, with numerous cultural disturbances already present. Residents, workers, and visitors to the area may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) as they travel area roads. The residents nearest to the SEZ could be subjected to large visual impacts from solar energy development within the SEZ.</p> <p>Large visual impacts on the SEZ and surrounding lands within the SEZ viewshed due to major modification of the character of the existing landscape.</p> <p>Utility-scale solar energy development within the proposed Imperial East SEZ is unlikely to cause even moderate visual impacts on highly sensitive visual resource areas, the closest of which is more than 15 mi (24 km) from the SEZ. The closest community is beyond 10 mi (16 km) from the SEZ and is likely to experience minimal visual impacts from solar development within the SEZ.</p>	None.

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Visual Resources <i>(Cont.)</i>	<p>The SEZ is located within the CDCA. While renewable energy development is allowable within the SEZ under the CDCA management plan, substantial, non-mitigable visual impacts would occur within the CDCA in the SEZ and surrounding lands.</p> <p>Approximately 50 mi (80 km) of the auto tour route of the Juan Baptista de Anza Historic Trail is within the 25-mi (40-km) SEZ viewshed. More than 4 mi (6 km) of auto tour route is within the SEZ. Strong visual contrasts could be observed within and near the SEZ by travelers on the auto tour route.</p> <p>Approximately 52 mi (84 km) of I-8 is within the 25-mi (40-km) SEZ viewshed. Almost 8 mi (13 km) of I-8 abuts the SEZ. Strong visual contrasts could be observed within and near the SEZ by travelers on I-8.</p> <p>Approximately 33 mi (53 km) of State Route 98 is within the 25-mi (40-km) SEZ viewshed. More than 4 mi (6 km) of State Route 98 is within the SEZ. Strong visual contrasts could be observed within and near the SEZ by travelers on State Route 98.</p> <p>The communities of Holtville, Calexico, Heber, El Centro, and Imperial are located within the 5 to 25 mi (8 to 40 km) viewshed of the SEZ, although slight variations in topography and vegetation provide some screening. Visual impacts on these communities would be expected to be minimal.</p>	

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Acoustic Environment	<p><i>Construction:</i> Estimated noise levels at the nearest residences located near the southwestern boundary (500 ft [150 m] from the SEZ boundary) would be about 69 dBA, well above the estimated background level of 50 dBA but below the Imperial County regulation of 75 dBA L_{eq} for construction noise. In addition, an estimated 65 dBA as L_{dn} at this location is well above the EPA guideline of 55 dBA for residential areas.</p> <p><i>Operations:</i> Noise levels at the nearest residences from a parabolic trough or power tower facility would be about 50 dBA, which is equivalent to the estimated background level and the Imperial County regulation of 50 dBA daytime L_{eq}. If the operation were limited to daytime, 12 hours only, a noise level of about 52 dBA L_{dn} would be estimated for the nearest residences, which is below the EPA guidelines of 55 dBA L_{dn} for residential areas. However, in the case of 6-hour TES, the estimated nighttime sound level at the nearest residences would be 60 dBA L_{eq}, which is higher than the Imperial County regulation of 45 dBA nighttime L_{eq}. The combined day-night noise is estimated to be about 61 dBA as L_{dn}, which is higher than the EPA guideline of 55 dBA L_{dn} for residential areas.</p> <p>If 80% of the SEZ were developed with dish engine facilities, the estimated noise level of 54 dBA L_{eq} at the nearest residences would be higher than the Imperial County regulation of 50 dBA daytime L_{eq}. On the basis of 12-hour daytime operation, the estimated 54 dBA L_{dn} at these residences would be just below the EPA guideline of 55 dBA L_{dn} for residential areas.</p>	<p>Noise levels from cooling systems equipped with TES should be managed so that levels at the nearest residences to the southwest of the SEZ are kept within applicable guidelines. This could be accomplished in several ways, for example, through placing the power block approximately 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few hours after sunset, and/or installing fan silencers.</p> <p>Dish engine facilities within the Imperial East SEZ should be located more than 1 to 2 mi (1.6 to 3 km) from nearby residences located southwest of the SEZ (i.e., the facilities should be located in the central or eastern portion of the proposed SEZ). Direct noise control measures applied to individual dish engine systems could also be used to reduce noise impacts at nearby residences.</p>
Paleontological Resources	<p>The potential for impacts on significant paleontological resources at the Imperial East SEZ is unknown, and a preliminary PFYC of Class 3b has been assigned. A more detailed investigation of the local geological deposits of the SEZ, and their location and potential depth is needed.</p>	<p>The need for and the nature of any SEZ-specific design features would depend on findings of paleontological surveys.</p>

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Cultural Resources	<p>Direct impacts on significant cultural resources could occur during site preparation and construction activities in the proposed SEZ; however, a cultural resource survey of the entire area of potential effect would first be required to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would follow to determine whether any are eligible for listing in the NRHP.</p> <p>The SEZ is located just north of an area previously identified as having a high density of prehistoric and historic resources. It is also located very near to the Lake Cahuilla ACECs identified for their cultural values. At least two burials have been identified by the Native American Heritage Commission as being in or near the SEZ, indicating the possibility of others in the vicinity. The Yuma-San Diego Trail, connecting Pilot Knob with the Yuha Basin, also runs through the vicinity of the SEZ. Although few sites have been identified to date within the SEZ, impacts on cultural resources within the SEZ are likely to result from solar energy development.</p>	<p>Design features specific to the SEZ would be determined through consultation with the California SHPO and affected Tribes.</p> <p>Because of the possibility of burials in the vicinity of the proposed Imperial East SEZ and its location along the Yuma-San Diego Trail, it is recommended that for surveys conducted in the SEZ consideration be given to include Native American representatives in the development of survey designs and historic property treatment and monitoring plans.</p>
Native American Concerns	<p>It is possible that there will be Native American concerns about the potential for burials within the SEZ and visual impacts on landscape features, such as Pilot Knob, Picacho Peak, and Yuha Basin. The potential for impacts on the Yuma-San Diego Trail may also be of concern.</p> <p>As consultations continue, it is possible that other Native American concerns regarding solar energy development within the SEZ will emerge.</p>	<p>The need for and nature of SEZ-specific design features regarding potential issues of concern, such as burials, Yuma-San Diego Trail, and Pilot Knob, would be determined during government-to-government consultation with affected Tribes.</p>
Socioeconomics	<p><i>Construction:</i> 209 to 2,769 total jobs; \$12.1 million to \$159.9 million income in ROI.</p> <p><i>Operations:</i> 13 to 288 annual total jobs; \$0.4 million to \$9.8 million annual income in the ROI.</p>	<p>None.</p>

TABLE 9.1.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Imperial East SEZ	SEZ-Specific Design Features
Environmental Justice	<p>Potential impacts on minority populations could be incurred as a result of the construction and operation of solar development. Although impacts are likely to be small, there are minority populations, as defined by CEQ guidelines, within the 50-mi (80-km) radius around the boundary of the SEZ; thus any adverse impacts of solar projects could disproportionately affect minority populations.</p> <p>Because there are no low-income populations within the 50-mi (80-km) radius, according to CEQ guidelines, there would be no impacts on low-income populations.</p>	None.
Transportation	The primary transportation impacts are anticipated to be from commuting worker traffic. California State Route 98 provides a regional traffic corridor that could experience moderate impacts for single projects that may have up to 1,000 daily workers, with an additional 2,000 vehicle trips per day (maximum).	None.

Abbreviations: AAC = All-American Canal; AAQS = ambient air quality standards; ACEC = Area of Critical Environmental Concern; BLM = Bureau of Land Management; BMP = best management practice; CDFG = California Department of Fish and Game; CEQ = Council on Environmental Quality; CESA = California Endangered Species Act; CO₂ = carbon dioxide; DoD = U.S. Department of Defense; EHC = East Highline Canal; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; Hg = mercury; KGRA = known geothermal resource area; L_{dn} = day-night average sound level; L_{eq} = equivalent sound pressure level; MTR = military training route; NO_x = nitrogen oxides; NP = National Park; NRHP = *National Register of Historic Places*; PM_{2.5} = particulate matter with an aerodynamic diameter of 2.5 μm or less; PM₁₀ = particulate matter with an aerodynamic diameter of 10 μm or less; PSD = prevention of significant deterioration; ROI = region of influence; ROW = right-of-way; SEZ = solar energy zone; SHPO = State Historic Preservation Office; SO₂ = sulfur dioxide; SUA = Special Use Airspace; TDS = total dissolved solids concentrations; TES = thermal energy storage; USFWS = U.S. Fish and Wildlife Service; VRM = visual resource management; WA = Wilderness Area.

^a The detailed programmatic design features for each resource area to be required under BLM's Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would be required for development in the proposed Imperial East SEZ.

^b The scientific names of all plants, wildlife, aquatic biota, and special statute species are provided in Sections 9.1.10 through 9.1.12.

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1 **9.1.2 Lands and Realty**
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4 **9.1.2.1 Affected Environment**
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6 The 5,722-acre (23-km²) proposed Imperial East SEZ is contained within a triangle
7 bordered by I-8 and State Route 98 on the north and south, respectively, and by Lake Cahuilla
8 ACEC C on the west. While the SEZ is largely devoid of development, the area to the south of
9 the SEZ is developed with several transmission lines, the All-American Canal and associated
10 facilities, including two hydropower drop structures, and the international boundary fence. The
11 canal, which originates at the Colorado River, is a major conduit for irrigation and the municipal
12 water supply for the Imperial Valley. Although the SEZ consists only of BLM-administered
13 public lands, there are about 980 acres (4 km²) of Reclamation Withdrawn¹ lands and 640 acres
14 (2.6 km²) of private lands within the external boundaries of the SEZ that are not part of the SEZ.
15 The area is rural in character.
16

17 There are several existing right-of-way (ROW) authorizations in the SEZ, including
18 authorizations for I-8 and State Route 98, a fiber optic line, a communications site, one short
19 segment of a 115-kV transmission line, and a short segment of road leading to a housing
20 complex and substation facilities just south of the SEZ. Also, two double wood pole transmission
21 lines parallel the western border of the SEZ within the adjacent ACEC.
22

23 A ROW issued to the Imperial Irrigation District (IID) covers all public lands within the
24 SEZ. This ROW documents that the IID holds a public water reserve on all lands in the SEZ. The
25 IID can sell water for solar development.
26

27 A 2-mi (3-km) wide Section 368 (of the Energy Policy Act of 2005) energy corridor
28 covers about 80% of the SEZ. This corridor was designated as an outcome of the West-wide
29 Energy Corridor PEIS (DOE and DOI 2008).
30

31 Currently, there are two applications for ROWs for solar facilities within the Imperial
32 East SEZ. These applications cover all of the land within the SEZ.
33
34

35 **9.1.2.2 Impacts**
36

37 **9.1.2.2.1 Construction and Operations**
38
39

40 Development of the proposed Imperial East SEZ for utility-scale solar energy production
41 would establish a large industrial area that would exclude many existing and potential uses of the
42 land, perhaps in perpetuity. Since the SEZ is undeveloped and rural, utility-scale solar energy

¹ The term “Reclamation Withdrawal” means withholding an area of public land from the operation of the public land laws for the purpose of reserving the land for the use of the BOR. In general, this means that the BOR has first priority for use of the land for BOR projects. Other uses of the land may sometimes be approved with the concurrence of the BOR.

1 development would be a new and discordant land use to the area. It also is possible that the
2 640 acres (2.6 km²) of private land located within the external boundary of the SEZ could be
3 developed in the same or a complementary manner as the public lands with the concurrence of
4 the landowner. The 980 acres (4 km²) of Reclamation Withdrawn lands within the external
5 boundaries of the SEZ are not part of the SEZ and are not analyzed for solar development as a
6 part of this PEIS. It is possible that these lands also could be developed with concurrence from
7 the BOR.
8

9 Current ROW authorizations on the SEZ would not be affected by solar energy
10 development since they are prior rights. Should the proposed SEZ be identified as an SEZ
11 in the Record of Decision (ROD) for this PEIS, the BLM would still have discretion to authorize
12 additional ROWs in the area until solar energy development was authorized, and then future
13 ROWs would be subject to the rights granted for solar energy development.
14

15 A designated Section 368 transmission corridor along I-8 covers 80% of the SEZ. It
16 could limit future solar development to less than 1,000 acres (4 km²) because to avoid technical
17 or operational interference between transmission and solar energy facilities, solar energy
18 facilities cannot be constructed under transmission lines or over pipelines. Because of the
19 proximity to the international border and the East Mesa ACEC north of I-8, the transmission
20 corridor capacity could be substantially reduced if the SEZ were fully developed for utility-scale
21 solar energy production. Transmission capacity is becoming a more critical factor and reducing
22 corridor capacity in this SEZ may have future, but currently unknown, consequences. This is an
23 administrative conflict that can be addressed by the BLM, but there would be implications either
24 for the amount of potential solar energy development or for the amount of transmission capacity
25 that can be accommodated.
26

27 The existing public water reserve held by the IID, as documented in a ROW, would
28 require close coordination with the district prior to development of on-site water supplies for
29 solar energy facilities.
30
31

32 ***9.1.2.2.2 Transmission Facilities and Other Off-Site Infrastructure*** 33

34 An existing 115-kV transmission line intersects the southwest corner of the SEZ; this line
35 might be available to transport the power produced in this SEZ. Establishing a connection to the
36 existing line would not involve the construction of a new transmission line outside of the SEZ. If
37 a connecting transmission line were constructed in a different location outside of the SEZ in the
38 future, site developers would need to determine the impacts from construction and operation of
39 that line. In addition, developers would need to determine the impacts of line upgrades if they
40 were needed. Road access to the site is good, and no new roads to the site would be required.
41 Transmission lines and roads within the SEZ would be required to support development of solar
42 energy facilities.
43

44 The existence of large transmission lines and an existing substation to the south but in
45 near proximity to the SEZ provides additional options for connecting solar development to the

1 regional grid. Access to these alternative facilities would cross land managed either by the BLM
2 or the BOR, thus no private or state lands would be affected.

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5 **9.1.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**

6
7 No SEZ-specific design features were identified. Implementing the programmatic design
8 features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy
9 Program would provide adequate mitigation for some identified impacts. The exceptions would
10 be the exclusion of many existing and potential uses of the public land, perhaps in perpetuity; the
11 visual impact of an industrialized-looking solar facility within an otherwise rural area; and any
12 induced changes in land use on private and BOR lands.

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9.1.3 Specially Designated Areas and Lands with Wilderness Characteristics

9.1.3.1 Affected Environment

The Imperial East SEZ is located within the CDCA and the area is adjacent to several specially designated areas, including three ACECs. The SEZ is near the ISDRA and the Juan Bautista de Anza National Historic Trail (see Figure 9.1.3.1-1). The major resource values associated with the adjacent ACECs are cultural resources and wildlife habitat. There is a designated WA near the north end of the ISDRA.

As part of the planning process for the BLM-administered lands in the CDCA, all public lands, except for about 300,000 acres (1,214 km²) of scattered parcels, were designated geographically into one of four multiple-use classes. The classification was based on the sensitivity of resources and kinds of uses for each geographic area. The multiple-use classes are (BLM 1999):

- Class C is for lands either designated as wilderness or for wilderness study areas. These lands are managed to protect their wilderness values.
- Class L (Limited Use) protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.
- Class M (Moderate Use) is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety or present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources which permitted uses may cause.
- Class I (Intensive use). Its purpose is to provide for concentrated use of lands and resources to meet human needs. Reasonable protection will be provided for sensitive natural and cultural values. Mitigation of impacts on resources and rehabilitation of affected areas will occur insofar as possible.

Land within the Imperial East SEZ is Class L. Guidelines contained in the CDCA Plan indicate that wind, solar, or geothermal electrical generation facilities could be allowed in Class L areas.

The ISDRA is the largest mass of sand dunes in the state. Formed by windblown sands of ancient Lake Cahuilla, the dune system extends for more than 40 mi (64 km) in a band averaging 5 mi (8 km) wide. Largely known as a favorite location for off-highway vehicle (OHV) enthusiasts, the dunes also offer scenery, opportunities for solitude, and a home to rare plants and

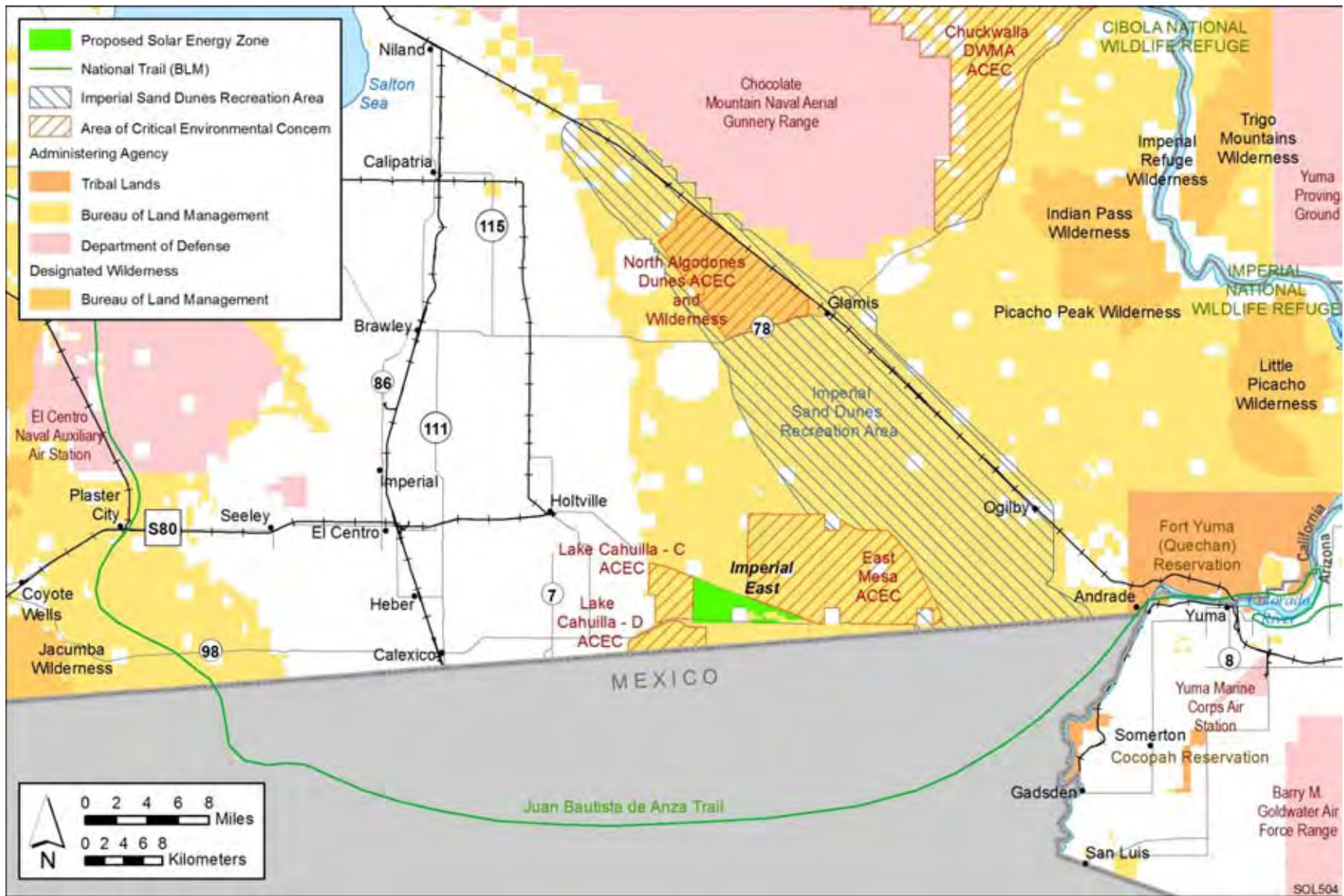


FIGURE 9.1.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Imperial East SEZ

1 animals. The dune system consists of three areas: the northernmost area is the Mammoth Wash
2 OHV open area and is about 22 mi (35 km) north of the SEZ; the North Algodones Dunes WA
3 is south of Mammoth Wash and ranges from about 16 to 22 mi (26 to 35 km) from the SEZ; and
4 the remainder of the area ranges from 10 to 22 mi (16 to 35 km) from the SEZ and stretches
5 south from State Route 78 where the largest and most heavily used dunes are found. With
6 some restrictions, these primary dunes may be traveled south toward the Mexican border
7 (BLM 2010a).

8
9 There are four ACECs near the SEZ.² Lake Cahuilla ACECs C and D to the west of the
10 SEZ were designated to protect prehistoric features associated with ancient Lake Cahuilla. The
11 East Mesa ACEC, which is included within the larger East Mesa flat-tailed horned lizard
12 Management Area, is just across I-8 from the SEZ and was designated to protect prehistoric
13 resources and habitat of the flat-tailed horned lizard. The North Algodones Dunes ACEC, which
14 is about 15 mi (24 km) north of the SEZ and which overlays most of the designated WA of the
15 same name, was designated because of its outstanding scenic values.

16
17 The Juan Bautista de Anza National Historic Trail approaches to within about 17 mi
18 (27 km) east of the SEZ, where it loops south into Mexico and then passes about 10 mi
19 (16 km) south of the SEZ before turning north back into the United States about 20 mi (32 km)
20 west of the SEZ. The trail then heads north and northwest. There is an auto tour route in the
21 United States that follows much of the route of the National Historic Trail, but in the area where
22 the trail dips south into Mexico, the route follows State Route 98, which passes through the SEZ
23 (see Figure 9.1.3.1.1).

24
25 There are no undesignated areas with wilderness characteristics near the SEZ that have
26 been identified.

27 28 29 **9.1.3.2 Impacts**

30 31 32 ***9.1.3.2.1 Construction and Operations***

33
34 The primary potential impacts on specially designated areas generally are from visual
35 impacts of solar energy development that could affect scenic, recreational, or wilderness
36 characteristics of the areas. This visual impact is difficult to determine and would vary by solar
37 technology employed, the specific area being affected, and the perception of individuals viewing
38 the development. Assessment of the visual impact of solar energy projects must be done on a
39 site-specific and technology-specific basis to accurately identify impacts

40
41 In general, the closer a viewer is to solar development, the greater the impact on an
42 individual's perception. From a visual analysis perspective, the most sensitive viewing distances

² The ACECs included in this analysis are the ones that are either immediately adjacent to the SEZ or that were designated because of scenic resources and are within 25 mi (40 km) of the SEZ. An additional five ACECs within that distance have been determined not to be affected by development of the SEZ.

1 generally are from 0 to 5 mi (0 to 8 km). The viewing height above a solar energy development
2 area, the size of the solar development area, and the purpose for which a person is visiting an
3 area are also important. Individuals seeking a wilderness or scenic experience within these areas
4 could be expected to be more adversely affected than those simply traveling along a highway
5 with another destination in mind.
6

7 The occurrence of glint and glare at solar facilities could potentially cause large, but
8 temporary, increases in brightness and visibility of the facilities. The visual contrast levels that
9 were assumed to assess potential impacts on specially designated areas do not account for
10 potential glint and glare effects; however, these effects would be incorporated into a future site-
11 and project-specific assessment that would be conducted for specific proposed utility-scale solar
12 energy projects.
13

14 The following areas could potentially be affected by development of the SEZ:

15
16 *California Desert National Conservation Area*
17

- 18 • The viewshed within 25 mi (40 km) of the Imperial East SEZ includes about
19 78,000 acres (316 km²), or about 0.3% of the CDCA (see Table 9.1.14.2-1)
20 and may be visible for over 40 mi (64 km). Installation of renewable energy
21 facilities is consistent with the CDCA Plan. Anticipated impacts on the CDCA
22 appear to be minimal.
23

24 *Imperial Sand Dunes Recreation Area*
25

- 26 • *The Mammoth Wash OHV Area*—This is the portion of the ISDRA most
27 isolated from the SEZ and is 22 mi (35 km) away. The westernmost portion
28 of the area would have long-distance views of the SEZ, but the SEZ would
29 constitute a minor portion of the overall viewscape from the area. The
30 majority of the OHV area would be screened from views of the SEZ.
31 Because of the distance and the lack of visibility of the SEZ, there is no
32 impact expected from development of the SEZ in this portion of the ISDRA.
33
- 34 • *North Algodones Dunes WA and ACEC*—A small portion (3%) of the
35 WA/ACEC would have views of development within the SEZ. Because of the
36 distance from the SEZ, the presence of agricultural development to the west in
37 the Imperial Valley, and the motorized recreational use in the adjacent
38 portions of the ISDRA, the potential for adverse impacts from the visual
39 impact of the SEZ on wilderness characteristics and visitors, and on the scenic
40 resources in the area, would not be significant.
41
42

1 *Remainder of the ISDRA*

- 2
- 3 • The largest portion of the ISDRA stretches southeast of State Route 78 for
- 4 about 25 mi (40 km). The ISDRA border at its closest approach to the SEZ is
- 5 about 6 mi (10 km) and solar development within the SEZ would be visible
- 6 although large portions of the area would have little to no visibility of
- 7 development in the SEZ. Visual impacts occurring in the ISDRA arising from
- 8 solar energy development would depend on the location of the viewer and
- 9 project location, project technology, site design, and other visibility factors
- 10 but solar energy development within the SEZ would be expected to have a
- 11 minimal impact on the ISDRA.
- 12
- 13

14 *ACECs*

- 15
- 16 • *Lake Cahuilla ACECs C and D*—The two Lake Cahuilla ACECs are located
- 17 adjacent to the SEZ and could be exposed to additional human traffic related
- 18 to construction and operation activities, as well as general human interest in
- 19 viewing solar facilities, and this could result in the potential loss of important
- 20 prehistoric resources. See Section 9.1.17 for further discussion of these areas.
- 21
- 22 • *East Mesa ACEC*—I-8 lies between the SEZ and this ACEC; thus there is no
- 23 direct road connection between the two that could lead to increases in human
- 24 traffic within the ACEC. It is not anticipated that solar development of the
- 25 SEZ would result in any adverse effects on the prehistoric or wildlife
- 26 resources in the ACEC.
- 27
- 28

29 *Juan Bautista de Anza National Historic Trail*

- 30
- 31 • The most significant portion of the National Historic Trail in the vicinity of
- 32 the SEZ is about 10 mi (16 km) south in Mexico. Because the area south of
- 33 the SEZ is flat, facilities in the SEZ may be visible from the trail corridor;
- 34 however, the area in Mexico through which the trail corridor passes is heavily
- 35 developed for agriculture, and it is anticipated that this development has a
- 36 much larger effect on the trail corridor. It is anticipated there would be no
- 37 impact on the Trail from solar development within the SEZ. For a discussion
- 38 of the potential impact on the Juan Bautista de Anza National Historic Trail
- 39 auto tour route that follows State Route 98 through the SEZ, see
- 40 Section 9.1.5.2.
- 41
- 42

43 ***9.1.3.2.2 Transmission Facilities and Other Off-Site Infrastructure***

44

45 See Section 9.1.2.2.2 for the discussion of the assumptions and requirements regarding

46 construction of new transmission lines or roads that also applies to impacts on specially

47 designated areas.

48

1 **9.1.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Implementing the programmatic design features described in Appendix A, Section A.2.2,
4 as required under BLM’s Solar Energy Program would provide adequate mitigation for some
5 identified impacts. The exceptions would be increases in human use of the Lake Cahuilla C
6 and D ACECs.
7

8 A proposed design feature specific to the proposed SEZ is the following:
9

- 10 • Because of a potential increase in human use in the two Lake Cahuilla
11 ACECs, once solar energy facility construction begins, the BLM would
12 monitor to determine whether increases in traffic in the ACECs occurs and
13 whether additional management measures (e.g., fencing) are required to
14 protect the resources in these areas.
15

1 **9.1.4 Rangeland Resources**

2
3 Rangeland resources include livestock grazing and wild horses and burros, both of
4 which are managed by the BLM.

5
6
7 **9.1.4.1 Livestock Grazing**

8
9
10 **9.1.4.1.1 Affected Environment**

11
12 The SEZ is not included within a grazing allotment and grazing is not authorized.

13
14
15 **9.1.4.1.2 Impacts**

16
17 There would not be any impacts on livestock grazing.

18
19
20 **9.1.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness**

21
22 No SEZ-specific design features would be necessary to protect or minimize impacts on
23 livestock.

24
25
26 **9.1.4.2 Wild Horses and Burros**

27
28
29 **9.1.4.2.1 Affected Environment**

30
31 Section 4.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) that occur
32 within the six-state study area. Twenty-two wild horse and burro herd management areas
33 (HMAs) occur within California. Also, several HMAs in Arizona are located near the Arizona–
34 California border. Two of these HMAs (Chocolate-Mule Mountains and Cibola-Trigo) occur
35 within a 50-mi (80-km) radius of the proposed Imperial East SEZ (Figure 9.1.4.2-1). Chocolate-
36 Mule Mountains is the closest HMA, located nearly 22 mi (35 km) northeast of the SEZ. The
37 Chocolate-Mule Mountains HMA contains an estimated population of 120 burros (BLM 2009b).

38
39 In addition to the HMAs managed by BLM, the U.S. Forest Service (USFS) has
40 51 established wild horse and burro territories in Arizona, California, Nevada, New Mexico,
41 and Utah and is the lead management agency that administers 37 of the territories (Giffen 2009;
42 USFS 2007). The closest territory to the proposed Imperial East SEZ is the Big Bear Territory
43 within the San Bernardino National Forest. It is located more than 130 mi (209 km) northwest
44 of the SEZ. This territory is managed for a population of 60 wild burros (USFS 2007).

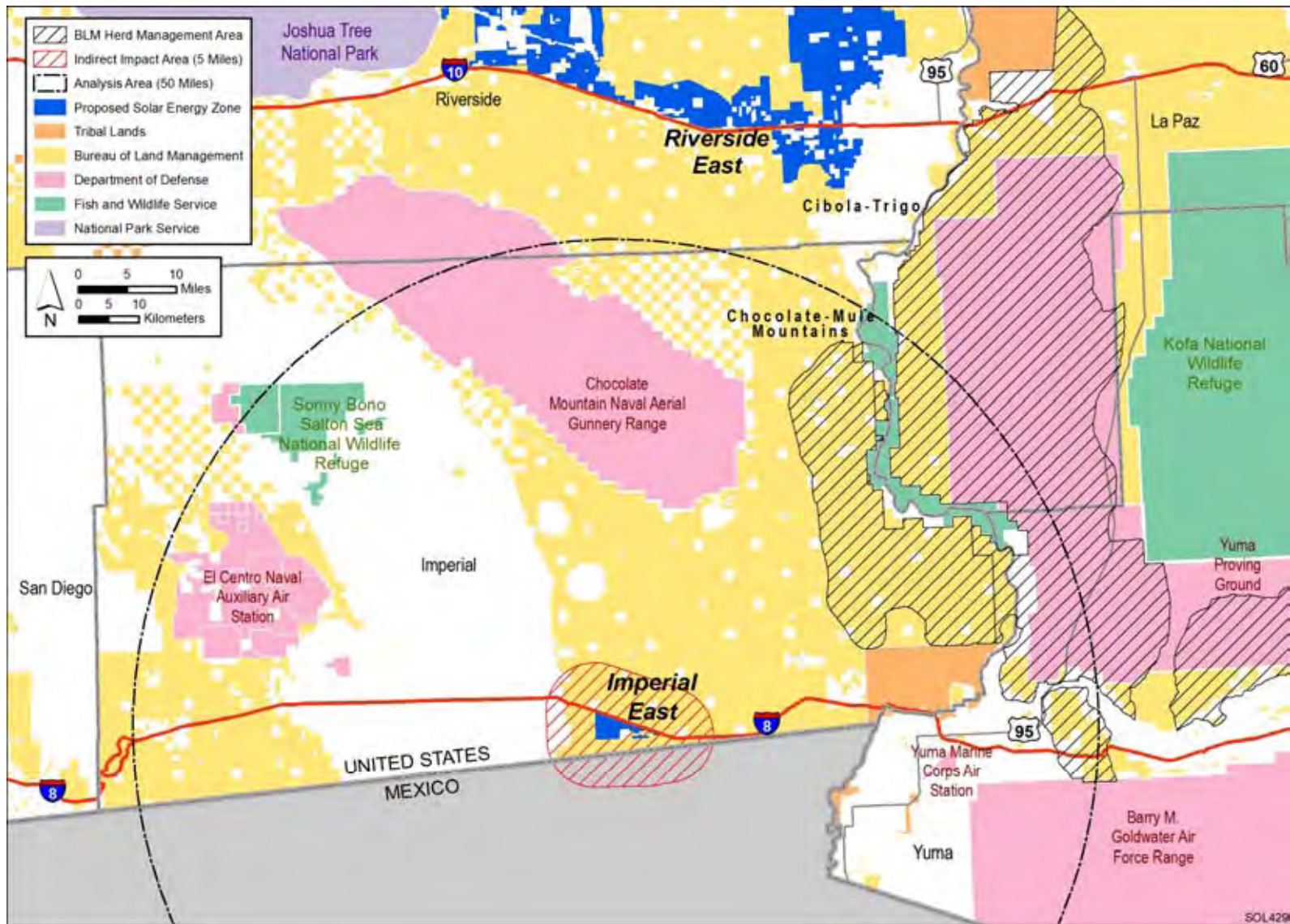


FIGURE 9.1.4.2-1 Wild Horse and Burro Herd Management Areas within the Analysis Area for the Proposed Imperial East SEZ (Source: BLM 2009a)

1

2

3

1 **9.1.4.2.2 Impacts**
2

3 Because the proposed Imperial East SEZ is nearly 22 mi (35 km) or more from any wild
4 horse and burro HMA managed by the BLM and more than 130 mi (209 km) from any wild
5 horse and burro territory administered by the USFS, solar energy development within the SEZ
6 would not affect wild horses and burros that are managed by these agencies.
7

8
9 **9.1.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**
10

11 The implementation of required programmatic design features described in Appendix A,
12 Section A.2.2, would reduce the potential for effects on wild horses and burros. No proposed
13 Imperial East SEZ-specific design features would be necessary to protect or minimize impacts
14 on wild horses and burros.
15

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1 **9.1.5 Recreation**

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3
4 **9.1.5.1 Affected Environment**

5
6 The proposed Imperial East SEZ area is a triangle of land located between I-8 and State
7 Route 98. State Route 98 cuts through the very southern end of the SEZ on a slight northwesterly
8 angle and thus leaves a small portion of the area south of the highway within the western end of
9 the SEZ. The western boundary of the SEZ is bordered by two double wood pole transmission
10 lines, and the view to the south is dominated by additional transmission lines and the All-
11 American Canal and associated facilities. The area is very flat and sparsely vegetated, mainly
12 with creosotebush. The recreation value of the area is very low. Although there are signs of
13 vehicle tracks throughout the area, it is not open to vehicle travel, but there are short segments of
14 roads in the area that are designated as open to travel (BLM 2007b). The small Tamarisk Long
15 Term Visitor Area (LTVA, about 10 units) is located just outside the SEZ and south of State
16 Route 98. In the last two years, the LTVA has had no more than three or four camper units
17 present at a time in the period from October through March (Meeks 2010). Visitors staying at the
18 LTVA are likely the most frequent users of the SEZ area since it is within easy walking distance.
19 Walking and bird watching are the most likely recreation uses of the area (Meeks 2010). Some
20 people may be attracted to the area by the presence of two cultural resource ACECs on the west
21 end of the SEZ, the All-American Canal, the international boundary fence about 1 mi (1.6 km)
22 south of the area, and the Juan Bautista de Anza National Historic Trail auto tour route, which
23 follows State Route 98.
24

25 There are few OHV routes designated as open within the proposed Imperial East SEZ;
26 these are discussed in Section 9.1.21 and shown in Figure 9.1.21-1.
27

28
29 **9.1.5.2 Impacts**

30
31 Recreational users would be excluded from developed areas of the SEZ. Although there
32 are no recreational use figures for the area of the SEZ, because of the generally low-quality
33 recreation opportunities in the SEZ, the impact of solar energy development in the SEZ on
34 recreation use is expected to be minimal.
35

36 The actual location of the route of the Juan Bautista de Anza Trail is about 10 mi (16 km)
37 south in Mexico, but visitors traveling the auto route of the trail on State Route 98 may find the
38 presence of a large solar development along the route inconsistent with their reasons for traveling
39 the route. The potential effect of this on tour route travelers is not known. Because the SEZ is
40 not actually on the route of the trail and because the area nearby already has been altered by the
41 presence of the All-American Canal and related facilities, numerous transmission lines, and the
42 international boundary fence, it is not anticipated that there would be a loss of recreation use of
43 the auto tour route as a result of development of the SEZ.
44

45 Open OHV routes crossing areas granted ROWs for solar facilities would be re-
46 designated as closed. However, a programmatic design feature addressing recreational impacts

1 would require consideration of development of alternative routes that would retain a similar level
2 of access across and to public lands as a part of the project proposal (see Section 5.5.1 for more
3 details on how routes coinciding with proposed solar facilities would be treated).
4

6 **9.1.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

7

8 No SEZ-specific design features were identified for addressing impacts on recreation use
9 at the proposed Imperial East SEZ. Implementing the programmatic design features described in
10 Appendix A, Section A.2.2, as required under BLM's Solar Energy Program would provide
11 adequate mitigation for any recreational use impacts. The exceptions would be in the loss of any
12 recreational use in the SEZ which would not be mitigated.
13

1 **9.1.6 Military and Civilian Aviation**

2
3
4 **9.1.6.1 Affected Environment**

5
6 The SEZ is entirely covered by two military training routes (MTRs) and Special Use
7 Airspace (SUA). The area is identified in BLM land records (BLM and USFS 2010b) as
8 requiring consultation with the U.S. Department of Defense (DoD) prior to approval of any
9 facilities.

10
11 Four small public airports are within approximately 34 mi (55 km) of the Imperial East
12 SEZ—three in the United States and one in Mexicali, Mexico. The Mexicali airport is the closest
13 of the four airports and is about 5 mi (8 km) southwest of the SEZ.

14
15
16 **9.1.6.2 Impacts**

17
18 The development of any solar energy or transmission facilities that encroach into the
19 airspace of the MTR/SUA could interfere with military training activities. While the military
20 has indicated that solar development on portions of the Imperial East SEZ is compatible with
21 existing military use, it has also commented that other portions should have height limits for
22 facilities, and some areas may be incompatible with existing military use. The system of military
23 airspace in the Southwest overlaps much of the area of highest interest for solar development and
24 there is potential for solar development to result in cumulative effects on the system of MTRs
25 that stretch beyond just one SEZ.

26
27 It is assumed that airspace required for the Mexicali airport is completely contained in
28 Mexico, so there normally would be no effect from facilities constructed in the SEZ; however,
29 inclement weather conditions or other considerations could alter this situation. The U.S. airports
30 are all far enough away not to be affected by solar facilities in the SEZ.

31
32
33 **9.1.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**

34
35 Implementing the programmatic design features described in Appendix A, Section A.2.2,
36 as required under BLM's Solar Energy Program would provide adequate mitigation for some
37 identified impacts on military and civilian aviation. The exception would be the potential impacts
38 on the operation of Mexicali Airport if solar power towers are utilized within the SEZ.

39
40 A proposed design feature specific to the proposed SEZ is the following:

- 41
42 • Should power tower facilities be proposed for the SEZ, coordination across
43 the international border should be required to ensure that there is no airspace
44 management concern associated with the Mexicali Airport.

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1 **9.1.7 Geologic Setting and Soil Resources**

2
3
4 **9.1.7.1 Affected Environment**

5
6
7 **9.1.7.1.1 Geologic Setting**

8
9
10 **Regional Geology**

11
12 The proposed Imperial East SEZ is located in the Imperial Valley, part of the Salton
13 Trough, a sediment-filled structural basin that lies within the Basin and Range physiographic
14 province in southern California (Figure 9.1.7.1-1). The Salton Trough is the landward extension
15 of the East Pacific Rise as it emerges from the 1,000-mi (1,609-km) long trough occupied by the
16 Gulf of California and continues northward to Palm Springs. The East Pacific Rise is a crustal
17 spreading center characterized by a series of northwest-trending transform (strike-slip) faults, the
18 northernmost being the San Andreas Fault System. The tectonic activity of the East Pacific Rise
19 has downwarped, downfaulted, extended, and laterally translated the sediments within the
20 Salton Trough. Although the basin is geologically complex, its surface is relatively featureless
21 (Riney et al. 1982; Mase et al. 1981; Morton 1977).

22
23 The Salton Trough has received a continuous influx of sand, silt, and clay derived from
24 the Colorado River, which created ephemeral lakes in the basin until about 300 years ago.
25 Underlying this alluvial cover is a succession of late Tertiary and Quaternary sediments
26 composed mainly of marine and nonmarine sandstones and clays and lake deposits. Water-
27 bearing aquifers occur in the upper 2,000 ft (610 m) of these deposits (Loeltz et al. 1975).
28 The depth to basement rock ranges from 11,000 to 15,400 ft (3,353 to 4,694 m), though
29 metamorphism of sedimentary deposits is known to occur at depths as shallow as
30 4,000 ft (1,219 m) because of the high heat flows associated with crustal spreading. High heat
31 flows also give rise to geothermal steam; and several known geothermal resource areas occur
32 throughout the valley (Riney et al. 1982; Mase et al. 1981; Morton 1977; Robinson et al. 1976)
33 Exposed sediments near the Imperial East SEZ consist mainly of modern alluvium, lake, and
34 playa deposits (Q) and dune sands (Qs) (Figure 9.1.7.1-2).

35
36
37 **Topography**

38
39 The Imperial Valley is a flat, alluvium-filled basin following the same northwest trend
40 as the Salton Trough. Located in the south-central part of Imperial County, the valley lies at or
41 below sea level and has an area of about 989,450 acres (4,004 km²) in the United States. It is
42 bounded to the north by the Salton Sea and extends south into Mexico. To the east are the
43 Algodones Dunes and Sand Hills; to the west (from north to south) are the Fish Creek
44 Mountains, Superstition Hills, Superstition Mountain, and the Coyote Mountains. The Yuha
45 Desert lies to the southwest. The Imperial Valley is separated from the Gulf of California by the
46 ridge of the Colorado River delta (in Mexico), which has an elevation of about 30 ft (9 m) above
47 mean sea level (MSL) at its lowest point (Morton 1977; Zimmerman 1981).



1

2 **FIGURE 9.1.7.1-1 Physiographic Features in the Imperial Valley Region**

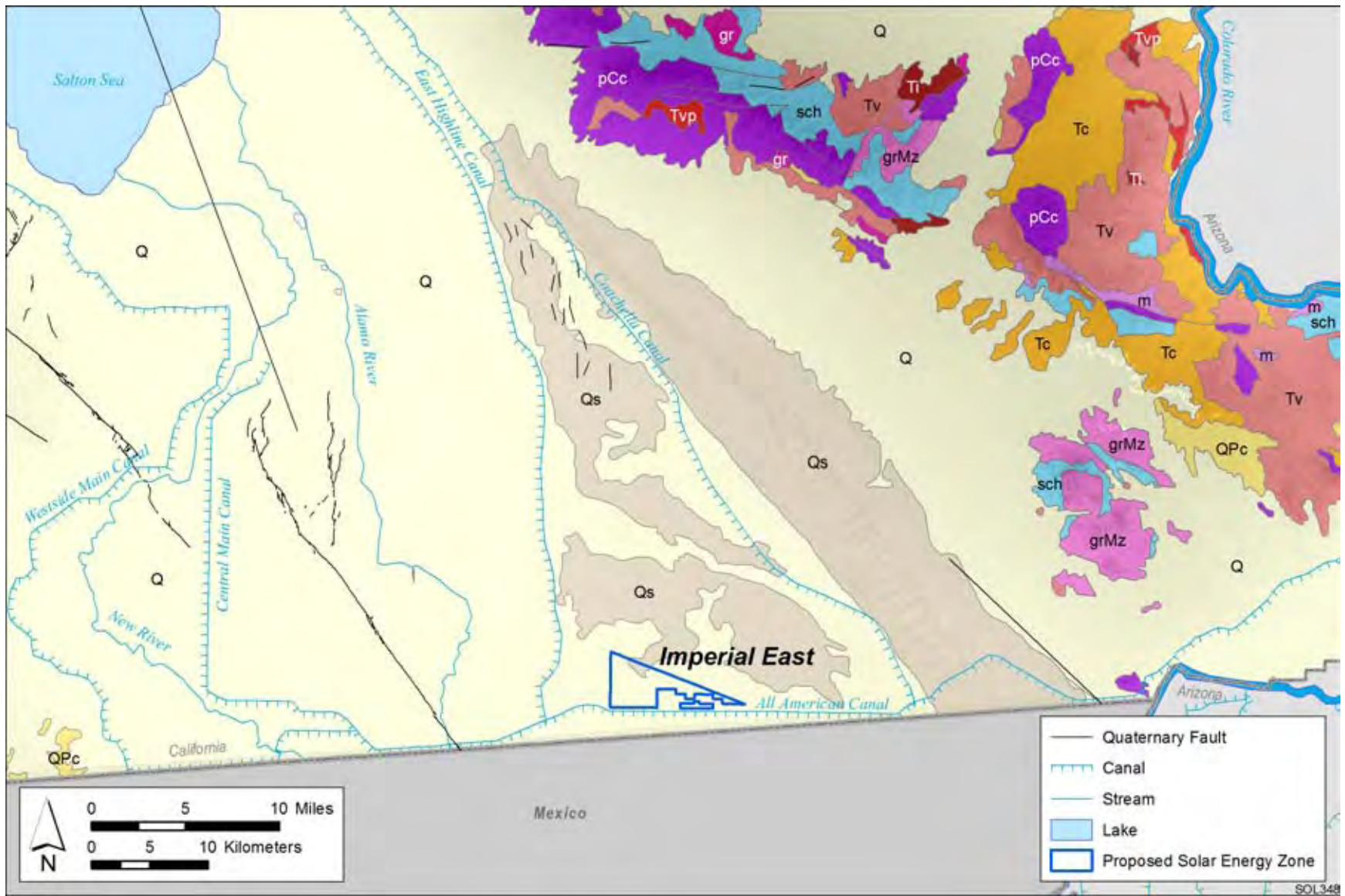


FIGURE 9.1.7.1-2 Geologic Map of the Imperial Valley Region (adapted from Ludington et al. 2007 and Gutierrez et al. 2010)

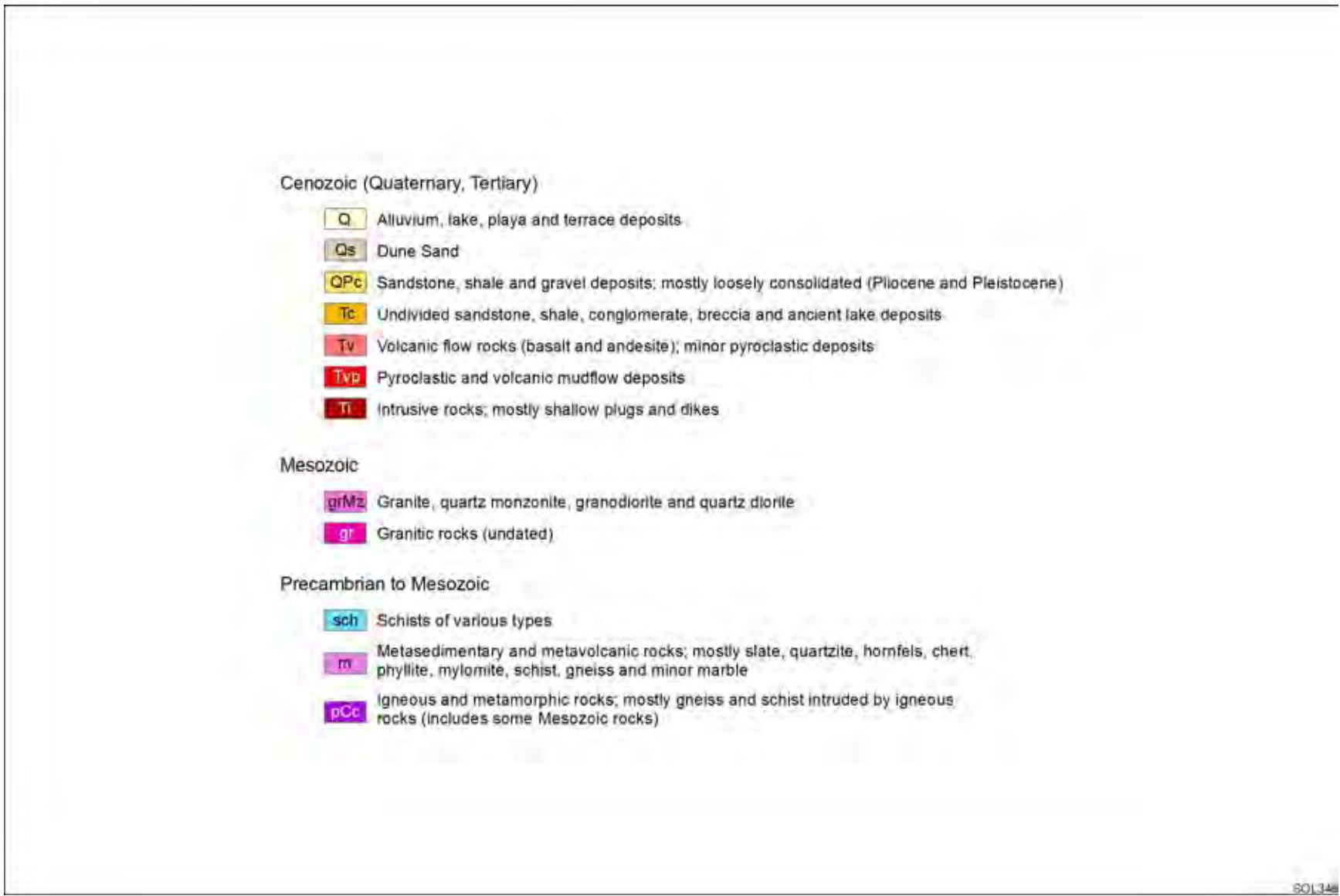


FIGURE 9.1.7.1-2 (Cont.)

1 As recently as 300 years ago, a freshwater lake, called Lake Cahuilla, filled the Imperial
2 Valley basin to the elevation of the Colorado River delta. The ancient lake was actually a
3 succession of lakes that periodically overflowed and covered a major portion of the Salton
4 Trough during the late Pleistocene and Holocene epochs. Muds and silts of this ancient lake form
5 the top 197 to 328 ft (60 to 100 m) of strata within the Imperial Valley (Mase et al. 1981). The
6 former shoreline marking the maximum Holocene water level of Lake Cahuilla is well preserved
7 around the margins of the Imperial Valley at an elevation of about 40 to 48 ft (12 to 15 m) above
8 sea level (Blake 1914; Stanley 1963). At this maximum level, Lake Cahuilla would have been
9 over 300 ft (91 m) deep, 105 mi (170 km) long, and 35 mi (56 km) across at its widest point
10 (Hubbs and Miller 1948; Waters 1983). The Salton Trough is currently occupied by the
11 Salton Sea, which lies 200 ft (61 m) below sea level (Riney et al. 1982).

12
13 The proposed Imperial East SEZ is located between the east side of the Lake Cahuilla
14 lakebed and the Algodones Sand Hills on a desert plain, called the Imperial East Mesa, a
15 terrace of the Colorado River delta. Its terrain is relatively flat with a very gentle dip to the
16 west (Figure 9.1.7.1-3). Elevations range from about 40 ft (12 m) near the southeastern corner
17 of the site to less than 20 ft (6.1 m) along its western boundary. The All-American Canal is
18 located south of the site and runs parallel to its southern border.

21 **Geologic Hazards**

22
23 The types of geologic hazards that could potentially affect solar project sites and their
24 mitigation are discussed in Sections 5.7.3 and 5.7.4. The following sections provide a
25 preliminary assessment of these hazards at the proposed Imperial East SEZ. Solar project
26 developers may need to conduct a geotechnical investigation to assess geologic hazards locally
27 to better identify facility design criteria and site-specific design features to minimize their risk.

28
29
30 **Seismicity.** The proposed Imperial East SEZ is located east of the San Andreas Fault
31 Zone, a seismically active region dominated by northwest-trending right-lateral strike slip
32 faulting that is categorized as “potentially active” (i.e., having surface displacement within the
33 last 11,000 years [Holocene]) under the Alquist-Priolo Earthquake Fault Zoning Act
34 (Figure 9.1.7.1-4). The term “potentially active” generally denotes that a fault has shown
35 evidence of surface displacement during Quaternary time (the last 1.6 million years). However,
36 because there are numerous such faults in California, the State Geologist has introduced new,
37 more discriminating criteria for zoning faults under the Alquist-Priolo Act. Currently, zoned
38 faults include those that are “sufficiently active,” showing evidence of surface displacement
39 within the past 11,000 years along one or more of its segments or branches, and “well-defined,”
40 having a clearly detectable trace at or just below the ground surface (Bryant and Hart 2007).

41
42 Although the Imperial Valley is a seismically active area (with over 2,000 recorded
43 earthquakes in the past 10 years), no known Quaternary faults intersect the proposed Imperial
44 East SEZ (Figure 9.1.7.1-4). Earthquake activity over the past 100 years has consisted
45 predominantly of swarms and clustered events along the Brawley Fault Zone, interspersed with
46 swarms and magnitude 5 to 7 main-shock/aftershock sequences along the Imperial Fault just to

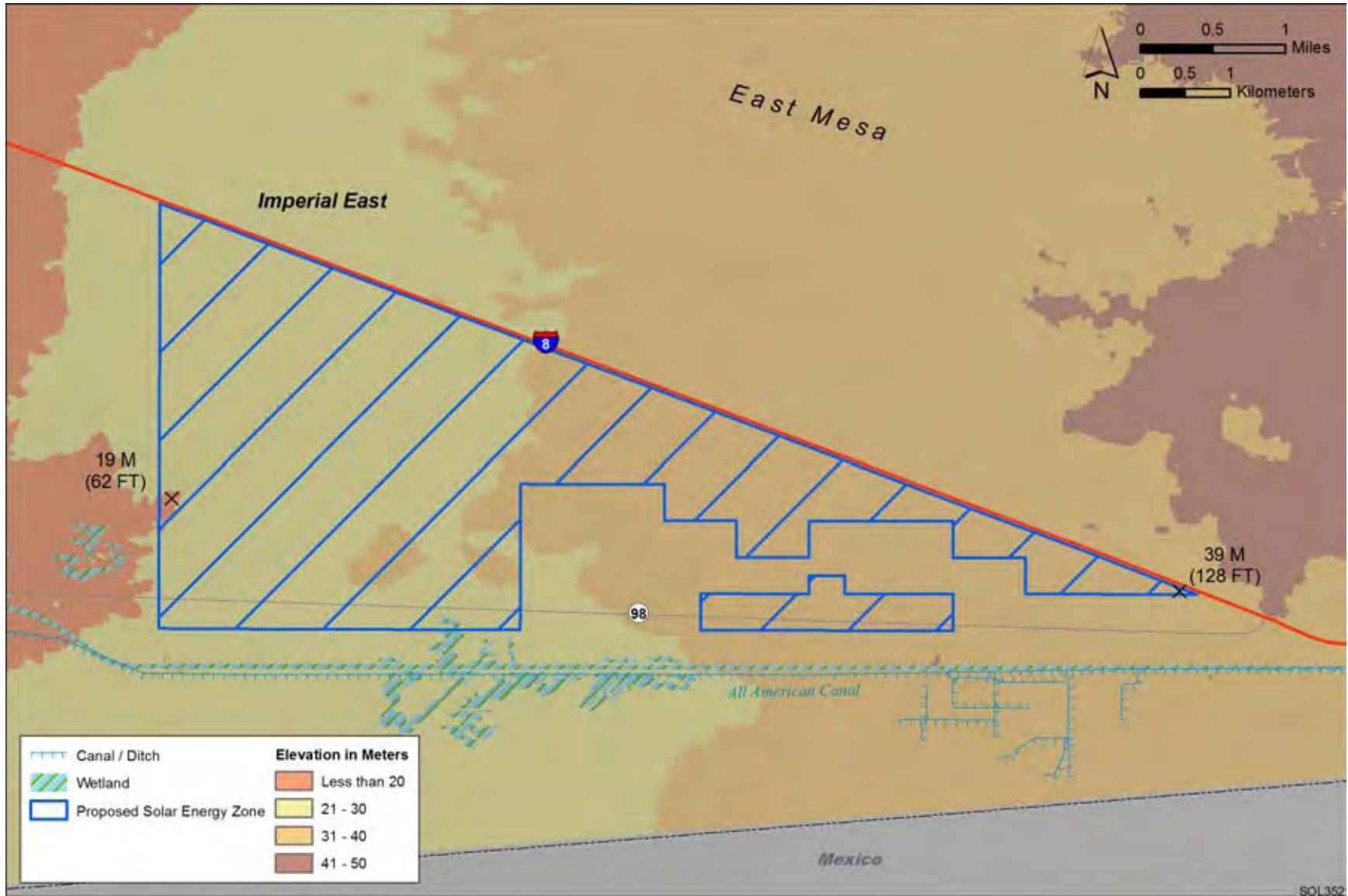


FIGURE 9.1.7.1-3 General Terrain of the Proposed Imperial East SEZ

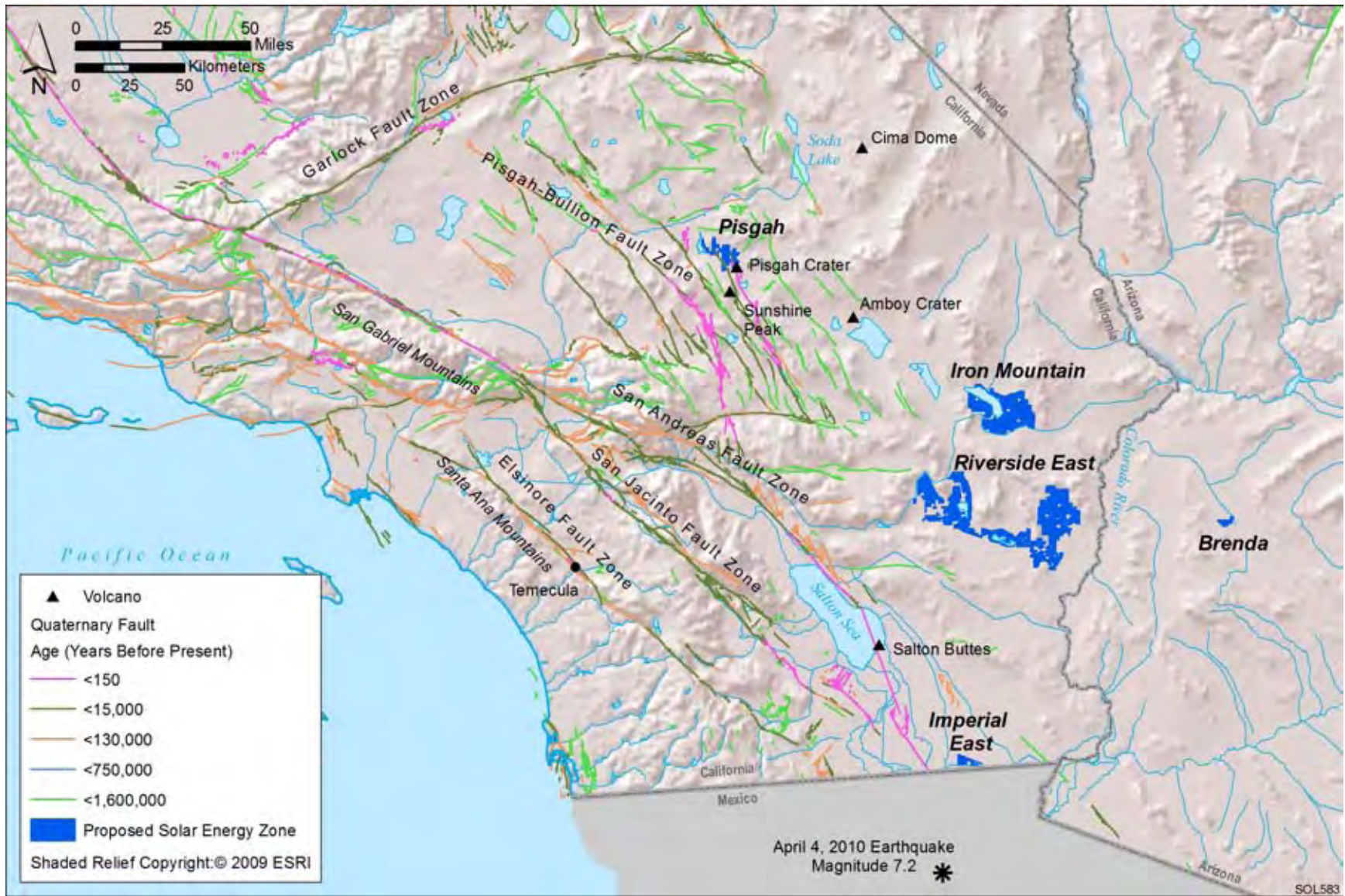


FIGURE 9.1.7.1-4 Quaternary Faults and Volcanoes in Southern California (USGS and CGS 2009; USGS 2010d)

1 the west of the site (Figure 9.1.7.1-5). Focal depths of earthquakes in the Imperial Valley are
2 generally between 3 and 4 mi (4 and 6 km), with a maximum depth of about 5 mi (8 km)
3 (Johnson and Hill 1982).
4

5 The Imperial Fault is the main strand of the San Andreas Fault System in the southern
6 Salton Trough (Figure 9.1.7.1-5). The fault accommodates slip from both the San Andreas
7 and San Jacinto Fault Zones. These fault zones are seismically active regions dominated by
8 northwest-trending right-lateral strike slip faulting and are categorized as “potentially active”
9 (i.e., having surface displacement within the last 11,000 years [Holocene]) under the Alquist-
10 Priolo Earthquake Fault Zoning Act. The term “potentially active” generally denotes that a fault
11 has shown evidence of surface displacement during Quaternary time (the last 2.6 million years).
12 However, because there are numerous such faults in California, the State Geologist has
13 introduced new, more discriminating criteria for zoning faults under the Alquist-Priolo Act.
14 Currently, zoned faults include those that are “sufficiently active,” showing evidence of surface
15 displacement within the past 11,000 years along one or more of its segments or branches, and
16 “well-defined,” having a clearly detectable trace at or just below the ground surface (Bryant and
17 Hart 2007).
18

19 Two major earthquakes have occurred along the Imperial fault, causing significant
20 surface rupture: the 1940 and 1979 Imperial Valley earthquakes (magnitudes 6.9 and 6.4,
21 respectively). Based on these recent events, late Holocene creep rates have been estimated to
22 range from 15 to 20 mm/yr. Slip along the Imperial Fault is transferred north to the San Andreas
23 Fault Zone through the Brawley Seismic Zone (Figure 9.1.7.1-5). Locally, there is a vertical
24 component (via subsidence) to the offset near Mesquite Lake to the northeast of the Imperial
25 Fault and west of the Brawley Seismic Zone. Average recurrence intervals are estimated to range
26 from 40 to 137 years (Treiman 1999).
27

28 On April 4, 2010, an earthquake referred to as the El Mayor-Cucapah Earthquake,
29 registering a moment magnitude (M_w^3) of 7.2 (at an approximate depth of 6.2 mi [10 km]),
30 occurred along a segment of the Laguna Salada fault system in northern Baja California, about
31 30 mi (50 km) southwest of the Imperial East SEZ (Figure 9.1.7.1-4). The Laguna-Salada system
32 is a northwest-trending zone of strike-slip faults that runs parallel to the San Andreas fault
33 system. Displacement was a combination of vertical (east side down) and right lateral shifts with
34 cumulative lateral offsets of about 3.9 ft (1.2 m). Aftershocks were concentrated along a
35 northwest-trending line extending from the Colorado River delta (on the Gulf of California,
36 Mexico) to Temecula, California. Ground-shaking in the vicinity of the Imperial East SEZ is
37 estimated to have been very strong (about 0.18 to 0.34 g) with moderate to heavy potential
38 structure damage (SCSN 2010 and USGS 2010d).
39
40

³ Moment magnitude (M_w) is used for earthquakes with magnitudes greater than 3.5 and is based on the moment of the earthquake, equal to the rigidity of the earth times the average amount of slip on the fault times the amount of fault area that slipped (USGS 2010e).



FIGURE 9.1.7.1-5 Delineated Earthquake Fault Zones near the Proposed Imperial East SEZ (CGS 2010)

1 **Liquefaction.** The proposed Imperial East SEZ lies within an area where the peak
2 horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.30 and
3 0.60 g. Shaking associated with this level of acceleration is generally perceived as very strong
4 to severe; the potential damage to structures is moderate to heavy (USGS 2008).
5

6 The 1979 Imperial Valley earthquake caused right lateral movement along a 22-mi
7 (35-km) section of the Imperial Fault. Evidence of liquefaction as a result of this earthquake
8 has been observed at several locations within the Imperial Valley, especially within the fine-
9 grained fluvial sediments (point bar, channel fill, and overbank deposits associated with the
10 Alamo River) and interbedded channel sands and lacustrine clays on the East Mesa. Sediments
11 most affected were those in the upper 16 ft (5 m); below this depth, sand deposits were found to
12 be dense enough to resist liquefaction under the ground-shaking conditions generated by the
13 1979 earthquake. The types of sediments with the greatest liquefaction effects were loose to
14 very loose silt to clayey silt (overbank deposits), very loose to medium dense very fine sand to
15 silt (channel fill), and stiff to very stiff silty clay to clay (lacustrine deposits). Investigators
16 identified liquefaction effects such as sand boils, ground cracks, earth slumps, earth falls, rock
17 falls, rock slides, lateral spreading, and ground settlement, some within 10 mi (16 km) of the
18 SEZ (Bennet et al. 1981, 1984; Youd and Wieczorek 1982). On the basis of these findings, as
19 well as the similarity in surface material and the very strong to severe ground-shaking intensity
20 that is probable in the region during an earthquake, the risk of liquefaction and ground failure
21 (i.e., permanent ground displacement capable of damaging structures) at the proposed Imperial
22 East SEZ is considered high.
23
24

25 **Volcanic Hazards.** The nearest volcanoes to the proposed Imperial East SEZ are the five
26 small rhyolitic domes (Obsidian Butte, Rock Hill, Red Island [composed of two domes], and
27 Mullet Island) forming the Salton Buttes along the southeast end of the Salton Sea, about 40 mi
28 (65 km) north-northwest of the SEZ (Figure 9.1.7.1-4). The Salton Buttes are within the Salton
29 Sea Geothermal Field and are part of the active crustal spreading center that lies beneath the
30 Colorado River delta sediments. The domes exhibit a bimodal (basalt-rhyolite) composition and
31 were most recently active about 16,000 years ago. The most likely future potential hazard
32 associated with the Salton Buttes volcanoes would result from an explosive rhyolitic eruption,
33 which could give rise to pyroclastic flows and surges; these events could be destructive to
34 distances of 6 mi (10 km) from an active vent (Robinson et al. 1976; Miller 1989).
35

36 The nearest active volcano is Mount St. Helens in the Cascade Range (Washington),
37 about 1,000 mi (1,590 km) north-northwest of Imperial Valley; it has shown some activity as
38 recently as 2008. The nearest volcano that meets the criterion for an unrest episode is the Long
39 Valley Caldera in east-central California, about 400 mi (640 km) to the northwest, which has
40 experienced recurrent earthquake swarms, changes in thermal springs and gas emissions, and
41 uplift since 1980 (Diefenbach et al. 2009). The Long Valley Caldera is part of the Mono-Inyo
42 Craters volcanic chain that extends from Mammoth Mountain (on the caldera rim) northward
43 about 25 mi (40 km) to Mono Lake. Small to moderate eruptions have occurred at various sites
44 along the volcanic chain in the past 5,000 years at intervals ranging from 250 to 700 years.
45 Wind-blown ash from some of these eruptions is known to have drifted as far east as Nebraska.
46 While the probability of an eruption within the volcanic chain in any given year is small (less

1 than 1%), serious hazards could result from a future eruption. Depending on the location, size,
2 timing (season), and type of eruption, hazards could include mudflows and flooding, pyroclastic
3 flows, small to moderate volumes of tephra, and falling ash (Hill et al. 1998, 2000; Miller 1989).
4

5 Earthquake swarms also occurred at Medicine Lake Volcano in northern California
6 (Cascade Range) for a few months in 1988. Medicine Lake is located about 700 mi (1,130 km)
7 northwest of the SEZ (Diefenbach et al. 2009). The most recent eruption at Medicine Lake was
8 rhyolitic in composition and occurred about 900 years ago (USGS 2010f). Nearby Lassen Peak
9 last erupted between 1914 and 1917; at least two blasts during this period produced mudflows
10 that inundated the valley floors of Hut and Lost Creeks to the east. Tephra from the most violent
11 eruption, occurring on May 22, 1915, was carried by prevailing winds and deposited as far as
12 310 mi (500 km) to the east (Miller 1989).
13
14

15 ***Slope Stability and Land Subsidence.*** The incidence of rock falls and slope failures in
16 the vicinity of the proposed Imperial East SEZ is low because it is located on the relatively flat
17 terrain of the Imperial East Mesa.
18

19 Subsidence due to earthquakes, geothermal fluid production, and groundwater
20 withdrawal has been observed in the Imperial Valley. The Imperial County Department of
21 Public Works⁴ established a subsidence monitoring program (Geothermal Subsidence
22 Detection Network) between 1971 and 1972. Monitoring has shown that substantial downward
23 movement of the valley floor relative to the mountains to the west has occurred (Crow and
24 Kasamayer 1978). A study conducted by Massonnet et al. (1997) found maximum rates of
25 subsidence on the East Mesa to be about 18 mm/yr between 1991 and 1994. Subsidence is not
26 generally a serious hazard if it occurs as a broad depression over a large region (except in flood-
27 prone areas sensitive to changes in elevation). The major problems associated with subsidence
28 occur as a result of differential vertical subsidence, horizontal displacement, and earth fissures
29 (Burbey 2002).
30
31

32 ***Other Hazards.*** Other potential hazards at the Imperial East SEZ include those associated
33 with soil compaction (restricted infiltration and increased runoff), expanding clay soils
34 (destabilization of structures), and hydro-compactable or collapsible soil (settlement).
35 Disturbance of soil crusts and desert varnish on soil surfaces may also increase the likelihood
36 of soil erosion by wind. Section 9.1.9.1.1 provides a discussion of flood risks within the Imperial
37 East SEZ.
38
39
40

⁴ The Imperial County Department of Public Works together with the Imperial Irrigation District, the California Division of Oil and Gas, and the U.S. Geological Survey formed the Imperial Valley Subsidence Detection Committee in the 1970s and constructed a network of precisely leveled benchmarks throughout the valley (Crow and Kasameyer 1978).

1 **9.1.7.1.2 Soil Resources**
2

3 Soils within the proposed Imperial East SEZ are predominantly fine sands and loamy fine
4 sands of the Rositas and Superstition Series, which together make up about 96% of the soil
5 coverage at the site (Figure 9.1.7.1-6). Soil map units within the Imperial East SEZ are described
6 in Table 9.1.7.1-1. Parent material consists of alluvium and eolian sands derived from various
7 sources. Soils are characterized as moderately to somewhat excessively well drained. Most soils
8 on the site have low surface runoff potential and rapid permeability. The natural soil surface is
9 suitable for roads, with a slight to moderate erosion hazard when used as roads or trails. The
10 water erosion potential is slight for all soils. The susceptibility to wind erosion is high for most
11 soils, with as much as 220 tons of soil eroded by wind per acre each year. All the soils within the
12 SEZ have features that are favorable for fugitive dust formation (NRCS 2010). Biological soil
13 crusts and desert pavement have not been documented in the SEZ, but may be present.
14

15 None of the soils within the SEZ is rated as hydric⁵ (a few units have not been rated).
16 Flooding is not likely for soils at the site (occurring less than once in 500 years). Most of the
17 soils (about 91%) are classified as farmland of statewide importance; about 6% of the soils
18 (Superstition loamy fine sand) are classified as prime farmland if irrigated (NRCS 2010).
19
20

21 **9.1.7.2 Impacts**
22

23 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
24 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
25 project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind,
26 soil erosion by water and surface runoff, sedimentation, and soil contamination. Such impacts are
27 common to all utility-scale solar energy developments in varying degrees and are described in
28 more detail for the four phases of development in Section 5.7.1.
29

30 Because impacts on soil resources result from ground-disturbing activities in the project
31 area, soil impacts would be roughly proportional to the size of a given solar facility, with larger
32 areas of disturbed soil having a greater potential for impacts than smaller areas (Section 5.7.2).
33 The magnitude of impacts would also depend on the types of components built for a given
34 facility since some components would involve greater disturbance and would take place over a
35 longer timeframe.
36
37

38 **9.1.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**
39

40 No SEZ-specific design features were identified for soil resources at the proposed
41 Imperial East SEZ. Implementing the programmatic design features described in Appendix A,
42 Section A.2.2., as required under BLM's Solar Energy Program, would reduce the potential for
43 soil impacts during all project phases.
44

⁵ A hydric soil is a soil formed under conditions of saturation, flooding, or ponding.

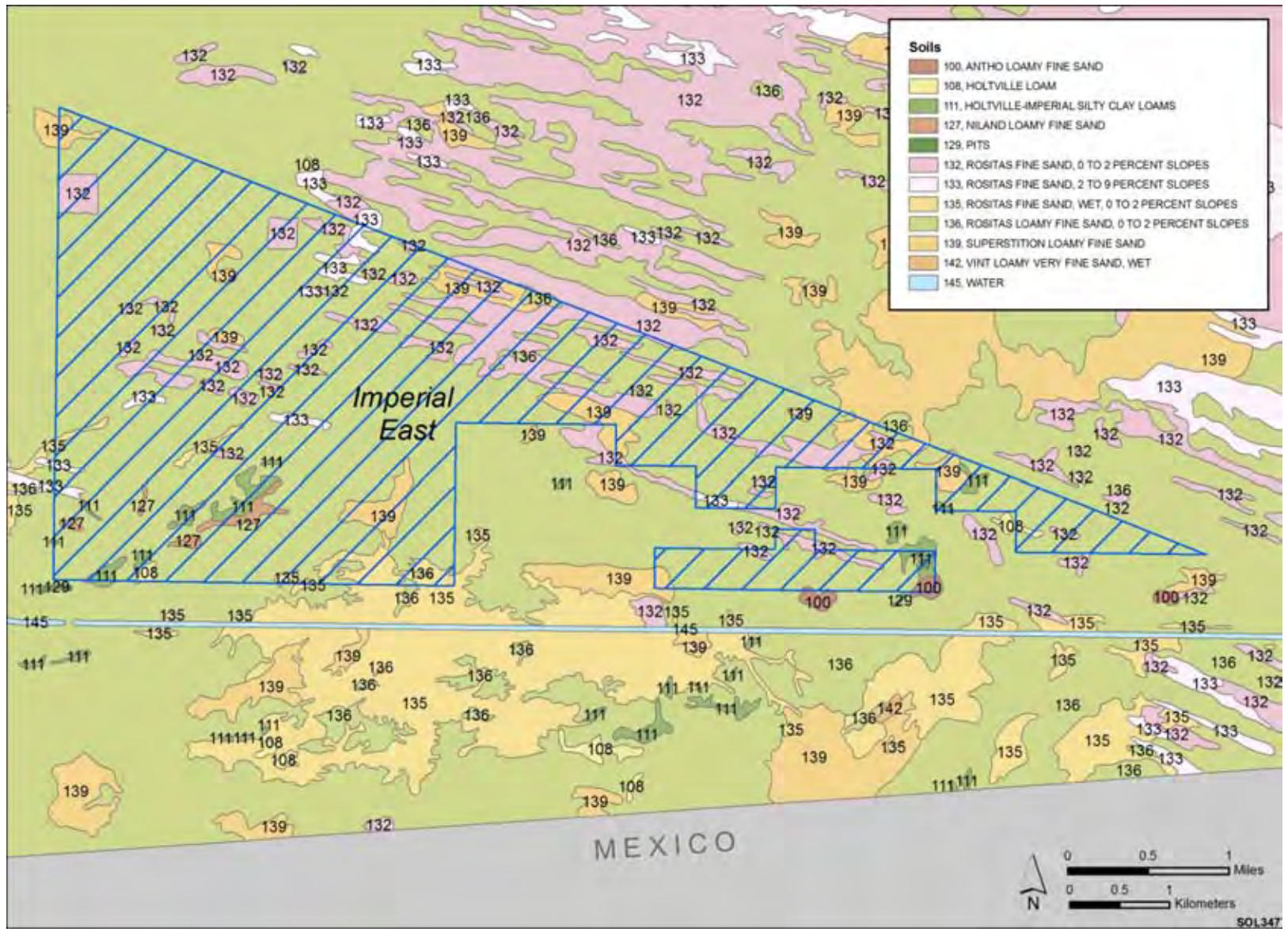


FIGURE 9.1.7.1-6 Soil Map for the Proposed Imperial East SEZ (NRCS 2008)

TABLE 9.1.7.1-1 Summary of Soil Map Units within the Proposed Imperial East SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential	Description	Area in Acres ^b (% of SEZ)
136	Rositas loamy fine sand (0 to 2% slope)	Slight (0.10)	High (WEG 2) ^c	Nearly level soils on the valley floor. Parent material consists of alluvium and eolian deposits derived from mixed sources. Very deep and somewhat excessively drained with low surface runoff potential (high infiltration rate) and rapid permeability; slightly saline. Available water capacity is low. Moderate rutting hazard. Used mainly for grazing, cropland, and wildlife habitat. Crops include citrus fruits, grapes, alfalfa, and truck crops. Farmland of statewide importance. ^d	8,515 (67)
135	Rositas fine sand, wet (0 to 2% slopes)	Slight (0.05)	High (WEG 1)	Nearly level soils on the valley floor. Parent material consists of alluvium and eolian deposits derived from mixed sources. Very deep and moderately well drained with low surface runoff potential (high infiltration rate) and rapid permeability; nonsaline to very slightly saline. Available water capacity is low. Moderate rutting hazard. Used mainly for grazing, cropland, and wildlife habitat. Crops include citrus fruits, grapes, alfalfa, and truck crops. Farmland of statewide importance.	1,904 (15)
132	Rositas fine sand (0 to 2% slopes)	Slight (0.05)	High (WEG 1)	Nearly level soils on the valley floor. Parent material consists of alluvium and eolian deposits derived from mixed sources. Very deep and somewhat excessively drained with low surface runoff potential (high infiltration rate) and rapid permeability; nonsaline to very slightly saline. Available water capacity is low. Moderate rutting hazard. Used mainly for grazing, cropland, and wildlife habitat. Crops include citrus fruits, grapes, alfalfa, and truck crops. Farmland of statewide importance.	854 (7)
139	Superstition loamy fine sand	Slight (0.10)	High (WEG 2)	Nearly level to gently sloping soils on alluvial fans. Parent material consists of alluvium derived from mixed sources. Very deep and somewhat excessively drained with low surface runoff potential (high infiltration rate) and rapid permeability; nonsaline. Most areas are without vegetation; provides some cover for wildlife. Available water capacity is low. Moderate rutting hazard. Used mainly for grazing and irrigated cropland. Prime farmland if irrigated.	756 (6)

TABLE 9.1.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential	Description	Area in Acres ^b (% of SEZ)
133	Rositas fine sand (0 to 9% slopes)	Slight (0.05)	High (WEG 1)	Nearly level to gently sloping soils on alluvial fans and sand sheets. Parent material consists of eolian deposits derived from mixed sources. Very deep and somewhat excessively drained, with low surface runoff potential (high infiltration rate) and rapid permeability; nonsaline to very slightly saline. Available water capacity is low. Moderate rutting hazard. Used mainly for grazing, cropland, and as wildlife habitat. Crops include citrus fruits, grapes, alfalfa, and truck crops. Farmland of statewide importance.	163 (1)
111	Holtville Imperial silty clay loam	Moderate (0.32)	Moderate (WEG 4)	Consists of about 50% Holtville silty clay loam and 40% Imperial silty clay loam. Nearly level to gently sloping soils on valley floor (floodplains and old lake beds). Parent material consists of alluvium derived from mixed sources. Very deep and moderately well to well drained with low runoff potential and very slow permeability; nonsaline to slightly saline. Available water capacity is moderate to high. Severe rutting hazard. Used for native desert plants and irrigated cropland. Used mainly for grazing, cropland, and as wildlife habitat. Crops include cotton, sugar beats, alfalfa, barley, annual ryegrass, sorghums, flax, safflower, carrots, and lettuce. Farmland of statewide importance.	154 (1)

^a Water erosion potential rates the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. The ratings are based on slope and soil erosion factor K (whole soil; doesn't account for the presence of rock fragments) and represent soil loss caused by sheet or rill erosion where 50 to 75% of the surface has been exposed by ground disturbance. A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions. A rating of "very severe" indicates that significant erosion is expected; loss of soil productivity and damage are likely and erosion control measures are costly and generally impractical.

^b To convert acres to km², multiply by 0.004047.

Footnotes continued on next page.

TABLE 9.1.7.1-1 (Cont.)

- ^c WEG = wind erodibility group. WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and also take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m²) per year; WEG 2, 134 tons (122 metric tons) per acre (4,000 m²) per year; and WEG 4, 86 tons (78 metric tons) per acre (4,000 m²) per year.
- ^d Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. Farmland of statewide importance includes soils in NRCS's land capability Class II and III that do not meet the criteria for Prime farmland, but may produce high yields of crops when treated and managed according to acceptable farming methods.

Source: NRCS (2010).

1 **9.1.8 Minerals (Fluids, Solids, and Geothermal Resources)**
2
3

4 **9.1.8.1 Affected Environment**
5

6 There are no existing locatable mining claims or oil and gas leases (BLM and
7 USFS 2010a) within the proposed Imperial East SEZ. In June 2009, public land in the
8 SEZ was closed to locatable mineral entry pending the outcome of this solar energy PEIS.
9

10 In the past, all of the area was leased for oil and gas, but no development occurred and
11 the leases were closed (BLM and USFS 2010b). The area remains open for discretionary mineral
12 leasing, including leasing for oil and gas, and other leasable minerals, and for disposal of salable
13 minerals.
14

15 About 60% of the SEZ is included within a known geothermal resource area (KGRA)
16 (BLM and USFS 2010b). There is an operating geothermal plant about 3 mi (4.8 km) northwest
17 of the SEZ.
18
19

20 **9.1.8.2 Impacts**
21

22 If the area is identified by the BLM as an SEZ to be used for utility-scale solar
23 development, it would continue to be closed to all incompatible forms of mineral development.
24 Since there are no oil and gas leases in the area, it is assumed that there would be no significant
25 impacts on these resources if the area were developed for solar energy production. Also, since
26 the area does not contain existing mining claims, it is also assumed there would be no loss of
27 locatable mineral production there in the future. Surface development for geothermal resources
28 would also be foregone on 3,462 acres (14 km²) within the KGRA.
29

30 If the area is identified as a solar energy development zone, some mineral uses might be
31 allowed on all or portions of the SEZ. For example, oil and gas development that involves the
32 use of directional drilling to access resources under the area (should any be found) might be
33 allowed. It might also be possible to develop geothermal resources by using directional drilling
34 techniques. The production of common minerals, such as sand and gravel and mineral materials
35 used for road construction, might take place in areas not directly developed for solar energy
36 production.
37
38

39 **9.1.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**
40

41 Implementing the programmatic design features described in Appendix A, Section A.2.2,
42 as required under BLM's Solar Energy Program would provide adequate mitigation for
43 protection of mineral resources with the possible exception of geothermal resources.
44
45

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A proposed design features specific to the proposed SEZ includes the following:

- To protect the option for geothermal leasing under solar energy facilities, ROW authorizations for solar energy facilities should specifically note the potential for geothermal leasing with no surface occupancy stipulations.

1 **9.1.9 Water Resources**

2
3
4 **9.1.9.1 Affected Environment**

5
6 The proposed Imperial East SEZ is located within the Southern Mojave–Salton Sea
7 subbasin of the California hydrologic region (USGS 2010c) and the Basin and Range
8 physiographic province characterized by intermittent mountain ranges and desert valleys
9 (Planert and Williams 1995). The proposed SEZ is within the desert landscape portion of the
10 Imperial Valley and has surface elevations ranging between 75 and 125 ft (23 and 38 m) above
11 sea level. This region of southern California is within the Colorado River subdivision of the
12 Sonoran Desert, which is characterized as a hot and dry climate with summer high temperatures
13 up to 120°F (48.8°C) and less than 3 in. (7.6 cm) of annual rainfall (ASDM 2010). The majority
14 of the precipitation falls in the winter and spring months with occasional monsoonal
15 thunderstorms (CDWR 2009). Evapotranspiration rates range between 57 and 75 in./yr (145 and
16 190 cm/yr) within the Imperial and Coachella Valleys (CIMIS 2010), and the average annual pan
17 evaporation rate is 118 in./yr (300 cm/yr) (Cowherd et al. 1988; WRCC 2010a). While the
18 Imperial Valley is a very arid region, it supports more than 450,000 acres (1,821 km²) of
19 farmland irrigated primarily by water diverted from the Colorado River (Layton 1978).

20
21
22 **9.1.9.1.1 Surface Waters (Including Drainages, Floodplains, and Wetlands)**

23
24 There are no surface water features located on the proposed Imperial East SEZ, but the
25 Salton Sea, along with several irrigation canals and small washes, is found within the Imperial
26 Valley, as shown in Figure 9.1.9.1-1. The All-American Canal flows along the southern
27 boundary of the proposed SEZ. The canal diverts Colorado River water at the Imperial Dam,
28 located 35 mi (56 km) east, to the agricultural fields of the Imperial Valley to the north and
29 west of the proposed SEZ. Annual average flows in the All-American Canal coming out of
30 the Colorado River ranged between 2.8 million and 3.7 million ac-ft/yr (3.5 billion and
31 4.6 billion m³/yr) for the period from 1962 to 1992 (USGS 2010b; stream gauge 09527500). The
32 canal has recently been lined with concrete to prevent seepage losses on a 23-mi (40-km) reach,
33 which includes the portion along the southern boundary of the proposed SEZ (CDWR 2009;
34 IID 2009). Diversions off the All-American Canal include the Coachella Canal (9 mi [14.5 km]
35 east), East Highland Canal (4 mi [6.5 km] west), and Central Main Canal (14 mi [22.5 km] west
36 of the proposed SEZ). The Alamo River and the New River are located 9 mi (14 km) and 23 mi
37 (37 km) west of the proposed SEZ, respectively. Salinity is the primary water quality concern for
38 Colorado River water that flows in the canals and rivers of the Imperial Valley, which typically
39 have total dissolved solids concentrations (TDS) between 700 and 800 mg/L (Layton 1978;
40 CRBSCF 2008).

41
42 The Salton Sea, located 37 mi (59.5 km) northwest of the proposed Imperial East SEZ
43 (Figure 9.1.9.1-1), is California’s largest inland water body, covering 230,000 acres (931 km²)
44 (CDWR 2009). The Salton Sea is the hydrologic sink for the Imperial Valley with no surface
45 outflows and has a water surface elevation of 230 ft (70 m) below sea level. The majority of the
46 Salton Sea’s inflow comes from the Alamo and New Rivers, which are classified as impaired



1

2 **FIGURE 9.1.9.1-1 Surface Water Features near the Proposed Imperial East SEZ**

1 water bodies because they primarily receive agricultural runoff and wastewater containing
2 elevated pesticides, dissolved salts, and sediment concentrations (Orlando et al. 2008). The lack
3 of surface outlets, high evaporation rates, and agricultural pollution have resulted in the
4 Salton Sea having a higher salt content (46 g/L) than seawater (33 g/L) (Thompson et al. 2008).

5
6 Flood hazards for the majority of the Imperial Valley region are considered moderate
7 (Zone X), and land within the proposed SEZ is classified as being susceptible to floods between
8 the 100-year and 500-year events (FEMA 2009). While the Imperial Valley has an arid climate,
9 the landscape has very little vegetation, and there are braided, ephemeral washes and drainage
10 patterns that experience flash floods and debris flows during large storm events. These
11 conditions, in combination with low-capacity stormwater infrastructure throughout the region,
12 result in the potential for flooding during storm events (CDWR 2009).

13
14 The NWI identified several small palustrine wetlands located along the All-American
15 Canal, which are described in more detail in Section 9.1.10.1. These wetlands are temporally
16 flooded throughout the year, and the groundwater level is often below the land surface
17 (USFWS 2009). Historically, these small wetlands have been supported by seepage water from
18 the unlined All-American Canal, which has been recently lined. The IID, which operates the
19 canal, is planning to create and enhance 44 acres (0.2 km²) of wetlands located just along the
20 southern boundary of the proposed SEZ as a mitigation measure for the canal lining project
21 (IID 2010a).

22 23 24 **9.1.9.1.2 Groundwater**

25
26 The proposed Imperial East SEZ is located within the Imperial Valley groundwater
27 basin and covers an area of 1.2 million acres (4,860 km²), with its eastern boundary extending
28 northwestward along the Sand Hills/Sand Mesa region and Chocolate Mountains toward the
29 Salton Sea (Figure 9.1.9.1-1). The valley fill alluvium can be as deep as 20,000 ft (6,100 m) in
30 the center of the valley and consists of Quaternary and Tertiary aged sediments; however, the
31 water-bearing aquifers are found in the top 2,000 ft (610 m) (Loeltz et al. 1975). The top
32 2,000 ft (610 m) of alluvium is primarily unconfined and contains two main aquifers separated
33 by a semipermeable layer averaging 60 ft (18 m) in thickness. The lower aquifer averages
34 380 ft (116 m) in thickness with a maximum thickness of 1,500 ft (457 m), while the upper
35 aquifer averages 60 ft (18 m) in thickness with a maximum thickness of 280 ft (85 m)
36 (CDWR 2003; groundwater basin number 7-30). These aquifers comprise silt, sand, and clays
37 that originate from the Colorado River mixed with locally derived coarse sands and gravels
38 (Loeltz et al. 1975). The upper aquifer also contains patches of up to 80 ft (24 m) of low-
39 permeability lake deposits from the prehistoric Lake Cahuilla, which creates localized areas
40 of confined conditions (CDWR 2003).

41
42 Recharge to the Imperial Valley groundwater basin is primarily through irrigation returns,
43 Colorado River recharge, seepage under unlined canals, surface runoff from surrounding higher
44 elevations, underflow from the Mexicali Valley to the south, and direct runoff and percolation of
45 precipitation (CDWR 2003). Discharge of groundwater is primarily through irrigation
46 withdrawals, losses to streams, and evapotranspiration (Thompson et al. 2008). A groundwater

1 model based on data from 1970 to 1990 suggests that the total recharge by irrigation returns and
2 seepage under canals was 250,000 ac-ft/yr (308 million m³/yr) and underflow recharge was
3 173,000 ac-ft/yr (213 million m³/yr), while total discharge from the basin was 439,000 ac-ft/yr
4 (541 million m³/yr) (CDWR 2003). Recharge by precipitation runoff and infiltration was
5 estimated to be less than 10,000 ac-ft/yr (12 million m³/yr) (Loeltz et al. 1975). It is very likely
6 that the estimated value of recharge by seepage from unlined canals was overestimated, because
7 in 1980 a 49-mi (79-km) reach of the Coachella Canal was lined with concrete, and in early
8 2010, lining of 23 mi (37 km) of the All-American Canal, including the reach along the south
9 portion of the proposed Imperial East SEZ, is scheduled to be completed (CDWR 2003, 2009;
10 IID 2009a). The newly lined portion of the canal is expected to save 67,700 ac-ft/yr
11 (83.5 million m³/yr) (IID 2009a).

12
13 The primary groundwater flow path follows the valley to the northwest in the direction of
14 the Salton Sea. Transmissivity values vary across the Imperial Valley groundwater basin; values
15 for fine-grained deposits typically range between 134 and 1,340 ft²/day (12 and 125 m²/day).
16 Regions of higher transmissivity are located along the Sand Mesa area (Figure 9.1.9.1-1); values
17 reach 114,000 ft²/day (10,590 m²/day). In general, transmissivity values decrease moving west
18 and north from the Sand Mesa area (Loeltz et al. 1975).

19
20 The majority of groundwater wells in the Imperial Valley are used for irrigation and
21 are located in the agricultural portion of the valley (5 mi [8 km] west of the proposed SEZ).
22 Reported groundwater well yields range between 45 and 1,550 gpm (170 and 5,687 L/min)
23 (Loeltz et al. 1975). Groundwater levels have remained steady in the region for several decades
24 because of relatively constant recharge rates (CDWR 2003). Three U.S. Geological Survey
25 (USGS) wells located in the desert portion of the Imperial Valley also show steady groundwater
26 elevations ranging from 23 to 47 ft (7 to 14 m) below the surface (USGS 2010b; well numbers
27 324242115073501, 324340115073401, 324632115011001). Groundwater quality is a concern in
28 the Imperial Valley because of high dissolved salts and agricultural chemical concentrations.
29 TDS concentrations range from 498 to 7,280 mg/L; values often exceed 2,000 mg/L
30 (CDWR 2003). Another potential water quality concern is that approximately 20% of the
31 groundwater in this region has temperatures greater than 59°F (15°C), which is why this region
32 is often considered for geothermal energy production (Dutcher et al. 1972).

33 34 35 **9.1.9.1.3 Water Use and Water Rights Management**

36
37 In 2005, water withdrawals from surface waters and groundwater in Imperial County
38 were 2.4 million ac-ft/yr (2.9 billion m³/yr), of which 98% came from surface waters and was
39 used primarily for irrigating agricultural fields. The majority of this water is imported into the
40 Imperial Valley from the Colorado River. Total groundwater withdrawals were 46,000 ac-ft/yr
41 (57 million m³/yr), which was used primarily for irrigation. Municipal and domestic water uses
42 totaled 34,000 ac-ft/yr (42 million m³/yr), and industrial and thermoelectric power uses totaled
43 3,000 ac-ft/yr (3.7 million m³/yr) (Kenny et al. 2009).

44
45 To manage water resources, California uses a “plural” system, which consists of a
46 mixture of riparian and prior appropriation doctrines for surface waters, a separate doctrine

1 for groundwater, and pueblo rights (BLM 2001a). Several agencies are involved with the
2 management of California’s water resources, including federal, state, local, and water/irrigation
3 districts. For example, water rights and water quality are managed by the State Water Board,
4 while the Department of Water Resources manages water conveyance, infrastructure, and flood
5 management (CDWR 2009). Surface water appropriations, for nonriparian rights, begin with a
6 permit application to the State Water Board and a review process that examines the application’s
7 beneficial use, pollution potential, and water quantity availability; the permitting, review, and
8 licensing procedure should not take more than 6 months to complete unless the application is
9 protested (BLM 2001a).

10
11 Groundwater management in California is primarily done at the local level of government
12 through local agencies or ordinances; it can also be subject to court adjudications. State statute
13 assigns authority and revenue mechanisms to several types of local agencies to provide water
14 for beneficial uses, as well as to manage withdrawals in order to prevent overdraft⁶ of the
15 aquifers. Local ordinances (typically at the county level) also can be used to manage
16 groundwater resources and have been adopted in 27 counties in California. Many of these
17 local groundwater ordinances are focused on controlling water exports out of the basin through
18 permitting processes. Court adjudications are the strongest form of groundwater management
19 used in California and often result in the creation of a court-appointed “watermaster” agency to
20 manage withdrawals for all users to ensure that the court-determined safe yield⁷ is maintained
21 (CDWR 2003).

22
23 Water resources potentially available for solar energy development at the proposed
24 Imperial East SEZ are imported Colorado River water and groundwater. Imported Colorado
25 River water via the All-American Canal is controlled by the IID, which is a public entity that
26 delivers Colorado River water to the agricultural regions of the Imperial Valley, supports and
27 maintains water infrastructure (e.g., canals, tile drainage systems, pumping stations), and
28 implements water conservation measures (IID 2005). Although the IID primarily supports
29 irrigation for agriculture, Section 22121 of the California water code allows organizations
30 such as the IID to appropriate water for energy production. The IID currently allows up to
31 25,000 ac-ft/yr (30.8 million m³/yr) to be used for non-agricultural uses within its service area
32 (IID 2009b). However, given the high demand of water for agricultural purposes and the limited
33 supply of Colorado River water, it is highly unlikely that IID water could be used to support
34 projects seeking large volumes of water for non-irrigation uses (Layton 1978; Anderholdt-
35 Shields 2010).

36
37 Groundwater withdrawals to support solar energy development are subject to the Imperial
38 County groundwater ordinance (Groundwater Management, Title 9, Division 22). The permitting
39 of new groundwater wells is reviewed by the county’s groundwater planning commission, which
40 oversees all groundwater extractions, exports, and artificial recharge applications. In addition,

⁶ Groundwater overdraft is the condition in which water extractions from an aquifer exceed recharge processes in such excess as to cause substantial and sustained decreases in groundwater flows and groundwater elevations.

⁷ Safe yield is the amount of groundwater that can be withdrawn from a groundwater basin over a period of time without exceeding the long-term recharge of the basin or unreasonably affecting the basin’s physical and chemical integrity.

1 the county groundwater planning commission has the authority to manage the groundwater
2 resources in terms of quantifying groundwater storage capacity, acquiring water rights, requiring
3 water conservations practices, and limiting groundwater withdrawal rates.
4
5

6 **9.1.9.2 Impacts**

7

8 Potential impacts on water resources related to utility-scale solar energy development
9 include direct and indirect impacts on surface waters and groundwater. Direct impacts occur at
10 the place of origin and at the time of the proposed activity, while indirect impacts occur away
11 from the place of origin or later in time. Impacts on water resources considered in this analysis
12 are the result of land disturbance activities (construction, final developed site plan, as well as
13 off-site activities such as road and transmission line construction) and water use requirements
14 for solar energy technologies that take place during the four project phases: site characterization,
15 construction, operations, and decommissioning/reclamation. Both land disturbance and
16 consumptive water use activities can affect groundwater and surface water flows, cause
17 drawdown of groundwater surface elevations, modify natural drainage pathways, obstruct natural
18 recharge zones, and alter surface water-wetland-groundwater connectivity. Water quality can
19 also be degraded through the generation of wastewater, chemical spills, increased erosion and
20 sedimentation, and increased salinity (e.g., by the excessive withdrawal from aquifers).
21
22

23 ***9.1.9.2.1 Land Disturbance Impacts on Water Resources***

24

25 Impacts related to land disturbance activities are common to all utility-scale solar energy
26 facilities, which are described in more detail for the four phases of development in Section 5.9.1;
27 these impacts will be minimized through the implementation of programmatic design features
28 described in Appendix A, Section A.2.2. In addition to the hydrologic evaluation (including
29 identifying 100-year floodplains and jurisdictional waters) described in the design features
30 (Appendix A, Section A.2.2), coordination and permitting with the California Department of
31 Fish and Game (CDFG) would be needed for any proposed alterations of surface water features
32 (both perennial and ephemeral) in accordance with the Lake and Streambed Alteration Program
33 (CDFG 2010c). Runoff of water and sediments from the proposed Imperial East SEZ could
34 impair the existing wetlands along the All-American Canal and mitigation wetlands associated
35 with the canal lining project. Siting of solar energy facilities and land disturbance should avoid
36 interfering with natural drainage patterns near the southern boundary of the proposed SEZ, where
37 wetland areas could be affected.
38
39

40 ***9.1.9.2.2 Water Use Requirements for Solar Energy Technologies***

41
42

43 **Analysis Assumptions**

44

45 A detailed description of the water use assumptions for the four utility-scale solar energy
46 technologies (parabolic trough, power tower, dish engine, and PV systems) is presented in

1 Appendix M. Assumptions regarding water use calculations specific to the proposed Imperial
2 East SEZ are as follows:

- 3
- 4 • On the basis of a total area of less than 10,000 acres (40 km²), it is assumed
5 that one solar project would be constructed during the peak construction year;
- 6
- 7 • Water needed for making concrete would come from an off-site source.
- 8
- 9 • The maximum land area disturbed for an individual solar facility during the
10 peak construction year is assumed to be 3,000 acres (12 km²);
- 11
- 12 • Assumptions on individual facility size and land requirements (Appendix M)
13 along with the assumed number of projects and maximum allowable land
14 disturbance, result in the potential to disturb up to 52% of the SEZ total area
15 during the peak construction year;
- 16
- 17 • Water use requirements for hybrid cooling systems are assumed to be on the
18 same order of magnitude as those using dry cooling (see Section 5.9.2.1); and
- 19
- 20 • For the purposes of this analysis, Colorado River water from the All-
21 American Canal is assumed to be unavailable for wet- and dry-cooling
22 purposes at solar energy developments because of two factors: (1) negotiation
23 with IID for canal water would have to be done on a project-specific basis,
24 and (2) limited water availability and irrigation demands in the Imperial
25 Valley suggest minimal canal water would be available (see Section 9.1.9.1.3
26 for more details).
- 27

28 **Site Characterization**

29
30
31 During site characterization, water would be used mainly for fugitive dust control and the
32 workforce potable water supply. Impacts on water resources during this phase of development
33 are expected to be negligible, because activities would be limited in area, extent, and duration;
34 water needs could be met by trucking water in from an off-site source.

35 **Construction**

36
37
38
39 During construction, water would be used mainly for fugitive dust control and the
40 workforce potable water supply. Because there are no significant surface water bodies on the
41 proposed Imperial East SEZ, the water requirements for construction activities could be met
42 by either trucking water to the sites or by using on-site groundwater resources (the potential
43 for using All-American Canal water for construction activities, except for potable supply, is
44 considered infeasible for the purposes of this analysis given the relatively short duration of
45 construction activities with respect to the logistical issues of conveying canal water to the
46 proposed SEZ). Water requirements for dust suppression and potable water supply during the

1 peak construction year, which are shown in Table 9.1.9.2-1, could be as high as 2,074 ac-ft
 2 (2.6 million m³). In addition, up to 74 ac-ft (91,300 m³) of sanitary wastewater would be
 3 generated and would need to be treated either on-site or sent to an off-site facility.
 4

5 Groundwater wells would have to yield an estimated 883 to 1,284 gpm (3,343 to
 6 4,860 L/min) to meet the water requirements estimated for construction. These yields are on
 7 the order of large municipal and agriculture production wells (Harter 2003) and similar in
 8 magnitude to reported well yields found in the Imperial Valley (Loeltz et al. 1975). Groundwater
 9 used for a potable supply must have a TDS of less than 1,500 mg/L and is recommended to be
 10 less than 500 mg/L to meet secondary maximum contaminant levels (*California Code*, Title 22,
 11 Article 16, Section 64449). Given the potential for high TDS values in the groundwater of the
 12 Imperial Valley groundwater basin, workforce water supplies may have to be brought in from
 13 off-site regardless of the availability of groundwater.
 14

15
 16 **Operations**
 17

18 During operations, water would be required for mirror/panel washing, the workforce
 19 potable water supply, and cooling (parabolic trough and power tower only) (Table 9.1.9.2-2).
 20 Water needs for cooling are a function of the type of cooling used (dry, wet, or hybrid). Further
 21 refinements to water requirements for cooling would result from the percentage of time that the
 22 option was employed (30 to 60% range assumed) and the power of the system. The differences
 23 between the water requirements reported in Table 9.1.9.2-2 for the parabolic trough and power
 24
 25

TABLE 9.1.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Imperial East SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements ^a				
Fugitive dust control (ac-ft) ^{b,c}	1,352	2,029	2,029	2,029
Potable supply for workforce (ac-ft)	74	45	19	9
Total water use requirements (ac-ft)	1,426	2,074	2,048	2,038
Wastewater generated				
Sanitary wastewater (ac-ft)	74	45	19	9

^a Assumptions of water use for fugitive dust control, potable supply for workforce, and wastewater generation are presented in Appendix M.
^b Fugitive dust control estimation assumes a local pan evaporation rate of 118 in./yr (300 cm/yr) (Cowherd et al. 1988; WRCC 2010a).
^c To convert ac-ft to m³, multiply by 1,234.

26
 27

TABLE 9.1.9.2-2 Estimated Water Requirements during Operations at Full Build-out Capacity at the Proposed Imperial East SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW) ^{a,b}	916	509	509	509
Water use requirements				
Mirror/panel washing (ac-ft/yr) ^{c,d}	458	254	254	25
Potable supply for workforce (ac-ft/yr)	13	6	6	1
Dry cooling (ac-ft/yr) ^e	183–916	102–509	NA ^f	NA
Wet cooling (ac-ft/yr) ^e	4,120–13,275	2,289–7,375	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA	NA	260	26
Dry-cooled technologies (ac-ft/yr)	654–1,387	362–769	NA	NA
Wet-cooled technologies (ac-ft/yr)	4,591–13,746	2,549–7,635	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr) ^g	260	144	NA	NA
Sanitary wastewater (ac-ft/yr)	13	6	6	1

^a Land area for parabolic trough was estimated at 5 acres/MW (0.02 km²/MW); land area for the power tower, dish engine, and PV technologies was estimated at 9 acres/MW (0.04 km²/MW).

^b Water needs are linearly related to power. Water usage for any other size project can be estimated by using multipliers provided in Table M.9-2 (Appendix M).

^c Value assumes a usage rate of 0.5 ac-ft/yr/MW for mirror washing for parabolic trough, power tower, and dish engine technologies and a rate of 0.05 ac-ft/yr/MW for panel washing for PV systems.

^d To convert ac-ft to m³, multiply by 1,234.

^e Dry-cooling value assumes 0.2 to 1.0 ac ft/yr per MW and wet-cooling value assumes 4.5 to 14.5 ac ft/yr per MW (range in these values represents 30 and 60% operating times) (DOE 2009).

^f NA = not applicable.

^g Value scaled from 250-MW Beacon Solar project with an annual discharge of 44 gpm (167 L/min) (AECOM 2009). Blowdown estimates are relevant to wet cooling only.

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tower technologies are attributable to the assumptions of acreage per megawatt. As a result, the water usage for the more energy-dense parabolic trough technology is estimated to be almost twice as large as that for the power tower technology.

At full build-out capacity, water needs for mirror/panel washing are estimated to range from 25 to 458 ac-ft/yr (31,000 to 565,000 m³/yr) and workforce potable water up to 13 ac-ft/yr (16,000 m³/yr). The maximum total water usage during operations at full-build-out capacity

1 would be greatest for those technologies using the wet-cooling option and is estimated to be as
2 high as 13,746 ac-ft/yr (17 million m³/yr). Water usage for dry-cooling systems would be as
3 high as 1,387 ac-ft/yr (1.7 million m³/yr), approximately a factor of 10 times less than that for
4 the wet-cooling option. Non-cooled technologies—dish engine and PV systems—require
5 substantially less water at full build-out capacity, at 260 ac-ft/yr (320,700 m³/yr) for dish engine
6 and 26 ac-ft/yr (32,100 m³/yr) for PV (Table 9.1.9.2-2). Operations would produce up to
7 13 ac-ft/yr (16,000 m³/yr) of sanitary wastewater; in addition, for wet-cooled technologies, up to
8 260 ac-ft/yr (320,700 m³/yr) of cooling system blowdown water would need to be treated either
9 on- or off-site. Any on-site treatment of wastewater would have to ensure that treatment ponds
10 are effectively lined in order to prevent any groundwater contamination.
11

12 Groundwater is the primary water resource available for solar energy development at the
13 proposed Imperial East SEZ. The estimates of recharge and discharge processes, along with
14 information on groundwater levels presented previously, suggest that the overall groundwater
15 balance is at a state of equilibrium. However, further characterization of the alluvial aquifers of
16 the Imperial Valley groundwater basin is needed to fully address the impacts of increased
17 groundwater withdrawals for solar energy development. It is estimated that the newly lined
18 portion of the All-American Canal near the southern boundary of the proposed SEZ will
19 eliminate up to 67,700 ac-ft/yr (83.5 million m³/yr) of recharge to the local aquifer.
20 Loeltz et al. (1975) reported well yields ranging between 45 and 1,550 gpm in the Imperial
21 Valley, which is equivalent to 72 and 2,500 ac-ft/yr (89,000 and 1.9 million m³/yr). Given these
22 values of historical well yields, anticipated losses in groundwater recharge, and the estimated
23 water requirements presented in Table 9.1.9.2-2, water use requirements could be sustainable
24 by groundwater resources for technologies using dry-cooling, dish engine, and PV systems.
25 The water use estimates for wet-cooling technologies could potentially cause groundwater
26 drawdown, given that they are a factor of 1 to 5 times greater than the largest historical well
27 yields of the Imperial Valley, and that local groundwater recharge will decrease due to the lining
28 of the All-American Canal. The potential use of All-American Canal water would have to be
29 negotiated with the IID on a project-specific basis, but it is likely that water use estimates for
30 dish engine and PV technologies could be supported by the IID's allocation for non-agricultural
31 uses (IID 2009b; Anderholdt-Shields 2010).
32

33 Groundwater drawdown that could potentially occur as a result of solar energy
34 development could potentially disrupt groundwater flow patterns in the Imperial Valley, but
35 greater concerns are associated with the land subsidence that has been observed in the valley
36 (Layton 1978). Land subsidence could cause cracks in the newly lined All-American Canal and
37 affect water quantities and rights of the IID. An additional concern of using groundwater for
38 solar energy development is the poor quality of the groundwater that is typically found in the
39 Imperial Valley. As mentioned previously, the potable water supply for the workforce may need
40 to be brought in from off-site (potentially from the All-American Canal) or the groundwater may
41 need to be treated to reduce TDS values to meet California requirements. The TDS values of the
42 groundwater are potentially high enough to cause corrosion and fouling of infrastructure
43 (Layton 1978).
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46

1 **Decommissioning/Reclamation**
2

3 During decommissioning/reclamation, all surface structures associated with the solar
4 project would be dismantled, and the site reclaimed to its pre-construction state. Activities and
5 water needs during this phase would be similar to those during the construction phase (dust
6 suppression and potable supply for workers) and may also include water to establish vegetation
7 in some areas. However, the total volume of water needed is expected to be less. Because
8 quantities of water needed during the decommissioning/reclamation phase would be less than
9 those for construction, impacts on surface and groundwater resources also would be less.
10

11
12 ***9.1.9.2.3 Off-Site Impacts: Roads and Transmission Lines***
13

14 Impacts associated with the construction of roads and transmission lines primarily deal
15 with water use demands for construction, water quality concerns relating to potential chemical
16 spills, and land disturbance effects on the natural hydrology. The extent of the impacts on water
17 resources is proportional to the amount and location of land disturbance needed to connect the
18 proposed SEZ to major roads and existing transmission lines. The proposed Imperial East SEZ is
19 located adjacent to existing roads and transmission lines, as described in Section 9.1.1.2, so it is
20 assumed that no additional construction outside of the SEZ would be required and there would
21 be no impacts.
22

23
24 ***9.1.9.2.4 Summary of Impacts on Water Resources***
25

26 The impacts on water resources associated with developing solar energy in the proposed
27 Imperial East SEZ are associated with land disturbance effects on natural hydrology, water use
28 requirements for the various solar energy technologies, and water quality concerns. Land
29 disturbance impacts are of specific concern along the southern boundary of the proposed SEZ,
30 because excess water and sediment runoff could impair the existing and mitigation wetland areas
31 along the All-American Canal.
32

33 Impacts relating to water use requirements vary depending on the type of solar
34 technology built and, for technologies using cooling systems, the type of cooling (wet, dry,
35 hybrid) employed. The recent lining of the All-American Canal along the southern boundary of
36 the proposed SEZ is expected to drastically decrease the local groundwater recharge of the area.
37 Given the water use estimates for the various solar energy technologies, dry-cooled parabolic
38 trough and power tower, along with dish engine and PV systems, could be feasible with respect
39 to the availability of groundwater resources. In addition, dish engine and PV technologies could
40 potentially be supported by All-American Canal water supplied by the IID, but would have to be
41 negotiated on a project-specific basis. Parabolic trough and power tower technologies using wet
42 cooling have the potential to cause groundwater drawdown and possibly land subsidence. Given
43 this analysis of available water resources, wet cooling would not be considered feasible for the
44 full build-out scenario of the proposed Imperial East SEZ
45

1 Water quality of the groundwater in the Imperial Valley is of concern because of its high
2 salts concentrations and potential for agricultural chemical pollution. Potable water from supply
3 sources may not be obtainable from the groundwater aquifers without considerable treatment;
4 thus bringing water in from off-site (potentially All-American Canal water) may be needed
5 during all phases of solar energy projects. Additional concerns regarding groundwater TDS
6 values that could potentially be corrosive to solar facility infrastructure would have to be
7 addressed during the site characterization phase.
8
9

10 **9.1.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**

11

12 The program for solar energy development on BLM-administered lands will require
13 implementation of the programmatic design features described in Appendix A, Section A.2.2,
14 thus mitigating some impacts on water resources. Programmatic design features would focus
15 on coordination with federal, state, and local agencies that regulate the use of water resources
16 to meet the requirements of permits and approvals needed to obtain water for development,
17 and on hydrological studies to characterize the aquifer from which groundwater would be
18 obtained (including drawdown effects, if a new point of diversion were created). The greatest
19 consideration for mitigating water impacts would be in the selection of solar technologies. The
20 mitigation of impacts would be best achieved by selecting technologies with low water demands.
21

22 Proposed design features specific to the proposed Imperial East SEZ include the
23 following:
24

- 25 • Water resource analysis indicates that wet-cooling options would not be
26 feasible. Other technologies should incorporate water conservation measures.
27
- 28 • Land disturbance activities should avoid impacts in the vicinity of the existing
29 and mitigation wetlands located along the southern boundary of the site.
30
- 31 • During site characterization, hydrologic investigations would need to identify
32 100-year floodplains and potential jurisdictional water bodies subject to Clean
33 Water Act Section 404 permitting. Siting of solar facilities and construction
34 activities should avoid areas identified as being within a 100-year floodplain.
35
- 36 • During site characterization, coordination and permitting with CDFG
37 regarding California's Lake and Streambed Alteration Program would be
38 required for any proposed alterations to surface water features (both perennial
39 and ephemeral).
40
- 41 • The groundwater-permitting process should be in compliance with the
42 Imperial County groundwater ordinance.
43
- 44 • Groundwater monitoring and production wells should be constructed in
45 accordance with standards set forth by the State of California (CDWR 1991)
46 and Imperial County.
47

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- Stormwater management plans and BMPs should comply with standards developed by the California Stormwater Quality Association (CASQA 2003).
- Water for potable uses should meet or be treated to meet the water quality standards of the California Safe Drinking Water Act (*California Health and Safety Code*, Chapter 4).

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9.1.10 Vegetation

This section addresses vegetation that could occur or is known to occur within the potentially affected area of the proposed Imperial East SEZ. The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur) and included only the SEZ. The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effect. No area of direct or indirect effects was assumed for new transmission lines or access roads, because they are not expected to be needed for developments on the Imperial East SEZ because of the proximity of an existing transmission line and state highway.

Indirect effects considered in the assessment included effects from surface runoff, dust, and accidental spills from the SEZ, but did not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ. This area of indirect effects was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects. The affected area is the area bounded by the areas of direct and indirect effects. These areas are defined and the impact assessment approach is described in Appendix M.

9.1.10.1 Affected Environment

The proposed Imperial East SEZ is located within the Sonoran Basin and Range Level III ecoregion (EPA 2007), which supports creosotebush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) plant communities with large areas of palo verde (*Cercidium microphyllum*)-cactus shrub and saguaro cactus (*Carnegiea gigantea*) communities (EPA 2002). The dominant species of the Lower Colorado River Valley subdivision of the Sonoran Desert are primarily creosotebush, white bursage, and all-scale (*Atriplex polycarpa*), with big galleta (*Pleuraphis rigida*), Palmer alkali heath (*Frankenia palmeri*), brittlebush (*Encelia farinosa*), and western honey mesquite (*Prosopis glandulosa* var. *torreyana*) are dominant in some areas (Turner and Brown 1994). Larger drainageways and washes support species of small trees and shrubs that may also occur in adjacent areas, such as western honey mesquite, ironwood (*Olneya tesota*), and blue palo verde (*Cercidium floridum*), as well as species such as smoketree (*Psoralea spinosa*), which are mostly restricted to drainageways. Shrub species found in minor drainages include cat-claw acacia (*Acacia greggii*), burrobrush (*Hymenoclea salsola* var. *pentalepis*), Anderson thornbush (*Lycium andersonii*), and desert broom (*Baccharis sarothroides*). Annual precipitation in the Sonoran Desert occurs in winter and summer (Turner and Brown 1994) and is very low in the area of the SEZ, averaging about 2.7 in. (6.8 mm), at Calexico (see Section 9.1.13).

Land cover types, described and mapped under the California Gap Analysis Program (CAREGAP) (NatureServe 2009) were used to evaluate plant communities in and near the SEZ. Each cover type encompasses a range of similar plant communities. Land cover types occurring within the potentially affected area of the proposed Imperial East SEZ are shown in

1 Figure 9.1.10.1-1. Table 9.1.10.1-1 provides the surface area of each cover type within the
2 potentially affected area.

3
4 Lands within the Imperial East SEZ are classified primarily as Sonora-Mojave
5 Creosotebush-White Bursage Desert Scrub. The North American Warm Desert Active and
6 Stabilized Dune cover type increases from west to east across the SEZ, becoming the dominant
7 cover type east of the SEZ. Additional cover types within the SEZ are given in Table 9.1.10.1-1.
8 Creosote was observed to be the dominant species over most of the SEZ in August 2009, with
9 quail brush (*Atriplex lentiformis*) codominant in some northern areas. Stabilized dunes,
10 considered sensitive habitats, support mesquite hummocks and clumps of Mormon tea (*Ephedra*
11 *trifurca*) and creosote. Sensitive habitats on the SEZ also include wetlands, desert dry washes,
12 and riparian areas. A characteristic Sonoran Desert species observed on the SEZ is western
13 honey mesquite.

14
15 The area surrounding the SEZ, within 5 mi (8 km), includes 16 cover types, which are
16 listed in Table 9.1.10.1-1. The predominant cover types are Sonora-Mojave Creosotebush-White
17 Bursage Desert Scrub and North American Warm Desert Active and Stabilized Dune. The SEZ
18 and affected area occur in California and a small portion of northern Mexico (Figure 9.1.10.1-1).
19 Cover types are mapped only for the U.S. portions of the indirect impact area; the remaining
20 portions are unmapped.

21
22 One wetland mapped by the *National Wetlands Inventory* (NWI) extends into the south-
23 central portion of the SEZ, south of State Route 98 (USFWS 2009). The wetland is supported
24 by seepage from the All-American Canal, located to the south (Figure 9.1.10.1-2) of the SEZ,
25 and is classified as a palustrine wetland with a scrub-shrub plant community that is temporarily
26 flooded. NWI maps are produced from high-altitude imagery and are subject to uncertainties
27 inherent in image interpretation (USFWS 2009). The All-American Canal was not lined in this
28 section of the canal partly because of the high value of these wetlands. In addition, these
29 wetlands were enhanced to offset impacts from the All-American Canal lining project; therefore,
30 they are considered a mitigation area to support nesting Yuma clapper rail (see Section 9.1.12).
31 Approximately 5 acres (0.02 km²) of the wetland is located within the SEZ and primarily
32 mapped as the North American Warm Desert Riparian Woodland and Shrubland cover type. The
33 wetland communities are characterized by the dominance of either tamarisk (*Tamarix* spp.) or
34 arrow-weed (*Tessaria sericea*) (BOR 2006). Numerous ephemeral dry washes occur within the
35 SEZ. These dry washes typically contain water for short periods during or following
36 precipitation events, and include temporarily flooded areas, but typically do not support wetland
37 or riparian habitats. Several shallow drainages in the west and south-central portions of the SEZ,
38 however, support dense stands of woody vegetation that are mapped as North American Warm
39 Desert Riparian Woodland and Shrubland, although these areas are not identified as wetlands.
40 Mesquite and arrow-weed occur in some drainages in the western portion of the SEZ.

41
42 Wetlands within the 5 mi (8 km) indirect impact area include those associated with the
43 All-American Canal. The canal is classified as a riverine wetland that is sparsely vegetated, with
44 less than 30% plant cover. Common reed (*Phragmites australis*), an invasive native species, is
45 abundant along the canal margin in many areas. Tamarisk, a non-native woody invasive, also

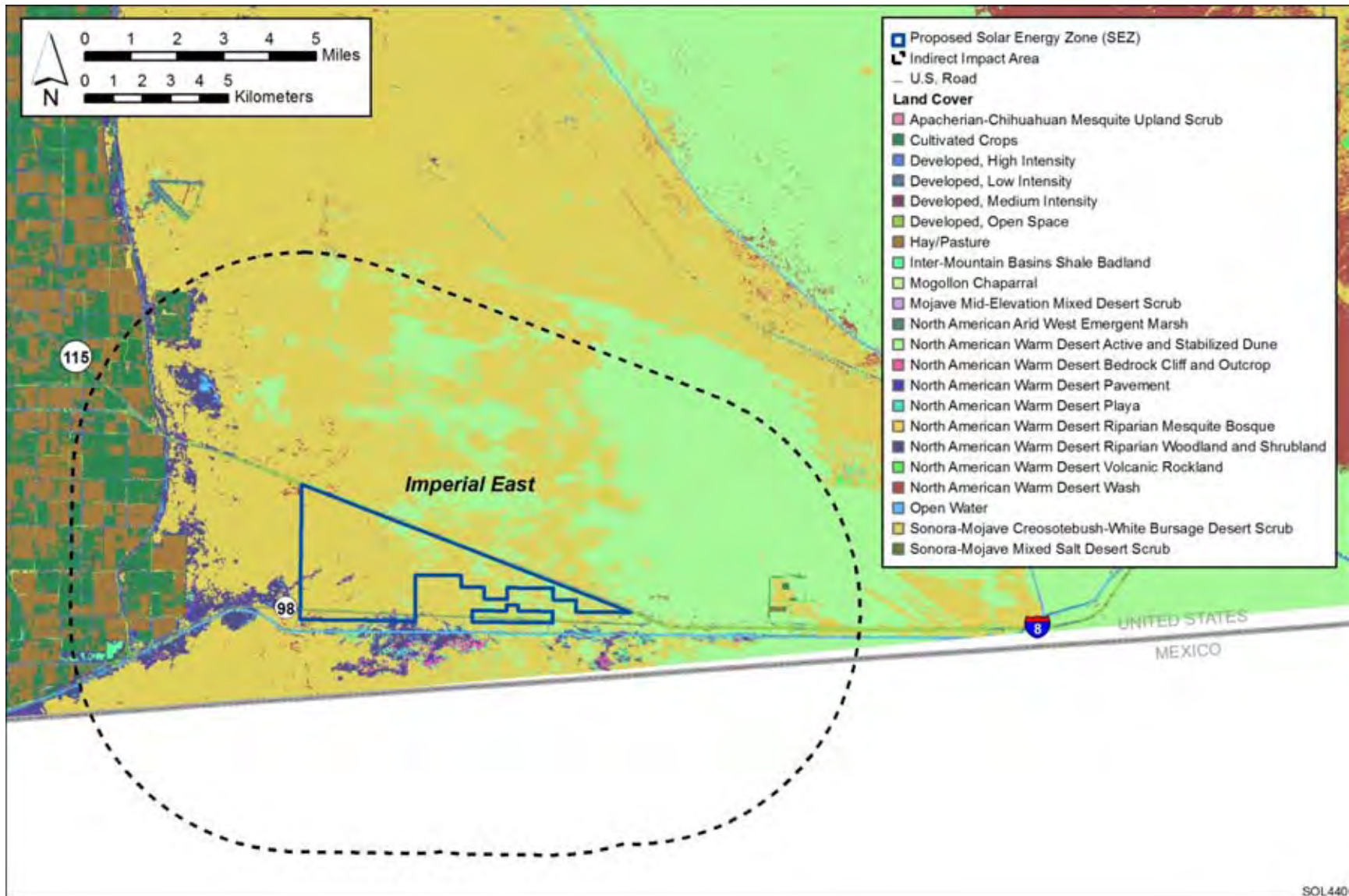


FIGURE 9.1.10.1-1 Land Cover Types within the Proposed Imperial East SEZ (Source: NatureServe 2009)

TABLE 9.1.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Imperial East SEZ and Potential Impacts

Land Cover Type ^a	Area of Cover Type in Affected Areas (acres) ^b		
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	Overall Impact Magnitude ^e
5264 Sonora-Mojave Creosotebush-White Bursage Desert Scrub: Occurs in broad valleys, lower bajadas, plains, and low hills in the Mojave and Sonoran Deserts. Shrubs form a sparse to moderately dense cover (2 to 50%), although the ground surface may be mostly barren. The dominant species are typically creosotebush (<i>Larrea tridentata</i>) and white bursage (<i>Ambrosia dumosa</i>). Other shrubs, dwarf shrubs, and cacti may also be dominant or form sparse understories. Herbaceous species are typically sparse, but may be seasonally abundant.	4,631 acres ^f (0.5%, 1.1%)	35,911 acres (3.6%)	Small
3121 North American Warm Desert Active and Stabilized Dune: Consists of unvegetated to sparsely vegetated (generally <10% plant cover) active dunes and sand sheets. Vegetation includes shrubs, forbs, and grasses. Includes unvegetated “blowouts” and stabilized areas.	705 acres (0.4%, 0.4%)	24,102 acres (12.7%)	Small
21, 22 Developed, Open Space–Low Intensity: Includes housing, parks, golf courses, and other areas planted in developed settings. Impervious surfaces compose up to 49% of the total land cover.	230 acres (0.4%, 3.2%)	1,907 acres (3.1%)	Small
9182 North American Warm Desert Riparian Woodland and Shrubland: Occurs along medium to large perennial streams in canyons and desert valleys. Consists of a mix of riparian woodlands and shrublands. Vegetation is dependent upon annual or periodic flooding, along with substrate scouring, and/or a seasonally shallow water table.	44 acres (0.1%, 0.4%)	3,226 acres (4.1%)	Small
9151 North American Warm Desert Wash: Consists of intermittently flooded linear or braided strips within desert scrub or grassland landscapes on bajadas, mesas, plains, and basin floors. Although often dry, washes are associated with rapid sheet and gully flow. The vegetation varies from sparse and patchy to moderately dense and typically occurs along the banks, but may occur within the channel. Shrubs and small trees are typically intermittent to open. Common upland shrubs often occur along the edges.	34 acres (<0.1%, <0.1%)	343 acres (0.1%)	Small

TABLE 9.1.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type in Affected Areas (acres) ^b		
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	Overall Impact Magnitude ^e
3120 North American Warm Desert Bedrock Cliff and Outcrop: Occurs on subalpine to foothill steep cliff faces, narrow canyons, rock outcrops, unstable scree and talus slopes. Consists of barren and sparsely vegetated areas (generally <10% plant cover) with desert species, especially succulents. Lichens are predominant in some areas.	33 acres (<0.1%, <0.1%)	540 acres (0.3%)	Small
3139 Inter-Mountain Basins Shale Badland: Typically occurs on rounded hills and plains. Consists of barren and sparsely vegetated areas (<10% plant cover) with high rate of erosion and deposition. Vegetation consists of sparse dwarf shrubs and herbaceous plants.	33 acres (0.4%, 0.7%)	793 acres (10.2%)	Small
3143 North American Warm Desert Pavement: Consists of unvegetated to very sparsely vegetated (<2% plant cover) areas, usually in flat basins, with ground surfaces of fine to medium gravel coated with “desert varnish.” Desert scrub species are usually present. Herbaceous species may be abundant in response to seasonal precipitation.	11 acres (<0.1%, <0.1%)	473 acres (0.5%)	Small
3180 North American Warm Desert Volcanic Rockland: Consists of barren and sparsely vegetated (<10% plant cover) areas. Vegetation is variable and typically includes scattered desert shrubs.	<1 acres (<0.1%, <0.1%)	31 acres (<0.1%)	Small
81, 82 Hay/Pasture, Cultivated Crops: Areas where pasture/hay or cultivated crops account for more than 20% of the total land cover.	0 acres	7,502 acres (1.3%)	Small
11 Open Water: Plant or soil cover is generally less than 25%.	0 acres	644 acres (0.6%)	Small
23, 24 Developed, Medium-High Density: Includes housing and commercial/industrial development. Impervious surfaces compose 50 to 100% of the total land cover.	0 acres	9 acres (<0.1%)	Small

TABLE 9.1.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type in Affected Areas (acres) ^b		
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	Overall Impact Magnitude ^e
3161 North American Warm Desert Playa: Consists of barren and sparsely vegetated areas (generally <10% plant cover) that are intermittently flooded; salt crusts are common. Sparse shrubs occur around the margins, and patches of grass may form in depressions. In large playas, vegetation forms rings in response to salinity. Herbaceous species may be periodically abundant.	0 acres	2 acres (0.1%)	Small
5265 Sonora-Mojave Mixed Salt Desert Scrub: Extensive open-canopied shrublands in the Mojave and Sonoran Deserts, usually occurring around playas and in valley bottoms or basins with saline soils. Vegetation is typically composed of one or more <i>Atriplex</i> species; other salt-tolerant plants are often present or even codominant. Grasses occur at varying densities.	0 acres	1 acre (<0.1%)	Small

^a Land cover descriptions are from NatureServe (2009). Full descriptions of land cover types, including plant species, can be found in Appendix I.

^b Area in acres, determined from Sanborn Mapping (2008).

^c Includes the area of the cover type within the SEZ, the percentage that area represents of all occurrences of that cover type within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ), and the percentage that area represents of all occurrences of that cover type on BLM lands within the SEZ region. The SEZ region intersects portions of California, Arizona, and northern Mexico. However, the SEZ and affected area occur only in California and a small portion of northern Mexico.

^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from project facilities. The potential degree of indirect effects would decrease with increasing distance from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.

^e Overall impact magnitude categories were based on professional judgment and were (1) *small*: a relatively small proportion ($\leq 1\%$) of the cover type within the SEZ region would be lost; (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of a cover type would be lost; (3) *large*: $> 10\%$ of a cover type would be lost.

^f To convert acres to km², multiply by 0.004047.

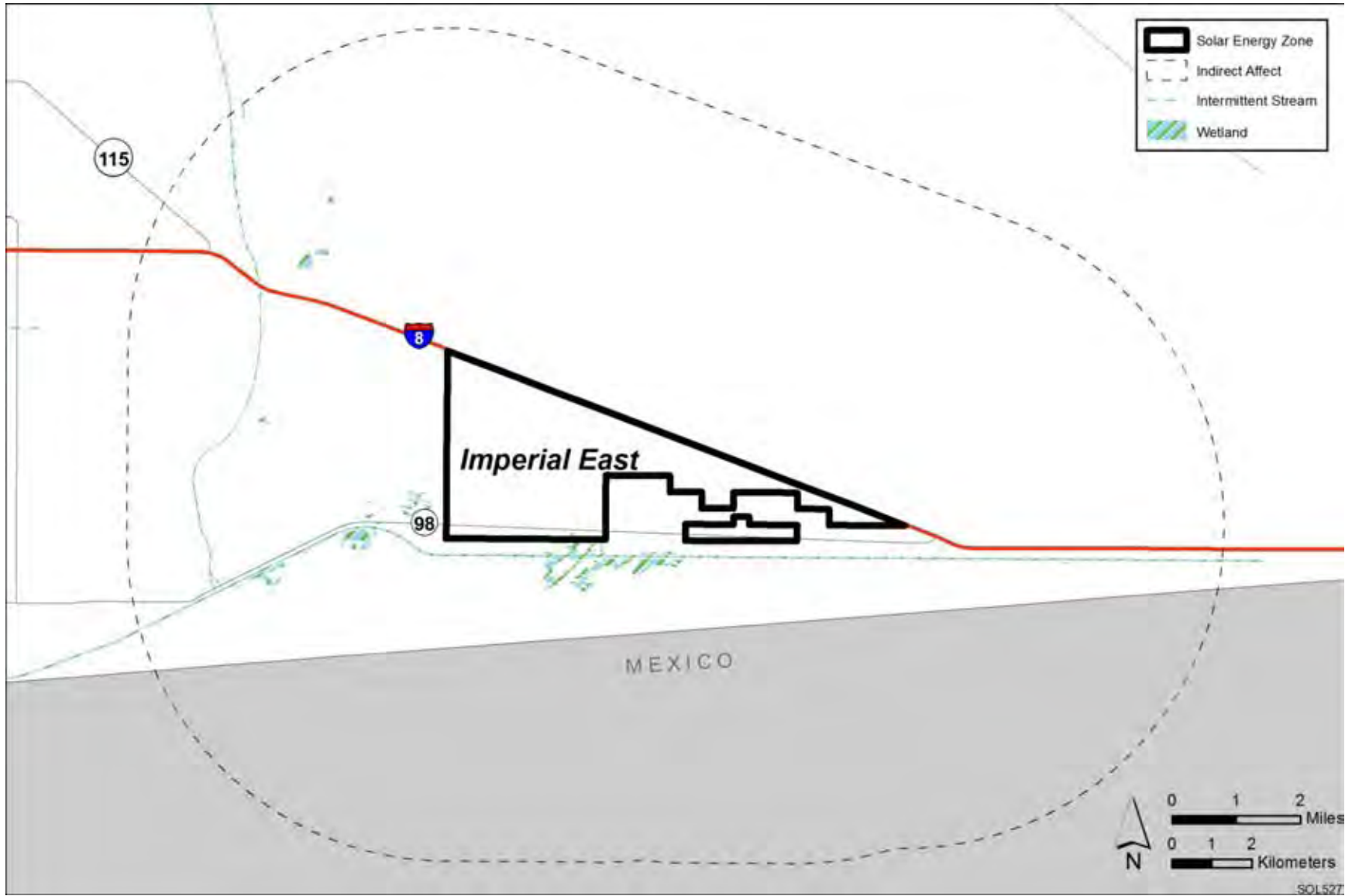


FIGURE 9.1.10.1-2 Wetlands within the Proposed Imperial East SEZ (Source: USFWS 2009)

occurs along the canal. Numerous wetland areas, supported by canal seepage, occur near the canal and range from temporarily to seasonally flooded. They are primarily classified as North American Warm Desert Riparian Woodland and Shrubland. Most of these wetlands are palustrine wetlands with a scrub-shrub plant community. Small areas of emergent plant communities also occur near the canal. Emergent plant communities are composed primarily of herbaceous species rooted in shallow water or saturated soil. Changes in wetland boundaries may occur in some areas subsequent to the lining of portions of the All-American Canal and associated wetland mitigation programs (BOR 2006). Similar wetland types occur to the west of the SEZ and are associated with the East Highline Canal. A number of excavated areas that contain surface water are located northwest of the SEZ. These wetlands are sparsely vegetated and semipermanently to permanently flooded. They are classified as Sonora-Mojave Creosotebush-White Bursage Desert Scrub and as North American Warm Desert Riparian Woodland and Shrubland. One small seasonally flooded wetland in this area supports a scrub-shrub plant community. Wetlands south of the U.S.–Mexico border include the Andrade Mesa wetlands, a system of marshes that are likely supported by seepage from the All-American Canal (University of Arizona 2003).

The proposed Imperial East SEZ is located within the Imperial County Weed Management Area (ICWMA). Table 9.1.10.1-2 provides a list of invasive plant species of the California Sonoran Desert Region, which includes Imperial County. Common reed and tamarisk, which occur in wet areas, occur within the 5-mi (8-km) indirect impact area along the All-American Canal.

9.1.10.2 Impacts

The construction of solar energy facilities within the Imperial East SEZ would result in direct impacts on plant communities because of the removal of vegetation within the facility footprint during land-clearing and land-grading operations. Approximately 80% of the SEZ (4,578 acres [18.5 km²]) would be expected to be cleared with full development of the SEZ. The plant communities affected would depend on facility locations and could include any of the communities occurring on the SEZ. Therefore, for this analysis, all the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.

Indirect effects (e.g., caused by surface runoff or dust from the SEZ) have the potential to degrade affected plant communities and may reduce biodiversity by promoting the decline or elimination of species sensitive to disturbance. Indirect effects can also cause an increase in disturbance-tolerant species or invasive species. High impact levels could result in the elimination of a community or the replacement of one community type for another. The proper implementation of design features, however, would reduce indirect effects to a minor or small level of impact.

Possible impacts from solar energy facilities on vegetation that are encountered within the SEZ, are described in more detail in Section 5.10.1. Any such impacts will be minimized through the implementation of required programmatic design features described in Appendix A,

TABLE 9.1.10.1-2 Weed Species of the California Sonoran Desert Region

Common Name	Scientific Name
Barbwire Russian thistle	<i>Salsola paulsenii</i>
Bermudagrass	<i>Cynodon dactylon</i>
Camelthorn	<i>Alhagi maurorum</i>
Common Russian thistle	<i>Salsola tragus</i>
Field bindweed	<i>Convolvulus arvensis</i>
Giant reed	<i>Arundo donax</i>
Giant salvinia	<i>Salvinia auriculata</i>
Hydrilla	<i>Hydrilla verticillata</i>
Scarlet wisteria	<i>Sesbania punicea</i>
Tamarisk	<i>Tamarix ramosissima</i>
Tocalote	<i>Centaurea melitensis</i>
White horsenettle	<i>Solanum elaeagnifolium</i>

Source: CDFA (2010).

Section A.2.2, and through any additional mitigation applied. SEZ-specific design features are described in Section 9.1.10.3.

9.1.10.2.1 Impacts on Native Species

The impacts of construction, operation, and decommissioning were considered small if the impact affected a relatively small proportion (<1%) of the cover type in the SEZ region (within 50 mi [80 km] of the center of the SEZ); a moderate impact (>1 but <10%) could affect an intermediate proportion of cover type; a large impact could affect greater than 10% of a cover type.

Solar facility construction and operation would primarily affect communities of the Sonora-Mojave Creosotebush-White Bursage Desert Scrub cover type. Additional cover types within the SEZ that would be affected include North American Warm Desert Active and Stabilized Dune; Developed, Open Space–Low Intensity; North American Warm Desert Riparian Woodland and Shrubland; North American Warm Desert Wash; North American Warm Desert Bedrock Cliff and Outcrop; Inter-Mountain Basins Shale Badland; North American Warm Desert Pavement; and North American Warm Desert Volcanic Rockland. The developed areas likely support few native plant communities. The potential impacts on native species cover types resulting from solar energy facilities in the proposed Imperial East SEZ are summarized in Table 9.1.10.1-1. Most of these cover types are relatively common in the SEZ region; however, Inter-Mountain Basins Shale Badland is relatively uncommon, representing approximately 0.3% of the land area within the SEZ region. The construction, operation, and decommissioning of solar projects within the SEZ would result in small impacts on each of the cover types in the affected area.

Re-establishment of shrub communities in temporarily disturbed areas would likely be very difficult because of the arid conditions and might require extended periods of time. In addition, noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation.

Potential impacts on wetlands as a result of solar energy facility development are described in Section 5.10.1. Specific to the affected area of the proposed Imperial East SEZ, approximately 5 acres (0.02 km²) of wetland habitat occurs within the SEZ and could be affected by project development. These wetlands were enhanced to offset impacts from the All-American Canal lining project and are considered a mitigation area.

Grading could result in direct impacts on the wetlands within the SEZ if fill material were placed within wetland areas. Grading near the wetlands in or near the SEZ could disrupt surface water or groundwater flow characteristics, resulting in changes in the frequency, duration, depth, or extent of inundation or soil saturation, and could potentially alter wetland plant communities and affect wetland function. Increases in surface runoff from a solar energy project site could also affect wetland hydrologic characteristics. The introduction of contaminants into wetlands in or near the SEZ could result from spills of fuels or other materials used on a project site. Soil disturbance could result in sedimentation in wetland areas, which could degrade or eliminate wetland plant communities. Sedimentation effects or hydrologic changes could also extend to wetlands outside of the SEZ. Grading could also affect dry washes within the SEZ, and alteration of surface drainage patterns or hydrology could adversely affect downstream dry wash communities. Vegetation within these communities could be lost by erosion or desiccation. See Section 9.1.9 for further discussion of impacts on washes.

Although the use of groundwater within the Imperial East SEZ for technologies with high water requirements, such as wet-cooling systems, may be unlikely, groundwater withdrawals for such systems could affect groundwater resources (see Section 9.1.9.2.2). However, further characterization of the alluvial aquifers of the Imperial Valley groundwater basin would be needed to fully address the impacts of increased groundwater withdrawals for solar energy development. Most of the wetlands in the vicinity of the SEZ are supported by the discharge of shallow groundwater sources, primarily originating from seepage from the All-American Canal and the East Highline Canal. Reductions in groundwater inflows to wetlands that are supported by groundwater discharge could alter wetland hydrologic characteristics and plant communities and could potentially reduce wetland surface area.

The deposition of fugitive dust from disturbed soil areas in habitats outside a solar project area could result in reduced productivity or changes in plant community composition. Fugitive dust deposition could affect plant communities of each of the cover types occurring within the indirect impact area identified in Table 9.1.10.1-1.

9.1.10.2 Impacts from Noxious Weeds and Invasive Plant Species

Executive Order (E.O.) 13112, “Invasive Species,” directs federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts of invasive species (*Federal Register*, Volume 64, page 61836, Feb. 8, 1999). Potential impacts of noxious weeds and invasive plant species resulting from solar energy facilities are described in Section 5.10.1. Despite required design features to prevent the spread of noxious weeds, project disturbance could potentially increase the prevalence of noxious weeds and invasive species in the affected area of the proposed Imperial East SEZ and increase the probability that weeds could be transported into areas that were previously relatively weed free. This could result in reduced restoration success and possible widespread habitat degradation. Noxious weeds, including tamarisk and common reed, occur near the SEZ. Additional species potentially occurring in the Sonoran Desert Region are given in Table 9.1.10.1-2.

Past or present land uses may affect the susceptibility of plant communities to the establishment of noxious weeds and invasive species. Existing roads and recreational OHV use within the SEZ area of potential impact would also likely contribute to the susceptibility of plant communities to the establishment and spread of noxious weeds and invasive species. Portions of the SEZ have been disturbed by the construction of transmission lines. Small areas of Developed, Open Space–Low Intensity, totaling about 230 acres (0.93 km²), occur within the SEZ, and approximately 1,907 acres (7.72 km²) occur within the area of indirect effects. Because disturbance may promote the establishment and spread of invasive species, developed areas may provide sources of such species.

9.1.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

In addition to the programmatic design features, SEZ-specific design features would reduce the potential for impacts on plant communities. While the specific practices are best established when project details are considered, some measures can be identified at this time, as follows:

- An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration, should be approved and implemented to increase the potential for successful restoration of Sonoran Desert habitats, such as desert scrub and dunes, and minimize the potential for the spread of invasive species. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides.
- Wetland, riparian habitats, desert dry washes which occur primarily within the western and southern portions of the SEZ, and sand dune habitats and sand transport areas, primarily in the northern and eastern portions of the SEZ, should be avoided to the extent practicable, and any impacts minimized and mitigated. A buffer area should be maintained around wetlands, riparian areas,

and dry washes to reduce the potential for impacts on wetlands on or near the SEZ. Appropriate engineering controls should be used to minimize impacts on these areas resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.

- An appropriate buffer shall be maintained between project impacts and the wetland south of the Imperial Valley SEZ to ensure all impacts from construction, operations, and maintenance of solar facilities do not impair the current functions and values associated with wetland resource, including habitat support for sensitive species.
- Groundwater withdrawals should be limited to reduce the potential for indirect impacts on wetland habitats associated with groundwater discharge, such as the wetlands near the All-American Canal and East Highline Canal.

If these SEZ-specific design features are implemented in addition to programmatic design features, it is anticipated that a high potential for impacts from invasive species and impacts on wetlands, dry washes, sand dunes, and riparian habitats would be reduced to a minimal potential for impact. Residual impacts on wetlands could result from remaining groundwater withdrawal, etc.; however, it is anticipated that these impacts would be avoided in the majority of instances.

1 **9.1.11 Wildlife and Aquatic Biota**

2
3 This section addresses wildlife (amphibians, reptiles, birds, and mammals) and aquatic
4 biota that could occur within the potentially affected area of the proposed Imperial East SEZ.
5 Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) were determined
6 from the California Wildlife Habitat Relationships System (CDFG 2008). Land cover types
7 suitable for each species were determined from the Southwest Regional Gap Analysis Project
8 (SWReGAP) (USGS 2004, 2005, 2007). The amount of aquatic habitat within the SEZ region
9 was determined by estimating the length of linear perennial stream and canal features and the
10 area of standing water body features (i.e., ponds, lakes, and reservoirs) within 50 mi (80 km) of
11 the SEZ by using available GIS surface water datasets.

12
13 The affected area considered in this assessment included the areas of direct and indirect
14 effects. The area of direct effects was defined as the area that would be physically modified
15 during project development (i.e., where ground-disturbing activities would occur within the
16 SEZ). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ
17 boundary where ground-disturbing activities would not occur but that could be indirectly
18 affected by activities in the area of direct effects (e.g., surface runoff, dust, noise, lighting, and
19 accidental spills from the SEZ). The potential degree of indirect effects would decrease with
20 increasing distance from the SEZ. This area of indirect effects was identified on the basis of
21 professional judgment and was considered sufficiently large to bound the area that would
22 potentially be subject to indirect effects.

23
24 The affected area is the area bounded by the areas of direct and indirect effects. These
25 areas are defined and the impact assessment approach is described in Appendix M. No area of
26 direct or indirect effects was assumed for a new transmission line or access road because they
27 are not expected to be needed for facilities on the proposed Imperial East SEZ because of the
28 proximity of an existing transmission line and state highway.

29 30 31 **9.1.11.1 Amphibians and Reptiles**

32 33 34 ***9.1.11.1.1 Affected Environment***

35
36 This section addresses amphibian and reptile species that are known to occur, or for
37 which potentially suitable habitat occurs, on or within the potentially affected area of the
38 proposed Imperial East SEZ. The list of amphibian and reptile species potentially present in the
39 project area was determined from range maps and habitat information available from the
40 California Wildlife Habitat Relationships System (CDFG 2008). Land cover types suitable for
41 each species were determined from the SWReGAP (USGS 2004, 2005, 2007). See Appendix M
42 for additional information on the approach used.

43
44 On the basis of the range, habitat preferences, and/or presence of potentially suitable
45 land cover for the amphibian species that occur within southeastern California (CDFG 2008;
46 USGS 2004, 2005, 2007), the red-spotted toad (*Bufo punctatus*) is expected to occur within the

1 proposed Imperial East SEZ. However, because it prefers dry, rocky areas near temporary
2 sources of standing water, its occurrence within the SEZ would be spatially limited. The Couch's
3 spadefoot (*Scaphiopus couchii*) could potentially occur in the SEZ, although its mapped range is
4 east of the SEZ (CDFG 2008). Several other amphibian species could inhabit the All-American
5 Canal, immediately south of the SEZ, and the East Highline Canal, located about 2.8 mi (4.5 km)
6 west of the SEZ. These species include the bullfrog (*Rana catesbeiana*), Colorado River toad
7 (*Bufo alvarius*), Rio Grande leopard frog (*Rana berlandieri*), and Woodhouse's toad (*Bufo*
8 *woodhousii*). Because these species tend to occur within 300 ft (100 m) of permanent water
9 (USGS 2007), they would not be expected to occur within the SEZ.

10
11 Twenty-seven reptile species could occur within the proposed Imperial East SEZ
12 (CDFG 2008): 1 tortoise, 12 lizards, and 14 snakes. The desert tortoise (*Gopherus agassizii*) is a
13 federal- and state-listed threatened species. This species is discussed in Section 9.1.12. Among
14 the more common lizard species that could occur within the SEZ are the Colorado fringe-toed
15 lizard (*Uma notata*), desert horned lizard (*Phrynosoma platyrhinos*), long-nosed leopard lizard
16 (*Gambelia wislizenii*), side-blotched lizard (*Uta stansburiana*), western banded gecko (*Coleonyx*
17 *variegatus*), and zebra-tailed lizard (*Callisaurus draconoides*).

18
19 The most common snake species expected to occur within the proposed Imperial East
20 SEZ are the coachwhip (*Masticophis flagellum*), glossy snake (*Arizona elegans*), gophersnake
21 (*Pituophis catenifer*), groundsnake (*Sonora semiannulata*), and long-nosed snake (*Rhinocheilus*
22 *lecontei*). The Mojave rattlesnake (*Crotalus scutulatus*) and sidewinder (*C. cerastes*) would be
23 the most common poisonous snake species expected to occur on the SEZ.

24
25 Table 9.1.11.1-1 provides habitat information for the representative amphibian and reptile
26 species that could occur on or in the affected area of the proposed Imperial East SEZ.

27 28 29 **9.1.11.1.2 Impacts**

30
31 The potential for impacts on amphibians and reptiles from utility-scale solar energy
32 development within the proposed Imperial East SEZ is presented in this section. The types
33 of impacts that amphibians and reptiles could incur from construction, operation, and
34 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
35 such impacts would be minimized through the implementation of required programmatic design
36 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
37 Section 9.1.11.1.3, below, identifies SEZ-specific design features of particular relevance to the
38 Imperial East SEZ.

39
40 The assessment of impacts on amphibians and reptile species is based on available
41 information on the presence of species in the affected area as presented in Section 9.1.11.1.1
42 following the analysis approach described in Appendix M. Additional NEPA assessments and
43 coordination with state natural resource agencies may be needed to address project-specific
44 impacts more thoroughly. These assessments and consultations could result in additional
45 required actions to avoid or mitigate impacts on amphibians and reptiles (see Section 9.1.11.1.3).

TABLE 9.1.11.1-1 Representative Amphibians and Reptiles That Could Occur on or in the Affected Area of the Proposed Imperial East SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Amphibians				
Red-spotted toad (<i>Bufo punctatus</i>)	Rocky canyons and gullies in deserts, grasslands, and dry woodlands. When inactive, it occurs under rocks, in rock crevices, or underground. Often found near rocky areas associated with spring seepages, intermittent streams, and cattle tanks. Breeds in shallow water of temporary rain pools, spring-fed pools, and pools along intermittent streams. About 1,065,200 acres ^f of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	35,912 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small
Lizards				
Colorado Desert fringe-toed lizard (<i>Uma notata</i>)	Restricted to sparsely vegetated windblown sand of dunes, flats, riverbanks, and washes. Requires fine, loose sand for burrowing. About 190,100 acres of potentially suitable habitat occurs in the SEZ region.	705 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	24,102 acres of potentially suitable habitat (12.7% of available potentially suitable habitat)	Small
Desert horned lizard (<i>Phrynosoma platyrhinos</i>)	Deserts dominated by sagebrush, creosotebush, greasewood, or cactus. Occurs on sandy flats, alluvial fans, washes, and edges of dunes. Burrows in soil during periods of inactivity. Common throughout Mojave and Colorado Deserts. About 2,209,200 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	65,422 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small

TABLE 9.1.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Lizards (Cont.)				
Long-nosed leopard lizard (<i>Gambelia wislizenii</i>)	Desert and semidesert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows, which it occupies when inactive. Widely distributed in the Mojave, Colorado, and other desert areas in California. About 1,065,200 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	35,912 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small
Side-blotched lizard (<i>Uta stansburiana</i>)	Arid and semiarid locations with scattered bushes or scrubby trees. Often occurs in sandy washes with scattered rocks and bushes. About 1,800,500 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	37,267 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small
Western banded gecko (<i>Coleonyx variegatus</i>)	Wide variety of habitats, including deserts with creosotebush and sagebrush and pinyon-juniper woodlands. Inhabits both rocky areas and barren dunes. Most abundant in sandy flats and desert washes. Uses rocks, burrows, and spaces beneath vegetative debris or trash during periods of inactivity. About 1,617,600 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	39,483 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small
Zebra-tailed lizard (<i>Callisaurus draconoides</i>)	Sparsely vegetated deserts on open sandy washes, dunes, floodplains, beaches, or desert pavement. Common and widely distributed throughout Mojave and Colorado Deserts. About 1,992,200 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	64,089 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small

TABLE 9.1.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Snakes				
Coachwhip (<i>Masticophis flagellum</i>)	Wide variety of open terrain habitats. Most abundant in deserts, grasslands, scrub, chaparral, and pastures. Prefers relatively dry open terrain. Seeks cover in burrows, rocks, or vegetation. About 1,430,200 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	60,553 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Small
Glossy snake (<i>Arizona elegans</i>)	Variety of habitats including barren to sparsely shrubby deserts, sagebrush flats, grasslands, and sandhills. Prefers sandy areas with scattered brush, but also occurs in rocky areas. Shelters and lays eggs underground. Common throughout southern California, particularly the desert regions. About 1,698,000 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	60,356 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small
Gophersnake (<i>Pituophis catenifer</i>)	Wide variety of habitats including deserts, prairies, shrublands, woodlands, and farmlands. May dig its burrow or occupy mammal burrows. Eggs are laid in burrows or under large rocks or logs. Most widespread and common snake in California. About 2,016,600 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	65,501 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small
Groundsnake (<i>Sonora semiannulata</i>)	Arid and semiarid areas including desert flats, sand hummocks, rocky hillsides with pockets of loose soil. Ranges from prairie and desert lowlands to pinyon-juniper and oak-pine zone. About 1,125,900 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	39,137 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small

TABLE 9.1.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Snakes (Cont.)				
Long-nosed snake (<i>Rhinocheilus lecontei</i>)	Typically inhabits deserts, dry prairies, and river valleys. Occurs by day and lays eggs underground or rocks. Burrows rapidly in loose soil. Common in desert regions. About 783,700 acres of potentially suitable habitat occurs in the SEZ region.	783 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	27,671 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small
Mojave rattlesnake (<i>Crotalus scutulatus</i>)	Mostly upland desert and lower mountain slopes, including barren desert, grasslands, open woodland, and scrubland. Generally avoids broken rocky terrain or densely vegetated areas. Takes refuge in animal burrows or spaces under or among rocks. Widely distributed throughout the Mojave and extreme northern Colorado Deserts. About 1,125,800 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	39,137 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small
Sidewinder (<i>Crotalus cerastes</i>)	Open desert terrain with fine windblown sand, desert flats with sandy washes, or sparsely vegetated sand dunes. Concentrates near washes and areas of relatively dense vegetation where mammal burrows are common. During periods of inactivity, uses underground burrows, occurs under bushes, or almost completely snuggles under sand. Widely distributed and locally abundant in the Mojave and Colorado Deserts. About 1,307,400 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	63,239 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	Small

Footnotes on next page.

TABLE 9.1.11.1-1 (Cont.)

-
- ^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Only the U.S. portion is tabulated. Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).
- ^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 4,578 acres (18.5 km²) would be developed in the SEZ.
- ^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Only the U.S. portion is tabulated. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ boundary.
- ^d Overall impact magnitude categories were based on professional judgment and were (1) *small*: $\leq 1.7\%$ of potentially suitable habitat for the species would be lost and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1.7 but $\leq 17\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>17\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Design features would reduce most indirect effects to negligible levels. Proportion cutoffs were adjusted to account for the fact that 40% of the SEZ region occurs in Mexico.
- ^e Species-specific mitigation is presented for those species with particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.
- ^f To convert acres to km², multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 In general, impacts on amphibians and reptiles would result from habitat disturbance
2 (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality
3 to individual amphibians and reptiles. Table 9.1.11.1-1 summarizes the potential impacts on
4 representative amphibian and reptile species resulting from solar energy development that could
5 occur on or in the affected area of the proposed Imperial East SEZ.
6

7 On the basis of the impacts on amphibians and reptiles summarized in Table 9.1.11.1-1,
8 direct impacts on amphibian and reptile species would be small, because only 0.1 to 0.4% of
9 potentially suitable habitats identified for the species in the SEZ region would be lost. Larger
10 areas of potentially suitable habitats for the amphibian and reptile species occur within the area
11 of potential indirect effects (e.g., up to 12.7% of available habitat for the Colorado River fringe-
12 toed lizard). Other impacts on amphibians and reptiles could result from surface water and
13 sediment runoff from disturbed areas, fugitive dust generated by project activities, accidental
14 spills, collection, and harassment. These indirect impacts are expected to be negligible with
15 implementation of programmatic design features.
16

17 Decommissioning of facilities and reclamation of disturbed areas after operations cease
18 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
19 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
20 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
21 reclamation on wildlife. Of particular importance for amphibian and reptile species would be the
22 restoration of original ground surface contours, soils, and native plant communities associated
23 with semiarid shrublands.
24
25

26 ***9.1.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 27

28 The implementation of required programmatic design features described in Appendix A,
29 Section A.2.2, would reduce the potential for effects on amphibians and reptiles, especially for
30 those species that utilize habitat types that can be avoided (e.g., palustrine wetlands). Indirect
31 impacts could be reduced to negligible levels by implementing programmatic design features,
32 especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive
33 dust. While SEZ-specific features are best established when considering specific project details,
34 design features that can be identified at this time include the following:
35

- 36 • The potential for indirect impacts on several amphibian species could be
37 reduced by maximizing the distance between solar energy development and
38 the All-American Canal.
- 39 • Avoid wetlands located along the southern boundary of the SEZ, including
40 those that are to be created or enhanced in the area (Section 9.1.9.1.1).
41
42

43 If these SEZ-specific design features are implemented in addition to other programmatic
44 design features, impacts on amphibian and reptile species could be reduced. Any residual
45 impacts on amphibians and reptiles are anticipated to be small given the relative abundance of
46 potentially suitable habitats in the SEZ region. However, as potentially suitable habitats for a

1 number of the amphibian and reptile species occur throughout much of the SEZ, additional
2 species-specific mitigation of direct effects for those species would be difficult or infeasible.

3 4 5 **9.1.11.2 Birds**

6 7 8 **9.1.11.2.1 Affected Environment**

9
10 This section addresses bird species that are known to occur, or for which potentially
11 suitable habitat occurs, on or within the potentially affected area of the proposed Imperial East
12 SEZ. The list of bird species potentially present in the project area was determined from range
13 maps and habitat information available from the California Wildlife Habitat Relationships
14 System (CDFG 2008). Land cover types suitable for each species were determined from the
15 SWReGAP (USGS 2004, 2005, 2007). See Appendix M for additional information on the
16 approach used.

17
18 Nearly 90 species of birds have a range
19 that encompasses the SEZ region. However,
20 habitats for about 40 of these species either do
21 not occur on or are limited within the SEZ
22 (e.g., habitat for waterfowl and wading birds).
23 In addition, the SEZ region is within only the
24 winter range (40 species) or the summer range
25 (9 species) of a number of birds. Eleven bird
26 species that could occur on or in the affected area of the SEZ are considered focal species for the
27 California Partners in Flight's *Desert Bird Conservation Plan* (CalPIF 2009): ash-throated
28 flycatcher (*Myiarchus cinerascens*), black-tailed gnatcatcher (*Polioptila melanura*), black-
29 throated sparrow (*Amphispiza bilineata*), burrowing owl (*Athene cunicularia*), common raven
30 (*Corvus corax*), Costa's hummingbird (*Calypte costae*), crissal thrasher (*Toxostoma crissale*),
31 ladder-backed woodpecker (*Picoides scalaris*), Le Conte's thrasher (*Toxostoma lecontei*),
32 phainopepla (*Phainopepla nitens*), and verdin (*Auriparus flaviceps*). Habitats for these species
33 are described in Table 9.1.11.2-1. The ash-throated flycatcher would be a summer resident
34 within the SEZ, while the other desert focal bird species could occur yearlong (CalPIF 2009).

Desert Focal Bird Species

Bird species whose requirements define spatial attributes, habitat characteristics, and management regimes representative of a healthy desert system (Chase and Geupel 2005).

35 36 37 **Waterfowl, Wading Birds, and Shorebirds**

38
39 As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds
40 (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and terns)
41 are among the most abundant groups of birds in the six-state study area. Nearly 20 waterfowl,
42 wading bird, and shorebird species occur within the SEZ region. Within the SEZ, waterfowl,
43 wading birds, and shorebirds are uncommon because of the lack of habitat, but they occur within
44 the area of the All-American Canal just south of the SEZ. The killdeer (*Charadrius vociferus*)
45 and least sandpiper (*Calidris minutilla*) (shorebird species) would be expected to occur on the
46 SEZ. The Colorado River, located more than 20 mi (32 km) east of the SEZ, and the Salton Sea,

TABLE 9.1.11.2-1 Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Imperial East SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Shorebirds				
Killdeer (<i>Charadrius vociferus</i>)	Widespread throughout California. Open areas such as fields, meadows, lawns, mudflats, and shores. Nests on ground in open dry or gravelly locations. About 317,000 acres ^f of potentially suitable habitat occurs in the SEZ region. Yearlong.	230 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	2,562 acres of potentially suitable habitat (0.8% of available potentially suitable habitat)	Small
Least sandpiper (<i>Calidris minutilla</i>)	Wet meadows, mudflats, flooded fields, lake shores, edge of salt marshes, and river sandbars. About 186,600 acres of potentially suitable habitat occurs in the SEZ region. Common to abundant in winter.	44 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat)	3,870 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small
Neotropical Migrants				
Ash-throated flycatcher (<i>Myiarchus cinerascens</i>)	Common in scrub and woodland habitats including desert riparian and desert washes. Requires hole/cavity for nesting. Uses shrubs or small trees for foraging perches. About 1,615,100 acres of potentially suitable habitat occurs in the SEZ region. Summer.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	39,481 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small
Black-tailed gnatcatcher (<i>Polioptila melanura</i>)	Nests in bushes mainly in wooded desert washes with dense mesquite, palo verde, ironwood, and acacia. Also occurs in desert scrub habitat. About 1,709,900 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	60,356 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small

TABLE 9.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Black-throated sparrow (<i>Amphispiza bilineata</i>)	Chaparral and desert scrub habitats with sparse to open stands of shrubs. Often in areas with scattered Joshua trees. Nests in thorny shrubs or cactus. About 1,429,800 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	61,310 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	Small
Brewer's sparrow (<i>Spizella breweri</i>)	Common in Mojave and Colorado Deserts during winter. Occupies open desert scrub and cropland habitats. About 1,172,300 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	40,403 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small
Cactus wren (<i>Campylorhynchus brunneicapillus</i>)	Desert (especially areas with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and trees in towns in arid regions. Nests in <i>Opuntia</i> spp.; twiggy, thorny trees and shrubs; and sometimes in buildings. Nests may be used as winter roost. Locally common in the Mojave and Colorado Deserts. About 802,100 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	111 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat)	4,109 acres of potentially suitable habitat (0.5% of available potentially suitable habitat)	Small
Common poorwill (<i>Phalaenoptilus nuttallii</i>)	Scrubby and brushy areas, prairie, desert, rocky canyons, open woodlands, and broken forests. Mostly in arid and semiarid habitats. Nests in open areas on a bare site. About 1,808,500 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	40,021 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small

TABLE 9.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Common raven (<i>Corvus corax</i>)	Occurs in most habitats. Trees and cliffs provide cover. Roosts primarily in trees. Nests on cliffs, bluffs, tall trees, or human-made structures. Forages in sparse, open terrain. About 1,355,400 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	41,054 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small
Costa's hummingbird (<i>Calypte costae</i>)	Desert and semidesert areas, arid brushy foothills, and chaparral. Main habitats are desert washes; edges of desert riparian and valley foothill riparian areas; coastal, desert, and desert succulent shrub; lower elevation chaparral; and palm oasis. Also in mountains, meadows, and gardens during migration and winter. Most common in canyons and washes when nesting. Nests located in trees, shrubs, vines, or cacti. About 1,614,700 acres of potentially suitable habitat occurs in the SEZ region. Common in summer and uncommon in winter in California.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	39,481 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small
Greater roadrunner (<i>Geococcyx californianus</i>)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Requires thickets, large bushes, or small trees for shade, refuge, and roosting. Usually nests low in trees, shrubs, or clump of cactus. Rarely nests on ground. About 2,114,100 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	63,599 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small

TABLE 9.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Horned lark (<i>Eremophila alpestris</i>)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semidesert shrublands, and alpine tundra. During migration and winter, inhabits the same habitats other than tundra, and also occurs in agricultural areas. Usually occurs where plant density is low and there are exposed soils. About 1,134,600 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	35,912 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small
House finch (<i>Carpodacus mexicanus</i>)	Variety of areas including arid scrub and brush, desert riparian areas, open woodlands, cultivated lands, and savannas. Usually forages in areas with elevated escape perches (e.g., trees, tall shrubs, transmission lines, and buildings). Roosts and nests in sheltered sites in trees; tall, dense shrubs; man-made structures; cliff crevices; or earthen banks. About 289,800 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	274 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	5,142 acres of potentially suitable habitat (1.8% of available potentially suitable habitat)	Small
Ladder-backed woodpecker (<i>Picoides scalaris</i>)	Fairly common in the Mojave and Colorado Deserts. Variety of habitats including deserts, arid scrub, riparian woodlands, mesquite, scrub oak, pinyon-juniper woodlands. Digs nest hole in rotted stub or dead or dying branches of various trees. Also nests in saguaro, agave, yucca, fence posts, and utility poles. Nests on ledges; branches of trees, shrubs, and cactus; and holes in trees or walls. About 1,146,500 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	39,138 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small

TABLE 9.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Le Conte's thrasher (<i>Toxostoma lecontei</i>)	Open desert wash, alkali desert scrub, and desert succulent shrub habitats. Prefers to nest and forage in arroyos and washes lined with dense stands of creosotebush and salt bush. About 1,698,700 acres of potentially suitable habitat occurs in the SEZ region. Yearlong but uncommon to rare.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	60,356 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small
Lesser nighthawk (<i>Chordeiles acutipennis</i>)	Open country, desert regions, scrub, savanna, and cultivated areas. Usually near water including open marshes, salt ponds, large rivers, rice paddies, and beaches. Roosts on low perches or the ground. Nests in the open on bare sites. About 2,128,000 acres of potentially suitable habitat occurs in the SEZ region. Uncommon summer resident.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	62,194 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Open country with scattered trees and shrubs, savanna, desert scrub, desert riparian, Joshua tree, and occasionally open woodland habitats. Perches on poles, wires, or fence posts (suitable hunting perches are important aspect of habitat). Nests in shrubs and small trees. About 1,802,100 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	41,388 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	Small

TABLE 9.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
Phainopepla (<i>Phainopepla nitens</i>)	Common in Mojave and Colorado Deserts. Desert scrub, mesquite, juniper and oak woodlands, tall brush, washes, riparian woodlands, and orchards. Nests in dense foliage of large shrubs or trees, sometimes in a clump of mistletoe. About 910,000 acres of potentially suitable habitat occurs in the SEZ region. Yearlong, but many move to more western and northern portions of California during summer.	783 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	27,671 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small
Say's phoebe (<i>Sayornis saya</i>)	Arid open country, deserts, sagebrush plains, dry barren foothills, canyons, cliffs, ranches, and rural homes. Nests in cliff crevices, holes in banks, sheltered ledges, tree cavities, under bridges and roofs, and in mines. About 1,392,200 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	38,359 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	Small
Verdin (<i>Auriparus flaviceps</i>)	Common to abundant in Colorado Desert, less common in Mojave Desert. Desert riparian, desert wash, desert scrub, and alkali desert scrub areas with large shrubs and small trees. Nests in shrubs, small trees, or cactus. About 1,701,000 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	39,480 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	Small

TABLE 9.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
White-throated swift (<i>Aeronautes saxatalis</i>)	Mountainous country near cliffs and canyons where breeding occurs. Forages over forest and open situations. Nests in rock crevices and canyons, sometimes in buildings. Ranges widely over most terrain and habitats, usually high in the air. About 379,200 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	307 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	5,682 acres of potentially suitable habitat (1.5% of available potentially suitable habitat)	Small
Birds of Prey				
American kestrel (<i>Falco sparverius</i>)	Occurs in most open habitats, in various shrub and early successional forest habitats, forest openings, and various ecotones. Perches on trees, snags, rocks, utility poles and wires, and fence posts. Uses cavities in trees, snags, rock areas, banks, and buildings for nesting and cover. About 664,600 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	307 acres of potentially suitable habitat lost (0.05% of available potentially suitable habitat)	5,714 acres of potentially suitable habitat (0.9% of available potentially suitable habitat)	Small
Golden eagle (<i>Aquila chrysaetos</i>)	Grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. Occasionally in most other habitats, especially during migration and winter. Nests on cliffs and sometimes trees in rugged areas, with breeding birds ranging widely over surrounding areas. About 2,032,000 acres of potentially suitable habitat occurs in the SEZ region. Winter.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	40,054 acres of potentially suitable habitat (2.0% of available potentially suitable habitat)	Small

TABLE 9.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Birds of Prey</i> (Cont.)				
Prairie falcon (<i>Falco mexicanus</i>)	Associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. Nests in pothole or well-sheltered ledge on rocky cliff or steep earth embankment. May also nest in man-made excavations on otherwise unsuitable cliffs and old nests of ravens, hawks, and eagles. Forages in large patch areas with low vegetation. May forage over irrigated croplands in winter. About 1,901,300 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	40,020 acres of potentially suitable habitat (2.07% of available potentially suitable habitat)	Small
Red-tailed hawk (<i>Buteo jamaicensis</i>)	Wide variety of habitats from deserts, mountains, and populated valleys. Open areas with scattered, elevated perch sites such as scrub desert, plains and montane grassland, agricultural fields, pastures urban parklands, broken coniferous forests, and deciduous woodland. Nests on cliff ledges or in tall trees. About 246,900 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	230 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	1,908 acres of potentially suitable habitat (0.8% of available potentially suitable habitat)	Small
Turkey vulture (<i>Cathartes aura</i>)	Occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting. Migrates and forages over most open habitats. Roosts communally in trees, exposed boulders, and occasionally transmission line support towers. About 1,423,300 acres of potentially suitable habitat occurs in the SEZ region. Summer.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	39,678 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	Small

TABLE 9.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Upland Game Birds</i>				
Gambel's quail (<i>Callipepla gambelii</i>)	Deserts, especially in areas with brushy or thorny growth, and adjacent cultivated areas. Usually occurs near water. Nests on the ground under cover of small trees, shrubs, and grass tufts. About 1,902,800 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	40,494 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small
Mourning dove (<i>Zenaida macroura</i>)	Habitat generalist, occurring in grasslands, shrublands, croplands, lowland and foothill riparian forests, ponderosa pine forests, deserts, and urban and suburban areas. Rarely in aspen and other forests, coniferous woodlands, and alpine tundra. Nests on ground or in trees. Winters mostly in lowland riparian forests adjacent to cropland. About 1,846,200 acres of potentially suitable habitat occurs in the SEZ region. Yearlong.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	42,192 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	Small
White-winged dove (<i>Zenaida asiatica</i>)	Desert riparian, wash, succulent shrub, scrub, and Joshua tree habitats; orchards and vineyards, croplands, and pastures. About 1,737,700 acres of potentially suitable habitat occurs in the SEZ region. Summer.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	60,357 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small

^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Only the U.S. portion is tabulated. Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 4,578 acres (18.5 km²) would be developed in the SEZ.

Footnotes continued on next page.

TABLE 9.1.11.2-1 (Cont.)

-
- ^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Only the U.S. portion is tabulated. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ boundary.
- ^d Overall impact magnitude categories were based on professional judgment and were (1) *small*: $\leq 1.7\%$ of potentially suitable habitat for the species would be lost and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1.7 but $\leq 17\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>17\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Design features would reduce most indirect effects to negligible levels. Proportion cutoffs were adjusted to account for the fact that 40% of the SEZ region occurs in Mexico.
- ^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.
- ^f To convert acres to km^2 , multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 located more than 35 mi (56 km) northwest of the SEZ, would provide more productive habitat
2 for this group of birds.

5 **Neotropical Migrants**

7 As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse
8 category of birds within the six-state study area. Neotropical migrants expected to occur on or in
9 the affected area of the proposed Imperial East SEZ throughout the year include the black-tailed
10 gnatcatcher, black-throated sparrow, cactus wren (*Campylorhynchus brunneicapillus*), common
11 poorwill (*Phalaenoptilus nuttallii*), common raven, Costa's hummingbird, crissal thrasher,
12 greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), house finch
13 (*Carpodacus mexicanus*), ladder-backed woodpecker, Le Conte's thrasher, loggerhead shrike
14 (*Lanius ludovicianus*), phainopepla, Say's phoebe (*Sayornis saya*), verdin, and white-throated
15 swift (*Aeronautes saxatalis*). The winter range for the Brewer's sparrow (*Spizella breweri*),
16 green-tailed towhee (*Pipilo chlorurus*), and sage sparrow (*Amphispiza belli*) encompasses the
17 SEZ, while the summer range for the ash-throated flycatcher (*Myiarchus cinerascens*) and lesser
18 nighthawk (*Chordeiles acutipennis*) encompasses the SEZ (CDFG 2008).

21 **Birds of Prey**

23 Section 4.10.2.2.4 provides an overview of the birds of prey (raptors, owls, and vultures)
24 within the six-state study area. More than 15 birds of prey species have ranges that encompass
25 the proposed Imperial East SEZ (CDFG 2008). Some of these species, particularly several owl
26 and hawk species, are not expected to occur within the SEZ, because their preferred habitats are
27 not present within the SEZ. These species include the long-eared owl (*Asio otus*), northern saw-
28 whet owl (*Aegolius acadicus*), sharp-shinned hawk (*Accipiter striatus*, winter), and western
29 screech-owl (*Megascops kennicottii*). Some raptor species such as the Cooper's hawk (*Accipiter*
30 *cooperii*), great horned owl (*Bubo virginianus*), merlin (*Falco columbarius*), red-shouldered
31 hawk (*Buteo lineatus*), and rough-legged hawk (*Buteo lagopus*) would either utilize the SEZ
32 occasionally for feeding or would occur only where riparian areas or other woodland habitat
33 occurs.

35 Raptor species expected to occur within the SEZ include the American kestrel
36 (*Falco sparverius*, yearlong), burrowing owl (yearlong), ferruginous hawk (*Buteo regalis*,
37 winter), golden eagle (*Aquila chrysaetos*, winter), prairie falcon (*Falco mexicanus*, yearlong),
38 red-tailed hawk (*Buteo jamaicensis*, yearlong), and turkey vulture (*Cathartes aura*, summer)
39 (CDFG 2008). However, the American kestrel, golden eagle, prairie falcon, and red-tailed
40 hawk make only infrequent use of the desert regions within which the proposed Imperial
41 East SEZ occurs. The golden eagle is a fully protected species in the State of California
42 (CDFG 2010a).

1 **Upland Game Birds**
2

3 Section 4.10.2.2.5 provides an overview of the upland game birds (primarily pheasants,
4 grouse, quail, and doves) that occur within the six-state study area. Upland game species that
5 could occur yearlong within the proposed Imperial East SEZ are Gambel’s quail (*Callipepla*
6 *gambelii*) and mourning dove (*Zenaida macroura*), while the white-winged dove (*Zenaida*
7 *asiatica*) would occur during the summer (CDFG 2008). Gambel’s quail is common within the
8 Colorado and Mojave Desert areas of California. It prefers riparian areas and also occurs near
9 streams, springs, and water holes. While it feeds in open habitats, trees or tall shrubs are required
10 for escape cover. It also requires a nearby source of water, particularly during hot summer
11 months (CDFG 2008). Up to 400,000 Gambel’s quail are harvested annually in California
12 (CDFG 2008). The mourning dove is common throughout California and can be found in a wide
13 variety of habitats. Regardless of habitat occupied, it requires a nearby water source (CDFG
14 2008). The white-winged dove occurs in the southeastern corner of California. It inhabits desert
15 riparian, wash, succulent shrub, scrub, alkali scrub, and Joshua tree habitats. It also occurs in
16 orchards, vineyards, cropland, and pastures (CDFG 2008).
17

18 Table 9.1.11.2-1 provides habitat information for the representative bird species that
19 could occur on or in the affected area of the proposed Imperial East SEZ. Due to their special
20 status standing, the burrowing owl, crissal thrasher, ferruginous hawk, and short-eared owl are
21 discussed in Section 9.1.12.1.
22

23
24 **9.1.11.2.2 Impacts**
25

26 The types of impacts that birds could incur from construction, operation, and
27 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
28 such impacts would be minimized through the implementation of required programmatic design
29 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
30 Section 9.1.11.2.3, below, identifies design features of particular relevance to the proposed
31 Imperial East SEZ.
32

33 The assessment of impacts on bird species is based on available information on the
34 presence of species in the affected area as presented in Section 9.1.11.2.1 following the analysis
35 approach described in Appendix M. Additional NEPA assessments and coordination with state
36 natural resource agencies may be needed to address project-specific impacts more thoroughly.
37 These assessments and consultations could result in additional required actions to avoid or
38 mitigate impacts on birds (see Section 9.1.11.2.3).
39

40 In general, impacts on birds would result from habitat disturbance (i.e., habitat reduction,
41 fragmentation, and alteration) and from disturbance, injury, or mortality to individual birds.
42 Table 9.1.11.2-1 summarizes the potential impacts on representative bird species resulting from
43 solar energy development that could occur on or in the affected area in the proposed Imperial
44 East SEZ. Direct impacts on bird species would be small for all bird species, because only 0.4%
45 or less of habitats potentially suitable for each species would be lost (Table 9.1.11.2-1). Larger
46 areas of suitable habitat would be lost for bird species that occur within the area of potential

1 indirect effects (e.g., up to 4.3% of potentially suitable habitat for the black-throated sparrow).
2 Other impacts on birds could result from collision with vehicles and buildings, surface water
3 and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise,
4 lighting, spread of invasive species, accidental spills, and harassment. Indirect impacts on areas
5 outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are
6 expected to be negligible with implementation of programmatic design features.
7

8 Decommissioning of facilities and reclamation of disturbed areas after operations cease
9 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
10 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
11 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
12 reclamation on wildlife. Of particular importance for bird species would be the restoration of
13 original ground surface contours, soils, and native plant communities associated with semiarid
14 shrublands.
15

16 ***9.1.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 17

18
19 The successful implementation of programmatic design features presented in
20 Appendix A, Section A.2.2, would reduce the potential for effects on birds. Indirect impacts
21 could be reduced to negligible levels by implementing programmatic design features, especially
22 those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust.
23 While SEZ-specific design features important to reducing impacts on birds are best established
24 when specific project details are considered, some design features can be identified at this time,
25 as follows:
26

- 27 • Pre-disturbance surveys should be conducted within the SEZ for bird species
28 listed under the Migratory Bird Treaty Act. Impacts on potential nesting
29 habitat of these species should be avoided, particularly during the nesting
30 season.
31
- 32 • Pre-disturbance surveys should be conducted within the SEZ for the following
33 desert bird focal species (CalPIF 2009): ash-throated flycatcher, black-tailed
34 gnatcatcher, black-throated sparrow, burrowing owl, common raven, Costa's
35 hummingbird, crissal thrasher, ladder-backed woodpecker, Le Conte's
36 thrasher, phainopepla, and verdin. Impacts on potential nesting habitat of
37 these species should be avoided.
38
- 39 • Plant species that positively influence the presence and abundance of desert
40 bird focal species should be avoided to the extent practicable. These species
41 include Goodding's willow, yucca, Joshua tree, mesquite, honey mesquite,
42 screwbean, desert mistletoe, big saltbush, smoketree, and catclaw acacia
43 (CalPIF 2009).
44
- 45 • Wetland habitats along the southern boundary of the SEZ boundary should be
46 avoided to the extent practicable.

- 1 • Take of golden eagles and other raptors should be avoided. Mitigation
2 regarding the golden eagle should be developed in consultation with the
3 USFWS and CDFG. A permit may be required under the Bald and Golden
4 Eagle Protection Act.
5

6 If these SEZ-specific design features are implemented in addition to programmatic design
7 features, impacts on bird species could be reduced. Any residual impacts on birds are anticipated
8 to be small given the relative abundance of suitable habitats in the SEZ region. However, as
9 potentially suitable habitats for a number of the bird species occur throughout much of the SEZ,
10 additional species-specific mitigation of direct effects for those species would be difficult or
11 infeasible. The potential for indirect impacts on several bird species (particularly waterfowl,
12 wading birds, and shorebirds) could be reduced by maximizing the distance between solar energy
13 facilities and the All-American Canal.
14

15 **9.1.11.3 Mammals** 16

17 **9.1.11.3.1 Affected Environment** 18

19 This section addresses mammal species that are known to occur, or for which suitable
20 habitat occurs, on or within the potentially affected area of the proposed Imperial East SEZ. The
21 list of mammal species potentially present in the project area was determined from range maps
22 and habitat information available from the California Wildlife Habitat Relationships System
23 (CDFG 2008). Land cover types suitable for each species were determined from the SWReGAP
24 (USGS 2004, 2005, 2007). See Appendix M for additional information on the approach used.
25 Based on species distributions and habitat preferences, about 40 mammal species could occur
26 within the SEZ (CDFG 2008). The following discussion emphasizes big game and other
27 mammal species that (1) have key habitats within or near the Imperial East SEZ, (2) are
28 important to humans (e.g., big game, small game, and furbearer species), and/or (3) are
29 representative of other species with similar habitats.
30
31
32

33 **Big Game** 34

35 The desert bighorn sheep (*Ovis canadensis nelsoni*) and mule deer (*Odocoileus*
36 *hemionus*) are the only big game species expected to occur in the area of the proposed Imperial
37 East SEZ. Because it is a BLM sensitive species, the desert bighorn sheep is discussed in
38 Section 9.1.12. The mule deer is common to abundant throughout California, except in deserts
39 and intensely farmed areas (CDFG 2008). It prefers a mosaic of vegetation that has herbaceous
40 openings, dense brush or tree thickets, riparian areas, and abundant edges. Mule deer are
41 browsers and grazers, feeding on shrubs, forbs, and a few grasses. Brush is important for
42 escape cover and for thermal regulation in winter and summer (CDFG 2008). The burro deer
43 (*Odocoileus hemionus eremicus*), a subspecies of mule deer, occurs in the Colorado Desert. It
44 occurs primarily along the Colorado River, especially during hot summers, and in desert wash
45 woodland communities when away from the river (generally when late summer thunderstorms
46

1 and cooler temperatures allow the deer to move up the larger washes into the mountains or wash
2 complexes in the foothills) (BLM and CDFG 2002). Burro deer consume foliage from riparian
3 and woodland trees (e.g., willow, palo verde, and ironwood) and various shrubs. Major threats to
4 the burro deer include habitat loss from agricultural development and urbanization and
5 infestation of tamarisk along the Colorado River (BLM and CDFG 2002).

6 7 8 **Other Mammals** 9

10 A number of small game and furbearer species occur within the area of the proposed
11 Imperial East SEZ. These include the American badger (*Taxidea taxus*), black-tailed jackrabbit
12 (*Lepus californicus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus*
13 *audubonii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), and white-tailed antelope
14 squirrel (*Ammospermophilus leucurus*) (CDFG 2008).

15
16 Nongame (small) mammal species such as bats, mice, kangaroo rats, and shrews also
17 occur within the area of the Imperial East SEZ. These include the cactus mouse (*Peromyscus*
18 *eremicus*), canyon deer mouse (*P. crinitus*), desert kangaroo rat (*Dipodomys deserti*), desert
19 shrew (*Notiosorex crawfordi*), desert woodrat (*Neotoma lepida*), little pocket mouse
20 (*Perognathus longimembris*), long-tailed pocket mouse (*Chaetodipus formosus*), Merriam's
21 kangaroo rat (*Dipodomys merriami*), and southern grasshopper mouse (*Onychomys torridus*)
22 (CDFG 2008). The ranges of nine bat species encompass the SEZ: big brown bat (*Eptesicus*
23 *fuscus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), Californian leaf-nosed bat (*Macrotus*
24 *californicus*), California mastiff bat (*Eumops perotis californicus*), California myotis (*Myotis*
25 *californicus*), pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), Townsend's
26 big-eared bat (*Corynorhinus townsendii*), and western pipistrelle (*Parastrellus hesperus*). Most
27 bat species would utilize only the SEZ during foraging. Roost sites for the species (e.g., caves,
28 hollow trees, rock crevices, or buildings) are absent to scarce on or in the affected area of
29 the SEZ.
30

31 Table 9.1.11.3-1 provides habitat information for the representative mammal species that
32 could occur on or in the affected area of the proposed Imperial East SEZ. Because of their
33 special status standing, the California mastiff bat, Californian leaf-nose bat, pallid bat, and
34 Townsend's big-eared bat are discussed in Section 9.1.12.1.
35
36

37 **9.1.11.3.2 Impacts** 38

39 The types of impacts that mammals could incur from construction, operation, and
40 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
41 such impacts would be minimized through the implementation of required programmatic design
42 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
43 Section 9.1.11.3.3, below, identifies design features of particular relevance to the proposed
44 Imperial East SEZ.
45

TABLE 9.1.11.3-1 Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Imperial East SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Big Game				
Mule deer (<i>Odocoileus hemionus</i>)	Occurs in early to intermediate successional stages of most forest, woodland, and brush habitats. About 1,781,800 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	41,748 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	Small. Ensure that development does not block free access to the unlined section of the All-American Canal.
Small Game and Furbearers				
American badger (<i>Taxidea taxus</i>)	Open grasslands and deserts, meadows in subalpine and montane forests, alpine tundra. Digs burrows in friable soils. Most common in areas with abundant populations of ground squirrels, prairie dogs, and pocket gophers. Relatively uncommon throughout California. About 1,119,200 acres ^f of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	39,137 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small
Black-tailed jackrabbit (<i>Lepus californicus</i>)	Open plains, fields, and deserts with scattered thickets or patches of shrubs. Also, open, early stages of forests and chaparral habitats. Rests during the day in shallow depressions, and uses shrubs for cover. About 2,118,900 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	66,029 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small

TABLE 9.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers (Cont.)</i>				
Bobcat (<i>Lynx rufus</i>)	Occurs in nearly all habitats and successional stages. Optimal habitats include mixed woodlands and forest edges, hardwood forests, swamps, forested river bottoms, brushlands, deserts, mountains, and other areas with thick undergrowth. Availability of water may limit its distribution in xeric regions. Uses rocky clefts, caves, hollow logs, spaces under fallen trees, and so forth when inactive; usually changes shelter areas daily. About 1,613,800 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	42,180 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small
Coyote (<i>Canis latrans</i>)	Suitable habitat characterized by interspersions of brush and open areas with free water. Least common in dense coniferous forest. Where human control efforts occur, restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 2,358,200 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	64,112 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	Small
Desert cottontail (<i>Sylvilagus audubonii</i>)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Thickets and patches of shrubs, vines, and brush also used as cover. About 1,690,200 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	38,161 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	Small

TABLE 9.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers (Cont.)</i>				
Round-tailed ground squirrel (<i>Spermophilus tereticaudus</i>)	Optimum habitat includes desert succulent shrub, desert wash, desert scrub, alkali desert scrub, and levees in cropland habitat. Also occurs in urban habitats. Burrows usually at base of shrubs. About 1,146,200 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	39,138 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small
White-tailed antelope squirrel (<i>Ammospermophilus leucurus</i>)	Common to abundant in California deserts. Optimal habitats are desert scrub, sagebrush, alkali desert scrub, Joshua tree, bitterbrush, and pinyon-juniper. Fairly common in desert riparian, desert succulent shrub, and desert wash habitats. Also occurs in mixed chaparral and annual grassland habitats. Requires friable soil for burrowing. Burrows may be under shrubs or in open; often uses abandoned kangaroo rat burrows. About 1,709,700 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	36,794 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small
<i>Nongame (Small) Mammals</i>				
Big brown bat (<i>Eptesicus fuscus</i>)	Deserts, forests and woodlands, old fields, shrublands, and urban/suburban areas. Uncommon in hot desert habitats. Summer roosts are in buildings, hollow trees, rock crevices, tunnels, and cliff swallow nests. Maternity colonies occur in attics, barns, tree cavities, rock crevices, and caves. Caves, mines, and manmade structures used for hibernation sites. About 1,555,000 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	30,011 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small

TABLE 9.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (Small)</i>				
<i>Mammals (Cont.)</i>				
Brazilian free-tailed bat (<i>Tadarida brasiliensis</i>)	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, and suburban/urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 2,194,100 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	66,038 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small
Cactus mouse (<i>Peromyscus eremicus</i>)	Deserts, shrublands, chaparral, and coniferous woodlands. Occurs on rocky areas and areas with sandy substrates and loamy soils. Nests in rock heaps, stone walls, burrows, brush fences, and woodrat houses. About 1,626,700 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	39,481 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small
Californian myotis (<i>Myotis californicus</i>)	Cliffs, deserts, forests, woodlands, grasslands, savannas, shrublands, and savannas. Often uses manmade structures for night roosts. Uses crevices for summer day roosts. May roost on small desert shrubs or on the ground. Hibernates in caves, mines, tunnels, or buildings. For maternity colonies may inhabit rock crevices, under bark, or under eaves of buildings. Common to abundant below 6,000 ft. About 1,790,000 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	40,020 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small

TABLE 9.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (Small)</i>				
<i>Mammals (Cont.)</i>				
Canyon deermouse (<i>Peromyscus crinitus</i>)	Found in most desert and chaparral habitats. Gravelly desert pavement, talus, boulders, cliffs, and slickrock—rocky areas with virtually any type of plant cover. About 1,245,000 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	39,169 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small
Desert kangaroo rat (<i>Dipodomys deserti</i>)	Low deserts, deep wind-drifted sandy soil with sparse vegetation, alkali sinks, and shadscale or creosotebush scrub. Nests in burrows dug in mounds, usually under vegetation. About 658,700 acres of potentially suitable habitat occurs in the SEZ region.	739 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	24,445 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small
Desert shrew (<i>Notiosorex crawfordi</i>)	Generally found in arid areas with adequate cover for nesting and resting. Deserts, semiarid grasslands with scattered cactus and yucca, chaparral slopes, alluvial fans, sagebrush, gullies, juniper woodlands, riparian areas, and dumps. About 2,132,700 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	64,123 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small
Desert woodrat (<i>Neotoma lepida</i>)	Sagebrush scrub; chaparral; deserts and rocky slopes with scattered cactus, yucca, pine-juniper, or other low vegetation; creosotebush desert; Joshua tree woodlands; scrub oak woodlands; pinyon-juniper woodlands; and riparian zones. Most abundant in rocky areas with Joshua trees. Dens built of debris on ground, among cacti or yucca, along cliffs, among rocks, or occasionally in trees. About 2,017,000 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	41,318 acres of potentially suitable habitat (2.0% of available potentially suitable habitat)	Small

TABLE 9.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (Small)</i>				
<i>Mammals (Cont.)</i>				
Little pocket mouse (<i>Perognathus longimembris</i>)	Common to abundant in southern California deserts. Preferred habitat includes desert riparian, desert scrub, desert wash, and sagebrush. Nests in an underground burrow. Sandy soil preferred for burrowing, but also commonly burrows on gravel washes and on stony soils. About 1,723,800 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	60,357 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small
Long-tailed pocket mouse (<i>Chaetodipus formosus</i>)	Common in sagebrush, desert scrub, and desert succulent shrub habitats with rocky or stony groundcover. Often inhabits rocky washes and canyon mouths. Uses underground burrows. About 1,836,700 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	36,826 acres of potentially suitable habitat (2.0% of available potentially suitable habitat)	Small
Merriam's kangaroo rat (<i>Dipodomys merriami</i>)	Most widespread kangaroo rat in California. In southern California, occurs in desert scrub and alkali desert scrub, sagebrush, Joshua tree, and pinyon-juniper habitats. Uses desert flats or slopes with sparse to moderate canopy coverage and sandy to gravelly substrates. Uses underground burrows often located at the base of a shrub. About 1,817,200 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	60,830 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small

TABLE 9.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (Small)</i>				
<i>Mammals (Cont.)</i>				
Southern grasshopper mouse (<i>Onychomys torridus</i>)	Hot, arid valleys and scrub deserts with sparse and scattered vegetation such as mesquite, creosotebush cholla, yucca, and short grasses. Frequents scrub habitats with friable soils for digging. Also uses abandoned underground burrows. About 1,815,000 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	63,583 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small
Spotted bat (<i>Euderma maculatum</i>)	Mostly found in the foothills, mountains, and desert regions of southern California. Roosts in caves and cracks or crevices in cliffs and canyons. About 1,765,000 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	40,020 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	Small
Western pipistrelle (<i>Parastrellus hesperus</i>)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 1,342,900 acres of potentially suitable habitat occurs in the SEZ region.	4,578 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	38,367 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small

^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Only the U.S. portion is tabulated. Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 4,578 acres (18.5 km²) would be developed in the SEZ.

Footnotes continued on next page.

TABLE 9.1.11.3-1 (Cont.)

-
- ^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Only the U.S. portion is tabulated. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ boundary.
- ^d Overall impact magnitude categories were based on professional judgment and were (1) *small*: $\leq 1.7\%$ of potentially suitable habitat for the species would be lost and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1.7 but $\leq 17\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>17\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Design features would reduce most indirect effects to negligible levels. Proportion cutoffs were adjusted to account for the fact that 40% of the SEZ region occurs in Mexico.
- ^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.
- ^f To convert acres to km^2 , multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 The assessment of impacts on mammal species is based on available information on the
2 presence of species in the affected area as presented in Section 9.1.11.3.1 following the analysis
3 approach described in Appendix M. Additional NEPA assessments and coordination with state
4 natural resource agencies may be needed to address project-specific impacts more thoroughly.
5 These assessments and consultations could result in additional required actions to avoid or
6 mitigate impacts on mammals (see Section 9.1.11.3.3).
7

8 Table 9.1.11.3-1 summarizes the potential impacts on representative mammal species
9 resulting from solar energy development (with the implementation of required programmatic
10 design features) in the proposed Imperial East SEZ.
11

12 Direct impacts on small game, furbearers, and nongame (small) mammal species would
13 be small, because 0.4% or less of potentially suitable habitats identified for the species would
14 be lost (Table 9.1.11.3-1). Larger areas of suitable habitat for these species occur within the
15 area of potential indirect effects (e.g., up to 3.7% for the desert kangaroo rat). Other impacts on
16 mammals could result from collision with fences and vehicles, surface water and sediment runoff
17 from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of
18 invasive species, accidental spills, and harassment. These indirect impacts are expected to be
19 negligible with implementation of programmatic design features.
20

21 Decommissioning of facilities and reclamation of disturbed areas after operations cease
22 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
23 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
24 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
25 reclamation on wildlife. Of particular importance for mammal species would be the restoration
26 of original ground surface contours, soils, and native plant communities associated with
27 semiarid shrublands.
28
29

30 ***9.1.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 31

32 The implementation of required programmatic design features described in Appendix A,
33 Section A.2.2, would reduce the potential for effects on mammals. While some SEZ-specific
34 design features are best established when considering specific project details, one design feature
35 that can be identified at this time is the following:
36

- 37 • Ensure that solar project development does not prevent mule deer free access
38 to the unlined section of the All-American Canal.
39

40 If this SEZ-specific design feature is implemented in addition to programmatic design
41 features, impacts on mammal species could be reduced. Any residual impacts on mammals are
42 anticipated to be small given the relative abundance of suitable habitats in the SEZ region.
43 However, as potentially suitable habitats for a number of the mammal species occur throughout
44 much of the SEZ, additional species-specific mitigation of direct effects for those species would
45 be difficult or infeasible.
46
47

1 **9.1.11.4 Aquatic Biota**

2
3
4 **9.1.11.4.1 Affected Environment**

5
6 This section addresses aquatic habitats and biota that are known to occur on the proposed
7 Imperial East SEZ itself or within an area that could be affected, either directly or indirectly, by
8 activities associated with solar energy development within the SEZ. For the proposed Imperial
9 East SEZ, the area of direct effects was considered to be the entire SEZ area. As discussed in
10 Section 9.1.1.1, a new access road would not be needed because State Route 98, a two-lane
11 highway, passes through the southern edge of the SEZ. In addition, for this analysis, the impacts
12 of construction and operation of transmission lines outside of the SEZ were not assessed,
13 assuming that the existing 115-kV transmission line might be used to connect some new solar
14 facilities to load centers, and that additional project-specific analysis would be done for new
15 transmission construction or line upgrades. The area of potential indirect impacts on aquatic
16 biota from SEZ development was considered to extend up to 5 mi (8 km) beyond the SEZ
17 boundary.

18
19 There are no water body or stream features located within the proposed Imperial East
20 SEZ (Figure 9.1.10.1-2). As described in Section 9.1.10, there are approximately 5 acres
21 (0.02 km²) of palustrine wetlands along the southern edge of the SEZ that are part of a larger
22 wetland area located along the All-American Canal. The NWI classification indicates that these
23 wetlands are temporarily flooded throughout the year primarily through seepage from the canal.
24 The recently completed concrete lining of the canal may have reduced the traditional water
25 source for these wetlands. However, restoration efforts are planned (Section 9.1.9.1.1). Fish
26 communities in these wetlands have not been studied in detail, but the limited collection data
27 available indicate that short-lived, heat- and salt-tolerant species like mosquitofish (*Gambusia*
28 *affinis*), tilapia (*Tilapia zilli*), and mollies (*Poecilia* spp.) predominate (USFWS 1988). The
29 presence of federally listed pupfish and other native California desert species has not been
30 documented within wetlands associated with the All-American Canal, and in evaluating the
31 canal lining project, the USFWS did not identify impacts on endangered fish as a concern
32 (Section 9.1.12) (BOR 2006).

33
34 The area of potential indirect impacts on aquatic biota from SEZ development was
35 considered to extend up to 5 mi (8 km) beyond the SEZ boundary (Figure 9.1.10.1-2). No
36 standing water bodies are present in the area of potential indirect effects. The majority of the
37 palustrine wetlands described above are located along the All-American Canal in the area of
38 indirect effects. The only stream-like features within the area of potential indirect effects are
39 portions of the All-American Canal and the East Highline Canal. A total of approximately 17 mi
40 (27 km) of the All-American Canal is located within the area of potential indirect effects, 7 mi
41 (11 km) of which runs from east to west about 0.25 mi (0.4 km) from the southern boundary of
42 the SEZ. The All-American Canal diverts Colorado River water from the Imperial Dam, which
43 is located approximately 39 mi (63 km) northeast of the proposed SEZ. Twenty-three miles
44 (37 km) of the All-American Canal is lined with concrete to prevent water seepage. The East
45 Highline Canal is a diversion off the All-American Canal and is located approximately 4 mi
46 (6.4 km) west of the Imperial East SEZ. Approximately 8 mi (13 km) of the East Highline Canal

1 is located within the area of potential indirect effects. Chironomidae, Oligochaeta, hydracarina,
2 and corbicula dominated the macroinvertebrate community of the nearby Coachella Canal
3 (USFWS 1988) and presumably similar species would be present in the All-American Canal and
4 East Highline Canal. Both canals support populations of non-native sport fish including striped
5 bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), carp (*Cyprinus carpio*),
6 flathead catfish (*Pylodictis olivaris*), channel catfish (*Ictalurus punctatus*), sunfish (*Lepomis*
7 spp.), and tilapia (*Tilapia* spp.) (USFWS 1988). Both canals are heavily used as recreational
8 fishing areas. Native fish are relatively rare in the lower Colorado River due to overfishing,
9 predation by non-native species, and human alteration of streams and rivers (Mueller and
10 Marsh 2002). There are no records of endangered species native to the Colorado River within the
11 All-American Canal (see Section 9.1.12), and the USFWS found no adverse impacts on
12 endangered fish would occur as a result of lining the canal (BOR 2006), suggesting endangered
13 species and suitable habitat are not present.

14
15 Outside of the indirect effects area, but within 50 mi (80 km) of the SEZ, there is
16 approximately 94,721 acres (383 km²) of lake and reservoir habitat (including reservoirs formed
17 by dams constructed on the Colorado River). Also present within 50 mi (80 km) of the SEZ is
18 approximately 40 mi (64 km) of the Colorado River above Ferguson Lake and 42 mi (67.5 km)
19 below the Imperial Dam. There are approximately 122 mi (196 km) of perennial stream habitat,
20 114 mi (183 km) of intermittent stream habitat, and a total of 371 mi (597 km) of canal habitat
21 within 50 mi (80 km) of the SEZ. Only canal habitat is present within the area of potential
22 indirect effects and represents approximately 5% of the overall amount of stream and canal
23 habitat available within the overall analysis area.

24 25 26 **9.1.11.4.2 Impacts**

27
28 The types of impacts that could occur to aquatic habitats and biota from development
29 of utility-scale solar energy facilities are discussed in Section 5.10.3.1. Effects particularly
30 relevant to aquatic habitats and communities include water withdrawal and changes in water,
31 sediment, and contaminant inputs associated with runoff.

32
33 No permanent water bodies or streams are present within the boundaries of the Imperial
34 East SEZ; therefore, no direct impacts on these features are expected. However, wetlands are
35 present and therefore direct impacts on wetland communities are possible as a result of solar
36 energy development within the SEZ. It is also assumed that the man-made All-American Canal
37 and East Highline Canal and associated palustrine wetlands within 5 mi (8 km) of the SEZ
38 (Figure 9.1.10-2) could be indirectly affected by development and operation of solar energy
39 facilities. Aquatic organisms present in these habitat features could be affected by runoff of
40 water and sediment from the SEZ, especially if ground disturbance occurred along the southern
41 boundary of the SEZ (Section 9.1.9.2.1). However, the aquatic communities in both canals are
42 composed primarily of introduced non-native species and implementation of commonly used
43 engineering practices to control water runoff and sediment deposition into these canal and
44 wetland habitat features would control the potential for impacts on aquatic organisms. Overall,
45 the potential for indirect impacts on aquatic habitats and organisms within the region are small.

1 Water quality in aquatic habitats could be affected by the introduction of contaminants
2 such as fuels, lubricants, or pesticides/herbicides during site characterization, construction,
3 operation, or decommissioning for a solar energy facility, as identified in Section 5.9.1.2.4.
4 Because of the proximity of the Imperial East SEZ to the All-American Canal and associated
5 wetlands, there is the potential for contaminants from solar energy development activities within
6 the SEZ to affect aquatic biota or habitats within these areas.
7

8 In arid environments, reductions in the quantity of water in aquatic habitats are of
9 particular concern. Water quantity in aquatic habitats could also be affected if significant
10 amounts of surface water or groundwater were utilized for power plant cooling water, for
11 washing mirrors, or for other needs. The greatest need for water would occur if technologies
12 employing wet cooling, such as parabolic trough or power tower, were developed at the site; the
13 associated impacts would ultimately depend on the water source used (including groundwater
14 from aquifers at various depths). As discussed in Section 9.1.9.2.2, it seems unlikely that
15 sufficient water for wet cooling could be obtained from the All-American Canal. Obtaining
16 cooling water from other perennial surface water features in the region could affect water levels
17 and, as a consequence, aquatic organisms in those water bodies. Additional details regarding the
18 volume of water required and the types of organisms present in potentially affected water bodies
19 would be required in order to further evaluate the potential for impacts from water withdrawals.
20

21 ***9.1.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 22

23
24 No SEZ-specific design features have been identified. If programmatic design features
25 are implemented and if the utilization of water from groundwater or surface water sources is
26 adequately controlled to maintain sufficient water levels in nearby aquatic habitats, the impacts
27 on aquatic biota and habitats from solar energy development at the Imperial East SEZ would be
28 expected to be small.

1 **9.1.12 Special Status Species (Threatened, Endangered, Sensitive, and Rare Species)**
2

3 This section addresses special status species that are known to occur, or for which
4 suitable habitat occurs, on or within the potentially affected area of the proposed Imperial East
5 SEZ. Special status species include the following types of species⁸:
6

- 7 • Species listed as threatened or endangered under the Endangered Species Act
8 (ESA);
9
- 10 • Species that are proposed for listing, are under review, or are candidates for
11 listing under the ESA;
12
- 13 • Species that are listed as threatened or endangered under the California
14 Endangered Species Act (CESA), or that are identified as fully protected by
15 the state⁹;
16
- 17 • Species that are listed by the BLM as sensitive; and
18
- 19 • Species that have been ranked by the State of California as S1 or S2, or
20 species of concern by the State of California or the USFWS; hereafter referred
21 to as “rare” species.
22

23 Special status species known to occur within 50 mi (80 km) of the Imperial East SEZ
24 center (i.e., the SEZ region) were determined from natural heritage records available through
25 NatureServe Explorer (NatureServe 2010), information provided by the California Department
26 of Fish and Game (CDFG 2010a), California Natural Diversity Database (CNDDDB)
27 (CDFG 2010d), California Regional Gap Analysis Project (CAREGAP) (Davis et al. 1998,
28 USGS 2010a), and SWReGAP (USGS 2004, 2005, 2007). Information reviewed consisted of
29 county-level occurrences as determined from NatureServe, point and polygon element
30 occurrences as determined from CNDDDB, as well as modeled land cover types and predicted
31 suitable habitats for the species within the 50-mi (80-km) region as determined from CAREGAP
32 and SWReGAP. The 50-mi (80-km) SEZ region intersects Imperial and Riverside Counties,
33 California; La Paz and Yuma Counties, Arizona; and northern Mexico. However, the SEZ and
34 affected area occur only in Imperial County, California. See Appendix M for additional
35 information on the approach used to identify species that could be affected by development
36 within the SEZ.
37
38
39

⁸ See Section 4.6.4 for definitions of these species categories. Note that some of the categories of species included here do not fit BLM’s definition of special status species as defined in BLM Manual 6840 (BLM 2008). These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

⁹ State-listed species are those listed as threatened or endangered under the CESA; California fully protected species are species that receive the strictest take provisions as identified by the CDFG.

1 **9.1.12.1 Affected Environment**
2

3 The affected area considered in the assessment included the areas of direct and indirect
4 effects. The area of direct effects was defined as the area that would be physically modified
5 during project development (i.e., where ground-disturbing activities would occur). For the
6 Imperial East SEZ, the area of direct effects was limited to the SEZ itself. Due to the proximity
7 of existing infrastructure, the impacts of construction and operation of transmission lines outside
8 of the SEZ are not assessed, assuming that the existing transmission might be used to connect
9 some new solar facilities to load centers, and that additional project-specific analysis would be
10 conducted for new transmission construction or line upgrades. Similarly, the impacts of
11 construction or upgrades to access roads were not assessed for this SEZ due to the proximity of
12 I-8 (see Section 9.1.1.2 for a discussion of development assumptions for this SEZ). The area of
13 indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-
14 disturbing activities would not occur but that could be indirectly affected by activities in the area
15 of direct effects. Indirect effects considered in the assessment included effects from surface
16 runoff, dust, noise, lighting, and accidental spills from the SEZ, but did not include ground-
17 disturbing activities. The potential magnitude of indirect effects would decrease with increasing
18 distance from the SEZ. This area of indirect effects was identified on the basis of professional
19 judgment and was considered sufficiently large to bound the area that would potentially be
20 subject to indirect effects. The affected area includes both the direct and indirect effects areas.
21

22 The primary habitat type in the affected area is Sonora-Mojave creosotebush-white
23 bursage desert scrub (see Section 9.1.10). Potentially unique habitats in the affected area in
24 which special status species may reside include desert dunes and various aquatic and wetland
25 habitats. Aquatic and riparian habitats in the affected area occur within and along the All-
26 American Canal and the East Highline Canal, both of which are operated by the IID for the
27 BOR. Seepage wetlands also have the potential to occur along these canals, which may support
28 riparian, freshwater marsh, and scrub communities (see Section 9.1.9; Figure 9.1.12.1-1). Other
29 wetland habitats may occur in the affected area through the seasonal inundation of agricultural
30 fields.
31

32 All special status species that are known to occur within the Imperial East SEZ region
33 (i.e., within 50 mi [80 km] of the center of the SEZ) are listed, with their status, nearest recorded
34 occurrence, and habitats, in Appendix J. Of these species, 35 could occur on or in the affected
35 area, based on recorded occurrences or the presence of potentially suitable habitat in the area.
36 These species, their status, and their habitats are presented in Table 9.1.12.1-1. For many of the
37 species listed in the table, their predicted potential occurrence in the affected area is based only
38 on a general correspondence between mapped CArEGAP land cover types and descriptions of
39 species habitat preferences. This overall approach to identifying species in the affected area
40 probably overestimates the number of species that actually occur in the affected area. For many
41 of the species identified as having potentially suitable habitat in the affected area, the nearest
42 known occurrence is more than 20 mi (32 km) from the SEZ.
43

44 On the basis of CNDDDB records and information provided by the CDFG and USFWS,
45 six special status species are known to occur within the affected area of the Imperial East SEZ:
46 giant Spanish-needle, sand food, flat-tailed horned lizard, California black rail, Yuma clapper

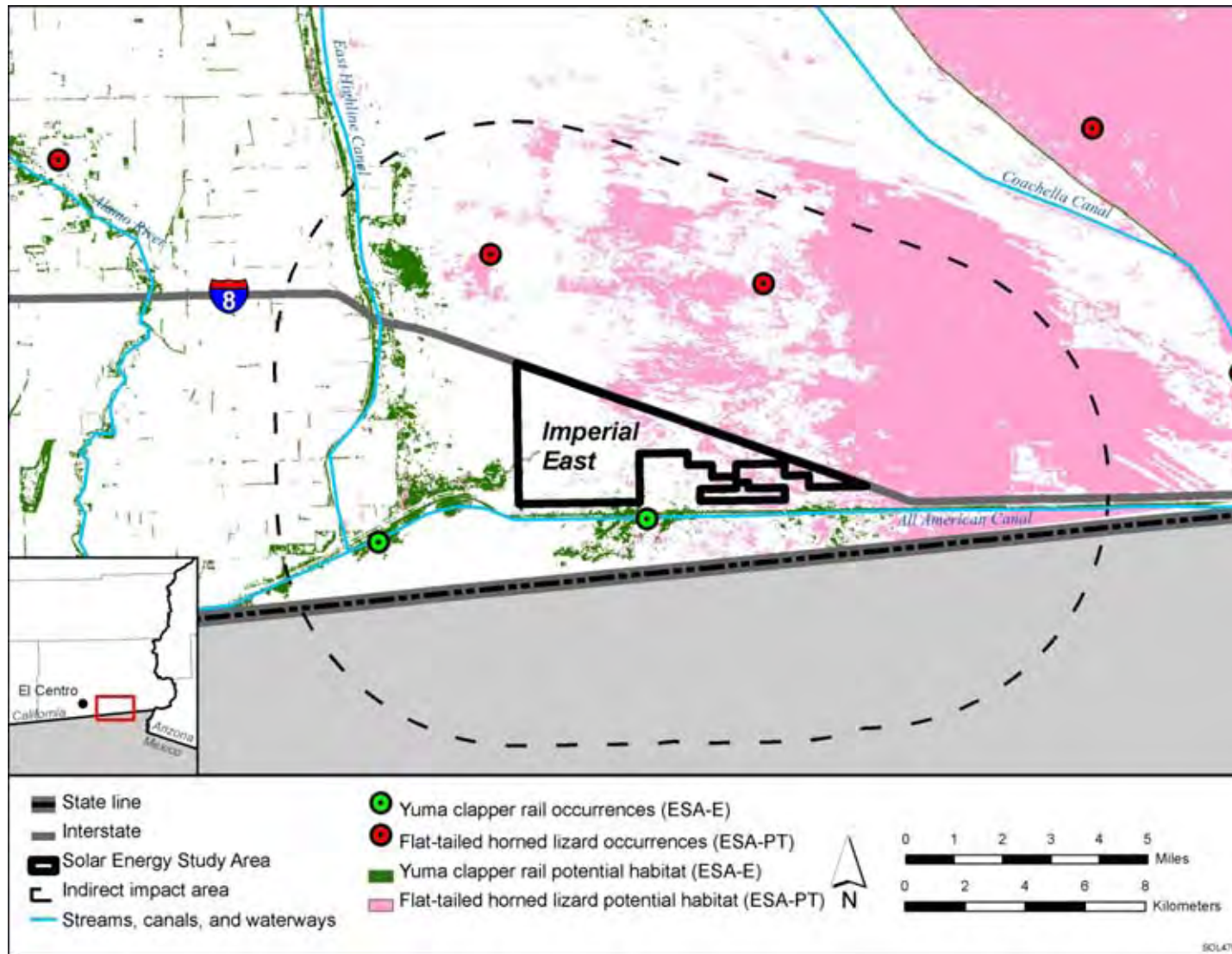


FIGURE 9.1.12.1-1 Known or Potential Occurrences of Species Listed as Endangered, Threatened, or Proposed for Listing under the ESA That May Occur in the Proposed Imperial East SEZ Affected Area (potentially suitable habitat was determined from the CAREGAP land cover model) (Sources: CDFG 2010b; USGS 2010a)

1

2

3

4

TABLE 9.1.12.1-1 Special Status Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Occur on or in the Affected Area of the Proposed Imperial East SEZ and Potential Impacts

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants						
Abrams' spurge	<i>Chamaesyce abramsiana</i>	CA-S1	Restricted to deserts of southern California. Inhabits sandy substrates within creosotebush scrub communities in the Mojave and Sonoran Deserts at elevations below 3,000 ft. ^h Nearest recorded occurrences are 18 mi ⁱ from the SEZ. About 993,869 acres ^j of potentially suitable habitat occurs within the SEZ region.	4,631 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	35,911 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effect; translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Note that these same potential mitigations apply to all special status plants.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Bitter hymenoxys	<i>Hymenoxys odorata</i>	CA-S2	Sandy substrates within riparian and Sonoran Desert scrub communities. Also occurs within open flats, mesquite flats, ditches, and drainage areas, and along roads and streams. Elevation ranges between 150 and 500 ft. Nearest recorded occurrences are 10 mi from the SEZ. About 1,375,118 acres of potentially suitable habitat occurs within the SEZ region.	4,720 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	39,954 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Brown turbans	<i>Malperia tenuis</i>	CA-S1	Rocky hillsides, alluvium washes, sandy flats, and lava flats within Sonoran Desert scrub and creosotebush scrub communities. Elevation ranges between 50 and 1,100 ft. Nearest recorded occurrences are 31 mi from the SEZ. About 1,526,944 acres of potentially suitable habitat occurs within the SEZ region.	4,665 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	36,255 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
California satintail	<i>Imperata brevifolia</i>	CA-S2	Chaparral, coastal sage scrub, creosotebush, desert scrub, mesic riparian scrub, and alkaline meadow and seep communities. Elevation ranges between 0 and 1,650 ft. Nearest recorded occurrences are 25 mi from the SEZ. About 1,059,507 acres of potentially suitable habitat occurs within the SEZ region.	4,631 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	35,912 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Chaparral sand-verbena	<i>Abronia villosa</i> var. <i>aurita</i>	BLM-S; CA-S2	Endemic to southern California. Chaparral desert sand dunes at elevations between 350 and 5,250 ft. Historically occurred on and in the vicinity of the SEZ; the species has not been recorded in the project area since 1964. Most recent recorded occurrences are 15 mi west of the SEZ. About 190,582 acres of potentially suitable habitat occurs within the SEZ region.	705 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	24,102 acres of potentially suitable habitat (12.6% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Coves' cassia	<i>Senna covesii</i>	CA-S2	Sonoran Desert dry washes and slopes with sandy substrates within desert scrub and creosotebush scrub communities. Elevation ranges between 1,000 and 3,500 ft. Nearest recorded occurrences are 43 mi from the SEZ. About 1,527,612 acres of potentially suitable habitat occurs within the SEZ region.	4,665 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	36,255 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Dwarf germander	<i>Teucrium cubense</i> ssp. <i>depressum</i>	CA-S2	Desert dunes, playas, riparian, creosotebush scrub, and desert scrub communities. Elevation ranges between 150 and 1,300 ft. Nearest recorded occurrence is 40 mi from the SEZ. About 1,346,699 acres of potentially suitable habitat occurs within the SEZ region.	5,380 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	63,242 acres of potentially suitable habitat (4.7% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants						
(Cont.)						
Emory's crucifixion-thorn	<i>Castela emoryi</i>	CA-S2	Restricted to deserts of southern California and southwestern Arizona, where it occurs at low densities. Inhabits slightly wet areas within Mojave Desert scrub, nonsaline playas, creosotebush scrub, and Sonoran Desert scrub communities. Preferred sites are described as being moist, having fine-textured alluvial bottomland soils, and associated with basalt flows. Elevation ranges between 295 and 2,200 ft. Nearest recorded occurrence is 25 mi from the SEZ. About 1,061,542 acres of potentially suitable habitat occurs within the SEZ region.	4,631 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	35,914 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Flat-seeded spurge	<i>Chamaesyce platysperma</i>	BLM-S; CA-S1	Sandy substrates of desert dunes within Sonoran Desert scrub communities at elevations below 650 ft. Nearest recorded occurrences are 45 mi from the SEZ. About 1,249,216 acres of potentially suitable habitat occurs within the SEZ region.	5,336 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	60,014 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effect and off site mitigation, including compensatory mitigation, could reduce impacts. Translocation is not a feasible option for this species.
Giant Spanish-needle^k	<i>Palafoxia arida</i> var. <i>gigantea</i>	BLM-S; CA-S1	Desert sand dune habitats at elevations below 330 ft. Known to occur in the affected area within 5 mi east of the SEZ. About 190,187 acres of potentially suitable habitat occurs within the SEZ region.	705 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	24,102 acres of potentially suitable habitat (12.7% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Glandular ditaxis	<i>Ditaxis claryana</i>	CA-S1	Sandy substrates within desert scrub communities at elevations below 1,525 ft. Nearest recorded occurrence is 20 mi from the SEZ. About 1,059,112 acres of potentially suitable habitat occurs within the SEZ region.	4,631 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	35,912 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Hairy stickleaf	<i>Mentzelia hirsutissima</i>	CA-S2	Patchy distribution in southern California. Washes, fans, or slopes having rocky or sandy substrates within Sonoran Desert scrub and creosotebush scrub communities at elevations below 2,300 ft. Nearest recorded occurrences are 25 mi west of the SEZ. About 1,527,612 acres of potentially suitable habitat occurs within the SEZ region.	4,665 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	36,255 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Harwood's milkvetch	<i>Astragalus insularis</i> var. <i>harwoodii</i>	CA-S2	Sonoran Desert of Arizona and California on sandy or gravelly substrates of desert dunes within desert scrub communities. Elevation ranges between 0 and 2,325 ft. Nearest occurrences are approximately 20 mi from the SEZ. About 1,249,216 acres of potentially suitable habitat occurs within the SEZ region.	5,336 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	60,014 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance on desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Mud nama	<i>Nama stenocarpum</i>	CA-S1	Margins of freshwater wetlands in southern California, including lakes, streams, rivers, marshes, and swamps. Elevation ranges between 0 and 1,640 ft. Nearest occurrences are approximately 30 mi from the SEZ. About 94,887 acres of potentially suitable habitat occurs within the SEZ region.	44 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	3,226 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Munz's cholla	<i>Opuntia munzii</i>	BLM-S; CA-S1; FWS-SC	Gravelly or sandy to rocky soils, often on lower bajadas, washes, and flats. Also occurs in hills and canyon sides. Occurs in Sonoran Desert creosotebush shrub communities at elevations below 3,280 ft. Nearest recorded occurrences are 25 mi north (upgradient) of the SEZ. About 1,856,676 acres of potentially suitable habitat occurs within the SEZ region.	4,709 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	37,298 acres of potentially suitable habitat (2.0% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Saguaro cactus	<i>Carnegiea gigantea</i>	CA-S1	Endemic to the Sonoran Desert along the Colorado River from the Whipple Mountains to Laguna Dam; on rocky substrates within Sonoran Desert scrub and creosote scrub communities at elevations between 160 and 4,900 ft. Nearest recorded occurrence is from the Chuckwalla DWMA, approximately 30 mi northeast of the SEZ. About 1,158,649 acres of potentially suitable habitat occurs within the SEZ region.	4,631 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	35,943 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Sand evening-primrose	<i>Camissonia arenaria</i>	CA-S2	Sandy washes and rocky slopes within Sonoran Desert scrub communities at elevations below 3,000 ft. Nearest recorded occurrence is from the Chuckwalla DWMA, approximately 30 mi northeast of the SEZ. About 1,627,232 acres of potentially suitable habitat occurs within the SEZ region.	4,665 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	36,286 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Sand food	<i>Pholisma sonorae</i>	BLM-S; CA-S2; FWS-SC	Sonoran sand dune habitats at elevations below 650 ft. Known to occur in the affected area within 5 mi east of the SEZ. About 190,187 acres of potentially suitable habitat occurs within the SEZ region.	705 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	24,102 acres of potentially suitable habitat (12.7% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Slender cottonheads	<i>Nemacaulis denudata</i> var. <i>gracilis</i>	CA-S2	Mojave and Sonoran Deserts on sandy soils within coastal dunes, desert dunes, creosotebush scrub, and desert scrub communities at elevations below 1,300 ft. Nearest recorded occurrences are 11 mi from the SEZ. About 1,249,299 acres of potentially suitable habitat occurs within the SEZ region.	5,336 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	60,014 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants						
(Cont.)						
Wiggins' croton	<i>Croton wigginsii</i>	CA-S1	Restricted to desert dunes of the Sonoran Desert. Elevation ranges between 164 and 330 ft. Nearest recorded occurrences are from the Algodones Dunes, approximately 11 mi east of the SEZ. About 190,187 acres of potentially suitable habitat occurs within the SEZ region.	705 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	24,102 acres of potentially suitable habitat (12.7% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Arthropods						
Cheeseweed owlfly	<i>Oliarces clara</i>	CA-S1	Colorado River drainage of southwestern Arizona and southern California within creosotebush scrub communities on or near bajadas at elevations below 330 ft. Nearest recorded occurrences are 30 mi from the SEZ. About 993,869 acres of potentially suitable habitat occurs within the SEZ region.	4,631 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	35,911 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance of occupied habitats on the SEZ; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Reptiles						
Colorado Desert fringe-toed lizard	<i>Uma notata</i>	BLM-S; CA-S2	Sparsely vegetated arid areas with windblown sand, including dunes, flats, and washes at elevations below 1,600 ft. Nearest recorded occurrence is 6 mi northeast of the SEZ. About 658,770 acres of potentially suitable habitat occurs within the SEZ region.	739 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	24,445 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. In addition, pre-disturbance surveys and avoidance of occupied habitats on the SEZ; translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects could reduce impacts.
Flat-tailed horned lizard	<i>Phrynosoma mcallii</i>	ESA-PT; BLM-S; CA-S2; CA-SC	Sandy desert hardpan, gravel flats, and dunes with sparse vegetation of low species diversity at elevations below 850 ft. Known to occur in the affected area within 3 mi north of the SEZ. About 281,300 acres of potentially suitable habitat occurs within the SEZ region.	716 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	24,575 acres of potentially suitable habitat (9.0% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. In addition, pre-disturbance surveys and avoidance of occupied habitats on the SEZ or compensatory mitigation of direct effects could reduce impacts.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds						
California black rail	<i>Laterallus jamaicensis coturniculus</i>	BLM-S; CA-FP; CA-T; CA-S1; FWS-SC	Year-round resident in the Imperial Valley and lower Colorado River in Arizona and California. Locally common in marshes along the Colorado River or canal systems. Known to occur in the affected area from the All-American Canal. About 184,792 acres of potentially suitable habitat occurs within the SEZ region.	44 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	3,870 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding disturbance to occupied and potentially suitable wetland habitats in the area of direct effect could reduce impacts. Translocation and compensatory mitigation are not permitted for California fully protected species. The potential for impact and need for mitigation should be determined in coordination with the USFWS and CDFG.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds (Cont.)						
Ferruginous hawk	<i>Buteo regalis</i>	BLM-S; FWS-SC	Winter resident and migrant at lower elevations and open grasslands, shrublands, and agricultural areas in southern California. Open grasslands, sagebrush flats, desert scrub, desert valleys, and fringes of pinyon-juniper habitats. This species is known to occur in Imperial County, California. About 1,252,826 acres of potentially suitable habitat occurs within the SEZ region.	4,855 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	44,553 acres of potentially suitable foraging habitat (3.6% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of all potentially suitable foraging habitat is not feasible because this habitat is widespread in the area of direct effect and readily available throughout the SEZ region.
Least bittern	<i>Ixobrychus exilis</i>	BLM-S; CA-S1; CA-SC	Year-round resident in the lower Colorado River Valley including the Salton Sea and the Colorado River in California and Arizona. Emergent vegetation of larger bodies of water such as lakes, ponds, and rivers. Nests in dense cattail marshes and thickets of saltcedar. The species occurs near the Colorado River as near as 35 mi and 40 mi east and northwest of the SEZ, respectively. About 206,149 acres of potentially suitable habitat occurs within the SEZ region.	44 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	3,870 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing impacts on wetlands would reduce impacts. Pre-disturbance surveys and avoidance of occupied habitats in the area of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds (Cont.)						
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	BLM-S; CA-S2; CA-SC	Year-round resident within the SEZ region. Open areas with short sparse vegetation, including grasslands, agricultural fields, and disturbed areas. Nests in burrows created by mammals or tortoises. Feeds on insects and small mammals. Nearest recorded occurrence is 10 mi west of the SEZ. About 2,531,363 acres of potentially suitable habitat occurs within the SEZ region.	5,718 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	76,150 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance of discovered populations and occupied habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
White-faced ibis	<i>Plegadis chihi</i>	CA-S1; FWS-SC	Winter resident in the lower Colorado River Forages in fresh emergent wetlands, shallow lacustrine waters, muddy ground of wet meadows, and irrigated or flooded pastures and croplands. Dense, fresh emergent wetlands serve as nesting habitat. Roosts amidst dense, freshwater emergent vegetation such as bulrushes, cattails, reeds, or low shrubs over water. Nearest recorded occurrences are from the Salton Sea, approximately 40 mi northwest of the SEZ. About 789,151 acres of potentially suitable habitat occurs within the SEZ region.	44 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	11,372 acres of potentially suitable habitat (1.4% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing impacts on wetlands would reduce impacts. Pre-disturbance surveys and avoidance of occupied habitats in the area of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Birds (Cont.)</i>						
Yuma clapper rail	<i>Rallus longirostris yumanensis</i>	ESA-E; CA-FP; CA-T; CA-S1	Freshwater marshes containing dense stands of cattails. Nests on dry hummocks or in small shrubs among dense cattails or bulrushes along the edges of shallow ponds in freshwater marshes with stable water levels. Known to occur in the affected area along the All-American Canal within 0.5 mi south of the SEZ. About 185,175 acres of potentially suitable habitat occurs within the SEZ region.	44 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	3,870 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing impacts on wetlands would reduce impacts. Pre-disturbance surveys and avoiding disturbance to occupied and potentially suitable wetland habitats in the area of direct effect also could reduce impacts. Translocation and compensatory mitigation are not permitted for California fully protected species. The potential for impact and need for mitigation should be determined in consultation with the USFWS and CDFG.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Mammals						
California leaf-nosed bat	<i>Macrotus californicus</i>	BLM-S; CA-S2; CA-SC; FWS-SC	Year-round resident in SEZ region. Desert riparian, desert wash, desert scrub, and palm oasis habitats at elevations below 2,000 ft. Roosts in mines, caves, and buildings. Nearest recorded occurrences are 20 mi east of the SEZ. About 1,539,377 acres of potentially suitable habitat occurs within the SEZ region.	4,698 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	36,795 acres of potentially suitable foraging habitat (2.4% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of all potentially suitable foraging habitat is not feasible because this habitat is widespread in the area of direct effect and readily available throughout the SEZ region.
Pallid bat	<i>Antrozous pallidus</i>	BLM-S; CA-SC; FWS-SC	Year-round resident throughout the California solar region. Inhabits low-elevation desert communities, including grasslands, shrublands, and woodlands. Day roosts in caves, crevices, and mines. Nearest recorded occurrence is from the North Algodones Dunes Wilderness, approximately 18 mi north of the SEZ. About 1,403,590 acres of potentially suitable habitat occurs within the SEZ region.	4,708 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	39,678 acres of potentially suitable foraging habitat (2.8% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of all potentially suitable foraging habitat is not feasible because this habitat is widespread in the area of direct effect and readily available throughout the SEZ region.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Mammals (Cont.)						
Pocketed free-tailed bat	<i>Nyctinomops femorosaccus</i>	CA-S2; CA-SC; FWS-SC	Arid lowland areas including creosotebush and chaparral habitats in association with very large boulders, high cliffs, rugged rock outcroppings, and rocky canyons. Nearest recorded occurrences are 16 mi from of the SEZ. About 1,120,055 acres of potentially suitable habitat occurs within the SEZ region.	4,631 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	35,912 acres of potentially suitable foraging habitat (3.2% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of all potentially suitable foraging habitat is not feasible because this habitat is widespread in the area of direct effect and readily available throughout the SEZ region.
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM-S; CA-S2; CA-SC; FWS-SC	Found throughout California, in all but subalpine and alpine habitats, and may be found at any season throughout its range. Roosts in caves, mines, tunnels, buildings, or other human-made structures. Nearest recorded occurrence is approximately 35 mi from the SEZ. About 2,919,158 acres of potentially suitable habitat occurs within the SEZ region.	5,721 acres of potentially suitable foraging habitat lost (0.2% of available potentially suitable habitat)	75,484 acres of potentially suitable foraging habitat (2.6% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of all potentially suitable foraging habitat is not feasible because this habitat is widespread in the area of direct effect and readily available throughout the SEZ region.

TABLE 9.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Mammals (Cont.)						
Western mastiff bat	<i>Eumops perotis californicus</i>	BLM-S; FWS-SC; CA-SC	Year-round resident in southern California and southwestern Arizona in many open semiarid habitats, including conifer and deciduous woodlands, shrublands, grasslands, chaparral, and urban areas. Day roosts in crevices in cliff faces, buildings, and tall trees. Nearest recorded occurrence is 16 mi west of the SEZ. About 2,435,906 acres of potentially suitable habitat occurs within the SEZ region.	5,721 acres of potentially suitable foraging habitat lost (0.2% of available potentially suitable habitat)	75,484 acres of potentially suitable foraging habitat (3.1% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of all potentially suitable foraging habitat is not feasible because this habitat is widespread in the area of direct effect and readily available throughout the SEZ region.
Yuma hispid cotton rat	<i>Sigmodon hispidus eremicus</i>	CA-S2; CA-SC; FWS-SC	Southern Colorado River Valley in southwest Arizona and southwestern California in dense stands of vegetation near wetlands, herbaceous grasslands, and hardwood woodland communities. Preferred sites are described as being dense grassy areas such as fields, marshes, and roadside edges, brushy areas along streams or ponds, irrigated fields, and desert scrub. Known to occur in the affected area near the All-American Canal within 0.5 mi south of the SEZ. About 574,906 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	12,554 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small overall impact; no direct effect. Pre-disturbance surveys and avoidance of occupied habitats in the area of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

Footnotes on next page.

TABLE 9.1.12.1-1 (Cont.)

-
- a BLM-S = listed as a sensitive species by the BLM; CA-S1 = ranked as S1 in the state of California; CA-S2 = ranked as S2 in the state of California; CA-T = listed as threatened by the state of California; ESA-E = listed as endangered under the ESA; ESA-PT = proposed threatened under the ESA; FWS-SC = USFWS species of concern.
- b For plant and invertebrate species, potentially suitable habitat was determined by using CArEGAP and SWReGAP land cover types. For reptile, bird, and mammal species, potentially suitable habitat was determined by using CArEGAP and SWReGAP habitat suitability models as well as CArEGAP and SWReGAP land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- c Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the SEZ region was determined by using CArEGAP and SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. Impacts of access road and transmission line construction, upgrade, or operation are not assessed in this evaluation due to the proximity of existing infrastructure to the SEZ.
- d Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations.
- e Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ.
- f Overall impact magnitude categories were based on professional judgment and were (1) *small*: <1% of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: ≥ 1 but <10% of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: $\geq 10\%$ of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Design features would reduce most indirect effects to negligible levels.
- g Species-specific mitigations are suggested here, but final mitigations should be developed in consultation with state and federal agencies and should be based on pre-disturbance surveys.
- h To convert ft to m, multiply by 0.3048.
- i To convert mi to km, multiply by 1.609.
- j To convert acres to km², multiply by 0.004047.
- k Species in bold text have been recorded or have designated critical habitat in the affected area.

1 rail, and Yuma hispid cotton rat. There are no groundwater-dependent species in the vicinity of
2 the SEZ based upon CNDDDB records, comments provided by the USFWS (Stout 2009), and the
3 evaluation of groundwater resources in the Imperial East SEZ region (Section 9.1.9).
4
5

6 ***9.1.12.1.1 Species Listed under the ESA That Could Occur in the Affected Area*** 7

8 In its scoping comments on the proposed Imperial East SEZ, the USFWS expressed
9 concern for impacts of project developments on the Yuma clapper rail, a species listed as
10 endangered under the ESA (Stout 2009). The Yuma clapper rail is also listed as threatened under
11 the CESA and is a California fully protected species. This species has the potential to occur on
12 the SEZ or within the affected area on the basis of observed occurrences near the SEZ and the
13 presence of apparently suitable habitat (Figure 9.1.12.1-1; Table 9.1.12.1-1). Appendix J
14 provides basic information on life history, habitat needs, and threats to populations of this
15 species. No other species currently listed under the ESA is likely to occur within the Imperial
16 East SEZ affected area. The USFWS determined that the desert tortoise is absent from the
17 affected area on the basis of the USGS habitat suitability model (Nussear et al. 2009) and known
18 range of the species.
19

20 The Yuma clapper rail occurs in freshwater marsh habitats containing dense vegetation
21 such as cattail (*Typha* sp.), bulrush (*Scirpus* sp.), or reeds (*Phragmites* sp.) from southern
22 Nevada, south and west to the Salton Sea, California, and southeast to Arizona and Mexico.
23 According to CNDDDB records, the species is known to occur in the affected area of the Imperial
24 East SEZ along the All-American Canal system (Figure 9.1.12.1-1; Table 9.1.12.1-1). The
25 USFWS identified seepage wetland habitats along the canal that could serve as sensitive wetland
26 resources for the species (Stout 2009). In addition, mitigation wetland habitat adjacent to the
27 southern boundary of the SEZ is maintained to offset impacts from previous construction and
28 lining projects for the All-American Canal. According to the CAREGAP land cover model,
29 potentially suitable habitats along the All-American Canal and within associated seepage
30 wetlands are known to occur in the affected area within 0.5 mi (0.8 km) south of the SEZ.
31 Potentially suitable wetland habitat may also occur on the SEZ (Figure 9.1.12.1-1;
32 Table 9.1.12.1-1). A site visit in August 2009 confirmed the presence of potentially suitable
33 habitat along the canal, although no individuals were recorded. Designated critical habitat for
34 this species does not occur in the SEZ region.
35
36

37 ***9.1.12.1.2 Species Proposed for Listing under the ESA That Could Occur in the*** 38 ***Affected Area*** 39

40 The USFWS did not identify any species proposed for listing under the ESA in its
41 scoping comments on the Imperial East SEZ (Stout 2009). However, the flat-tailed horned lizard
42 is proposed for listing as a threatened species under the ESA (USFWS 2010) and is known to
43 occur in the vicinity of the SEZ (Figure 9.1.12.1-1; Table 9.1.12.1-1). Appendix J provides basic
44 information on life history, habitat needs, and threats to populations of this species.
45

1 The flat-tailed horned lizard is restricted to desert habitats from Imperial, Riverside, and
2 San Diego Counties, California, and Yuma County, Arizona. It is confined to sandy habitats
3 including dunes, sandy washes, and desert flats. Creosote scrub is the dominant vegetation cover
4 among inhabited locations. Similar to other horned lizards (genus *Phrynosoma*), the flat-tailed
5 horned lizard is an ant specialist, and the distribution of this species is often associated with the
6 occurrence of harvester ants (*Pogonomyrex californicus*). According to CNDDDB, the species is
7 known to occur within 3 mi (5 km) north of the Imperial East SEZ. The BLM El Centro Field
8 Office also acknowledged the potential occurrence of this species on BLM-administered lands
9 within the SEZ. Potentially suitable habitat (desert dune and pavement) occurs on the SEZ
10 according to the CAREGAP land cover model and confirmed by a site visit in August 2009
11 (Figure 9.1.12.1-1; Table 9.1.12.1-1).

14 **9.1.12.1.3 BLM-Designated Sensitive Species**

16 There are 15 BLM-designated sensitive species that may occur in the affected area of
17 the Imperial East SEZ (Table 9.1.12.1-1). These BLM-designated sensitive species include the
18 following: (1) plants—chaparral sand-verbena, flat-seeded spurge, giant Spanish-needle, Munz’s
19 cholla, and sand food; (2) reptiles—Colorado Desert fringe-toed lizard and flat-tailed horned
20 lizard; (3) birds—California black rail, ferruginous hawk, least bittern, and western burrowing
21 owl; and (4) mammals—California leaf-nosed bat, pallid bat, Townsend’s big-eared bat, and
22 western mastiff bat. Of these species, the giant Spanish-needle and sand food have been recorded
23 in the affected area. Habitats in which these species are found, the amount of potentially suitable
24 habitat in the affected area, and known locations of the species relative to the SEZ are presented
25 in Table 9.1.12.1-1. The flat-tailed horned lizard was previously discussed because it is under
26 review for listing under the ESA (Section 9.1.12.1.2). The remaining 14 BLM-designated
27 sensitive species as related to the SEZ are described in the remainder of this section. Additional
28 life history information for these species is provided in Appendix J.

31 **Chaparral Sand-Verbena**

33 The chaparral sand-verbena is a flowering herb endemic to southern California. It
34 historically occurred approximately 15 mi (24 km) west of the SEZ, but it is currently known to
35 occur only in Riverside and Orange Counties outside the area of indirect effects. Although the
36 species has not been recently recorded near the SEZ, potentially suitable sand dune habitat still
37 occurs on the SEZ and in other portions of the affected area according to the CAREGAP land
38 cover model (Table 9.1.12.1-1).

41 **Flat-Seeded Spurge**

43 The flat-seeded spurge is a flowering herb known only from the Sonoran Desert in
44 southern California and southwestern Arizona. The species inhabits sandy substrates of dunes
45 within desert scrub communities. The species is known to occur as near as 45 mi (72 km) from
46 the SEZ. Populations are not known to occur on the SEZ, but potentially suitable habitat occurs

1 on the SEZ and in other portions of the affected area according to the CAREGAP land cover
2 model (Table 9.1.12.1-1).

5 **Giant Spanish-Needle**

7 The giant Spanish-needle is a flowering herb endemic to sand dune habitats in the
8 Sonoran Desert of southern California and southwestern Arizona. Populations are known to
9 occur as near as 5 mi (8 km) east of the SEZ. Populations are not known to occur on the SEZ,
10 but suitable desert dune habitats may occur on the SEZ and in other portions of the affected
11 area according to the CAREGAP land cover model (Table 9.1.12.1-1).

14 **Munz's Cholla**

16 The Munz's cholla is a tree-like cactus endemic to southern California, where it is known
17 only from the Chocolate Mountains in Imperial and Riverside Counties as near as 25 mi (40 km)
18 north of the SEZ. The species inhabits Sonoran Desert creosotebush scrub communities. It is not
19 known to occur on the SEZ, but potentially suitable habitat occurs on the SEZ and in other
20 portions of the affected area according to the CAREGAP land cover model (Table 9.1.12.1-1).

23 **Sand Food**

25 The sand food is a parasitic plant endemic to Sonoran Desert habitats of southern
26 California and southwestern Arizona. The species lacks chlorophyll and exists as a parasite on
27 the roots of various desert shrubs that inhabit desert dunes. The species is known to occur within
28 5 mi (8 km) east of the SEZ. Potentially suitable habitat for the species occurs on the SEZ and in
29 other portions of the affected area according to the CAREGAP land cover model
30 (Table 9.1.12.1-1).

33 **Colorado Desert Fringe-Toed Lizard**

35 The Colorado Desert fringe-toed lizard is a fairly small smooth-skinned lizard that
36 inhabits desert sand dune habitats in southeastern California and western Arizona. The species is
37 a habitat specialist, occurring in specialized dune habitats composed of fine, loose, windblown
38 sand deposits. The species is known to occur 6 mi (10 km) northeast of the SEZ. Potentially
39 suitable habitat for the species occurs on the SEZ and in other portions of the affected area
40 according to the CAREGAP land cover model (Table 9.1.12.1-1).

43 **California Black Rail**

45 The California black rail is a small wetland bird that inhabits coastal and freshwater
46 marshes of southern California and western Arizona. This species is also listed as threatened

1 under the CESA and is a California fully protected species. In the SEZ region, the species is
2 associated with marsh habitats containing dense vegetation such as cattail (*Typha* sp.), bulrush
3 (*Scirpus* sp.), or reeds (*Phragmites* sp.). Nearest recorded CNDDDB occurrences are 25 mi
4 (40 km) east of the SEZ. However, the USFWS has confirmed the presence of this species in
5 seepage wetland areas associated with the All-American Canal within the affected area
6 (Stout 2009). According to the CAREGAP land cover model, potentially suitable wetland
7 habitats may occur on the SEZ and within other portions of the affected area (Table 9.1.12.1-1).
8
9

10 **Ferruginous Hawk**

11
12 The ferruginous hawk is a winter resident and migrant in the Imperial East SEZ region.
13 The species inhabits open grasslands, sagebrush (*Artemisia* sp.) flats, desert scrub, and the
14 fringes of pinyon-juniper woodlands. This species is known to occur in Imperial County,
15 California, and according to the CAREGAP land cover model, potentially suitable foraging
16 habitat may occur on the SEZ and in other portions of the affected area (Table 9.1.12.1-1).
17
18

19 **Least Bittern**

20
21 The least bittern is a common summer resident in suitable habitats of the lower Colorado
22 River in southwestern California and southwestern Arizona. The species inhabits freshwater
23 marsh habitats containing dense emergent vegetation such as cattail (*Typha* sp.) and reeds
24 (*Phragmites* sp.). Nearest recorded CNDDDB occurrences are from the Salton Sea, approximately
25 35 mi (56 km) northwest of the SEZ. The species may occur in seepage wetlands associated with
26 the All-American Canal, which is located within 0.5 mi (0.8 km) south of the SEZ (Stout 2009).
27 According to the CAREGAP land cover model, potentially suitable foraging and nesting habitats
28 may occur on the SEZ and within other portions of the affected area (Table 9.1.12.1-1).
29
30

31 **Western Burrowing Owl**

32
33 The western burrowing owl is a year-round resident of open, dry grasslands and desert
34 habitats in southern California and Arizona. Populations occur locally in open areas with sparse
35 vegetation. The USFWS has estimated that the Imperial Valley supports the highest western
36 burrowing owl density within North America and over 70% of California's western burrowing
37 owl population. Nearest recorded occurrences are 10 mi (16 km) west of the SEZ. According to
38 the CAREGAP habitat suitability model, potentially suitable habitat may occur on the SEZ and in
39 other portions of the affected area (Table 9.1.12.1-1). The availability of nest sites (burrows)
40 within the affected area has not been determined, shrubland habitat that may be suitable for
41 either foraging or nesting occurs throughout the affected area.
42
43
44

1 **California Leaf-Nosed Bat**
2

3 The California leaf-nosed bat is a large-eared bat with a leaflike flap of protective skin on
4 the tip of its nose. It primarily occurs along the Colorado River from southern Nevada, through
5 Arizona and California, to Baja California, and Sinaloa Mexico. The species forages in a variety
6 of desert habitats including desert riparian, desert wash, desert scrub, and palm oasis. It roosts in
7 caves, crevices, and mines. Nearest recorded occurrences are 20 mi (32 km) east of the SEZ.
8 According to the CAREGAP land cover model, potentially suitable foraging habitat may occur
9 on the SEZ and in other portions of the affected area (Table 9.1.12.1-1). On the basis of an
10 evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky
11 cliffs and outcrops) in the affected area.
12
13

14 **Pallid Bat**
15

16 The pallid bat is a large pale bat with large ears locally common in desert grasslands
17 and shrublands in the southwestern United States. It roosts in caves, crevices, and mines.
18 The species is a year-round resident throughout southern California. The nearest recorded
19 occurrence is the North Algodones Dunes Wilderness, approximately 18 mi (29 km) north
20 of the SEZ. According to the CAREGAP land cover model, potentially suitable foraging habitat
21 may occur on the SEZ and in other portions of the affected area (Table 9.1.12.1-1). On the basis
22 of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat
23 (rocky cliffs and outcrops) in the affected area.
24
25

26 **Townsend's Big-Eared Bat**
27

28 The Townsend's big-eared bat is widely distributed throughout the western United States.
29 In California, the species forages year-round in a wide variety of desert and nondesert habitats.
30 The species roosts in caves, mines, tunnels, buildings, and other man-made structures. Nearest
31 recorded occurrences are approximately 35 mi (56 km) from the SEZ. According to the
32 CAREGAP land cover model, potentially suitable foraging habitat may occur on the SEZ and
33 in other portions of the affected area (Table 9.1.12.1-1). On the basis of an evaluation of
34 SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky cliffs and
35 outcrops) in the affected area.
36
37

38 **Western Mastiff Bat**
39

40 The western mastiff bat is a large uncommon resident of southern California and western
41 Arizona. The species forages in many open, semiarid habitats including conifer and deciduous
42 woodlands, shrublands, grassland, and urban areas. It roosts in crevices, trees, and buildings.
43 Nearest recorded occurrences are 16 mi (26 km) west of the SEZ. According to the CAREGAP
44 land cover model, potentially suitable foraging habitat may occur on the SEZ and in other
45 portions of the affected area (Table 9.1.12.1-1). On the basis of an evaluation of SWReGAP land

1 cover types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the
2 affected area.

3 4 5 **9.1.12.1.4 State-Listed Species** 6

7 There are 2 species listed by the state of California that may occur in the Imperial East
8 SEZ affected area (Table 9.1.12.1-1): California black rail and Yuma clapper rail. Both of these
9 species are listed as a threatened species under the CESA; they are also considered to be
10 California fully protected species. These species were previously discussed in Section 9.1.12.1.1
11 or Section 9.1.12.1.3 because of their status under the ESA or the BLM.
12

13 14 **9.1.12.1.5 Rare Species** 15

16 There are 35 species that have a state status of S1 or S2 in California or are listed as
17 species of concern by the State of California or USFWS that may occur in the affected area of
18 the Imperial East SEZ (Table 9.1.12.1-1). Of these species, 19 have not been discussed
19 as ESA-listed (Section 9.1.12.1.1), proposed for listing under the ESA (Section 9.1.12.1.2),
20 BLM-designated sensitive (Section 9.1.12.1.3), or state-listed (Section 9.1.12.1.4). The Yuma
21 hispid cotton rat is considered rare in the state of California and is known to occur in the
22 affected area.
23

24 25 **9.1.12.2 Impacts** 26

27 The potential for impacts on special status species from utility-scale solar energy
28 development within the proposed Imperial East SEZ is presented in this section. The types of
29 impacts that special status species could incur from construction and operation of utility-scale
30 solar energy facilities are discussed in Section 5.10.4.
31

32 The assessment of impacts on special status species is based on available information
33 on the presence of species in the affected area as presented in Section 9.1.12.1 following the
34 analysis approach described in Appendix M. It is assumed that, prior to development, surveys
35 would be conducted to determine the presence of special status species and their habitats in and
36 near areas where ground-disturbing activities would occur. Additional National Environmental
37 Policy Act of 1969 (NEPA) assessments, ESA consultations, and coordination with state natural
38 resource agencies may be needed to address project-specific impacts more thoroughly. These
39 assessments and consultations could result in additional required actions to avoid, minimize, or
40 mitigate impacts on special status species (see Section 9.1.12.3).
41

42 Solar energy development within the Imperial East SEZ could affect a variety of
43 habitats (see Section 9.1.10). These impacts on habitats could in turn affect special status species
44 dependent on those habitats. Based on CNDDDB records and information provided by the CDFG
45 and USFWS, there are six special status species known to occur in the affected area: giant
46 Spanish-needle, sand food, flat-tailed horned lizard, California black rail, Yuma clapper rail, and

1 Yuma hispid cotton rat. These species are listed in bold in Table 9.1.12.1-1. Other special status
2 species may occur on the SEZ or within the affected area based upon the presence of potentially
3 suitable habitat. As discussed in Section 9.1.12.1, this approach to identifying the species that
4 could occur in the affected area probably overestimates the number of species that actually occur
5 in the affected area and may therefore overestimate impacts on some special status species.
6

7 Potential direct and indirect impacts on special status species within the SEZ and in
8 the area of indirect effects outside the SEZ are presented in Table 9.1.12.1-1. In addition, the
9 overall potential magnitude of impacts on each species (assuming design features are in place)
10 is presented along with any potential species-specific mitigation measures that could further
11 reduce impacts.
12

13 Impacts on special status species could occur during all phases of development
14 (construction, operation, and decommissioning and reclamation) of a utility-scale solar energy
15 project within the SEZ. Construction and operation activities could result in short- or long-term
16 impacts on individuals and their habitats, especially if these activities were sited in areas where
17 special status species are known to or could occur. As presented in Section 9.1.1.2, impacts of
18 access road and transmission line construction, upgrade, or operation are not assessed in this
19 evaluation due to the proximity of existing infrastructure to the SEZ
20

21 Direct impacts would result from habitat destruction or modification. It is assumed that
22 direct impacts would occur only within the SEZ where ground-disturbing activities are expected
23 to occur. Indirect impacts could result from surface water and sediment runoff from disturbed
24 areas, fugitive dust generated by project activities, accidental spills, harassment, and lighting. No
25 ground-disturbing activities associated with project development are anticipated to occur within
26 the area of indirect effects. Decommissioning of facilities and reclamation of disturbed areas
27 after operations cease could result in short-term negative impacts on individuals and habitats
28 adjacent to project areas, but long-term benefits would accrue if original land contours and native
29 plant communities were restored in previously disturbed areas.
30

31 The successful implementation of design features (discussed in Appendix A) would
32 reduce direct impacts on some special status species, especially those that depend on habitat
33 types that can be easily avoided. Indirect impacts on special status species could be reduced to
34 negligible levels by implementing design features, especially those engineering controls that
35 would reduce runoff, sedimentation, spills, and fugitive dust.
36
37

38 ***9.1.12.2.1 Impacts on Species Listed under the ESA*** 39

40 The Yuma clapper rail is the only species listed under the ESA that has the potential to
41 occur in the affected area of the proposed Imperial East SEZ and the only ESA-listed species
42 that the USFWS identified for its potential to be affected by solar energy development on the
43 SEZ (Stout 2009). The Yuma clapper rail is known to occur in freshwater marsh habitats in
44 southeastern California and southwestern Arizona. Within the Imperial East SEZ region, the
45 species is known to occur along the All-American Canal in Imperial County, California, within
46 0.5 mi (0.8 km) south of the SEZ (Figure 9.1.12.1-1). According to the CAREGAP land cover

1 model, approximately 44 acres (0.2 km²) of potentially suitable habitat on the SEZ (desert
2 riparian habitat) could be directly affected by construction and operations of solar energy
3 development on the SEZ (Table 9.1.12.1-1). This direct effects area represents <0.1% of
4 available suitable habitat of the Yuma clapper rail in the SEZ region. About 3,870 acres (16 km²)
5 of suitable habitat occurs in the area of potential indirect effects; this area represents about 2.1%
6 of the available suitable habitat in the SEZ region (Table 9.1.12.1-1).

7
8 The USFWS cautioned that full-scale solar energy development near the southern
9 boundary of the SEZ may directly affect the seepage wetlands associated with the All-American
10 Canal that may provide suitable habitat for this species (Stout 2009). In addition to direct
11 impacts, these wetland habitats may be indirectly affected by fugitive dust, runoff, and
12 sedimentation from solar development on the SEZ.

13
14 The overall impact on the Yuma clapper rail from construction, operation, and
15 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
16 considered small because the amount of potentially suitable habitat for this species in the
17 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
18 The implementation of design features and complete avoidance of wetland habitats on the
19 SEZ would reduce impacts to negligible levels. Impacts also could be reduced by conducting
20 pre-disturbance surveys and avoiding occupied habitats in the areas of direct effect.

21
22 As a California fully protected species (pursuant to the California Fish and Game Code
23 Section 3511), the CDFG has the authority to prohibit impacts on and the taking of Yuma
24 clapper rails under any circumstance. Therefore, direct and indirect impacts on occupied and
25 potentially suitable wetland habitats should be completely avoided. The implementation of
26 design features and complete avoidance of wetland habitats on the SEZ would reduce impacts on
27 this species to negligible levels. Consultation with the USFWS and CDFG would be required
28 under the ESA and CESA to fully address the impacts of solar development on the Yuma clapper
29 rail and to determine any additional mitigation requirements.

30 31 32 ***9.1.12.2.2 Impacts on Species Proposed for Listing under the ESA***

33
34 The USFWS did not identify any species proposed for listing under the ESA that might
35 be affected by solar development on the Imperial East SEZ (Stout 2009). However, the flat-tailed
36 horned lizard is proposed for listing as a threatened species under the ESA and is known to occur
37 in the vicinity of the SEZ (Figure 9.1.12.1-1; Table 9.1.12.1-1). This species is restricted to
38 desert habitats from Imperial, Riverside, and San Diego Counties, California, and Yuma County,
39 Arizona. It is primarily confined to sandy habitats including dunes, sandy washes, and desert
40 flats, where there is an abundance of harvester ants (*Pogonomyrex californicus*). According to
41 CNDDDB, the species is known to occur within 3 mi (5 km) north of the Imperial East SEZ. The
42 BLM El Centro Field Office also acknowledged the potential occurrence of this species on
43 BLM-administered lands within the SEZ. According to the CAREGAP land cover model,
44 approximately 716 acres (3 km²) of potentially suitable habitat on the SEZ (desert dune and
45 pavement) could be directly affected by construction and operations of solar energy facilities on
46 the SEZ (Table 9.1.12.1-1). This direct effects area represents about 0.3% of available suitable

1 habitat of the flat-tailed horned lizard in the SEZ region. About 24,575 acres (99 km²) of suitable
2 habitat occurs in the area of potential indirect effects; this area represents about 9.0% of the
3 available suitable habitat in the SEZ region (Table 9.1.12.1-1).
4

5 The overall impact on the flat-tailed horned lizard from construction, operation, and
6 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
7 considered small because the amount of potentially suitable habitat for this species in the area
8 of direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
9 implementation of design features would further reduce indirect impacts to negligible levels.
10

11 Avoidance or minimizing disturbance to all occupied or potentially suitable habitat in the
12 area of direct effects could further reduce direct impacts on this species. Potentially suitable
13 habitat on the SEZ that should be avoided include all desert dunes and associated sand transport
14 systems. If avoidance or minimization is not a feasible option, a compensatory mitigation plan
15 could be developed and implemented to mitigate direct effects on occupied or suitable habitats.
16 Compensation could involve the protection and enhancement of existing occupied or suitable
17 habitats to compensate for habitats lost to development. Consultation with the USFWS and
18 CDFG would be required under the ESA and CESA to fully address the impacts of solar
19 development on the flat-tailed horned lizard and to determine mitigation requirements.
20

21 ***9.1.12.2.3 Impacts on BLM-Designated Sensitive Species***

22 Impacts on the 14 BLM-designated sensitive species that have potentially suitable habitat
23 within the SEZ and are not previously discussed as ESA-listed or proposed for ESA listing
24 (Sections 9.1.12.2.1 or 9.1.12.2.2) are discussed below.
25
26
27

28 **Chaparral Sand-Verbena**

29 The chaparral sand-verbena historically occurred as near as 15 mi (24 km) west of the
30 SEZ, but it is currently known to occur only as near as Riverside County, California, outside of
31 the area of indirect effects. According to the CAREGAP land cover model, approximately
32 705 acres (3 km²) of potentially suitable desert sand dune habitat within the SEZ may be directly
33 affected by project construction and operations (Table 9.1.12.1-1). This direct effects area
34 represents 0.4% of available suitable habitat in the SEZ region. About 24,102 acres (98 km²) of
35 potentially suitable habitat occurs within the area of indirect effects; this area represents about
36 12.6% of the available suitable habitat in the SEZ region (Table 9.1.12.1-1).
37
38
39

40 The overall impact on the chaparral sand-verbena from construction, operation, and
41 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
42 considered small because the amount of potentially suitable habitat for this species in the area of
43 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
44 implementation of design features would further reduce indirect impacts to negligible levels.
45

1 Chaparral sand-verbena habitat (desert sand dunes) occurs in a limited portion of the SEZ
2 and could be avoided during the development of facilities and protected from indirect effects.
3 Avoiding or minimizing disturbance to occupied habitats and dunes and sand transport systems
4 would further reduce impacts on this species. If avoidance or minimization are not feasible
5 options, plants could be translocated from the area of direct effects to protected areas that would
6 not be affected directly or indirectly by future development. Alternatively, or in combination
7 with translocation, a compensatory mitigation plan could be developed and implemented to
8 mitigate direct effects on occupied habitats. Compensation could involve the protection and
9 enhancement of existing occupied or suitable habitats to compensate for habitats lost to
10 development. A comprehensive mitigation strategy that used one or more of these options could
11 be designed to completely offset the impacts of development. The need for mitigation, other than
12 design features, should be determined by conducting pre-disturbance surveys for the species and
13 its habitat on the SEZ.

14 15 16 **Flat-Seeded Spurge**

17
18 The flat-seeded spurge is not known to occur in the affected area of the Imperial East
19 SEZ. According to the CAREGAP land cover model, however, approximately 5,366 acres
20 (22 km²) of suitable habitat on the SEZ could be directly affected by construction and operations
21 (Table 9.1.12.1-1). This direct effects area represents about 0.4% of available suitable habitat in
22 the SEZ region. About 60,014 acres (243 km²) of suitable habitat occurs in the area of potential
23 indirect effects; this area represents about 4.8% of the available suitable habitat in the SEZ
24 region (Table 9.1.12.1-1).

25
26 The overall impact on the flat-seeded spurge from construction, operation, and
27 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
28 considered small because the amount of potentially suitable habitat for this species in the area
29 of direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
30 implementation of design features would further reduce indirect impacts to negligible levels.

31
32 Avoiding and minimizing disturbance of dunes and sand transport systems would reduce
33 impacts on this species. In addition, impacts could be reduced by avoiding or minimizing
34 disturbance to discovered populations and occupied habitats on the SEZ. A compensatory
35 mitigation plan could be developed and implemented to mitigate direct effects on occupied
36 habitats. Compensation could involve the protection and enhancement of protected off site
37 habitats to compensate for habitats lost to development. A comprehensive mitigation strategy
38 that uses one or more of these options could be designed to completely offset the impacts of
39 development. The BLM has determined that translocation is not a feasible mitigation option for
40 this species.

41 42 43 **Giant Spanish-Needle**

44
45 The giant Spanish-needle is known to occur in the affected area of the Imperial East
46 SEZ in desert sand dune habitats. According to the CAREGAP land cover model, approximately

1 705 acres (3 km²) of potentially suitable desert dune habitat on the SEZ could be directly
2 affected by construction and operations (Table 9.1.12.1-1). This direct effects area represents
3 0.4% of available suitable habitat in the SEZ region. About 24,102 acres (98 km²) of potentially
4 suitable habitat occurs in the area of potential indirect effects; this area represents about 12.7% of
5 the available suitable habitat in the SEZ region (Table 9.1.12.1-1).
6

7 The overall impact on the giant Spanish-needle from construction, operation, and
8 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
9 considered small because the amount of potentially suitable habitat for this species in the area
10 of direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
11 implementation of design features would further reduce indirect impacts to negligible levels.
12

13 Giant Spanish-needle habitat (desert sand dunes) occupies a limited portion of the SEZ
14 and could be avoided during the development of facilities and protected from indirect effects.
15 Avoiding or minimizing disturbance to occupied habitats and dunes and sand transport systems,
16 and the mitigation measures described previously for the chaparral sand-verbena, could further
17 reduce impacts on this species.
18

19 **Munz's Cholla**

20 The Munz's cholla is not known to occur in the affected area of the Imperial East SEZ.
21
22 However, according to the CAREGAP land cover model, approximately 4,709 acres (19 km²) of
23 potentially suitable desert scrub and wash habitats on the SEZ could be directly affected by
24 construction and operations (Table 9.1.12.1-1). This direct impact area represents about 0.3% of
25 available suitable habitat in the SEZ region. About 37,298 acres (151 km²) of potentially suitable
26 habitat occurs in the area of potential indirect effects; this area represents about 2.0% of the
27 available suitable habitat in the SEZ region (Table 9.1.12.1-1).
28

29
30 The overall impact on the Munz's cholla from construction, operation,
31 and decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
32 considered small, because the amount of potentially suitable habitat for this species in the area
33 of direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
34 implementation of design features would further reduce indirect impacts to negligible levels.
35

36 The avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts
37 on the Munz's cholla, because these habitats (mostly desert scrub) are widespread throughout the
38 area of direct effects. However, the implementation of mitigation options described previously
39 for the chaparral sand-verbena could reduce impacts on this species.
40

41 **Sand Food**

42 The sand food is known to occur in the affected area of the Imperial East SEZ in desert
43 sand dune habitats. According to the CAREGAP land cover model, approximately 705 acres
44 (3 km²) of potentially suitable desert dune habitat on the SEZ could be directly affected by
45
46

1 construction and operations (Table 9.1.12.1-1). This direct effects area represents 0.4% of
2 available suitable habitat in the SEZ region. About 24,102 acres (98 km²) of potentially suitable
3 habitat occurs in the area of potential indirect effects; this area represents about 12.7% of the
4 available suitable habitat in the SEZ region (Table 9.1.12.1-1).

5
6 The overall impact on the sand food from construction, operation, and decommissioning
7 of utility-scale solar energy facilities within the Imperial East SEZ is considered small, because
8 the amount of potentially suitable habitat for this species in the area of direct effects represents
9 less than 1% of potentially suitable habitat in the SEZ region. The implementation of design
10 features would further reduce indirect impacts to negligible levels.

11
12 Sand food habitat (desert sand dunes) occupies a limited portion of the SEZ and could be
13 avoided during the development of facilities and protected from indirect effects. Avoiding or
14 minimizing disturbance to occupied habitats and dunes and sand transport systems, and the
15 mitigation measures described previously for the chaparral sand-verbena, could further reduce
16 impacts on this species.

17 18 19 **Colorado Desert Fringe-Toed Lizard**

20
21 The Colorado Desert fringe-toed lizard is not known to occur in the affected area of the
22 Imperial East SEZ, although nearest occurrences are 6 mi (10 km) northeast of the SEZ.
23 According to the CAREGAP land cover model, approximately 739 acres (3 km²) of potentially
24 suitable habitat (desert dunes and washes) on the SEZ could be directly affected by construction
25 and operations (Table 9.1.12.1-1). This direct effects area represents about 0.1% of available
26 suitable foraging habitat in the SEZ region. About 24,445 acres (99 km²) of potentially suitable
27 foraging habitat occurs in the area of potential indirect effects; this area represents about 3.7% of
28 the available suitable habitat in the SEZ region (Table 9.1.12.1-1).

29
30 The overall impact on the Colorado Desert fringe-toed lizard from construction,
31 operation, and decommissioning of utility-scale solar energy facilities within the Imperial East
32 SEZ is considered small because the amount of potentially suitable habitat for this species in the
33 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
34 The implementation of design features would further reduce indirect impacts to negligible levels.

35
36 Colorado Desert fringe-toed lizard habitat (desert sand dunes and washes) occupies a
37 limited portion of the SEZ and could be avoided during the development of facilities and
38 protected from indirect effects. Avoiding or minimizing disturbance to occupied habitats, dune
39 and sand transport systems, and desert wash habitats would reduce impacts on this species. If
40 avoidance or minimization is not feasible, impacts could be reduced to negligible levels by
41 conducting pre-disturbance surveys and avoiding occupied habitats on the SEZ. A compensatory
42 mitigation plan could also be developed and implemented to mitigate direct effects on occupied
43 habitats. Compensation could involve the protection and enhancement of existing occupied or
44 suitable habitats to compensate for habitats lost to development. A comprehensive mitigation
45 strategy that uses a number of mitigation options could be designed to completely offset the
46 impacts of development.

1 **California Black Rail**
2

3 The California black rail is listed as a BLM-designated sensitive species; it is also listed
4 as threatened under the CESA and is a California fully protected species. This species is
5 associated with freshwater marsh habitats in southern California and southwestern Arizona.
6 According to CNDDDB and information provided by the CDFG and USFWS, the species is
7 known to occur in the affected area of the Imperial East SEZ. The USFWS has confirmed the
8 presence of this species in seepage wetland areas associated with the All-American Canal within
9 the affected area. According to the CAREGAP land cover model, approximately 44 acres
10 (0.2 km²) of potentially suitable habitat on the SEZ (desert riparian habitat) could be directly
11 affected by construction and operations of solar energy facilities on the SEZ (Table 9.1.12.1-1).
12 This direct effects area represents about less than 0.1% of available suitable habitat of the
13 California black rail in the SEZ region. About 3,870 acres (16 km²) of suitable habitat occurs
14 in the area of potential indirect effects; this area represents about 2.1% of the available suitable
15 habitat in the SEZ region (Table 9.1.12.1-1).
16

17 The overall impact on the California black rail from construction, operation, and
18 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
19 considered small because the amount of potentially suitable habitat for this species in the area of
20 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
21 implementation of design features would further reduce indirect impacts to negligible levels.
22

23 As a California fully protected species (pursuant to the California Fish and Game Code
24 Section 3511), the CDFG has the authority to prohibit impacts on and the taking of California
25 black rails under any circumstance. Therefore, direct and indirect impacts on occupied and
26 potentially suitable wetland habitats should be completely avoided. Complete avoidance of
27 wetland habitats on the SEZ would reduce impacts on this species to negligible levels.
28 Consultation with the CDFG should be conducted to fully address the impacts of solar
29 development on the California black rail and to determine any additional mitigation
30 requirements.
31
32

33 **Ferruginous Hawk**
34

35 The ferruginous hawk is a winter resident in southern California within the Imperial East
36 SEZ region. According to the CAREGAP land cover model, approximately 4,855 acres (20 km²)
37 of potentially suitable foraging habitat on the SEZ could be directly affected by construction and
38 operations (Table 9.1.12.1-1). This direct effects area represents about 0.4% of available suitable
39 habitat in the SEZ region. About 44,553 acres (180 km²) of potentially suitable habitat occurs in
40 the area of potential indirect effects; this area represents about 3.6% of the available suitable
41 habitat in the SEZ region (Table 9.1.12.1-1).
42

43 The overall impact on the ferruginous hawk from construction, operation, and
44 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
45 considered small because direct effects would only occur on potentially suitable foraging habitat,
46 and the amount of this habitat in the area of direct effects represents less than 1% of potentially

1 suitable habitat in the SEZ region. The implementation of design features is expected to be
2 sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of impacts on
3 all potentially suitable foraging habitat is not a feasible way to mitigate impacts on the
4 ferruginous hawk because potentially suitable shrubland is widespread throughout the area of
5 direct effects and readily available in other portions of the affected area.
6
7

8 **Least Bittern**

9

10 Within the Imperial East SEZ region, the least bittern is a common summer resident in
11 marsh and wetland habitats from the Salton Sea northwest of the SEZ to the Colorado River east
12 of the SEZ. The species is not known to occur in the affected area of the Imperial East SEZ.
13 However, according to the CAREGAP land cover model, approximately 44 acres (0.2 km²) of
14 potentially suitable habitat on the SEZ (desert riparian habitat) could be directly affected by
15 construction and operations of solar energy facilities on the SEZ (Table 9.1.12.1-1). This direct
16 effects area represents less than 0.1% of available suitable habitat of the least bittern in the SEZ
17 region. About 3,870 acres (16 km²) of suitable habitat occurs in the area of potential indirect
18 effects; this area represents about 2.1% of the available suitable habitat in the SEZ region
19 (Table 9.1.12.1-1).
20

21 The overall impact on the least bittern from construction, operation, and
22 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
23 considered small because the amount of potentially suitable habitat for this species in the area of
24 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
25 implementation of design features would further reduce indirect impacts to negligible levels.
26

27 Because the least bittern, California black rail, and Yuma clapper rail occupy similar
28 habitats in the SEZ region, mitigation would be similar to offset impacts of solar energy
29 development within the Imperial East SEZ for these three species. Although the least bittern is
30 not a California fully protected species, the strict provisions provided to the California black rail
31 and Yuma clapper rail as fully protected species would also preclude direct and indirect impacts
32 of solar energy development within the Imperial East SEZ to the least bittern.
33
34

35 **Western Burrowing Owl**

36

37 The western burrowing owl is not known to occur in the affected area of the Imperial
38 East SEZ. However, according to the CAREGAP habitat suitability model, approximately
39 5,718 acres (23 km²) of potentially suitable desert scrub habitat on the SEZ could be directly
40 affected by construction and operations (Table 9.1.12.1-1). This direct effects area represents less
41 than 0.1% of available suitable habitat in the SEZ region. About 11,372 acres (46 km²) of
42 potentially suitable habitat occurs in the area of potential indirect effects; this area represents
43 about 3.0% of the available suitable habitat in the SEZ region (Table 9.1.12.1-1). Most of this
44 area could serve as foraging and nesting habitat (shrublands). The abundance of burrows suitable
45 for nesting on the SEZ and in the area of indirect effects has not been determined.
46

1 The overall impact on the western burrowing owl from construction, operation, and
2 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
3 considered small because the amount of potentially suitable habitat for this species in the area of
4 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
5 implementation of design features is expected to be sufficient to reduce indirect impacts on this
6 species to negligible levels.

7
8 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
9 western burrowing owl because potentially suitable shrubland habitats are widespread
10 throughout the area of direct effect and readily available in other portions of the SEZ region.
11 However, impacts on the western burrowing owl could be reduced by avoiding or minimizing
12 disturbance to occupied burrows and habitat in the area of direct effects. If avoidance or
13 minimization of disturbance to all occupied habitat is not a feasible option, a compensatory
14 mitigation plan could be developed and implemented to mitigate direct effects. Compensation
15 could involve the protection and enhancement of existing occupied or suitable habitats to
16 compensate for habitats lost to development. A comprehensive mitigation strategy that used one
17 or both of these options could be designed to completely offset the impacts of development. The
18 need for mitigation, other than design features, should be determined by conducting
19 preconstruction surveys for the species and its habitat within the area of direct effects.
20

21 **California Leaf-Nosed Bat**

22
23
24 The California leaf-nosed bat is a year-round resident in southern California within the
25 Imperial East SEZ region. According to the CAREGAP land cover model, approximately
26 4,698 acres (19 km²) of potentially suitable foraging habitat on the SEZ could be directly
27 affected by construction and operations (Table 9.1.12.1-1). This direct effects area represents
28 about 0.3% of available suitable foraging habitat in the SEZ region. About 36,795 acres
29 (149 km²) of potentially suitable foraging habitat occurs in the area of potential indirect effects;
30 this area represents about 2.4% of the available suitable foraging habitat in the SEZ region
31 (Table 9.1.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat
32 represented by desert shrubland. On the basis of an evaluation of CAREGAP land cover types,
33 there is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the affected area.
34

35 The overall impact on the California leaf-nosed bat from construction, operation, and
36 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
37 considered small because the amount of potentially suitable habitat for this species in the area of
38 direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region.
39 The implementation of design features is expected to be sufficient to reduce indirect impacts on
40 this species to negligible levels. Avoidance of all potentially suitable foraging habitats is not
41 feasible because potentially suitable habitat is widespread throughout the area of direct effect and
42 readily available in other portions of the SEZ region.
43
44
45

1 **Pallid Bat**

2
3 The pallid bat is a year-round resident in southern California within the Imperial East
4 SEZ region. According to the CAREGAP land cover model, approximately 4,708 acres (19 km²)
5 of potentially suitable foraging habitat on the SEZ could be directly affected by construction and
6 operations (Table 9.1.12.1-1). This direct effects area represents about 0.3% of available suitable
7 foraging habitat in the SEZ region. About 39,678 acres (161 km²) of potentially suitable foraging
8 habitat occurs in the area of potential indirect effects; this area represents about 2.8% of the
9 available suitable foraging habitat in the SEZ region (Table 9.1.12.1-1). Most of the potentially
10 suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the
11 basis of an evaluation of CAREGAP land cover types, there is no potentially suitable roosting
12 habitat (rocky cliffs and outcrops) in the affected area.
13

14 The overall impact on the pallid bat from construction, operation, and decommissioning
15 of utility-scale solar energy facilities within the Imperial East SEZ is considered small, because
16 the amount of potentially suitable habitat for this species in the area of direct effects represents
17 less than 1% of potentially suitable habitat in the SEZ region. The implementation of design
18 features is expected to be sufficient to reduce indirect impacts on this species to negligible levels.
19 Avoidance of all potentially suitable foraging habitats is not feasible because potentially suitable
20 habitat is widespread throughout the area of direct effect and readily available in other portions
21 of the SEZ region.
22

23
24 **Townsend's Big-Eared Bat**

25
26 The Townsend's big-eared bat is a year-round resident in southern California within
27 the Imperial East SEZ region. According to the CAREGAP land cover model, approximately
28 5,721 acres (23 km²) of potentially suitable foraging habitat on the SEZ could be directly
29 affected by construction and operations (Table 9.1.12.1-1). This direct impact area represents
30 about 0.2% of available suitable foraging habitat in the SEZ region. About 75,484 acres
31 (305 km²) of potentially suitable foraging habitat occurs in the area of potential indirect effects;
32 this area represents about 2.6% of the available suitable foraging habitat in the SEZ region
33 (Table 9.1.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat
34 represented by desert shrubland. On the basis of an evaluation of CAREGAP land cover types,
35 there is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the affected area.
36

37 The overall impact on the Townsend's big-eared bat from construction, operation, and
38 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
39 considered small, because the amount of potentially suitable habitat for this species in the area of
40 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
41 implementation of design features is expected to be sufficient to reduce indirect impacts on this
42 species to negligible levels. Avoidance of all potentially suitable foraging habitats is not feasible
43 because potentially suitable habitat is widespread throughout the area of direct effect and readily
44 available in other portions of the SEZ region.
45
46

1 **Western Mastiff Bat**

2
3 The western mastiff bat is a year-round resident in southern California within the
4 Imperial East SEZ region. According to the CAREGAP land cover model, approximately
5 5,721 acres (23 km²) of potentially suitable foraging habitat on the SEZ could be directly
6 affected by construction and operations (Table 9.1.12.1-1). This direct effects area represents
7 about 0.2% of available suitable foraging habitat in the SEZ region. About 75,484 acres
8 (305 km²) of potentially suitable foraging habitat occurs in the area of potential indirect effects;
9 this area represents about 3.1% of the available suitable foraging habitat in the SEZ region
10 (Table 9.1.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat
11 represented by desert shrubland. On the basis of an evaluation of CAREGAP land cover types,
12 there is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the affected area.
13

14 The overall impact on the western mastiff bat from construction, operation, and
15 decommissioning of utility-scale solar energy facilities within the Imperial East SEZ is
16 considered small, because the amount of potentially suitable habitat for this species in the area of
17 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
18 implementation of design features is expected to be sufficient to reduce indirect impacts on this
19 species to negligible levels. Avoidance of all potentially suitable foraging habitats is not feasible
20 because potentially suitable habitat is widespread throughout the area of direct effect and readily
21 available in other portions of the SEZ region.
22

23
24 ***9.1.12.2.4 Impacts on State-Listed Species***

25
26 There are two species listed by the state of California that could occur in the affected area
27 of the Imperial East SEZ (Table 9.1.12.1-1): California black rail and Yuma clapper rail. Impacts
28 on each of these species were previously discussed in Section 9.1.12.2.1 or Section 9.1.12.2.3
29 because of their status under the ESA or BLM.
30

31
32 ***9.1.12.2.5 Impacts on Rare Species***

33
34 There are 35 species that have a state status of S1 or S2 in California or are listed as
35 species of concern by the state of California or USFWS that may occur in the affected area of the
36 Imperial East SEZ. Impacts have been previously discussed for 16 of these species that are also
37 listed under the ESA (Section 9.1.12.2.1), proposed for listing under the ESA
38 (Section 9.1.12.2.2), BLM-designated sensitive (Section 9.1.12.2.3), or state-listed
39 (Section 9.1.12.2.4). Impacts on the remaining 19 rare species that do not have any other
40 special status designation are presented in Table 9.1.12.1-1.
41

42
43 **9.1.12.3 SEZ-Specific Design Features and Design Feature Effectiveness**

44
45 The implementation of required programmatic design features described in Appendix A,
46 Section A.2.2, would greatly reduce or eliminate the potential for effects of utility-scale solar

1 energy development on special status species. While some SEZ-specific design features are best
2 established when specific project details are being considered, some design features can be
3 identified at this time, including the following:

- 4
5 • Pre-disturbance surveys should be conducted within the SEZ to determine
6 the presence and abundance of all special status species, including those
7 identified in Table 9.1.12.1-1; disturbance to occupied habitats for these
8 species should be avoided or minimized to the extent practicable. If avoiding
9 or minimizing impacts on occupied habitats is not possible, and where
10 appropriate, translocation of individuals from areas of direct effect; or
11 compensatory mitigation of direct effects on occupied habitats could reduce
12 impacts. A comprehensive mitigation strategy for special status species that
13 uses one or more of these options to offset the impacts of development should
14 be developed in coordination with the appropriate federal and state agencies.
15
- 16 • Disturbance of wetland habitats within the SEZ should be avoided or
17 minimized to the extent practicable. Adverse impacts on the following species
18 could be reduced with the avoidance of desert riparian, wash, and wetland
19 habitats: bitter hymenoxys, brown turbans, California satintail, coves' cassia,
20 dwarf germander, Emory's crucifixion-thorn, mud nama, Munz's cholla, sand
21 evening-primrose, Colorado Desert fringe-toed lizard, California black rail,
22 ferruginous hawk, least bittern, white-faced ibis, Yuma clapper rail, California
23 leaf-nosed bat, pallid bat, pocketed free-tailed bat, Townsend's big-eared bat,
24 western mastiff bat, and Yuma hispid cotton rat.
25
- 26 • Avoidance of desert dunes and sand transport systems on the SEZ could
27 reduce impacts on several special status species, including the Abrams'
28 spurge, chaparral sand-verbena, dwarf germander, flat-seeded spurge, giant
29 Spanish-needle, Harwood's milkvetch, sand food, slender cottonheads,
30 Wiggins' croton, Colorado Desert fringe-toed lizard, and flat-tailed horned
31 lizard.
32
- 33 • As California fully protected species, direct and indirect impacts on the
34 California black rail and Yuma clapper rail should be completely avoided.
35
- 36 • Consultations with the USFWS and the CDFG should be conducted to address
37 the potential for impacts on the Yuma clapper rail a species listed as
38 endangered under the ESA and CESA. Consultation would identify an
39 appropriate survey protocol, avoidance measures, and, if appropriate,
40 reasonable and prudent alternatives, reasonable and prudent measures, and to
41 determine any addition mitigation requirements beyond those already afforded
42 to the Yuma clapper rail as a California fully protected species.
43
- 44 • Coordination with the USFWS and CDFG should be conducted to address the
45 potential for impacts on the flat-tailed horned lizard, a species that is proposed
46 for listing under the ESA. Coordination would identify an appropriate survey

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protocol, avoidance measures, and, potentially, translocation or compensatory mitigation.

- Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and CDFG.

If these SEZ-specific design features are implemented in addition to other project design features, impacts on the special status and rare species could be reduced.

1 **9.1.13 Air Quality and Climate**

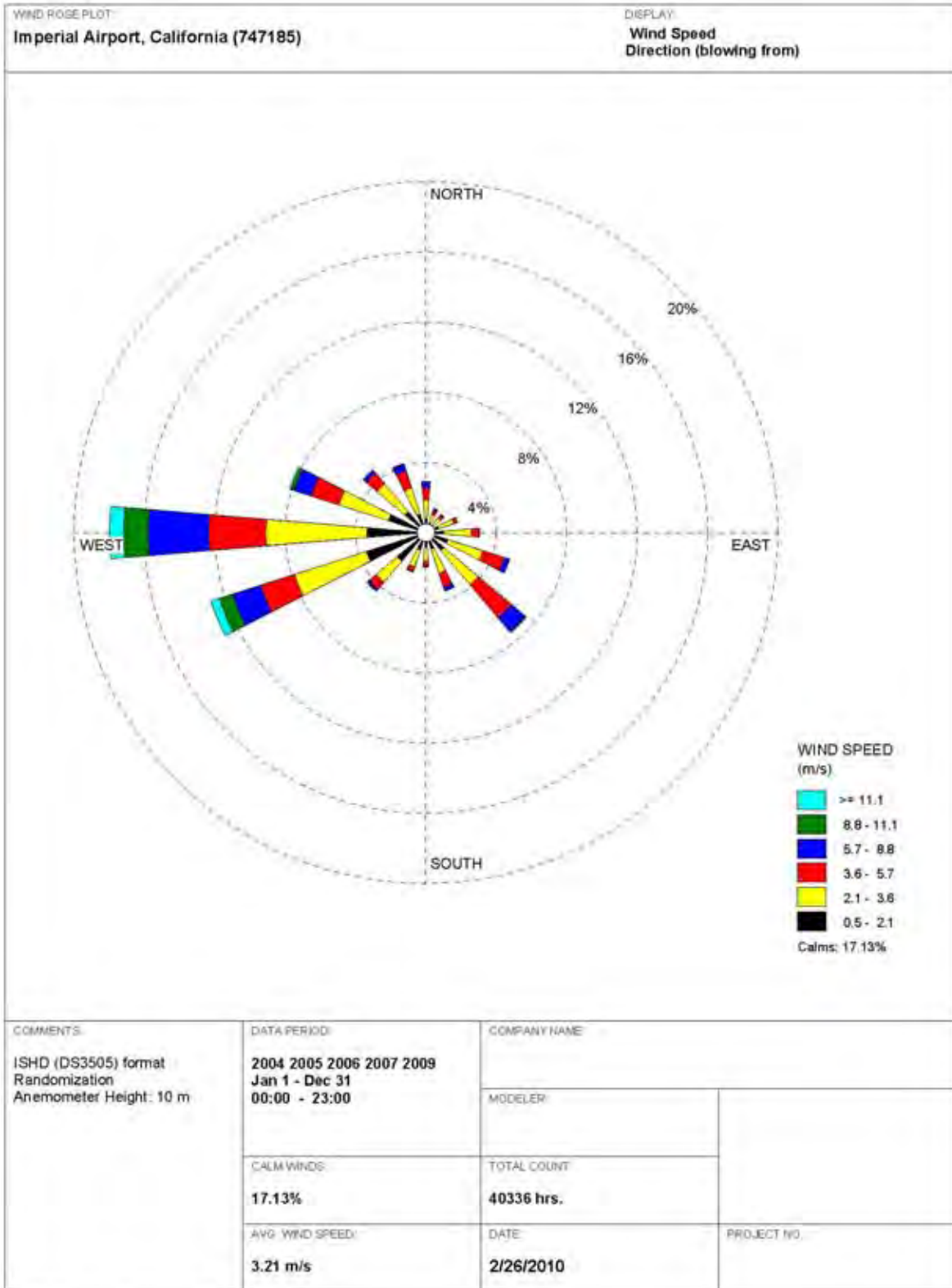
2
3
4 **9.1.13.1 Affected Environment**

5
6
7 **9.1.13.1.1 Climate**

8
9 The proposed Imperial East SEZ is located in the south central portion of Imperial
10 County in the southeastern corner of California, along the Arizona and U.S.–Mexico borders.
11 The SEZ with an average elevation of about 94 ft (29 m) lies in the northwestern portion of the
12 Sonoran Desert, which has a low desert climate. As a result, the area surrounding the SEZ is one
13 of the hottest and driest parts of California, characterized by temperate winters and hot, dry
14 summers, large daily temperature swings, scant precipitation, high evaporation rates, low relative
15 humidity, and abundant sunshine. Meteorological data collected at the Imperial Airport and
16 Calexico stations, which are about 21 mi (34 km) west–northwest of and 15 mi (24 km) west of
17 the Imperial East SEZ, respectively, are summarized below.

18
19 A wind rose from the Imperial Airport in Imperial, California for the 5 years including
20 2004 to 2007 and 2009, and taken at a level of 33 ft (10 m), is presented in Figure 9.1.13.1-1
21 (NCDC 2010a). During this period, the annual average wind speed at the airport was about
22 7.2 mph (3.2 m/s), with a prevailing wind direction from the west (about 17.9% of the time) and
23 secondarily from the west–southwest (about 12.8% of the time). Predominant west winds are
24 reflective of the statewide prevailing westerlies, because the airport is located in the middle of a
25 wide valley and winds are not affected by local terrain (NCDC 2010b). Winds for the period
26 were predominantly from the west throughout the year, except in July and August, when winds
27 were mostly from the southeast. Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s])
28 occurred frequently (about 17% of the time) because of the stable conditions caused by strong
29 radiative cooling from late night to sunrise. Average wind speeds by season were the highest in
30 spring at 8.6 mph (3.9 m/s), lower in summer and fall at 7.9 mph (3.5 m/s) and 6.4 mph
31 (2.9 m/s), respectively, and lowest in winter at 5.8 mph (2.6 m/s).

32
33 Imperial County experiences a very hot and dry climate due to large-scale sinking and
34 compressional warming of air in the semipermanent Pacific high-pressure system centered off
35 the California coast except in winter. For the 1904 to 2009 period, the annual average
36 temperature at Calexico was 71.1°F (21.7°C) (WRCC 2010b). January was the coldest month,
37 with an average minimum temperature of 39.0°F (3.9°C), and July was the warmest month with
38 an average maximum of 103.9°F (39.9°C). On most days in summer, daytime maximum
39 temperatures were in the 100s, and minimums were in the upper 60s or higher. The minimum
40 temperatures recorded were below freezing ($\leq 32^\circ\text{F}$ [0°C]) on five days in January and four days
41 in December, but subzero temperatures were never recorded. During the same period, the highest
42 temperature, 117°F (47.2°C), was reached in July 1905, and the lowest, 21°F (–6.1°C) was
43 reached in January 1913. In a typical year, about 166 days had a maximum temperature of $\geq 90^\circ\text{F}$
44 (32.2°C), while about 11 days had minimum temperatures at or below freezing.



1

2 **FIGURE 9.1.13.1-1 Wind Rose at 33-ft (10-m) Height at Imperial Airport, Imperial,**
 3 **California, 2004–2007, 2009 (Source: NCDC 2010a)**

1 Driven by the prevailing westerlies, cool and humid air masses from the Pacific Ocean
2 lose most of their moisture on the windward side of western mountain ranges parallel to the
3 California coastline. Thus, Imperial County on the leeward side experiences a lack of
4 precipitation. For the 1904 to 2009 period, annual precipitation at Calexico averaged about
5 2.67 in. (6.8 cm) (WRCC 2010b). There is an average of 12 days annually with measurable
6 precipitation (0.01 in. [0.025 cm] or higher). About 60% of the annual precipitation occurs
7 during August and the three winter months, while spring has the lowest precipitation. No
8 measurable snowfall at Calexico was ever recorded.
9

10 Because a semipermanent Pacific high-pressure system centered off the California coast
11 deflects most storms far to the north except in winter, Imperial County rarely experiences severe
12 weather events, such as thunderstorms, hurricanes, and tornadoes. Many thunderstorms in
13 California are accompanied by little or no precipitation, and lightning strikes sometimes cause
14 forest fires (NCDC 2010b).
15

16 Each year some flash flooding is reported as a result of thunderstorms with heavy rains,
17 especially in areas with steep slopes. Since 1999, eight floods (mostly flash floods) were reported
18 in Imperial County (NCDC 2010c), one of which did cause minimal property damage.
19

20 In Imperial County, six hail events in total, which caused no property or crop damage,
21 have been reported since 1990. Hail measuring 1.75 in. (4.4 cm) in diameter was reported in
22 1990 and 2008. In Imperial County, one high-wind event was reported in 2007, and
23 33 thunderstorm wind events have been reported since 1955; those with a maximum
24 wind speed of up to 100 mph (45 m/s) have occurred mostly from July through September,
25 causing some property damage (NCDC 2010c).
26

27 Since 1999, eight dust storm events, occurring from late spring to early fall, were
28 reported in Imperial County (NCDC 2010c). The ground surface of the SEZ is covered
29 predominantly with fine sands and loamy fine sands, which have relatively high dust storm
30 potential. High winds can trigger large amounts of blowing dust in areas of Imperial County that
31 have dry and loose soils with sparse vegetation. Dust storms can deteriorate air quality and
32 visibility and have adverse effects on health, particularly for people with asthma or other
33 respiratory problems.
34

35 Historically, two Category one hurricane and four tropical storms/depressions have
36 passed within 100 mi (160 km) of the proposed Imperial East SEZ (CSC 2010). In the period
37 1950 to June 2010, a total of seven tornadoes (0.1 per year) were reported in Imperial County
38 (NCDC 2010c). However, most tornadoes were relatively weak (i.e., one was uncategorized,
39 four were F0, and two were F1 on the Fujita tornado scale). One of these tornadoes caused minor
40 property damage. None of the tornadoes in Imperial County were reported near the proposed
41 Imperial East SEZ.
42
43

44 ***9.1.13.1.2 Existing Air Emissions***

45

46 Imperial County, which encompasses the proposed Imperial East SEZ, has many
47 industrial emission sources, which are mostly concentrated over the central Imperial Valley, a

1 metropolitan and agricultural region. Several geothermal power
 2 plants representing point source emissions are located to the
 3 northwest of the SEZ and produce relatively minor volatile
 4 organic compound (VOC) emissions. Mobile source emissions
 5 are substantial because the county is crossed by a major
 6 interstate highway, I-8, and many state and county routes.
 7 Data on annual emissions of criteria pollutants and VOCs in
 8 Imperial County are presented in Table 9.1.13.1-1 for 2002
 9 (WRAP 2009). Emission data are classified into six source
 10 categories: point, area, onroad mobile, nonroad mobile,
 11 biogenic, and fire (wildfires, prescribed fires, agricultural
 12 fires, structural fires). In 2002, nonroad sources were major
 13 contributors to total SO₂ and NO_x emissions (about 72%
 14 and 36%, respectively). Onroad sources were secondary
 15 contributors to NO_x emissions (about 33%), but with
 16 contributions comparable to nonroad sources. Onroad sources
 17 were major contributors to CO emissions (about 38%).
 18 Biogenic sources (i.e., vegetation—including trees, plants,
 19 and crops—and soils) that release naturally occurring
 20 emissions accounted for most of VOC emissions (about 94%)
 21 and secondarily contributed to CO emissions (about 35%).
 22 Area sources accounted for about 90% of PM₁₀ and 72% of
 23 PM_{2.5}. Fire sources are minor secondary contributors to SO₂
 24 and PM_{2.5} emissions. In Imperial County, point sources are
 25 minor contributors to all criteria pollutants and VOC emissions.
 26

27 In 2006, California produced about 483.9 MMt of
 28 *gross*¹⁰ carbon dioxide equivalent (CO_{2e})¹¹ emissions
 29 (CARB 2010a). Gross greenhouse gas (GHG) emissions in
 30 California increased by about 12% from 1990 to 2006, which
 31 was three-fourths of the increase in the national rate (about 16%). In 2006, transportation
 32 (38.4%) and electricity use (21.9%) were the primary contributors to gross GHG emission
 33 sources in California. Fossil fuel use in the residential, commercial, and industrial (RCI) sectors
 34 combined accounted for about 29.0% of total state emissions. California's *net* emissions were
 35 about 479.8 MMt CO_{2e}, considering carbon sinks from forestry activities and agricultural soils
 36 throughout the state. The EPA (2009a) also estimated 2005 emissions in California. Its estimate
 37 of CO₂ emissions from fossil fuel combustion was 390.6 MMt, which was comparable to the
 38 state's estimate. The transportation and RCI sectors accounted for about 58.7% and 30.5% of the

TABLE 9.1.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Imperial County, California, Encompassing the Proposed Imperial East SEZ, 2002^a

Pollutant	Emissions (tons/yr)
SO ₂	499
NO _x	14,520
CO	70,360
VOC	150,725
PM ₁₀	19,367
PM _{2.5}	5,542

^a Includes point, area, onroad and nonroad mobile, biogenic, and fire emissions.

^b Notation: CO = carbon monoxide; NO_x = nitrogen oxides; PM_{2.5} = particulate matter with a diameter of ≤2.5 μm; PM₁₀ = particulate matter with a diameter of ≤10 μm; SO₂ = sulfur dioxide; and VOC = volatile organic compounds.

Source: WRAP (2009).

¹⁰ Excluding GHG emissions removed as a result of forestry and other land uses and excluding GHG emissions associated with exported electricity.

¹¹ A measure used to compare the emissions from various GHGs on the basis of their global warming potential, defined as the cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas, CO₂. The CO_{2e} for a gas is derived by multiplying the mass of the gas by the associated global warming potential.

1 CO₂ emissions total, respectively, while the electric power generation accounted for the
2 remainder (about 10.8%).
3
4

5 **9.1.13.1.3 Air Quality** 6

7 California Ambient Air Quality Standards (CAAQS) address the same six criteria
8 pollutants as does the National Ambient Air Quality Standards (NAAQS) (CARB 2010b;
9 EPA 2010a): sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃),
10 particulate matter (PM; PM₁₀ and PM_{2.5}) and lead (Pb). CAAQS are more stringent than the
11 NAAQS for most of criteria pollutants. In addition, California has set standards for some
12 pollutants that are not addressed by the NAAQS: visibility-reducing particles, sulfates, hydrogen
13 sulfide, and vinyl chloride. The NAAQS and CAAQS for criteria pollutants are presented in
14 Table 9.1.13.1-2.
15

16 Imperial County is located administratively within Southeast Desert Intrastate Air Quality
17 Control Region (AQCR) (Title 40, Part 81, Section 167 of the *Code of Federal Regulations*
18 [40 CFR 81.167]), along with parts of Kern, Los Angeles, Riverside, and San Bernardino
19 Counties. In addition, the Imperial East SEZ is located within the Salton Sea Air Basin, 1 of
20 15 geographic air basins designated for the purpose of managing air resources in California,
21 which also includes the Coachella Valley in the central portion of Riverside County. Currently,
22 the area surrounding the proposed SEZ is designated as being in attainment of NAAQS for all
23 criteria pollutants, except O₃ and PM₁₀ (40 CFR 81.305). The central Imperial Valley is
24 designated as a nonattainment area for PM_{2.5}, but the proposed Imperial East SEZ is located
25 outside the nonattainment area boundary. Further, area designations by the state based on the
26 CAAQS are almost the same as those based on the NAAQS (CARB 2010c), except that only
27 the City of Calexico is designated as a nonattainment area for PM_{2.5} based on the CAAQS.
28

29 Air quality in Imperial County is frequently poor, especially with respect to O₃ and
30 PM₁₀ levels. Imperial County has favorable conditions for high O₃ production, such as high
31 temperature, intense solar radiation, and little precipitation. Large areas of barren lands and
32 agricultural lands in Imperial County contribute to higher PM concentrations under high winds.
33 PM concentrations are dominated by primary PM, which includes windblown dust from paved
34 and unpaved roads, agricultural activities, construction activities, and dust transported from the
35 South Coast region, San Diego, and densely populated Mexicali in Mexico across the border.
36

37 There are no ambient air monitoring stations in the area surrounding the proposed
38 Imperial East SEZ. To characterize ambient air quality around the SEZ, two representative
39 monitoring stations in Calexico were chosen: Calexico—East, about 10 mi (16 km) to the west,
40 and Calexico High School, about 15 mi (24 km) to the west of the SEZ. Ambient concentrations
41 of NO₂, CO, and O₃ are recorded at the former station, while all criteria pollutants are recorded
42 at the latter station. The background concentrations of criteria pollutants at these stations for the
43 2004 to 2008 period are presented in Table 9.1.13.1-2 (EPA 2010b). Monitored SO₂, NO₂, CO,
44 and Pb levels at either station were lower than their respective standards. Monitored O₃, PM₁₀,
45 and PM_{2.5} exceeded both the NAAQS and CAAQS, except annual average PM_{2.5} levels, which
46 were lower than the NAAQS but higher than the CAAQS.

**TABLE 9.1.13.1-2 NAAQS, CAAQS and Background Concentration Levels
Representative of the Proposed Imperial East SEZ in Imperial County, California,
2004–2008**

Pollutant ^a	Averaging Time	NAAQS	CAAQS	Background Concentration Level	
				Concentration ^{b,c}	Measurement Location, Year
SO ₂	1-hour	0.075 ppm ^d	0.25 ppm	0.162 ppm (–; 65%)	Calexico, 2006
	3-hour	0.5 ppm	– ^e	0.066 ppm (13%; –)	Calexico, 2006
	24-hour	0.14 ppm	0.04 ppm	0.019 ppm (14%; 48%)	Calexico, 2006
	Annual	0.030 ppm	–	0.002 ppm (6.7%; –)	Calexico, 2006
NO ₂	1-hour	0.100 ppm ^f	0.18 ppm	0.107 ppm (–; 59%)	Calexico, 2007
	Annual	0.053 ppm	0.030 ppm	0.012 ppm (23%; 40%)	Calexico, 2006
CO	1-hour	35 ppm	20 ppm	9.8 ppm (28%; 49%)	Calexico, 2005
	8-hour	9 ppm	9.0 ppm	7.4 ppm (82%; 82%)	Calexico, 2005
O ₃	1-hour	0.12 ppm ^g	0.09 ppm	0.107 ppm (–; 119%)	Calexico, 2007
	8-hour	0.075 ppm	0.070 ppm	0.083 ppm (111%; 119%)	Calexico, 2007
PM ₁₀	24-hour	150 µg/m ³	50 µg/m ³	154 µg/m ³ (103%; 308%)	Calexico, 2004
	Annual	– ^h	20 µg/m ³	66 µg/m ³ (–; 330%)	Calexico, 2007
PM _{2.5}	24-hour	35 µg/m ³	–	46 µg/m ³ (131%; –)	Calexico, 2006
	Annual	15.0 µg/m ³	12 µg/m ³	13.3 µg/m ³ (89%; 111%)	Calexico, 2005
Pb	30-day	–	1.5 µg/m ³	–	–
	Calendar quarter	1.5 µg/m ³	–	0.03 µg/m ³ (2.0%; –)	Calexico, 2007
	Rolling 3-month	0.15 µg/m ³ ⁱ	–	–	–

^a Notation: CO = carbon monoxide; NO₂ = nitrogen dioxide; O₃ = ozone; Pb = lead; PM_{2.5} = particulate matter with a diameter of ≤2.5 µm; PM₁₀ = particulate matter with a diameter of ≤10 µm; and SO₂ = sulfur dioxide.

^b Monitored concentrations are the highest for calendar-quarter Pb; second-highest for all averaging times less than or equal to 24-hour averages, except fourth-highest daily maximum for 8-hour O₃ and the 98th percentile for 24-hour PM_{2.5}; and arithmetic mean for annual SO₂, NO₂, PM₁₀, and PM_{2.5}.

^c First and second values in parentheses are background concentration levels as a percentage of NAAQS and CAAQS, respectively. Calculation of 1-hour SO₂, 1-hour NO₂, and rolling 3-month Pb to NAAQS was not made because no measurement data based on new NAAQS standards are available.

^d Effective August 23, 2010.

^e A dash denotes “not applicable” or “not available.”

^f Effective April 12, 2010.

^g The EPA revoked the 1-hour O₃ standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).

^h Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of 50 µg/m³.

ⁱ Effective January 12, 2009.

Sources: CARB (2010b); EPA (2010a,b).

1 The Prevention of Significant Deterioration (PSD) regulations (see 40 CFR 52.21),
2 which are designed to limit the growth of air pollution in clean areas, apply to a major new
3 source or modification of an existing major source within an attainment or unclassified area
4 (see Section 4.11.2.3). As a matter of policy, EPA recommends that the permitting authority
5 notify the Federal Land Managers when a proposed PSD source would locate within 62 mi
6 (100 km) of a sensitive Class I area. There are several Class I areas around the Imperial East
7 SEZ, but none of the Class I areas are located within 62 mi (100 km). The nearest Class I area is
8 the Joshua Tree National Park (NP) (40 CFR 81.405), about 69 mi (111 km) north-northwest of
9 the SEZ, which is not in the direction of prevailing winds at the SEZ (Figure 9.1.13.1-1). The
10 next nearest Class I areas are the San Jacinto WA and the Agua Tibia WA, which are located
11 about 103 mi (165 km) northwest and 108 mi (174 km) west-northwest of the SEZ, respectively.
12
13

14 **9.1.13.2 Impacts**

15
16 Potential impacts on ambient air quality associated with a solar project would be of
17 most concern during the construction phase. Impacts on ambient air quality from fugitive dust
18 emissions resulting from soil disturbances are anticipated, but they would be of short duration.
19 During the operations phase, only a few sources with generally low-level emissions would exist
20 for any of the four types of solar technologies evaluated. A solar facility would either not burn
21 fossil fuels or burn only small amounts during operation. (For facilities using heat transfer fluids
22 [HTFs], fuel could be used to maintain the temperature of the HTFs for more efficient daily
23 start-up.) Conversely, solar facilities would displace air emissions that would otherwise be
24 released from fossil fuel power plants.
25

26 Air quality impacts shared by all solar technologies are discussed in detail in
27 Section 5.11.1, and technology-specific impacts are discussed in Section 5.11.2. Impacts specific
28 to the proposed Imperial East SEZ are presented in the following sections. Any such impacts
29 would be minimized through the implementation of required programmatic design features
30 described in Appendix A, Section A.2.2, and through any additional mitigation applied.
31 Section 9.1.13.3 below identifies SEZ-specific design features of particular relevance to the
32 Imperial East SEZ.
33
34

35 **9.1.13.2.1 Construction**

36
37 The Imperial East SEZ has a relatively flat terrain; thus only a minimum number of site
38 preparation activities, perhaps with no large-scale earthmoving operations, would be required.
39 However, fugitive dust emissions from soil disturbances during the entire construction phase
40 would be a major concern, because of the large areas that would be disturbed in a region that
41 experiences windblown dust problems. Fugitive dusts, which are released near ground level,
42 typically have more localized impacts than similar emissions from an elevated stack with
43 additional plume rise induced by buoyancy and momentum effects.
44
45
46

1 **Methods and Assumptions**

2
3 Air quality modeling for PM₁₀ and PM_{2.5} emissions associated with construction
4 activities was performed using the EPA-recommended AERMOD model (EPA 2009b). Details
5 for emissions estimation, the description of AERMOD, input data processing procedures, and
6 modeling assumptions are described in Section M.13 of Appendix M. Estimated air
7 concentrations were compared with the applicable NAAQS/CAAQS levels at the site boundaries
8 and nearby communities.¹² No PSD increment levels at the nearby Class I areas were estimated,
9 because all such areas are located more than 62 mi (100 km) from the SEZ, which is farther than
10 maximum modeling distance of 31 mi (50 km) for AERMOD, and not downwind of prevailing
11 winds in the area. For the Imperial East SEZ, the modeling was conducted based on the
12 following assumptions and input:

- 13
- 14 • Uniformly distributed emissions over the 3,000 acres (12.1 km²) in the
15 western portion of the SEZ, close to the nearest residences (IID employee
16 housings) and the nearby communities, such as Holtville;
- 17
- 18 • Surface hourly meteorological data from the Imperial Airport and upper air
19 sounding data from Miramar Naval Air Station near San Diego for the 5-year
20 period (2004 to 2007 and 2009); and
- 21
- 22 • A regularly spaced receptor grid over a modeling domain of 62 mi × 62 mi
23 (100 km × 100 km) centered on the proposed SEZ, and additional discrete
24 receptors at the SEZ boundaries.
- 25

26 **Results**

27

28

29 The modeling results for both PM₁₀ and PM_{2.5} concentration increments and total
30 concentrations (modeled plus background concentrations) that would result from construction-
31 related fugitive emissions are summarized in Table 9.1.13.2-1. Maximum 24-hour PM₁₀
32 concentration increments modeled to occur at the site boundaries would be an estimated
33 574 µg/m³, which far exceeds the relevant standards of 150 or 50 µg/m³. Total 24-hour PM₁₀
34 concentrations of 728 µg/m³ at the SEZ boundary would also exceed the standard. However,
35 high PM₁₀ concentrations would be limited to the immediate area surrounding the SEZ boundary
36 and would decrease quickly with distance. Predicted maximum 24-hour PM₁₀ concentration
37 increments at the nearest residences, which are employee housing for the IID located about
38 500 ft (150 m) south of the southwestern corner of the SEZ, would be about 170 µg/m³.
39 Predicted maximum 24-hour PM₁₀ concentration increments would be about 27 µg/m³ at the
40 next nearest residences (about 2.7 mi [4.3 km] west of the SEZ), about 12 µg/m³ at Yuma, about
41 11 µg/m³ at Holtville, and 5 µg/m³ or lower at all other nearby cities. Modeled annual average
42

¹² To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS/CAAQS levels. Only monitored data can be used to determine the attainment status. Modeled data are used to assess potential problems and as a consideration in the permitting process.

TABLE 9.1.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Imperial East SEZ

Pollutant ^a	Averaging Time	Rank ^b	Concentration ($\mu\text{g}/\text{m}^3$)			Percent of NAAQS/CAAQS ^e		
			Maximum Increment ^b	Background ^c	Total	NAAQS/CAAQS ^d	Increment	Total
PM ₁₀	24 hours	H6H	574	154	728	150/50	383/1,149	486/1,457
	Annual	NA ^f	69.1	66	135	NA/20	NA/345	NA/675
PM _{2.5}	24 hours	H8H	38.0	46	84.0	35/NA	108/NA	240/NA
	Annual	NA	6.9	13.3	20.2	15.0/12	46/58	134/168

^a PM_{2.5} = particulate matter with a diameter of $\leq 2.5 \mu\text{m}$; PM₁₀ = particulate matter with a diameter of $\leq 10 \mu\text{m}$.

^b Concentrations for attainment demonstration are presented. H6H = highest of the sixth-highest concentrations at each receptor over the 5-year period. H8H = highest of the multiyear average of the eighth-highest concentrations at each receptor over the 5-year period. For the annual average, multiyear averages of annual means over the five-year period are presented. Maximum concentrations are predicted to occur at the site boundaries.

^c See Table 9.1.13.1-2.

^d First and second values are NAAQS and CAAQS, respectively.

^e First and second values are concentration levels as a percentage of NAAQS and CAAQS, respectively.

^f NA = not applicable.

1 increment and total (increment plus background) PM₁₀ concentrations at the SEZ boundary
2 would be about 69.1 µg/m³ and 135 µg/m³, respectively, which are much higher than the
3 CAAQS level of 20 µg/m³. Modeled increment and background concentrations make
4 comparable contributions to this total. Annual PM₁₀ increments would be much lower, about
5 10 µg/m³ at the nearest residences and about 1 µg/m³ or lower for the other mentioned
6 residences and cities; these levels are well below the CAAQS of 20 µg/m³. Modeled 24-hour
7 total PM_{2.5} concentrations would be 84.0 µg/m³ at the SEZ boundary, which is higher than the
8 NAAQS of 35 µg/m³, while the annual average total PM_{2.5} concentration would be 20.2 µg/m³,
9 which is above both the NAAQS and CAAQS of 15.0 and 12 µg/m³, respectively. Modeled
10 annual average PM_{2.5} increments would be lower than its respective standards, but total
11 concentrations would exceed standards because of relatively high background contributions. At
12 the nearest residences, predicted maximum 24-hour and annual PM_{2.5} concentration increments
13 would be about 5.0 and 1.3 µg/m³, respectively.
14

15 As mentioned, no AERMOD modeling was made for nearby Class I areas because of
16 the distances from the SEZ. Considering distances, prevailing winds, and topography, contours
17 of predicted concentration levels over the modeling domain indicates that no Class I PSD
18 increments are anticipated to be exceeded at the nearby Class I areas, including the nearest one
19 (Joshua Tree NP).
20

21 In conclusion, predicted 24-hour and annual PM₁₀ and PM_{2.5} concentration levels could
22 exceed the standard levels at the SEZ boundaries and immediate surrounding areas during the
23 construction of solar facilities. To reduce potential impacts on ambient air quality and in
24 compliance with BLM design features, aggressive dust control measures would be used.
25 Potential air quality impacts on any nearby residences and cities would be much lower. Modeling
26 indicates that construction activities could result in negligible impacts on the nearest federal
27 Class I area (Joshua Tree NP), which are located about 69 mi (111 km) from the SEZ.
28 Accordingly, it is anticipated that impacts of construction activities on ambient air quality would
29 be moderate and temporary.
30

31 Construction emissions from the engine exhaust from heavy equipment and vehicles
32 could cause impacts on air-quality-related values (AQRVs) (e.g., visibility and acid deposition)
33 at the nearby federal Class I areas. SO_x emissions from engine exhaust would be very low,
34 because BLM design features would require that ultra-low-sulfur fuel with a sulfur content of
35 15 ppm be used. NO_x emissions from engine exhaust would be primary contributors to potential
36 impacts on AQRVs. Construction-related emissions are temporary in nature and thus would
37 cause some unavoidable but short-term impacts.
38

39 For this analysis, the impacts of construction and operation of transmission lines outside
40 of the SEZ were not assessed, assuming that the existing regional 115-kV transmission line
41 might be used to connect some new solar facilities to load centers, and that additional project-
42 specific analysis would be done for new transmission construction or line upgrades. However,
43 some construction of transmission lines could occur within the SEZ. Potential impacts on
44 ambient air quality would be a minor component of construction impacts in comparison with
45 solar facility construction and would be temporary in nature.
46

1 **9.1.13.2.2 Operations**
2

3 Emission sources associated with the operation of a solar facility would include auxiliary
4 boilers, vehicle (commuter, visitor, support, and delivery) traffic, maintenance (e.g., mirror
5 cleaning and repair and replacement of damaged mirrors), and drift from cooling towers for the
6 parabolic trough or power tower technology if wet cooling were implemented (drift comprises
7 low-level PM emissions).
8

9 The type of emission sources caused by and offset by operation of a solar facility are
10 discussed in Section M.13.4 of Appendix M.
11

12 Estimates of potential air emissions displaced by the solar project development at the
13 Imperial East SEZ are presented in Table 9.1.13.2-2. Total power generation capacity ranging
14 from 509 to 916 MW is estimated for the Imperial East SEZ for various solar technologies
15 (see Section 9.1.2). The estimated amount of emissions avoided for the solar technologies
16 evaluated depends only on the megawatts of conventional fossil fuel-generated power displaced,
17 because a composite emission factor per megawatt-hour of power by conventional technologies
18 is assumed (EPA 2009c). If the Imperial East SEZ were fully developed, it is expected that
19 emissions avoided would be somewhat substantial. Development of solar power in the SEZ
20 would result in avoided air emissions ranging from 0.8 to 1.5% of total emissions of SO₂, NO_x,
21 Hg, and CO₂ from electric power systems in the state of California (EPA 2009c). Avoided
22 emissions would be up to 0.3% of total emissions from electric power systems in the six-state
23 study area. When compared with all source categories, power production from the same solar
24 facilities would displace up to 0.29% of SO₂, 0.03% of NO_x, and 0.19% of CO₂ emissions in the
25 state of California (EPA 2009a; WRAP 2009). These emissions would be up to 0.10% of total
26 emissions from all source categories in the six-state study area. Power generation from fossil
27 fuel-fired power plants accounts for only 53% of the total electric power generation in
28 California, most of which is from natural gas combustion. Thus, solar facilities to be built in the
29 Imperial East SEZ could considerably reduce fuel-combustion-related emissions in California
30 but relatively less so than those built in other states with higher fossil use rates.
31

32 About one-quarter of the electricity consumed in California is generated out of state, with
33 about three-quarters of this amount coming from the southwestern states. Thus it is possible that
34 a solar facility in California would replace power from fossil fuel-fired power plants outside of
35 California but within the six-state study area. It is also possible that electric power transfer
36 between the states will increase in the future. To assess the potential region-wide emissions
37 benefit, emissions being displaced were also estimated based on composite emission factors
38 averaged over the six-state study area. For SO₂, NO_x, and Hg, composite emission factors for
39 the six-state study area would be about 5 to 6 times higher than those for California alone. For
40 CO₂, the six-state emission factor is about 60% higher than the California-only emission factor.
41 If the Imperial East SEZ were fully developed, emissions avoided would be somewhat
42 considerable. Development of solar power in the SEZ would result in avoided air emissions
43 ranging from 0.27 to 0.48% of total emissions of SO₂, NO_x, Hg, and CO₂ from electric power
44 systems in the six southwestern states. These emissions would be up to 0.26% of total emissions
45 from all source categories in the six-state study area.
46

TABLE 9.1.13.2-2 Annual Emissions from Combustion-Related Power Generation Displaced by Full Solar Development of the Proposed Imperial East SEZ

Area Size (acres)	Capacity (MW) ^a	Power Generation (GWh/yr) ^b	Emissions Displaced (tons/yr; 10 ³ tons/yr for CO ₂) ^c			
			SO ₂	NO _x	Hg	CO ₂
5,722	509–916	891–1,604	114–205 (673–1,212)	187–337 (992–1,786)	0.002–0.003 (0.008–0.014)	443–797 (703–1,266)
Percentage of total emissions from electric power systems in California ^d			0.84–1.5%	0.84–1.5%	0.84–1.5%	0.84–1.5%
Percentage of total emissions from all source categories in California ^e			0.16–0.29%	0.02–0.03%	– ^f	0.10–0.19%
Percentage of total emissions from electric power systems in the six-state study area ^d			0.05–0.08% (0.27–0.48%)	0.05–0.09% (0.27–0.48%)	0.06–0.10% (0.27–0.48%)	0.17–0.30% (0.27–0.48%)
Percentage of total emissions from all source categories in the six-state study area ^e			0.02–0.04% (0.14–0.26%)	0.007–0.012% (0.04–0.07%)	– (–)	0.05–0.10% (0.08–0.15%)

- ^a It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km²) per MW (for parabolic trough technology) to 9 acres (0.036 km²) per MW (power tower, dish engine, and PV technologies) would be required.
- ^b Assumed a capacity factor of 20%.
- ^c Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 0.26, 0.42, 3.7 × 10⁻⁶, and 994 lb/MWh, respectively, were used for the state of California. Values in parentheses are estimated based on composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 1.51, 2.23, 1.8 × 10⁻⁵, and 1,578 lb/MWh, respectively, averaged over six southwestern states.
- ^d Emission data for all air pollutants are for 2005.
- ^e Emission data for SO₂ and NO_x are for 2002, while those for CO₂ are for 2005.
- ^f A dash indicates not estimated.

Sources: EPA (2009a,c); WRAP (2009).

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As discussed in Section 5.11.1.5, the operation of associated transmission lines would generate some air pollutants from activities such as periodic site inspections and maintenance. However, these activities would occur infrequently, and the amount of emissions would be small. In addition, transmission lines could produce minute amounts of O₃ and its precursor NO_x associated with corona discharge (i.e., the breakdown of air near high-voltage conductors), which is most noticeable for high-voltage lines during rain or very humid conditions. Since the Imperial East SEZ is located in an arid desert environment, these emissions would be small, and potential impacts on ambient air quality associated with transmission lines would be negligible, considering the infrequent occurrences and small amount of emissions from corona discharges.

1 **9.1.13.2.3 Decommissioning/Reclamation**
2

3 As discussed in Section 5.11.1.4, decommissioning/reclamation activities are similar to
4 construction activities but are on a more limited scale and of shorter duration. Potential impacts
5 on ambient air quality would be correspondingly less than those from construction activities.
6 Decommissioning activities would last for a short period, and their potential impacts would be
7 moderate and temporary. The same mitigation measures adopted during the construction phase
8 would also be implemented during the decommissioning phase (Section 5.11.3).
9

10 **9.1.13.3 SEZ-Specific Design Features and Design Feature Effectiveness**
11

12 No SEZ-specific design features are required. Limiting dust generation during
13 construction and operations at the proposed Imperial East SEZ (such as increased watering
14 frequency or road paving or treatment) is a required design feature under BLM’s Solar Energy
15 Program. These extensive fugitive dust control measures would keep off-site PM levels as low as
16 possible during construction.
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1 **9.1.14 Visual Resources**

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4 **9.1.14.1 Affected Environment**

5
6 The proposed Imperial East SEZ is located approximately 1.2 mi (1.9 km) north of the
7 United States–Mexico border in the Sonoran Desert, within the CDCA in Imperial County in
8 southern California. The SEZ occupies an area of 5,722 acres (23.2 km²) and measures
9 approximately 2.9 mi (4.7 km) north to south (at greatest extent) and 7.1 mi (11.4 km) east to
10 west. The SEZ is located approximately 10 mi (16 km) (at closest approach) southeast of the
11 town of Holtville, California, and 16 mi (26 km) east of the community of Calexico. I-8 runs
12 along the northeastern boundary of the SEZ, and State Route 98 runs east to west through the
13 southern portion of the SEZ. The SEZ and surrounding mountain ranges are shown in
14 Figure 9.1.14.1-1. The SEZ ranges in elevation from 78 ft (24 m) in the northwestern portion
15 to 127 ft (39 m) in the southeastern portion of the SEZ.

16
17 The Imperial East SEZ is located in the Sonoran Basin and Range ecoregion (EPA 2007)
18 and the USFS’s East Mesa-Sand Hills subsection, which consists of very gently to moderately
19 sloping alluvial fans and moderately steep to steep sand dunes (USFS 1997).

20
21 The SEZ presents a flat, open landscape, mostly treeless, but with shrubs in some areas
22 tall enough to provide partial screening of views. The landscape is visually dominated by the
23 strong horizon line; the closest visible mountain ranges are too far from the SEZ to affect the
24 SEZ’s visual values significantly.

25
26 Vegetation varies somewhat in different parts of the SEZ. Much of the SEZ is covered
27 with creosote flats consisting of generally tall, widely spaced creosotebushes on gravel, as shown
28 in Figure 9.1.14.1-2. The gravel in the flats is light gray, and because many areas have less than
29 10% vegetative cover, landscape color in these areas is predominantly gray, scattered with olive
30 green and browns of the creosotebush. Some areas in the south-central portion contain a more
31 dense and diverse set of shrubs, with some small trees and a few palm trees. During an August
32 2009 site visit, areas with denser vegetation presented a range of gray-blues, greens, golds and
33 browns, as shown in Figure 9.1.14.1-3.

34
35 No permanent water features are present on the SEZ. This landscape type is common
36 within the region.

37
38 Although the SEZ itself is generally natural appearing, cultural modifications within the
39 SEZ detract markedly from the SEZ’s scenic quality. In addition to State Route 98, several
40 gravel and dirt roads of various sizes cross the SEZ. Traffic on I-8 is visible from portions of the
41 SEZ. Several transmission lines, ranging from large, galvanized steel with open lattice, to
42 relatively small, wooden “H” frame towers cross or pass near the SEZ in different directions, and
43 one or more transmission lines are visible from most locations within the SEZ. Communication
44 and camera towers (for monitoring the international border) are also visible from much of the
45 SEZ. Panoramic views of the SEZ are shown in Figures 9.1.14.1-2 and 9.1.14.1-3.

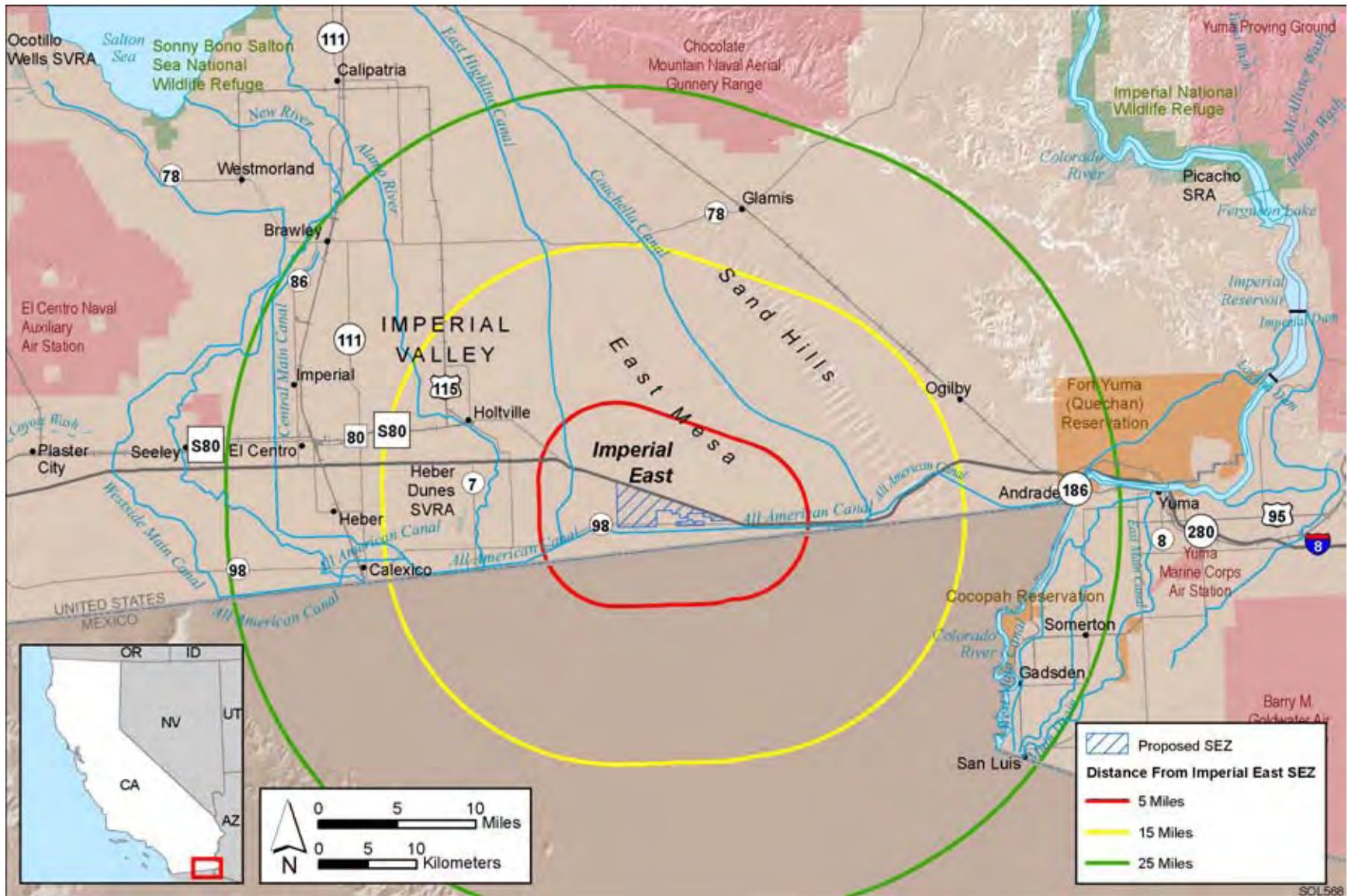


FIGURE 9.1.14.1-1 Proposed Imperial East SEZ and Surrounding Lands

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FIGURE 9.1.14.1-2 Approximately 180° Panoramic View of the Proposed Imperial East SEZ, from Northwest Corner of the SEZ near I-8, Looking South

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FIGURE 9.1.14.1-3 Approximately 180° Panoramic View of the Proposed Imperial East SEZ, from South-Central Portion of the SEZ near State Route 98, Looking West

1 Off-site views do little to enhance the scenic quality of the SEZ and offer almost no
2 topographic relief or other features of interest. The SEZ lies in East Mesa, which is bounded by
3 Imperial Valley to the west and Imperial Sand Dunes to the east. Topographic relief on the mesa
4 is low, generally less than 45 ft (13.7 m), and the mesa is characterized by open views. Distant
5 mountains to the south add slightly to the scenic value of views in that direction, but mountains
6 in other directions are too distant to add to the scenic quality of the SEZ. The Imperial Sand
7 Dunes, located approximately 8 to 10 mi (13 to 16 km) northeast of the SEZ, are theoretically
8 visible just above the horizon from portions of the SEZ but are likely screened in most locations
9 within the SEZ by vegetation and small undulations in topography between the SEZ and the
10 dunes.

11
12 Immediately south of the SEZ is the All-American Canal, which runs parallel to the
13 southern boundary of the SEZ at a distance of 0.3 mi (0.5 km). The canal is a major man-made
14 water feature. Its two hydropower facilities and associated dams and substations are visible from
15 portions of the SEZ. The structures' strong regular geometry, visual complexity, and more
16 reflective, uniformly colored and smooth surfaces contrast strongly in form, line, color, and
17 texture with the simple, relatively natural-appearing landscape; some viewers, however, might
18 find that the structures add visual interest to an otherwise monotonous landscape.

19
20 Also to the south of the SEZ (in Mexico in the vicinity of the SEZ) is the Juan Bautista
21 de Anza Trail, though it is not likely visible from the SEZ (its exact location in the area is not
22 known at this time). This historic trail dates to 1775–1776 as the first overland route to connect
23 New Spain with San Francisco. The Juan Bautista de Anza National Historic Trail approaches to
24 within about 17 mi (27 km) east of the SEZ where it loops south into Mexico and then passes
25 about 10 mi (16 km) south of the SEZ before turning back north into the United States about
26 20 mi (32 km) west of the SEZ. The trail then heads north and northwest. The auto tour portion
27 of the trail follows State Route 98, within the southern boundary of the SEZ, although the route
28 in this area is not associated with the historic trail.

29
30 The BLM conducted a visual resource inventory (VRI) for the SEZ and surrounding
31 lands in 2009 (BLM 2010c). The VRI evaluates BLM-administered lands based on scenic
32 quality; sensitivity level, in terms of public concern for preservation of scenic values in the
33 evaluated lands; and distance from travel routes or key observation points (KOPs). Based on
34 these three factors, BLM-administered lands are placed into one of four VRI Classes, which
35 represent the relative value of the visual resources. Classes I and II are the most valued; Class III
36 represents a moderate value; and Class IV represents the least value. Class I is reserved for
37 specially designated areas, such as national wildernesses and other congressionally and
38 administratively designated areas where decisions have been made to preserve a natural
39 landscape. Class II is the highest rating for lands without special designation. More information
40 about VRI methodology is available in Section 5.12 and in *Visual Resource Inventory*, BLM
41 Manual Handbook 8410-1 (BLM 1986a).

42
43 The VRI map for the SEZ and surrounding lands is shown in Figure 9.1.14.1-4. The VRI
44 values for the SEZ and immediate surroundings are VRI Class III, indicating moderate relative
45 visual values, and VRI Class IV, indicating low relative visual values. The inventory indicates
46 low scenic quality for the SEZ and its immediate surroundings, based in part on the lack of visual

1 variety and notable features, and the relative commonness of the landscape type within the
2 region. Positive scenic quality attributes included some variety in vegetation types and color;
3 however, these positive attributes were insufficient to raise the scenic quality to the “Moderate”
4 level. The inventory indicates moderate sensitivity for the SEZ and its immediate surroundings.
5 The inventory indicates relatively low levels of use; however, the overall sensitivity rating is
6 “Moderate” for the following reasons:

- 7
- 8 1. The SEZ is within the CDCA,
- 9
- 10 2. There are several ACECs nearby, and
- 11
- 12 3. The SEZ is adjacent to the auto tour route of the Juan Bautista de Anza
13 National Historic Trail.
- 14

15 Within the El Centro Field Office, lands within the 25-mi (40-km), 650-ft (198-m)
16 viewshed of the SEZ contain 760 acres (3.08 km²) of VRI Class I lands, north of the SEZ in the
17 Imperial Sand Hills; 4,874 acres (19.72 km²) of VRI Class II lands, north and northeast of the
18 SEZ in the Imperial Sand Hills; 13,829 acres (55.964 km²) of Class III lands, primarily north of
19 the SEZ on East Mesa or northeast beyond the Imperial Sand Hills; and 20,188 acres
20 (81.698 km²) of VRI Class IV lands, north of the SEZ on East Mesa or northeast beyond the
21 Imperial Sand Hills.

22

23 More information about VRI methodology is available in Section 5.12 and in *Visual*
24 *Resource Inventory*, BLM Manual Handbook 8410-1 (BLM 1986a). The BLM has not assigned
25 Visual Resource Management (VRM) classes for the SEZ and surrounding BLM lands. More
26 information about the BLM’s VRM program is available in Section 5.12 and in *Visual Resource*
27 *Management*, BLM Manual Handbook 8400 (BLM 1984).

28

29

30 **9.1.14.2 Impacts**

31

32 The potential for impacts from utility-scale solar energy development on visual resources
33 within the proposed Imperial East SEZ and surrounding lands, as well as the impacts of related
34 developments (e.g., access roads and transmission lines) outside of the SEZ, is presented in this
35 section.

36

37 Site-specific impact assessment is needed to systematically and thoroughly assess visual
38 impact levels for a particular project. Without precise information about the location of a project,
39 a relatively complete and accurate description of its major components and their layout, it is not
40 possible to assess precisely the visual impacts associated with the facility. However, if the
41 general nature and location of a facility are known, a more generalized assessment of potential
42 visual impacts can be made by describing the range of expected visual changes and discussing
43 contrasts typically associated with these changes. In addition, a general analysis can identify
44 sensitive resources that may be at risk if a future project is sited in a particular area. Detailed
45 information about the methodology employed for the visual impact assessment used in this PEIS,
46 including assumptions and limitations, is presented in Appendix M.

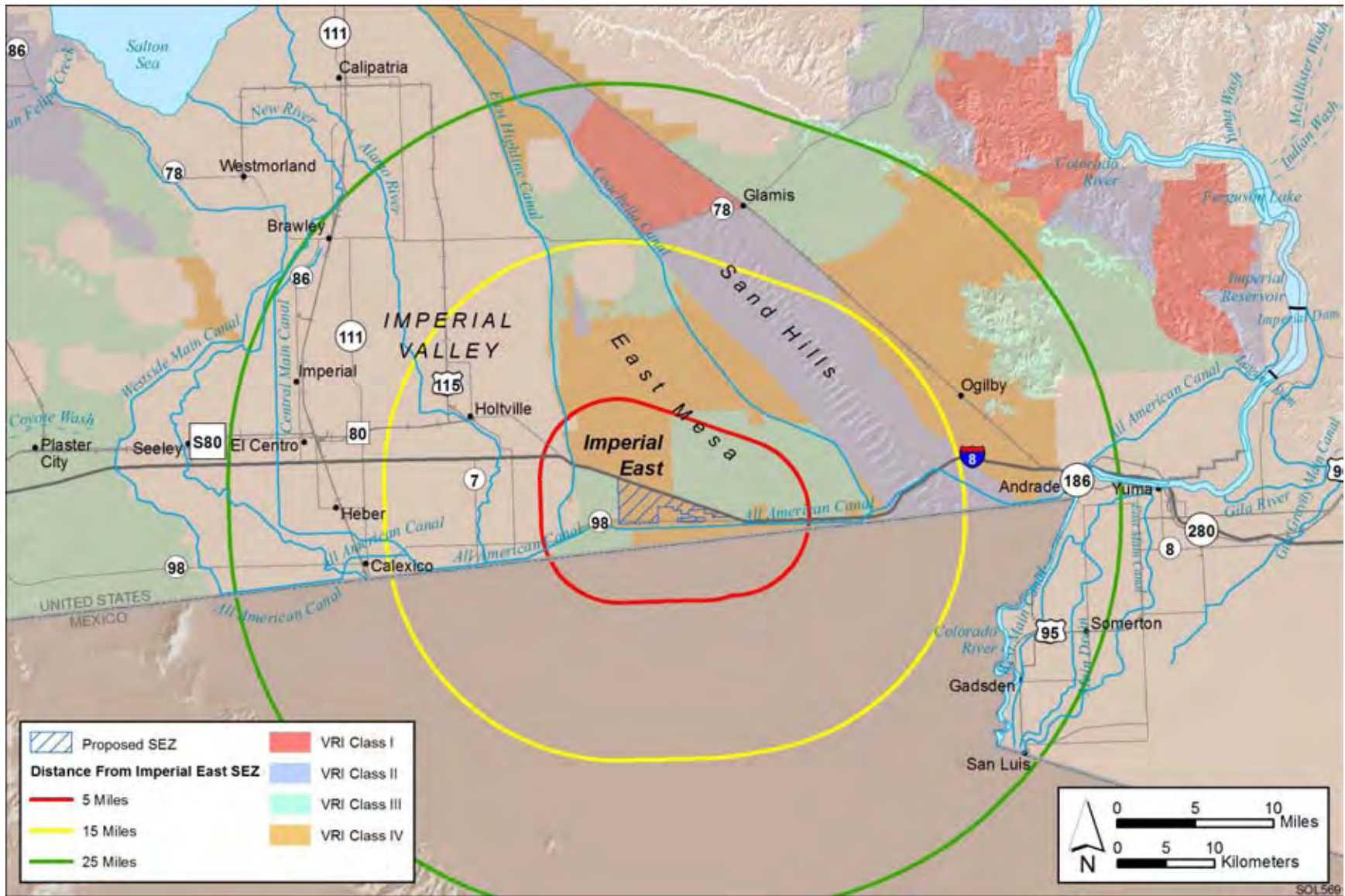


FIGURE 9.1.14.1-4 Visual Resource Inventory Values for the Proposed Imperial East SEZ and Surrounding Lands

1 *Potential Glint and Glare Impacts.* Similarly, the nature and magnitude of potential glint-
2 and glare-related visual impacts for a given solar facility is highly dependent on viewer position,
3 sun angle, the nature of the reflective surface and its orientation relative to the sun and the
4 viewer, atmospheric conditions, and other variables. The determination of potential impacts from
5 glint and glare from solar facilities within a given proposed SEZ would require precise
6 knowledge of these variables, and is not possible given the scope of the PEIS. Therefore, the
7 following analysis does not describe or suggest potential contrast levels arising from glint and
8 glare for facilities that might be developed within the SEZ; however, it should be assumed that
9 glint and glare are possible visual impacts from *any* utility-scale solar facility, regardless of size,
10 landscape setting, or technology type. The occurrence of glint and glare at solar facilities could
11 potentially cause large, but temporary, increases in brightness and visibility of the facilities. The
12 visual contrast levels projected for sensitive visual resource areas discussed in the following
13 analysis do not account for potential glint and glare effects; however, these effects would be
14 incorporated into a future site-and project-specific assessment that would be conducted for
15 specific proposed utility-scale solar energy projects. For more information about potential glint
16 and glare impacts associated with utility-scale solar energy facilities, see Section 5.12 of this
17 PEIS.

18 19 20 ***9.1.14.2.1 Impacts on the Proposed Imperial East SEZ***

21
22 Some or all of the SEZ could be developed for one or more utility-scale solar energy
23 projects, utilizing one or more of the solar energy technologies described in Appendix F.
24 Because of the industrial nature and large size of utility-scale solar energy facilities, large visual
25 impacts on the SEZ would occur as a result of the construction, operation, and decommissioning
26 of solar energy projects. In addition, large impacts could occur at solar facilities that utilize
27 highly reflective surfaces or major light-emitting facility components (solar dish, parabolic
28 trough, and power tower technologies), with lesser impacts associated with reflective surfaces
29 expected from PV facilities. These impacts would be expected to involve major modification of
30 the existing character of the landscape and would likely dominate the views nearby. Additional,
31 and potentially large impacts would occur as a result of the construction, operation, and
32 decommissioning of related facilities, such as access roads and electric transmission lines within
33 the SEZ (however, no new transmission lines construction outside of the proposed SEZ was
34 assessed; see Section 9.1.1.2). While the primary visual impacts associated with solar energy
35 development within the SEZ would occur during daylight hours, lighting required for utility-
36 scale solar energy facilities would be a potential source of visual impacts at night, both within
37 the SEZ and on surrounding lands.

38
39 Common and technology-specific visual impacts from utility-scale solar energy
40 development, as well as impacts associated with electric transmission lines, are discussed in
41 Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and
42 decommissioning, and some impacts could continue after project decommissioning. Visual
43 impacts resulting from solar energy development in the SEZ would be in addition to impacts
44 from solar energy development and other development that may occur on other public or private
45 lands within the SEZ viewshed, and are subject to cumulative effects. For discussion of
46 cumulative impacts, see Section 9.1.22.4.13 of the PEIS.

1 The changes described above would be expected to be consistent with BLM VRM
2 objectives for VRM Class IV, as seen from nearby KOPs. As noted above, the BLM has not
3 assigned VRM classes for the SEZ and surrounding BLM lands. More information about impact
4 determination using the BLM VRM program is available in Section 5.12 and in *Visual Resource*
5 *Contrast Rating*, BLM Manual Handbook 8431-1 (BLM 1986b).

6
7 Implementation of the programmatic design features intended to reduce visual impacts
8 (described in Appendix A, Section A.2.2 of the PEIS) would be expected to reduce visual
9 impacts associated with utility-scale solar energy development within the SEZ; however, the
10 degree of effectiveness of these design features could be assessed only at the site- and project-
11 specific level. Given the large scale, reflective surfaces, and strong regular geometry of utility-
12 scale solar energy facilities, and the lack of screening vegetation and landforms within the SEZ
13 viewshed, siting the facilities away from sensitive visual resource areas and other sensitive
14 viewing areas would be the primary means of mitigating visual impacts. The effectiveness of
15 other visual impact mitigation measures would generally be limited, but would be important to
16 reduce visual contrasts to the greatest extent possible.

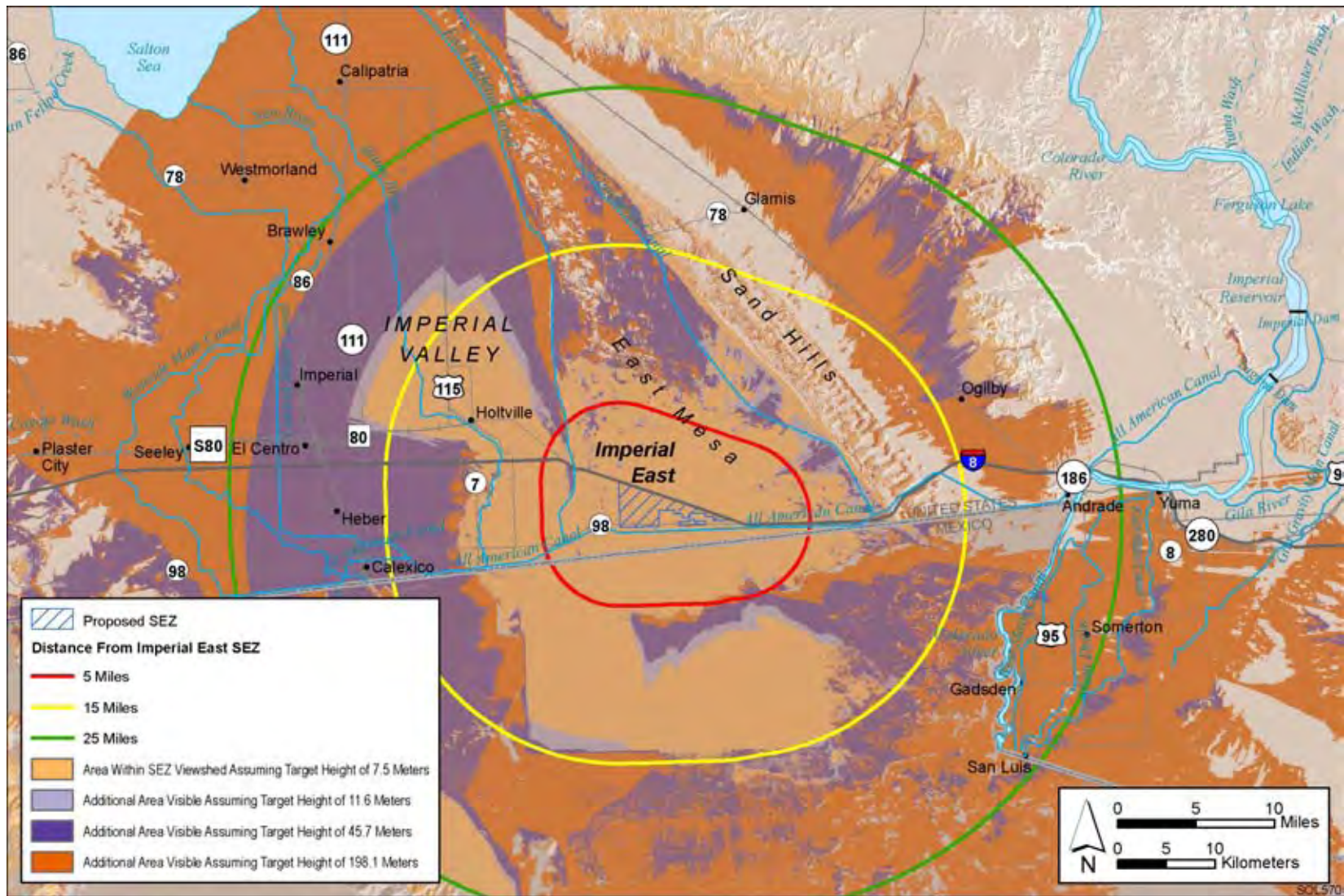
17 18 19 ***9.1.14.2.2 Impacts on Lands Surrounding the Proposed Imperial East SEZ***

20 21 22 **Impacts on Selected Sensitive Visual Resource Areas**

23
24 Because of the large size of utility-scale solar energy facilities and the generally flat,
25 open nature of the proposed SEZ, lands outside the SEZ would be subjected to visual impacts
26 related to construction, operation, and decommissioning of utility-scale solar energy facilities.
27 The affected areas and extent of impacts would depend on a number of visibility factors and
28 viewer distance (for a detailed discussion of visibility and related factors, see Section 5.12).
29 A key component in determining impact levels is the intervisibility between the project and
30 potentially affected lands; if topography, vegetation, or structures screen the project from
31 viewer locations, there is no impact.

32
33 Preliminary viewshed analyses were conducted to identify which lands surrounding
34 the proposed SEZ could have views of solar facilities in at least some portion of the SEZ
35 (see Appendix N for important information on the assumptions and limitations of the methods
36 used). Four viewshed analyses were conducted, assuming four different heights representative of
37 project elements associated with potential solar energy technologies: PV and parabolic trough
38 arrays (24.6 ft [7.5 m]), solar dishes and power blocks for CSP technologies (38 ft [11.6 m]),
39 transmission towers and short solar power towers (150 ft [45.7 m]), and tall solar power towers
40 (650 ft [198.1 m]). Viewshed maps for the SEZ for all four solar technology heights are
41 presented in Appendix N.

42
43 Figure 9.1.14.2-1 shows the combined results of the viewshed analyses for all four solar
44 technologies. The colored segments indicate areas with clear lines of sight to one or more areas
45 within the SEZ and from which solar facilities within these areas of the SEZ would be expected
46 to be visible, assuming the absence of screening vegetation or structures and adequate lighting
47 and other atmospheric conditions. The light brown areas are locations from which PV and



1
2 **FIGURE 9.1.14.2-1 Viewshed Analyses for the Proposed Imperial East SEZ and Surrounding Lands, Assuming Solar Technology**
3 **Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar**
4 **development within the SEZ could be visible)**

1 parabolic trough arrays located in the SEZ could be visible. Solar dishes and power blocks for
2 CSP technologies would be visible from the areas shaded in light brown and the additional areas
3 shaded in light purple. Transmission towers and short solar power towers would be visible from
4 the areas shaded light brown, light purple, and the additional areas shaded in dark purple. Power
5 tower facilities located in the SEZ could be visible from areas shaded light brown, light purple,
6 dark purple, and for at least the upper portions of power tower receivers could be visible from the
7 additional areas shaded in medium brown.
8

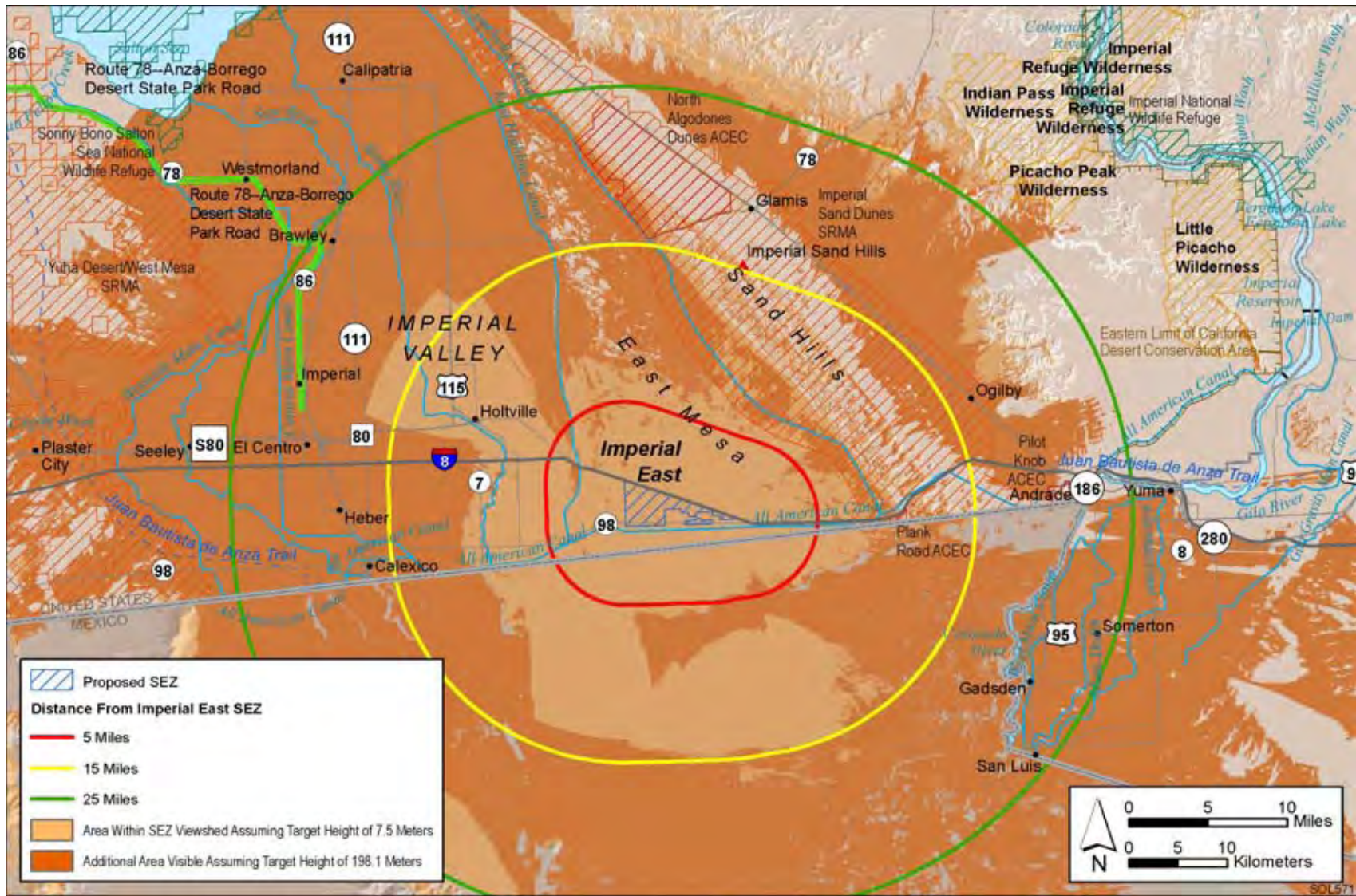
9 For the following visual impact discussion, the tall solar power tower (650 ft [198.1 m])
10 and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds are shown in figures and
11 discussed in the text. These heights represent the maximum and minimum landscape visibility
12 for solar energy technologies analyzed in the PEIS. Viewsheds for solar dish and CSP
13 technology power blocks (38 ft [11.6 m]) and for transmission towers and short solar power
14 towers (150 ft [45.7 m]) are presented in Appendix N. The visibility of these facilities would fall
15 between that for tall power towers and PV and parabolic trough arrays.
16
17

18 **Impacts on Selected Federal-, State-, and BLM-Designated Sensitive Visual** 19 **Resource Areas** 20

21 Figure 9.1.14.2-2 shows the results of a GIS analysis that overlays selected federal-,
22 state-, and BLM-designated sensitive visual resource areas onto the combined tall solar power
23 tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds, in order
24 to illustrate which of these sensitive visual resource areas could have views of solar facilities
25 within the SEZ and therefore potentially would be subject to visual impacts from those facilities.
26 Distance zones that correspond with the BLM's VRM system-specified foreground-
27 middleground distance (5 mi [8 km]), background distance (15 mi [24 km]), and a 25-mi
28 (40-km) distance zone are shown as well, in order to indicate the effect of distance from the SEZ
29 on impact levels, which are highly dependent on distance.
30

31 The scenic resources included in the analysis were as follows:
32

- 33 • National Parks, National Monuments, National Recreation Areas, National
34 Preserves, National Wildlife Refuges, National Reserves, National
35 Conservation Areas, National Historic Sites;
36
- 37 • Congressionally authorized Wilderness Areas;
38
- 39 • Wilderness Study Areas;
40
- 41 • National Wild and Scenic Rivers;
42
- 43 • Congressionally authorized Wild and Scenic Study Rivers;
44
- 45 • National Scenic Trails and National Historic Trails;
46
- 47 • National Historic Landmarks and National Natural Landmarks;



1
2 **FIGURE 9.1.14.2-2** Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds
3 for the Proposed Imperial East SEZ

- All-American Roads, National Scenic Byways, State Scenic Highways, and BLM- and USFS-designated scenic highways/byways;
- BLM-designated Special Recreation Management Areas; and
- ACECs designated because of outstanding scenic qualities.

Potential impacts on specific sensitive resource areas visible from and within 25 mi (40 km) of the proposed Imperial East SEZ are discussed below. The results of this analysis are also summarized in Table 9.1.14.2-1. Further discussion of impacts on these areas is available in Sections 9.1.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and 9.1.17 (Cultural Resources) of the PEIS.

The following visual impact analysis describes *visual contrast levels* rather than *visual impact levels*. *Visual contrasts* are changes in the seen landscape, including changes in the forms, lines, colors, and textures of objects seen in the landscape. A measure of *visual impact* includes potential human reactions to the visual contrasts arising from a development activity, based on viewer characteristics, including attitudes and values, expectations, and other characteristics that are viewer- and situation-specific. Accurate assessment of visual impacts requires knowledge of the potential types and numbers of viewers for a given development and their characteristics and expectations; specific locations from which the project might be viewed; and other variables that were not available or not feasible to incorporate in the PEIS analysis. These variables would be incorporated into a future site-and project-specific assessment that would be conducted for specific proposed utility-scale solar energy projects. For more discussion of visual contrasts and impacts, see Section 5.12 of the PEIS.

GOOGLE EARTH™ VISUALIZATIONS

The visual impact analysis discussion in this section utilizes three-dimensional Google Earth™ perspective visualizations of hypothetical solar facilities placed within the SEZ. The visualizations include simplified wireframe models of a hypothetical solar power tower facility. The models were placed at various locations within the SEZ as visual aids for assessing the approximate size and viewing angle of utility-scale solar facilities. The visualizations are intended to show the apparent size, distance, and configuration of the SEZ, as well as the apparent size of a typical utility-scale solar power tower project and its relationship to the surrounding landscape, as viewed from potentially sensitive visual resource areas within the viewshed of the SEZ.

The visualizations are not intended to be realistic simulations of the actual appearance of the landscape or of proposed utility-scale solar energy projects. The placement of models within the SEZ did not reflect any actual planned or proposed projects within the SEZ, and did not take into account engineering or other constraints that would affect the siting or choice of facilities for this particular SEZ. The number of facility models placed in the SEZ does not reflect the 80% development scenario analyzed in the PEIS, but it should be noted that the discussion of expected visual contrast levels does account for the 80% development scenario. A solar power tower was chosen for the models because the unique height characteristics of power tower facilities make their visual impact potential extend beyond other solar technology types.

TABLE 9.1.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40.2-km) Viewshed of the Proposed Imperial East SEZ, Assuming a Viewshed Analysis Target Height of 650 ft (198.1 m)

Feature Type	Feature Name (Total Acreage/Linear Distance)	Feature Area or Linear Distance ^a		
		Visible within 5 mi	Visible between	
			5 and 15 mi	15 and 25 mi
National Conservation Area	California Desert (25,919,319 acres)	9,127 acres (0.0%) ^b	26,738 acres (0.1%)	42,544 acres (0.2%)
WA	North Algodones Dunes (26,330 acres)	0 acres	0 acres	762 acres (2.9%)
National Historic Trail	Juan Batista de Anza	0 mi	0 mi	4 mi
National Natural Landmark	Imperial Sand Hills (NA ^c)	NA	NA	NA
ACEC designated for outstanding scenic values	North Algodones Dunes (25,835 acres)	0 acres	0 acres	745 acres (2.9%)

^a To convert acres to km², multiply by 0.004047; to convert mi to km, multiply by 1.609.

^b Percentage of total feature area for areal features.

^c NA = data not available.

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17
18
19
20

National Conservation Areas

- *California Desert Conservation Area*—The California Desert Conservation Area (CDCA) is a 26-million-acre (105,000-km²) parcel of land in southern California designated by Congress in 1976 through the Federal Land Policy and Management Act. About 10 million acres (40,000 km²) of the CDCA are administered by the BLM. As shown in Figure 9.1.14.2-2, the proposed Imperial East SEZ is located within the CDCA.

The CDCA management plan notes the “superb variety of scenic values” in the CDCA (BLM 1999) and lists scenic resources as needing management to preserve their value for future generations. The CDCA management plan divides CDCA lands into multiple-use classes on the basis of management objectives. The class designations govern the type and degree of land use actions allowed within the areas defined by class boundaries. All land use actions and resource management activities on public lands within a multiple-use class delineation must meet the guidelines given for that class.

1 The proposed SEZ is within an area classified as multiple use class “L.” This
2 limited class protects sensitive, natural, scenic, ecological, and cultural
3 resource values. Class L management provides for generally lower-intensity,
4 carefully controlled multiple use of resources, while ensuring that sensitive
5 values are not significantly diminished.
6

7 Utility-scale solar development within the SEZ is an allowable use in multiple
8 use Class “L” lands under the CDCA management plan. Construction and
9 operation of solar facilities under the PEIS development scenario would result
10 in substantial visual impacts on the SEZ and some surrounding lands within
11 the SEZ viewshed that could not be completely mitigated.
12

13 Portions of the CDCA within the 650-ft (198.1-m) viewshed for the Imperial East
14 SEZ include approximately 78,409 acres (317.3 km²), or 0.3% of the total CDCA
15 acreage. Portions of the CDCA within the 24.6-ft (7.5-m) viewshed encompass
16 approximately 23,599 acres (95.5 km²) or 0.1% of the total CDCA acreage. Absent
17 screening and other visibility factors that would prevent viewers from seeing solar
18 energy facilities within the SEZ, all CDCA lands within the SEZ viewshed would be
19 subject to visual impacts from solar development within the SEZ. The nature of the
20 impacts experienced would vary with the distance from the SEZ, the angle of view,
21 project numbers, sizes and locations, and other project- and site-specific factors.
22
23

24 ***Wilderness Area***

- 25
26 • *North Algodones Dunes*—The 26,330-acre (106.6 km²) North Algodones
27 Dunes Wilderness is a congressionally designated WA located about 16 mi
28 (25 km) at the point of closest approach north of the SEZ. As shown in
29 Figure 9.1.14.2-2, solar energy facilities within the SEZ could be visible from
30 a very small portion of the WA. Portions of the WA within the 650-ft
31 (198.1-m) viewshed (approximately 762 acres [3.08 km²], or 2.9% of the total
32 WA acreage) extend from the point of closest approach at the northwest
33 corner of the SEZ to approximately 22.5 mi (36.2 km) from the SEZ. Portions
34 of the WA within the 24.6-ft (7.5-m) viewshed encompass approximately 342
35 acres (1.4 km²) or 1.3% of the total WA acreage.
36

37 The North Algodones Dunes WA is entirely contained within Imperial Sand
38 Dunes Recreation Area and constitutes much of the northern portion of the
39 area. The largest and tallest dunes are on the west side of the WA, while the
40 east side contains smaller, secondary dunes.
41

42 Figure 9.1.14.2-3 is a three-dimensional Google Earth™ perspective
43 visualization of the SEZ (highlighted in orange) as seen from one of the
44 higher dunes (elevated approximately 300 ft [91.4 m] above the SEZ) on the
45 west side of the WA, and approximately 21 mi (34 km) from the northeastern
46 boundary of the SEZ. The visualization includes two simplified wireframe



1

FIGURE 9.1.14.2-3 Google Earth Visualization of the Proposed Imperial East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from the North Algodones Dunes WA/ACEC

2

3

4

1 models of a hypothetical solar power tower facility. The models were placed
2 within the SEZ as a visual aide for assessing the approximate size and viewing
3 angle of utility-scale solar facilities. The receiver towers depicted in the
4 visualization are properly scaled models of a 459-ft (139.9-m) power tower
5 with an 867-acre (3.5-km²) field of 12-ft (3.7-m) heliostats, each representing
6 approximately 100 MW of electric generating capacity. In the visualization,
7 the SEZ area is depicted in orange, the heliostat fields in blue.

8 Looking south at the SEZ from one of the higher dunes (elevated
9 approximately 300 ft [91.4 m] above the SEZ) on the west side of the WA, the
10 visualization suggests that the upper portions of sufficiently tall power towers
11 and other tall solar facility components (e.g., transmission towers and plumes
12 located within the SEZ) could be visible from the higher dunes in the WA,
13 and that lower height solar collector arrays might also be visible, in the
14 absence of screening vegetation or structures. The SEZ is far enough from the
15 WA, and the angle of view is low enough, however, that any visible solar
16 collector arrays would be barely visible over the horizon and would appear as
17 a very thin horizontal band that would repeat the strong horizon line. At the
18 long distance between the WA and the SEZ, the SEZ would occupy a very
19 small part of the field of view. Visible operating power tower receivers within
20 the SEZ would appear as distant points of light on the southern horizon. If
21 sufficiently tall, power towers could have red or white flashing hazard
22 navigation lights that could be visible for long distances at night, and could
23 potentially be seen from this viewpoint, although there would be numerous
24 other lights visible in the vicinity of the SEZ. Under the development scenario
25 analyzed in this PEIS, solar energy development within the SEZ would be
26 expected to cause minimal visual impacts on the North Algodones Dunes WA.

29 *National Historic Trail*

- 31 • *Juan Bautista de Anza*—The Juan Bautista de Anza National Historic Trail is
32 a congressionally designated multistate and two-country historic trail that
33 passes within approximately 10 mi (18 km) of the SEZ at the point of closest
34 approach on the south side of the SEZ, located in Mexico. As shown in
35 Figure 9.1.14.2-2, within the United States, the eastern portion of the trail is
36 18 mi (30 km) east of the SEZ at the point of closest approach. The western
37 portion of the trail in the United States is located 20 mi (33 km) west of the
38 SEZ. Portions of the western portion of the historic trail in the United States
39 are within the 650-ft (198.1-m) viewshed, extending from the point of closest
40 approach at the western boundary of the SEZ to approximately 24 mi (39 km)
41 from the SEZ. The historic trail is not within the lower-height viewsheds,
42 except for a roughly 0.5-mi (0.8-km) segment approximately 20 mi (32 km)
43 east of the SEZ.
44

1 The area of intermittent visibility east of the SEZ is within and around the
2 Pilot Knob ACEC (see discussion below). In the absence of vegetative or
3 other screening, the SEZ and solar development within the SEZ could be
4 visible on the western horizon from the highest ridges and west-facing slopes
5 in the Pilot Knob area, but the SEZ would occupy a very small portion of the
6 field of view. If visible at the long distance between Pilot Knob and the SEZ,
7 operating power tower receivers located within the SEZ would appear as
8 distant lights on the horizon, viewed against the background of the In-Ko-Pah
9 Mountains. If sufficiently tall, power towers could have red or white flashing
10 hazard navigation lights that could be visible for long distances at night, and
11 could potentially be seen from this viewpoint, although there would be
12 numerous other lights visible in the vicinity of the SEZ. Expected visual
13 impacts on trail users would be minimal.
14

15 In Yuma, Arizona, the trail splits into the historic route and the auto route.
16 The historic trail goes southwest into Baja California, Mexico, for
17 approximately 55 mi (89 km) and then turns north back into California.
18 Because of the lack of accurate elevation data and uncertainty about the
19 exact location of the historic trail in Mexico, accurate GIS-based viewshed
20 analyses for the trail in Mexico were not performed. In Mexico, the trail is
21 approximately 12 mi (19 km) south of the SEZ and runs generally east–west
22 through agricultural lands. The elevation gradually decreases south of the
23 SEZ; thus it is likely that the SEZ is visible from nearby locations in Mexico,
24 but a large area of agricultural lands is located about 6 mi (10 km) south of the
25 SEZ in Mexico that may screen views of the SEZ. Absent vegetative or other
26 screening, because the elevation is lower than the SEZ, low-height solar
27 facilities would not likely be visible; however, taller structures might be
28 visible. When operating, sufficiently tall power tower receivers within the
29 SEZ might be visible as points of light on the northern horizon. If sufficiently
30 tall, power towers could have red or white flashing hazard navigation lights
31 that could be visible for long distances at night. Unless there was screening
32 present, they could potentially be seen from the trail, although there would be
33 other lights visible in the vicinity of the SEZ.
34

35 Approximately 19 mi (31 km) west of the SEZ, the national historic trail
36 re-enters the United States in an agricultural area but at an elevation
37 approximately 70 to 80 ft (21 to 24 m) lower than the western boundary of the
38 SEZ. Within the 25-mi (40-km) viewshed of the SEZ, the trail west of the
39 SEZ is only visible in the 650-ft (198.1-m) viewshed, indicating that if solar
40 development within the SEZ were not screened by vegetation or structures
41 between the trail and the SEZ, only the upper portions of taller operating
42 power towers within the SEZ would be visible as distant lights on the horizon.
43 As above, flashing red or white hazard navigation lights on power towers
44 could potentially be visible at night. At the long distance to the SEZ, and very
45 low viewing angle, impacts from solar development within the SEZ on views
46 from the trail would be minimal.
47

1 As noted previously, while the historic trail route passes through Mexico in
2 the close vicinity of the SEZ, the auto route stays in California. It follows I-8
3 from Yuma to State Route 98, where it crosses the SEZ, paralleling the
4 southern boundary of the SEZ. In Calexico, west of the SEZ, the auto route
5 travels north on State Route 111.
6

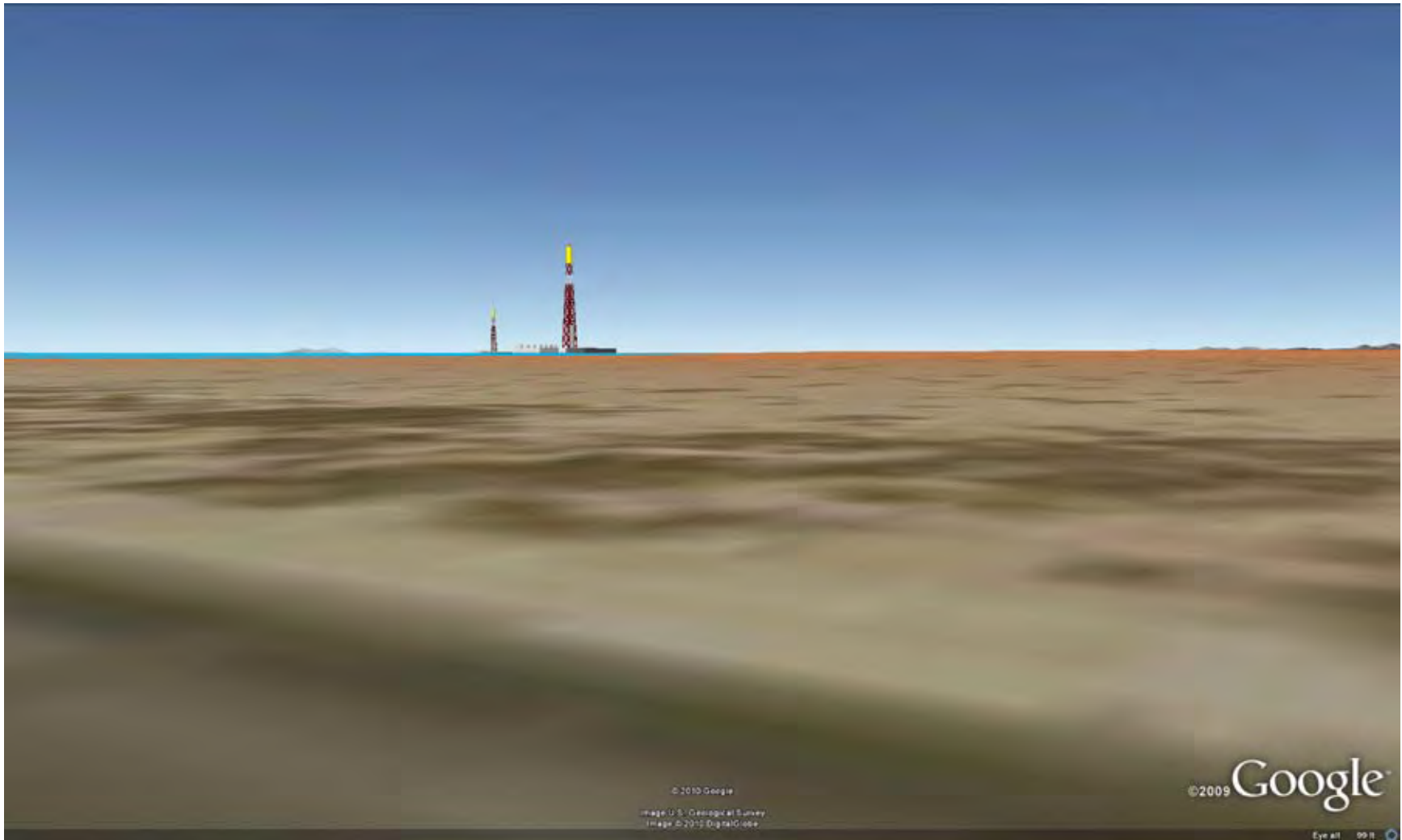
7 Traveling along the auto route from the east, the trail auto route enters the
8 25-mi (40-km) SEZ viewshed near the Imperial Sand Dunes, approximately
9 20 mi (32 km) east of the SEZ. At this point, in the absence of screening by
10 vegetation, the upper portions of sufficiently tall power towers would come
11 into view, likely appearing as distant points of light on the western horizon. In
12 this area, the trail passes through flat lands, with sandy soils and sparse
13 vegetation that would not generally be tall or dense enough to screen views of
14 the SEZ. Traveling west on the auto route, solar facilities in the SEZ would
15 appear in front of travelers, gradually increasing in apparent size.
16

17 Figure 9.1.14.2-4 is a Google Earth visualization that depicts a view of the
18 SEZ (highlighted in orange) as seen from a point along State Route 98, within
19 the SEZ. The heliostat field is highlighted in blue.
20

21 Where the auto route passes through the SEZ, solar facilities within the SEZ
22 would generally be visible, and facilities located near the roads could strongly
23 attract attention, and would likely dominate views from the roads. Views of
24 East Mesa and surrounding Imperial Valley and Imperial Sand Dunes could
25 be completely or partially screened by solar facilities, depending on the layout
26 of solar facilities within the SEZ. The collector/reflector arrays of solar
27 facilities within the SEZ would be seen edge-on, so they would repeat the line
28 of eth horizon, but could be so close to the roadway that their forms and
29 structural details would be visible, which would increase visual contrast
30 levels.
31

32 Taller ancillary facilities, such as buildings, transmission structures, and
33 cooling towers; and plumes (if present) would likely be visible projecting
34 above the collector/reflector arrays, and their structural details could be
35 evident at least for nearby facilities. The ancillary facilities could create form
36 and line contrasts with the strongly horizontal, regular, and repeating forms
37 and lines of the collector/reflector arrays. Color and texture contrasts would
38 also be likely, but their extent would depend on the materials and surface
39 treatments utilized in the facilities.
40

41 Under the 80% development scenario analyzed in this PEIS, strong visual
42 contrasts would be expected for viewpoints on the auto route portion or the
43 trail within the SEZ. If solar facilities were located on both sides of the roads,
44 the banks of solar collectors on both sides of the roads could form a visual
45 “tunnel” that travelers would pass through.
46



1

FIGURE 9.1.14.2-4 Google Earth Visualization of the Proposed Imperial East SEZ (shown in orange tint), as Seen from Viewpoint on the Auto Route of the Juan Bautista de Anza Trail within the SEZ

2

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4

5

1 If power tower facilities were located in the SEZ in close proximity to the auto
2 tour route, when operating, the receivers could appear as brilliant light sources
3 as viewed from the road, and if sufficiently close to the road, would likely
4 strongly attract views. Also, during certain times of the day from certain
5 angles, sunlight on dust particles in the air might result in the appearance of
6 light streaming down from the tower(s). If sufficiently tall, power towers
7 could have red or white flashing hazard navigation lights that could be visible
8 for long distances at night, and could be visually conspicuous from this
9 viewpoint. Other lighting associated with solar facilities in the SEZ could be
10 visible as well.

11
12 From the west, the auto route of the Juan Bautista de Anza National Historic
13 Trail enters the 25-mi (40-km) SEZ viewshed approximately 23 mi (38 km)
14 northwest of the SEZ, at which point the SEZ would come into view in the
15 absence of screening by vegetation or structures. Solar facilities in the SEZ
16 would gradually increase in apparent size as drivers moved eastward on State
17 Route 98. Where visible, the SEZ would appear just to the left of the center
18 of the field of view looking down the road.

19
20 Within the SEZ, the visual experience would be similar to that described
21 above for west-bound travelers, except that most solar facilities would likely
22 be viewed on the left side of west-bound vehicles, as most of the SEZ lands
23 are north of the auto tour route.

24 25 26 ***National Natural Landmark***

- 27
28 • *Imperial Sand Hills*—Imperial Sand Hills National Natural Landmark (NNL)
29 is located approximately 16 mi (25 km) northeast of the SEZ. It is one of the
30 largest masses of sand dunes in the United States and is an outstanding
31 example of dune geology and ecology. Dunes in excess of 500 ft (152.4 m)
32 high are found within the NNL, and the SEZ and solar energy facilities within
33 the SEZ would be visible from the highest dunes within the NNL. If power
34 tower facilities were sited in the SEZ, the receivers could project slightly
35 above the line of the horizon for viewers on high dunes within the NNL, and
36 at the relatively long distance to the SEZ, would appear as distant points of
37 light when operating. If sufficiently tall, power towers could have red or white
38 flashing hazard navigation lights that could be visible from the NNL at night.
39 Potential visual impacts occurring in the landmark arising from solar energy
40 development within the SEZ would depend on the location of the viewer and
41 project location, project technology, site design, and other visibility factors.
42 Under the 80% development scenario analyzed in this PEIS, solar energy
43 development within the SEZ would be expected to cause minimal to weak
44 visual contrasts with the natural-appearing surroundings, as seen from
45 the NNL.

1 ***ACEC Designated for Outstanding Scenic Qualities***
2

- 3 • *North Algodones Dunes*—The North Algodones Dunes ACEC is a
4 25,835-acre (104.6-km²) BLM-designated ACEC that is located north of
5 the Imperial Sand Hills NNL. The ACEC was designated to provide
6 special management for this outstanding scenic area. The ACEC is located
7 approximately 16 mi (25 km) north of the SEZ at the point of closest
8 approach. As shown in Figure 9.1.14.2-2, the area of the ACEC within the
9 viewshed of the SEZ includes the western-most portion of the ACEC and
10 extends east for approximately 2.7 mi (4.3 km). Portions of the ACEC within
11 the 650-ft (198.1-m) viewshed include approximately 745 acres (3.0 km²), or
12 2.9% of the total ACEC acreage. Portions of the ACEC within the 24.6-ft
13 (7.5-m) viewshed include approximately 346 acres (1.4 km²), or 1.3% of the
14 total ACEC acreage.

15
16 The North Algodones Dunes ACEC is entirely contained within the North
17 Algodones Dunes WA and constitutes nearly the same area as the WA.
18 Potential impacts on the ACEC from solar energy development within the
19 SEZ are the same as those described for the WA (discussed above).
20

21
22 **Impacts on Selected Other Federal Lands and Resources**
23

- 24 • *Plank Road*—The 298-acre (1.2-km²) Plank Road ACEC has been designated
25 by the BLM as a unique historic road. The ACEC is located within the
26 Imperial Sand Dunes Recreation Area and is located about 10 mi (16 km)
27 from the southeastern corner of the SEZ, at the point of closest approach. The
28 area of the ACEC within the 650-ft (198.1-m) viewshed of the SEZ includes
29 26 acres (0.1 km²), or 8.8% of the total ACEC acreage. The area within the
30 24.6-ft (7.5-m) viewshed of the SEZ includes 16 acres (0.07 km²), or 5.2% of
31 the total SRMA acreage.
32

33 The elevation within the ACEC is approximately 80 to 100 ft (24 to 30 m)
34 higher than the SEZ. The area between the ACEC and the SEZ has few
35 cultural disturbances visible except unpaved roads and fences. Solar collector
36 arrays and other low-height components of solar facilities within the SEZ
37 would be barely visible and would be viewed edge-on, so they would tend to
38 repeat the strong horizontal line of the plain in which the ACEC and the SEZ
39 are located, which would reduce visual contrast. Less reflective objects, such
40 as PV panel arrays, might be difficult to distinguish against the background.
41 Power towers, transmission towers, other power block facilities, and plumes
42 could be visible above the collector arrays. If sufficiently tall, power towers
43 could have red or white flashing hazard navigation lights that could be visible
44 from the ACEC at night. Under the development scenario analyzed in this
45 PEIS, solar energy facilities located within the SEZ would be expected to
46 create minimal to weak visual contrasts, as seen from the ACEC.
47

- 1 • *Pilot Knob*—The 869-acre (3.5-km²) Pilot Knob ACEC was designated for its
2 prehistoric and Native American values. In addition to its Native American
3 values and the Fort Yuma Indian Reservation bordering its public lands, the
4 Pilot Knob ACEC was used by General Patton in training troops for combat in
5 World War II (WWII). As shown in Figure 9.1.14.2-2, the ACEC is located
6 approximately 20 mi (31 km) from the nearest eastern edge of the SEZ, at the
7 point of closest approach. The area of the ACEC within the 650-ft (198.1-m)
8 viewshed of the SEZ includes 37 acres (0.2 km²). The area within the 24.6-ft
9 (7.5-m) viewshed of the SEZ includes 6 acres (0.02 km²), or 0.6% of the total
10 ACEC acreage.
11

12 As noted above (under discussion of impacts on Juan Bautista de Anza
13 National Historic Trail), there is an area of intermittent SEZ visibility within
14 and around the Pilot Knob ACEC. In the absence of vegetative or other
15 screening, the SEZ and solar development within the SEZ could be visible on
16 the western horizon from the highest ridges and west-facing slopes in the Pilot
17 Knob area, but would occupy a very small portion of the field of view. Even
18 at the higher elevations, the angle of view is low enough that the tops of solar
19 collector arrays would not likely be visible, and the arrays, if visible at all,
20 would repeat the line of the plain in which the SEZ is located. If power tower
21 receivers located within the SEZ were visible at the long distance between
22 Pilot Knob and the SEZ, when operating, they would appear as distant lights
23 on the horizon, viewed against the background of the In-Ko-Pah Mountains. If
24 sufficiently tall, power towers could have red or white flashing hazard
25 navigation lights that could be visible from the ACEC. Expected visual
26 impacts on trail users would be minimal.
27

28 Additional scenic resources exist at the national, state, and local levels, and impacts on
29 both federal and nonfederal lands may occur, including sensitive traditional cultural properties
30 important to Tribes. Note that in addition to the resource types and specific resources analyzed
31 in this PEIS, future site-specific NEPA analyses would include state and local parks, recreation
32 areas, other sensitive visual resources, and communities close enough to the proposed project to
33 be affected by visual impacts. Selected other lands and resources are included in the discussion
34 below.
35

36 In addition to impacts associated with the solar energy facilities themselves, sensitive
37 visual resources could be affected by facilities that would be built and operated in conjunction
38 with the solar facilities. With respect to visual impacts, the most important associated facilities
39 would be access roads and transmission lines, the precise location of which cannot be determined
40 until a specific solar energy project is proposed. For this analysis, the impacts of construction
41 and operation of transmission lines outside of the SEZ were not assessed, assuming that the
42 existing 115-kV transmission line might be used to connect some new solar facilities to load
43 centers, and that additional project-specific analysis would be done for new transmission
44 construction or line upgrades. However, transmission lines to connect facilities to the existing
45 line would be required. Note that depending on project- and site-specific conditions, visual
46 impacts associated with access roads, and particularly transmission lines, could be large.

1 Detailed information about visual impacts associated with transmission lines is presented in
2 Section 5.7.1. A detailed site-specific NEPA analysis would be required to precisely determine
3 visibility and associated impacts for any future solar projects, based on more precise knowledge
4 of facility location and characteristics.
5
6

7 **Impacts on Selected Other Lands and Resources**

8
9

10 **Route 78-Anza Borrego Desert State Park Road.** Approximately 7 mi (1 km) of
11 Route 78-Anza Borrego Desert State Park Road is within the northwestern portion of the
12 viewshed of the Imperial East SEZ. The visible portion of the trail within the 25-mi (40 km) limit
13 of analysis for visual impacts is within 21 mi (34 km) of the SEZ. Since both the SEZ and the
14 road in this area are in low-lying areas, the angle of view between them is low, and at the very
15 long distance between them, minimal visual impacts on State Route 78 users would be expected.
16
17

18 **I-8 and State Route 98.** As noted above (under discussion of impacts on Juan Bautista de
19 Anza Historic Trail auto tour route), State Route 98, a two-lane highway, passes through the
20 southern portion of the Imperial East SEZ. It is also the auto tour portion of the Juan Bautista de
21 Anza National Historic Trail. The annual average daily traffic (AADT) value for State Route 98
22 in the vicinity of the SEZ is 1,900 to 2,500 vehicles. I-8 is a two-lane interstate highway that
23 follows the northern boundary of the SEZ. The AADT value for I-8 in the vicinity of the SEZ is
24 11,200 to 14,000 vehicles. Under the PEIS development scenario, travelers on both roadways
25 could be subject to large visual impacts from solar energy development within the SEZ;
26 however, because of the relatively small size of the SEZ and high travel speed for the two
27 roads, the duration of these impacts would normally be brief, generally not exceeding 8 minutes
28 per trip.
29

30 Solar facilities within the SEZ could be in full view from both roads, and facilities
31 located near the roads would likely strongly attract visual attention and could dominate views
32 from the roads. On State Route 98, views of East Mesa and surrounding Imperial Valley and
33 Imperial Sand Dunes could be completely or partially screened by solar facilities, depending on
34 the layout of solar facilities within the SEZ. Because State Route 98 passes through the SEZ,
35 solar facilities within the SEZ could create strong visual contrasts for travelers, depending on
36 solar project characteristics and location within the SEZ. If solar facilities were located on both
37 sides of State Route 98, banks of solar collectors on both sides of the road could form a visual
38 “tunnel” that travelers would pass through.
39

40 If operating power tower facilities were located in the SEZ in close proximity to the
41 roads, the receivers could appear as brilliant light sources as viewed from the roads, and if
42 sufficiently close to the roads would likely strongly attract views. Also, during certain times of
43 the day from certain angles, sunlight on dust particles in the air might result in the appearance of
44 light streaming down from the tower.
45

1 As travelers approached and passed through the SEZ, depending on lighting conditions,
2 the solar technologies present, facility layout, and mitigation measures employed, there would be
3 the potential for significant levels of glint and glare from reflective surfaces. These effects could
4 potentially distract drivers and/or impair views toward the facilities. These potential impacts
5 could be reduced by siting reflective components away from the roads, employing various
6 screening mechanisms, and/or adjusting the mirror operations to reduce potential impacts.
7
8

9 ***Communities of Holtville, Calexico, Heber, El Centro, and Imperial.*** As shown in
10 Figure 9.1.14.2-2, the viewshed analyses indicate visibility of the SEZ from the communities of
11 Holtville (approximately 10 mi [16 km] northwest of the SEZ), Calexico (approximately 16 mi
12 [26 km] southwest of the SEZ), Heber (approximately 18 mi [29 km] west of the SEZ),
13 El Centro (approximately 20 mi [33 km] northwest of the SEZ) and Imperial (approximately
14 21 mi [34 km] northwest of the SEZ). A detailed future site-specific NEPA analysis is required
15 to determine visibility precisely; however, given the flatness of the area and the relatively long
16 distances to these communities from the SEZ, visual impacts from solar energy facilities within
17 the SEZ would be expected to be minimal. All of these communities are lower in elevation than
18 the SEZ. Because of the long distance and very low angle of view, visibility of solar facilities
19 within the SEZs from any of these communities except Holtville, is very doubtful. Visibility
20 from Holtville is unlikely, except that sufficiently tall power towers, transmission towers,
21 plumes, and other tall solar facility components might be visible above the horizon but not likely
22 conspicuous. Where visibility existed, it would be limited to the outskirts of these communities
23 in the direction of the SEZ, because structures and vegetation within the urban areas would
24 screen views of the SEZ from most of the communities.
25
26

27 ***Other Impacts.*** In addition to the impacts described for the resource areas above, nearby
28 residents and visitors to the area may experience visual impacts from solar energy facilities
29 located within the SEZ (as well as any associated access roads and transmission lines) from their
30 residences, or as they travel area roads. The range of impacts experienced would be highly
31 dependent on viewer location, project types, locations, sizes, and layouts, as well as the presence
32 of screening, but under the 80% development scenario analyzed in the PEIS, from some
33 locations, strong visual contrasts from solar development within the SEZ could potentially be
34 observed.
35
36

37 ***9.1.14.2.3 Summary of Visual Resource Impacts for the Proposed Imperial East SEZ*** 38

39 Under the 80% development scenario analyzed in this PEIS, there could be multiple solar
40 facilities within the Imperial East SEZ, a variety of technologies employed, and a range of
41 supporting facilities that would contribute to visual impacts, such as transmission towers and
42 lines, substations, power block components, and roads. The resulting visually complex landscape
43 would be essentially industrial in appearance and would contrast strongly with the surrounding
44 mostly natural-appearing landscape. Large visual impacts on the SEZ and surrounding lands
45 within the SEZ viewshed would be associated with solar energy development within the SEZ
46 because of major modification of the character of the existing landscape. Additional impacts

1 could occur from construction and operation of transmission lines and access roads within and/or
2 outside the SEZ.

3
4 The SEZ is in an area of low scenic quality, with numerous cultural disturbances already
5 present. Residents, workers, and visitors to the area may experience visual impacts from solar
6 energy facilities located within the SEZ (as well as any associated access roads and transmission
7 lines) as they travel area roads. The residents nearest to the SEZ could be subjected to large
8 visual impacts from solar energy development within the SEZ.

9
10 Utility-scale solar energy development within the proposed Imperial East SEZ is unlikely
11 to cause even moderate visual impacts on highly sensitive visual resource areas, the closest of
12 which is more than 15 mi (24 km) from the SEZ. The closest community is beyond 10 mi
13 (16 km) from the SEZ and is likely to experience minimal visual impacts from solar
14 development within the SEZ.

15 16 17 **9.1.14.3 SEZ-Specific Design Features and Design Feature Effectiveness**

18
19 No SEZ-specific design features have been identified to protect visual resources for the
20 proposed Imperial East SEZ. As noted in Section 5.12, the presence and operation of large-scale
21 solar energy facilities and equipment would introduce major visual changes into
22 nonindustrialized landscapes and could create strong visual contrasts in line, form, color, and
23 texture that could not easily be mitigated substantially. Implementation of the programmatic
24 design features that are presented in Appendix A, Section A.2.2, would reduce the magnitude of
25 visual impacts experienced; however, the degree of effectiveness of these design features could
26 be assessed only at the site- and project-specific assessment level. Given the large-scale,
27 reflective surfaces and strong regular geometry of utility-scale solar energy facilities and the
28 typical lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities
29 away from sensitive visual resource areas and other sensitive viewing areas is the primary means
30 of mitigating visual impacts. The effectiveness of other visual impact mitigation measures would
31 generally be limited.

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1 **9.1.15 Acoustic Environment**

2
3
4 **9.1.15.1 Affected Environment**

5
6 The proposed Imperial East SEZ is located in south central Imperial County in the
7 southeastern corner of California. Imperial County has established noise standards (ICPDS
8 undated). Noise standards applicable to solar energy development include the property-line noise
9 standards: 50 dBA daytime (7 a.m. to 10 p.m.) L_{eq} and 45 dBA nighttime (10 p.m. to 7 a.m.) L_{eq}
10 for residential zones. In addition, the construction noise limit has been established at 75 dBA L_{eq}
11 at the nearest sensitive receptor, and construction equipment operation is limited to 7 a.m. to
12 7 p.m., Monday through Friday, and 9 a.m. to 5 p.m. Saturday.

13
14 I-8 runs east–west along the northeast edge of the proposed Imperial East SEZ, while
15 State Route 98, a two-lane highway, passes through the southern edge. About 0.25 mi (0.4 km)
16 to the south of the SEZ lies the All-American Canal, along which two hydroelectric power plants
17 are located. Several geothermal facilities and development projects are located to the northwest
18 within 5 mi (8 km) from the proposed SEZ. Large-scale irrigated agricultural activities occur
19 about 2.5 mi (4 km) to the west and 6 mi (10 km) in Mexico to the south of the SEZ. The
20 Mexicali Airport in Mexico and Holtville Airport are about 5 to 6 mi (8 to 10 km) southwest and
21 north–northwest of the SEZ, respectively. Therefore, noise sources around the SEZ include road
22 traffic from I-8 and State Route 98, industrial noise from hydroelectric power plants and
23 geothermal facilities, agricultural activities, noise from activities and events at nearby
24 communities and aircraft flyover including military/commercial/private airplanes, crop dusters,
25 and border patrol helicopters. No sensitive receptors (e.g., hospitals, schools, or nursing homes)
26 exist around the SEZ. The nearest noise receptor lies in a cluster of employee residences of the
27 IID, which are located about 500 ft (150 m) south of the southwestern corner of the SEZ.
28 Temporary residences including a small Tamarisk long-term visitor area, is located just south of
29 the SEZ and north of the All-American Canal. The next nearest residences are located about
30 2.7 mi (4.3 km) west of the northwestern corner of the SEZ along the East Highline Canal. The
31 nearest population center with schools or town infrastructure is Holtville, located about 10 mi
32 (16 km) northwest of the SEZ. Background noise levels would be relatively high along the north
33 and south SEZ boundary, while noise levels in the central portion of the SEZ would be relatively
34 low. To date, no environmental noise survey has been conducted around the Imperial East SEZ.
35 On the basis of the population density in Imperial County, the day-night average sound level
36 (L_{dn} or DNL) is estimated to be 37 dBA for Imperial County, typical of a rural area (Eldred
37 1982; Miller 2002). However, maximum noise levels in the SEZ would be about 75 and 65 dBA
38 L_{dn} along I-8 and State Route 98, respectively (ICPDS undated), and thus noise levels within the
39 SEZ are estimated to be about 50 dBA L_{dn} ¹³ or slightly higher.

40
41
42

¹³ Typically, the nighttime level is 10 dBA lower than the daytime level, and it can be interpreted as 50 dBA during daytime hours and 40 dBA during nighttime hours.

1 **9.1.15.2 Impacts**
2

3 Potential noise impacts associated with solar projects in the Imperial East SEZ would
4 occur during all phases of the projects. During the construction phase, potential noise impacts
5 associated with operation of heavy equipment and vehicular traffic on nearby residences
6 (within 500 ft [150 m]) would be anticipated, albeit of short duration. During the operations
7 phase, potential impacts on nearby residences would be anticipated, depending on the solar
8 technologies employed. Noise impacts shared by all solar technologies are discussed in detail in
9 Section 5.13.1, and technology-specific impacts are presented in Section 5.13.2. Impacts specific
10 to the Imperial East SEZ are presented in this section. Any such impacts would be minimized
11 through the implementation of required programmatic design features described in Appendix A,
12 Section A.2.2, and through any additional SEZ-specific design features applied (see
13 Section 9.1.15.3 below). This section primarily addresses potential noise impacts on humans,
14 although potential impacts on wildlife and/or visitors at nearby sensitive areas are discussed,
15 Additional discussion on potential noise impacts on wildlife is presented in Section 5.10.2.
16

17
18 **9.1.15.2.1 Construction**
19

20 The proposed Imperial East SEZ has a relatively flat terrain; thus, minimal site
21 preparation activities would be required, and associated noise levels would be lower than those
22 during general construction (e.g., erecting building structures and installing equipment, piping,
23 and electrical). Solar array construction would also generate noise, but it would be spread over
24 a wide area.
25

26 For the parabolic trough and power tower technologies, the highest construction noise
27 levels would occur at the power block area; a maximum of 95 dBA at a distance of 50 ft (15 m)
28 is assumed, if impact equipment such as pile drivers or rock drills is not being used. Typically,
29 the power block area is located in the center of the solar facility, at a distance of more than
30 0.5 mi (0.8 km) to the facility boundary. However, noise levels from construction of the solar
31 array would be lower than 95 dBA. When geometric spreading and ground effects are taken into
32 consideration, as explained in Section 4.13.1, noise levels would attenuate to about 50 dBA at a
33 distance of 0.5 mi (0.8 km) from the power block area, which is assumed to be at or near the
34 facility boundary. This noise level is the same as an estimated daytime background level. In
35 addition, mid- and high-frequency noise from construction activities is significantly attenuated
36 by atmospheric absorption under the low-humidity conditions typical of an arid desert
37 environment, and by temperature lapse conditions typical of daytime hours; thus noise
38 attenuation to background levels would occur at distances somewhat shorter than 0.5 mi
39 (0.8 km). If a 10-hour daytime work schedule is considered, the EPA guideline level of 55 dBA
40 L_{dn} for residential areas (EPA 1974) would occur at about 1,200 ft (370 m) from the power block
41 area, which would be well within the facility boundary. For construction activities occurring near
42 the residences closest to the southwestern SEZ boundary, estimated noise levels at the nearest
43 residences would be about 69 dBA, which is well above an estimated background level of
44 50 dBA but below the Imperial County regulation of 75 dBA L_{eq} for construction noise. In

1 addition, an estimated 65 dBA L_{dn} ¹⁴ at this location is well above the EPA guideline of 55 dBA
2 L_{dn} for residential areas. However, noise levels at this location would be lower than these values,
3 because these residences are located upwind of prevailing winds, which creates a shadow zone
4 (to be discussed later).

5
6 There are three specially designated areas near the SEZ (Lake Cahuilla ACECs C and D,
7 and East Mesa ACEC) within 5-mi (8-km) of the Imperial East SEZ, which is the farthest
8 distance that noise (except extremely loud noise) would be discernable. However, these ACECs
9 are not noise-sensitive areas (i.e., they were designed as ACECs because they could contain
10 significant cultural resources), and thus no noise impact analysis for these ACECs was
11 conducted.

12
13 Depending on the soil conditions, pile driving might be required for installation of
14 solar dish engines. However, the pile drivers used would be relatively small and quiet, such as
15 vibratory or sonic drivers, rather than the impulsive impact pile drivers frequently seen at large-
16 scale construction sites. Potential impacts on the nearest residences (more than 500 ft [150 m]
17 from the SEZ boundary) would be anticipated to be minor, except when pile driving occurs near
18 the southwestern corner of the SEZ.

19
20 It is assumed that most construction activities would occur during the day, when noise is
21 better tolerated than at night, because of the masking effects of background noise. In addition,
22 construction activities for a utility-scale facility are temporary in nature (typically a few years).
23 Construction would cause some unavoidable but localized short-term impacts on neighboring
24 residences, particularly for activities occurring near the southwestern proposed SEZ boundary,
25 close to the nearby residences.

26
27 Construction activities could result in various degrees of ground vibration, depending
28 on the equipment used and construction methods employed. All construction equipment causes
29 ground vibration to some degree, but activities that typically generate the most severe vibrations
30 are high-explosive detonations and impact pile driving. As for noise, vibration would diminish in
31 strength with distance. For example, vibration levels at receptors beyond 140 ft (43 m) from a
32 large bulldozer (87 VdB at 25 ft [7.6 m]) would diminish below the threshold of perception for
33 humans, which is about 65 VdB (Hanson et al. 2006). During the construction phase, no major
34 construction equipment that can cause ground vibration would be used, and no residences or
35 sensitive structures are located in close proximity. Therefore, no adverse vibration impacts are
36 anticipated from construction activities, including from pile driving for dish engines.

37
38 For this analysis, the impacts of construction and operation of transmission lines outside
39 of the SEZ were not assessed, assuming that the existing 115-kV transmission line might be used
40 to connect some new solar facilities to load centers, and that additional project-specific analysis
41 would be done for new transmission construction or line upgrades. However, some construction
42 of transmission lines could occur within the SEZ. Potential noise impacts on nearby residences

¹⁴ For this analysis, background levels of 50 and 40 dBA for daytime and nighttime hours, respectively, are assumed, which result in day-night average noise level (L_{dn}) of 50 dBA.

1 would be a minor component of construction impacts in comparison with solar facility
2 construction and would be temporary in nature.

3 4 5 **9.1.15.2.2 Operations**

6
7 Noise sources common to all or most types of solar technologies include equipment
8 motion from solar tracking; maintenance and repair activities (e.g., washing of mirrors or
9 replacement of broken mirrors) at the solar array area; commuter/visitor/support/delivery traffic
10 within and around the solar facility; and control/administrative buildings, warehouses, and other
11 auxiliary buildings/structures. Diesel-fired emergency power generators and fire water pump
12 engines would be additional sources of noise, but their operations would be limited to several
13 hours per month (for preventive maintenance testing).

14
15 With respect to the main solar energy technologies, noise-generating activities in the
16 PV solar array area would be minimal, related mainly to solar tracking, if used. Dish engine
17 technology, which employs collector and converter devices in a single unit, on the other hand,
18 generally has the strongest noise sources.

19
20 For the parabolic trough and power tower technologies, most noise sources during
21 operations would come from the power block area, including the turbine generator (typically
22 in an enclosure), pumps, boilers, and dry or wet-cooling systems. The power block is typically
23 located in the center of the facility. On the basis of a 250-MW parabolic trough facility with a
24 cooling tower (Beacon Solar, LLC 2008), simple noise modeling indicates that noise levels
25 around the power block would be more than 85 dBA, but about 52 dBA at the facility boundary,
26 about 0.5 mi (0.8 km) from the power block area. For a facility located near the southwestern
27 corner of the SEZ, the predicted noise level would be about 50 dBA at the nearest residences
28 about 500 ft (150 m) from the SEZ boundary, which is the same as estimated background level
29 and the Imperial County regulation of 50 dBA daytime L_{eq} . Such noise from a solar facility
30 could be discernable at the residences depending on meteorological conditions. If thermal
31 energy storage (TES) were not used (i.e., if the operation were limited to daytime, 12 hours
32 only¹⁵), the EPA guideline level of 55 dBA (as L_{dn} for residential areas) would occur at about
33 1,370 ft (420 m) from the power block area and thus would not be exceeded outside of the
34 proposed SEZ boundary. At the nearest residences, about 52 dBA as L_{dn} is estimated, which is
35 below the EPA guideline level. However, if TES were used during nighttime hours, day-night
36 average sound levels higher than those estimated above would be anticipated, as explained
37 below and in Section 4.13.1.

38
39 On a calm, clear night typical of the proposed Imperial East SEZ setting, the
40 air temperature would likely increase with height (temperature inversion) because of strong
41 radiative cooling. Such a temperature profile tends to focus noise downward toward the ground.
42 Thus, there would be little, if any, shadow zone¹⁶ within 1 or 2 mi (2 or 3 km) of the noise

15 Maximum possible operating hours at the summer solstice, but limited to 7 to 8 hours at the winter solstice.

16 A shadow zone is defined as the region where direct sound does not penetrate because of upward diffraction.

1 source in the presence of a strong temperature inversion (Beranek 1988). In particular, such
2 conditions add to the effect of noise being more discernable during nighttime hours, when the
3 background levels are the lowest. To estimate the day-night average sound level (L_{dn}), 6-hour
4 nighttime generation with TES is assumed after 12-hour daytime generation. For nighttime
5 hours under temperature inversion, 10 dB is added to sound levels estimated from the uniform
6 atmosphere (see Section 4.13.1). On the basis of these assumptions, the estimated sound level
7 at the nearest residences (about 0.6 mi [1.0 km] from the power block area for a solar facility
8 located near the southwestern SEZ boundary) would be 60 dBA L_{eq} , which is higher than the
9 Imperial County regulation of 45 dBA nighttime L_{eq} . The combined day/night noise is estimated
10 to be about 61 dBA as L_{dn} , which is higher than the EPA guideline of 55 dBA for residential
11 areas. The assumptions are conservative in terms of operating hours, and no credit was given to
12 other attenuation mechanisms; thus it is likely that sound levels would be lower than 61 dBA at
13 the nearest residences, even if TES were used at a solar facility. Operating parabolic trough or
14 power tower facilities using TES and located near the southwestern SEZ boundary could result in
15 noise levels above background levels and corresponding adverse noise impacts on the nearest
16 residences. In the permitting process, refined noise propagation modeling would be warranted
17 along with measurement of background sound levels.

18
19 The solar dish engine is unique among concentrating solar power (CSP) technologies,
20 because it generates electricity directly and does not require a power block. A single, large solar
21 dish engine has relatively low noise levels, but a solar facility might employ tens of thousands
22 of dish engines, which would cause high noise levels around such a facility. For example, the
23 proposed 750-MW SES Solar Two dish engine facility in California would employ as many as
24 30,000 dish engines (SES Solar Two, LLC 2008). At the Imperial East SEZ, assuming a dish
25 engine facility of up to 509 MW covering 80% of the total area (4,578 acres [19 km²]), up to
26 20,360 25-kW dish engines could be employed. Also, for a large dish engine facility, several
27 hundred step-up transformers would be embedded in the dish engine solar field, along with
28 several substations; the noise from these sources, however, would be masked by dish engine
29 noise.

30
31 The composite noise level of a single dish engine would be about 89 dBA at a distance of
32 3 ft (0.9 m) (SES Solar Two, LLC 2008). This noise level would be attenuated to about 40 dBA
33 (typical of the mean rural daytime environment) within 340 ft (105 m). However, the combined
34 noise level from tens of thousands of dish engines operating simultaneously would be high in
35 the immediate vicinity of the facility, for example, about 49 dBA at 1.0 mi (1.6 km) and 45 dBA
36 at 2 mi (3 km) from the boundary of the square-shaped dish engine solar field; both values are
37 lower than the daytime Imperial County regulation of 50 dBA. These levels would occur at
38 somewhat shorter distances than the aforementioned distances, considering noise attenuation by
39 atmospheric absorption and temperature lapse during daytime hours. To estimate noise levels at
40 the nearest residences, it was assumed that dish engines were placed all over the Imperial East
41 SEZ at intervals of 98 ft (30 m). Under these assumptions, the estimated noise levels at the
42 nearest residences (500 ft [150 m] from the SEZ boundary) would be about 54 dBA, which is
43 somewhat higher than the daytime Imperial County regulation of 50 dBA. On the basis of
44 12-hour daytime operation, the estimated 54 dBA L_{dn} at these residences is just below the EPA
45 guideline of 55 dBA L_{dn} for residential areas. Considering other attenuation mechanisms and
46 upwind location of prevailing winds, noise levels at the nearest residences would be lower than

1 the values estimated above. Noise from dish engines could cause adverse impacts on the nearest
2 residences, depending on background noise levels and meteorological conditions. Thus,
3 consideration of minimizing noise impacts is very important during the siting of dish engine
4 facilities. Direct mitigation of dish engine noise through noise control engineering could also
5 limit noise impacts.

6
7 During operations, no major ground-vibrating equipment would be used. In addition,
8 no sensitive structures are located close enough to the Imperial East SEZ to experience physical
9 damage. Therefore, potential vibration impacts on surrounding communities and vibration-
10 sensitive structures during operation of any solar facility would be minimal.

11
12 Transformer-generated humming noise and switchyard impulsive noises would be
13 generated during the operation of solar facilities. These noise sources would be located near the
14 power block area, typically near the center of a solar facility. Noise from these sources would
15 generally be limited within the facility boundary and rarely be heard at nearby residences,
16 assuming a 0.6-mi (1.0-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and
17 another 500 ft [150 m] to the nearby residences). Accordingly, potential impacts of these noise
18 sources on nearby residences would be minimal.

19
20 For this analysis, the impacts of construction and operation of transmission lines outside
21 of the SEZ were not assessed, assuming that the existing 115-kV transmission line might be used
22 to connect some new solar facilities to load centers, and that additional project-specific analysis
23 would be done for new transmission construction or line upgrades. However, some construction
24 of transmission lines within the SEZ could occur. For impacts from transmission line corona
25 discharge noise during rainfall events (discussed in Section 5.13.1.5), the noise level at 50 ft
26 (15 m) and 300 ft (91 m) from the center of a 230-kV transmission line towers would be
27 about 39 and 31 dBA (Lee et al. 1996), respectively, typical of daytime and nighttime mean
28 background levels in rural environments. Corona noise includes high-frequency components and
29 is considered to be more annoying than low-frequency environmental noise. However, corona
30 noise would not likely cause impacts, unless a residence was located close to it (e.g., within
31 500 ft [152 m] of a 230-kV transmission line). The Imperial East SEZ is located in an arid desert
32 environment, and incidents of corona discharge are infrequent. Therefore, potential impacts on
33 nearby residents from corona noise along the transmission line ROW would be negligible.

34 35 36 ***9.1.15.2.3 Decommissioning/Reclamation***

37
38 Decommissioning/reclamation requires many of the same procedures and equipment
39 used in traditional construction. Decommissioning/reclamation would include dismantling
40 of solar facilities and support facilities such as buildings/structures and mechanical/electrical
41 installations, disposal of debris, grading, and revegetation as needed. Activities for
42 decommissioning would be similar to those used for construction but on a more limited scale.
43 Potential noise impacts on surrounding communities would be correspondingly lower than those
44 for construction activities. Decommissioning activities would be of short duration, and their
45 potential impacts would be minor and temporary in nature. The same mitigation measures

1 adopted during the construction phase could also be implemented during the decommissioning
2 phase.

3
4 Similarly, potential vibration impacts on surrounding communities and vibration-
5 sensitive structures during decommissioning of any solar facility would be lower than those
6 during construction and thus minimal.

7 8 9 **9.1.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**

10 The implementation of required programmatic design features described in Appendix A,
11 Section A.2.2, would greatly reduce or eliminate the potential for noise impacts from
12 development and operation of solar energy facilities. While some SEZ-specific design features
13 are best established when specific project details are being considered, measures that can be
14 identified at this time include the following:

- 15
16 • Noise levels from cooling systems equipped with TES should be managed so
17 that levels at the nearest residences to the southwest of the SEZ are kept
18 within applicable guidelines. This could be accomplished in several ways, for
19 example, through placing the power block approximately 1 to 2 mi (1.6 to
20 3 km) or more from residences, limiting operations to a few hours after sunset,
21 and/or installing fan silencers.
- 22
23 • Dish engine facilities within the Imperial East SEZ should be located more
24 than 1 to 2 mi (1.6 to 3 km) from nearby residences located to the southwest
25 of the SEZ (i.e., the facilities should be located in the central or eastern
26 portion of the proposed SEZ). Direct noise control measures applied to
27 individual dish engine systems could also be used to reduce noise impacts at
28 nearby residences.
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1 **9.1.16 Paleontological Resources**

2
3
4 **9.1.16.1 Affected Environment**

5
6 The surface geology of the proposed Imperial East SEZ is predominantly composed of
7 thick alluvial deposits (more than 100 ft [30 m] thick) and eolian sediments (loess). Age ranges
8 from Miocene to Holocene suggests depositional environments that could produce fossils. The
9 sub-sea-level basin of the Salton Trough has received a continuous influx of sand, silt, and clay
10 derived from the Colorado River, which created ephemeral lakes in the basin until about
11 300 years ago. Underlying this alluvial cover is a succession of late Tertiary (Miocene and
12 Pliocene) and Quaternary sediments composed mainly of marine and nonmarine sandstones and
13 clays. The total acreage of the alluvial deposits within the SEZ is 12,310 acres (50 km²) or 97%
14 of the SEZ. The total acreage of the eolian deposits within the northwestern portion of the SEZ is
15 324 acres (1 km²) or 3% of the SEZ. In the absence of a potential fossil yield classification
16 (PFYC) map for the California Desert District, a preliminary classification of PFYC Class 3b is
17 assumed, as there are some documented fossil localities in Imperial County. Class 3b indicates
18 that the potential for the occurrence of significant fossil materials is unknown and needs to be
19 investigated further (see Section 4.8 for a discussion of the PFYC system).

20
21
22 **9.1.16.2 Impacts**

23
24 The potential for impacts on significant paleontological resources at the Imperial East
25 SEZ is unknown. Vertebrate mammalian and invertebrate fossils have been found in deposits of
26 Ancient Lake Cahuilla in the Salton Trough. However, the potential for impacts on significant
27 paleontological resources at the Imperial East SEZ is unknown and a preliminary PFYC of
28 Class 3b has been assigned. A more detailed investigation of the local geological deposits of the
29 SEZ, and their location and potential depth is needed. Once a project area has been chosen, a
30 paleontological survey will likely be needed following consultation with the BLM. The
31 appropriate course of action would be determined as established in BLM IM2008-009 and
32 IM2009-011 (BLM 2007a, 2008a). Section 5.14 discusses the types of impacts that could occur
33 on any significant paleontological resources found to be present within the Imperial East SEZ.
34 Impacts will be minimized through the implementation of required programmatic design features
35 described in Appendix A, Section A.2.2.

36
37 Indirect impacts on paleontological resources outside of the SEZ, such as through looting
38 or vandalism, are unknown. Programmatic design features for controlling water runoff and
39 sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.

40
41 No new roads or transmission lines have been assessed for the Imperial East SEZ,
42 assuming existing corridors would be used; impacts on paleontological resources related to the
43 creation of new corridors would be evaluated at the project-specific level if new road or
44 transmission construction or line upgrades are to occur.

1 A programmatic design feature requiring a stop work order in the event of an inadvertent
2 discovery of paleontological resources would reduce impacts by preserving some information
3 and allowing excavation of the resource, if warranted. Depending on the significance of the find,
4 it could also result in some modification to the project footprint. Since the SEZ is located in an
5 area preliminarily classified as PFYC Class 3b, and fossil localities have been found in deposits
6 of Ancient Lake Cahuilla, a stipulation would be included in permitting documents to alert solar
7 energy developers of the possibility of a delay if paleontological resources were uncovered
8 during surface-disturbing activities.
9

10 **9.1.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**

11 Impacts would be minimized through the implementation of required programmatic
12 design features, including a stop-work stipulation in the event that paleontological resources are
13 encountered during construction, as described in Appendix A, Section A.2.2.
14

15 The need for and the nature of any SEZ-specific design features would depend on
16 findings of paleontological surveys.
17
18
19

1 **9.1.17 Cultural Resources**

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3
4 **9.1.17.1 Affected Environment**

5
6
7 **9.1.17.1.1 Prehistory**

8
9 Human settlement in the Colorado Desert region extends back roughly 10,000 years.
10 While a considerable amount of information has been collected for the Baja Region, more
11 archaeological research has taken place on coastal areas rather than inland areas because of
12 the higher density of development on the coast. The lack of evidence on the interior is also
13 attributable to the instability of the landforms in the Salton Basin and the highly mobile
14 settlement strategies of early populations (Schaefer and Laylander 2007). Evidence of past
15 activities in the project area is primarily associated with Lake Cahuilla. This lake was formed by
16 the periodic overflowing of the Colorado River into the Salton Basin. The lake would form every
17 100 to 150 years (Redlands Institute 2002). Most archaeological material found in the Salton
18 Basin is associated with the later incarnations of Lake Cahuilla dating to the last 2000 years.
19

20 The oldest evidence for people in the Baja Peninsula region is associated with the
21 San Dieguito Complex (10,000 B.C.–5,000 B.C.). People from this culture appear to have lived
22 primarily along the coast, although some sites have been found inland. Artifacts attributed to
23 this culture include large stone tools that are only worked on one side (unifacial worked stone),
24 stones where flakes were removed in a single direction (unidirectional flake cores), and massive
25 bifacial tools. Tools were made from numerous types of stone. People from this culture appear to
26 have relied on hunting for their main food supply, stopping in any location for short periods of
27 time only (Berryman and Cheever 2001). No solid evidence of the San Dieguito Complex sites
28 has been found in the Salton Basin (Doyle et al. 2003).
29

30 The Archaic Period (5,000 B.C.–A.D. 500) represents a transition to a subsistence
31 strategy that relies on a more intensive use of local resources. This time period is characterized
32 by an expansion into locations away from the coast and a growing reliance on vegetation for
33 food; however, hunting still remains a major portion of the diet. Artifacts associated with the
34 Archaic period include well-made projectile points, knives and scrapers, and grinding stones.
35 The projectile points are large and were used on spears. Sites from this time period are found
36 near the margins of old watercourses and dry lakeshores. Very little evidence for this complex is
37 found in the Salton Basin. Evidence for the Archaic Period is found in rock shelters on the edges
38 of the Colorado Desert. Sites dating to this complex are likely either buried under alluvium or
39 have been destroyed by agricultural development (Schaefer 1994).
40

41 Use of the Salton Basin during prehistoric times varied depending largely on the presence
42 or absence of Lake Cahuilla. When the lake was present, it was exploited as a source for fish and
43 plants that would grow on the lake margins. During periods when the lake was not present, an
44 obsidian source known as Obsidian Butte, which is near the southern end of the current
45 Salton Sea, was the major source for obsidian in the region (Schaefer and Laylander 2007).
46 Obsidian serves as a key raw material for tool manufacture.
47

1 The last prehistoric phase identified for the Salton Basin prior to contact with Europeans
2 is the Patayan Phase (500 A.D.–1500 A.D.). Extensive evidence from the Patayan Phase is found
3 along the shore remnants of prehistoric Lake Cahuilla. Beginning with this phase, the prehistory
4 of the Salton Basin is more fully understood. The Patayan culture appears to have been formed
5 when the Archaic Period people of the region were influenced by the Hohokam cultures to the
6 east along the Gila River. Technology associated with the Patayan culture includes buff ware
7 ceramics, clay figurines and pipes, side-notched projectile points, stone manos, pestles and
8 mortars, traded shell beads, rock art, and geoglyphs (Schaefer 1994). Larger more permanent
9 Patayan settlements appear along the northwestern edge of Lake Cahuilla. Some of these sites
10 include evidence of fish traps. However, sites on the southeastern edge of the lake are more
11 widely distributed and suggest more seasonal usage (Schaefer 1994).

14 ***9.1.17.1.2 Ethnohistory***

16 Although of differing linguistic stock, the Native Americans who inhabited the
17 southeastern California deserts when Euro-Americans first arrived shared similar lifeways and
18 broadly similar beliefs, norms, and values (Halmo 2003). The mountains and valleys of their
19 shared environment provided a variety of seasonally available resources. Native American
20 groups harvested these resources following a regular seasonal pattern. They lived in kin-based
21 groups, or lineages, that would join together or split apart depending on the type and the
22 abundance of the resources available. A pattern of seasonal camps combined with
23 semipermanent villages or rancherias emerged. Lineages tended to consider as their own,
24 specific highly productive areas, while the areas between were shared with other lineages of
25 varying ethnicity. Wild plant resources were often managed; stands of plant resources might be
26 pruned, watered, or burned to encourage growth (Lightfoot and Parish 2009). The pattern of
27 seasonal migration to exploit particular resources allowed the groups to adapt to changes in their
28 subsistence base with the arrival of new cultural impulses and populations. Floodplain
29 horticulture, adopted from the Southwest, allowed for semipermanent occupation of river
30 floodplains and lakeshores (Halmo 2003). These gardens became part of the migratory pattern,
31 which continued to take some bands into the highlands to harvest resources available there.
32 Similarly, with the discovery of gold in the nineteenth century and the influx of Euro-American
33 populations in the twentieth century, Native Americans added wage labor in mines, on river
34 boats, and on large irrigated farms to their seasonal rounds (Bean et al. 1978).

36 The various Native American ethnic groups that inhabited the southeastern California
37 deserts each had an area that they considered their homeland, but the boundaries between these
38 areas were not sharply drawn and fluctuated over time. Travel to hunt, trade, or just visit
39 neighboring groups was common (Kelly and Fowler 1986). The territorial claims of the different
40 ethnic groups overlapped each other. Lineages would sometimes share territory, or one group
41 would invite its neighbors to share an abundant resource (CSRI 2002). A network of often still
42 discernable trails reflects a web of social and trade links that stretched from the Pacific Coast
43 to the Great Plains. As discussed below in Section 9.1.18.1, the Native Americans living in
44 southeastern California tend to view the landscape they inhabit holistically, each part
45 intrinsically and inextricably connected to the whole. In some sense, the network of trails
46 tied the landscape together. Trails thus could have sacred as well as profane aspects.

1 Many of the ethnic groups that inhabited the Colorado Desert shared a considerable
2 amount of ritual behavior and world view. Common to most was some form of the *k̄aruk*, an
3 important, often annual ritual in which lineages come together to commemorate those who had
4 passed away since the last commemoration (Luomola 1978). For those whose traditional use area
5 would have included the SEZ, Pilot Knob (*Avikwalal*) was a focal point in a sacred landscape
6 (BOR 1994).
7

8 Located at the eastern edge of the Imperial Valley, the proposed Imperial East SEZ lies
9 within an area of cultural transition between the hunting and gathering Kumeyaay bands west of
10 the valley and the floodplain farmers who lived to the east along the banks of the Colorado
11 River. The SEZ lies closest to the Kamia bands of the Kumeyaay who practiced floodplain
12 horticulture along the banks of the New River and the Alamo River. The Kamia interacted with,
13 traded with, and sometimes lived together with lineages from surrounding ethnic groups,
14 including the Quechan and the Cocopah, Yuman-speaking groups living along the Colorado
15 River, other Kumeyaay lineages based in the mountains to the west, and the Cahuilla, who were
16 centered in Coachella Valley north of the Salton Sea.
17

18 **Kamia**

19

20
21 During the protohistoric period, the time between first European contact and the
22 incorporation of Native Americans into the Euro-American political system, the traditional
23 use area of the Kamia centered upon the banks of the Alamo River from Brawley south to
24 Holtville, about 10 mi (16 km) northwest of the SEZ, along the New River and at Indian Wells
25 (Knack 1981). The Kumeyaay in general are thought to have spread eastward from the California
26 coast about AD 1000, eventually taking advantage of the resources provided by Lake Cahuilla,¹⁷
27 which formed intermittently in the Salton Basin from at least 1200 into the seventeenth century
28 (Schaefer and Laylander 2007). Changes in the weather pattern beginning about 1829 resulted in
29 increasing aridity in the basin, and the Kamia moved southeastward following the retreating
30 water sources, eventually joining with the Quechan around 1849 (Knack 1981). What is known
31 of their culture is based on interviews conducted in the early part of the twentieth century with
32 elderly Kamia descendants living on the Fort Yuma reservation (Gifford 1931).
33

34 Although speakers of the same language, the Kamia relied less completely on gathering
35 and hunting than did their western Kumeyaay neighbors. Influenced by their Quechan neighbors,
36 they grew maize, beans, taparies, and melons, but would often prefer to gather an abundant wild
37 crop (Luomola 1978). They built substantial, rectangular semi-subterranean dwellings similar to
38 those of the Quechan, but these were not grouped into nucleated villages, nor were they
39 inhabited all year. Their crops, once planted and well started needed little additional tending, and
40 the Kamia lineages scattered to collect wild foods as they began to ripen, most importantly honey
41 mesquite and screwbeans. Honey Mesquite and screwbean pods could be stored and exchanged
42 with their western neighbors for highland crops such as acorns, piñon nuts, tobacco, and agave

¹⁷ Lake Cahuilla formed when the Colorado River shifted course to the west and flowed into the Salton Sea Basin, then dried when the river reverted to its former course. The process of formation and desiccation was cyclical before the construction of dams on the Colorado, with cycles lasting about 150 years (Redlands Institute 2002).

1 hearts. The Kamia appear to have been on friendly terms with their neighbors and traded with the
2 Quechan, Cahuilla, and Cocopah. Although the Kamia were not long-distance traders, their
3 homeland did lie across the major Yuma-San Diego Trail that linked the Quechan to the coast
4 near present-day San Diego (Cleland and Apple 2003). Most of their trading was with their
5 western neighbors in the Jacumba-Campo area, near mountain springs. There they obtained
6 important mineral resources—granite for mortars and metates and hematite for arrow
7 straighteners—as well as woven goods and abalone shell from the coasts. They occasionally
8 visited the Cocopah to the south to obtain akwil nuts and traded shells, eagle feathers, and salt.
9 Their western Kumeyaay neighbors would sometimes winter with them, enjoying garden
10 produce and fishing (Doyle et al. 2003; Knack 1981; Luomola 1978).

11
12 Culturally intermediate between the gathering and hunting Kumeyaay bands to the west
13 and the River Yumans to the east, the Kamia adopted many traits of the Quechan, including
14 floodplain farming, house construction, religious symbols and practices, and cremation of the
15 dead (Luomola 1978).

16 17 18 **Quechan** 19

20 Sometimes referred to as the Yuma, the Quechan (Kwatsan) are a Yuman-speaking group
21 closely allied with the Mohave traditionally centered at the confluence of the Gila and Colorado
22 Rivers. While it is not clear when they arrived at the confluence, they were there by the 1770s.
23 They were not mentioned by Francisco Vasquez de Coronado who passed through the area in
24 1540. Quechan tradition tells that the Tribe migrated south from the sacred mountain
25 *Avikwaame*, in the Newberry Mountains near Laughlin, Nevada. They are thought to have
26 arrived at the confluence sometime between the thirteenth and the eighteenth centuries.
27 Traditionally, the Quechan practiced floodplain horticulture, depending on the annual floods of
28 the Colorado River to replenish their fields with fresh silt. The fertility of the soil allowed for
29 multiple plantings and harvests, which the Quechan supplemented by gathering plants from the
30 desert and by fishing. During the growing season, they dispersed along the floodplains of the
31 Colorado and the Gila Rivers, moving to the upper terraces during the winter. The Quechan
32 prospered using simple technology. Their bows were simple and unbacked. Arrows often had no
33 stone points. Digging sticks served for planting maize, and clothing was minimal (Bee 1983).

34
35 While their settlements were dispersed and independent, more than the inland Colorado
36 Desert tribes, the Quechan had a sense that they were a Tribe, a nation occupying a specific
37 territory. They acted together in warfare; acting together with their allies the Mohave, they
38 were often at odds with the Halchidhoma, the Maricopa, and the Cocopah.

39
40 The confluence of the Gila and Colorado Rivers was an important crossing along the
41 Yuma-San Diego Trail, which lead to the coast. Important to the Spanish and later the
42 Americans, the Spanish established a mission there in 1779 only to have it destroyed by the
43 Quechan and Cahuilla two years later. The Hispanic connection remained important to the
44 Quechan who desired Spanish trade goods, for which they exchanged slaves captured during
45 raids on their enemies (Knack 1981). After the defeat of Mexico in 1848, the United States

1 established a fort at Yuma to control the crossing which was now an important wagon road.
2 A reservation was established for the Quechan in 1884.

3
4 Quechan cosmology included ritually important trails. The most important of these
5 remains the *Xam Kwatcan* Trail that follows the Colorado River connecting Pilot Knob
6 (*Avikwalali*) with Spirit Mountain (*Avikwaame*), thus connecting a series of ritually important
7 places of power (Johnson 2003).

8
9 The Quechan were on friendly terms with the Kamia and eventually accepted Kamias
10 displaced from the Imperial Valley into their communities. It is perhaps for this reason that the
11 territorial claim they presented to the Indian Claims Commission in the 1950s extends 10 mi
12 (16 km) west of Mexicali and included the SEZ.

13 14 15 **Cocopah**

16
17 The Cocopah are a Yuman-speaking Tribe who inhabited the Colorado Delta downstream
18 of the Quechan and the southern reaches of the New River and the Alamo River and parts of
19 Arizona. When Spanish seafarers first made their way through the Gulf of California and up the
20 Colorado River in 1540, they encountered the Cocopah in the delta. It is believed that they came
21 southward along the Colorado River some time after AD 1000. They remained along the river
22 when Lake Cahuilla was formed, but likely could not have inhabited the delta area, which would
23 likely have dried up (Schaefer and Laylander 2007). It is thought that as the lake diminished,
24 Quechan and Mohave who had lived along the lake returned to the Colorado River, displacing
25 the Cocopah to the reforming delta. The long-standing antipathy between the Cocopah and the
26 Quechan and Mohave may have its roots in this event. The Cocopah had friendly relations with
27 the Kumeyaay and Maricopa. They were allied in war with the Maricopa and traded with the
28 Kumeyaay, including the Kamia (Doyle et al. 2003; de Williams 1983).

29
30 The Cocopah practiced floodplain agriculture but incorporated more irrigation structures
31 such as dykes and dams than their northern neighbors. Like them, they practiced a seasonal
32 round of food procurement. In the early part of the year, they moved to the high desert seeking
33 agave and ginseng cactus fruit. With the spring, they traveled downstream to islands near the
34 gulf to harvest wild rice. By midsummer, there were more fish in the river and they returned
35 northward, where they planted maize, beans, and squash as flood waters receded. Like their
36 neighbors, honey mesquite was their most important wild food source, but they harvested other
37 pods and seeds as well. Their housing was likewise seasonally adapted. Four-post semi-
38 subterranean structures were their winter homes, built near their fields, while domed brush
39 structures marked their seasonal summer camps (de Williams 1983).

40
41 The Gadsen Purchase in 1853 divided the Cocopah who lived in the newly acquired
42 United States territory from those living in Mexico. They continued to live along the river and
43 are first mentioned near Yuma, Arizona, in 1873. Throughout the latter half of the nineteenth
44 century, they adapted to the newcomers by engaging in the riverboat trade then thriving on the
45 Colorado River. They sold wood to fuel the boats and became known as expert river pilots. With
46 the demise of the river traffic their fortunes diminished. They dispersed to serve as day laborers

1 in the new irrigation-fed agricultural economy that began to flourish around Yuma and in the
2 Imperial Valley in the early part of the twentieth century, and were first granted reservation
3 lands in the United States in 1917. They remained reclusive until the 1960s, when with the
4 advice of neighboring Tribes, they began the process of developing their reservation lands
5 (de Williams 1983).
6
7

8 **Cahuilla** 9

10 The Cahuilla occupied the Coachella Valley. Their society was composed of lineage-
11 based groups with hereditary leaders, but with no overarching sociopolitical organization. They
12 are believed to have entered the Colorado Desert from the Great Basin sometime between
13 500 BC and AD 500. They were hunters and gatherers living in permanent villages near reliable
14 water. They appear to have first settled on the shores of Lake Cahuilla and then moved to the
15 mountains as the lake dried. The Cahuilla tended toward larger groups consisting of multiple
16 lineages (Lightfoot and Parish 2009). Preferred settlement sites were near mesquite stands or
17 palm oases. They considered the latter to be sacred (Bean et al. 1978). While villages were
18 occupied year-round, small groups would move seasonally to temporary camps to collect
19 localized plant resources or to hunt. Larger groups would travel to the mountains together with
20 mountain allies to harvest pinyon nuts and acorns. These would be brought to the permanent
21 villages for storage. Species important to the Cahuilla are discussed in Section 9.1.18.
22

23 The Cahuilla were long-distance traders. The routes westward through San Gorgonio
24 Pass to the coast lay within their traditional use area, and the Cahuilla maintained trading
25 relationships east of the Colorado River with the Maricopa. They participated in a trade network
26 that stretched as far east as the Great Plains (Bean et al. 1978). While The Cocomaricopa Trail
27 connecting the coast with the Colorado and Gila Rivers passed through their traditional use area
28 (Cleland and Apple 2003) and their major trade orientation appears to have been east–west, they
29 also interacted with their southern neighbors, the Kamia.
30
31

32 **9.1.17.1.3 History** 33

34 The first Europeans to explore southern California were the Spanish in the mid-1500s.
35 Extensive exploration did not take place until the establishment of missions on the Pacific Coast
36 beginning in 1769 (Redlands Institute 2002). The Colorado Desert was an obstacle to avoid
37 during these early years of European exploration. The first Spaniard to cross the desert was
38 Juan Bautista de Anza who crossed a portion of the Colorado Desert in the mid-1770s. He was
39 attempting to establish an overland supply route to the missions on the California coast from
40 those in southern Arizona. The de Anza expedition left modern Arizona in 1774. They followed
41 the Colorado River south from Yuma close to the Colorado delta before turning northwest. The
42 expedition crossed the Salton Basin west of modern Calexico (Doyle et al. 2003). De Anza
43 eventually reached the missions along the coast and returned. After these crossings, the trail
44 was not used again until the 1820s. Those crossing the Colorado Desert in the 1820s were also
45 attempting to connect the missions on the Pacific with those in Arizona. Increasing exploration
46 of the area also brought fur traders into the area during the same period (Doyle et al. 2003). All

1 of the trips across the desert took the route south and west of modern Calexico. It was not until
2 the discovery of gold that the trail system was used heavily.
3

4 European settlement in the California area greatly expanded when gold was discovered
5 in 1849 on the American River near Sutter's Mill. The influx of people was so great due to the
6 gold rush that California achieved statehood in the following year. Statehood and gold helped
7 encourage the establishment of railroads into California. In 1853, a group laying out a
8 prospective southern railroad route through the Colorado Desert followed along the eastern shore
9 of prehistoric Lake Cahuilla from north to south. The proposing of this route brought attention to
10 the resources of the Salton Basin. The first rail lines into the Salton Basin were laid in 1875. The
11 railroads extended to Yuma in 1877. The railroad network into the area expanded significantly
12 after the introduction of irrigated agriculture after 1900.
13

14 The potential for irrigation and commercial-scale agriculture in the Imperial Valley was
15 first conceived by Dr. Oliver Wozencraft in 1849 (Doyle et al. 2003). His plans failed because of
16 government distractions during the political and social upheavals that culminated in the Civil
17 War. Other attempts were made and failed until money was finally allocated in 1900 to install an
18 irrigation canal from the Colorado River into the Salton Basin. Due to design studies conducted
19 during the late nineteenth century, the canal was to tap into the Colorado River in Mexico and
20 run west to the Alamo River. Work began in 1900 on the Imperial Canal. The canal began
21 operating the following year. A lack of maintenance on the canal and an unusually severe winter
22 in 1904-1905 resulted in the canal being compromised by flood waters in 1905 (Doyle et al.
23 2003). It was this break that formed the modern Salton Sea. It took two years for the break to be
24 completely repaired. In 1911, the IID was established, and in 1916, it took control of the canal.
25 In 1928, Congress passed the Boulder Canyon Project Act, which authorized construction of the
26 Boulder Dam and the All-American Canal. Actual construction began in 1934. The canal began
27 operating in 1948 after delays caused by WWII.
28

29 Once irrigation began in 1901, the area became a major agricultural area. Much of the
30 development in the Salton Basin was the result of the irrigation. Many of the towns in the
31 Imperial Valley were established shortly after the irrigation system was completed. The towns
32 of Imperial, Calexico, Brawley, Holtville, and El Centro were all established between 1900 and
33 1904 (Doyle et al. 2003). Additional economic development in the Imperial Valley came from
34 the mining of gypsum, salt, manganese, and sand and gravel. Recreation became a source of
35 revenue beginning in the post WWII years. Much of the recreation has focused on the Salton
36 Sea. Fishing, boating, camping, hiking, and wildlife viewing are all activities that have become
37 popular in the Imperial Valley. Several thousand people bring their recreational vehicles to the
38 area every winter (Doyle et al. 2003).
39

40 A final aspect of the history of the Imperial Valley was the creation of the CAMA and
41 DTC in 1942 by General George S. Patton. The training area extended from western Arizona,
42 northwest to the Mohave Desert of California, to east of the Salton Sea. Other military facilities
43 in the Imperial Valley included the Old Sandy Beach Naval Station and the Naval Auxiliary Air
44 Station located on the southwest shore of the Salton Sea, and Camp Dunlop (Doyle et al. 2003).
45 East of the Imperial Valley is the Chocolate Mountain Naval Aerial Gunnery Range, which is
46 one part of a larger Naval Air Facility based out of El Centro.
47

1 **9.1.17.1.4 Traditional Cultural Properties—Landscape**
2

3 Colorado Desert Tribes take a holistic view of the world; they see the features of their
4 environment as an interconnected whole imbued with a life force. Prominent features may be
5 seen as places of power and sacred places. High hills and mountains tend to be regarded as
6 sacred, while some peaks have special status. Other features that tend to be regarded as sacred
7 include caves, certain rock formations, springs, and hot springs. Revered locations include
8 panels of rock art, evidence of ancestral settlements, arranged-rock sites, burial or cremation
9 areas, and systems of trails. Sacred sites are often seen as places of power where offerings are
10 left (Halmo 2003). Tribes see themselves as exercising divinely given responsibilities of
11 stewardship over the lands where they believe they were created and as retaining a divine
12 birthright to those lands. Specific mountain peaks are seen as points of emergence associated
13 with creation stories. Tribal belief systems and ceremonial activities throughout the region have
14 many elements in common. Many of these common elements have Mohave roots. There remains
15 considerable interaction among the Tribes. A system of alliances furthered trade and the sharing
16 of hunting and gathering grounds.
17

18 From the Native American perspective, the proposed Imperial East SEZ is encompassed
19 by a sacred landscape tied together by a network of trails. Passing through the former Kamia
20 settlement of Xahupai, near modern Indian Wells, the Yuma-San Diego Trail comes close to or
21 passes through the SEZ. While an important trade route, it also links two sacred areas. The trail
22 links Pilot Knob (*Avikwalali*), one of the foci of traditional ritual activities for the Quechan,
23 Cocopah, and Kamia with another sacred area on Yuha Mesa (BOR 1994; Cleland and Apple
24 2003; Doyle et al. 2003). The cultural features at Yuha Basin form a Discontiguous District
25 listed in the *National Register of Historic Places* (NRHP) and are included in the Yuha Basin
26 ACEC. It is located 35 mi (56 km) west of the SEZ. The linked sites include such features as
27 shaman hearths, spirit breaks, memorial cairns, trail cairns, burial cairns, initiation sites, and
28 geoglyphs (Doyle et al. 2003). Such sacred areas served as cross-cultural common grounds or
29 joint use areas for ceremonial activities (Johnson 2003). Pilot Knob serves as the southern
30 terminus of the *Xam Kwatcan* Trail, thus linking the Imperial Valley to the sacred origin
31 mountain *Avikwaame*, in southern Nevada. These trails seldom consist of a single path but were
32 a network of alternative parallel paths most visible on the shoulders and tops of ridge systems,
33 relatively stable alluvial fans, and other upland areas where footing was solid and there was less
34 vegetation to deal with (Cleland and Apple 2003). Pilot Knob is included in BLM ACEC 73
35 (BLM 1999). It is located 20 mi (32 km) to the east of the SEZ and is visible on a clear day.
36 Picacho Peak, located farther north along the trail and 34 mi (55 km) northeast of the SEZ, is
37 another sacred feature (Singleton 2010a). Its peak would be just visible from the SEZ. The
38 western branch of the *Xam Kwatcan* Trail (Trail of Dreams) reaches a crossroads at Indian Pass
39 ACEC about 27 mi (43 km) northeast of the SEZ and passes the Gold Basin and Rand Intaglios
40 ACEC located about 20 mi (33 km) northeast of the SEZ.
41

42 There are no reported pit-house remains in the Imperial East SEZ, but archaeological
43 surveys along the All-American Canal, which parallels the southern boundary of the SEZ, found
44 the area to have a relatively high density of Native American cultural remains (BOR 1994).
45 Before the construction of the dams on the Colorado River lowered its height along the southern
46 reach of the river, the SEZ would have been on its floodplain and may have been inundated

1 during spring flooding. It is possible that fields were planted when waters receded, but more
2 likely it was primarily used as a seasonal gathering area.

3
4 According to a Sacred Lands File Search through the Native American Heritage
5 Commission, two burials are recorded in Township and Range sections partially included in the
6 Imperial East SEZ (Singleton 2010b).

7 8 9 **9.1.17.1.5 Cultural Surveys and Known Archaeological and Historic Resources**

10
11 One archaeological survey has been conducted within the Imperial East SEZ in the
12 northwest corner of the SEZ, according to GIS data available from the El Centro Field Office.
13 No sites within the SEZ were recorded from that survey; however, several sites were recorded
14 northwest of the SEZ. Two sites within the SEZ are identified adjacent to State Route 98.
15 Archaeological work conducted in the area is primarily associated with the All-American Canal
16 Lining Project in the early 1990s. According to the 1994 Final Environmental Impact Statement
17 for the project, the area along the canal south of the SEZ is an area of known high density of both
18 prehistoric and historic cultural remains. More than 50 sites have been recorded between the SEZ
19 and the United States–Mexico International Border, most of these are south of the All-American
20 Canal outside of the SEZ. Approximately 40 sites have been recorded directly to the west and
21 southwest of the SEZ, and two sites have been recorded in close proximity to the SEZ in the east.
22 No sites have been recorded to the north and northeast in the dune areas, but no surveys appear
23 to have been conducted in this region, with the exception of the survey described above at the
24 westernmost end of the SEZ.

25
26 The BLM has designated several locations within relatively close proximity to the
27 proposed Imperial East SEZ as ACECs because of their significant cultural value. The East Mesa
28 ACEC is adjacent to the SEZ on the east and includes prehistoric resources as well as important
29 biological resources. The four segments of the Lake Cahuilla ACEC include archaeological sites
30 associated with the shores of prehistoric Lake Cahuilla. They range from directly adjacent on the
31 west of the SEZ to about 9 mi (14.5 km) to the northwest. Important places of Native American
32 value associated with the *Xam Kwatcan* Trail are included in the Pilot Knob ACEC about 20 mi
33 (32 km) to the east, Indian Pass ACEC about 27 mi (43 km) to the northeast in the Chocolate
34 Mountains, and the Gold Basin and Rand Intaglios ACEC about 20 mi (33 km) to the northeast.
35 Traditionally, these locations were linked by a network of trails to sites on the western edge of
36 the Imperial Valley: the Yuha Basin ACEC about 27 mi (44 km) to the west of the SEZ, West
37 Mesa SEZ about 35 mi (57 km) to the northwest, and the San Sebastian Marsh/San Felipe Creek
38 ACEC located some 43 mi (70 km) northwest of the SEZ. The latter ACEC also includes historic
39 resources. The Plank Road ACEC, about 10 mi (16 km) east of the SEZ is designated to protect a
40 unique historic road.

1 ***National Register of Historic Places***
2

3 There are no historic properties listed in the NRHP within the SEZ or within 5 mi (8 km)
4 of the SEZ. The All-American Canal is an eligible historic resource that runs adjacent to the SEZ
5 to the south but is not currently listed.
6

7
8 **9.1.17.2 Impacts**
9

10 Direct impacts on significant cultural resources could occur in the proposed Imperial East
11 SEZ; however, as stated in Section 9.1.17.1, further investigation is needed in a number of areas.
12 A cultural resource survey of the entire area of potential effect (APE) of a proposed project
13 would first need to be conducted to identify archaeological sites, historic structures and features,
14 and traditional cultural properties, and an evaluation would need to follow to determine whether
15 any are eligible for listing in the NRHP. Possible impacts from solar energy development on
16 cultural resources that are encountered within the SEZ or along related ROWs are described in
17 more detail in Section 5.15. Impacts would be minimized through the implementation of required
18 programmatic design features described in Appendix A, Section A.2.2. Programmatic design
19 features assume that the necessary surveys, evaluations, and consultations will occur.
20

21 Programmatic design features to reduce water runoff and sedimentation would prevent
22 the likelihood of indirect impacts on cultural resources resulting from erosion outside of the SEZ
23 boundary (including along ROWs). Indirect impacts on cultural resources outside of the SEZ as a
24 result of vandalism or theft are unlikely since the SEZ is small in size and is readily accessible
25 and no new access pathways are assumed (see below).
26

27 No new access roads or transmission lines have been assessed for the Imperial East SEZ,
28 assuming existing corridors would be used; impacts on cultural resources related to the creation
29 of new corridors would be evaluated at the project-specific level if new road or transmission
30 construction or line upgrades are to occur.
31

32 Because of the interconnectedness of the landscape in Native American cosmology, a
33 change in one part affects the whole; thus damage to one part of the sacred landscape would
34 affect the entire network. The proposed Imperial East SEZ includes or is close to the Yuma-San
35 Diego Trail. Since visible segments tend to follow the shoulders and tops of ridge systems, it is
36 likely that they will not be directly affected by the development of solar facilities. However,
37 Native Americans have expressed concern over the visual impacts of development on segments
38 of those trails that have religious importance (Halmo 2003). Development that is visible from
39 the trails or sacred areas may be considered intrusive. The Imperial East SEZ is not pristine
40 wilderness. It is crossed and bordered by a major interstate highway (I-8) and the All-American
41 Canal. It is relatively distant from Pilot Knob, Yuha Mesa, and Picacho Peak. The horse
42 geoglyph at the base of Pilot Knob is at the base of its southern side. Only a power tower would
43 be visible from that side of the mountain. The site would be visible, but probably not dominant
44 from Picacho Peak. It is also on the valley floor, and a solar facility may be visible from a
45 distance. The construction of an extensive solar energy facility would have more visual impact
46 on the landscape than already exists.

1 **9.1.17.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Programmatic design features to mitigate adverse effects on significant cultural
4 resources, such as avoidance of significant sites and features and cultural awareness training for
5 the workforce, are provided in Appendix A, Section A.2.2.
6

7 SEZ-specific design features would be determined in consultation with the California
8 SHPO and affected Tribes. Consultation efforts should include discussions on significant
9 archaeological sites and traditional cultural properties and on sacred sites and trails with views of
10 the proposed SEZ. Because of the possibility for burials in the vicinity of the proposed Imperial
11 East SEZ and its location along the Yuma-San Diego Trail interconnecting a sacred landscape
12 and its associated sites, it is recommended that for surveys conducted in the SEZ, consideration
13 be given to including Native American representatives in the development of survey designs and
14 historic property treatment and monitoring plans.
15

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1 **9.1.18 Native American Concerns**
2

3 Native Americans share many environmental and socioeconomic concerns with other
4 ethnic groups. For a discussion of issues of possible Native American concern shared with the
5 population as a whole, several sections in this PEIS should be consulted. General topics of
6 concern are addressed in Section 4.16. Specifically for the proposed Imperial East SEZ,
7 Section 9.1.17 discusses archaeological sites, structures, landscapes, trails, and traditional
8 cultural properties; Section 9.1.8 discusses mineral resources; Section 9.1.9.1.3 discusses water
9 rights and water use; Section 9.1.10 discusses plant species; Section 9.1.11 discusses wildlife
10 species, including wildlife migration patterns; Section 9.1.13 discusses air quality; Section 9.1.14
11 discusses visual resources; Sections 9.1.19 and 9.1.20 discuss socioeconomics and environmental
12 justice, respectively; and issues of human health and safety are discussed in Section 5.21. This
13 section focuses on concerns that are specific to Native Americans and to which Native
14 Americans bring a distinct perspective.
15

16 Many Native Americans tend to view the whole of the landscape as interconnected and
17 as imbued with a life force, including features and objects viewed by Euro-American cultures
18 as inanimate. The importance of landscapes, geophysical features, trails, rock art, and
19 archaeological sites is discussed in Section 9.1.17. To the extent that these features are
20 religiously significant, it is important to the Tribes that they retain access to those located on
21 federal land as required by the American Indian Religious Freedom Act (AIRFA). They may
22 also regard activities that Euro-Americans would consider secular as having sacred components.
23 For example, for many Native Americans, the taking of game or the gathering of plants or other
24 natural resources is seen as both a sacred and a secular act (Stoffle et al. 1990). The California
25 Native American Heritage Commission (NAHC) has consulted its Sacred Lands File and
26 determined that a Native American burial or village is located in two of the sections at least
27 partially included in the SEZ (Singleton 2010b).
28

29 The NAHC has also been consulted to determine which Tribes have a traditional
30 association with the California SEZs (Singleton 2010b). All federally recognized Tribes with
31 traditional ties to the Imperial East SEZ were contacted so that they could identify their concerns
32 regarding solar energy development. Table 9.1.18-1 lists the Tribes contacted because of their
33 traditional ties to the SEZs in southeastern California. Appendix K lists all federally recognized
34 Tribes contacted for this PEIS. The concerns Native Americans have brought up thus far about
35 energy development projects are summarized in this section. Their comments provide important
36 insights into their concerns over energy development in the area.
37
38

39 **9.1.18.1 Affected Environment**
40

41 As discussed in Section 9.1.17.1.2, the territorial boundaries of the Tribes who inhabited
42 the Colorado Desert appear to have been fluid over time. At times they overlapped, and
43 resources were shared where abundant. The Imperial East SEZ, devoid of reliable water sources
44 until the construction of the All-American Canal, does not appear to have been the site of any
45 long-term Native American habitation. While primarily in the traditional range of the Kamia
46 (Knack 1981), it was likely used intermittently and jointly by the surrounding Tribes: the

TABLE 9.1.18-1 Federally Recognized Tribes with Traditional Ties to the Southeastern California SEZs

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Cabazon Band of Cahuilla Mission Indians	Indio	California
Cahuilla Band of Mission Indians	Anza	California
Campo Kumeyaay Nation	Campo	California
Chemehuevi Indian Tribe	Havasu Lake	California
Cocopah Indian Tribe	Somerton	Arizona
Colorado River Indian Tribes	Parker	Arizona
Ewiiapaayp Band of Kumeyaay Indians	Alpine	California
Fort Mojave Indian Tribe	Needles	California
La Posta Band of Kumeyaay Indians	Boulevard	California
Los Coyotes Band of Cahuilla & Cupeno Indians	Warm Springs	California
Manzanita Band of Kumeyaay Indians	Boulevard	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
Salt River Pima-Maricopa Indian Community	Scottsdale	Arizona
San Fernando Band of Mission Indians	Newhall	California
San Manuel Band of Mission Indians	Patton	California
Soboba Band of Luiseño Indians	San Jacinto	California
Sycuan Band of the Kumeyaay Nation	El Cajon	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twentynine Palms Band of Mission Indians	Coachella	California
Viejas Band of Kumeyaay Indians	Alpine	California

1
2
3 Quechan, Cocopah, and perhaps the Cahuilla as well. The Tribal Traditional Use Area
4 boundaries considered here are those presented by the Tribes themselves to the Indian Claims
5 Commission in the 1950s where they exist. While the commission recognized some of the
6 individual claims of the Quechan, most of California, including much of the Imperial Valley,
7 was judged to be the common territory of the “Indians of California” and is so shown on maps of
8 judicially established Native American land claims (Royster 2008). This category was created by
9 Congress to accommodate the claims of California Native Americans who had lost their identity
10 as distinct tribes, bands, or villages due to the arrival and policies of Euro-Americans (Indian
11 Claims Commission 1958). The claims of the Cahuilla and much of the land claimed by Quechan
12 lie within the territory assigned to the Indians of California, but were presented individually to
13 the commission (Indian Claims Commission 1958; CSRI 2002).

14
15
16 **9.1.18.1.1 Territorial Boundaries**

17
18
19 **Kamia**

20
21 Remnants of the Kamia had been absorbed by the Quechan by the mid-nineteenth
22 century. They made no separate claim to the Indian Claims Commission, but their homeland,

1 centered on New River and Alamo River, is included in the claims presented to the commission
2 by the Quechan. Kamia territory, as reconstructed from ethnographic sources, would have
3 included the Imperial East SEZ (Knack 1981). Kamia descendants can be found on the
4 Fort Yuma Indian Reservation, located approximately 20 mi (32 km) east of the SEZ.
5
6

7 **Quechan**

8
9 While the heart of Quechan territory lies at the confluence of the Gila and Colorado
10 Rivers well to the east of the SEZ, because the Kamia joined them and because the Quechan
11 traveled westward along the Yuma–San Diego Trail to trade, the territorial claim they presented
12 before the Commission includes the Imperial East SEZ. As presented, their territory extended
13 westward to 10 mi (16 km) west of Mexicali and paralleled the New River northward,
14 encompassing the southern end of the Salton Trough (Indian Claims Commission 1958). Their
15 claim overlaps with that of the Cahuilla and includes lands awarded by the commission to the
16 Indians of California. Quechan descendants occupy the Fort Yuma Indian Reservation in
17 Arizona and California.
18
19

20 **Cocopah**

21
22 The Cocopah appear to have presented no claim before the Indian Claims Commission.
23 Traditionally, they occupied the lower reaches of the Colorado River as far as its mouth and the
24 southern reaches of the New River and Alamo River in what is now Mexico. Earlier, they may
25 have occupied the area now inhabited by the Quechan, with whom they were not on friendly
26 terms. However, they did trade with the Kamia and probably traversed the Imperial East SEZ
27 (de Williams 1983). Cocopah descendants reside on reservations centered around Somerton,
28 Arizona.
29
30

31 **Cahuilla**

32
33 The Coachella Valley, northwest of the Imperial East SEZ, is the heart of Cahuilla
34 territory. Their traditional use area was well north of the SEZ. The southern boundary of the
35 claim presented to the Indian Claims Commission extends from a point northeast of Volcan
36 Mountain through “a point in the area of the Salton Sea, which is approximately 14 mi [23 km]
37 west of the town of Niland” to a point 3 mi (5 km) south of the Riverside County line about
38 12 mi (19 km) west of the Colorado River (CSRI 2002). The Cahuilla appear to have been on
39 friendly terms with the Kamia and, as traders, may have been familiar with the Yuma–San Diego
40 Trail. Cahuilla descendants can be found on several small reservations in Southern California,
41 including those of the Morongo Band of Mission Indians in Banning and the Agua Caliente Band
42 of Cahuilla Indians in Palm Springs.
43
44
45

1 **9.1.18.1.2 Plant Resources**

2
3 The traditional Native American subsistence base in the Colorado Desert was a
4 combination of floodplain agriculture and hunting and gathering. The proportion of farming to
5 gathering varied with the Tribe and the land occupied. The banks of New River and Alamo River
6 were used by the Kamia for floodplain agriculture, taking advantage of overflow from the
7 Colorado River, which flowed northwest into the Salton Trough where it sank into the ground.
8 The Imperial East SEZ may sometimes have been inundated during these periods of overflow.
9 Archaeological surveys have shown a relatively high density of artifacts south of the All-
10 American Canal. The SEZ does not appear to have been the center of Kamia occupation,
11 although it may have been an area of traditional hunting and plant collecting.

12
13 The plant communities observed or likely to be present at the Imperial East SEZ are
14 discussed in Section 9.1.10. Most of the SEZ is covered by Sonora-Mojave Creosotebush-White
15 Bursage Desert Scrub and North American Warm Desert Active and Stabilized Dune plant
16 communities (NatureServe 2008).

17
18 Native American populations have traditionally made use of hundreds of native plants.
19 Table 9.1.18.1-1 lists plants often mentioned as important by Native Americans that were either
20 observed at the Imperial East SEZ or are possible members of the cover-type plant communities
21 identified at the SEZ. The table groups plants by use category, but individual plants are not
22 necessarily confined to one category. These plants are the dominant species; however, other
23 plants important to Native Americans could occur in the SEZ, depending on localized conditions
24
25

**TABLE 9.1.18.1-1 Plant Species Important to
Native Americans Observed or Likely To Be
Present in the Proposed Imperial East SEZ**

Common Name	Scientific Name	Status
Food		
Buckwheat	<i>Eriogonum</i> spp.	Possible
Honey mesquite	<i>Prosopis Glandolosa</i>	Observed
Saltbush	<i>Atriplex</i> spp.	Possible
Indigo bush	<i>Psorothamnus schotti</i>	Observed
Medicine		
Creosotebush	<i>Larrea tridentata</i>	Observed
Mormon tea	<i>Ephedra nevadensis</i>	Possible
Unspecified		
Boxthorn	<i>Lycium</i> sp.	Possible
Brittlebush	<i>Opuntia</i> sp.	Possible
Burrowbush	<i>Ambrosia dumosa</i>	Possible

Sources: Field visit and NatureServe (2008).

1 and the season. Creosotebush dominates the SEZ, while mesquite clusters in the western end.
 2 Mesquite was among the most important of the traditional wild food plants for Native Americans
 3 in this area. Its long, bean-like pods were harvested in the summer, could be stored, and were
 4 widely traded. Groves were managed by burning. Mesquite blossoms are edible, and the cicadas
 5 and grasshoppers that live in the groves were collected and eaten by the Cahuilla. Mesquite
 6 trunks served as a source of wood; fiber from its inner bark was made into string; its thorns were
 7 used for tattooing; and its gum was used as an adhesive, a cleansing agent, and medicine.
 8 Saltbush and buckwheat seeds were harvested, processed, and eaten (Lightfoot and Parish 2009).

9
 10 The proposed Imperial East SEZ includes other plants useful to Native Americans. The
 11 leaves of the dominant creosote bush were widely made into tea for medicinal purposes, as was a
 12 tea made from *Ephedra* spp., or Mormon tea (Lightfoot and Parish 2009). While some of the
 13 plant species present at the SEZ were used by Native Americans, they do not appear to be
 14 especially plentiful in the SEZ. It is likely that better sources of these plants existed elsewhere.

15
 16
 17 **9.1.18.1.3 Other Resources**
 18

19 Animal species potentially present in the proposed Imperial East SEZ are listed in
 20 Table 9.1.18.1-2. The SEZ has a relatively low potential for game species. Before the
 21 construction of the All-American Canal this area would likely have been too dry for game birds;
 22 with the canal, quail, a traditional tribal game species, may be present (see Section 9.1.11.2). The
 23
 24

TABLE 9.1.18.1-2 Animal Species Used by Native Americans Whose Range Includes the Proposed Imperial East SEZ

Common Name	Scientific Name	Status
Mammals		
Bighorn sheep	<i>Ovis canadensis</i>	All year
Black-tailed jackrabbit	<i>Lepus californicus</i>	All year
Coyote	<i>Canis latrans</i>	All year
Desert cottontail	<i>Silvilagus audubonii</i>	All year
Ground squirrel	<i>Spermophilus</i> sp. and <i>Ammospermophilus</i> sp.	All year
Wood rat	<i>Neotoma</i> spp.	All year
Birds		
Doves		
White-winged dove	<i>Zenaida asiatica</i>	Summer
Mourning dove	<i>Zenaida macroura</i>	All year
Gambel's quail	<i>Callipepla gambelii</i>	All year
Reptiles		
Rattlesnakes	<i>Crotalus</i> spp.	All year

Sources: Lightfoot and Parrish (2009); de Williams (1983).

1 SEZ is within the range of the desert mountain sheep. It is not preferred habitat, but individuals
2 may pass through (see 9.1.11.3.1). Black-tailed jackrabbit (*Lepus californicus*) and desert
3 cottontail (*Sylvilagus audubonii*), both traditionally hunted by Native Americans in the area
4 (Doyle et al. 2003; Lightfoot and Parrish 2009), are likely to be present in the SEZ as are other
5 small animals traditionally used as food.

6
7 As long-time desert dwellers, Native Americans have a great appreciation for the
8 importance of water in an arid environment. They have expressed concern over the use and
9 availability of water for solar energy installations (Halmo 2003; Jackson 2009). Contamination
10 of groundwater was one of the main concerns for industrial developments planned in this region
11 in the past (CSRI 1987).

12
13 Some Tribes share with the populace as a whole concerns over potential danger from
14 electromagnetic fields. In traditional Cahuilla culture, electricity, both natural (lightning) and
15 artificially generated, is considered dangerous and something to be avoided (Bean et al. 1978).
16 They may have concerns over a facility that produces electricity and its associated transmission
17 system.

18
19 In addition, Native Americans have expressed concern over ecological segmentation, that
20 is, development that fragments animal habitat and does not provide corridors for movement.
21 They would prefer solar energy development take place on land that has already been disturbed,
22 such as abandoned farmland, rather than on undisturbed ground (Jackson 2009).

23 24 25 **9.1.18.2 Impacts**

26
27 To date, no comments have been received from the Tribes specifically referencing the
28 proposed Imperial East SEZ. However, in a response letter, the Quechan Indian Tribe of Fort
29 Yuma indicates that some of the California SEZs lie within their Tribal Traditional Use Area,
30 presumably including the Imperial SEZ. The Tribe stresses the importance of evaluating impacts
31 of development on landscapes as a whole (Jackson 2009). The Imperial East SEZ is already
32 surrounded by modern development. The All-American Canal and the United States–Mexico
33 border fence parallel its southern boundary; a freeway, I-8, marks its northern boundary; and it
34 includes hydropower plants and electric substations associated with the canal. These comprise
35 already existing intrusions into the traditional Tribal landscape.

36
37 The impacts expected on resources important to Native Americans from solar energy
38 development within the Imperial East SEZ fall into two major categories: impacts on the
39 landscape and impacts on discrete localized resources.

40
41 Potential landscape-scale impacts are those caused by the presence of an industrial
42 facility within a culturally important landscape that includes sacred mountains and other
43 geophysical features tied together by a network of sacred trails. Impacts may be visual—the
44 intrusion of an industrial feature in sacred space—or audible—noise from the construction,
45 operation, or decommissioning of a facility detracting from the traditional cultural values of the
46 site. As consultation with the Tribes continues and project-specific analyses are undertaken, it is

1 possible that Native Americans will express concerns over potential visual and other effects of
2 solar energy development within the SEZ on a culturally important landscape, including features
3 such as Pilot Knob and Picacho Peak, and on shrines and sacred places (see also Section 9.1.17);
4 however, known features of this type are 20 to 35 mi (32 to 56 km) away from the SEZ.
5 Section 9.1.14 discusses visual impacts and viewing distances.
6

7 Localized effects are possible both within the SEZ and in adjacent areas. Within the
8 SEZ, these effects would include destroying or degrading important plant resources, destroying
9 the habitat of and impeding the movement of culturally important animal species, and destroying
10 archaeological sites and burials. Any ground-disturbing activity associated with development
11 within the SEZ has the potential for destruction of localized resources. Since solar energy
12 facilities cover large tracts of ground, even taking into account the implementation of design
13 features, it is unlikely that avoidance of all resources would be possible. However, as discussed
14 in Sections 9.1.10 and 9.1.11, impacts on plant and animal resources are expected to be small
15 since there is an abundance of similar plant and animal habitat in the area. Programmatic design
16 features (see Appendix A, Section A.2.2) assume that the necessary cultural surveys, site
17 evaluations, and Tribal consultations will occur.
18

19 Implementation of programmatic design features, as discussed in Appendix A,
20 Section A.2.2, should eliminate impacts on Tribes' reserved water rights and the potential for
21 groundwater contamination issues.
22

23 **9.1.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

24 Programmatic design features to mitigate impacts of potential concern to Native
25 Americans, such as avoidance of burials, sacred sites, water sources, and tribally important plant
26 and animal species, are provided in Appendix A, Section A.2.2.
27

28 The development of solar energy facilities in the state of California requires developers
29 to follow CEC guidelines for interacting with Native Americans in addition to Federal
30 requirements (CEC 2009a). Developers must obtain information from California's NAHC on the
31 presence of Native American sacred sites in the project vicinity and a list of Native Americans
32 who want to be contacted about proposed projects in the region. Table 9.1.18.3-1 lists the Tribes
33 recommended for contact by the NAHC.
34

35 The need for and nature of SEZ-specific design features regarding potential issues of
36 concern, such as burials, the Yuma-San Diego Trail, and Pilot Knob, would be determined
37 during government-to-government consultation with affected Tribes.
38
39

TABLE 9.1.18.3-1 Federally Recognized Tribes Listed by the NAHC to Contact Regarding the Proposed Imperial East SEZ

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Chemehuevi Indian Tribe	Havasu Lake	California
Colorado River Indian Tribes	Parker	Arizona
Cocopah Indian Tribe	Somerton	Arizona
Fort Mojave Indian Tribe	Needles	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
San Manuel Band of Mission Indians	Patton	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twentynine Palms Band of Mission Indians	Coachella	California

Sources: (Singleton 2010a,b).

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The Quechan Tribe has requested that they be consulted at the inception of any solar energy project that would affect resources important to them. The Quechan also suggest that the clustering of large solar energy facilities be avoided, that priority for development be given to lands that have already been disturbed by agricultural or military use, and that the feasibility of placing solar collectors on existing structures be considered, thus minimizing or avoiding the use of undisturbed land (Jackson 2009).

Mitigation of impacts on archaeological sites and traditional cultural properties is discussed in Section 9.1.17.3, in addition to programmatic design features for historic properties discussed in Appendix A, Section A.2.2.

1 **9.1.19 Socioeconomics**

2
3
4 **9.1.19.1 Affected Environment**

5
6 This section describes current socioeconomic conditions and local community services
7 within the region of influence (ROI) surrounding the proposed Imperial East SEZ. The ROI is a
8 two-county area consisting of Yuma County in Arizona and Imperial County in California. It
9 encompasses the area in which workers are expected to spend most of their salaries and in which
10 a portion of site purchases and nonpayroll expenditures from the construction, operation, and
11 decommissioning phases of the proposed SEZ facility are expected to take place.
12

13
14 **9.1.19.1.1 ROI Employment**

15
16 In 2008, employment in the ROI stood at 126,391 (Table 9.1.19.1-1). Over the period
17 1999 to 2008, the annual average employment growth rate was slightly higher in Yuma County
18 (3.6%) than in Imperial County (3.0%). At 3.3%, the growth rate in the ROI as a whole was
19 higher than the average rates for Arizona (2.3%) and California (0.9%).
20

21 In 2006, the service sector provided the highest percentage of employment in the
22 ROI at 38.2%, followed by wholesale and retail trade with 23.3% (Table 9.1.19.1-2). Smaller
23 employment shares were held by agriculture (15.2%), manufacturing (8.1%), and construction
24 (7.4%). Within the ROI, the distribution of employment across sectors is similar to that of the
25 ROI as a whole, but with a higher percentage of employment in agriculture (21.1%) and a lower
26 percentage (30.1%) in services in Imperial County, and slightly lower employment in agriculture
27 (10.3%) and slightly higher employment in services (44.4%) in Yuma County.
28
29

TABLE 9.1.19.1-1 ROI Employment in the Proposed Imperial East SEZ

Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Yuma County, Arizona	48,903	69,683	3.6
Imperial County, California	42,162	56,708	3.0
ROI	91,065	126,391	3.3
Arizona		2,960,199	2.3
California	15,566,900	17,059,574	0.9

Sources: U.S Department of Labor (2009a,b).

30
31

TABLE 9.1.19.1-2 ROI Employment in the Proposed Imperial East SEZ by Sector, 2006^a

	Yuma County, Arizona		Imperial County, California		ROI	
	Employment	% of Total	Employment	% of Total	Employment	% of Total
Agriculture ^a	5,017	10.3	8,711	21.1	13,728	15.2
Mining	53	0.1	175	0.4	228	0.3
Construction	4,696	9.6	1,995	4.8	6,691	7.4
Manufacturing	3,374	6.9	3,938	9.5	7,312	8.1
Transportation and public utilities	1,471	3.0	1,981	4.8	3,452	3.8
Wholesale and retail trade	10,624	21.8	10,393	25.2	21,017	23.3
Finance, insurance, and real estate	1,874	3.8	1,495	3.6	3,369	3.7
Services	21,636	44.4	12,768	30.9	34,404	38.2
Other	10	0.0	6	0.0	16	0.0
Total	48,746		41,275		90,021	

^a Agricultural employment includes 2007 data for hired farmworkers.

Sources: U.S. Bureau of the Census (2009a); USDA (2009a,b).

1 **9.1.19.1.2 ROI Unemployment**
2

3 Unemployment rates have been high in both counties in the ROI. Over the period 1999 to
4 2008, the average rate in Imperial County was 17.7%, slightly higher than the rate in Yuma
5 County (17.4%) (Table 9.1.19.1-3). The average rate in the ROI over this period was 17.5%,
6 much higher than the average rates for California (5.8%) and Arizona (4.8%). Unemployment
7 rates for the first 10 months of 2009 contrast markedly with rates for 2008 as a whole; in
8 Imperial County, the unemployment rate increased to 29.3%, while in Yuma County the rate
9 reached 21.3%. The average rates for the ROI (25.1%), for California (11.6%), and for Arizona
10 (8.4%) were also higher during this period than the corresponding average rates for 2008.
11

12
13 **9.1.19.1.3 ROI Urban Population**
14

15 The population of the ROI in 2008 was 72% urban, with a group of cities clustered
16 around El Centro in the southern portion of Imperial County, and the largest population centered
17 on Yuma, in the western part of Yuma County.
18

19 The largest urban area in Imperial County, El Centro, had an estimated 2006 to 2008
20 population of 40,081; other cities in the county include Calexico (37,978) and Brawley (22,593)
21 (Table 9.1.19.1-4). In addition, four other cities in the county had a 2006 to 2008 population
22 ranging between 2,185 and 13,444 persons. Most of these cities are about 20 mi (32 km) from
23 the site of the proposed SEZ. Population growth rates among the cities in Imperial County have
24 varied over the period 2000 to 2008. Imperial grew at an annual rate of 7.5% during this period,
25 with higher than average growth also experienced in Calexico (4.3%). The cities of El Centro
26 (0.7%), Calipatria (0.5%), Brawley (0.4%), Westmoreland (0.3%), and Holtville (-0.5%) all
27 experienced lower growth rates between 2000 and 2008.
28
29

**TABLE 9.1.19.1-3 ROI Unemployment Rates for
the Proposed Imperial East SEZ (%)**

Location	1999–2008	2008	2009 ^a
Yuma County, Arizona	17.4	17.1	21.3
Imperial County, California	17.7	22.9	29.3
ROI	17.5	19.8	25.1
Arizona	4.8	5.5	8.4
California	5.8	7.2	11.6

^a Rates for 2009 are the average for January through November.

Sources: U.S. Department of Labor (2009a–c).

TABLE 9.1.19.1-4 ROI Urban Population and Income for the Proposed Imperial East SEZ

City	Population		Average Annual Growth Rate, 2000–2008 (%)	Median Household Income (\$ 2008)		
	2000	2008		1999	2006–2008	Average Annual Growth Rate, 1999 and 2006–2008 (%) ^a
Yuma, Arizona	77,715	89,842	1.9	45,545	42,095	–0.9
El Centro	37,835	40,081	0.7	42,695	36,959	–1.6
Calexico	27,109	37,978	4.3	37,247	32,288	–1.5
San Luis, Arizona	15,322	24,654	6.1	29,569	23,305	–2.6
Brawley	22,052	22,593	0.4	40,270	35,582	–1.4
Imperial	7,560	13,444	7.5	63,669	NA	NA
Somerton, Arizona	7,266	12,146	6.9	34,176	NA	NA
Calipatria	7,289	7,566	0.5	39,864	NA	NA
Holtville	5,612	5,396	–0.5	46,760	NA	NA
Westmoreland	2,131	2,185	0.3	30,083	NA	NA
Wellton, Arizona	1,829	1,921	0.6	34,821	NA	NA

^a Data are averages for the period 2006 to 2008.

Source: U.S. Bureau of the Census (2009b-d).

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3 Yuma County has three small cities—San Luis (24,654), Somerton (12,146), and Wellton
4 (1,921)—in addition to Yuma (89,842). Population growth between 2000 and 2008 was
5 relatively high in Somerton (6.9%) and San Luis (6.1%), with annual growth rates of 1.9% in
6 Yuma and 0.6% in Wellton.

7
8
9 **9.1.19.1.4 ROI Urban Income**

10
11 Median household incomes varied considerably across cities in the ROI. One city in
12 Imperial County, Imperial (\$63,669), had median incomes in 1999 that were higher than the
13 average for the state (\$61,154) (Table 9.1.19.1-4). The remainder of the cities in the ROI had
14 relatively low median household incomes, and two cities—Westmoreland (\$30,083) and
15 San Luis (\$29,569)—had median incomes that were less than half the state average.

16
17 Data on median household incomes in the ROI for the period 2006 to 2008 were only
18 available for five cities. Among these cities, median incomes growth rates for the period 1999
19 and 2006 to 2008 were negative, with a fairly large decline in median incomes in San Luis
20 (–2.6%). The average median household income growth rate for the state as a whole over this
21 period was less than 0.1%.
22
23

1 **9.1.19.1.5 ROI Population**
 2

3 Table 9.1.19.1-5 presents recent and projected populations in the ROI and states as a
 4 whole. Population in the ROI stood at 356,392 in 2008, having grown at an average annual rate
 5 of 2.1% since 2000. The average annual growth rate for the ROI was lower than that for Arizona
 6 (3.2%) and higher than that for California (1.5%) over the same period.
 7

8 Both counties in the ROI have experienced growth in population since 2000; population
 9 in Yuma County grew at an annual rate of 2.4% between 2000 and 2008, while in Imperial
 10 County population grew by 1.7% over the same period. The ROI population is expected to
 11 increase to 519,735 by 2021 and to 583,043 by 2023.
 12

13
 14 **9.1.19.1.6 ROI Income**
 15

16 Personal income in the ROI stood at \$8.4 billion in 2007 and has grown at an annual
 17 average rate of 2.4% over the period 1998 to 2007 (Table 9.1.19.1-6). Per capita income in the
 18 ROI fell over the same period at a rate of -0.3%, declining from \$23,036 to \$22,375. Per-capita
 19 incomes were slightly higher in Imperial County (\$22,476) than in Yuma County (\$22,194) in
 20 2007. Per-capita income growth rates were lower in both counties than the corresponding state
 21 rates for Arizona (0.9%) and California (1.1%).
 22

23 Median household incomes in 2006 to 2008 varied from \$37,492 in Imperial County
 24 to \$40,079 in Yuma County (U.S. Bureau of the Census 2009d).
 25
 26

TABLE 9.1.19.1-5 ROI Population for the Proposed Imperial East SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Yuma County, Arizona	160,026	193,299	2.4	276,132	285,531
Imperial County, California	142,361	163,093	1.7	243,603	252,512
ROI	302,387	356,392	2.1	519,735	583,043
Arizona	5,130,632	6,622,885	3.2	8,945,447	9,271,163
California	34,105,437	38,129,628	1.5	44,646,420	45,667,413

Sources: U.S. Bureau of the Census (2009e,f); Arizona Department of Commerce (2010); California Department of Finance (2010).

27
 28

TABLE 9.1.19.1-6 ROI Personal Income for the Proposed Imperial East SEZ

Location	1998	2007	Average Annual Growth Rate, 1998–2007 (%)
Yuma County, Arizona			
Total income ^a	3.3	4.5	3.0
Per-capita income	22,314	22,194	-0.1
Imperial County, California			
Total income ^a	3.3	4.0	1.8
Per-capita income	23,806	22,476	-0.6
ROI			
Total income ^a	6.6	8.4	2.4
Per-capita income	23,036	22,375	-0.3
Arizona			
Total income ^a	149.2	215.8	3.8
Per-capita income	30,551	33,558	0.9
California			
Total income ^a	1,231.7	1,573.6	2.5
Per-capita income	37,339	41,821	1.1

^a Unless indicated otherwise, values are reported in \$ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of the Census (2009e,f).

9.1.19.1.7 ROI Housing

In 2007, more than 139,823 housing units were located in the two ROI counties, with about 62% of these located in Yuma County (Table 9.1.19.1-7). Owner-occupied units account for approximately 64% of the occupied units in the two counties, with rental housing making up 36% of the total. Vacancy rates in 2007 were 19.8% in Yuma County and 13.6% in Imperial County; 15.7% of housing units in Yuma County and 4.7% in Imperial County were used for seasonal or recreational purposes. With an overall vacancy rate of 17.5% in the ROI, there were 24,415 vacant housing units in the ROI in 2007, of which 8,868 are estimated to be rental units that would be available to construction workers. There were 13,750 seasonal, recreational, or occasional-use units in the ROI at the time of the 2000 Census.

Housing stock in the ROI as a whole grew at an annual rate of 2.4% over the period 2000 to 2007, with 21,792 new units added to the existing housing stock in the ROI (Table 9.1.19.1-7).

TABLE 9.1.19.1-7 ROI Housing Characteristics for the Proposed Imperial East SEZ

Parameter	2000	2007 ^a
Yuma County, Arizona		
Owner-occupied	38,911	48,658
Rental	14,937	20,774
Vacant units	20,292	17,150
Seasonal and recreational use	11,668	NA
Total units	74,140	86,582
Imperial County, California		
Owner-occupied	22,975	24,831
Rental	16,409	21,145
Vacant units	4,507	7,265
Seasonal and recreational use	2,082	NA
Total units	43,891	53,241
ROI Total		
Owner-occupied	61,886	73,489
Rental	31,346	41,919
Vacant units	24,799	24,415
Seasonal and recreational use	13,750	NA
Total units	118,031	139,823

^a NA = data not available.

Sources: U.S. Bureau of the Census (2009h,i).

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3 The median value of owner-occupied housing in 2008 varied between \$147,400 in Yuma
4 County and \$233,700 in Imperial County (U.S. Bureau of the Census 2009g).

5
6
7 **9.1.19.1.8 ROI Local Government Organizations**

8
9 The various local and county government organizations in Imperial County are listed in
10 Table 9.1.19.1-8. No Tribal governments are located in the ROI, although there are members of
11 Tribal groups located in the ROI, but whose Tribal governments are located in adjacent states.

12
13
14 **9.1.19.1.9 ROI Community and Social Services**

15
16 This section describes educational, health care, law enforcement, and firefighting
17 resources in the ROI.

TABLE 9.1.19.1-8 ROI Local Government Organizations and Social Institutions in the Proposed Imperial East SEZ

Governments	
City	
Brawley	San Luis, Arizona
Calexico	Somerton, Arizona
Calipatria	Welton, Arizona
El Centro	Westmoreland
Holtville	Yuma, Arizona
Imperial	
County	
Imperial County	
Tribal	
None	

Sources: U.S. Bureau of the Census (2009b); U.S. Department of the Interior (2010).

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Schools

In 2007, the six-county ROI had a total of 119 public and private elementary, middle, and high schools (NCES 2009). Table 9.1.19.1-9 provides summary statistics for enrollment and educational staffing and two indices of educational quality—student-teacher ratios and levels of service (number of teachers per 1,000 population). The student-teacher ratio in Yuma County schools (20.2) is slightly lower than that for schools in Imperial County (20.9), while the level of service is slightly higher in Imperial County (10.8) than in Yuma County, where there are fewer teachers per 1,000 population (9.5).

Health Care

The number of physicians (268) and the number of doctors per 1,000 population (1.4) are slightly higher in Yuma County than in Imperial County (150 and 0.9, respectively) (Table 9.1.19.1-10).

Public Safety

Several state, county, and local police departments provide law enforcement in the ROI (Table 9.1.19.1-11). Imperial County has 177 officers and would provide law enforcement

TABLE 9.1.19.1-9 ROI School District Data for the Proposed Imperial East SEZ, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service ^a
Yuma County, Arizona	55	1,800	20.2	9.5
Imperial County, California	64	1,735	20.9	10.8
ROI	119	3,535	20.5	10.1

^a Number of teachers per 1,000 population.

Source: NCES (2009).

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TABLE 9.1.19.1-10 Physicians in the Proposed Imperial East SEZ ROI, 2007

Location	Number of Primary Care Physicians	Level of Service ^a
Yuma County, Arizona	268	1.4
Imperial County, California	150	0.9
ROI	418	1.1

^a Number of physicians per 1,000 population.

Source: AMA (2009).

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services to the SEZ; there are 68 officers in Yuma County. Currently, there are 237 professional firefighters in the ROI (Table 9.1.19.1-11). Levels of service of police protection are 1.1 per 1,000 population in Imperial County and 0.4 in Yuma County.

9.1.19.1.10 ROI Social Structure and Social Change

Community social structures and other forms of social organization within the ROI are related to various factors, including historical development, major economic activities and sources of employment, income levels, race and ethnicity, and forms of local political organization. Although an analysis of the character of community social structures is beyond the scope of the current programmatic analysis, project-level NEPA analyses would include a description of ROI social structures, contributing factors, their uniqueness, and consequently, the susceptibility of local communities to various forms of social disruption and social change.

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TABLE 9.1.19.1-11 Public Safety Employment in the Proposed Imperial East SEZ ROI

Location	Number of Police Officers ^a	Level of Service ^b	Number of Firefighters ^c	Level of Service
Yuma County, Arizona	68	0.4	127	0.7
Imperial County, California	177	1.1	110	0.7
ROI	245	0.7	237	0.7

^a 2007 data.

^b Number per 1,000 population.

^c 2008 data; number does not include volunteers.

Sources: U.S. Department of Justice (2008); Fire Departments Network (2009).

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Various energy development studies have suggested that once the annual growth in population is between 5 and 15% in smaller rural communities, alcoholism, depression, suicide, social conflict, divorce, and delinquency would increase and levels of community satisfaction would deteriorate (BLM 1980, 1983, 1996). Tables 9.1.19.1-12 and 9.1.19.1-13 present data for a number of indicators of social change, including violent crime and property crime rates, alcoholism and illicit drug use, and mental health and divorce, that might be used to indicate social change.

There is some variation in the level of crime across the ROI, with slightly higher rates of violent crime in Yuma County (3.1 per 1,000 population) than in Imperial County (2.9) (Table 9.1.19.1-12). Property-related crime rates are slightly higher in Imperial County (33.4) than in Yuma County (21.1), meaning that overall crime rates in Imperial County (36.0) were higher than for Yuma County (24.2).

Other measures of social change—alcoholism, illicit drug use, and mental health—are not available at the county level and thus are presented for the SAMHSA region in which the ROI is located. There is some variation across the two regions in which the two counties are located, with slightly higher rates for alcoholism and illicit drug in the region in which Imperial County is located and slightly higher rates of mental illness in the region in which Yuma County is located (Table 9.1.19.1-13).

9.1.19.1.11 ROI Recreation

Various areas in the vicinity of the proposed SEZ are used for recreational purposes, with natural, ecological, and cultural resources in the ROI attracting visitors for a range of activities, including hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback riding, mountain climbing, and sightseeing. These areas are discussed in Section 9.1.5.

TABLE 9.1.19.1-12 County and ROI Crime Rates for the Proposed Imperial East SEZ ROI^a

Location	Violent Crime ^b		Property Crime ^c		All Crime	
	Offenses	Rate	Offenses	Rate	Offenses	Rate
Yuma County, Arizona	637	3.1	4,376	21.1	5,013	24.2
Imperial County, California	474	2.9	6,025	33.4	6,499	36.0
ROI	1,111	2.9	10,401	26.8	11,512	29.7

^a Rates are the number of crimes per 1,000 population.

^b Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

^c Property crime includes burglary, larceny, theft, motor vehicle theft, and arson.

Sources: U.S. Department of Justice (2009a,b).

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TABLE 9.1.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Imperial East SEZ ROI^a

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health ^b	Divorce ^c
Arizona Rural South Region (includes Yuma County)	7.3	2.6	8.8	— ^d
California Region 13 (includes Imperial County)	8.5	3.2	8.6	—
Arizona				3.9
California				4.3

^a Data for alcoholism and drug use represent percentage of the population over 12 years of age with dependence or abuse of alcohol, illicit drugs. Data are averages for 2004 to 2006.

^b Data for mental health represent percentage of the population over 18 years of age suffering from serious psychological distress. Data are averages for 2002 to 2004.

^c Divorce rates are the number of divorces per 1,000 population. Data are for 1990.

^d A dash indicates data not available.

Sources: SAMHSA (2009); CDC (2009).

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1 Because the number of visitors using state and federal lands for recreational activities is
 2 not available from the various administering agencies, the value of recreational resources in these
 3 areas, based solely on the number of recorded visitors, is likely to be an underestimation. In
 4 addition to visitation rates, the economic valuation of certain natural resources can also be
 5 assessed in terms of the potential recreational destination for current and future users, that is,
 6 their nonmarket value (see Section 5.17.1.1).

7
 8 Another method is to estimate the economic impact of the various recreational activities
 9 supported by natural resources on public land in the vicinity of the proposed solar development,
 10 by identifying sectors in the economy in which expenditures on recreational activities occur. Not
 11 all activities in these sectors are directly related to recreation on state and federal lands, with
 12 some activity occurring on private land (e.g., dude ranches, golf courses, bowling alleys, and
 13 movie theaters). Expenditures associated with recreational activities form an important part of
 14 the economy of the ROI. In 2007, 10,020 people were employed in the ROI in the various sectors
 15 identified as recreation, constituting 8.2% of total ROI employment (Table 9.1.19.1-14).
 16 Recreation spending also produced \$198 million in income in the ROI in 2007. The primary
 17 sources of recreation-related employment were eating and drinking places.

18
 19
 20 **9.1.19.2 Impacts**

21
 22 The following analysis begins with a description of the common impacts of solar
 23 development, including common impacts on recreation and on social change. These impacts
 24 would occur regardless of the solar technology developed in the SEZ. The impacts of
 25 developments employing various solar energy technologies are analyzed in detail in subsequent
 26 sections.
 27
 28

TABLE 9.1.19.1-14 ROI Recreation Sector Activity in the Proposed Imperial East SEZ, 2007

ROI	Employment ^b	Income (\$ million)
Amusement and recreation services	74	1.5
Automotive rental	142	12.7
Eating and drinking places	7,874	133.5
Hotels and lodging places	549	12.2
Museums and historic sites,	14	0.4
Recreational vehicle parks and campsites	385	10.4
Scenic tours	457	18.4
Sporting goods retailers	525	9.2
Total ROI	10,020	198.3

Source: MIG, Inc. (2009).

1 **9.1.19.2.1 Common Impacts**
2

3 Construction and operation of a solar energy facility at the proposed Imperial East SEZ
4 would produce direct and indirect economic impacts. Direct impacts would occur as a result of
5 expenditures on wages and salaries, procurement of goods and services required for project
6 construction and operation, and the collection of state sales and income taxes. Indirect impacts
7 would occur as project wages and salaries, procurement expenditures, and tax revenues
8 subsequently circulate through the economy of each state, thereby creating additional
9 employment, income, and tax revenues. Facility construction and operation would also require
10 in-migration of workers and their families into the ROI surrounding the site, which would affect
11 population, rental housing, health service employment, and public safety employment.
12 Socioeconomic impacts common to all utility-scale solar energy developments are discussed
13 in detail in Section 5.17. These impacts will be minimized through the implementation of
14 programmatic design features described in Appendix A, Section A.2.2.
15

16 **Recreation Impacts**
17

18 Estimating the impact of solar facilities on recreation is problematic, because it is
19 not clear how solar development in the SEZ would affect recreational visitation and
20 nonmarket values (i.e., the value of recreational resources for potential or future visits; see
21 Section 5.17.1.2.3). While it is clear that some land in the ROI would no longer be accessible
22 for recreation, the majority of popular recreational locations would be precluded from solar
23 development. It is also possible that solar facilities in the ROI would be visible from popular
24 recreation locations, and that construction workers residing temporarily in the ROI would occupy
25 accommodation otherwise used for recreational visits, thus reducing visitation and consequently
26 affecting the economy of the ROI.
27
28

29 **Social Change**
30

31 Although an extensive literature in sociology documents the most significant components
32 of social change in energy boomtowns, the nature and magnitude of the social impact of energy
33 developments in small rural communities are still unclear (see Section 5.17.1.1.4). While some
34 degree of social disruption is likely to accompany large-scale in-migration during the boom
35 phase, there is insufficient evidence to predict the extent to which specific communities are
36 likely to be affected, which population groups within each community are likely to be most
37 affected, and the extent to which social disruption is likely to persist beyond the end of the boom
38 period (Smith et al. 2001). Accordingly, because of the lack of adequate social baseline data, it
39 has been suggested that social disruption is likely to occur once an arbitrary population growth
40 rate associated with solar energy development projects has been reached, with an annual rate of
41 between 5 and 10% growth in population assumed to result in a breakdown in social structures,
42 with a consequent increase in alcoholism, depression, suicide, social conflict, divorce,
43 delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983, 1996).
44
45

1 In overall terms, the in-migration of workers and their families into the ROI would
2 represent an increase of 0.3% in county population during construction of the trough technology,
3 with smaller increases for the power tower, dish engine, and PV technologies, and during the
4 operation of each technology. While it is possible that some construction and operations workers
5 will choose to locate in communities closer to the SEZ, the lack of available housing to
6 accommodate all in-migrating workers and families in smaller rural communities in the ROI, and
7 insufficient range of housing choices to suit all solar occupations, many workers are likely to
8 commute to the SEZ from larger communities elsewhere in the ROI, thereby reducing the
9 potential impact of solar development on social change. Regardless of the pace of population
10 growth associated with the commercial development of solar resources, and the likely residential
11 location of in-migrating workers and families in communities some distance from the SEZ itself,
12 the number of new residents from outside the ROI is likely to lead to some demographic and
13 social change in small rural communities in the ROI. Communities hosting solar development
14 are likely to be required to adapt to a different quality of life, with a transition away from a more
15 traditional lifestyle involving ranching and taking place in small, isolated, close-knit,
16 homogenous communities with a strong orientation toward personal and family relationships,
17 toward a more urban lifestyle, with increasing cultural and ethnic diversity, and increasing
18 dependence on formal social relationships within the community.
19
20

21 ***9.1.19.2.2 Technology-Specific Impacts***

22

23 The economic impacts of solar energy development in the proposed SEZ were measured
24 in terms of employment, income, state tax revenues (sales and income), population in-migration,
25 housing, and community service employment (education, health, and public safety). More
26 information on the data and methods used in the analysis are provided in Appendix M.
27

28 The assessment of the impact of the construction and operation of each technology was
29 based on SEZ acreage, assuming 80% of the area could be developed. To capture a range of
30 possible impacts, solar facility size was estimated on the basis of land requirements of various
31 solar technologies, assuming that 9 acres/MW (0.04 km²/MW) would be required for power
32 tower, dish engine, and PV technologies, and 5 acres/MW (0.02 km²/MW) for solar trough
33 technologies. Impacts of multiple facilities employing a given technology at each SEZ were
34 assumed to be the same as impacts for a single facility with the same total capacity. Construction
35 impacts were assessed for a representative peak year of construction, assumed to be 2021 for
36 each technology. Construction impacts assumed that a maximum of one project could be
37 constructed within a given year, with a corresponding maximum land disturbance of up to
38 3,000 acres (12 km²). For operations impacts, a representative first year of operations was
39 assumed to be 2023 for trough and power tower, 2022 for the minimum facility size for dish
40 engine and PV, and 2023 for the maximum facility size for these technologies. The years of
41 construction and operations were selected as representative of the entire 20-year study period,
42 because they are the approximate midpoint; construction and operations could begin earlier.
43
44
45

1 **Solar Trough**
2
3

4 **Construction.** Total construction employment impacts in the ROI (including direct
5 and indirect impacts) from the use of solar trough technology would be up to 2,769 jobs
6 (Table 9.1.19.2-1).
7

8 Construction activities would constitute 1.5% of total ROI employment. A solar
9 development would also produce \$159.9 million in income. Direct sales taxes would be
10 \$0.6 million; direct income taxes, \$6.1 million.
11

12 Given the scale of construction activities and the likelihood of local worker availability in
13 the required occupational categories, construction of a solar facility would mean that some
14 in-migration of workers and their families from outside the ROI would be required, with
15 1,325 persons in-migrating into the ROI. Although in-migration may potentially affect local
16 housing markets, the relatively small number of in-migrants and the availability of temporary
17 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
18 construction on the number of vacant rental housing units would not be expected to be large,
19 with 663 rental units expected to be occupied in the ROI. This occupancy rate would represent
20 5.4% of the vacant rental units expected to be available in the ROI.
21

22 In addition to the potential impact on housing markets, in-migration also would affect
23 community service (education, health, and public safety) employment. An increase in such
24 employment would be required to meet existing levels of service in the ROI. Accordingly,
25 13 new teachers, 2 physicians, and 2 public safety employees (career firefighters and uniformed
26 police officers) would be required in the ROI. These increases would represent 0.3% of total ROI
27 employment expected in these occupations.
28
29

30 **Operations.** Total operations employment impacts in the ROI (including direct and
31 indirect impacts) from a build-out using solar trough technologies would be 288 jobs
32 (Table 9.1.19.2-1). Such a solar development would also produce \$9.8 million in income.
33 Direct sales taxes would be \$0.1 million; direct income taxes, \$0.3 million. Based on fees
34 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage rental
35 payments would be \$1.1 million, and solar generating capacity payments would total at least
36 \$6.0 million.
37

38 Given the likelihood of local worker availability in the required occupational categories,
39 operation of a solar facility would mean that some in-migration of workers and their families
40 from outside the ROI would be required, with 65 persons in-migrating into the ROI. Although
41 in-migration may potentially affect local housing markets, the relatively small number of
42 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
43 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
44 housing units would not be expected to be large, with 59 owner-occupied units expected to be
45 occupied in the ROI.
46

TABLE 9.1.19.2-1 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Imperial East SEZ with Trough Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	1,682	199
Total	2,769	288
Income ^b		
Total	159.9	9.8
Direct state taxes ^b		
Sales	0.6	0.1
Income	6.1	0.3
BLM payments (\$ million 2008)		
Rental	NA ^d	1.1
Capacity ^e	NA	6.0
In-migrants (no.)	1,325	65
Vacant housing ^c (no.)	663	59
Local community service employment		
Teachers (no.)	13	1
Physicians (no.)	2	0
Public safety (no.)	2	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 600 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 916 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

1 In addition to the potential impact on housing markets, in-migration would affect
2 community service (health, education, and public safety) employment. An increase in such
3 employment would be required to meet existing levels of service in the provision of these
4 services in the ROI. Accordingly, one new teacher would be required in the ROI.
5
6

7 **Power Tower**

8
9

10 **Construction.** Total construction employment impacts in the ROI (including direct
11 and indirect impacts) from the use of power tower technology would be up to 1,103 jobs
12 (Table 9.1.19.2-2). Construction activities would constitute 0.6% of total ROI employment.
13 Such a solar development would also produce \$63.7 million in income. Direct sales taxes
14 would be less than \$0.2 million; direct income taxes, \$2.4 million.
15

16 Given the scale of construction activities and the likelihood of local worker availability
17 in the required occupational categories, construction of a solar facility would mean that some
18 in-migration of workers and their families from outside the ROI would be required, with
19 528 persons in-migrating into the ROI. Although in-migration may potentially affect local
20 housing markets, the relatively small number of in-migrants and the availability of temporary
21 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
22 construction on the number of vacant rental housing units would not be expected to be large,
23 with 264 rental units expected to be occupied in the ROI. This occupancy rate would represent
24 2.2% of the vacant rental units expected to be available in the ROI.
25

26 In addition to the potential impact on housing markets, in-migration would affect
27 community service (education, health, and public safety) employment. An increase in such
28 employment would be required to meet existing levels of service in the ROI. Accordingly,
29 five new teachers, one physician, and one public safety employee would be required in the ROI.
30 These increases would represent 0.1% of total ROI employment expected in these occupations.
31
32

33 **Operations.** Total operations employment impacts in the ROI (including direct and
34 indirect impacts) from a build-out using power tower technologies would be 133 jobs
35 (Table 9.1.19.2-2). Such a solar development would also produce \$4.3 million in income.
36 Direct sales taxes would be less than \$0.1 million; direct income taxes, \$0.2 million. Based on
37 fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage
38 rental payments would be \$1.1 million, and solar generating capacity payments would total at
39 least \$3.3 million.
40

41 Given the likelihood of local worker availability in the required occupational categories,
42 operation of a power tower facility would mean that some in-migration of workers and their
43 families from outside the ROI would be required, with 34 persons in-migrating into the ROI.
44 Although in-migration may potentially affect local housing markets, the relatively small number
45 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
46 home parks) mean that the impact of solar facility operation on the number of vacant

TABLE 9.1.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Imperial East SEZ with Power Tower Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	670	103
Total	1,103	133
Income ^b		
Total	63.7	4.3
Direct state taxes ^b		
Sales	0.2	<0.1
Income	2.4	0.2
BLM payments (\$ million 2008)		
Rental	NA ^d	1.1
Capacity ^e	NA	3.3
In-migrants (no.)	528	34
Vacant housing ^c (no.)	264	30
Local community service employment		
Teachers (no.)	5	0
Physicians (no.)	1	0
Public safety (no.)	1	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 509 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

1 owner-occupied housing units would not be expected to be large, with 30 owner-occupied units
2 expected to be required in the ROI.

3
4 No new community service employment would be required to meet existing levels of
5 service in the ROI.

6 7 8 **Dish Engine**

9
10
11 **Construction.** Total construction employment impacts in the ROI (including direct and
12 indirect impacts) from the use of dish engine technology would be up to 448 jobs
13 (Table 9.1.19.2-3). Construction activities would constitute 0.2% of total ROI employment. Such
14 a solar development would also produce \$25.9 million in income. Direct sales taxes would be
15 \$0.1 million; direct income taxes, \$1.0 million.

16
17 Given the scale of construction activities and the likelihood of local worker availability in
18 the required occupational categories, construction of a dish engine facility would mean that some
19 in-migration of workers and their families from outside the ROI would be required, with
20 215 persons in-migrating into the ROI. Although in-migration may potentially affect local
21 housing markets, the relatively small number of in-migrants and the availability of temporary
22 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
23 construction on the number of vacant rental housing units would not be expected to be large,
24 with 107 rental units expected to be occupied in the ROI. This occupancy rate would represent
25 0.1% of the vacant rental units expected to be available in the ROI.

26
27 In addition to the potential impact on housing markets, in-migration would affect
28 community service (education, health, and public safety) employment. An increase in such
29 employment would be required to meet existing levels of service in the ROI. Accordingly, two
30 new teachers would be required in the ROI. This increase would represent less than 0.1% of total
31 ROI employment expected in this occupation.

32
33
34 **Operations.** Total operations employment impacts in the ROI (including direct
35 and indirect impacts) from a build-out using dish engine technology would be 129 jobs
36 (Table 9.1.19.2-3). Such a solar development would also produce \$4.2 million in income.
37 Direct sales taxes would be less than \$0.1 million; direct income taxes, \$0.2 million. Based on
38 fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage
39 rental payments would be \$1.1 million, and solar generating capacity payments would total at
40 least \$3.3 million.

41
42 Given the likelihood of local worker availability in the required occupational categories,
43 operation of a dish engine solar facility would mean that some in-migration of workers and their
44 families from outside the ROI would be required, with 33 persons in-migrating into the ROI.
45 Although in-migration may potentially affect local housing markets, the relatively small number
46 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile

TABLE 9.1.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Imperial East SEZ with Dish Engine Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	272	100
Total	448	129
Income ^b		
Total	25.9	4.2
Direct state taxes ^b		
Sales	0.1	<0.1
Income	1.0	0.2
BLM payments (\$ million 2008)		
Rental	NA ^d	1.1
Capacity ^e	NA	3.3
In-migrants (no.)	215	33
Vacant housing ^c (no.)	107	29
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 509 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

1 home parks) mean that the impact of solar facility operation on the number of vacant owner-
2 occupied housing units would not be expected to be large, with 29 owner-occupied units
3 expected to be required in the ROI.

4
5 No new community service employment would be required to meet existing levels of
6 service in the ROI.

9 **Photovoltaic**

10
11
12 **Construction.** Total construction employment impacts in the ROI (including direct and
13 indirect impacts) from the use of PV technology would be up to 209 jobs (Table 9.1.19.2-4).
14 Construction activities would constitute 0.1% of total ROI employment. Such a solar
15 development would also produce \$12.1 million in income. Direct sales taxes would be less
16 than \$0.1 million; direct income taxes, \$0.5 million.

17
18 Given the scale of construction activities and the likelihood of local worker availability
19 in the required occupational categories, construction of a solar facility would mean that some
20 in-migration of workers and their families from outside the ROI would be required, with
21 100 persons in-migrating into the ROI. Although in-migration may potentially affect local
22 housing markets, the relatively small number of in-migrants and the availability of temporary
23 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
24 construction on the number of vacant rental housing units would not be expected to be large,
25 with 50 rental units expected to be occupied in the ROI. This occupancy rate would represent
26 0.4% of the vacant rental units expected to be available in the ROI.

27
28 In addition to the potential impact on housing markets, in-migration would affect
29 community service (education, health, and public safety) employment. An increase in such
30 employment would be required to meet existing levels of service in the ROI. Accordingly,
31 one new teacher would be required in the ROI. This increase would represent less than 0.1%
32 of total ROI employment expected in this occupation.

33
34
35 **Operations.** Total operations employment impacts in the ROI (including direct and
36 indirect impacts) from a build-out using PV technologies would be 13 jobs (Table 9.1.19.2-4).
37 Such a solar development would also produce \$0.4 million in income. Direct sales taxes would
38 be less than \$0.1 million; direct income taxes, less than \$0.1 million. Based on fees established
39 by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage rental payments
40 would be \$1.1 million, and solar generating capacity payments would total at least \$2.7 million.

41
42 Given the likelihood of local worker availability in the required occupational categories,
43 operation of a PV solar facility would mean that some in-migration of workers and their families
44 from outside the ROI would be required, with three persons in-migrating into the ROI. Although
45 in-migration may potentially affect local housing markets, the relatively small number of
46 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home

TABLE 9.1.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Imperial East SEZ with PV Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	127	10
Total	209	13
Income ^b		
Total	12.1	0.4
Direct state taxes ^b		
Sales	<0.1	<0.1
Income	0.5	<0.1
BLM payments (\$ million 2008)		
Rental	NA ^d	1.1
Capacity ^e	NA	2.7
In-migrants (no.)	100	3
Vacant housing ^c (no.)	50	2
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 509 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect owner-occupied housing.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$5,256 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), assuming full build-out of the site.

1
2
3

1 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
2 housing units would not be expected to be large, with two owner-occupied units expected to be
3 required in the ROI.

4
5 No new community service employment would be required to meet existing levels of
6 service in the ROI.

9 **9.1.19.3 SEZ-Specific Design Features and Design Feature Effectiveness**

10
11 No SEZ-specific design features addressing socioeconomic impacts have been identified
12 for the proposed Imperial East SEZ. Implementing the programmatic design features described
13 in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would reduce
14 the potential for socioeconomic impacts during all project phases.
15

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1 **9.1.20 Environmental Justice**

2
3
4 **9.1.20.1 Affected Environment**

5
6 Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority
7 Populations and Low-Income Populations” (*Federal Register*, Vol. 59, page 7629, Feb. 11,
8 1994) formally requires federal agencies to incorporate environmental justice as part of their
9 missions. Specifically, it directs them to address, as appropriate, any disproportionately high and
10 adverse human health or environmental effects of their actions, programs, or policies on minority
11 and low-income populations.

12
13 The analysis of the impacts of solar energy projects on environmental justice issues
14 follows guidelines described in the Council on Environmental Quality’s (CEQ’s) *Environmental*
15 *Justice Guidance under the National Environmental Policy Act* (CEQ 1997). The analysis
16 method has three parts: (1) a description of the geographic distribution of low-income and
17 minority populations in the affected area is undertaken; (2) an assessment is conducted to
18 determine whether construction and operation would produce impacts that are high and adverse;
19 and (3) if impacts are high and adverse, a determination is made as to whether these impacts
20 disproportionately affect minority and low-income populations.

21
22 Construction and operation of solar energy projects in the proposed Imperial East SEZ
23 could affect environmental justice if any adverse health and environmental impacts resulting
24 from either phase of development are significantly high and if these impacts disproportionately
25 affect minority and low-income populations. If the analysis determines that health and
26 environmental impacts are not significant, there can be no disproportionate impacts on minority
27 and low-income populations. In the event impacts are significant, disproportionality would be
28 determined by comparing the proximity of any high and adverse impacts with the location of
29 low-income and minority populations.

30
31 The analysis of environmental justice issues associated with the development of solar
32 facilities considered impacts within the SEZ and in an associated 50-mi (80-km) radius around
33 the boundary of the SEZ. A description of the geographic distribution of minority and low-
34 income groups in the affected area was based on demographic data from the 2000 Census
35 (U.S. Bureau of the Census 2009k,1). The following definitions were used to define minority and
36 low-income population groups:

- 37
38 • **Minority.** Persons are included in the minority category if they identify
39 themselves as belonging to any of the following racial groups: (1) Hispanic,
40 (2) Black (not of Hispanic origin) or African American, (3) American Indian
41 or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander.

42
43 Beginning with the 2000 Census, where appropriate, the census form allows
44 individuals to designate multiple population group categories to reflect their
45 ethnic or racial origins. In addition, persons who classify themselves as being
46 of multiple racial origin may choose up to six racial groups as the basis of

1 their racial origins. The term minority includes all persons, including those
2 classifying themselves in multiple racial categories, except those who classify
3 themselves as not of Hispanic origin and as White or “Other Race”
4 (U.S. Bureau of the Census 2009k).

5
6 The CEQ guidance proposed that minority populations be identified where
7 either (1) the minority population of the affected area exceeds 50% or (2) the
8 minority population percentage of the affected area is meaningfully greater
9 than the minority population percentage in the general population or other
10 appropriate unit of geographic analysis.

11
12 The PEIS applies both criteria in using the Census Bureau data for census
13 block groups, wherein consideration is given to the minority population that is
14 both greater than 50% and 20 percentage points higher than in the state (the
15 reference geographic unit).

- 16
17 • **Low-Income.** Individuals who fall below the poverty line. The poverty line
18 takes into account family size and age of individuals in the family. In 1999,
19 for example, the poverty line for a family of five with three children below the
20 age of 18 was \$19,882. For any given family below the poverty line, all
21 family members are considered as being below the poverty line for the
22 purposes of analysis (U.S. Bureau of the Census 2009I).

23
24 The data in Table 9.1.20.1-1 show the minority and low-income composition of the
25 total population located in the proposed SEZ based on 2000 Census data and CEQ guidelines.
26 Individuals identifying themselves as Hispanic or Latino are included in the table as a separate
27 entry. However, because Hispanics can be of any race, this number also includes individuals
28 identifying themselves as being part of one or more of the population groups listed in the table.

29
30 A large number of minority and low-income individuals are located in the 50-mi (80-km)
31 area around the boundary of the SEZ. Within the 50-mi (80-km) radius in Arizona, 55.8% of the
32 population is classified as minority, while 19.2% is classified as low-income. The number of
33 minority individuals exceeds 50% of the total population in the area, and the number of minority
34 individuals exceeds the state average by 20 percentage points or more; thus, there is a minority
35 population in the SEZ area based on 2000 Census data and CEQ guidelines. The number of low-
36 income individuals does not exceed the state average by 20 percentage points or more and does
37 not exceed 50% of the total population in the area; thus, there are no low-income populations in
38 the 50-mi (80-km) area around the boundary of the SEZ.

39
40 Within the 50-mi (80-km) radius in California, 80.1% of the population is classified as
41 minority, while 22.6% is classified as low income. The number of minority individuals exceeds
42 50% of the total population in the area, and the number of minority individuals exceeds the state
43 average by 20 percentage points or more; thus, there is a minority population in the SEZ area
44 based on 2000 Census data and CEQ guidelines. The number of low-income individuals does not
45 exceed the state average by 20 percentage points or more and does not exceed 50% of the total
46

TABLE 9.1.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Imperial East SEZ

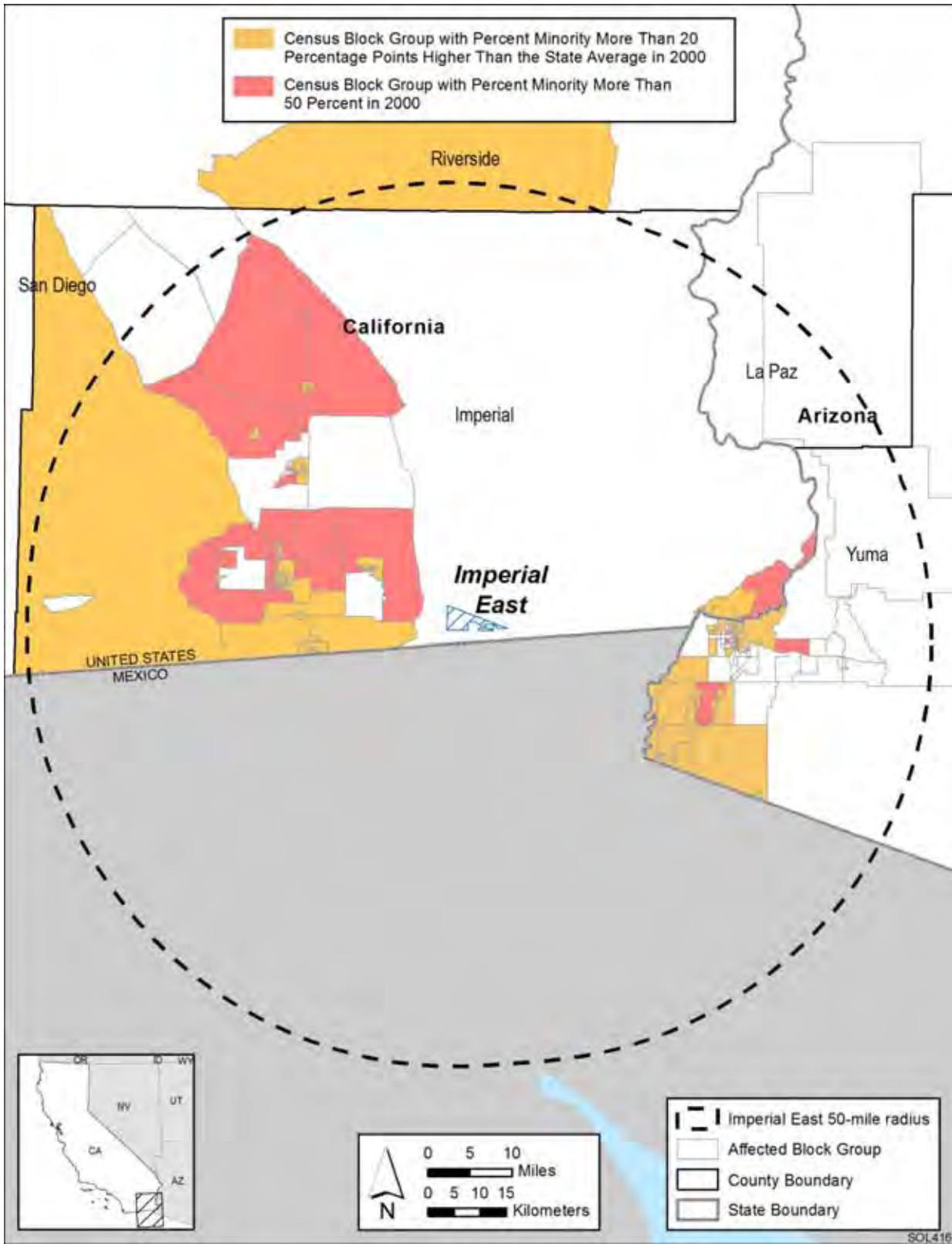
Parameter	Arizona	California
Total population	155,910	149,237
White, non-Hispanic	68,985	29,751
Hispanic or Latino	78,732	106,238
Non-Hispanic or Latino minorities	8,193	13,248
One race	6,524	11,949
Black or African American	3,105	7,260
American Indian or Alaskan Native	1,804	1,784
Asian	1,353	2,569
Native Hawaiian or Other Pacific Islander	132	112
Some other race	130	224
Two or more races	1,669	1,299
Total minority	86,925	119,486
Low income	28,763	29,419
Percentage minority	55.8	80.1
State percentage minority	24.5	40.5
Percentage low-income	19.2	22.6
State percentage low-income	13.9	14.2

Source: U.S. Bureau of the Census (2009k.1).

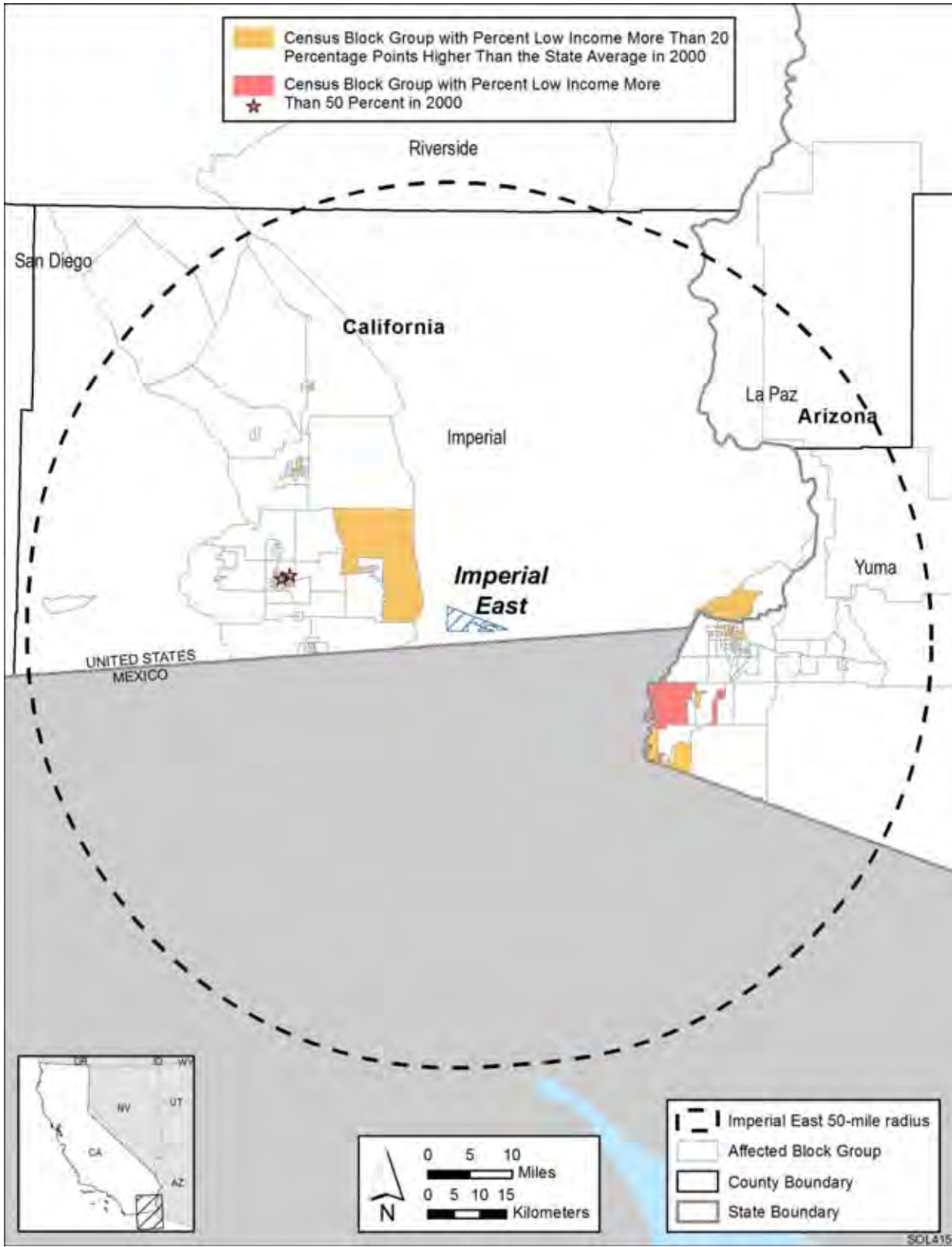
1
2
3 population in the area; thus, there are no low-income populations in the 50-mi (80-km) area
4 around the boundary of the SEZ.

5
6 Figures 9.1.20.1-1 and 9.1.20.1-2 show the locations of the minority and low-income
7 population groups within the 50-mi (80-km) area around the boundary of the SEZ.

8
9 In the California portion of the 50-mi (80-km) radius around the SEZ, more than 50% of
10 the population is classified as minority in block groups located to the west and northwest of the
11 SEZ; in the area surrounding the cities of Brawley, El Centro, Imperial, Westmoreland, and
12 Calipatria; in the city of Brawley itself; and next to the Colorado River in the Fort Yuma Indian
13 Reservation. Block groups with a minority population that is more than 20 percentage points
14 higher than the state average are located to the west of the SEZ, in the cities of Mexicali,
15 El Centro, Holtville, Brawley, Westmoreland, and Calipatria, and in the Fort Yuma Indian
16 Reservation. In the Arizona portion of the 50-mi (80-km) radius, more than 50% of the
17 population is classified as minority in block groups located to the immediate east and south of



1
 2 **FIGURE 9.1.20.1-1 Minority Population Groups within the 50-mi (80-km) Area Surrounding the**
 3 **Proposed Imperial East SEZ**



1

2 **FIGURE 9.1.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius**
 3 **Surrounding the Proposed Imperial East SEZ**

1 the city of Yuma. Block groups with a minority population that is more than 20 percentage
2 points higher than the state average are located in the city of Yuma, to the immediate east and to
3 the southwest of the city.
4

5 Low-income populations in the 50-mi (80-km) radius are limited to block groups in the
6 City of El Centro, around the City of Holtville, and in the Fort Yuma Indian Reservation. In
7 Arizona, there are a number of block groups in which the low-income population exceeds 50%
8 of the total population and in which the low-income population is more than 20 percentage
9 points higher than the state average, located to the southwest of the city of Yuma.
10

11 **9.1.20.2 Impacts**

12
13
14 Environmental justice concerns common to all utility-scale solar energy developments
15 are described in detail in Section 5.18. These impacts will be minimized through the
16 implementation of programmatic design features described in Appendix A, Section A.2.2,
17 which address the underlying environmental impacts contributing to the concerns. The
18 potentially relevant environmental impacts associated with solar development within the
19 proposed Imperial East SEZ include noise and dust during the construction of solar facilities;
20 noise and electromagnetic field (EMF) effects associated with solar project operations; the visual
21 impacts of solar generation and auxiliary facilities, including transmission lines; access to land
22 used for economic, cultural, or religious purposes; and effects on property values; these are areas
23 of concern that might potentially affect minority and low-income populations. Minority
24 populations have been identified within 50 mi (80 km) of the proposed Imperial East SEZ; no
25 low-income populations are present (Section 9.1.20.1).
26

27 Potential impacts on low-income and minority populations could be incurred as a result
28 of the construction and operation of solar development involving each of the four technologies.
29 Although impacts are likely to be small, there are minority populations, as defined by CEQ
30 guidelines (Section 9.1.20.1), within the 50-mi (80-km) radius around the boundary of the SEZ;
31 thus any adverse impacts of solar projects could disproportionately affect minority populations.
32 Because there are also low-income populations within the 50-mi (80-km) radius, according to
33 CEQ guidelines, there could also be impacts on low-income populations.
34
35

36 **9.1.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**

37
38 No SEZ-specific design features addressing environmental justice impacts have been
39 identified for the proposed Imperial East SEZ. Implementing the programmatic design features
40 described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would
41 reduce the potential for environmental justice impacts during all project phases.
42

1 **9.1.21 Transportation**
2

3 The proposed Imperial East SEZ is accessible by road. An interstate highway and a state
4 highway border the SEZ, with a rail line about 17 mi (27 km) away. Three small airports are
5 located within 34 mi (55 km) of the SEZ in the United States with a fourth small airport located
6 approximately 5 mi (8 km) away in Mexico. General transportation considerations and impacts
7 are discussed in Sections 3.4 and 5.19, respectively
8

9
10 **9.1.21.1 Affected Environment**
11

12 State Route 98, a two-lane highway, passes through the southern edge of the Imperial
13 East SEZ, as shown in Figure 9.1.21-1. The figure also shows the designated open OHV routes
14 in the proposed Imperial East SEZ. These routes were designated under the CDCA Plan
15 (BLM 1999). The town of Calexico is located about 15 mi (24 km) to the west of the SEZ along
16 State Route 98. To the east, State Route 98 terminates at I-8 at the southeast corner of the SEZ.
17 I-8 forms the northeastern boundary of the SEZ. Yuma, Arizona is about 29 mi (47 km) to the
18 east along I-8, and El Centro, California is 19 mi (31 km) to the west along I-8, with San Diego
19 slightly more than another 100 mi (160 km) farther down the road. Annual average traffic
20 volumes along State Route 98 and I-8 near the SEZ for 2008 are provided in Table 9.1.21.1-1.
21

22 A branch line of the Union Pacific (UP) Railroad serves the nearby area (Union Pacific
23 Railroad 2009). Rail service is available in Calexico and El Centro to the west of the Imperial
24 East SEZ. A branch line originates at the Niland stop along the UP railroad main line between
25 Los Angeles and Tucson. This branch line travels south through El Centro and Calexico before
26 it passes into Mexico. The UP main line also provides service to the east of the SEZ in Yuma.
27

28 Three small public airports on the United States side of the border with Mexico are
29 within a driving distance of approximately 34 mi (55 km) of the Imperial East SEZ. The nearest
30 public airport, which is suitable only for light aircraft, is the Calexico International Airport,
31 approximately 18 mi (29 km) to the west of the SEZ, taking State Route 98 to State Route 111
32 south in Calexico. The airport is operated by the City of Calexico and has one asphalt runway
33 that is 4,679-ft (1,426-m) long in good condition (FAA 2009).
34

35 The Imperial County Airport is located north of El Centro off State Route 86, north of
36 I-8, approximately 25 mi (40 km) to the northwest of the SEZ. Owned and operated by the
37 County of Imperial, this airport has two asphalt runways, 4,500- and 5,304-ft (1,372- and
38 1,617-m) long, both in good condition (FAA 2009). In 2008, the amount of commercial freight
39 shipped and received at the Imperial County Airport was 1,374,379 lb (623,408 kg) and
40 975,544 lb (442,499 kg), respectively (BTS 2009). Scheduled passenger service at the airport
41 is provided by Skywest/United Airlines or one of its partners (SkyWest 2004). In 2008, 11,837
42 and 11,665 passengers arrived and departed, respectively (BTS 2009).
43

44 Approximately 34 mi (55 km) to the east of the SEZ, the Yuma County Airport Authority
45 (YCAA) operates the Yuma International Airport in Yuma, Arizona, with scheduled passenger

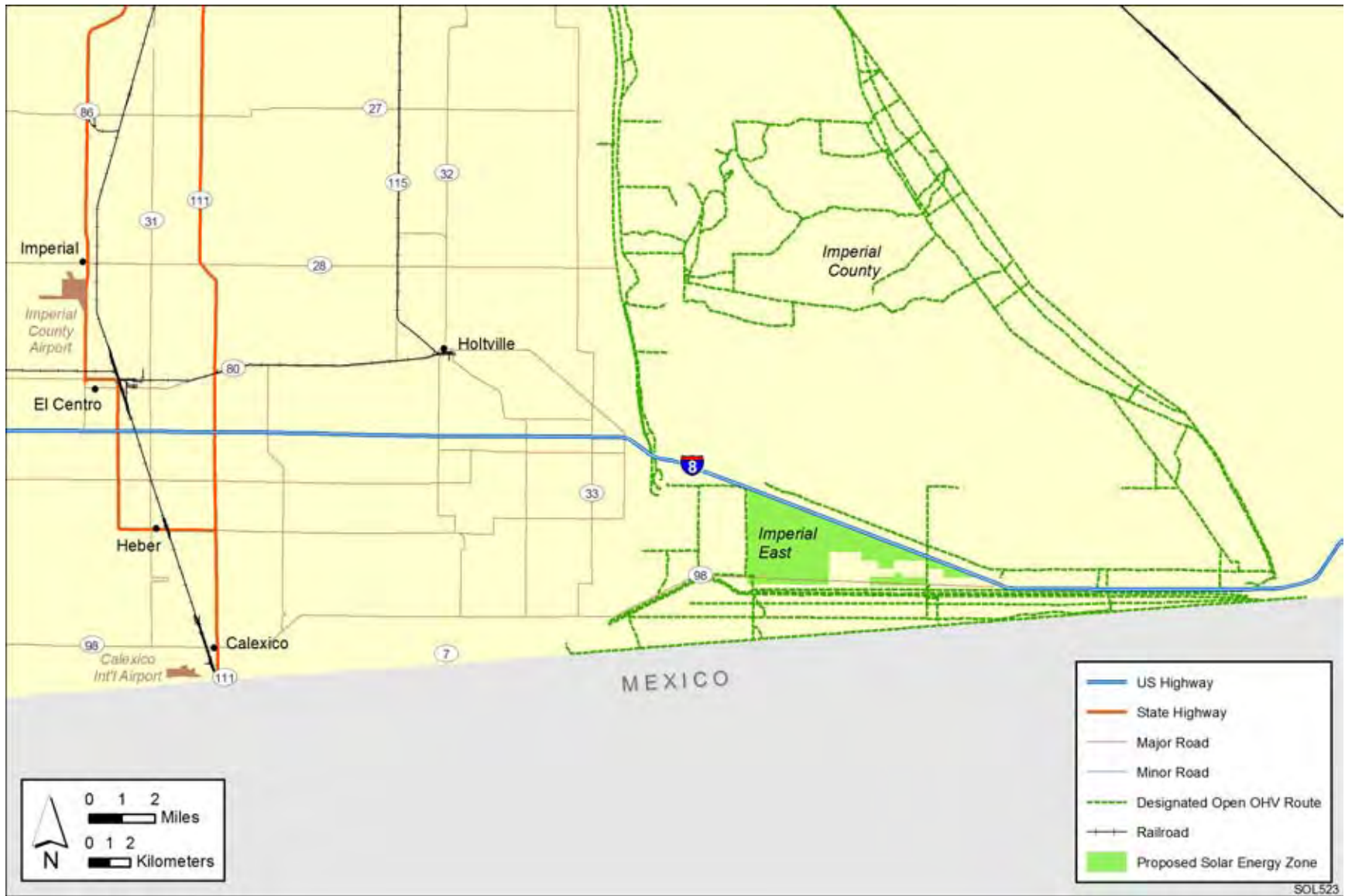


FIGURE 9.1.21-1 Local Transportation Network Serving the Proposed Imperial East SEZ

TABLE 9.1.21.1-1 AADT on Major Roads near the Proposed Imperial East SEZ, 2008

Road	General Direction	Location	AADT (Vehicles)
I-8	East-west	Junction State Route 111	14,600
		Junction State Route 7	11,200
		Junction U.S. 80/State Route 115	11,600
		Junction State Route 98	14,000
State Route 78	Southwest-northeast	Junction State Route 111	4,200
		Junction State Route 115	4,400
State Route 98	East-west	Junction State Route 111	24,100
		West of junction State Route 7	2,500
		Bonesteel Road (west of Imperial East SEZ)	1,900
		Junction I-8	1,950

Source: Caltrans (2009).

1
2
3 service provided by three airlines (Empire, Skywest/United, and Mesa/US Airways) (Yuma
4 County Airport Authority 2010). The airport is jointly owned by Yuma County and the
5 U.S. Marines Corps, and military activities (Yuma Marine Corps Air Station) account for about
6 50% of aircraft operations (AirNav, LLC 2010). The airport operates four runways, all in good
7 condition. The longest runway is concrete and 13,300-ft (4,054-m) long (FAA 2009). The other
8 three runways are asphalt/concrete with the shortest runway having a length of 5,710 ft
9 (1,740 m) (FAA 2009). In 2009, the amount of commercial freight shipped and received at
10 the Yuma International Airport was 669,802 lb (303,817 kg) and 940,501 lb (426,604 kg),
11 respectively (BTS 2009). In 2010, 86,387 and 86,415 passengers arrived and departed,
12 respectively (BTS 2009).

13
14 Mexicali General Rodolfo Sanchez Taboada International Airport (Mexicali Airport) is
15 located approximately 5 mi (8 km) due southwest of the SEZ in Mexico. The airport has a single
16 concrete runway that is 8,530 ft (2,600 m) long (World Aero Data 2010). Approximately
17 467,000 passengers passed through the airport in 2009 (Grupo Aeroportuario del Pacifico 2010).

18
19
20 **9.1.21.2 Impacts**

21
22 As discussed in Section 5.19, the primary transportation impacts are anticipated to be
23 from commuting worker traffic. State Route 98 provides a regional traffic corridor that could
24 experience moderate impacts for single projects that may have up to 1,000 daily workers, with
25 an additional 2,000 vehicle trips per day (maximum). This would represent up to approximately
26 two times the AADT values summarized in Table 9.1.21-1 for State Route 98 in the vicinity of
27 the SEZ. For I-8, the exits at State Route 98 might experience some congestion as well. Local

1 road improvements would be necessary in any portion of the SEZ along State Route 98 that
2 might be developed so as not to overwhelm the local roads near any site access point(s).

3
4 Solar development within the SEZ would affect public access along OHV routes that are
5 designated open and available for public use. Although there are few routes designated as open
6 within the proposed SEZ, open routes crossing areas granted ROWs for solar facilities would be
7 re-designated as closed (see Section 5.5.1 for more details on how routes coinciding with
8 proposed solar facilities would be treated.

9
10
11 **9.1.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**

12
13 No SEZ-specific design features have been identified related to impacts on transportation
14 systems around the Imperial East SEZ. The programmatic design features discussed in
15 Appendix A, Section A.2.2, including local road improvements, multiple site access locations,
16 staggered work schedules, and ride-sharing, would all provide some relief to traffic congestion
17 on local roads leading to the SEZ. Depending on the location of a proposed solar facility within
18 the SEZ, more specific access locations and local road improvements would be implemented.
19 The proximity of the Mexicali Airport may require coordination with the proper Mexican
20 authorities to minimize any potential impacts with flight traffic. However, all commercial
21 passenger flights originating at or terminating at that airport are destined for southern Mexican
22 cities, while the SEZ is to the northeast.

1 **9.1.22 Cumulative Impacts**
2

3 The analysis presented in this section addresses the potential cumulative impacts in the
4 vicinity of the proposed Imperial East SEZ in Imperial County, California. The CEQ guidelines
5 for implementing NEPA define cumulative impacts as environmental impacts resulting from the
6 incremental impacts of an action when added to other past, present, and reasonably foreseeable
7 future actions (40 CFR 1508.7). The impacts of other actions are considered without regard to
8 the agency (federal or nonfederal), organization, or person that undertakes them. The time frame
9 of this cumulative impacts assessment could appropriately include activities that would occur up
10 to 20 years in the future (the general time frame for PEIS analyses), but little or no information is
11 available for projects that could occur further than 5 to 10 years in the future.
12

13 The areas east and north of the Imperial East SEZ are largely undeveloped and have few
14 permanent residents. Areas to the west and northwest are irrigated farmland receiving water from
15 the All-American Canal that is immediately south of the Imperial East SEZ. The United States–
16 Mexico border is within 2 mi (3 km) south of the proposed SEZ. The Imperial Sand Dunes are
17 10 to 15 mi (16 to 24 km) east and northeast. No grazing allotments or mineral mining activity
18 occurs in the proposed Imperial East SEZ or within the immediate vicinity to the north and east.
19

20 The geographic extent of the cumulative impacts analysis for potentially affected
21 resources near the Imperial East SEZ are identified in Section 9.1.22.1. An overview of ongoing
22 and reasonably foreseeable future actions is presented in Section 9.1.22.2. General trends in
23 population growth, energy demand, water availability, and climate change are discussed in
24 Section 9.1.22.3. Cumulative impacts for each resource area are discussed in Section 9.1.22.4.
25

26
27 **9.1.22.1 Geographic Extent of the Cumulative Impacts Analysis**
28

29 The geographic extent of the cumulative impacts analysis for potentially affected
30 resources evaluated near the Imperial East SEZ is provided in Table 9.1.22.1-1. These
31 geographic areas define the boundaries encompassing potentially affected resources. Their
32 extent may vary depending on the nature of the resource being evaluated and the distance at
33 which an impact may occur. Thus, for example, the evaluation of air quality may have a greater
34 regional extent of impact than would cultural resources. Most of the lands around the SEZ are
35 administered by the BLM, the DoD, or the City of El Centro. In addition, the Section 368 utility
36 corridor is overlapping and adjacent to the south and west of the SEZ; the Mexico border is
37 within 2 mi (3 km) to the south, and Tribal Lands are 20 mi (30 km) to the east. The BLM
38 administers nearly 23% of the lands within a 50-mi (80-km) radius of the SEZ.
39
40

TABLE 9.1.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Imperial East SEZ

Resource Area	Geographic Extent
Lands and Realty	Eastern Imperial County
Specially Designated Areas and Lands with Wilderness Characteristics	Within a 25-mi (40-km) radius of the Imperial East SEZ
Rangeland Resources	Eastern Imperial County
Recreation	Eastern Imperial County
Military and Civilian Aviation	For Military Aviation, southeastern California and western Arizona. For Civilian Aviation, eastern Imperial County
Soil Resources	Areas within and adjacent to the Imperial East SEZ
Minerals	Eastern Imperial County
Water resources Surface Water Groundwater	Colorado River, All-American Canal Imperial Valley Groundwater Basin
Air Quality and Climate	A 31-mi (50-km) radius from the center of the Imperial East SEZ
Vegetation, Wildlife and Aquatic Biota, Special Status Species	A 50-mi (80-km) radius from the center of the Imperial East SEZ, including portions of Imperial and Riverside Counties in California and La Paz and Yuma Countries in Arizona
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Imperial East SEZ
Acoustic Environment (noise)	Areas adjacent to the Imperial East SEZ
Paleontological Resources	Areas within and adjacent to the Imperial East SEZ
Cultural Resources	Areas within and adjacent to the Imperial East SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the SEZ for other properties, such as traditional cultural properties
Native American Concerns	Imperial Valley and adjacent areas within a 25-mi (40-km) radius of the Imperial East SEZ
Socioeconomics	A 50-mi (80-km) radius from the center of the Imperial East SEZ
Environmental Justice	Imperial County
Transportation	I- 8; State Route 98

1
2

1 **9.1.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
2

3 The future actions described below are those that are “reasonably foreseeable”; that is,
4 they have already occurred, are ongoing, are funded for future implementation, or are included in
5 firm near-term plans. Types of proposals with firm near-term plans are as follows:
6

- 7 • Proposals for which NEPA documents are in preparation or finalized;
- 8
- 9 • Proposals in a detailed design phase;
- 10
- 11 • Proposals listed in formal NOIs published in the *Federal Register* or state
12 publications;
- 13
- 14 • Proposals for which enabling legislations has been passed; and
- 15
- 16 • Proposals that have been submitted to federal, state or county regulators to
17 begin a permitting process.
- 18

19 Projects in the bidding or research phase or that have been put on hold were not included
20 in the cumulative impact analysis.
21

22 The ongoing and reasonably foreseeable future actions described below are grouped
23 into three categories: (1) actions that relate to energy production and distribution, including
24 potential solar energy projects under the proposed action (Section 9.1.22.2.1) and (2) other
25 ongoing and reasonably foreseeable actions, including those related to mining and mineral
26 processing, grazing management, transportation, recreation, water management, and
27 conservation (Section 9.1.22.2.2). Together, these actions have the potential to affect human and
28 environmental receptors within the geographic range of potential impacts over the next 20 years.
29
30

31 **9.1.22.2.1 Energy Production and Distribution**
32

33 Reasonably foreseeable future actions related to energy production and distribution and
34 other major actions within a 50-mi (80-km) radius from the center of the Imperial East SEZ,
35 which includes portions of Imperial and Riverside Counties in California and La Paz and Yuma
36 Counties in Arizona, are identified in Table 9.1.22.2-1 and described in the following sections.
37 Locations are shown in Figure 9.1.22.2-1. Future renewable energy facilities are expected to be
38 the main contributors to potential future impacts in this area because of favorable conditions in
39 the area for their development, large acreages required, and potentially large quantities of water
40 used. Thus, this analysis focuses on renewable energy and any other foreseeable large energy
41 projects, nominally covering 500 acres (802 km²) or more or requiring amounts of water on the
42 scale of utility-scale CSP.
43
44
45
46

TABLE 9.1.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution and Other Major Actions near the Proposed Imperial East SEZ

Description	Status	Resources Affected	Primary Impact Location
<i>Fast-Track Energy Project on BLM-Administered Land</i>			
Imperial Valley Solar Project (CACA-47740), 750 MW dish engine; 6,500 total acres ^a	Under review; AFC filed June 30, 2008	Land use, visual, terrestrial habitats, wildlife, groundwater	About 35 mi (56 km) west of Imperial East SEZ
Orresource Geothermal (CACA 6217, CACA 6218, CACA 17568)	Ongoing	Land use, terrestrial habitats, visual	About 3 mi (5 km) northwest of Imperial East SEZ, within the East Mesa Known Geothermal Resource Area
Geothermal Power Project (CACA 18092X)	Authorized	Land use, terrestrial habitats, visual	About 5 mi (8 km) northwest of Imperial East SEZ, within the East Mesa Known Geothermal Resource Area
Black Rock 1,2 ,and 3 Geothermal Power Project, 159 MW, 160 acres	Planned, currently on hold	Land use, terrestrial habitats, visual	Northwest Imperial County near Salton Sea and Sonny Bono Salton Sea National Wildlife Refuge
<i>Transmission and Distribution Systems</i>			
Existing Southwest Powerlink 500-kV Transmission Line	Ongoing	Land use, terrestrial habitats, visual	Line runs from the Palo Verde Nuclear Generating Station in Arizona to the San Diego area, passing just to the south of the Imperial East SEZ.
Upgrades to Imperial Irrigation District 230-kV Transmission Line	Planned	Land use, terrestrial habitats, visual	Line would run from the IID/San Diego Gas & Electric's (SDG&E) Imperial Valley Substation approximately 10 mi (16 km) southwest of the City of El Centro and terminate at the El Centro Switching Station.

TABLE 9.1.22.2-1 (Cont.)

Description	Status	Resources Affected	Primary Impact Location
Upgrades for Imperial Valley Solar Project Transmission Line	Planned	Land use, terrestrial habitats, wildlife, visual	Construction of a new 230-kV substation approximately in the center of the Imperial Valley Solar Project site and would connect to the SDG&E Imperial Valley Substation via 10.3-mi (16-km) transmission line.
New Sunrise Powerlink 500-kV Transmission Line	Planned	Land use, terrestrial habitats, wildlife, visual	Line would run westward 150 mi (242 km) from the El Centro area in Imperial County to western San Diego County.
<i>Other Projects</i>			
Imperial Irrigation District Hydroelectric Power Plants	Ongoing	Land use, surface water	Power plants are along the All-American Canal in Imperial County, including locations near Imperial East SEZ.
North Baja Pipeline Expansion Project	Planned	Land use, terrestrial habitats, visual	Gas pipeline would run 80 mi (128 km) from Ehrenberg, Arizona, through Riverside and Imperial Counties to a connection point located between Yuma, Arizona, and Imperial East SEZ.
Proposed West Chocolate Mountains Renewable Energy Evaluation Area	NOI to prepare an EIS issued on Feb 10, 2010	Land use, visual, terrestrial habitats, wildlife, groundwater	About 25 mi (40 km) north of the Imperial East SEZ

^a Project approved. Updated information will be included in the Final EIS. See http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/fast-track_renewable.html for details.

1
2
3

1 **Renewable Energy Development**
2

3 Several recent executive and legislative actions in California have addressed
4 renewable energy development in the state. In November 2008, Governor Schwarzenegger
5 signed E.O. S-14-08 to streamline California’s renewable energy project approval process and
6 increase the state’s Renewable Portfolio Standard (RPS) to the most aggressive in the nation—
7 at 33% renewable power by 2020. On September 15, 2009, the governor issued a second E.O.
8 requiring that 33% of all electrical energy produced in the state be from renewable energy
9 sources by the year 2020. The E.O. directed the CARB to adopt regulations increasing
10 California’s RPS to 33% by 2020.
11

12 In 2009, the California Legislature drafted bills requiring that electrical energy
13 production meet a standard of 33% from renewable sources. On October 12, 2009, Governor
14 Schwarzenegger vetoed two bills from the California Legislature on electrical energy generated
15 by renewable sources in favor of an alternative plan that would remove limits on the amount of
16 renewable power utilities could buy from other states (African American Environmentalist
17 Association 2009).
18
19

20 **Solar Energy.** Table 9.1.22.2-1 lists one foreseeable solar energy project on public
21 land, a so-called fast-track project. Fast-track projects are those on public lands for which the
22 environmental review and public participation process is underway and the ROW applications
23 could be approved by December 2010 (BLM 2010b). The fast-track project is considered
24 foreseeable because the permitting and environmental review processes are under way. The
25 location of this project is shown on Figure 9.1.22.2-1.
26

- 27 • *Imperial Valley Solar Project (CACA 47740).* Formerly named the Stirling
28 Energy Systems Solar Two Project, this proposed fast-track project will use
29 CSP dish engine technology (i.e., SunCatchers) in a facility with an output
30 of 750 MW (BLM and CEC 2010). The project will be constructed in
31 two phases—Phase I with 300 MW followed by Phase II with 450 MW. The
32 proposed project site is located on approximately 6,500 acres (26.3 km²) of
33 land in Imperial County, of which 6,140 acres (24.8 km²) are on public land
34 and the remaining 360 acres (1.5 km²) are on private land. The site is about
35 14 mi (23 km) west of El Centro, California, and about 35 mi (56 km) west of
36 the Imperial East SEZ.
37

38 The proposed project includes the solar facility, a 230-kV substation at the
39 center of the project site, a 10-mi (16-km) 230-kV transmission line that will
40 connect to the grid at the San Diego Gas & Electric (SDG&E) Imperial Valley
41 Substation, an 112-mi (19-km) water-supply pipeline, and access roads. The
42 upgrades to the transmission lines are described in the Transmission and
43 Distribution section below.
44

45 Construction for the proposed project would begin in 2010 and continue for
46 40 months, employing about 360 people per month and peaking to 731 people

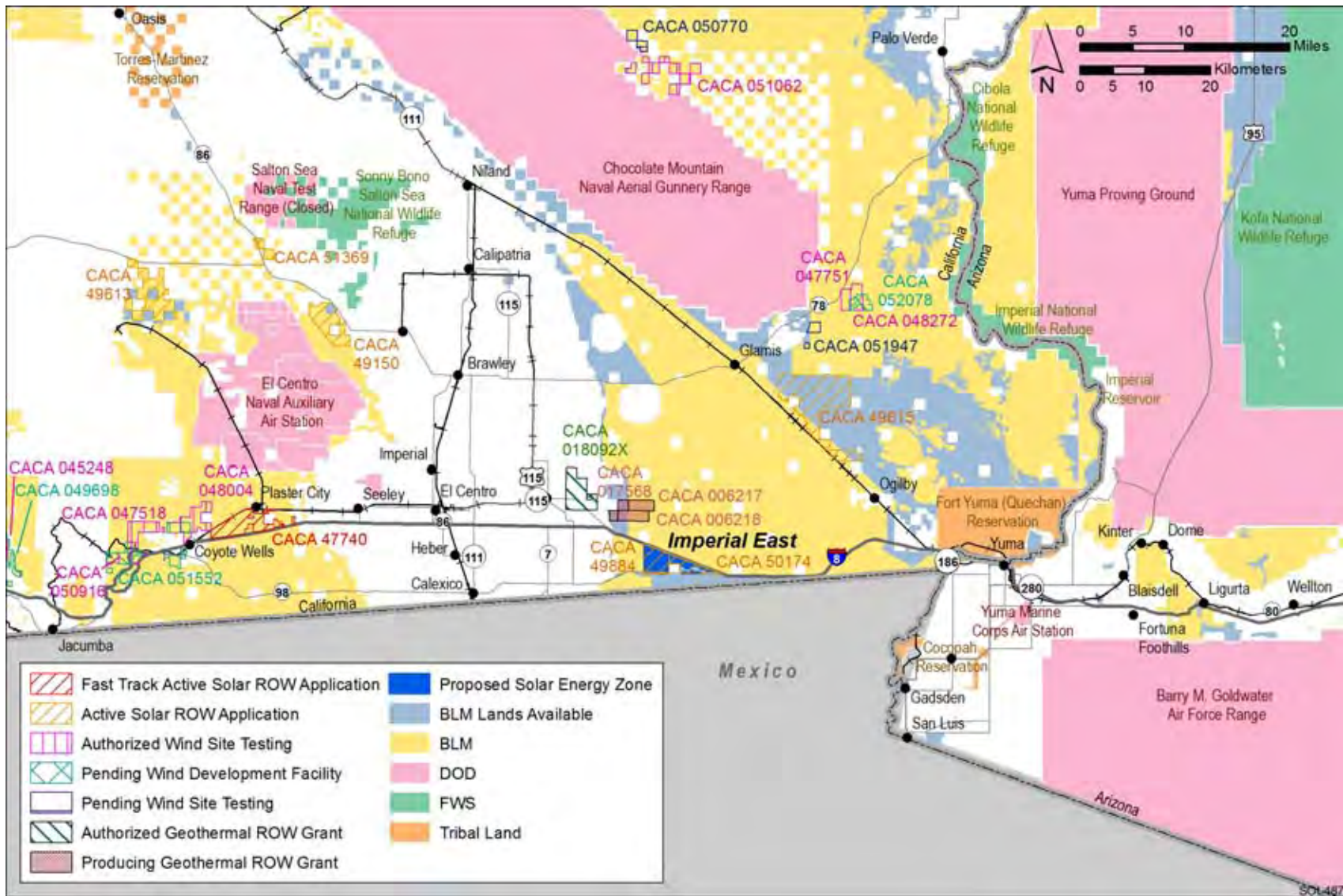


FIGURE 9.1.22.2-1 Locations of Renewable Energy Projects on Public Land within a 50-mi (80-km) Radius of the Proposed Imperial East SEZ

1 during the seventh month of construction. Operations would require 164 full-
2 time employees.

3
4 Special status wildlife species of concern include the flat-tailed horned lizard
5 and the burrowing owl. The proposed facility will have access to at least
6 150,000 to 200,000 gal (568 to 757 m³) of reclaimed water per day for use in
7 all construction and operation activities. On the basis of operation 365 days
8 a year, this would amount to the availability of about 170 to 220 ac-ft/yr
9 (210,000 to 272,000 m³/yr). The proposed water source for mirror washings
10 would be reclaimed water from the Seeley Waste Water Treatment Facility.
11 Upgrades to this existing treatment facility would be funded by Imperial
12 Valley Solar, LLC (BLM and CEC 2010).

- 13
14 • *Pending Solar ROW Applications on BLM-Administered Lands.* In addition to
15 the fast-track solar project described above, a number of regular-track
16 applications for solar project ROWs that have been submitted to the BLM
17 are for projects that would be located either within the Imperial East SEZ
18 or within 50 mi (80 km) of the SEZ (BLM 2010b). Table 9.1.22.2-2 provides
19 a
20 list of all solar projects that had pending applications submitted to BLM as of
21 March 2010. Figure 9.1.22.2-1 shows the locations in these applications.

22
23 Of the six active solar applications listed in Table 9.1.22.2-2, two applications
24 are within the Imperial East SEZ: CACA 49884 encompasses the entire
25 west side of the SEZ, and CACA 50174 encompasses the entire east side of
26 the SEZ. One application (CACA 49615) is located about 20 mi (32 km)
27 northeast of the boundary. Three applications lie within 35 to 50 mi (56 to
28 80 km) northwest of the boundary—CACA 49150, CACA 49613, and
29 CACA 51369. All of these applications are administered through the
30 El Centro Field Office of BLM.

31
32 The likelihood of any of the regular-track application projects actually being
33 developed is uncertain, but it is generally assumed to be less than that for fast-
34 track applications. The projects are all listed in Table 9.1.22.2-2 for
35 completeness and as an indication of the level of interest in development of
36 solar energy in the region. Some number of these applications would be
37 expected to result in actual projects. Thus, the cumulative impacts of these
38 potential projects are analyzed in their aggregate effects.

39
40
41 **Wind Energy.** Table 9.1.22.2-2 lists ROW grant applications for two pending wind site
42 testing, seven authorized for wind site testing, and two pending wind development facilities
43 within a 50-mi (80-km) radius of the proposed Imperial East SEZ. As shown in
44 Figure 9.1.22.2-1, the locations of the applications lie generally west and northeast of the
45 Imperial East SEZ. The actual development of all 11 proposals is considered pending, however,
46 since they await authorization of development of wind facilities.

TABLE 9.1.22.2-2 Pending Renewable Energy Project ROW Applications on BLM-Administered Land within 50 mi (80 km) of the Proposed Imperial East SEZ^a

Serial No.	Project Name	Application Received	Size (acres ^b)	MW	Technology	Field Office
<i>Solar Applications</i>						
CACA 49150	BCL & Associates Inc.	July 17, 2007	5,464	500	PV	El Centro
CACA 49613	First Solar Development Inc.	Dec. 3, 2007	7,525	500	PV	El Centro
CACA 49615	Pacific Solar Investments Inc.	Sept. 4, 2007	17,807	1500	PV	El Centro
CACA 49884	Solar Reserve, LLC	April 24, 2008	3,830	100	CSP	El Centro
CACA 50174	LSR Midway, Well LLC	Aug. 11, 2008	2,571	400	CSP	El Centro
CACA 51369	Invenergy Solar Development, LLC	Sept. 16, 2009	1,081	50	PV	El Centro
<i>Wind Applications</i>						
<i>Pending Wind Site Testing</i>						
CACA 50770	- ^c	-	-	-	Wind	-
CACA 51947	L.H. Renewables, LLC	March 10, 2010	9,069	65	Wind	El Centro
<i>Authorized Wind Site Testing</i>						
		Application Authorized				
CACA 45248	Pacific Wind Development LLC	Sept. 15, 2004	16,355	-	Wind	El Centro
CACA 47518	GreenHunter Wind Energy LLC assigned to Ocotillo Express LLC	Feb. 3, 2009	6,280	-	Wind	El Centro
CACA 47751	Renewergy, LLC	Jan. 23, 2007	11,187	-	Wind	El Centro
CACA 48004	Ocotillo Renewables, LLC	April 26, 2006	3,208	-	Wind	El Centro
CACA 48272	Imperial Wind	Aug. 16, 2010	1,960	-	Wind	El Centro
CACA 50916	Ocotillo Express, LLC	June 11, 2009	8,757	-	Wind	El Centro
CACA 51062	John Deere Renewables, LLC	April 29, 2009	6,256	-	Wind	El Centro
<i>Pending Wind Development Facility</i>						
CACA 51552	Ocotillo Express, LLC	Oct. 09, 2009	14,691	-	Wind	El Centro
CACA 52078	Imperial Wind	May 28, 2010	2,054	-	Wind	El Centro

Footnotes on next page.

TABLE 9.1.22.2-2 (Cont.)

- ^a Information taken from pending and authorized wind energy projects listed on the BLM California Desert District Web site (BLM 2010d) and downloaded from *GeoCommunicator* (BLM and USFS 2010a). Total solar acres = 38,278; total solar MW = 3,050; total wind acres and MW not available.
- ^b To convert acres to km², multiply by 0.004047.
- ^c A dash indicates data not available.

1 The likelihood of any of these regular-track wind projects actually being developed is
2 uncertain; the projects are all listed to give an indication of the level of interest in development
3 of wind energy in the region. Most are in the wind testing stage and are in the process of
4 preparing Environmental Assessments necessary for project approval.
5

6 The following paragraph describes the Ocotillo Express Project. This proposed project
7 encompasses multiple applications, including two authorized applications for wind testing
8 (CACA 47518 and CACA 50916).
9

- 10 • *Ocotillo Express Project.* Ocotillo Express LLC acquired GreenHunter Wind
11 Energy, LLC's BLM ROW grant (CACA 47518), an additional adjacent
12 ROW (CACA 50916), and a small amount of private land, together totaling
13 approximately 15,000 acres (61 km²) of land for a proposed 561-MW wind
14 generation facility. The electricity would flow to the proposed Sunrise
15 Powerlink 500-kV transmission line from Imperial County to San Diego
16 County. The proposed project site is located near Ocotillo, borders the Anza-
17 Borrego Desert State Park, and is about 40 mi (64 km) west of the SEZ.
18

19 The project would be in operation by the end of 2012 and is expected to
20 employ 400 workers over the two-year construction period. Special status
21 wildlife species of concern include the flat-tailed horned lizard and peninsular
22 bighorn sheep. In total, approximately 61.4 ac-ft (76,000 m³) of water would
23 be needed during construction (Anza-Borrego Desert State Park 2010).
24
25

26 ***Geothermal Energy.*** Imperial County contains some of the most productive geothermal
27 resource areas in the United States. Within the El Centro FO management area, 118,720 acres
28 (480 km²) of land are identified as having geothermal resource potential (BLM 2008b). This
29 acreage is divided into seven Known Geothermal Resource Areas: Dunes, East Brawley, East
30 Mesa, Glamis, Heber, Salton Sea, and South Brawley.
31

32 Three producing and one authorized geothermal leases are located within a 50-mi
33 (80-km) radius of the proposed Imperial East SEZ, as listed in Table 9.1.22.2-1 and shown in
34 Figure 9.1.22.2-1. These geothermal leases are within 5 mi (8 km) northwest of the SEZ and
35 within the East Mesa KGRA. The producing leases (CACA 6217, CACA 6218, and
36 CACA 17568) are all owned by Orresource Geothermal.
37

- 38 • *Black Rock 1,2, and 3 Geothermal Power Project.* Formerly named the Salton
39 Sea Geothermal Unit 6 Power Project, CE Obsidian Energy, LLC (Applicant)
40 currently possesses a license to construct a geothermal generating plant on an
41 80-acre (0.3-km²) site in Imperial County, California. The project was
42 designated as Salton Sea Unit 6 (docket # 02-AFC-2) and was originally
43 granted a license by the California Energy Commission in December 2003 for
44 a 185-MW plant. The original 2003 license was amended in May 2005 to
45 enable the plant to increase its capacity to 215 MW. The applicant petitioned,

1 and the California Energy Commission subsequently granted, an extension to
2 the Salton Sea Unit 6 license, making it effective until December 18, 2011.
3 The applicant is now proposing to amend its license to allow for the
4 construction of three smaller geothermal plants totaling 159 MW net of
5 generating capacity. Both the 185-MW and 215-MW projects proposed using
6 multiple flash geothermal power generating technology, while the amended
7 project proposes single flash technology, which requires less facility
8 infrastructure and produces less waste compared to multiple flash technology.
9

10 The three units will be colocated on the same site as the original Salton Sea
11 Unit 6 project and will share various common auxiliary facilities. The site is
12 currently used for agriculture. Land uses in the surrounding area include
13 existing geothermal power facilities, agriculture, and the Sonny Bono Salton
14 Sea National Wildlife Refuge. The original project site covered 80 acres
15 (0.32 km²) bounded on the north by McKendry Road, on the east by Boyle
16 Road, on the west by Severe Road, and on the south by Peterson Road. The
17 Amended Project includes the original 80-acre (0.32-km²) site plus an
18 additional 80 acres (0.32 km²) adjacent to the south, part of which was used
19 for construction support in the original project. The three power plants would
20 be situated generally in the middle of the site, with production well pads on
21 the northern, western, and southern perimeters of the site (CEC 2009b).
22
23

24 **Transmission and Distribution**

25
26 Existing transmission lines near the Imperial East SEZ include the Southwest Powerlink
27 transmission line and the IID Transmission System.
28
29

30 ***Existing Southwest Powerlink 500-kV Transmission Line.*** The Southwest Powerlink
31 500-kV transmission line, extending from the Palo Verde Nuclear Generating Station in Arizona
32 to the San Diego, California, area, crosses just to the south of the Imperial East SEZ close to the
33 United States–Mexico border near the All-American Canal. This line has been in operation since
34 the 1980s.
35
36

37 ***Upgrades to Imperial Irrigation District 230-kV Transmission Line.*** The IID high-
38 voltage transmission system includes 1,300 mi (2,093 km) of line in Imperial, Riverside, and
39 San Diego Counties. The IID operates a 115-kV transmission line that crosses the Imperial East
40 SEZ. The IID provides electricity for more than 145,000 customers from hydroelectric power
41 units located on the All-American Canal and from gas-fired power plants (CEC 2010).
42

43 In October 2009, IID staff issued a Draft Mitigated Negative Declaration to be considered
44 by the IID Board of Directors in December 2009 on a proposal to upgrade the existing 230-kV
45 “S” line that runs from the IID/SDG&E Imperial Valley Substation located on BLM lands
46 approximately 10 mi (16 km) southwest of the city of El Centro and terminating at the El Centro

1 Switching Station. The project consists of upgrading an approximate 18 mi (29 km) of 230-kV
2 overhead transmission line by installing approximately 285 new double circuit steel poles,
3 including all existing polymer horizontal insulators, to replace the existing wood poles
4 supporting a single 230-kV circuit. The Draft Mitigated Negative Declaration concluded that
5 impacts of the project would be less than significant if mitigations for the burrowing owl, Yuma
6 clapper rail, and flat-tailed horned lizard are implemented (IID 2009b).

7
8
9 ***Upgrades for Imperial Valley Solar Project Transmission.*** This project would include
10 the construction of a new 230-kV substation at the center of the Imperial Valley Solar Project
11 and would connect to the SDG&E Imperial Valley Substation via an approximate 10-mi
12 (16-km), double-circuit, 230-kV transmission line. The transmission line would parallel the
13 Southwest Powerlink transmission line within the designated ROW.

14
15 Other than this interconnection transmission line, no new transmission lines or off-site
16 substations would be required for the Phase I construction of Imperial Valley Solar Project. The
17 full Phase II expansion of the solar project would require the construction of the 500-kV Sunrise
18 Powerlink transmission line project proposed by SDG&E (CEC 2008) as described below.

19
20
21 ***New Sunrise Powerlink 500-kV Transmission Line.*** In December 2008, the CPUC
22 granted a Certificate of Public Convenience and Necessity to SDG&E to construct and operate
23 the Sunrise Powerlink 500-kV transmission line. The line is scheduled to go into service in late
24 2012. The line would be a new 500/230-kV transmission line extending westward north and
25 south of I-8 for about 123 mi (198 km) from the Imperial Valley Substation in Imperial County
26 to the western part of San Diego County. The portion of the line in Imperial County is a 500-kV
27 line that extends westward from the Imperial Valley substation to a new 500/230 Suncrest
28 Substation south of I-8 and east of the community of Alpine. The line then proceeds as a 230-kV
29 line north of I-8 into the Sycamore Canyon Substation on the MCAS Miramar (CPUC
30 2008, 2010).

31 32 33 ***9.1.22.2.2 Other Actions***

34
35 Other actions of relevance in the vicinity of the SEZ are as follows:

- 36
37 • ***Existing Imperial Irrigation District Hydroelectric Power Plants.*** The IID
38 operates 14 hydroelectric power units at 7 locations along the All-American
39 Canal in Imperial County, California (IID 2010b). Two of the seven locations
40 are near the Imperial East SEZ. The All-American Canal draws water from
41 the Colorado River near Yuma, Arizona, that is transported to the Imperial
42 Valley for use primarily for crop irrigation. IID's installed hydroelectric
43 generation capacity totals 84 MW (GE 2004).
44
- 45 • ***North Baja Pipeline Expansion Project.*** In October 2007, the Federal Energy
46 Regulatory Commission (FERC) approved a request of North Pipeline LLC to

1 construct an 80-mi (128-km) liquefied natural gas pipeline from Ehrenberg,
2 Arizona, through Riverside and Imperial Counties, California, to a connection
3 point with the Gasoducto Bajanorte Pipeline at the U.S.–Mexico border. The
4 connection point is located between Yuma and the Imperial East SEZ
5 (FERC 2010; BLM 2001b). The portion of the North Baja pipeline that
6 crosses Imperial County is located east of the Imperial East SEZ and near the
7 southeast corner of the Imperial Sand Dunes.
8

- 9 • *Proposed West Chocolate Mountains Renewable Energy Evaluation Area.* In
10 a February 10, 2010 Notice of Intent (NOI) in the *Federal Register*, the BLM
11 El Centro Field Office announced its intent to prepare an EIS to consider an
12 amendment to the CDCA Plan to identify whether 21,300 acres (86.2 km²)
13 of BLM-administered lands within the West Chocolate Mountains area should
14 be made available for geothermal, solar, or wind energy development. The
15 Evaluation Area lies about 25 mi (40 km) north of the proposed Imperial
16 East SEZ in Riverside County, east of Niland and northeast of El Centro,
17 California. Cumulative impacts at this distance would affect mainly ecological
18 and socioeconomic resources.
19
20

21 **9.1.22.3 General Trends**

22 **9.1.22.3.1 Population Growth**

23
24
25
26 Table 9.1.22.2-3 presents recent and projected populations in the 50-mi (80-km) radius
27 ROI and in California as a whole. Population in the ROI stood at 387,798 in 2008, having grown
28 at an average annual rate of 3.2% since 2000. Growth rates for the two counties in the ROI were
29 higher than those for California (1.4%) over the same period.
30

31 Both counties in the ROI experienced growth in population since 2000; population in
32 Imperial County grew at an annual rate of 3.0% between 2000 and 2008, while in Yuma County,
33 population grew by 3.3% over the same period. The ROI population is expected to increase to
34 519,735 by 2021 and to 583,043 by 2023 (California Department of Finance 2010).
35
36

37 **9.1.22.3.2 Energy Demand**

38
39 The growth in energy demand is related to population growth through increases in
40 housing, commercial floor space, transportation, manufacturing, and services. With population
41 growth expected in Imperial, Riverside, and San Bernardino Counties between 2006 and 2016,
42 an increase in energy demand is also expected. However, the Energy Information Administration
43 (EIA) projects a decline in per-capita energy use through 2030, mainly because of improvements
44 in energy efficiency and the high cost of oil throughout the projection period. Primary energy
45 consumption in the United States between 2007 and 2030 is expected to grow by about 0.5%
46

TABLE 9.1.22.2-3 ROI Population for the Proposed Imperial East SEZ

Location	2000	2008 ^a	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Yuma County, Arizona	160,026	207,305	3.3	276,132	285,531
Imperial County, California	142,361	180,493	3.0	243,603	252,512
ROI	302,387	387,798	3.2	519,735	583,043
Arizona	5,130,632	6,622,885	3.2	8,945,447	9,271,163
California	34,105,437	38,129,628	1.4	44,646,420	45,667,413

^a Data are averages for the period 2006 to 2008.

Sources: U.S. Bureau of the Census (2009d); Arizona Department of Commerce (2010); California Department of Finance (2010).

each year. The fastest growth is projected for the residential, commercial, and industrial sector (RCI), which is expected to grow by about 5% (residential), 0.4% (commercial), and 0.19% (industrial) each year (EIA 2009).

9.1.22.3.3 Water Availability

Water used in the vicinity of the Imperial East SEZ comes primarily from surface water provided by irrigation canals. There are no surface water features on the proposed Imperial East SEZ, but several irrigation canals and small washes are located within the Imperial Valley. The All-American Canal flows along the southern boundary of the proposed SEZ. The canal diverts Colorado River water at the Imperial Dam (located 35 mi [56 km] west of the SEZ) to the agricultural fields of the Imperial Valley to the north and west of the proposed SEZ. Annual average flows in the canal coming out of the Colorado River ranged between 2.8 million and 3.7 million ac-ft/yr (3.5 billion to 4.6 billion m³/yr) for the period of 1962 to 1992 (USGS 2010b; stream gauge 09527500).

The majority of groundwater wells in the Imperial Valley are used for irrigation and are located in the agricultural portion of the valley (5 mi [8 km] west of the proposed SEZ). Reported groundwater well yields range between 45 and 1,550 gpm (170 and 5,687 L/min) (Loeltz et al. 1975). In 2005, water withdrawals from surface waters and groundwater in Imperial County were 2.4 million ac-ft/yr (2.9 billion m³/yr), of which 98% came from surface waters and was used primarily for irrigating agricultural fields. The majority of this water is imported into the Imperial Valley from the Colorado River. Total groundwater withdrawal was 46,000 ac-ft/yr (57 million m³/yr), which was primarily used for irrigation. Municipal and domestic water uses totaled 34,000 ac-ft/yr (42 million m³/yr), and industrial and thermoelectric power uses totaled 3,000 ac-ft/yr (3.7 million m³/yr) (Kenny et al. 2009).

1 Groundwater levels have remained steady in the region for several decades because of
2 relatively constant recharge rates (CDWR 2003). Three USGS wells located in the desert portion
3 of the Imperial Valley also show steady groundwater elevations, ranging from 23 to 47 ft (7 to
4 14 m) below the surface (USGS 2010b; well numbers 324242115073501, 324340115073401,
5 324632115011001).

6
7 Recharge to the Imperial Valley groundwater basin is primarily through irrigation returns,
8 Colorado River recharge, seepage under unlined canals, surface runoff from surrounding higher
9 elevations, underflow from the Mexicali Valley to the south, and direct runoff and percolation
10 of precipitation (CDWR 2003). Discharge of groundwater is primarily through irrigation
11 withdrawals, losses to streams, and evapotranspiration (Tompson et al. 2008). A groundwater
12 model based on data from 1970 to 1990 suggests that the total recharge by irrigation returns and
13 seepage under canals was 250,000 ac-ft/yr (308 million m³/yr) and underflow recharge was
14 173,000 ac-ft/yr (213 million m³/yr), while total discharge from the basin was 439,000 ac-ft/yr
15 (541 million m³/yr) (CDWR 2003). Recharge by precipitation runoff and infiltration was
16 estimated to be less than 10,000 ac-ft/yr (12 million m³/yr) (Loeltz et al. 1975). Recharge from
17 seepage may be overestimated because of a 1980 project that lined a 49-mi (79-km) stretch of the
18 Coachella Canal with concrete and an ongoing project to line 23 mi (37 km) of the All-American
19 Canal, including the reach along the south portion of the proposed Imperial East SEZ, scheduled
20 to be completed in early 2010 (CDWR 2003, 2009; IID 2009a). The lining of that portion of the
21 canal is expected to save 67,700 ac-ft/yr (83.5 million m³/yr) of water (IID 2009a).

22 23 24 **9.1.22.3.4 Climate Change**

25
26 Global warming continues to affect many desert areas in the southwestern United States
27 with increased temperature and prolonged drought during the past 20 to 30 years. A report on
28 global climate change in the United States prepared on behalf of the National Science and
29 Technology Council by the U.S. Global Research Program documents current temperature and
30 precipitation conditions and historic trends, and projects impacts during the remainder of the
31 twenty-first century through modeling using low and high scenarios of GHG emissions. The
32 report summarizes the science of climate change and the recent and future impacts of climate
33 change on the United States (GCRP 2009). The following excerpts from this report indicate that
34 there has been a trend for increasing global temperature and decrease in annual precipitation in
35 desert regions:

- 36
37
- 38 • Average temperature in the United States had increased more than 2°F (1.1°C)
39 over the period of 1957 to 2007.
 - 40 • Southern areas, particularly desert regions of southern Arizona and
41 southeastern California have experienced longer drought and are projected to
42 have more severe periods of drought during the remainder of the twenty-
43 first century. Much of the Southwest has experienced drought conditions since
44 1999. This period represents the most severe drought in 110 years.
- 45

- 1 • The incidence of wildfires in the western United States has increased in recent
2 decades because of increased drought.
- 3
- 4 • Temperature increases in the next 20 to 30 years are expected to be strongly
5 correlated with past emissions of heat-trapping gases such as carbon dioxide
6 and methane.
- 7
- 8 • Many extreme weather events have increased both in frequency and intensity
9 during the last 40 to 50 years. Precipitation and runoff are expected to
10 decrease in the Southwest in spring and summer based on current data and
11 anticipated temperature increases. Water use will increase over the next
12 several decades as the population of southern California grows, resulting in
13 trade-offs between competing uses.
- 14
- 15 • Climate project models also show a 10 to 20% decline in runoff in California
16 and Nevada for the period of 2041 to 2060 compared with data from 1901 to
17 1970 used as a baseline.
- 18
- 19 • In the Southwest average temperatures increased about 1.5°F (0.8°C) in 2000
20 compared to a baseline period of 1960 to 1979. By the year 2020 temperatures
21 are projected to rise 2 to 3°F (1.1 to 1.7°C) above the 1960 to 1979 baseline.
- 22

23 Increased global temperatures from GHG emissions will likely continue to exacerbate
24 drought in the southern California deserts. The State of California has prepared several reports
25 of climate change impact predictions for the remainder of the twenty-first century that address
26 topics such as economics, ecosystems, water use/availability, impacts of Santa Ana winds,
27 agriculture, timber production, and snowpack. The California climate change portal Web site
28 (<http://www.climatechange.ca.gov/publications/cat/index.html>) lists the Climate Action Team
29 reports that are submitted to the governor and state legislature. These reports are included as
30 final papers of the CEC's Public Interest Energy Research Program.

31 32 33 **9.1.22.4 Cumulative Impacts on Resources**

34
35 This section addresses potential cumulative impacts in the 5,722-acre (23-km²)
36 proposed Imperial East SEZ on the basis of the following assumptions: (1) because of the
37 relatively small size of the proposed SEZ (less than 10,000 acres [40.5 km²]), only one project
38 would be constructed at a time, and (2) maximum total disturbance over 20 years would be
39 about 4,578 acres (18.5 km²) (80% of the entire proposed SEZ). For purposes of analysis, it is
40 also assumed that no more than 3,000 acres (12.1 km²) would be disturbed per project annually
41 and 250 acres (1.01 km²) monthly on the basis of construction schedules planned in current
42 applications. An existing 115-kV transmission line intersects the southwest corner of the SEZ;
43 therefore, for this analysis, the impacts of construction and operation of new transmission lines
44 were not assessed. Regarding site access, because I-8 runs along the northeast border and State
45 Route 98 crosses the SEZ along its southern edge, no major road construction activities outside
46 of the SEZ would be needed for development to occur in the SEZ.

1 Cumulative impacts that would result in each resource area from the construction,
2 operation, and decommissioning of solar energy development projects within the proposed SEZ
3 when added to other past, present, and reasonably foreseeable future actions described in the
4 previous section are discussed below. At this stage of development, because of the uncertain
5 nature of the future projects in terms of location within the proposed SEZ, size, number, and
6 the types of technology that would be employed, the impacts are discussed qualitatively or
7 semiquantitatively, with ranges given as appropriate. More detailed analyses of cumulative
8 impacts would be performed in the environmental reviews for the specific projects in relation
9 to all other existing and proposed projects in the geographic areas.

10 11 12 **9.1.22.4.1 Lands and Realty**

13
14 The proposed Imperial East SEZ contains BLM-administered lands within a triangle
15 bordered by I-8 and State Route 98 on the north and south, respectively, and by the Lake
16 Cahuilla ACEC on the west. Land within the SEZ is undeveloped. Immediately to the south lie
17 several transmission lines, the All-American Canal and associated facilities, and the international
18 boundary fence. BOR and state lands lie in close proximity to the SEZ, while the general area is
19 rural in character. The IID holds a public water reserve on all lands in the SEZ, while a 2-mi
20 (3-km) wide Section 368 energy corridor covers about 80% of the SEZ.

21
22 Construction of utility-scale solar energy facilities within the SEZ would preclude its use
23 for other purposes and would introduce a new and discordant land use to the area. In addition, it
24 is possible that 640 acres (2.6 km²) of state lands, as well as 980 acres (4 km²) of Reclamation
25 Withdrawn lands, within the external boundaries of the SEZ could be developed in a similar
26 fashion. The BOR parcel is within in a solar ROW application that includes the eastern half of
27 the SEZ.

28
29 Seven solar projects and 11 wind projects with ROW applications totaling over
30 124,000 acres (502 km²) are proposed within a 50-mi (80-km) radius of the Imperial East SEZ
31 (see Table 9.1.22.2-2 and Figure 9.1.22.2-1). One of the solar applications is a fast-track project
32 that includes about 6,500 acres (26 km²) (see Section 9.1.22.2.1). Should this proposed level of
33 development occur along with accompanying transmission lines, roads, and other infrastructure
34 within the geographic extent being considered for this SEZ, the character of the CDCA could be
35 dramatically changed. While development of other renewable energy projects could occur, due to
36 the relatively small size of the SEZ the contribution to cumulative impacts from utility-scale
37 solar projects in the SEZ is expected to be minor.

38 39 40 **9.1.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics**

41
42 The Imperial Sand Dunes Recreation Area, several ACECs, the Juan Bautista de Anza
43 National Historic Trail, and the All-American Canal Mitigation Wetlands are the only specially
44 designated areas that are in close proximity to the proposed Imperial East SEZ. No significant
45 impacts associated with development of the SEZ were identified. Construction of utility-scale
46 solar energy facilities within the SEZ in combination with potential and likely development of

1 other renewable energy projects, accompanying infrastructure, and other foreseeable
2 developments within the geographic extent of effects would not likely cumulatively contribute
3 to the visual impacts on these specially designated areas. The ACECs adjacent to the SEZ were
4 identified as being potentially susceptible to damage from an increase in the amount of human
5 traffic in or near them, and additional effects from activities away from the SEZ are not likely
6 to contribute to an increase in the level of potential impact.
7
8

9 **9.1.22.4.3 Rangeland Resources**

10
11 The SEZ is not included within a grazing allotment. Therefore, utility-scale solar
12 development would not affect livestock grazing.
13

14 Because the proposed Imperial East SEZ is about 20 mi (32 km) or more from the nearest
15 wild horse or burro HMA, solar energy development would not contribute to cumulative impacts
16 on wild horses and burros managed by the BLM.
17

18 19 **9.1.22.4.4 Recreation**

20
21 Because of the nature of the land in the SEZ, there is very little recreation use occurring
22 there; therefore, the impact of solar energy development within the SEZ on recreation use is
23 expected to be minimal and would not contribute significantly to any cumulative loss of
24 recreation opportunities in the geographic area.
25

26 27 **9.1.22.4.5 Military and Civilian Aviation**

28
29 The proposed Imperial East SEZ is entirely covered by two MTRs and an SUA. These
30 are part of a very large, interconnected system of training routes throughout the Southwest. The
31 development of any solar energy or transmission facilities that encroach into the airspace of
32 MTRs would create safety issues and would conflict with military training activities. The DoD
33 has indicated a concern for any facilities taller than 100 ft (30 m) above ground level in this area,
34 which would include power towers. With potential solar development occurring throughout the
35 region, not only in SEZs, maintaining a large-picture view of the overall effects on the system of
36 MTRs will be necessary to avoid cumulative effects.
37

38 The Mexicali airport in Mexico about 5 mi (8 km) southwest of the SEZ is the only
39 regional airport close enough to be potentially affected by solar facilities in the SEZ. With
40 mitigations in place, there would be no contribution to cumulative impacts on civilian aviation
41 facilities.
42
43
44

1 **9.1.22.4.6 Soil Resources**
2

3 Ground-disturbing activities (e.g., grading, excavating, and drilling) during the
4 construction phase of a solar project, including any new associated transmission lines, would
5 contribute to the soil loss due to erosion. Construction of new roads or improvements to existing
6 roads within the SEZ would also contribute to soil erosion. During construction, operations, and
7 decommissioning of the solar facilities, worker travel and other road use would also contribute to
8 soil loss. These losses would be in addition to losses occurring as a result of disturbance caused
9 by other users in the area, including from construction and operation of other new or existing
10 geothermal energy facilities that lie within 10 mi (16 km) to the northwest of the facility
11 (Figure 9.1.22.2-1). As discussed in Section 9.1.7.3, programmatic design features would
12 be employed to minimize erosion and loss of soil during the construction, operation, and
13 decommissioning phases of the solar facilities and any associated transmission lines. Because of
14 the generally low level of soil disturbance activities within the geographic extent of effects and
15 with the expected design features in place, cumulative impacts from the disturbance of soils
16 would be small.
17

18
19 **9.1.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)**
20

21 No locatable mining claims or oil and gas leases occur within the proposed Imperial East
22 SEZ. Public land in the SEZ was closed in June 2009 to locatable mineral entry pending the
23 outcome of this PEIS. The area remains open for discretionary mineral leasing, including leasing
24 for oil and gas and other salable minerals. About 60% of the SEZ is included within a KGA.
25 There is an operating geothermal plant about 3 mi (2.4 km) northwest of the SEZ.
26

27 Solar energy development in the proposed SEZ would foreclose opportunities for future
28 mineral development that would be inconsistent with solar energy facilities as long as they are
29 in place. However, since there are no oil and gas leases in the area nor does the area contain
30 existing mining claims, it is assumed there would be no loss of locatable mineral production
31 there in the future. The impact of the loss of surface development of geothermal resources on
32 3,462 acres (14 km²) within the KGRA would be a minor impact, while the cumulative impacts
33 from the solar energy development in the proposed SEZ on mineral resources would be small.
34

35
36 **9.1.22.4.8 Water Resources**
37

38 The water requirements for various technologies if they were to be employed on the
39 proposed SEZ to develop utility-scale solar energy facilities are described in Section 9.1.9.2. If
40 the SEZ were to be fully developed over 80% of its available land area, the amount of water
41 needed during the peak construction year for all evaluated solar technologies would be 1,382 to
42 2,047 ac-ft (1.9 to 2.5 million m³), mainly for fugitive dust control. During operations, the
43 amount of water needed for all evaluated solar technologies would range from 26 to
44 13,746 ac-ft/yr (0.03 to 17 million m³), with PV representing the lower end of this range. Such
45 water use requirements would be sustainable for technologies using dry-cooling, dish engine,
46 and PV systems. However, water use estimates for wet-cooling technologies could potentially

1 cause groundwater drawdown and could potentially disrupt groundwater flow patterns in the
2 Imperial Valley. Drawdown could worsen land subsidence that has been occurring in the valley
3 and could cause cracks in the newly lined All-American Canal and affect water quantities and
4 rights of the IID (Section 9.1.9.2.2).

5
6 There are currently two pending applications for development of a solar energy project
7 within the Imperial East SEZ—applications CACA 49884 and CACA 50174 for proposed
8 100 MW and 400 MW of CSP, respectively (Figure 9.1.22.2-1 and Table 9.1.22.2-1). While
9 these two applications effectively cover the entire SEZ, their combined output of 500 MW is
10 about one-half the maximum estimated 916-MW build-out capacity of the SEZ based on gross
11 assumptions for output per available acre for solar trough technology. On the basis of
12 technology-specific water use rates (Section 9.1.9) and solar trough technology, the combined
13 facilities could require up to 7,200 ac-ft/yr (8.9 million m³/yr) if wet cooled, or 500 ac-ft/yr
14 (0.6 million m³/yr) if dry cooled, assuming 60% operating time in each case. Impacts on the
15 Imperial Valley aquifer could be significant under the wet-cooling scenario, but would be
16 sustainable under the dry-cooling scenario.

17
18 While the Imperial aquifer beneath the proposed SEZ is thought to be in equilibrium,
19 balancing current withdrawals with recharge, it is estimated that the newly lined portion of the
20 All-American Canal near the southern boundary of the proposed SEZ will eliminate up to
21 67,700 ac-ft/yr (83.5 million m³/yr) of recharge to the aquifer (Section 9.1.9.1.2). In addition, an
22 approved geothermal lease agreement, CACA 018092X, is about 7 mi (11 km) northwest of the
23 proposed SEZ (Figure 9.1.22-1), which could result in further withdrawals from the aquifer for
24 cooling water. Contributions to cumulative impacts on groundwater from solar development in
25 the SEZ should be viewed in the context of groundwater dynamics that are heavily affected by
26 irrigation water returns and leakage from the All-American Canal. In this already highly
27 influenced context, cumulative impacts on groundwater from currently foreseeable projects
28 within the geographic extent of effects are expected to be variable but small overall.

29
30 Similarly, with respect to wastewaters, the small quantities of sanitary wastewater that
31 would be generated during the construction and operation of the potential utility-scale solar
32 energy facilities within the proposed Imperial East SEZ in combination with similarly small
33 volumes from other foreseeable projects would not be expected to strain available sanitary
34 wastewater treatment facilities in the general area of the SEZ. Blowdown water from cooling
35 towers for wet-cooled technologies would be treated within a project site (e.g., in settling ponds)
36 and injected into the ground, released to surface water bodies, or reused and thus would not
37 contribute cumulative impacts to any nearby treatment systems.

38 39 **9.1.22.4.9 Vegetation**

40
41
42 The proposed Imperial East SEZ is located within the Sonoran Basin and Range
43 ecoregion (EPA 2007), which supports creosotebush (*Larrea tridentata*)-bur sage (*Ambrosia* sp.)
44 plant communities with large areas of palo verde (*Parkinsonia* sp.) cactus shrub and saguaro
45 cactus (*Carnegiea gigantea*) communities. One wetland mapped by the *National Wetlands*
46 *Inventory* extends into the south-central portion of the SEZ, south of State Route 98

1 (USFWS 2009). The wetland is supported by seepage from the All-American Canal, located to
2 the south (Figure 9.1.1.10-2) of the SEZ and is classified as a palustrine wetland with a scrub-
3 shrub plant community that is temporarily flooded. Wetlands within the 5-mi (8-km) indirect
4 impact area include those associated with the canal. If utility-scale solar energy projects were
5 constructed within the SEZ, all vegetation within the footprints of the facilities would likely be
6 removed during land-clearing and land-grading operations. The plant communities affected
7 could include any of the communities occurring on the SEZ.
8

9 With respect to other, ongoing actions, a large portion of the Imperial Valley has been
10 converted to agricultural land via irrigation, beginning about 3 mi (5 km) west of the SEZ. This
11 conversion has had the largest overall ongoing impact on vegetation in Imperial County. Past
12 impacts on major cover types located in the central Imperial Valley would have been large due
13 to the extensive land area converted. The major cover type affected would have been the Sonora-
14 Mojave Creosotebush-White Bursage Desert Scrub, which is still dominant in undeveloped
15 areas. In addition, changes in wetland boundaries may occur in some areas subsequent to the
16 lining of portions of the All-American Canal and associated wetland mitigation programs
17 (BOR 2006).
18

19 Other renewable energy projects proposed within a 50-mi (80-km) radius of the Imperial
20 East SEZ include two producing geothermal facilities located about 3 mi (5 km) to the north and
21 a third authorized geothermal lease located about 6 mi (10 km) to the northwest of the SEZ.
22 Additionally, there are as many as 7 proposed solar projects and 11 proposed wind projects with
23 pending applications on public land within a 50-mi (80-km) radius of the SEZ, including two
24 solar applications within the SEZ (Section 9.1.22.2 and Figure 9.1.22.2-1). Renewable energy
25 projects, particularly solar, would have the greatest future potential to affect vegetation due to the
26 large acreages that might be cleared. However, only one solar application and no wind
27 applications are located within 20 mi (32 km) of the SEZ. The magnitude of such effects would
28 depend on the actual development of renewable energy projects within and outside the SEZ and
29 accompanying transmission lines, roads, and other infrastructure within the geographic extent of
30 effects.
31

32 Since the major cover type present on the SEZ, Sonora-Mojave Creosotebush-White
33 Bursage Desert Scrub, is still abundant within the geographic extent of effects, outside of the
34 agricultural areas, and a relatively small fraction of this area would be further affected by
35 foreseeable actions, cumulative impacts on this cover type from foreseeable developments are
36 expected to be small. Minor cover types, including the dune habitat in the eastern portion of
37 the SEZ and extending eastward, and riparian woodland/shrubland habitats along the southern
38 edge of the SEZ and extending to the All-American Canal could incur greater cumulative
39 impacts due to their sensitivity and the rareness of these cover types within the geographic
40 extent of effects. Programmatic design features would be adopted to protect these areas.
41

42 In addition, the cumulative effects of fugitive dust generated during the construction of
43 the solar facilities along with other activities in the area, such as transportation and recreation,
44 could increase the dust loading in habitats outside a solar project area, which could result in
45 reduced productivity or changes in plant community composition. Programmatic design features

1 would be implemented to reduce the impacts from solar energy projects and thus reduce the
2 overall cumulative impacts on plant communities and habitats.

3 4 5 **9.1.22.4.10 Wildlife and Aquatic Biota** 6

7 As many as 158 species of amphibians (1 species), reptiles (27 species), birds
8 (90 species), and mammals (40 species) occur in and around the proposed Imperial East SEZ
9 (Section 9.1.11). The construction of utility-scale solar energy projects in the SEZ and any
10 associated transmission lines and roads in or near the SEZ would have an impact on wildlife
11 through habitat disturbance (i.e., habitat reduction, fragmentation, and alteration), wildlife
12 disturbance, loss of connectivity between natural areas (e.g., habitat fragmentation and blockage
13 of dispersal corridors for bighorn sheep and desert tortoise), and wildlife injury or mortality. In
14 general, impacted species with broad distributions and occurring in a variety of habitats would be
15 less affected than species with a narrowly defined habitat within a restricted area. Programmatic
16 design features include pre-disturbance biological surveys to identify key habitat areas used by
17 wildlife, followed by avoidance or minimization of disturbance to those habitats (e.g., avoiding
18 development in dune and riparian areas).
19

20 In addition, up to 7 other solar projects, 11 wind projects, and 1 geothermal project have
21 pending applications on public lands within 50 mi (80 km) of the SEZ, including two within the
22 proposed Imperial East SEZ (Section 9.1.22.2 and Figure 9.1.22.2-1). Renewable energy
23 projects, particularly solar, would have the greatest future potential to affect wildlife due to the
24 large areas covered by such projects. However, only one solar application and no wind
25 applications are within 20 mi (32 km) of the SEZ. The magnitude of cumulative impacts from
26 renewable energy projects would depend on actual development and accompanying transmission
27 lines, roads, and other infrastructure within the geographic extent of effects. Since many of the
28 wildlife species have extensive available habitat within the geographic extent of effects and a
29 relatively small fraction of the area would be affected by foreseeable projects, the cumulative
30 impact on most wildlife species is expected to be small. Programmatic design features would be
31 used to reduce the impacts from solar energy projects and thus reduce the overall cumulative
32 impacts on wildlife. However, cumulative impacts on wildlife species within dune or riparian
33 habitats, such as exist on or near the SEZ, might be somewhat higher due to the sensitivity and
34 scarcity of these habitats.
35

36 Similarly, aquatic biota present in wetlands along the southern border of the SEZ,
37 extending southward to the All-American Canal, would be of concern for cumulative impacts.
38 Historically, these wetlands developed only after the construction of the All-American Canal in
39 the 1930s (Cohn 2004) and continue to be supported by water seepage from the canal.
40 Cumulative impacts on these wetlands and associated aquatic biota could occur because of
41 reduction in seepage water supply resulting from lining the canal, drawdown of groundwater by
42 solar facilities, and the possibility of off-site impacts from ground disturbance within the SEZ.
43 Increased future demands on water from the Colorado River, which supplies the All-American
44 Canal, could also affect surface water levels in the canal and, as a consequence wetlands and
45 aquatic organisms. Avoidance of wetlands within the SEZ and off-site and implementation of
46 development best management practices could minimize the effects of ground disturbance on

1 these wetlands. Also, it is assumed that water for solar energy development would not come
2 from the All-American Canal, and therefore water levels in the associated wetlands should not
3 be affected.
4

5
6 ***9.1.22.4.11 Special Status Species (Threatened, Endangered, Sensitive,
7 and Rare Species)***
8

9 Six special status species are known to occur within the affected area of the Imperial East
10 SEZ: California black rail, giant Spanish-needle, sand food, flat-tailed horned lizard, Yuma
11 clapper rail, and Yuma hispid cotton rat. The USFWS determined that the desert tortoise is
12 absent from the affected area. The flat-tailed horned lizard, proposed for listing as an ESA-
13 threatened species, is known to occur in the vicinity of the SEZ, while potentially suitable habitat
14 (desert dune and pavement) occurs on the SEZ (Section 9.1.12.1.2). Numerous additional species
15 occurring on or in the vicinity of the SEZ are listed as threatened or endangered by the states of
16 California or Arizona, or listed as a sensitive species by the BLM. Programmatic design features
17 that could reduce or eliminate the potential for cumulative effects on these species from the
18 construction and operation of utility-scale solar energy projects within the geographic extent of
19 effects include avoidance of habitat and minimization of erosion, sedimentation, and dust
20 deposition. In addition, translocation could be used to minimize take of individuals.
21

22 A number of reasonably foreseeable future actions are possible in the geographic extent
23 of effects of the proposed Imperial East SEZ, including seven solar and eleven wind project
24 applications. Many of the same sensitive species or suitable habitat identified within or around
25 the Imperial East SEZ would likely occur in or around the proposed locations of these potential
26 projects. The actual species of concern or suitable habitat would be identified in biological
27 surveys that would need to be performed as project applications move forward. Effects on
28 identified species or suitable habitat would be assessed in required environmental reviews.
29 Approved projects in these and other areas would employ design features to reduce or eliminate
30 the impacts on protected species as required by the ESA and other applicable federal and state
31 laws and regulations.
32

33 Depending on the number and size of other projects that will be built within the next
34 20 to 30 years in the geographic extent of effects, there could be cumulative impacts on protected
35 species due to habitat destruction and overall development and fragmentation of the area.
36 Habitats that are particularly at risk are the dune, wetland, and riparian woodland habitats present
37 on the Imperial East SEZ, which are scarce habitats sensitive to the effects of development. Most
38 of the identified foreseeable actions are located more than 20 mi (32 km) from the SEZ and
39 would not affect substantial portions of sensitive habitats present on or near the SEZ. Thus
40 cumulative impacts from such future projects are expected to be small. However, considering
41 habitat loss from the conversion of much of the central Imperial Valley to agriculture, total
42 cumulative impacts on sensitive species from past and future actions could be moderate.
43
44
45

1 **9.1.22.4.12 Air Quality and Climate**
2

3 While solar energy generates minimal emissions compared with fossil fuels, the site
4 preparation and construction activities associated with solar energy facilities would produce
5 some emissions, mainly particulate matter (fugitive dust) and emissions from vehicles and
6 construction equipment. When these emissions are combined with those from other projects near
7 solar energy development or when they are added to natural dust generation from winds and
8 windstorms, the air quality in the general vicinity of the projects could be temporarily degraded.
9 For example, particulate matter (dust) concentration at or near the SEZ boundaries could at times
10 exceed state or federal ambient air quality standards. The dust generation from the construction
11 activities can be controlled by implementing aggressive dust control measures, such as increased
12 watering frequency, or road paving or treatment.
13

14 Several other renewable energy projects are proposed or planned within the air basin
15 shared by the proposed Imperial East SEZ (Section 9.1.22.2.1 and Figure 9.1.22.2-1). A total of
16 7 solar and 11 wind proposals are pending within 50 mi (80 km) of the Imperial East SEZ. These
17 projects potentially in combination with others with pending applications could produce periods
18 of elevated particulate emissions within the 50-mi (80-km) geographic extent of effects. Since
19 the proposed solar projects, which involve the greatest area of ground disturbance, are more than
20 20 mi (32 km) from the proposed Imperial East SEZ and are widely separated, cumulative
21 impacts are expected to be small.
22

23 Over the long term and across the region, the development of solar energy may have
24 beneficial cumulative impacts on the air quality and atmospheric values in southern California
25 by offsetting the need for energy production from fossil fuels that results in higher levels of
26 emissions. As discussed in Section 9.1.13, air emissions from operating solar energy facilities
27 are relatively minor, while the displacement of criteria air pollutant, VOC, TAP, and GHG
28 emissions currently produced from fossil fuels could be relative large. For example, if the
29 Imperial East SEZ were fully developed with solar facilities over up to 80% of its area, the
30 quantity of pollutants avoided could be up to 1.5% of all emissions from the current electric
31 power systems in California.
32

33 **9.1.22.4.13 Visual Resources**
34

35 The Imperial Valley is flat and is characterized by wide-open views. A lack of
36 obstructions allow visibility for 50 mi (80 km) or more under favorable atmospheric conditions,
37 while occasional poor air quality can limit visibility. The SEZ presents a flat, open landscape,
38 mostly treeless, but with shrubs tall enough in some areas to provide partial screening of views.
39 The landscape is visually dominated by the strong horizon line; the closest visible mountain
40 ranges are too far away to significantly affect the visual values in the vicinity of the SEZ.
41 Cultural modifications on and around the site detract markedly from its scenic quality. These
42 distractions include the presence of major and minor roads, transmission lines, communications
43 towers, and the All-American Canal and its associated infrastructure. The VRI values for the
44 SEZ and immediate surroundings are VRI Class III, indicating moderate relative visual values,
45 and VRI Class IV, indicating low relative visual values. The inventory indicates low scenic
46

1 quality for the SEZ and its immediate surroundings, with moderate sensitivity for the SEZ and its
2 immediate surroundings (Section 9.1.14.1).

3
4 Development of utility-scale solar energy projects within the SEZ would contribute to the
5 cumulative visual impacts in the general vicinity of the SEZ. However, the exact nature of the
6 visual impact and the design features that would be appropriate would depend on the specific
7 project locations within the SEZ and on the solar technologies used for the project. Such impacts
8 and potential design features would be considered in visual analyses conducted for future
9 specific projects. In general, large visual impacts on the SEZ would be expected to occur as a
10 result of the construction, operation, and decommissioning of utility-scale solar energy projects.
11 These impacts would be expected to involve major modification of the existing character of the
12 landscape and could dominate the views for some nearby viewers. Additional impacts would
13 occur as a result of the construction, operation, and decommissioning of related facilities, such as
14 access roads and electric transmission lines.

15
16 Because of the large size of utility-scale solar energy development, other pending
17 renewable energy applications on public lands in the area, and the generally flat, open nature of
18 the proposed SEZ, some lands outside the SEZ would also be subjected to visual impacts related
19 to the construction, operation, and decommissioning of utility-scale solar energy development.
20 Potential impacts would include night sky pollution, including increased skyglow, light spillage,
21 and glare. Some of the affected lands outside the SEZ would include potentially sensitive scenic
22 resource areas, including the North Algodones Dunes scenic ACECs. Other sensitive visual
23 resource areas, including a congressionally designated WA, national historic trail, the CDCA,
24 and I-8 and State Route 98, would be subject to mostly minor or minimal visual impacts. Visual
25 impacts resulting from solar energy development within the SEZ would be in addition to impacts
26 caused by other potential projects in the area, such as other solar facilities on private lands,
27 transmission lines, and other renewable energy facilities, including windmills. The presence of
28 new facilities would normally be accompanied by increased numbers of workers in the area,
29 traffic on local roadways, and support facilities, all of which would add to cumulative visual
30 impacts.

31
32 As many as 7 other solar projects and 11 wind projects have pending applications on
33 public lands within 50 mi (80 km) of the SEZ. The overall extent of cumulative effects of
34 renewable energy development in the area would depend on the number of projects that actually
35 are built. However, since most of the pending applications would be more than 20 mi (32 km)
36 from the proposed SEZ, it may be concluded that the general visual character of the landscape
37 within the geographic extent of effects would not be fundamentally altered. Locally, the SEZ
38 would be transformed from primarily rural desert to utility-scale solar development. The
39 facilities would also be viewable by motorists on I-8 and State Route 98, as well as from the
40 sensitive areas mentioned above. Views from these locations are currently visually affected by
41 transmission line corridors, the All-American Canal, towns, and other infrastructure, as well as
42 the road system itself. Thus, cumulative visual impacts in the region from future solar and other
43 renewable energy development in the region would be small, while total impacts, including those
44 from past developments, would be moderate, due to the moderate visual sensitivity of the region.

1 In addition to cumulative visual impacts associated with views of particular future
2 development, as additional facilities are added several projects might become visible from one
3 location, or in succession, as viewers move through the landscape, such as driving on local roads.
4 In general, the new developments would vary in appearance, and depending on the number and
5 type of facilities, the resulting visual disharmony could add to the cumulative visual impact.
6
7

8 ***9.1.22.4.14 Acoustic Environment***

9

10 The areas around the proposed Imperial East SEZ and in Imperial County, in general,
11 are relatively quiet. The existing noise sources include road traffic from I-8 and State Route 98,
12 industrial activities at hydroelectric power plants and geothermal facilities, agricultural activities,
13 activities and events at nearby communities, and aircraft flyovers, including military,
14 commercial, and private airplanes, crop dusters, and Border Patrol helicopters. The construction
15 of solar energy facilities could increase the noise levels over short durations because of the noise
16 generated by construction equipment during the day. After the facilities are constructed and
17 begin operating, there would be little or minor noise impacts for any of the technologies except
18 from solar dish engine facilities and from parabolic trough or power tower facilities using TES.
19 It is possible that residents could be cumulatively affected by more than one solar or other
20 development built in close proximity of the SEZ, particularly at night when the noise is more
21 discernable because of relatively low background levels. However, such cumulative impacts are
22 unlikely due to attenuation of noise with distance and the sparse population of the region.
23
24

25 ***9.1.22.4.15 Paleontological Resources***

26

27 The potential for impacts on significant paleontological resources at the Imperial East
28 SEZ in Imperial Valley is unknown. The specific sites selected for future projects would be
29 surveyed if determined necessary by the BLM, and paleontological resources encountered would
30 be avoided or mitigated to the extent possible. A similar process would be employed at other
31 foreseeable developments in the area, and no significant cumulative impacts on paleontological
32 resources are expected.
33
34

35 ***9.1.22.4.16 Cultural Resources***

36

37 While much of the proposed Imperial East SEZ has not been surveyed for cultural
38 resources, the area along the All-American Canal south of the SEZ has been found to contain
39 a high density of both prehistoric and historic cultural remains, and the canal itself is an
40 important historic resource. Direct impacts on significant cultural resources during site
41 preparation and construction activities could occur in the SEZ; however, further investigation
42 would be needed, including a cultural resource survey of the entire area of potential effect to
43 identify historic properties (i.e., cultural resources eligible for listing in the NRHP). It is possible
44 that the development of utility-scale solar energy projects in the SEZ, when added to other
45 potential projects likely to occur in the area, could contribute cumulatively to cultural resource
46 impacts. However, historic properties would be avoided or mitigated to the extent possible in

1 accordance with state and federal regulations. Similarly, through ongoing consultation with the
2 California SHPO and appropriate Native American governments, it is likely that most adverse
3 effects on significant cultural resources within the geographic extent of effects could be
4 mitigated to some degree. However, avoidance of all historic properties and mitigation of all
5 adverse effects on historic properties may not be possible.
6
7

8 ***9.1.22.4.17 Native American Concerns*** 9

10 Government-to-government consultation has been initiated with federally recognized
11 Tribes whose traditional use areas include the Imperial East SEZ area in order to identify Tribal
12 concerns regarding solar energy development within the SEZ. Among their concerns is the
13 impairment of culturally and religiously important landscapes, and adverse effects on culturally
14 important native plant and game species. It is likely that the development of utility-scale solar
15 energy projects within the SEZ, when added to other potential projects likely to occur in the area,
16 including renewable energy projects outside the SEZ, would contribute cumulatively to visual
17 impacts on their traditional landscape and the destruction of other resources in the valley
18 important to Native Americans. Continued government-to-government consultation with area
19 Tribes is necessary to effectively consider and address the cumulative impacts of solar energy
20 development in the Imperial East SEZ on resources important to Tribes.
21
22

23 ***9.1.22.4.18 Socioeconomics*** 24

25 Solar energy development projects in the proposed Imperial East SEZ could cumulatively
26 contribute to socioeconomic effects in the immediate vicinity of the SEZs and in the surrounding
27 multicounty ROI. The effects could be positive (e.g., creation of jobs and generation of extra
28 income, increased revenues to local governmental organizations through additional taxes paid by
29 the developers and workers) or negative (e.g., added strain on social institutions such as schools,
30 police protection, and health care facilities). Impacts from solar development would be most
31 intense during facility construction, but of greatest duration during operations. Construction
32 would temporarily increase the number of workers in the area needing housing and services in
33 combination with temporary workers involved in other new projects in the area, including other
34 renewable energy projects. The number of workers involved in the construction of solar projects
35 in the peak construction year could range from about 130 to 1,680, depending on the technology
36 being employed, with solar PV facilities at the low end and solar trough facilities at the high end.
37 The total number of jobs created in the area could range from approximately 210 (solar PV) to as
38 high as 2,830 (solar trough).
39

40 Cumulative socioeconomic effects in the ROI from construction of solar facilities would
41 occur to the extent that multiple construction projects of any type were occurring at the same
42 time. It is a reasonable expectation that this condition would occur within a 50-mi (80-km)
43 radius of the SEZ occasionally over the 20-year or more solar development period. Potential
44 future projects within the geographic extent of effects, including those with pending applications
45 on public land (Section 9.1.22.2.1), would employ additional construction workers within the

1 next several years. These new workers are not likely strain local resources given their wide
2 geographic distribution.

3
4 Annual impacts during the operation of solar facilities would be less, but of 20- to
5 30-year duration, and could combine with those from other new projects in the area. The number
6 of workers needed at the solar facilities within the SEZ would be in the range of 10 to 200, with
7 approximately 13 to 290 total jobs created in the region. Additional operation workers would be
8 needed at other future renewable energy projects in the geographic extent of effects, including
9 those with pending applications on public land (Section 9.1.22.2.1). Population increases
10 resulting from renewable energy development within 50 mi (80 km) of the Imperial East SEZ
11 would contribute to general population growth trends in the region in recent years. The
12 socioeconomic impacts overall would be positive, through the creation of additional jobs and
13 income. The negative impacts, including some short-term disruption of rural community quality
14 of life, would not likely be considered large enough to require specific mitigation measures.

15
16
17 **9.1.22.4.19 Environmental Justice**

18
19 Minority populations but no low-income populations have been identified within 50 mi
20 (80 km) of the proposed SEZ in either California or Arizona, as defined under CEQ guidelines.
21 However, it is not expected that solar development within the proposed Imperial East SEZ would
22 contribute to cumulative impacts on minority populations.

23
24
25 **9.1.22.4.20 Transportation**

26
27 During construction activities, there could be up to 1,000 workers commuting to a single
28 construction site at the SEZ, which could double the daily traffic load on State Route 98 near
29 the junction with I-8 at the eastern end of the SEZ and have small to moderate cumulative
30 impacts in combination with existing traffic levels and increases from additional future projects
31 in the area. Local road improvements may be necessary near site access points. Any impacts
32 from construction activities would be temporary. Traffic increases during operation would be
33 reduced because of the lower number of workers needed to operate solar facilities and would
34 have a smaller contribution to cumulative impacts.

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1 **9.1.23 References**

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3 *Note to Reader:* This list of references identifies Web pages and associated URLs where
4 reference data were obtained for the analyses presented in this PEIS. It is likely that at the time
5 of publication of this PEIS, some of these Web pages may no longer be available or their URL
6 addresses may have changed. The original information has been retained and is available through
7 the Public Information Docket for this PEIS.

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1 **9.2 IRON MOUNTAIN**

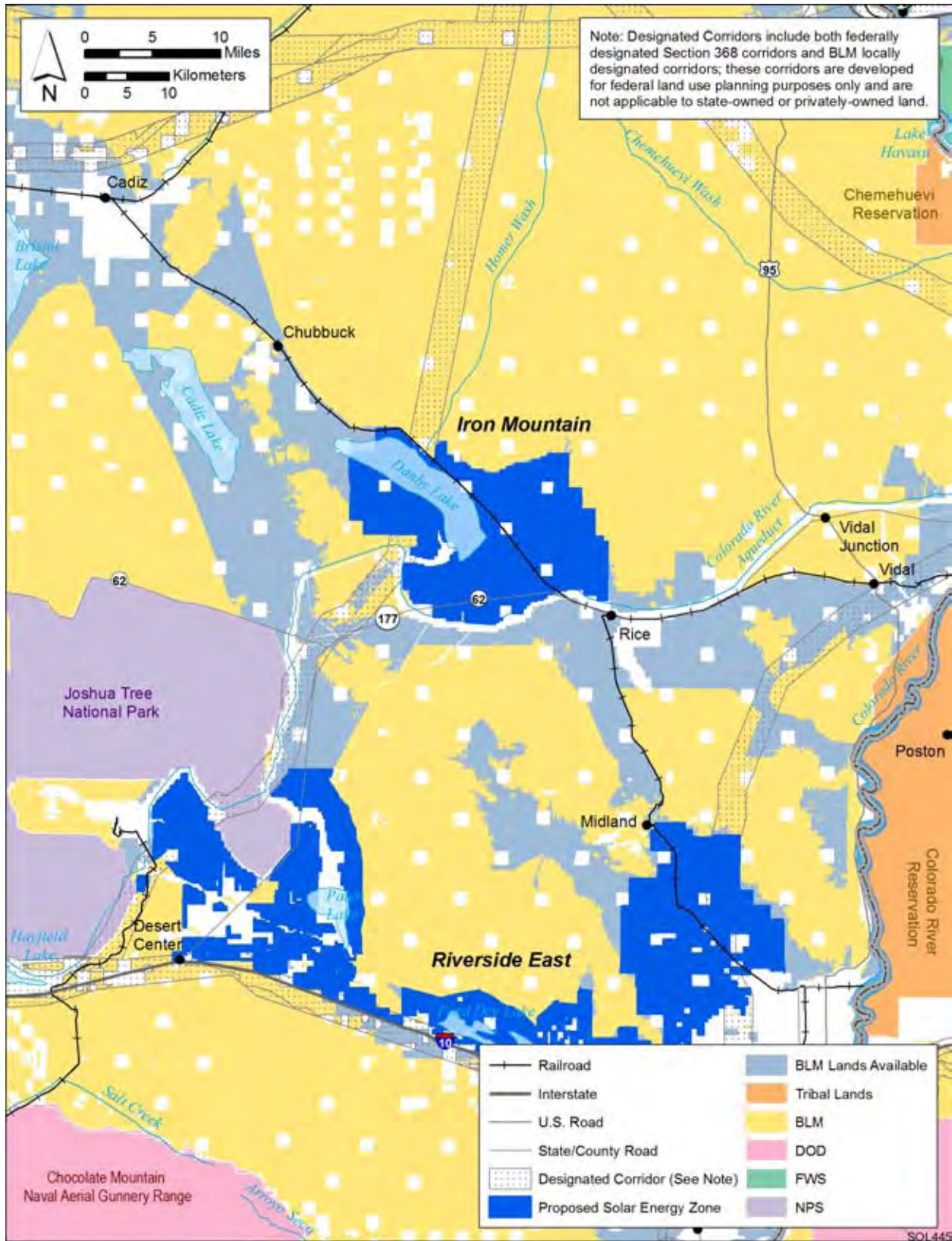
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4 **9.2.1 Background and Summary of Impacts**

5
6
7 **9.2.1.1 General Information**

8
9 The proposed Iron Mountain SEZ has a total area of 106,522 acres (431 km²) and is
10 located in San Bernardino County in southeastern California, about 20 mi (32 km) west of the
11 Arizona border (Figure 9.2.1.1-1). In 2008, the county population was 2,086,465, while the
12 two-county region surrounding the SEZ—San Bernardino and Riverside Counties—had a total
13 population of 4,189,515. Several mid-sized cities lie near the SEZ, including San Bernardino,
14 Fontana, Ontario, Rancho Cucamonga, and Victorville in San Bernardino County, and Riverside
15 and Moreno Valley in Riverside County. U.S. 95 runs north–south about 15 mi (24 km) to the
16 east of the proposed SEZ, while State Route 62, a two-lane highway, passes through its southern
17 edge. Los Angeles to the west and Phoenix to the southeast are each about 220 mi (355 km)
18 away via I-10, which runs east–west approximately 31 mi (50 km) south of the Iron Mountain
19 SEZ. The Arizona and California (ARZC) Railroad serves the area and traverses the SEZ from
20 the northwest to the southeast, roughly bisecting the SEZ. The Cadiz Road is an unpaved road
21 adjacent to and paralleling the railroad. Three small public airports are within approximately
22 85 mi (137 km) of the SEZ.

23
24 A 230-kV transmission line runs north–south through the western portion of the SEZ. It
25 is assumed that this existing 230-kV transmission line could potentially provide access from the
26 SEZ to the transmission grid (see Section 9.2.1.2). As of February 2010, five solar project
27 applications were pending in the SEZ. Active pending renewable energy applications within the
28 SEZ are described in Section 9.2.22 and are shown in Figure 9.2.22.2-1. Figure 9.2.22.2-1 also
29 shows several large areas of active pending solar ROW applications on BLM-administered lands
30 to the west-northwest of the proposed SEZ.

31
32 The proposed Iron Mountain SEZ lies in Ward Valley, a broad valley within the
33 California Desert Conservation Area within the Mojave Desert. Ward Valley lies in the Basin
34 and Range physiographic province and is bounded by the Turtle Mountains to the east and the
35 Iron Mountains to the west; surface elevations range from 600 to 1650 ft (183 to 503 m) and
36 lower elevations occur near the center of the valley. The Old Woman Mountains and the Palen-
37 McCoy WAs, with some peaks higher than 5,000 ft (1,524 m), also lie nearby. The region is
38 characterized by wide daily temperature extremes and low precipitation and humidity. Annual
39 precipitation amounts increase with elevation, from 3.6 in. (9 cm) in the valleys up to 12 in.
40 (30.5 cm) in the mountains. Danby Lake (also known as Danby Dry Lake), which covers
41 approximately 31.5 mi² (81.5 km²) of the northwestern portion of the proposed SEZ
42 (Figure 9.2.1.1-1), is an internal drainage area for the Ward Valley and a region of active soda
43 mining that can be inundated intermittently throughout the year because of natural drainage. The
44 valley floor slopes gently toward Danby Lake in all directions. The Ward Valley groundwater
45 basin underlies the area. The abandoned town of Milligan is located in the northwest corner of
46



1

2 **FIGURE 9.2.1.1-1 Proposed Iron Mountain SEZ**

3

1 the SEZ, and trailers used by sodium lease operators working an active sodium lease are located
2 approximately 1.3 mi (2.2 km) east of Milligan on Cadiz Road. The Metropolitan Water District
3 Aqueduct is located on the south and west sides of the SEZ. Three WWII Military Divisional
4 Camps started by General Patton border the Iron Mountain SEZ. The Iron Mountain Divisional
5 Camp is an ACEC eligible for listing on the NRHP and is the best preserved camp in California.
6 Scrubland vegetation throughout the area reflects the arid climate.

7
8 The proposed Iron Mountain SEZ and other relevant information are shown in
9 Figure 9.2.1.1-1. The criteria used to identify the SEZ as an appropriate location for solar
10 development included proximity to existing transmission lines or designated corridors, proximity
11 to existing roads, a slope of generally less than 2%, and an area of more than 2,500 acres
12 (10 km²). In addition, the area was identified as being relatively free of other types of conflicts,
13 such as USFWS-designated critical habitat for threatened and endangered species, ACECs,
14 SRMAs, and NLCS lands (see Section 2.2.2.2 for the complete list of exclusions). Although
15 these classes of restricted lands were excluded from the proposed Iron Mountain SEZ, other
16 restrictions might be appropriate. The analyses in the following sections address the affected
17 environment and potential impacts associated with utility-scale solar energy development in the
18 proposed SEZ for important environmental, cultural, and socioeconomic resources.

19
20 As initially announced in the *Federal Register* on June 30, 2009, the proposed Iron
21 Mountain SEZ encompassed 109,642 acres (444 km²). Subsequent to the study area scoping
22 period, the Iron Mountain SEZ boundaries were altered somewhat to facilitate BLM's
23 administration of the SEZ area. Borders with irregularly shaped boundaries were adjusted to
24 match the section boundaries of the Public Lands Survey System (PLSS) (BLM and USFS
25 2010a). Some small higher slope areas internal to and at the borders of the site were also added
26 to the SEZ; although included in the SEZ, these higher slope areas would not likely be utilized
27 for solar facilities. The revised SEZ is approximately 3,100 acres (15 km²) smaller than the
28 original SEZ as published in June 2009.

31 **9.2.1.2 Development Assumptions for the Impact Analysis**

32
33 Maximum development of the proposed Iron Mountain SEZ was assumed to be 80% of
34 the total SEZ area over a period of 20 years, a maximum of 85,217 acres (345 km²). These
35 values are shown in Table 9.2.1.2-1, along with other development assumptions. Full
36 development of the Iron Mountain SEZ would allow development of facilities with an estimated
37 total of 9,469 MW of electrical power capacity if power tower, dish engine, or PV technologies
38 were used, assuming 9 acres/MW (0.04 km²/MW) of land required, and an estimated
39 17,043 MW of power if solar trough technologies were used, assuming 5 acres/MW
40 (0.02 km²/MW) of land required.

41
42 Availability of transmission from SEZs to load centers will be an important consideration
43 for future development in SEZs. The nearest existing transmission line is a 230-kV line that runs
44 through the SEZ. It is possible that this existing line could be used to provide access from the
45 SEZ to the transmission grid, but the 230-kV capacity of that line would be inadequate for
46 9,469 to 17,043 MW of new capacity (note that a 500-kV line can accommodate approximately

TABLE 9.2.1.2-1 Proposed Iron Mountain SEZ—Assumed Development Acreages, Maximum Solar MW Output, Access Roads, and Transmission Line ROWs

Total Acreage and 80% of Acreage	Maximum Output for Various Solar Technologies	Distance to Nearest State, U.S., or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Transmission Line ROW and Road ROW	Distance to Nearest Designated Transmission Corridor ^d
106,522 acres and 85,217 acres ^a	9,469 MW ^b 17,043 MW ^c	Adjacent (State Route 62)	Adjacent and 230 kV	0 acres and 0 acres	Adjacent to SEZ ^e

- ^a To convert acres to km², multiply by 0.004047.
- ^b Maximum power output if the SEZ were fully developed using power tower, dish engine, or PV technologies, assuming 9 acres/MW (0.04 km²/MW) of land required.
- ^c Maximum power output if the SEZ were fully developed using solar trough technologies, assuming 5 acres/MW (0.02 km²/MW) of land required.
- ^d BLM-designated corridors are developed for federal land use planning purposes only and are not applicable to state-owned or privately owned land.
- ^e A Section 368 federally designated 2-mi (3-km) wide energy corridor runs through the western portion of the SEZ.

1
2
3 the load of one 700-MW facility). At full build-out capacity of the proposed Iron Mountain SEZ,
4 it is clear that substantial new transmission and/or upgrades of existing transmission lines would
5 be required to bring electricity from the SEZ to load centers; however, at this time the location
6 and size of such new transmission facilities are unknown. Generic impacts of transmission and
7 associated infrastructure construction and of line upgrades for various resources are discussed in
8 Chapter 5. Project-specific analyses would need to identify the specific impacts of new
9 transmission construction and line upgrades for any projects proposed within the SEZ.

10
11 For the analysis in this PEIS, it was assumed that the existing 230-kV transmission line
12 that runs north–south through the western portion of the SEZ could provide access to the
13 transmission grid, and thus no additional acreage disturbance for transmission line access was
14 assessed. Access to the transmission line was assumed, without additional information on
15 whether this line would be available for connection of future solar facilities. If a connecting
16 transmission line were constructed in the future to connect facilities within the SEZ to a different
17 off-site grid location from the one assumed here, site developers would need to determine the
18 impacts from construction and operation of that line. In addition, developers would need to
19 determine the impacts of line upgrades if they were needed.

20
21 Existing road access to the proposed Iron Mountain SEZ should be adequate to support
22 construction and operation of solar facilities, because State Route 62, a two-lane highway,
23 passes through the southern edge the SEZ. Thus, no additional road construction outside of the
24 SEZ is assumed to be required to support solar development.
25

1 **9.2.1.3 Summary of Major Impacts and SEZ-Specific Design Features**
2

3 In this section, the impacts and SEZ-specific design features assessed in Sections 9.2.2
4 through 9.2.21 for the proposed Iron Mountain SEZ are summarized in tabular form.
5 Table 9.2.1.3-1 is a comprehensive list of the impacts discussed in these sections; the reader may
6 reference the applicable sections for detailed support of the impact assessment. Section 9.2.22
7 discusses potential cumulative impacts from solar energy development in the proposed SEZ.
8

9 Only those design features specific to the Iron Mountain SEZ are included in
10 Sections 9.2.2 through 9.2.21 and in the summary table. The detailed programmatic design
11 features for each resource area to be required under BLM’s Solar Energy Program are presented
12 in Appendix A, Section A.2.2. These programmatic design features would also be required for
13 development in this and other SEZs.
14
15

TABLE 9.2.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Iron Mountain SEZ and SEZ-Specific Design Features^a

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the SEZ for utility-scale solar energy production (80% of the total area) could disturb up to 85,217 acres (35 km ²) and would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Since the SEZ is largely undeveloped and rural, utility-scale solar energy development would be a new and discordant land use to the area.	None.
	A total of 1,200 acres (5 km ²) of state lands and approximately 2,400 acres (10 km ²) of private lands located within or adjacent to the exterior boundaries of the SEZ could be developed in a similar or complementary manner to the public lands with the landowners' permission. Development of additional industrial or support activities also could be induced on additional private and state lands near the SEZ.	None.
	Cadiz Road provides access through the SEZ and would likely remain open under any development scenario; however, access to the east of the SEZ toward the Turtle Mountains could be obstructed by solar development.	None.
	There is a potential hazard associated with unexploded military ordnance that could remain on the SEZ from past military training activities.	Survey of solar energy development sites for possible unexploded military ordnance would be required.
Specially Designated Areas and Lands with Wilderness Characteristics	Wilderness characteristics within the Turtle Mountains, Old Woman Mountains, and Palen-McCoy WAs would be adversely affected by solar development within the SEZ. Scenic resources in the Turtle Mountains ACEC would also be adversely affected.	Application of SEZ-specific design features for visual resource impacts (Section 9.2.14) may reduce the visual impact on wilderness characteristics, scenic resources, and on night sky viewing opportunities.
	Solar facility development in the SEZ could adversely affect the quality of the night sky environment as viewed from Joshua Tree NP.	None.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Rangeland Resources: Livestock Grazing	None.	None.
Rangeland Resources: Wild Horses and Burros	None.	None.
Recreation	Recreational users would lose the use of any portions of the SEZ developed for solar energy production. Because of the impacts of a large and highly visible industrial type of development in the SEZ, opportunities for an undeveloped and primitive recreation experience in and around the SEZ would be lost or reduced.	None.
	Wilderness recreation use in the Turtle Mountains, Old Woman Mountains, and Palen-McCoy WAs would likely be adversely affected.	None.
	Development of solar facilities in the SEZ and in adjacent areas currently under solar application would cause the loss of the expansive and undeveloped viewshed over a very large area.	None.
Military and Civilian Aviation	The development of any solar energy or transmission facilities that encroach into the airspace of MTRs would create safety issues and would conflict with military training activities.	None.
Geologic Setting and Soil Resources	Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase. Impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. These impacts may be impacting factors for other resources (e.g., air quality, water quality, and vegetation). Danby Lake may not be a suitable location for construction.	None.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Minerals (fluids, solids, and geothermal resources)	<p>Designation of the SEZ would affect the Danby Lake KSLA in the northwest corner of the SEZ. About 23,000 acres (93 km²) of the KSLA is within the boundary of the SEZ and there are three active and two pending sodium leases which are prior existing rights.</p> <p>Designation of the SEZ could make sand and gravel resources unavailable.</p>	<p>The presence of the KSLA must be addressed to evaluate the compatibility of solar development in the KSLA with continuation of sodium mineral leasing. Alternatively, the KSLA could be excluded from the SEZ.</p> <p>Planning and identification for retention of sand and gravel resources within the SEZ should be completed prior to authorization of solar energy leases.</p>
Water Resources	<p>Ground-disturbance activities (affecting 8% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills.</p> <p>Construction activities may require up to 6,813 ac-ft (8.4 million m³) of water during peak construction year.</p> <p>Construction activities would generate as much as 222 ac-ft (273,800 m³) of sanitary wastewater.</p> <p>Assuming full development of the SEZ, the following amounts of water would be used during operations:</p> <ul style="list-style-type: none"> ▪ For parabolic trough facilities (17,044-MW capacity), 12,170 to 25,805 ac-ft/yr (15.0 million to 31.8 million m³/yr) for dry-cooled systems (wet cooling not feasible with respect to water requirements); • For power tower facilities (9,469-MW capacity), 6,734 to 14,309 ac-ft/yr (8.3 million to 17.6 million m³/yr) for dry-cooled systems (wet cooling not feasible with respect to water requirements); 	<p>Water resource analysis indicates that wet-cooling options would not be feasible. Other technologies should incorporate water conservation measures.</p> <p>Land disturbance activities should avoid impacts to the extent possible in the vicinity of Danby Lake to reduce impacts on the regional drainage outlet and salt-mining operations.</p> <p>During site characterization, hydrologic investigations would need to identify 100-year floodplains and potential jurisdictional water bodies subject to Clean Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as within a 100-year floodplain.</p> <p>During site characterization, coordination and permitting with CDFG regarding California’s Lake and Streambed Alteration Program would be required for any proposed alterations to surface water features (both perennial and ephemeral).</p>

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Water Resources (Cont.)	<ul style="list-style-type: none"> • For dish engine facilities (9,469-MW capacity), 4,840 ac-ft/yr (6.0 million m³/yr); and ▪ For PV facilities (9,469-MW capacity), 484 ac-ft/yr (597,000 m³/yr). <p>Assuming full development of the SEZ, operations would generate up to 239 ac-ft/yr (294,800 m³/yr) of sanitary wastewater and up to 4,842 ac-ft/yr (6.0 million m³/yr) of blowdown water.</p> <p>Hydrology disturbances near Danby Lake could cause localized flooding and erosion, affect groundwater recharge and discharge processes, and disrupt salt-mining operations.</p> <p>High TDS values of groundwater near the Danby Lake region could produce water that is nonpotable and corrosive to infrastructure.</p>	<p>The groundwater-permitting process should be in compliance with the San Bernardino County groundwater ordinance.</p> <p>Construction of groundwater production wells in the Danby Lake region should be avoided because the water is nonpotable and contains corrosive levels of TDS.</p> <p>Groundwater monitoring and production wells should be constructed in accordance with standards set forth by the State of California and San Bernardino County.</p> <p>Stormwater management plans and BMPs should comply with standards developed by the California Stormwater Quality Association.</p> <p>Water for potable uses would have to meet or be treated to meet the water quality standards in the California Safe Drinking Water Act.</p>

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Vegetation ^b	<p>Up to 80% (85,217 acres [345 km²]) of the SEZ would be cleared of vegetation; re-establishment of shrub communities in disturbed areas would likely be very difficult because of the arid conditions.</p> <p>Sand dune, playa, desert chenopod scrub, riparian, and dry wash communities are important sensitive habitats within the SEZ that could be affected.</p> <p>Noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation.</p> <p>The deposition of fugitive dust from disturbed soil areas in habitats outside the SEZ area could result in reduced productivity or changes in plant community composition.</p> <p>Groundwater withdrawals could affect riparian areas or groundwater-dependent communities, such as mesquite bosque.</p>	<p>An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration should be approved and implemented to increase the potential for successful restoration of affected Sonoran Desert habitats and to minimize the potential for the spread of invasive species, such as tamarisk, cheatgrass, and sahara mustard. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides.</p> <p>Riparian, playa, chenopod scrub, sand dune, and desert dry wash habitats should be avoided to the extent practicable, and any impacts should be minimized and mitigated. A buffer area should be maintained around riparian areas, playas, and dry washes to reduce the potential for impacts on these habitats on or near the SEZ. Appropriate engineering controls should be used to minimize impacts on these areas resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.</p> <p>Groundwater withdrawals should be limited to reduce the potential for indirect impacts on riparian habitat that is associated with groundwater discharge or groundwater-dependent communities, such as mesquite bosque.</p>

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Wildlife: Amphibians and Reptiles ^b	<p>The red-spotted toad is the main amphibian expected to occur within the Iron Mountain SEZ, but its occurrence within the SEZ would be spatially limited. Several other amphibian species could inhabit the Colorado River Aqueduct south of the SEZ. These species, which include the bullfrog, Colorado River toad, Rio Grande leopard frog, and Woodhouse’s toad, would not be expected to occur within the SEZ.</p> <p>Thirty-one reptile species (the desert tortoise, which is a federally and state-listed species, 13 lizards, and 17 snakes) could occur within the SEZ.</p> <p>Direct impacts on amphibian and reptile species from SEZ development would be moderate (1.7 to 2.7% of potentially suitable habitats identified for the species in the SEZ region would be lost). With implementation of proposed design features, indirect impacts would be expected to be negligible.</p>	<p>Design features should be implemented to reduce the potential for direct effects on amphibians and reptiles that depend on specific habitat types that can be easily avoided (e.g., CRA, Homer Wash, and portions of Danby Lake).</p>
Wildlife: Birds ^b	<p>Nearly 100 species of birds have a range that encompasses the Iron Mountain SEZ region. However, potentially suitable habitats for about 40 of these species either do not occur on or are limited within the SEZ (e.g., habitat for waterfowl and wading birds).</p> <p>Direct impacts from habitat disturbance and long-term habitat reduction/fragmentation would be small to moderate (<0.01 to 7.5% of potentially suitable habitats identified for the species in the SEZ region would be lost).</p> <p>Other impacts on birds could result from collision with vehicles and facility structures, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.</p>	<p>Pre-disturbance surveys should be conducted within the SEZ for bird species listed under the Migratory Bird Treaty Act. Impacts on potential nesting habitat of these species should be avoided, particularly during the nesting season.</p> <p>Pre-disturbance surveys should be conducted within the SEZ for the following desert bird focal species (CalPIF 2009): ash-throated flycatcher, black-tailed gnatcatcher, black-throated sparrow, burrowing owl, common raven, Costa’s hummingbird, crissal thrasher, ladder-backed woodpecker, Le Conte’s thrasher, phainopepla, and verdin. Impacts on potential nesting habitat of these species should be avoided.</p>

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Wildlife: Birds ^b (<i>Cont.</i>)	Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of proposed design features.	<p>Plant species that positively influence the presence and abundance of the desert bird focal species should be avoided to the extent practicable. These species include Goodding's willow, yucca, Joshua tree, mesquite, honey mesquite, screwbean, desert mistletoe, big saltbush, smoketree, and catclaw acacia.</p> <p>Take of golden eagles and other raptors should be avoided. Mitigation regarding the golden eagle should be developed in consultation with the USFWS and CDFG. A permit may be required under the Bald and Golden Eagle Protection Act.</p> <p>Minimize development in Danby Lake and preclude development on Homer Wash. This could reduce impacts on species such as the killdeer, least sandpiper, ash-throated flycatcher, black-tailed gnatcatcher, Costa's hummingbird, Le Conte's thrasher, and verdin.</p>
Wildlife: Mammals ^b	<p>Direct impacts on small game, furbearers, and small mammals on the SEZ from habitat disturbance and long-term habitat reduction/fragmentation would be moderate (1.7 to 3.0% of potentially suitable habitats identified for the species in the SEZ region would be lost).</p> <p>Other impacts on mammals could result from collision with vehicles and fences, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.</p>	Development in Homer Wash should be avoided in order to reduce impacts on species such as the round-tailed ground squirrel, white-tailed antelope squirrel, little pocket mouse, long-tailed pocket mouse, and any other mammal species that inhabit wash habitats.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Wildlife: Mammals ^b (Cont.)	Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of proposed design features.	
Wildlife: Aquatic Biota ^b	No permanent water bodies, perennial streams, or wetlands are present within the boundaries of the Iron Mountain SEZ. A dry lake (Danby Lake) and ephemeral washes are present, but are not likely to contain aquatic habitat or communities. There is the potential for impacts on aquatic biota resulting from ground disturbance, contaminant inputs, and soil deposition from water and airborne pathways. Indirect effects on the CRA and wetlands near the SEZ may result from water withdrawal within the vicinity of the SEZ and from changes in water quality due to inputs of dust, sediment, and contaminants from the SEZ.	The amount of ground disturbance near Danby Lake should be minimized.
Special Status Species ^b	Potentially suitable habitat for 43 special status species occurs in the affected area of the Iron Mountain SEZ. For most of these special status species, between 1% and 6% of the potentially suitable habitat in the region occurs in the area of direct effects.	Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species. Disturbance to occupied habitats for these species should be avoided or minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible for some species, translocation of individuals from areas of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that used one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Special Status Species ^b (Cont.)		<p data-bbox="1314 363 1885 613">Disturbance of desert riparian, wash, and playa habitats within the SEZ should be avoided or minimized to the extent practicable. In particular, development should be avoided within Danby Lake, which covers approximately 25,000 acres (100 km²), and within Homer Wash. Avoiding or minimizing disturbance of these habitats could reduce impacts on four special status species.</p> <p data-bbox="1314 651 1885 773">Avoiding or minimizing disturbance of sand dunes and sand transport systems, rocky cliffs, and outcrops on the SEZ could reduce impacts on 15 special status species.</p> <p data-bbox="1314 812 1885 1092">Consultations with the USFWS and the CDFG should be conducted to address the potential for impacts on the desert tortoise, a species listed as threatened under the ESA and CESA. Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.</p> <p data-bbox="1314 1130 1885 1315">Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and CDFG.</p>

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Air Quality and Climate	<p><i>Construction:</i> Temporary exceedances of AAQS for PM₁₀ and PM_{2.5} at the SEZ boundaries possible during construction; higher concentrations would be limited to the immediate area surrounding the SEZ boundary and would decrease quickly with distance. Modeling indicates that Class I PSD PM₁₀ increments at the nearest federal Class I area (Joshua Tree NP) could be exceeded, but only under conservative assumptions (e.g., three simultaneous construction projects occurring in close proximity to the western SEZ boundary). In addition, construction emissions from the engine exhaust of heavy equipment and vehicles could cause some impacts on air-quality-related values (e.g., visibility and acid deposition) at the nearest federal Class I area, Joshua Tree NP.</p> <p><i>Operations:</i> Positive impact due to avoided emission of air pollutants from combustion-related power generation: 16 to 28% of total SO₂, NO_x, Hg, and CO₂ emissions from electric power systems in the state of California avoided (up to 3,818 tons/yr SO₂, 6,271 tons/yr NO_x, 0.06 tons/yr Hg, and 14,836,000 tons/yr CO₂).</p>	None.
Visual Resources	<p>Large visual impacts on the SEZ and surrounding lands within the SEZ viewshed due to major modification of the character of the existing landscape; potential additional impacts from construction and operation of transmission lines and access roads within the transmission line and road viewsheds.</p> <p>The SEZ is located approximately 9.9 mi (15.9 km) northeast of Joshua Tree NP and Joshua Tree WA at the point of closest approach. Because of the short distance and elevated viewpoints, weak to moderate visual contrasts could be observed by NP or WA visitors near the point of closest approach.</p> <p>The SEZ is located within the CDCA. CDCA lands within the SEZ viewshed would be subject to visual impacts from solar development within the SEZ.</p>	<p>Within the SEZ, in areas visible from and within 1 mi (1.6 km) of the boundary of the Old Woman Mountains WA, visual impacts associated with solar energy project operation should be consistent with VRM Class II management objectives, as experienced from KOPs (to be determined by the BLM) within the WA; and in areas visible from between 1 and 3 mi (1.6 and 4.8 km) visual impacts should be consistent with VRM Class III management objectives.</p> <p>Within the SEZ, in areas visible from and south of State Highway 62, visual impacts associated with solar energy project operation should be consistent with VRM Class III management objectives, as</p>

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Visual Resources (Cont.)	<p>The SEZ is located approximately 6.6 mi (10.6 km) northwest of the Rice Valley WA at the point of closest approach. Moderate visual contrasts could be observed by WA visitors.</p> <p>The SEZ is located approximately 1.6 mi (2.6 km) north of the Palen-McCoy WA at the point of closest approach. Because of the short distance and elevated viewpoints, strong visual contrasts could be observed by WA visitors.</p> <p>The SEZ is adjacent to the Old Woman Mountains WA. Because of the short distance and elevated viewpoints, moderate to strong visual contrasts could be observed by WA visitors.</p> <p>The SEZ is adjacent to the Turtle Mountains WA, Turtle Mountains Scenic ACEC, and Turtle Mountains NNL. Because of the short distance and elevated viewpoints, moderate to strong visual contrasts could be observed by WA visitors.</p> <p>Portions of State Route 62 and Cadiz Road intersect the SEZ. Strong contrasts may be observed by travelers on these roads.</p>	<p>experienced from KOPs (to be determined by the BLM) within the Palen-McCoy WA.</p> <p>Within the SEZ, in areas visible from and within 3 mi (4.8 km) of the boundary of the Turtle Mountains WA, visual impacts associated with solar energy project operation should be consistent with VRM Class II management objectives, as experienced from KOPs (to be determined by the BLM) within the WA; and in areas visible from between 3 and 5 mi (4.8 and 8 km), visual impacts should be consistent with VRM Class III management objectives.</p>
Acoustic Environment	<p><i>Construction.</i> Estimated noise levels at the nearest residences located near the west-central SEZ boundary (0.5 mi [0.8 km] from the SEZ boundary) would be about 50 dBA, which is higher than a typical daytime mean rural background level of 40 dBA but is below the San Bernardino County regulation of 55 dBA daytime L_{eq}. For 10-hour daytime work schedule, 47 dBA L_{dn} would be below the EPA guideline of 55 dBA for residential areas.</p> <p><i>Operations.</i> Noise levels at the nearest residences from a parabolic trough or power tower facility would be about 45 dBA, which is higher than typical daytime mean rural background level of 40 dBA but well below</p>	<p>Noise levels from cooling systems equipped with TES should be managed so that levels at the nearest residences to the west of the west-central SEZ are kept within applicable guidelines. This could be accomplished in several ways, for example, through placing the power block approximately 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few hours after sunset, and/or installing fan silencers.</p>

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Acoustic Environment (Cont.)	<p>the San Bernardino County regulation of 55 dBA daytime L_{eq}. For 12-hour daytime operation, the estimated 44 dBA L_{dn} falls well below the EPA guideline of 55 dBA for residential areas. However, in the case of 6-hour TES, the estimated nighttime noise level at the nearest residences would be 55 dBA, which is higher than the San Bernardino County regulation of 45 dBA nighttime L_{eq}. The day-night average noise level is estimated to be about 57 dBA L_{dn}, which is a little higher than the EPA guideline of 55 dBA L_{dn} for residential areas.</p> <p>If 80% of the SEZ were developed with dish engine facilities, the estimated noise level of 54 dBA at the nearest residences is higher than a typical daytime mean rural background level of 40 dBA but just below the San Bernardino County regulation of 55 dBA daytime L_{eq}. For 12-hour daytime operations, the estimated 51 dBA L_{dn} would be lower than the EPA guideline of 55 dBA L_{dn} for residential areas.</p>	Dish engine facilities within the Iron Mountain SEZ should be located more than 1 to 2 mi (1.6 to 3 km) from the nearest residences, west of the west-central SEZ (i.e., the facilities should be located in other portions of the proposed SEZ). Direct noise control measures applied to individual dish engine systems could also be used to reduce noise impacts at the nearest residences.
Paleontological Resources	The potential for impacts on significant paleontological resources at the Iron Mountain SEZ in Ward Valley is largely unknown. A more detailed investigation of the local geological deposits of the SEZ and their potential depth is needed. The area around Danby Lake within the SEZ has a high potential to contain paleontological deposits and would require a paleontological survey.	The need for and the nature of any SEZ-specific design features would depend on findings of paleontological surveys.
Cultural Resources	<p>Direct impacts on significant cultural resources could occur during site preparation and construction activities in the proposed SEZ; however, a cultural resource survey of the entire area of potential effect would first be required to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would follow to determine whether any are eligible for listing in the NRHP.</p> <p>Ward Valley as a whole, and in particular the Danby Lake vicinity, was an important gathering area for salt and other natural resources; numerous</p>	<p>Avoidance of significant sites (historic properties) within the proposed Iron Mountain SEZ, specifically in the vicinity of Danby Lake and near the Iron Mountain Divisional Camp is recommended.</p> <p>Because of the possibility of burials in the vicinity of the proposed Iron Mountain SEZ and its location along the Salt Song Trail, it is recommended that for surveys conducted in the SEZ consideration be given</p>

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Cultural Resources (Cont.)	<p>prehistoric and Native American sites and trails are potentially located within the SEZ and could be impacted by solar energy development. Potential impacts on locations in the area that are of cultural or religious significance to Native American Tribes must also be evaluated.</p> <p>Activities associated with the WWII Desert Training Center were also prominent in the valley, and physical remnants of those activities are present within the SEZ and could be affected.</p>	<p>to include Native American representatives in the development of survey designs and historic property treatment and monitoring plans.</p> <p>Troops in training for World War II often used the same locations that Native Americans did for similar purposes. Any excavation of historic sites should take into consideration the potential for the co-location of prehistoric and ethnohistoric components.</p> <p>Other possible design features specific to the SEZ would be determined through consultation with the California SHPO and affected Tribes.</p>
Native American Concerns	<p>It is possible that there will be Native American concerns about the Salt Song Trail, which passes just west of the proposed Iron Mountain SEZ. Solar development within the SEZ is likely to be visible from the trail. Additional trail networks may also go through or near the SEZ.</p> <p>As consultations continue, it is possible that other Native American concerns regarding solar energy development within the SEZ will emerge.</p>	<p>The need for and nature of SEZ-specific design features regarding potential issues of concern, such as burials and the Salt Song Trail, would be determined during government-to-government consultation with the affected Tribes.</p>
Socioeconomics	<p><i>Construction:</i> 1,221 to 16,165 total jobs; \$73.2 million to \$969 million income in ROI.</p> <p><i>Operations:</i> 259 to 6,138 annual total jobs; \$9.0 million to \$230.3 million annual income in the ROI.</p>	<p>None.</p>

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Environmental Justice	Minority and low-income <i>individuals</i> live within 50 mi (80 km) of the SEZ. However, as defined in CEQ guidelines, no low-income or minority <i>populations</i> occur within that area; thus, there would be no disproportionately high and adverse human health or environmental effects on low-income or minority populations.	None.
Transportation	The primary transportation impacts would result from commuting worker traffic. State Route 62 provides a regional traffic corridor that could experience moderate impacts for single projects that may have up to an additional 2,000 vehicle trips per day (maximum).	None.

Abbreviations: AAQS = ambient air quality standards; ACEC = Area of Critical Environmental Concern; BLM = Bureau of Land Management; BMP = best management practice; CDFG = California Department of Fish and Game; CEQ = Council on Environmental Quality; CESA= California Endangered Species Act; CO₂ = carbon dioxide; CRA = Colorado River Aqueduct; CSP = concentrating solar power; dBA = A-weighted decibel; DoD = U.S. Department of Defense; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; Hg = mercury; KOP = key observation point; KSLA = known sodium leasing area; L_{dn} = day-night average sound level; L_{eq} = equivalent continuous sound level; MTR = military training route; NNL = National Natural Landmark; NO_x = nitrogen oxides; NP = National Park; NRHP = *National Register of Historic Places*; PM_{2.5} = particulate matter with an aerodynamic diameter of 2.5 μm or less; PM₁₀ = particulate matter with an aerodynamic diameter of 10 μm or less; PSD = prevention of significant deterioration; PV = photovoltaic; ROI = region of influence; SEZ = solar energy zone; SHPO = State Historic Preservation Office; SO₂ = sulfur dioxide; TDS = total dissolved solids; TES = thermal energy storage; USFWS = U.S. Fish and Wildlife Service; VRM = visual resource management; WA = Wilderness Area; WWII = World War II.

- ^a The detailed programmatic design features for each resource area to be required under BLM’s Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would be required for development in the proposed Iron Mountain SEZ.
- ^b The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 9.2.10 through 9.2.12.

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1 **9.2.2 Lands and Realty**

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4 **9.2.2.1 Affected Environment**

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6 The proposed Iron Mountain SEZ is located in a remote portion of the eastern Mojave
7 Desert about 32 mi (51 km) west of Parker, Arizona, and 45 mi (72 km) southwest of Needles,
8 California. The SEZ contains only BLM-administered lands, but there are about 2,560 acres
9 (10.4 km²) of private lands and about 640 acres (2.5 km²) of state lands included within the
10 external boundary of the SEZ. Another 560 acres (2.3 km²) of state land is located adjacent to
11 the southern boundary of the SEZ. On the western side of the SEZ is land owned by the
12 Metropolitan Water District (MWD) that is surrounded on three sides by the SEZ. The MWD
13 maintains a pumping station in this area that is part of the MWD Colorado River Aqueduct
14 (CRA). The aqueduct essentially forms the southern and western boundaries of the SEZ. State
15 Route 62 crosses through the very southern end of the SEZ, and the Cadiz Road, which is a good
16 quality dirt/gravel road, crosses the area in a northwest–southeast direction. A railroad line and
17 two underground natural gas pipelines parallel the Cadiz Road. A 230-kV power line that
18 services the MWD pumping station passes north to south through the western portion of the SEZ.
19

20 As of March 2010, a total of seven solar development applications had been filed by four
21 companies in the Iron Mountain SEZ. There are three active and two pending sodium leases in
22 the northwestern portion of the SEZ in Danby Lake KSLA. There are additional ROWs for
23 telephone and power lines and communication sites within the SEZ (BLM and USFS 2010b).
24

25 Most of the desert in and surrounding the SEZ was used for military training during
26 World War II. Live fire exercises were conducted in many places and unexploded military
27 ordnance can still be found in the area. Recently, limited surveys have been conducted to identify
28 areas where military contamination might be present (DOI 2005; USACE 2007; USACE 1956).
29

30 The SEZ area is surrounded on three sides by desert mountain ranges designated as
31 wilderness. Much of Joshua Tree National Park, which is about 10 mi (16 km) farther southwest
32 from the SEZ than these three areas, is also designated as wilderness. The overall character of the
33 area in and around the SEZ is rural and undeveloped. The SEZ and the areas surrounding it
34 provide one of the very large and open viewsapes for which the California Desert Conservation
35 Area (CDCA) is known.
36
37

38 **9.2.2.2 Impacts**

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40
41 **9.2.2.2.1 Construction and Operations**

42
43 Development of the proposed Iron Mountain SEZ for utility-scale solar energy
44 production would establish a very large industrial area that would exclude many existing and
45 potential uses of the land, perhaps in perpetuity. Since the SEZ is largely undeveloped and rural,
46 utility-scale solar energy development would be a new and discordant land use to the area. It also

1 is possible that the 1,200 acres (5 km²) of state land and about 2,400 acres (9.7 km²) of private
2 land located within or adjacent to the exterior boundaries of the SEZ could, with land owner
3 concurrence, be developed in the same or a complementary manner as the public lands.
4 Development of additional industrial or support activities also could be induced on additional
5 private and state lands near the SEZ.

6
7 Existing ROW authorizations on the SEZ would not be affected by solar energy
8 development since they are prior rights. Should the SEZ be designated, the BLM would still
9 have discretion to authorize additional ROWs in the area until solar energy development was
10 authorized, and then future ROWs would be subject to the rights granted for solar energy
11 development. It is not anticipated that approval of solar energy development would have a
12 significant impact on land available for ROWs in the area.

13
14 Cadiz Road is an important road that provides access through the SEZ and would likely
15 remain open under any development scenario. Access to the east of the SEZ toward the Turtle
16 Mountains could be obstructed by solar development. Access routes are already restricted in this
17 direction since many crossings over the railroad have been removed; development of solar
18 facilities could exacerbate this problem.

19
20 There is a potential hazard associated with unexploded military ordnance that could
21 remain on the SEZ from past military training activities. This hazard would need to be addressed
22 prior to ground-disturbing activities in any area of the SEZ, using results of available surveys as
23 a starting point.

24 25 26 ***9.2.2.2.2 Transmission Facilities and Other Off-Site Infrastructure***

27
28 An existing 230-kV transmission line runs north–south through the western portion of the
29 SEZ; this line might be available to transport the power produced in this SEZ. Establishing a
30 connection to the existing line would not involve the construction of a new transmission line
31 outside of the SEZ so there would be no additional impact from a new line. At full build-out
32 capacity of the proposed Iron Mountain SEZ, it is clear that substantial new transmission and or
33 upgrades of existing transmission lines would be required to bring electricity from the SEZ to
34 load centers; however, at this time the location and size of such new transmission facilities are
35 unknown. Generic impacts of transmission and associated infrastructure construction and of line
36 upgrades for various resources are discussed in Chapter 5. Project-specific analyses would need
37 to identify the specific impacts of new transmission construction and line upgrades for any solar
38 projects requiring additional transmission capacity.

39
40 Road access to the site is good and no new roads to the site would be required. Both
41 internal electric transmission lines and roads would be required to support development of solar
42 energy facilities. See Section 9.2.1.2 for the analysis assumptions for the SEZ.

1 **9.2.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Implementing the programmatic design features described in Appendix A, Section A.2.2,
4 as required under BLM’s Solar Energy Program, would provide adequate mitigation for some
5 identified impacts. The exceptions would be impacts related to the exclusion of many existing
6 and potential uses of the public land, perhaps in perpetuity; the visual impact of an
7 industrialized-looking solar facility within an otherwise rural area; and any induced changes in
8 land use on private and state lands.
9

10 The following is a proposed design feature specific to the proposed Iron Mountain SEZ:
11

- 12 • Survey of solar energy development sites for possible unexploded military
13 ordnance would be required.
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9.2.3 Specially Designated Areas and Lands with Wilderness Characteristics

9.2.3.1 Affected Environment

The proposed Iron Mountain SEZ is located in the CDCA and also in the center of an area of high wilderness and scenic value. Within 25 mi (40 km) of the area, 11 wilderness areas, including 1 within Joshua Tree National Park, are visible from the SEZ. The Turtle Mountain ACEC, which was designated for its outstanding scenic resources, is included within the boundary of the Turtle Mountains Wilderness. Additionally, the Chemehuevi Desert Wildlife Management Area (DWMA) and the Patton Iron Mountain Divisional Camp ACEC abut the SEZ. The Chemehuevi DWMA also overlaps the Turtle Mountains Wilderness to a great extent. Figure 9.2.3.1-1 shows the relationship of these areas to the SEZ. No lands with wilderness characteristics outside of designated wilderness areas have been identified within 25 mi (40 km) of the SEZ.

As part of the planning process for the BLM-administered lands in the CDCA, all public lands, except for about 300,000 acres (1,214 km²) of scattered parcels, were designated geographically into one of four multiple-use classes. The classification was based on the sensitivity of resources and the kinds of uses for each geographic area. Four multiple use classes were used (BLM 1999):

- Class C is for lands designated either as wilderness or for wilderness study areas. These lands are managed to protect their wilderness characteristics.
- Class L (Limited Use) protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.
- Class M (Moderate Use) is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources which permitted uses may cause.
- Class I (Intensive use). Its purpose is to provide for the concentrated use of lands and resources to meet human needs. Reasonable protection will be provided for sensitive natural and cultural values. Mitigation of impacts on resources and rehabilitation of affected areas will occur insofar as possible.

Land within the SEZ is predominantly Class M (93%) with some Class I (6%) and Class L (1%). The Multiple Use Class Guidelines contained in the CDCA Plan indicate that wind, solar, or geothermal electrical generation facilities could be allowed in all these classes.

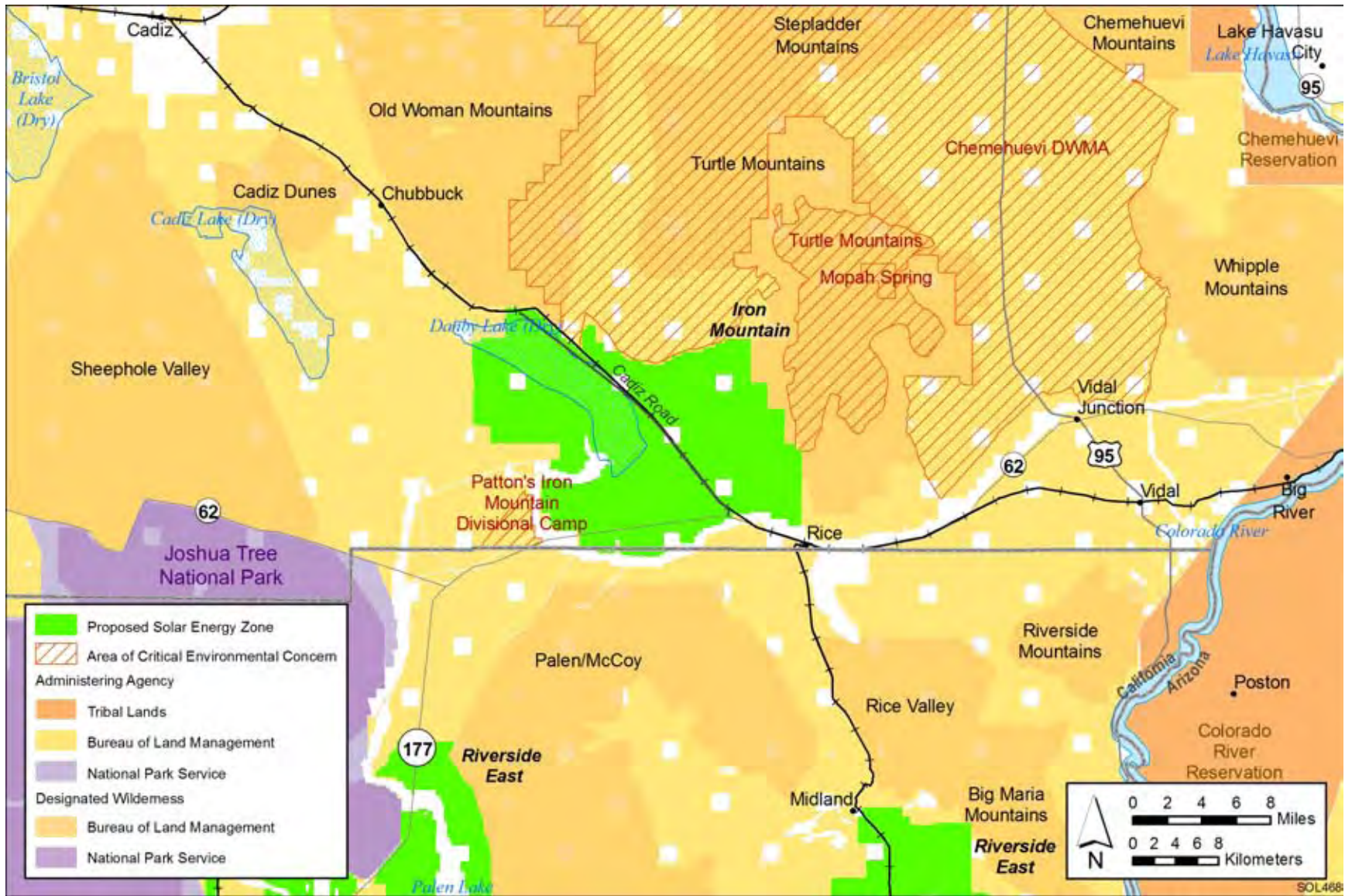


FIGURE 9.2.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Iron Mountain SEZ

1 **9.2.3.2 Impacts**

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3
4 **9.2.3.2.1 Construction and Operations**

5
6 The potential impact on specially designated areas from solar development within the
7 proposed Iron Mountain SEZ is difficult to determine and would vary by solar technology
8 employed, the specific area being affected, and the perception of individuals viewing the
9 development. Development of the SEZ, especially full development, would be a dominating
10 factor in the viewshed from large portions of some of these specially designated areas, as
11 summarized in Table 9.2.3.2-1.

12
13 The data provided in Table 9.2.3.2-1 assume the use of the power tower solar energy
14 technology, which because of the potential height of these facilities, could be visible from the
15 largest amount of land of the technologies being considered in the PEIS. The potential visual
16 impacts of solar energy projects in terms of the amount of acreage within specially designated
17 areas within the viewshed of the SEZ could be less for shorter solar energy facilities; however,
18 assessment of the visual impacts of solar development on specially designated areas must be
19 conducted on a site-specific and technology-specific basis to accurately identify impacts. See
20 Section 9.2.14 for a more complete review of the visual impacts for the Iron Mountain SEZ.

21
22 In general, the closer a viewer is to solar development, the greater the impact on an
23 individual's perception (see Section 9.2.14 for a more thorough discussion of visual impacts
24 and analysis). The viewing height above a solar energy development area, the size of the solar
25 development area, and the purpose for which a person is visiting an area are also important.
26 Individuals seeking a wilderness experience within these areas could be expected to be more
27 adversely affected than those simply traveling along the highway with another destination in
28 mind. In the case of the Iron Mountain SEZ, the low-lying location of the SEZ in relation to
29 surrounding specially designated areas would tend to highlight the industrial-like development
30 in the SEZ. In addition, because of the generally undeveloped nature of the whole area in and
31 around the SEZ, impacts on wilderness characteristics may be more significant than in other,
32 less pristine areas.

33
34 The occurrence of glint and glare at solar facilities could potentially cause large though
35 temporary increases in brightness and visibility of the facilities. The visual contrast levels that
36 were assumed to assess potential impacts on specially designated areas do not account for
37 potential glint and glare effects; however, these effects would be incorporated into a future site-
38 and project-specific assessment that would be conducted for specific proposed utility-scale solar
39 energy projects.

40
41 The NPS has identified concerns about the potential impact of solar energy development
42 on natural, cultural, and historical resources inside and outside of the boundaries of Joshua Tree
43 National Park. In addition, because of the lack of development in the immediate region of the
44 SEZ, the night sky is very dark and the NPS also has identified concerns that solar facility
45 development in the SEZ and in areas adjacent to the park could adversely affect the quality of the
46 night sky environment as viewed from the park. The amount of light that may emanate from Iron

TABLE 9.2.3.2-1 Specially Designated Areas Potentially within the Viewshed of Solar Facilities within the Proposed Iron Mountain SEZ^a

Resource	Total Acres	Acres within 5-mi ^b (8-km) Viewshed		Acres within 15-mi (24-km) Viewshed		Acres within 25-mi (40-km) Viewshed	
		No. of Acres	Percentage of Total Acres	No. of Acres	Percentage of Total Acres	No. of Acres	Percentage of Total Acres
California Desert Conservation Area	25,919,319	308,931	1.2	627,189	2.4	821,521	3.2
Turtle Mountains ACEC	50,057	9,384	18.7	10,024	20.0	10,024	20.0
Joshua Tree NP	793,331			8,931	1.1	14,606	1.8
<i>Wilderness Areas</i>							
Big Maria Mountains	46,056					8,974	19.5
Cadiz Dunes	21,286			79	0.4	1,443	6.8
Joshua Tree NP	586,623			8,898	1.5	14,333	2.4
Old Woman Mountains	183,555	20,092	10.9	74,026	40.3	88,760	48.4
Palen-McCoy	224,414	19,297	8.6	57,313	25.5	60,341	26.9
Rice Valley	43,412			34,944	80.5	40,639	93.6
Riverside Mountains	24,206			688	2.8	818	3.4
Sheephole Valley	195,002			11,755	6.0	37,033	19.0
Stepladder Mountains	84,187					12,833	15.2
Turtle Mountains	182,610	26,358	14.4	70,305	38.5	73,092	40.0
Whipple Mountains	78,484					97	0.1

^a Identified assuming a power tower facility of 650 ft (198.1 m).

^b To convert acres to lcm², multiply by 0.004047; to convert mi to km, multiply by 1.609.

1 Mountain solar facilities is not known but it could affect the national park and the surrounding
2 wilderness areas.

3
4 The following are descriptions of the potential impacts of solar energy facilities on
5 specially designated areas:

6
7
8 *Designated Wilderness within 5 mi (8 km) of the SEZ*

- 9
10 • The Turtle Mountains WA abuts the boundary of the SEZ for about 11 mi
11 (17.7 km). The Old Woman Mountains Wilderness is separated from the SEZ
12 by about 0.25 mi (0.40 km), where the railroad and Cadiz Road skirt the
13 northern end of the SEZ. The southern boundary of the SEZ ranges from 2 to
14 3.5 mi (3.2 to 5.6 km) from the Palen-McCoy Wilderness. Within 5 mi (8 km)
15 of the SEZ, wilderness characteristics would be adversely affected by
16 development within the SEZ. Designated wilderness within the 5-mi (8-km)
17 viewshed of the SEZ includes about 66,000 acres (267 km²). See Table
18 9.2.3.2-1 for additional details about the designated wilderness affected by
19 this SEZ.
20

21
22 *Designated Wilderness within 15 mi (24 km) of the SEZ*

- 23
24 • The boundary of the Rice Valley WA is within 7 mi (11 km) of the SEZ, and
25 80% of the WA is located in the zone between 5 and 15 mi (9.7 and 24 km)
26 from the SEZ. Because of the distance from the SEZ and because of the
27 possible impact of the intervening development associated with the MWD
28 aqueduct and State Route 62, the impacts on wilderness characteristics in the
29 Rice Valley WA would be expected to be less in this distance zone than those
30 described for the three areas listed above. The reduction of impacts because of
31 increased distance from the SEZ may not be true for the additional acreage in
32 this distance zone in the Turtle Mountains, Old Woman Mountains, and
33 Palen-McCoy WAs because of the potential large expanse of solar
34 development in the SEZ that would be visible. It is anticipated that the
35 wilderness characteristics for these three areas would be adversely affected at
36 distances greater than 5 mi (8 km). As shown in Table 9.2.3.2-1, about
37 237,000 acres (959 km²) of these four WAs is within the 15-mi (24-km)
38 viewshed of the SEZ. In addition, at this distance, small portions of four more
39 WAs begin to be included in the viewshed of the Iron Mountain SEZ,
40 including the WA within Joshua Tree NP.
41
42

43 *Designated Wilderness within 25 mi (40 km) of the SEZ*

- 44
45 • Between 15 and 25 mi (24 and 40 km), the impact of solar development in the
46 Iron Mountain SEZ on wilderness characteristics is expected to be

1 considerably reduced, as development in the SEZ becomes less of a factor in
2 the viewshed. However, as shown in Table 9.2.3.2-1, significant percentages
3 of the Turtle Mountains, Old Woman Mountains, Palen-McCoy, and Rice
4 Valley WAs are included in the viewshed of the SEZ within this distance. The
5 cumulative impact on wilderness characteristics in these four areas would be
6 expected to be more significant because of the large continuous extent of solar
7 development that would be visible from these WAs even at this distance.
8

9 Three other areas—Big Maria Mountains, Sheephole Valley, and Stepladder
10 Mountains WAs—also have significant percentages of designated wilderness
11 in the viewshed of the SEZ at this distance, but the impact on these areas from
12 development in the Iron Mountain SEZ is expected to be minor because of the
13 longer distance and the fact there would be little or no intervening views of
14 solar development in the SEZ. It is anticipated that wilderness characteristics
15 in areas within Joshua Tree National Park with views of the SEZ would be
16 affected in the same manner as these three WAs. At this distance, about
17 338,000 acres (1,368 km²) of designated wilderness is included in the
18 viewshed of the Iron Mountain SEZ.
19
20

21 *Joshua Tree National Park*

- 22
23 • The closest boundary of the national park and designated wilderness within
24 the park is located about 10 mi (16 km) from the boundary of the SEZ.
25 Visitors in about 14,606 acres (59 km²), or 1.8% of the park, would have
26 visibility of solar development within the SEZ. Almost all of this area within
27 the park with visibility of the SEZ is designated wilderness. The NPS has
28 commented that solar energy development on public lands within and outside
29 the study area adjacent to the park have a high potential to adversely affect
30 resources in the Coxcomb Mountains in the northern and eastern portions of
31 the park. Based on visual analysis of the potential impacts of development of
32 the SEZ and largely because of the distance to the park, it is anticipated that
33 solar development would have a minimal impact on the park.
34

35 The eastern portion of the national park affords park visitors with an
36 unimpeded opportunity for night sky viewing. Maintaining the high quality of
37 night sky viewing opportunity in this portion of the park is a major concern
38 for the NPS. The concerns of the NPS relate to any artificially induced light
39 from nighttime maintenance activity and/or security lighting within 20 mi
40 (32 km) of the park's boundaries. At this time no estimate of the potential for
41 impact on night sky viewing can be provided.
42
43
44

1 ACECs

- 2
- 3 • The Turtle Mountains ACEC, which was designated for its outstanding scenic
4 resources, is located to the east of the SEZ within the boundaries of the Turtle
5 Mountains Wilderness. The boundary of the scenic ACEC abuts the SEZ in
6 one area, and about 19% of the ACEC is within 5 mi (8 km) and in full view
7 of the SEZ. Although the ACEC would not be directly affected by
8 development in the SEZ, the setting of the area would be adversely affected,
9 and it is likely that visitors to the ACEC would find the scenic resources of the
10 area within view of the SEZ to be adversely affected by the presence of solar
11 facilities.
 - 12
 - 13 • The Patton Iron Mountain Divisional Camp ACEC is located near the
14 southwest corner of the SEZ. The area is significant because Patton's Third
15 Army trained there prior to deployment during WWII. The ACEC relates to
16 the cantonment area only, not the entire divisional camp, which includes its
17 related firing ranges. The area would not be directly affected by development
18 of the SEZ, but it is possible that if additional human traffic is drawn to the
19 area because of the solar facilities, increased management efforts may be
20 needed to protect the site.
 - 21
 - 22 • The Chemehuevi DWMA is an 875,000-acre (3,540-km²) area established to
23 provide for the management and protection of the desert tortoise. The DWMA
24 abuts the northern boundary of the SEZ and straddles both the 230-kV
25 transmission line and the main dirt road providing access to the SEZ from the
26 north. Increased traffic on this road accessing the SEZ and an increasing
27 number of people in the area could increase the mortality of the desert
28 tortoise. Since the area is very large, however, it is not anticipated that there
29 would be a significant effect on the function of the DWMA or on the tortoise
30 population.
 - 31
 - 32

33 *California Desert Conservation Area*

- 34
- 35 • The viewshed within 25 mi (40 km) of the Iron Mountain SEZ includes about
36 822,000 acres (3,327 km²), or about 3.2% of the CDCA (Table 9.2.3.2-1), and
37 the viewshed may extend to 40 mi (64 km). Installation of renewable energy
38 facilities is consistent with the CDCA Plan, but full development of the SEZ
39 would adversely affect wilderness characteristics in three designated WAs,
40 scenic values in one ACEC, and opportunities for undeveloped recreation in
41 and around the SEZ, and would cause a small loss of recreational use within
42 the area of the SEZ. It is anticipated that full development of the SEZ would
43 adversely affect recreational use in about 66,000 acres (267 km²) of
44 wilderness areas surrounding the SEZ that is located within the most sensitive
45 5-mi (8-km) visual zone surrounding the proposed SEZ. Overall adverse
46 impacts on the CDCA appear to be significant.
 - 47

1 **9.2.3.2.2 Transmission Facilities and Other Off-Site Infrastructure**

2
3 See Section 9.2.2.2 for the discussion of the assumptions and requirements regarding
4 construction of new transmission lines or roads; the discussion also applies to impacts on
5 specially designated areas.
6

7
8 **9.2.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**

9
10 Implementing the programmatic design features described in Appendix A, Section A.2.2,
11 as required under BLM’s Solar Energy Program, would provide some level of mitigation for
12 identified impacts. The exceptions would be that SEZ development would adversely affect
13 wilderness characteristics in the Turtle Mountains, Old Woman Mountains, and Palen-McCoy
14 WAs and scenic resources in the Turtle Mountain ACEC.
15

16 Proposed design features specific to the proposed SEZ include the following:

- 17
18 • The application of SEZ-specific design features for visual resource impacts
19 presented in Section 9.2.14 may reduce the visual impacts on wilderness
20 characteristics, scenic resources, and on night sky viewing opportunities.
21

22 It is anticipated that even with the adoption of the design features, adverse impacts on
23 wilderness characteristics and scenic resources would not be completely mitigated and residual
24 impacts would remain.
25
26

1 **9.2.4 Rangeland Resources**
2

3 Rangelands resources include livestock grazing and wild horses and burros, both of
4 which are managed by the BLM. These resources and possible impacts on them from solar
5 development within the proposed Iron Mountain SEZ are discussed in Sections 9.2.4.1 and
6 9.2.4.2.
7

8
9 **9.2.4.1 Livestock Grazing**

10
11
12 **9.2.4.1.1 Affected Environment**

13
14 The SEZ is not included within a grazing allotment, and grazing is not authorized in the
15 area. There is one allotment located just to the south of the area.
16

17
18 **9.2.4.1.2 Impacts**

19
20 There would be no impact on livestock grazing.
21

22
23 **9.2.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness**

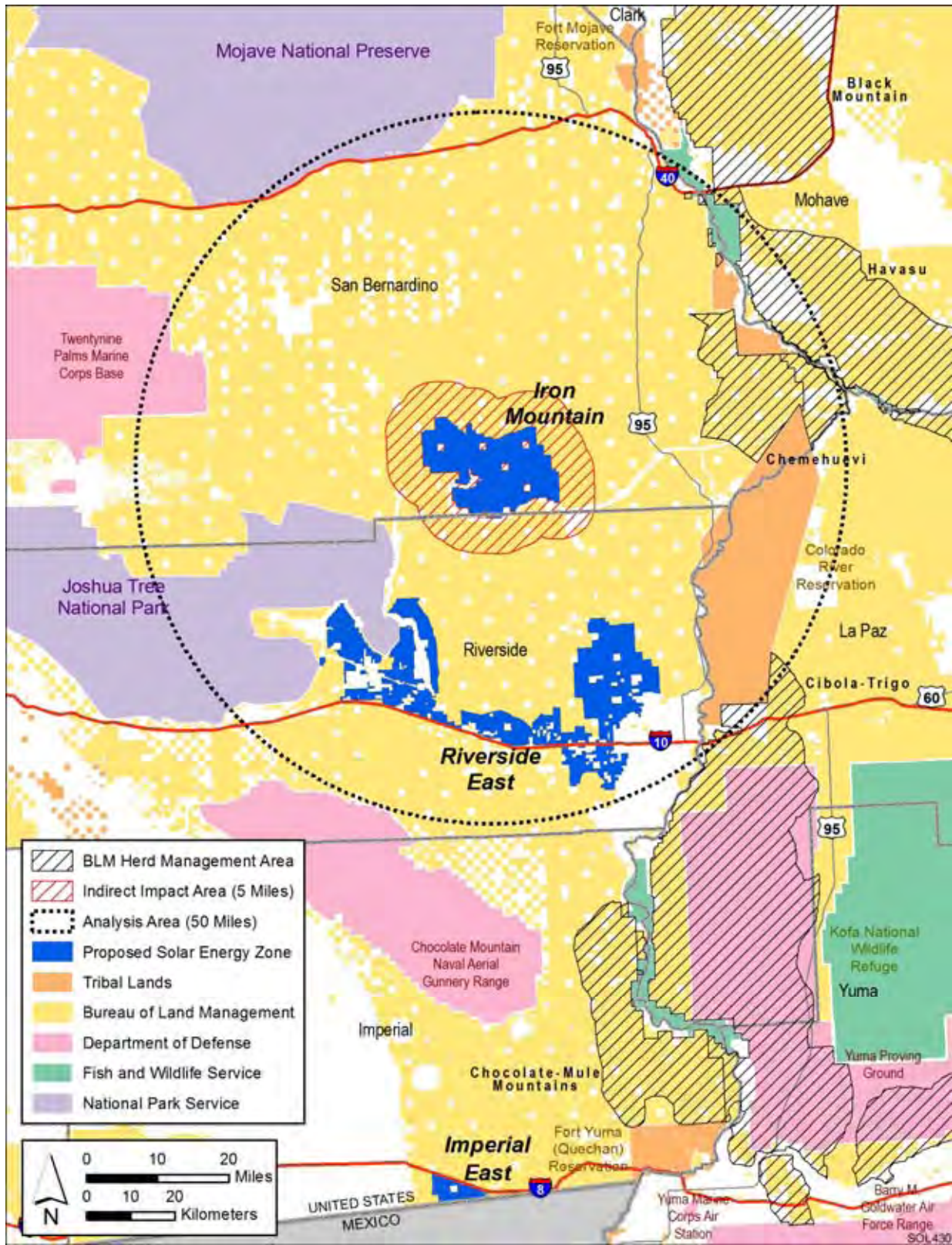
24
25 No SEZ-specific design features would be necessary to protect or minimize impacts on
26 livestock grazing.
27

28
29 **9.2.4.2 Wild Horses and Burros**

30
31
32 **9.2.4.2.1 Affected Environment**

33
34 Section 4.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) that
35 occur within the six-state study area. Twenty-two wild horse and burro HMAs occur within
36 California. Also, several HMAs in Arizona are located near the Arizona–California border.
37 Three of these HMAs occur within a 50-mi (80-km) radius of the proposed Iron Mountain
38 SEZ (Figure 9.2.4.2.1-1). The closest HMA is the Chemehuevi HMA located in California,
39 which contains only wild burros and is about 20 mi (32 km) east-northeast of the SEZ. The
40 Chemehuevi HMA contains an estimated population of 201 burros (BLM 2009e).
41

42 In addition to the HMAs managed by the BLM, the USFS has 51 established wild horse
43 and burro territories in Arizona, California, Nevada, New Mexico, and Utah and is the lead
44 management agency that administers 37 of the territories (Giffen 2009; USFS 2007). The closest
45 territory to the proposed Iron Mountain SEZ is the Big Bear Territory within the San Bernardino



1

2 **FIGURE 9.2.4.2-1 Wild Horse and Burro Herd Management Areas within the SEZ Region for**
 3 **the Proposed Iron Mountain SEZ (Sources: BLM 2009d; USFS 2007)**

1 National Forest. It is located more than 80 mi (129 km) west of the SEZ. This territory is
2 managed for a population of 60 wild burros (USFS 2007).

3
4
5 **9.2.4.2.2 Impacts**

6
7 Because the proposed Iron Mountain SEZ is 21 mi (34 km) or more from any wild horse
8 and burro HMA managed by the BLM and more than 80 mi (129 km) from any wild horse and
9 burro territory administered by the USFS, solar energy development within the SEZ would not
10 affect wild horses and burros that are managed by these agencies.

11
12
13 **9.2.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**

14
15 The implementation of required programmatic design features described in Appendix A,
16 Section A.2.2, would reduce the potential for effects on wild horses and burros. No proposed
17 Iron Mountain SEZ-specific design features would be necessary to protect or minimize impacts
18 on wild burros.

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1 **9.2.5 Recreation**

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3
4 **9.2.5.1 Affected Environment**

5
6 The proposed Iron Mountain SEZ is flat, and the land is of a type and quality that
7 generally does not attract large numbers of recreational users. Although the area is remote,
8 access into the area is easy, and primarily during the cooler months, low levels of recreational
9 use are likely to occur. The CDCA, like many remote areas of the public lands, attracts
10 individuals and families seeking undeveloped recreation opportunities. Opportunities for
11 exploration of old townsites, mining operations, and old roads as well as for hunting and
12 backcountry camping, hiking, and wildlife and wildflower viewing are important attractions
13 throughout the CDCA. There are areas both in and adjacent to the Iron Mountain SEZ that
14 provide these kinds of attractions.

15
16 The SEZ is very large and is part of a large open vista that is still undeveloped. The area
17 was used for military training during WWII, and several of the old military encampment sites
18 outside the SEZ attract visitors interested in the history of that period. Portions of the area are
19 important as access points to the Turtle Mountains WA. Cadiz Road, which passes through the
20 SEZ, is a major access route to backcountry recreation areas outside of the SEZ. In 2004, the
21 area was designated in the Northern and Eastern Mohave Route Designation Amendment to the
22 California Desert Plan as “Limited, Designated Roads and Trails” (BLM 2009b). Subsequently,
23 several road/trail segments in the SEZ have been designated as open to vehicular use.

24
25 State Route 62, which passes through the southern end of the SEZ, is a major travel route
26 between the Los Angeles metropolitan area and the Colorado River recreation areas. There are
27 approximately 10 segments of OHV routes designated as open within the proposed Iron
28 Mountain SEZ; these are shown in Figure 9.2.21-1.

29
30
31 **9.2.5.2 Impacts**

32
33
34 **9.2.5.2.1 Construction and Operations**

35
36 Recreational users would be excluded from developed areas of the SEZ. Although there
37 are no recreation statistics for the SEZ and surrounding lands, it is anticipated that there would
38 be a small loss of recreation use caused by development of the Iron Mountain SEZ. Because
39 of the visual impact of a large and highly visible industrial-type development in the SEZ,
40 opportunities for an undeveloped and primitive recreation experience in and around the SEZ
41 would be lost or reduced. Access through areas developed for solar power production could be
42 closed or rerouted. Access to public lands to the east of the SEZ could be adversely affected by
43 solar energy development if provision is not made to maintain public road access around or
44 through any solar development areas.

1 Open OHV routes crossing areas granted ROWs for solar facilities would be redesignated
2 as closed. However, a programmatic design feature addressing recreational impacts would
3 require consideration of development of alternative routes that would retain a similar level of
4 access across and to public lands as a part of the project proposal (see Section 5.5.1 for more
5 details on how routes coinciding with proposed solar facilities would be treated).
6

7 Based on viewshed analysis (see Section 9.2.14), the Iron Mountain SEZ would be
8 visible from a wide area, perhaps as far away as I-40, about 40 mi (64 km) to the northwest.
9 Solar facilities in the SEZ and in adjacent areas currently under solar application would cause
10 the loss of the currently expansive and undeveloped viewshed over a large area. The viewshed
11 within 25 mi (40 km) of the Iron Mountain SEZ alone includes about 822,000 acres (3,327 km²)
12 within the CDCA (Table 9.2.3.2-1). The viewshed analysis also shows that the SEZ would be
13 visible from large portions of the surrounding wilderness areas. About 66,000 acres (267 km²) of
14 designated wilderness in the Turtle Mountains, Old Woman Mountains, and Palen-McCoy WAs
15 is located within the most sensitive 5-mi (8-km) visual zone surrounding the proposed SEZ, and
16 wilderness recreation use in this area would likely be adversely affected by solar development in
17 the SEZ. Because of the continuity of the view of solar development beyond 5 mi (8 km) from
18 these three WAs, the adverse impacts on wilderness recreation use may extend further than 5 mi
19 (8 km) into these areas.
20

21 **9.2.5.2.2 Transmission Facilities and Other Off-Site Infrastructure**

22 See Section 9.2.2.2.2 for the discussion of the assumptions and requirements regarding
23 construction of new transmission lines or roads that also applies to impacts on recreation use.
24

25 **9.2.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

26 No SEZ-specific design features were identified for addressing impacts on recreation use
27 at the proposed Iron Mountain SEZ. Implementing the programmatic design features described
28 in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would provide
29 limited mitigation for some identified impacts. The exceptions would be the loss of recreation
30 use within the SEZ and of opportunities for undeveloped and primitive recreation around the
31 SEZ. Wilderness recreation use in the Turtle Mountains, Old Woman Mountains, and Palen-
32 McCoy WAs would also be adversely affected.
33
34
35
36
37
38

1 **9.2.6 Military and Civilian Aviation**

2
3
4 **9.2.6.1 Affected Environment**

5
6 The proposed Iron Mountain SEZ is located under five MTRs, which include a mixture
7 of visual and instrument routes; the lowest floor elevation is 200 ft (61 m) AGL. Because of this,
8 the area is identified by the BLM as an area where advance consultation with the DoD is
9 required for approval of activities that could adversely affect the use of the MTRs. The military
10 has indicated that development of portions of this area are compatible with its existing use
11 regardless of the proposed heights of solar facilities, while other portions should have height
12 limits and some areas may be incompatible with existing military use.
13

14 There are no civilian aviation facilities in the vicinity of the SEZ that would be affected
15 by construction and operation of solar energy facilities.
16

17
18 **9.2.6.2 Impacts**

19
20 The development of any solar energy or transmission facilities that encroach into the
21 airspace of the MTR could interfere with military training activities. While the military has
22 indicated that solar development on portions of the Iron Mountain SEZ is compatible with
23 existing military use, it has also commented that other portions should have height limits for
24 facilities, and some areas may be incompatible with existing military use.
25

26 The system of military airspace in the Southwest overlaps much of the area of highest
27 interest for solar development, and there is potential for solar development to result in
28 cumulative effects on the system of MTRs that stretch beyond just one SEZ or solar project.
29

30 There would be no impact on civilian aviation.
31

32
33 **9.2.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**

34
35 No SEZ-specific design features were identified for addressing impacts on military and
36 civilian aviation at the proposed Iron Mountain SEZ. Implementing the programmatic design
37 features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy
38 Program, would provide adequate mitigation for identified impacts.
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1 **9.2.7 Geologic Setting and Soil Resources**

2
3
4 **9.2.7.1 Affected Environment**

5
6
7 **9.2.7.1.1 Geologic Setting**

8
9
10 **Regional Geology**

11
12 The proposed Iron Mountain SEZ lies within the eastern Mojave Desert region of the
13 Basin and Range physiographic province in southeastern California. The site is at the southern
14 end of Ward Valley, a 53-mi (85-km) long north-trending intermontane basin that is bounded
15 on the west by the Piute, Little Piute, and Old Woman Mountains and on the east by the
16 Sacramento, Stepladder, and Turtle Mountains (National Research Council 1995;
17 Figure 9.2.7.1-1). Ward Valley is one of many internally drained, structural basins typical of the
18 Basin and Range province.

19
20 Basin-fill in Ward Valley consists of alluvium, fan deposits, and playa deposits estimated
21 to be as thick as 1,970 ft (600 m). These deposits are generally thickest in the center of the basin,
22 thin out toward the edges, and become more consolidated with depth. The principal water-
23 bearing units in the region are in these deposits. The relative volumes of younger basin-fill and
24 alluvium (Quaternary) and older basin-fill (Miocene and Pliocene) are not known. Ward Valley
25 basin-fill deposits are thought to rest uncomfortably on highly faulted Miocene sedimentary and
26 volcanic rocks that dip to the west (CDWR 2003; National Research Council 1995).

27
28 Exposed sediments in Ward Valley are predominantly modern alluvial and playa deposits
29 (Figure 9.2.7.1-2). Dune sands are common, extending from Rice Valley across the southwestern
30 corner of the Iron Mountain SEZ and continuing along the chain of dry lakes (Danby, Cadiz,
31 Bristol) to the northwest.

32
33 The surface of Danby Lake is mainly “efflorescent ground,” a white, powdery surface
34 caused by the evaporation of capillary brine; areas of the lakebed on the north and south ends,
35 however, are covered by a salt crystal surface and claypan (smooth, hard, compact clay).
36 Gypsum-capped pedestals within the lake are remnants of a once higher lakebed surface that
37 has since been reduced by deflation and erosion. Two lithologic cores drilled in Danby Lake in
38 the late 1950s found the upper 120 to 130 ft (37 to 40 m) in both cores to be a yellowish-brown
39 silty clay, grading with depth into an olive gray clay with coarse sand grains. Thick sequences of
40 crystalline gypsum occurred in both cores at depths of about 300 ft (91 m)—one thicker than
41 200 ft (61 m)—but no salt beds were found in either core (although commercial salt deposits are
42 known to exist in these areas). The lack of correlation between core sediments with increasing
43 depth suggests that they were deposited irregularly as a result of intermittent flooding events and
44 not within a perennial lake environment (Bassett et al. 1959).

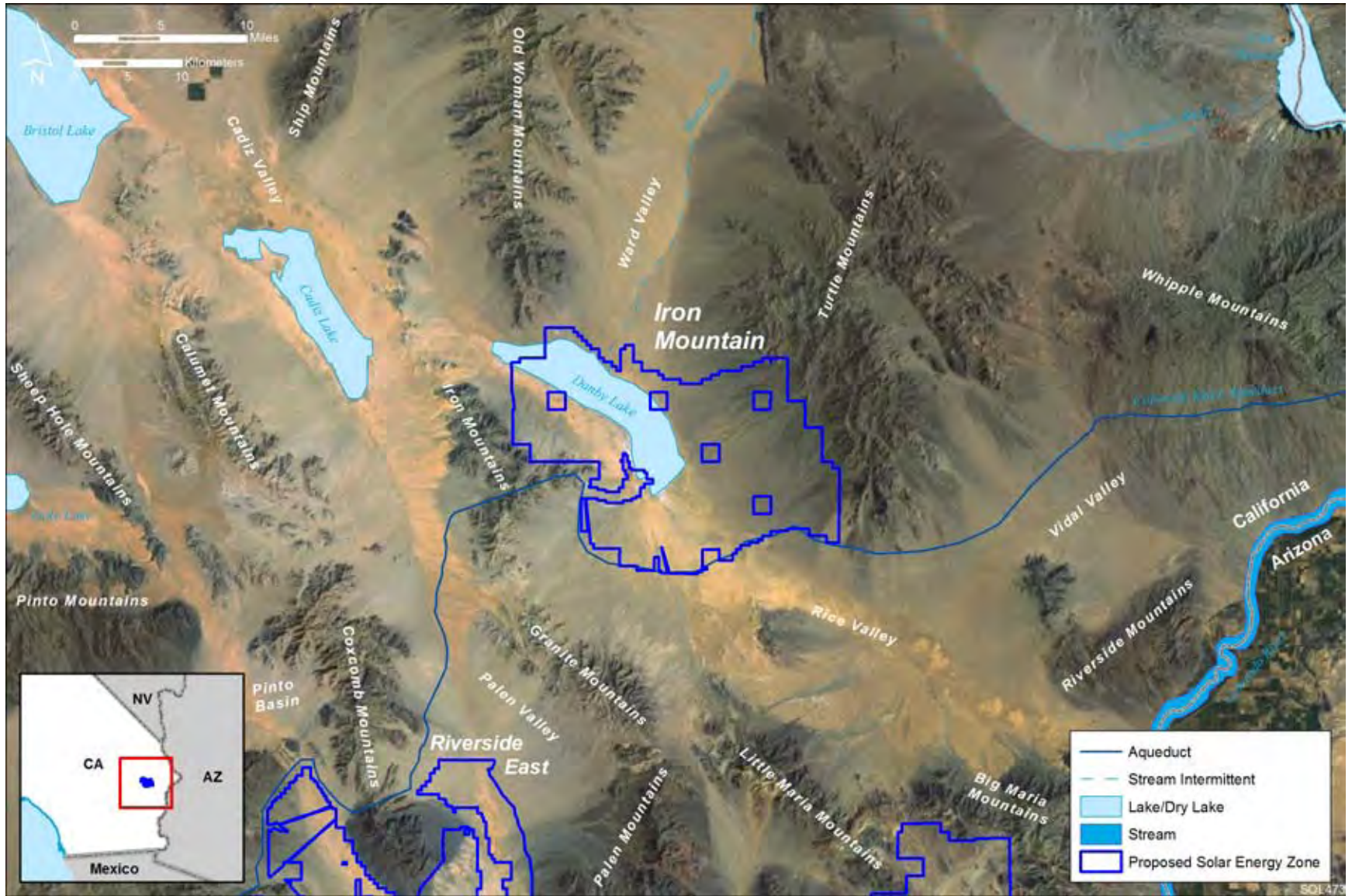
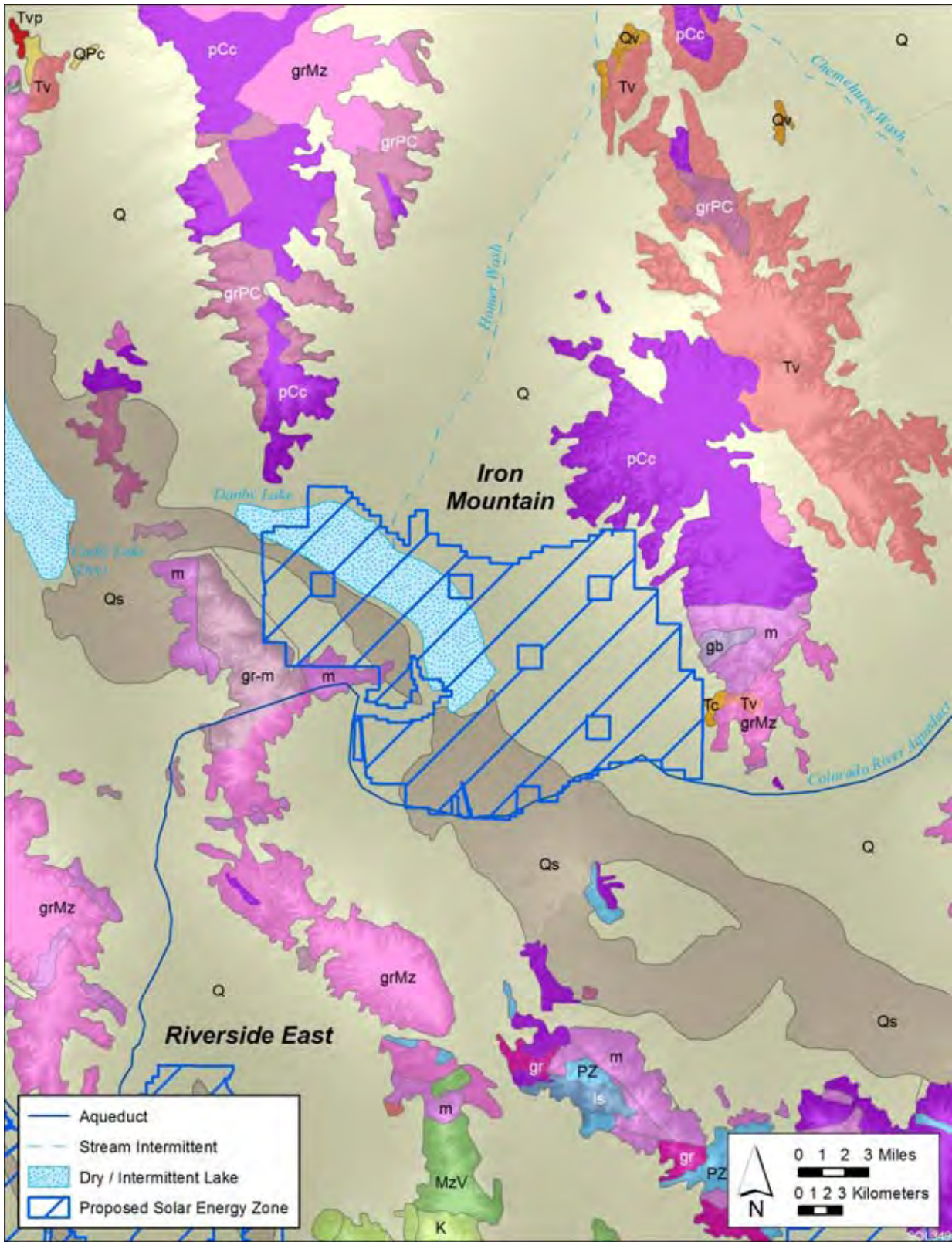


FIGURE 9.2.7.1-1 Physiographic Features in the Ward Valley Region



1
 2 **FIGURE 9.2.7.1-2 Geologic Map of the Ward Valley Region (adapted from Ludington et al. 2007**
 3 **and Gutierrez et al. 2010)**

Cenozoic (Quaternary, Tertiary)

- Q** Alluvium, lake, playa and terrace deposits
- Qs** Dune Sand
- QPc** Sandstone, shale and gravel deposits; mostly loosely consolidated (Pliocene and Pleistocene)
- Qv** Volcanic flow rocks; minor pyroclastic deposits
- Tc** Undivided sandstone, shale, conglomerate, breccia and ancient lake deposits
- Tv** Volcanic flow rocks (basalt and andesite); minor pyroclastic deposits
- Tvp** Pyroclastic and volcanic mudflow deposits

Mesozoic

- K** Sandstone, shale and conglomerate, undivided
- grMz** Granite, quartz monzonite, granodiorite and quartz diorite
- gr-m** Granitic and metamorphic rocks, mostly gneiss (Precambrian to Mesozoic)
- MzV** Volcanic and metavolcanic rocks (undivided)
- gf** Granitic rocks (undated)
- gb** Gabbro and dark dioritic rocks

Precambrian to Mesozoic

- ls** Limestone, dolomite and marble
- PZ** Metasedimentary rocks (undivided); includes slate, sandstone, shale, chert, conglomerate, limestone, dolomite, marble, phyllite, schist, hornfels and quartzite
- m** Metasedimentary and metavolcanic rocks; mostly slate, quartzite, hornfels, chert, phyllite, mylonite, schist, gneiss and minor marble
- pCc** Igneous and metamorphic rocks; mostly gneiss and schist intruded by igneous rocks (includes some Mesozoic rocks)
- grPC** Granite, syenite, anorthosite and gabbroic rocks; with various Precambrian plutonic rocks

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2 **FIGURE 9.2.7.1-2 (Cont.)**

1 **Topography**

2
3 Elevations along the axis of Ward Valley range from about 2,130 ft (650 m) near the
4 north end and along the valley sides to about 610 ft (186 m) at the southern end of the valley
5 within Danby Lake. Gently sloping alluvial fan deposits occur along the mountain fronts and
6 coalesce toward the basin center forming a broad, low-relief terrain (bajada). The valley is
7 drained by Homer Wash, an ephemeral stream that flows to the south and discharges into Danby
8 Lake. Waters discharging to Danby Lake drain toward a sump near the southwest edge of the
9 lakebed. Danby Lake is generally dry except for brief periods following heavy rain events
10 (National Research Council 1995; Moyle 1967). The dry lake is bordered to the southwest by
11 active dunes, part of a series of dunes that extend from the Bristol Lake area southeastward into
12 Rice Valley (Figure 9.2.7.1-1).

13
14 The proposed Iron Mountain SEZ is located between the Iron Mountains (to the west)
15 and the Turtle Mountains (to the east) in the southern part of Ward Valley, about 20 mi (32 km)
16 northwest of the Colorado River. Elevations range from about 1,772 ft (540 m) in the foothills of
17 the Turtle Mountains just within the northeastern corner of the SEZ to less than 656 ft (200 m)
18 within the dry lakebed (Figure 9.2.7.1-3).

19
20
21 **Geologic Hazards**

22
23 The types of geologic hazards that could potentially affect solar project sites and their
24 mitigation are discussed in Sections 5.7.3 and 5.7.4. The following sections provide a
25 preliminary assessment of these hazards at the proposed Iron Mountain SEZ. Solar project
26 developers may need to conduct a geotechnical investigation to assess geologic hazards locally
27 to better identify facility design criteria and site-specific mitigation measures to minimize their
28 risk.

29
30
31 **Seismicity.** The proposed Iron Mountain SEZ is located at the eastern margin of the
32 Eastern California Shear Zone and to the northeast of the San Andreas Fault Zone—both
33 seismically active regions dominated by northwest-trending right-lateral strike slip faulting and
34 categorized as “potentially active” (i.e., having surface displacement within the last 11,000 years
35 [Holocene]) under the Alquist-Priolo Earthquake Fault Zoning Act (Figure 9.2.7.1-4). The term
36 “potentially active” generally denotes that a fault has shown evidence of surface displacement
37 during Quaternary time (the last 1.6 million years). However, because there are numerous such
38 faults in California, the State Geologist has introduced new, more discriminating criteria for
39 zoning faults under the Alquist-Priolo Act. Currently, zoned faults include those that are
40 “sufficiently active,” that is, showing evidence of surface displacement within the past
41 11,000 years along one or more of its segments or branches and “well-defined,” that is, having a
42 clearly detectable trace at or just below the ground surface (Bryant and Hart 2007).

43
44 Ward Valley is about 50 mi (80 km) to the southeast of the East Bullion and Mesquite
45 Lake sections of the Pisgah-Bullion Fault Zone in San Bernardino County. The fault zone is part
46

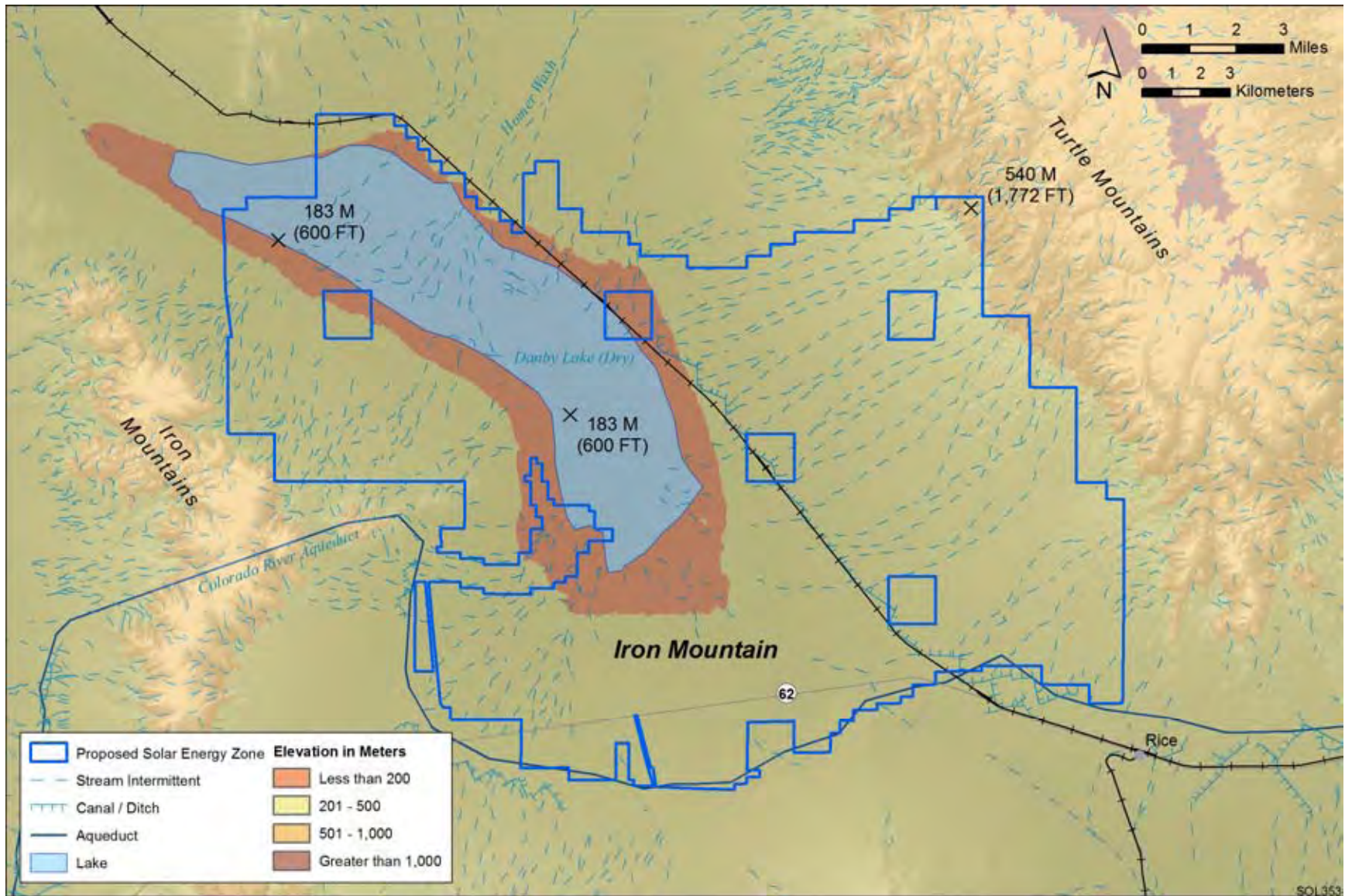


FIGURE 9.2.7.1-3 General Terrain of the Proposed Iron Mountain SEZ

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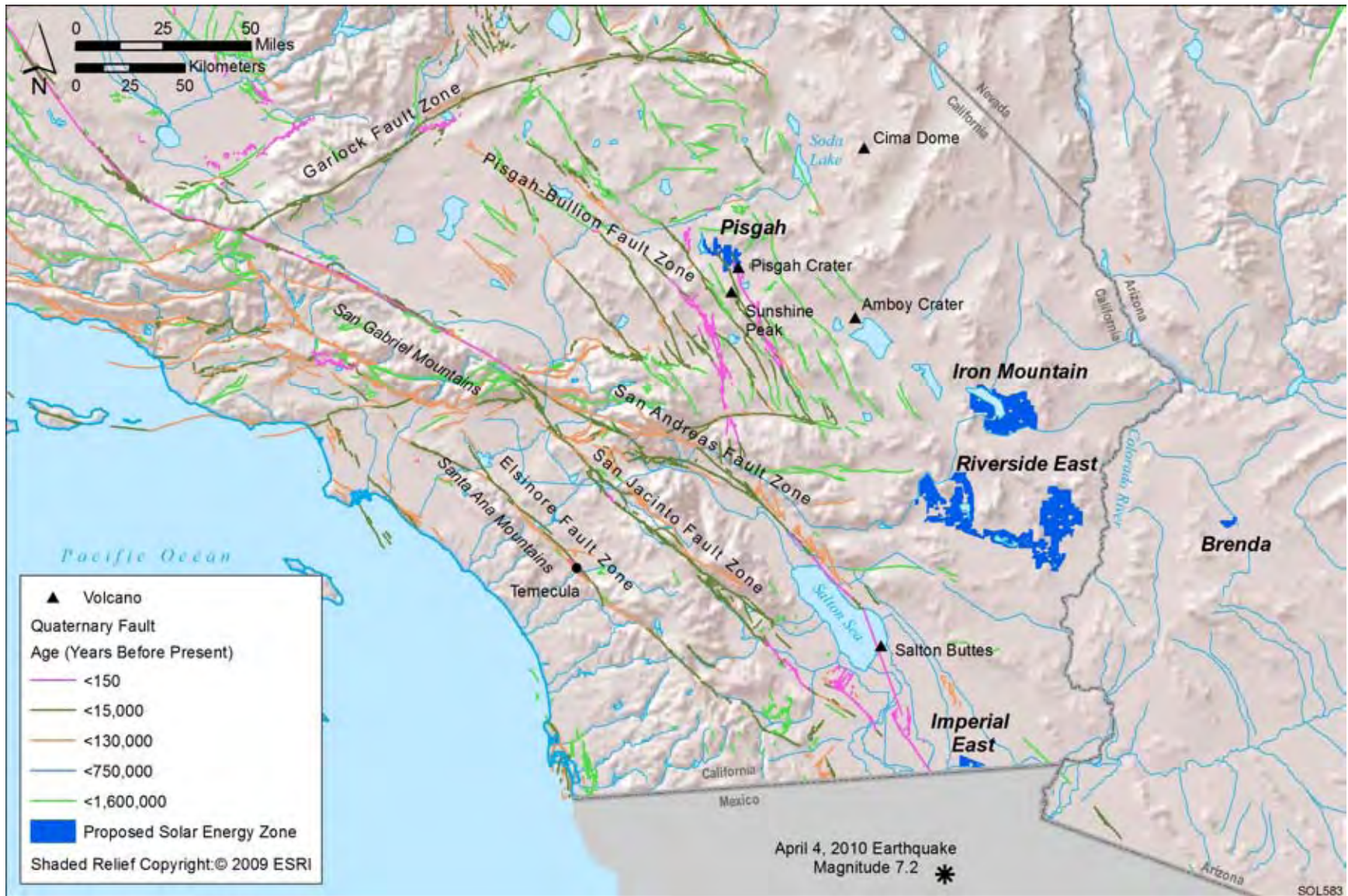


FIGURE 9.2.7.1-4 Quaternary Faults and Volcanoes in Southern California (Sources: USGS and CGS 2009; USGS 2010d)

1 of a complex of right-lateral strike-slip faults occurring within the Eastern California Shear Zone.
2 Offsets of late Pleistocene and Holocene alluvial, lacustrine, and eolian deposits place the most
3 recent movement along these sections at less than 15,000 years ago. Movement with ground
4 rupture in the northern part of the Mesquite Lake section was reported in 1999 (the Hector Mine
5 earthquake) with a magnitude of 7.1 (Bryant and Hart 2007; Treiman 2003; Bryant 2003).

6
7 The Coachella Valley and San Bernardino Mountains sections of the San Andreas
8 Fault Zone are located about 65 mi (105 km) to the southwest of Ward Valley. The fault zone
9 is a network of historically active right-lateral strike-slip faults that together compose the
10 transverse boundary between the North American and Pacific plates. It stretches along most
11 of California's coastline southeast to the northern Transverse Range and inland to the Salton
12 Sea (Figure 9.2.7.1-4). Two major historic earthquakes have occurred along the San Andreas—
13 the 1857 Fort Tejon earthquake (magnitude 7.9) and the 1906 San Francisco earthquake
14 (magnitude 7.8). Several smaller surface-rupturing earthquakes have also occurred in historic
15 time. Quaternary to Holocene creep rates ranging from 23 to 35 mm/yr have been reported
16 for the Coachella Valley and San Bernardino Mountains sections of the fault zone. Average
17 recurrence intervals are estimated to range from 150 to 275 years for the San Bernardino
18 Mountains section and 207 to 233 years for the Coachella Valley section (Bryant and
19 Lundberg 2002a,b; Matti et al. 1992; USGS 1988). The USGS (1988) estimates that the
20 most recent activity along the Coachella Valley section was about $1,680 \pm 40$ years ago.

21
22 Since 1974, about 57 earthquakes have been recorded within a 61-mi (100-km) radius
23 of the Iron Mountain SEZ. During this period, 30 (53%) of the recorded earthquakes had
24 magnitudes greater than 3.0; none were greater than 3.9 (USGS 2010c).

25
26
27 **Liquefaction.** The proposed Iron Mountain SEZ lies within an area where the peak
28 horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.10 and
29 0.20 g. Shaking associated with this level of acceleration is generally perceived as weak to light;
30 damage to structures would not be expected (USGS 2008b).

31
32 A regional evaluation for liquefaction hazards was completed for the San Bernardino
33 Valley and vicinity in western San Bernardino County by Matti and Carson (1991); the study did
34 not include the eastern part of San Bernardino County where the Iron Mountain SEZ is located.
35 San Bernardino Valley is located between the San Andreas and San Jacinto Fault Zones where
36 the peak horizontal acceleration with a 10% probability of exceedance in 50 years is much higher
37 (between 0.88 and 1.62 g) than that calculated for Ward Valley; therefore, only general
38 conclusions from the study are presented here.

39
40 The evaluation considered three aspects of liquefaction: (1) susceptibility,
41 (2) opportunity, and (3) potential. Susceptibility identifies sedimentary materials that are likely
42 to liquefy during a seismic event on the basis of their physical properties, depth to groundwater,
43 expected earthquake magnitude, and strength of ground shaking. Opportunity considers the
44 recurrence intervals for earthquake shaking strong enough to cause liquefaction in susceptible
45 materials. The potential for ground failure due to liquefaction evaluation then combines the

1 results of the susceptibility and opportunity evaluations and identifies areas that are most and
2 least likely to experience liquefaction (Matti and Carson 1991).

3
4 Investigators found that the level of liquefaction susceptibility was most dependent on
5 two factors: (1) depth to the groundwater table and (2) the intensity and duration of ground
6 shaking as determined by an earthquake's magnitude and the distance from the causative fault.
7 These factors, in combination with penetration-resistance data from various locations within the
8 San Bernardino valley, allowed them to conclude that liquefaction susceptibility gradually
9 decreases with increasing depth to groundwater, increasing distance away from the causative
10 fault, and increasing geologic age (and induration) of sedimentary materials. Although the playa
11 sediments at Danby Lake could be considered susceptible to liquefaction since groundwater
12 occurs near the surface (Section 9.2.9.1.2), the low intensity of ground shaking estimated for the
13 general area indicates that the potential for liquefaction in Ward Valley sediments is also likely
14 to be low.

15
16
17 **Volcanic Hazards.** The nearest volcanoes are in the Amboy Crater and lava field (part of
18 the Lavic Lake volcanic field), about 40 mi (65 km) northwest of the Iron Mountain SEZ and
19 immediately northwest of Bristol Dry Lake (Figure 9.2.7.1-4). Amboy Crater is a 250-ft (76-m)
20 high complex basaltic cinder cone surrounded by about 24.1 mi² (62 km²) of mafic lava flows.
21 The basalt fields erupted from several vents about 10,000 years ago. Hazards resulting from
22 these eruptions would likely be less severe than those from more silicic sources; they include the
23 formation of cinder cones, small volumes of tephra, and lava flows (Parker 1963; Miller 1989).

24
25 The Pisgah Crater (also part of the Lavic Lake volcanic field) is immediately adjacent to
26 the southeast corner of the Pisgah SEZ, about 75 mi (120 km) northwest of the Iron Mountain
27 SEZ (Figure 9.2.7.1-4). The 328-ft (100-m) high cinder cone is the youngest vent in the basalt
28 field. Lava flows issuing from vents within the basalt field sit above alluvial fan and playa lake
29 deposits. A similar, lesser known cinder cone and lava field also is present in the Sunshine Peak
30 area, about 6 mi (10 km) to the south. Researchers date the most recent activity associated with
31 the Pisgah volcano to about 25,000 years ago (Smithsonian 2010; Bassett and Kupfer 1964).
32 Because of the basaltic composition of the Pisgah Crater lava, hazards likely would be similar to
33 those described for the Amboy Crater but would depend on factors such as location, size, and
34 timing (season).

35
36 The Cima dome and volcanic field east of Soda Lake is about 80 mi (130 km) north-
37 northwest of the Iron Mountain SEZ (Figure 9.2.7.1-4). The volcanic field consists of about
38 40 basaltic cones and more than 60 associated mafic lava flows covering an area of about 58 mi²
39 (150 km²). It has had three periods of activity from the late Miocene through the late Pleistocene,
40 the most recent having occurred about 15,000 years ago (Dohrenwend et al. 1984). Because of
41 the basaltic nature of the Cima volcanic field, hazards associated with it would likely be similar
42 to those described for the Lavic Lake volcanic field, but would depend on factors such as
43 location, size, and timing (season).

44
45 The nearest active volcano is Mount St. Helens in the Cascade Range (Washington),
46 about 905 mi (1,460 km) north-northwest of Ward Valley, which has shown some activity as

1 recently as 2008. The nearest volcano that meets the criterion for an unrest episode is the Long
2 Valley Caldera in east-central California, about 320 mi (515 km) northwest, which has
3 experienced recurrent earthquake swarms, changes in thermal springs and gas emissions, and
4 uplift since 1980 (Diefenbach et al. 2009). The Long Valley Caldera is part of the Mono-Inyo
5 Craters volcanic chain that extends from Mammoth Mountain (on the caldera rim) northward
6 about 25 mi (40 km) to Mono Lake. Small to moderate eruptions have occurred at various sites
7 along the volcanic chain in the past 5,000 years at intervals ranging from 250 to 700 years.
8 Windblown ash from some of these eruptions is known to have drifted as far east as Nebraska.
9 While the probability of an eruption within the volcanic chain in any given year is small (less
10 than 1%), serious hazards could result from a future eruption. Depending on the location, size,
11 timing (season), and type of eruption, hazards could include mudflows and flooding, pyroclastic
12 flows, small to moderate volumes of tephra, and falling ash (Hill et al. 1998, 2000; Miller 1989).

13
14 Earthquake swarms also occurred at Medicine Lake Volcano in northern California
15 (Cascade Range) for a few months in 1988. Medicine Lake is about 620 mi (1,000 km) northwest
16 of the Iron Mountain SEZ (Diefenbach et al. 2009). The most recent eruption at Medicine Lake
17 was rhyolitic in composition and occurred about 900 years ago (USGS 2010c). Nearby Lassen
18 Peak last erupted between 1914 and 1917; at least two blasts during this period produced
19 mudflows that inundated the valley floors of Hut and Lost Creeks to the east. Tephra from the
20 most violent eruption, occurring on May 22, 1915, was carried by prevailing winds and
21 deposited as far as 310 mi (500 km) to the east (Miller 1989).

22
23
24 ***Slope Stability and Land Subsidence.*** The incidence of rock falls and slope failures can
25 be moderate to high along mountain fronts and can present a hazard to facilities on the relatively
26 flat terrain of valley floors like Ward Valley if they are located at the base of steep slopes. The
27 risk of rock falls and slope failures decreases toward the flat valley center.

28
29 No land subsidence monitoring has been conducted within the Ward Valley to date;
30 however, 32- to 64-ft (10- to 20-m) long earth fissures and 3-ft (1-m) wide sinkholes associated
31 with subsidence have been documented in the Temecula area of southwestern Riverside County,
32 about 124 mi (200 km) southwest of the proposed Iron Mountain SEZ (Figure 9.2.7.1-4). The
33 subsidence is the result of groundwater overdrafts in the Temecula-Wolf Valley that have caused
34 differential compaction in the sediments of the underlying aquifer. Land failure caused by
35 sinkholes and fissures has been significant enough to damage buildings, roads, potable water and
36 sewer lines, and other infrastructure (Corwin et al. 1991; Shlemon 1995). Land subsidence has
37 also been documented as far back as the 1970s in southern California's San Joaquin Valley,
38 where the maximum subsidence due to extensive groundwater withdrawals for irrigation is
39 greater than 28 ft (9 m) (Galloway et al. 1999) and in the Wilmington Oil Field as a result of oil
40 extraction from the Los Angeles basin in southern Los Angeles County (Kovach 1974).

41
42
43 ***Other Hazards.*** Other potential hazards at the Iron Mountain SEZ include those
44 associated with soil compaction (restricted infiltration and increased runoff), expanding clay
45 soils (destabilization of structures), and hydro-compactable or collapsible soil (settlement).

1 Disturbance of soil crusts and desert varnish on soil surfaces may also increase the likelihood of
2 soil erosion by wind.

3
4 Alluvial fan surfaces, such as those typical of Ward Valley, can be the sites of damaging
5 high-velocity flash floods and debris flows during periods of intense and prolonged rainfall. The
6 nature of the flooding and sedimentation processes (e.g., streamflow versus debris flow) will
7 depend on the specific morphology of the fan (National Research Council 1996).

8 9 10 **9.2.7.1.2 Soil Resources**

11
12 Because soil mapping is not complete for the Mojave Desert area, the map unit
13 composition within the proposed Iron Mountain SEZ has not been delineated. Therefore, only
14 soil series are shown in Figure 9.2.7.1-5 and described in Table 9.2.7.1-1. Soils within the SEZ
15 are predominantly gravelly alluvial sands and fine- to medium-grained eolian sands, which
16 together make up about 81% of the site's soil coverage. These soils are characterized as deep
17 and excessively well-drained, with low to high surface-runoff potential and moderate to rapid
18 permeability. The poorly drained soils of Danby Lake make up about 18% of the site's soil
19 coverage. These soils are composed of brine-saturated clay with some silt, fine-grained sand,
20 and evaporite deposits (Moyle 1967; Gale 1951). The fine- to medium-grained sands are highly
21 susceptible to wind erosion, and soil components of clay, silt, and sand could generate fugitive
22 dust if disturbed. Biological soil crusts and desert pavement have not been documented in the
23 SEZ, but they may be present.

24 25 26 **9.2.7.2 Impacts**

27
28 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
29 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
30 project. These impacts include soil compaction, soil horizon mixing, soil erosion and deposition
31 by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. Such
32 impacts are common to all utility-scale solar energy facilities in varying degrees and are
33 described in more detail for the four phases of development in Section 5.7 .1.

34
35 Because impacts on soil resources result from ground-disturbing activities in the project
36 area, soil impacts would be roughly proportional to the size of a given solar facility, with larger
37 areas of disturbed soil having a greater potential for impacts than smaller areas (Section 5.7.2).
38 The magnitude of impacts would also depend on the types of components built for a given
39 facility, because some components would involve greater disturbance and would take place over
40 a longer time frame.

41
42 Danby Lake may not be a suitable location for construction, because lakebed sediments
43 are often saturated with shallow groundwater and likely collapsible. The lake sits within the
44 lowest elevation area of Ward Valley and (especially its southwestern edge) serves as a sump for
45 drainage in the valley.

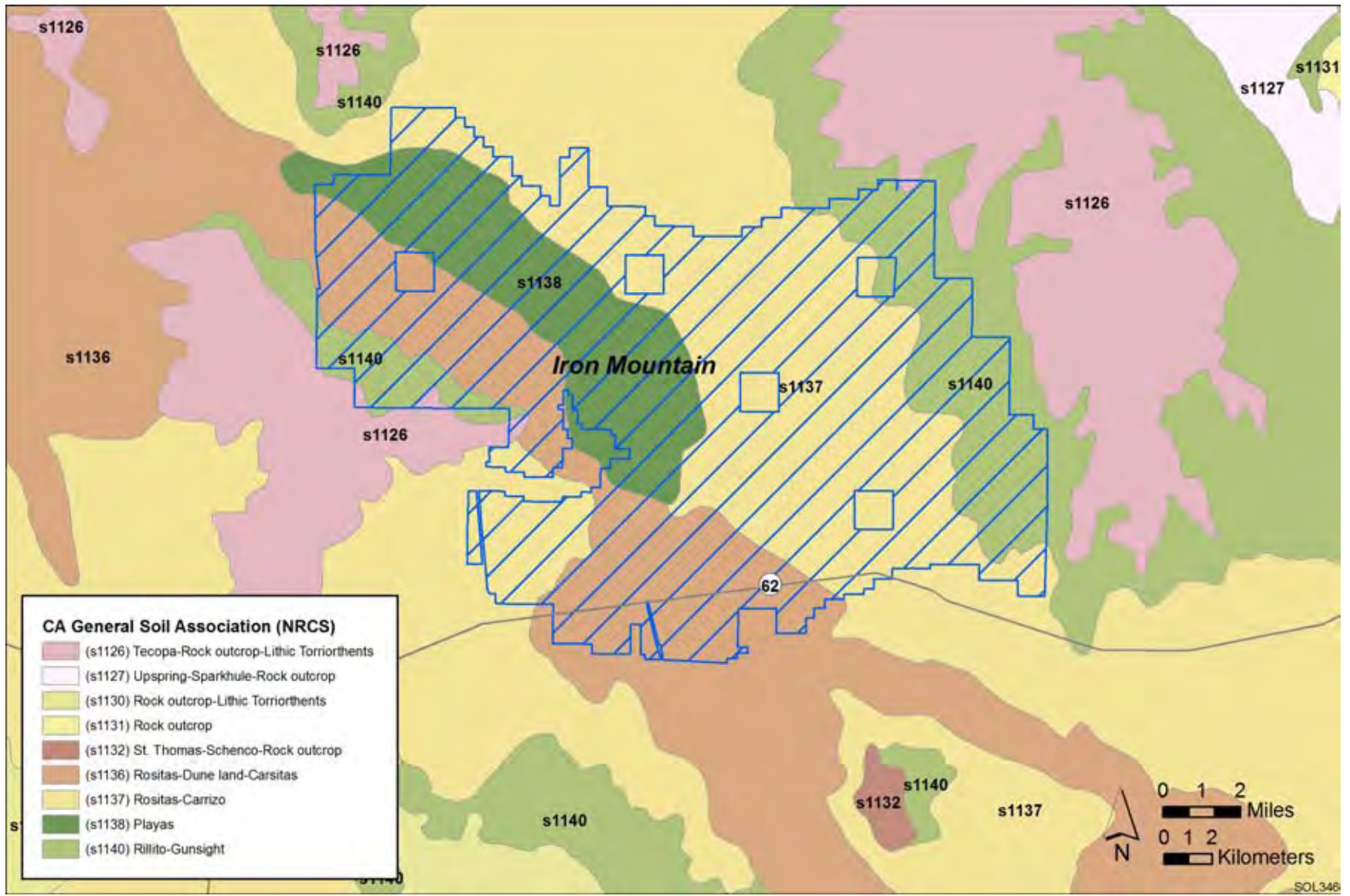


FIGURE 9.2.7.1-5 Soil Map for the Proposed Iron Mountain SEZ (Source: NRCS 2008)

TABLE 9.2.7.1-1 Summary of Soil Series within the Proposed Iron Mountain SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential	Wind Erosion Potential	Description	Area in Acres ^b (% of SEZ)
s1137	Rositas-Carrizo	– ^a	– ^a	<p><i>Rositas series</i> are gently sloping soils on dunes and sand sheets (gradients of 0 to 30%). Very deep and somewhat excessively drained with low surface runoff potential (high infiltration rate) and rapid permeability. Typically fine sand.</p> <p><i>Carrizo series</i> are gently sloping soils on floodplains, alluvial fans, fan piedmonts, and bolson floors (gradients of 0 to 15%). Parent material consists of alluvium from mixed sources. Very deep and excessively drained with negligible to very low surface runoff potential and rapid to very rapid permeability. Typically extremely gravelly sand. Aridic soil moisture regime. Used mainly as rangeland and wildlife habitat.</p>	46,028 (43)
s1136	Rositas-Dune land-Carsitas	–	–	<p><i>Rositas series</i> as described above. <i>Dune land</i> soils are constantly shifting medium-grained sand deposited by wind blowing across the valley. Parent material consists of eolian sands. Little or no vegetation; very rapid permeability. <i>Carsitas series</i> are nearly level to strongly sloping soils on alluvial fans, moderately steep valley fills, and dissected alluvial fan remnants. Excessively drained with slow surface runoff (except during torrential events) and rapid permeability. Typically gravelly sand. Used for watershed and recreation; commercial source of sand and gravel.</p>	24,398 (23)
s1138	Playas	–	–	Very poorly drained soils formed in flats and closed basins; moderately to strongly saline. Medium surface runoff potential and low permeability.	19,054 (18)

TABLE 9.2.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential	Wind Erosion Potential	Description	Area in Acres ^b (% of SEZ)
s1140	Rillito-Gunsight	–	–	<i>Rillito series</i> are nearly level to gently sloping soils on fan terraces (gradients of 0 to 3%). Deep and well-drained soils with low to medium surface runoff potential and moderate to moderately rapid permeability. <i>Gunsight series</i> are gently sloping to sloping soils on fan or stream terraces (gradients of 0 to 60%). Very deep and somewhat excessively drained with very low to high surface runoff potential and moderate to moderately rapid permeability. Aridic soil moisture regime. Typically very gravelly loam. Used mainly for livestock grazing and recreation.	16,487 (15)
s1126	Tecopa-Rock outcrop Lithic torriorthents	–	–	<i>Tecopa series</i> are sloping soils on low hills and low mountain side slopes (gradients of 15 to 75%). Very shallow and well-drained soils formed in residuum and colluvium weathered from metamorphic rocks with medium to rapid surface runoff and moderate permeability. Typically very gravelly sandy loam. Used mainly as desert rangeland. <i>Rock outcrop</i> occurs as low ridges or boulder piles and consists of variable rock types. Rapid surface runoff and barren of vegetation. <i>Lithic Torriorthents</i> are sloping soils on steep hill and mountain side slopes (gradients 15 to 60% or more) with rapid surface runoff. Typically very gravelly sand loam or loam.	556 (<1)

^a A dash indicates water and wind erosion potential not rated at the Soil Series taxonomic level.

^b To convert acres to lcm, multiply by 0.004047.

Source: NRCS (2006).

1 **9.2.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 No SEZ-specific design features were identified for soil resources at the proposed Iron
4 Mountain SEZ. Implementing the programmatic design features described in Appendix A,
5 Section A.2.2., as required under BLM’s Solar Energy Program, would reduce the potential for
6 soil impacts during all project phases.
7

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1 **9.2.8 Minerals (Fluids, Solids, and Geothermal Resources)**
2
3

4 **9.2.8.1 Affected Environment**
5

6 There are no locatable mining claims (BLM and USFS 2010a), or oil and gas or
7 geothermal leases (BLM and USFS 2010b) within the proposed Iron Mountain SEZ. The public
8 land in the SEZ was closed to locatable mineral entry in June 2009, pending the outcome of this
9 solar energy PEIS. In the past much of the area was leased for oil and gas, but no development
10 occurred and the leases were closed. The area is still open for discretionary mineral leasing,
11 including leasing for oil and gas and other leasable and salable minerals. There are sources of
12 sand and gravel within the area that, although not currently economical to develop, could be
13 economical in the future.
14

15 Danby Lake in the northwest corner of the SEZ contains about 28,000 acres (113 km²)
16 of public land that has been determined by the BLM to contain valuable sodium mineral deposits
17 (brines). The area has been classified as the Danby Lake KSLA in accordance with the criteria
18 and review process defined in federal regulations contained in 43 CFR Part 2400. Through a
19 lengthy process—including scientific analysis, administrative decision making, and publication
20 in the *Federal Register*—in 1983 the KSLA was determined to be chiefly valuable for
21 development of the sodium mineral resources to foster the economy of the nation by industrial
22 and mineral development. Under this classification multiple use management may allow for uses
23 other than sodium mineral development, but only if other uses do not interfere with or restrict the
24 production of sodium minerals.
25

26 The production of sodium from the KSLA has been ongoing for many years. The main
27 production method has been to pump underground salt brine into evaporation pits that are
28 constructed on the surface of the dry lakebed of Danby Lake and to collect the salt after the water
29 has evaporated. This process is relatively unobtrusive since large structures are not required to
30 harvest the sodium. About 23,000 acres (93 km²) of the KSLA is within the boundary of the
31 SEZ. Within the SEZ area, there currently are three active and two pending sodium leases.
32
33

34 **9.2.8.2 Impacts**
35

36 If the BLM identifies the area as an SEZ to be used for utility-scale solar development,
37 it would continue to be closed to all incompatible forms of mineral development, with the
38 exception of the KSLA where sodium development is the priority use. Since there are no oil
39 and gas or geothermal leases in the area, it is assumed there would be no significant impacts on
40 these resources if the area were developed for solar energy production. Also, since the area does
41 not contain existing mining claims, it is assumed there would be no loss of locatable mineral
42 production there in the future.
43

44 The existing classification of about 23,000 (93 km²) acres of the SEZ as a KSLA
45 makes that portion of the SEZ unavailable for solar development unless the BLM makes a
46 determination that solar development could be done in such a way that is not inconsistent with

1 the production of sodium, or unless a decision is made that solar energy production should be the
2 dominant use for all or a portion of the area. Additionally, physical conditions on the Danby
3 Lake lakebed do not appear to be conducive to solar development because of periodic flooding,
4 long periods when the lakebed is too wet to support travel, and because of the presence of highly
5 concentrated salt brine, which is corrosive to metals.
6

7 If the area is identified as a solar energy development zone, in addition to the continued
8 extraction of sodium, some other mineral uses might be allowed on all or portions of the SEZ.
9 For example, oil and gas development that involves the use of directional drilling to access
10 resources under the area (should any be found) might be allowed. Also, the production of
11 common minerals, such as sand, gravel, and mineral materials for road construction, might take
12 place in areas not directly developed for solar energy production.
13
14

15 **9.2.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**

16

17 Implementing the programmatic design features described in Appendix A, Section A.2.2,
18 as required under BLM's Solar Energy Program, would provide adequate mitigation for some
19 identified impacts. The exceptions may be impacts on the KSLA and on the availability of sand
20 and gravel to support construction of roads and infrastructure within the SEZ.
21

22 Proposed design features specific to the proposed SEZ include the following:
23

- 24 • The presence of the KSLA must be addressed to evaluate the compatibility of
25 solar development in the KSLA with respect to continuation of sodium
26 mineral leasing. This would likely involve analysis of the physical suitability
27 of the KSLA for solar development, an evaluation of the sodium resource and
28 methods available for its extraction, and a land use planning and decision
29 process to allocate future use of the current KSLA. Alternatively, the KSLA
30 could be excluded from the SEZ.
31
- 32 • Planning and identification for retention of sand and gravel resources within
33 the SEZ should be completed prior to authorization of solar energy ROWs.
34
35
36

1 **9.2.9 Water Resources**

2
3
4 **9.2.9.1 Affected Environment**

5
6 The proposed Iron Mountain SEZ is located within the Southern Mojave-Salton Sea
7 subbasin of the California hydrologic region (USGS 2010b) and the Basin and Range
8 physiographic province characterized by intermittent mountain ranges and desert valleys (Planert
9 and Williams 1995). The semi-enclosed Ward Valley encompasses the proposed SEZ and is
10 bounded by the Turtle Mountains to the east and the Iron Mountains to the west. Surface
11 elevations range from 600 to 1650 ft (183 to 503 m); lower elevations occur near the center of
12 the valley. This region is located within the Mojave Desert, which is characterized by extreme
13 daily temperature ranges and low precipitation and humidity (CDWR 2009). Most of the
14 precipitation in this region falls during the winter months of November to March, with a general
15 trend in annual precipitation amounts increasing with elevation from 3.6 in. (9 cm) in the valleys
16 up to 12 in. (30.5 cm) in the mountains (MWD 2001). Evaporation rates are high in this region,
17 with an average annual pan evaporation value of 130 in./yr (330 cm/yr) (Cowherd et al. 1988;
18 WRCC 2010a).

19
20
21 **9.2.9.1.1 Surface Waters (Including Drainages, Floodplains, and Wetlands)**

22
23 The primary surface water features within the proposed Iron Mountain SEZ are several
24 ephemeral washes coming off the Iron Mountains and Turtle Mountains that drain to the Danby
25 Lake region, which covers approximately 31.5 mi² (81.5 km²) of the northwestern portion of the
26 proposed SEZ (Figure 9.2.9.1-1). Danby Lake is an internal drainage area for the Ward Valley
27 and is a region of active salt mining that can be inundated intermittently throughout the year
28 because of natural drainage, releases from the Colorado River Aqueduct (CRA) during
29 maintenance periods, and mining-induced flooding (see Section 9.2.8.1 for more details on
30 mining operations). Homer wash, an intermittent stream, flows north to south along the middle
31 of the Ward Valley, meeting Danby Lake at the northern boundary of the proposed SEZ. The
32 CRA follows the southern boundary of the proposed Iron Mountain SEZ. The CRA delivers
33 Colorado River water from a diversion near Parker Dam on the California–Arizona border
34 (approximately 43 mi [69 km] northeast of the proposed SEZ) to municipalities and water
35 districts of southern California. The CRA conveys flows that range from 550,000 ac-ft/yr up
36 to 1.3 million ac-ft/yr (0.7 billion to 1.6 billion m³/yr) (MWD 2008). Cadiz Lake, a dry lake,
37 is 6 mi (10 km) west of the proposed SEZ in the adjacent Cadiz Valley.

38
39 Flood hazards have not been identified (Zone D) for the region surrounding the proposed
40 Iron Mountain SEZ (FEMA 2009). Intermittent flooding may occur along ephemeral washes and
41 the Danby Lake region (lowest elevation) with temporary ponding and erosion. No wetlands
42 have been identified within the proposed SEZ according to the NWI (USFWS 2009). One
43 intermittently flooded, riverine wetland that covers an area of 74 acres (0.3 km²) is located 5 mi
44 (8 km) to the south of the proposed SEZ (Figure 9.2.9.1-1).

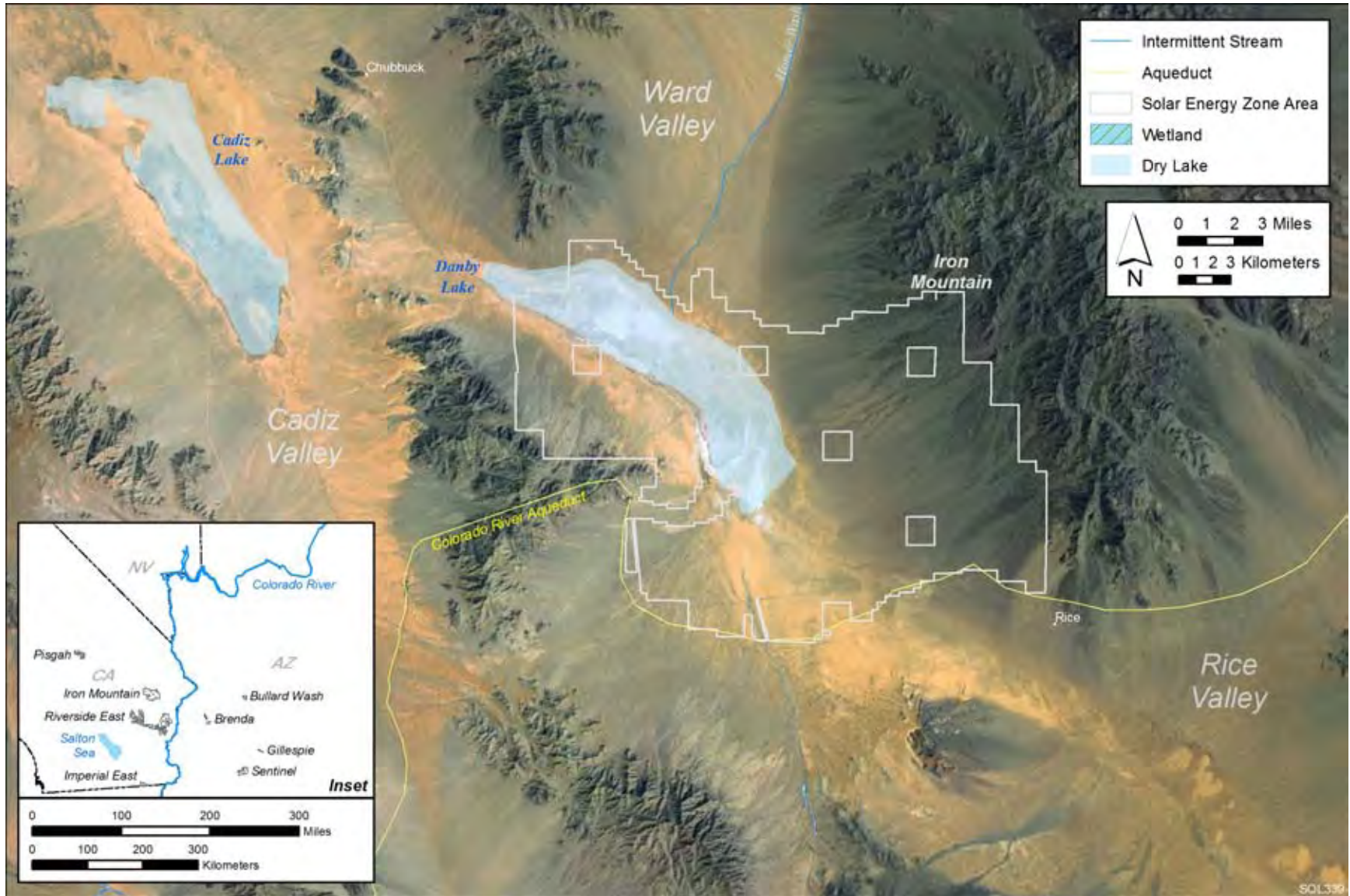


FIGURE 9.2.9.1-1 Surface Water Features near the Proposed Iron Mountain SEZ

1 **9.2.9.1.2 Groundwater**
2

3 The majority (98%) of the proposed Iron Mountain SEZ is located within the Ward
4 Valley groundwater basin with the southeastern corner (2%) located in the Rice Valley
5 groundwater basin. The Ward Valley and Rice Valley groundwater basins are connected by a
6 low-lying alluvial drainage divide. Groundwater is primarily found in alluvium, alluvial fan, and
7 playa deposits of Holocene and Pleistocene age sediments. These basin-fill aquifers are typically
8 unconfined and can range up to 2000 ft (610 m) in thickness. The alluvial deposits consist of
9 unconsolidated sand, pebbles, and boulders with varying amounts of silts and clays; the fan
10 deposits consist of moderately consolidated gravels, sand, silt, and clay; and the playa deposits
11 consist primarily of sand, silt, and soluble salts (CDWR 2003, groundwater basin number 7-03).
12

13 From a regional perspective, groundwater recharge in the eastern Mojave Desert is
14 largely supplied by rainfall and snowmelt runoff at higher elevations, and groundwater discharge
15 is primarily through interbasin flows and evaporation from low-elevation playas (MWD 2001).
16 Information on the groundwater aquifers in the Ward Valley is limited because of the historically
17 low level of development in this region. The groundwater storage capacity for the Ward Valley
18 groundwater basin is estimated to be 8.7 million ac-ft (11 billion m³) based on the basin size and
19 estimates of alluvium depths. The natural groundwater recharge is estimated to be 2,700 ac-ft/yr
20 (3.3 million m³/yr), and the groundwater discharge at Danby Lake is estimated to range from
21 11,000 to 22,000 ac-ft/yr (13.6 million to 27.2 million m³/yr) (CDWR 2003). Historical
22 groundwater withdrawals have been used to support small farms and vineyards, railroads, and
23 salt-mining industries (MWD 2001). Between 1901 and 1947 groundwater withdrawals
24 averaged 50 ac-ft/yr (61,700 m³/yr) but dropped off because of the railroads' switch from steam
25 to diesel engines; currently they range from 2 to 8 ac-ft/yr (2,500 to 9,900 m³/yr) (MWD 2001;
26 CDWR 2003).
27

28 Groundwater levels range from near the surface at Danby Lake to 700 ft below the
29 surface (CDWR 2003). A USGS monitoring well located on the northwest corner of the
30 proposed SEZ showed steady groundwater levels at 93 ft (28 m) below the surface from 1964
31 to 1984 (USGS 2009, well number 341627115102901). Other USGS wells within the adjacent
32 Cadiz Valley and Rice Valley groundwater basins have shown steady groundwater levels as
33 well (USGS 2009, well numbers 340500114505801, 340424114484801, 340300114473301,
34 342513115220001). Well yields between 10 and 260 gpm (38 and 984 L/min) have been
35 reported within the Ward Valley groundwater basin (CDWR 2003). Cadiz, Inc., reported
36 total groundwater yields of up to 3,700 gpm (14,000 L/min) for its agricultural production
37 wells, which are located 25 mi (40 km) northwest of the proposed SEZ in the Cadiz Valley
38 groundwater basin (MWD 2001). The groundwater quality in this region typically has TDS
39 concentrations of 300 to 500 mg/L, with the exception of the playa deposits near the dry
40 lakebeds. Danby Lake and other dry lakes within the region have reported TDS values up to
41 298,000 to 321,000 mg/L (MWD 2001; CDWR 2003).
42
43
44

1 **9.2.9.1.3 Water Use and Water Rights Management**
2

3 In 2005, water withdrawals from surface waters and groundwater in San Bernardino
4 County were 656,900 ac-ft/yr (860 million m³/yr), of which 57% came from surface waters and
5 43% came from groundwater. The largest water use category was municipal and domestic
6 supply, at 427,100 ac-ft/yr (527 million m³/yr). However, the majority of this water is used in the
7 larger cities located in the southwestern portion of San Bernardino County. Agricultural water
8 uses accounted for 167,000 ac-ft/yr (206 million m³/yr), while industrial and thermoelectric
9 water uses accounted for 29,150 and 33,630 ac-ft/yr (36 million and 41 million m³/yr),
10 respectively (Kenny et al. 2009).
11

12 California uses a “plural” system to manage water resources: a mixture of riparian and
13 prior appropriation doctrines for surface waters, a separate doctrine for groundwater, and pueblo
14 rights (BLM 2001). Several agencies are involved with the management of California’s water
15 resources, including federal, state, local, and water/irrigation districts. For example, water rights
16 and water quality are managed by the State Water Board, while the Department of Water
17 Resources manages water conveyance, infrastructure, and flood management (CDWR 2009).
18 Surface water appropriations, for nonriparian rights, begin with a permit application to the State
19 Water Board and a review process that examines the application’s beneficial use, pollution
20 potential, and water quantity availability; the permitting, review, and licensing procedure should
21 not take more than 6 months to complete unless the application is protested (BLM 2001).
22

23 Groundwater management in California is primarily done at the local level of government
24 through local agencies or ordinances and also can be subject to court adjudication. State statutes
25 provide authority and revenue mechanisms to several types of local agencies to provide water
26 for beneficial uses, as well as to manage withdrawals in order to prevent overdraft¹ of the
27 aquifers. Local ordinances (typically at the county level) also can be used to manage
28 groundwater resources and have been adopted in 27 counties in California. Many of these local
29 groundwater ordinances are focused on controlling water exports out of the basin through
30 permitting processes. Court adjudication is the strongest form of groundwater management
31 used in California and often results in the creation of a court-appointed “watermaster” agency
32 to manage withdrawals for all users to ensure that the court-determined safe-yield² is maintained
33 (CDWR 2003).
34

35 The CRA is managed and maintained by the MWD, a consortium of 26 municipal and
36 water districts. The primary function of the MWD is to provide drinking water to its members,
37 which are all located in areas of southern California approximately 100 mi (160 km) to the west
38 of the proposed Iron Mountain SEZ. While the CRA conveys substantial water flows along the
39 southern boundary of the proposed SEZ, this water is essentially unavailable for solar energy
40 development because of its location outside of the MWD service area; thus, any water transfers

1 Groundwater overdraft is the condition where water extractions from an aquifer exceed recharge processes such that there are substantial and sustained decreases in groundwater flows and groundwater elevations.

2 Safe-yield is the amount of groundwater that can be withdrawn from a groundwater basin over a period of time without exceeding the long-term recharge of the basin or unreasonably affecting the basin’s physical and chemical integrity.

1 would have to be approved by the MWD board (MWD 2009, Section 4200). Continued low
2 water levels in Lake Mead affect the surplus water supplies provided to the MWD by the Bureau
3 of Reclamation from the Colorado River; in addition, population growth and water supply
4 demands in the MWD service area suggest that water from the CRA would not be made
5 available for uses outside the MWD service area by the member agencies that compose the
6 MWD board (MWD 2008).

7
8 The primary water resource available to the proposed Iron Mountain SEZ is groundwater,
9 which is managed through the San Bernardino County groundwater ordinance (Groundwater
10 Management Act, Water Code Section 10750 et seq.). Any water withdrawals greater than
11 30 ac-ft/yr (37,000 m³/yr) are subject to a full review process in accordance with the California
12 Environmental Quality Act. The permitting and review process requires the applicant to provide
13 detailed information on the groundwater aquifer, including estimated storage capacity, recharge
14 conditions, water quality, and the anticipated safe-yield. Conditions of approval for the
15 groundwater withdrawal permit may include mitigation actions, as well as the establishment of a
16 groundwater monitoring plan.

17 18 19 **9.2.9.2 Impacts**

20
21 Potential impacts on water resources related to utility-scale solar energy development
22 include direct and indirect impacts on surface waters and groundwater. Direct impacts occur at
23 the place of origin and at the time of the proposed activity, while indirect impacts occur away
24 from the place of origin or later in time. Impacts on water resources considered in this analysis
25 are the result of land disturbance activities (construction, final developed site plan, as well as
26 off-site activities such as road and transmission line construction) and water use requirements
27 for solar energy technologies that take place during the four project phases: site characterization,
28 construction, operations, and decommissioning/reclamation. Both land disturbance and
29 consumptive water use activities can affect groundwater and surface water flows, cause
30 drawdown of groundwater surface elevations, modify natural drainage pathways, obstruct natural
31 recharge zones, and alter surface water-wetland-groundwater connectivity. Water quality also
32 can be degraded through the generation of wastewater, chemical spills, increased erosion and
33 sedimentation, and increased salinity (e.g., by the excessive withdrawal from aquifers).

34 35 36 **9.2.9.2.1 Land Disturbance Impacts on Water Resources**

37
38 Impacts related to land disturbance activities are common to all utility-scale solar energy
39 facilities, which are described in more detail for the four phases of development in Section 5.9.1;
40 these impacts will be minimized through the implementation of the programmatic design features
41 described in Appendix A, Section A.2.2. In addition to the hydrologic evaluation (including
42 identifying 100-year floodplains and jurisdictional waters) described in the design features,
43 coordination and permitting with the CDFG would be needed for any proposed alterations of
44 surface water features (both perennial and ephemeral) in accordance with the Lake and
45 Streambed Alteration Program (CDFG 2010c). The Danby Lake region is the natural drainage
46 outlet for the Ward Valley; the playa sediments contain high soluble salts concentrations. Siting

1 of solar energy facilities in the Danby Lake region could affect the natural drainage patterns of
2 the Ward Valley. As this region is the valley's drainage outlet, facilities here could cause
3 flooding, channel incision, and erosion in upstream drainages. Additionally, the intermittent
4 inundation that occurs in Danby Lake is important to groundwater recharge and discharge
5 processes. Groundwater development in the Danby Lake region would not be feasible for solar
6 energy development because of the very high TDS values (greater than 300,000 mg/L), as well
7 as the shallow groundwater depths in playa sediments that if developed could potentially cause
8 land subsidence.

9
10
11 **9.2.9.2.2 Water Use Requirements for Solar Energy Technologies**

12
13
14 **Analysis Assumptions**

15
16 A detailed description of the water use assumptions for the four utility-scale solar energy
17 technologies (parabolic trough, power tower, dish engine, and PV systems) is presented in
18 Appendix M. Assumptions regarding water use calculations specific to the proposed Iron
19 Mountain SEZ are as follows:

- 20
21 • On the basis of a total area of greater than 30,000 acres (121 km²), it is
22 assumed that three solar projects would be constructed during the peak
23 construction year;
24
25 • Water needed for making concrete would come from an off-site source;
26
27 • The maximum land area disturbed for an individual solar facility during the
28 peak construction year is assumed to be 3,000 acres (12 km²);
29
30 • Assumptions on individual facility size and land requirements (Appendix M),
31 along with the assumed number of projects and maximum allowable land
32 disturbance, results in the potential to disturb up to 8% of the total area of the
33 proposed SEZ;
34
35 • Water use requirements for hybrid cooling systems are assumed to
36 be on the same order of magnitude as those using dry-cooling systems
37 (see Section 5.9.2.1); and
38
39 • Water from the CRA is assumed to be unavailable to solar energy facilities
40 because of two factors: (1) the mechanisms to obtain CRA water would
41 have to be negotiated with the MWD board on a project-specific basis and
42 (2) current water demands by MWD member agencies suggest minimal
43 water is available.
44
45
46

1 **Site Characterization**

2
3 During site characterization, water would be used mainly for controlling fugitive dust and
4 for providing the workforce potable water supply. Impacts on water resources during this phase
5 of development are expected to be negligible since activities would be limited in area, extent,
6 and duration; water needs could be met by trucking water in from an off-site source.
7

8
9 **Construction**

10
11 During construction, water would be used mainly for controlling fugitive dust and for
12 providing the workforce potable water supply. Because there are no significant surface water
13 bodies on the proposed Iron Mountain SEZ, the water requirements for construction activities
14 could be met by either trucking water to the sites or by using on-site groundwater resources.
15 Water requirements for dust suppression and potable water supply during construction are shown
16 in Table 9.2.9.2-1 and could be as high as 6,813 ac-ft (8.4 million m³). Groundwater wells would
17 have to yield an estimated 2,896 to 4,221 gpm (10,963 to 15,978 L/min) to meet the estimated
18 construction water requirements. These yields are on the order of large municipal and agriculture
19 production wells (Harter 2003), so multiple wells may be needed in order to obtain the water
20 requirements. In addition, the generation of up to 222 ac-ft (273,800 m³) of sanitary wastewater
21 would need to be treated either on-site or sent to an off-site facility.
22

23 Information on the available groundwater resources in the Ward Valley groundwater
24 basin is limited because of the historically low development of the region. The estimated total
25 water use requirements during construction are on the order of 1.7 to 2.5 times greater than the
26 estimated natural recharge value of the basin. Groundwater levels have remained steady for
27 decades, but in that time period the highest level of groundwater production has only reached
28
29

TABLE 9.2.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Iron Mountain SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements ^a				
Fugitive dust control (ac-ft) ^{b,c}	4,452	6,678	6,678	6,678
Potable supply for workforce (ac-ft)	222	135	56	28
Total water use requirements (ac-ft)	4,674	6,813	6,734	6,706
Wastewater generated				
Sanitary wastewater (ac-ft)	222	135	56	28

^a Assumptions of water use for fugitive dust control, potable supply for workforce, and wastewater generation are presented in Appendix M.

^b Fugitive dust control estimation assumes a local pan evaporation rate of 130 in./yr (330 cm/yr) (Cowherd et al. 1988; WRCC 2010a).

^c To convert ac-ft to m³, multiply by 1,234.

1 50 ac-ft/yr (61,700 m³/yr). It is likely that groundwater production at the levels needed to meet
2 the construction requirements suggested in Table 9.2.9.2-1 would cause a substantial decline in
3 groundwater elevations in the alluvial aquifer and, potentially, land subsidence. However,
4 pumping tests would need to be performed during the site characterization phase to better
5 determine the storage capacity and safe-yield of the alluvial aquifer. Additionally, concerns
6 about groundwater quality used for the potable workforce supply would have to be addressed
7 during site characterization. Groundwater used for potable supply must have a TDS of less
8 than 1,500 mg/L and is recommended to be less than 500 mg/L to meet secondary maximum
9 contaminant levels (*California Code*, Title 22, Article 16, Section 64449).

12 **Operations**

14 During operations, water would be required for mirror/panel washing, the workforce
15 potable water supply, and cooling (parabolic trough and power tower only) (Table 9.2.9.2-2).
16 Cooling water is required only for the parabolic trough and power tower technologies. Water
17 needs for cooling are a function of the type of cooling used (dry, wet, hybrid). Further
18 refinements to water requirements for cooling would result from the percentage of time that the
19 option was employed (30 to 60% range assumed) and the power of the system. The differences
20 between the water requirements reported in Table 9.2.9.2-2 for the parabolic trough and power
21 tower technologies are attributable to the assumptions of acreage per megawatt. As a result, the
22 water usage for the more energy-dense parabolic trough technology is estimated to be almost
23 twice as large as that for the power tower technology.

24
25 At full build-out capacity, water needs for mirror/panel washing are estimated to
26 range from 473 to 8,522 ac-ft/yr (583,400 to 10.5 million m³/yr) and for the workforce potable
27 water supply, from 11 to 239 ac-ft/yr (13,600 to 294,800 m³/yr). The maximum total water
28 usage during operations at full build-out capacity would be greatest for those technologies using
29 the wet-cooling option and is estimated to be as high as 255,892 ac-ft/yr (316 million m³/yr).
30 Water usage for dry-cooling systems would be as high as 25,805 ac-ft/yr (32 million m³/yr),
31 approximately a factor of 10 times less than that for the wet-cooling option. Noncooled
32 technologies, dish engine and PV systems, require substantially less water at full build-out
33 capacity at 4,840 ac-ft/yr (6.0 million m³/yr) for dish engine and 484 ac-ft/yr (597,000 m³/yr) for
34 PV (Table 9.2.9.2-2). Operations would produce up to 239 ac-ft/yr (294,800 m³/yr) of sanitary
35 wastewater; in addition, for wet-cooled technologies, up to 4,842 ac-ft/yr (6.0 million m³/yr) of
36 cooling system blowdown water would need to be treated either on- or off-site. Any on-site
37 treatment of wastewater would have to ensure that treatment ponds are effectively lined in order
38 to prevent any groundwater contamination.

39
40 The availability of groundwater resources is not well quantified in the Ward Valley
41 because there is little development in the region, as previously mentioned. Water requirements
42 for potable uses by the workforce are of the same order of magnitude as historical groundwater
43 withdrawals. Water use requirements for panel washing of PV systems are a factor of 10 to
44 18 times less than those for mirror washing of parabolic trough, power tower, and dish engine
45 systems. The natural estimated groundwater recharge for the Ward Valley is 2,700 ac-ft/yr
46 (3.3 million m³/yr), which is of the same order of magnitude as the low operation

TABLE 9.2.9.2-2 Estimated Water Requirements during Operations at Full Build-out Capacity at the Proposed Iron Mountain SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW) ^{a,b}	17,044	9,469	9,469	9,469
Water use requirements				
Mirror/panel washing (ac-ft/yr) ^{c,d}	8,522	4,734	4,734	473
Potable supply for workforce (ac-ft/yr)	239	106	106	11
Dry-cooling (ac-ft/yr) ^e	3,409–17,044	1,894–9,469	NA ^f	NA
Wet-cooling (ac-ft/yr) ^e	76,696–247,131	42,609–137,295	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA	NA	4,840	484
Dry-cooled technologies (ac-ft/yr)	12,170–25,805	6,734–14,309	NA	NA
Wet-cooled technologies (ac-ft/yr)	85,457–255,892	47,449–142,135	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr) ^g	4,842	2,690	NA	NA
Sanitary wastewater (ac-ft/yr)	239	106	106	11

^a Land area for parabolic trough was estimated at 5 acres/MW (0.02 km²/MW); land area for the power tower, dish engine, and PV technologies was estimated at 9 acres/MW (0.04 km²/MW).

^b Water needs are linearly related to power. Water usage for any other size project can be estimated by using multipliers provided in Appendix M, Table M.9-2.

^c Value assumes a usage rate of 0.5 ac-ft/yr/MW for mirror washing for parabolic trough, power tower, and dish engine technologies and a rate of 0.05 ac-ft/yr/MW for panel washing for PV systems.

^d To convert ac-ft to m³, multiply by 1,234.

^e Dry-cooling value assumes 0.2 to 1.0 ac-ft/yr per MW and wet-cooling value assumes 4.5 to 14.5 ac ft/yr per MW (range in these values represents 30 and 60% operating times) (DOE 2009a).

^f NA = not applicable.

^g Value scaled from 250-MW Beacon Solar project with an annual discharge of 44 gpm (167 L/min) (AECOM 2009). Blowdown estimates are relevant to wet cooling only.

1
2
3 (30% operation time) values for dry-cooling water needs. At higher operation times (60%),
4 dry-cooling water demands are 3.5 to 6.3 times the natural groundwater recharge of the Ward
5 Valley. Groundwater withdrawals at these levels are likely to cause drawdown in the alluvial
6 aquifer, which could affect current salt-mining operations in the Danby Lake region that are
7 dependent upon maintaining certain depth-to-groundwater levels. Another potential impact of
8 drawdown in the alluvial aquifer is land surface subsidence. This is of particular concern in the
9 region along the CRA, because cracks in the aqueduct would affect the water quantities and
10 rights of the MWD. Further characterization of groundwater resources is needed in the Ward
11 Valley to better quantify the safe-yield of the basin's alluvial aquifer prior to the evaluation of
12 impacts relating to project-specific groundwater withdrawals. During site characterization,
13 developers should coordinate with San Bernardino County in order to comply with the county's

1 groundwater ordinance and permitting process, as well as to coordinate efforts for the further
2 characterization of the groundwater resources in the Ward Valley basin to ensure that there is
3 adequate groundwater supply and to limit land subsidence effects.

4
5 Wet-cooling water requirements are a factor of 2 to 11 times the highest estimate of
6 groundwater discharge that occurs at Danby Lake and approximately 3% of the estimated
7 groundwater storage capacity of the Ward Valley. Additionally, the highest estimated value
8 of water required for wet cooling is approximately one-third of the 801,000 ac-ft/yr
9 (988 million m³/yr) conveyed by the CRA during the period 2007–2008 (MWD 2008), which
10 supports the water needs of its 26 member agencies. These levels of water use needs for wet
11 cooling are not feasible with the water resources available to the region surrounding the
12 proposed Iron Mountain SEZ.

13 14 15 **Decommissioning/Reclamation**

16
17 During decommissioning/reclamation, all surface structures associated with the solar
18 project would be dismantled, and the site reclaimed to its preconstruction state. Activities and
19 water needs during this phase would be similar to those during the construction phase (dust
20 suppression and potable supply for workers) and may also include water to establish vegetation
21 in some areas. However, the total volume of water needed is expected to be less. Because
22 quantities of water needed during the decommissioning/reclamation phase would be less than
23 those for construction, impacts on surface and groundwater resources also would be less.

24 25 26 ***9.2.9.2.3 Off-Site Impacts of Roads and Transmission Lines***

27
28 Impacts associated with the construction of roads and transmission lines primarily deal
29 with water use demands for construction, water quality concerns relating to potential chemical
30 spills, and land disturbance effects on the natural hydrology. A new access road would not be
31 needed because State Route 62 passes through the southern portion of the SEZ, as described in
32 Section 9.2.1.2. It is assumed that existing transmission lines could provide access to the
33 transmission grid, and thus no additional acreage disturbance for transmission line access was
34 assessed.

35 36 37 ***9.2.9.2.4 Summary of Impacts on Water Resources***

38
39 The impacts on water resources associated with developing solar energy in the proposed
40 Iron Mountain SEZ are associated with land disturbance effects on natural hydrology, water use
41 requirements for the various solar energy technologies, and water quality associated with potable
42 water supply. Land disturbance in the region of Danby Lake area has the potential to disrupt the
43 natural drainage to this terminal outlet of the Ward Valley, as well as affect current salt-mining
44 operations. Hydrology alterations in the Danby Lake area could result in upstream erosion in
45 ephemeral washes, localized flooding and channel incision, and potential disruption of
46 groundwater recharge and discharge processes. Additionally, the playa sediments with high

1 soluble salts content in the Danby Lake region could produce groundwater with high TDS
2 values, resulting in water that is nonpotable and corrosive to infrastructure.

3
4 Impacts from water use requirements vary depending on the type of solar technology
5 built and, for technologies using cooling systems, the type of cooling (wet, dry, or hybrid)
6 employed. Groundwater is the primary water resource available to solar energy facilities in the
7 proposed Iron Mountain SEZ, and information on the groundwater storage capacity, as well as
8 on recharge and discharge processes, is not well quantified because of limited historical
9 development in the region. Given the current estimates of annual precipitation, groundwater
10 recharge, discharge at Danby Lake, and historical groundwater withdrawals and levels in the
11 Ward Valley, solar energy facilities using wet cooling would not be feasible because of the lack
12 of available water resources. Additionally, the water use estimates for dry-cooling (parabolic
13 trough and power tower) and dish engine technologies are larger than groundwater recharge
14 estimates for the Ward Valley. Groundwater drawdown of the alluvial aquifer is likely, as well as
15 the potential for land subsidence, which is of particular concern along the CRA. Further
16 quantification of the groundwater safe-yield for the Ward Valley would be needed prior to the
17 evaluation of impacts associated with project-specific groundwater withdrawals. Water use
18 estimates for PV systems are of a similar order of magnitude of the historically highest
19 groundwater withdrawals; this suggests that groundwater resources are adequate to support PV
20 facilities.

21
22 The estimated values of water requirements for the solar energy technologies are a
23 function of the full build-out capacity of the proposed SEZ. Full build-out of the large area of the
24 proposed Iron Mountain SEZ has the theoretical potential to generate 9,469 to 17,044 MW, but
25 would require very large water supplies for water-intensive technologies (Table 9.2.9.2-2). For
26 the purpose of evaluating a more realistic build-out scenario reflecting the available water
27 supplies, an estimate of the maximum power capacity for each technology was made assuming a
28 value for available groundwater resources in the Ward Valley. While groundwater storage, safe-
29 yield, and transport processes would need to be better quantified prior to approval of specific
30 project plans during a site characterization phase, the current estimate of the natural groundwater
31 recharge to the Ward Valley serves as a reasonable estimate of the available groundwater
32 resources. Using this value of 2,700 ac-ft/yr (3.3 million m³/yr) as an estimate of the maximum
33 available water resources for the proposed Iron Mountain SEZ, parabolic trough and power
34 tower technologies could expect to generate 1 to 6% (wet cooling) and 10 to 40% (dry cooling)
35 of the of the full build-out power capacity. Dish engine facilities could produce 56% of the full
36 build-out power capacity, while water use requirements for PV are lower than this estimate of
37 available water resources.

38 39 40 **9.2.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**

41
42 The program for solar energy development on BLM-administered lands will require that
43 the programmatic design features in Appendix A, Section A.2.2, be implemented, thus mitigating
44 some impacts on water resources. Programmatic design features would focus on coordination
45 with federal, state, and local agencies that regulate the use of water resources to meet the
46 requirements of permits and approvals needed to obtain water for development, and on

1 hydrological studies to characterize the aquifer from which groundwater would be obtained
2 (including drawdown effects, if a new point of diversion is created). The greatest consideration
3 for mitigating water impacts would be in the selection of solar technologies. The mitigation of
4 impacts would be best achieved by selecting technologies with low water demands.

5
6 Proposed design features specific to the proposed Iron Mountain SEZ include the
7 following:

- 8
9 • Water resource analysis indicates that wet-cooling options would not be
10 feasible. Other technologies should incorporate water conservation measures.
11
- 12 • Land disturbance activities should avoid impacts to the extent possible in the
13 vicinity of Danby Lake to reduce impacts on the regional drainage outlet and
14 salt-mining operations.
15
- 16 • During site characterization, hydrologic investigations would need to identify
17 100-year floodplains and potential jurisdictional water bodies subject to Clean
18 Water Act Section 404 permitting. Siting of solar facilities and construction
19 activities should avoid areas identified as being within a 100-year floodplain.
20
- 21 • During site characterization, coordination and permitting with CDFG
22 regarding California's Lake and Streambed Alteration Program would be
23 required for any proposed alterations to surface water features (both perennial
24 and ephemeral).
25
- 26 • The groundwater-permitting process should be in compliance with the
27 San Bernardino County groundwater ordinance.
28
- 29 • Construction of groundwater production wells in the Danby Lake region
30 should be avoided because the water is nonpotable and contains corrosive
31 levels of TDS.
32
- 33 • Groundwater monitoring and production wells should be constructed in
34 accordance with standards set forth by the State of California (CDWR 1991)
35 and San Bernardino County.
36
- 37 • Stormwater management plans and BMPs should comply with standards
38 developed by the California Stormwater Quality Association (CASQA 2003).
39
- 40 • Water for potable uses would have to meet or be treated to meet the water
41 quality standards in the California Safe Drinking Water Act (*California*
42 *Health and Safety Code*, Chapter 4).
43

9.2.10 Vegetation

This section addresses vegetation that could occur or is known to occur within the potentially affected area of the proposed Iron Mountain SEZ. The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur) and included only the SEZ. The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effect. No areas of direct or indirect effects were assumed for new transmission lines or access roads; they are not expected to be needed for facilities on the Iron Mountain SEZ because of the proximity of an existing transmission line and state highway.

Indirect effects considered in the assessment included effects from surface runoff, dust, and accidental spills from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ. This area of indirect effect was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects. The affected area is the area bounded by the areas of direct and indirect effects. These areas are defined and the impact assessment approach is described in Appendix M.

9.2.10.1 Affected Environment

The proposed Iron Mountain SEZ is located within the Sonoran Basin and Range Level III ecoregion (EPA 2007), which supports creosotebush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) plant communities with large areas of palo verde (*Cercidium microphyllum*)-cactus shrub and saguaro cactus (*Carnegiea gigantea*) communities (EPA 2002). The dominant species of the Lower Colorado River Valley subdivision of the Sonoran Desert are primarily creosotebush, white bursage, and all-scale (*Atriplex polycarpa*), with big galleta (*Pleuraphis rigida*), Palmer alkali heath (*Frankenia palmeri*), brittlebush (*Encelia farinosa*), and western honey mesquite (*Prosopis glandulosa* var. *torreyana*) dominant in some areas (Turner and Brown 1994). Larger drainageways and washes support species of small trees and shrubs that may also occur in adjacent areas, such as western honey mesquite, ironwood (*Olneya tesota*), and blue palo verde (*Cercidium floridum*) as well as species such as smoketree (*Psoralea spinosa*), which are mostly restricted to drainageways. Shrub species found in minor drainages include cat-claw acacia (*Acacia greggii*), burrobrush (*Hymenoclea salsola* var. *pentalepis*), Anderson thornbush (*Lycium andersonii*), and desert broom (*Baccharis sarothroides*). Annual precipitation in the Sonoran Desert occurs in winter and summer (Turner and Brown 1994) and is very low in the area of the SEZ, averaging about 3.4 in. (86.6 mm) at Iron Mountain Station (see Section 9.2.13). The Iron Mountain SEZ is in a transitional area that includes many species associated with the Mojave Desert.

Land cover types, described and mapped under CAREGAP (NatureServe 2009) were used to evaluate plant communities in and near the SEZ. Each cover type encompasses a range of similar plant communities. Land cover types occurring within the potentially affected area of the

1 proposed Iron Mountain SEZ are shown in Figure 9.2.10.1-1. Table 9.2.10.1-1 provides the
2 surface area of each cover type within the potentially affected area.

3
4 Lands within the Iron Mountain SEZ are classified primarily as Sonora–Mojave
5 Creosotebush–White Bursage Desert Scrub, North American Warm Desert Playa, North
6 American Warm Desert Wash, and North American Warm Desert Bedrock Cliff and Outcrop.
7 Additional cover types within the SEZ are given in Table 9.2.10.1-1. Creosote was observed to
8 be the dominant species over much of the SEZ in August 2009. Sensitive habitats on the SEZ
9 include desert dry wash and dry wash woodlands, playa, sand dune, riparian, and desert
10 chenopod scrub/mixed salt desert scrub habitats. Characteristic Sonoran Desert species observed
11 on the SEZ include blue palo verde, western honey mesquite, ironwood (*Olneya tesota*),
12 smoketree, and Ocotillo (*Fouquieria splendens*). Cacti species observed within the SEZ were
13 golden cholla (*Opuntia echinocarpa*), beavertail prickly pear (*Opuntia basilaris*), and pencil
14 cholla (*Opuntia arbuscula*).

15
16 The area surrounding the SEZ, within 5 mi (8 km), includes 14 cover types, which are
17 listed in Table 9.2.10.1-1. The predominant cover types are Sonora–Mojave Creosotebush–White
18 Bursage Desert Scrub and North American Warm Desert Bedrock Cliff and Outcrop.

19
20 There are no wetlands mapped by the NWI that occur within the SEZ or within the 5-mi
21 (8-km) area of indirect effects. NWI maps are produced from high-altitude imagery and are
22 subject to uncertainties inherent in image interpretation (Stout 2009). Larger washes support
23 dense stands of woody vegetation, a small portion of which are mapped as North American
24 Warm Desert Riparian Woodland and Shrubland and include tamarisk, western honey mesquite,
25 blue palo verde, and ironwood. Numerous ephemeral dry washes occur within the SEZ. These
26 dry washes typically contain water for short periods during or following precipitation events, and
27 include temporarily flooded areas, but typically do not support wetland or riparian habitats.
28 Danby Lake, in the northwestern portion of the SEZ, is a dry lakebed most of the year; it is
29 inundated for 3 to 4 days during fall–winter rains in most years with a shallow summer water
30 table 3 to 4 ft below the surface. Danby Lake is primarily classified as North American Warm
31 Desert Playa. The occurrences of the Sonora-Mojave Mixed Salt Desert Scrub, North American
32 Warm Desert Active and Stabilized Dune, and North American Warm Desert Volcanic Rockland
33 cover types in the Iron Mountain SEZ are located within Danby Lake.

34
35 The proposed Iron Mountain SEZ is located within the Mojave Weed Management Area
36 (MWMA). Table 9.2.10.1-2 provides a list of problem weed species of the MWMA.

37
38 An invasive species known to occur within the SEZ is tamarisk, which occurs along wet
39 areas. In addition, cheatgrass and sahara mustard occur in the BLM Needles Field Office area,
40 which includes the proposed Iron Mountain SEZ. Tamarisk and Sahara mustard are included on
41 the MWMA weed list.

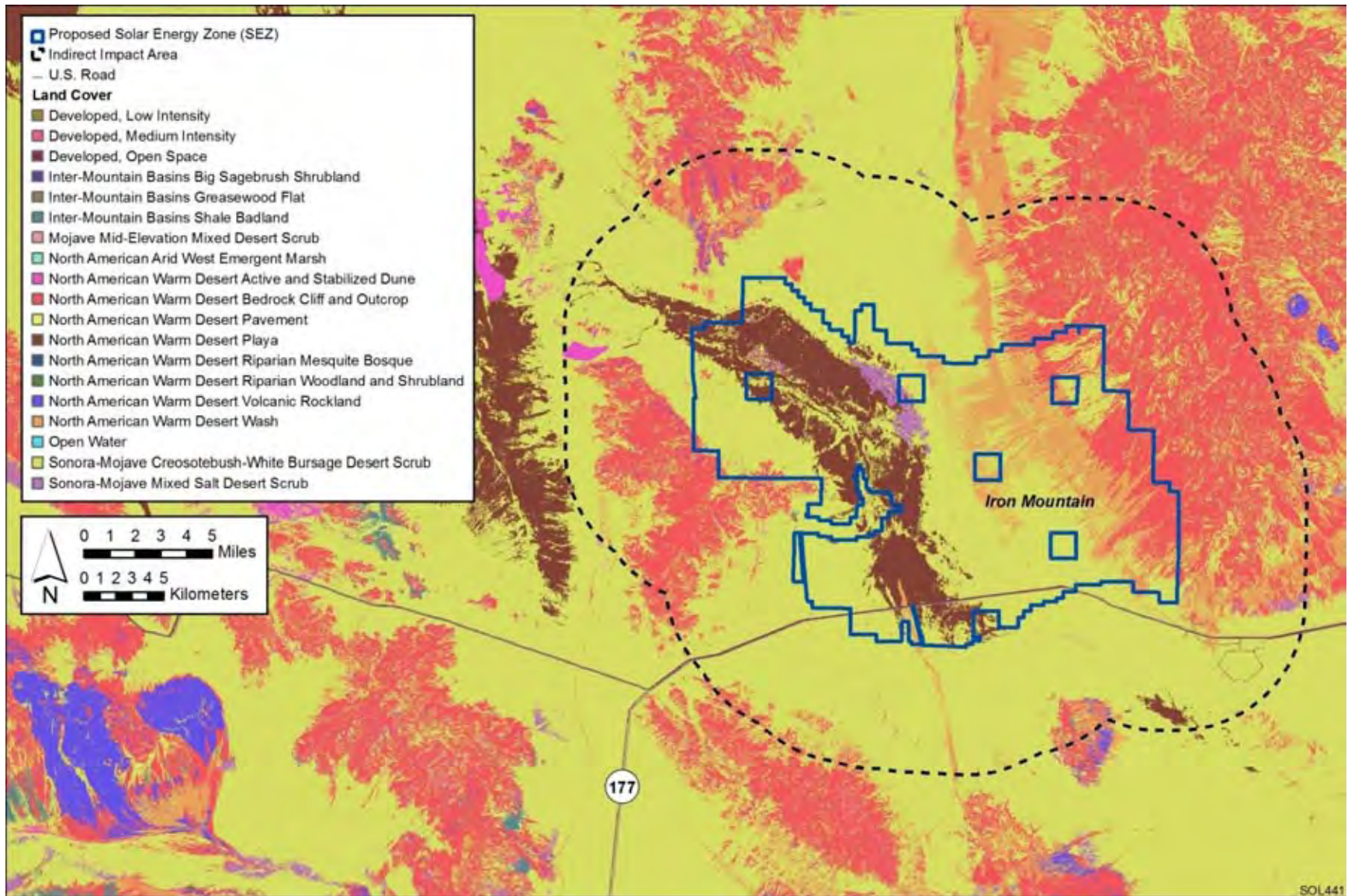


FIGURE 9.2.10.1-1 Land Cover Types within the Proposed Iron Mountain SEZ (Source: NatureServe 2009)

TABLE 9.2.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Iron Mountain SEZ and Potential Impacts

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	Overall Impact Magnitude ^e
5264 Sonora-Mojave Creosotebush-White Bursage Desert Scrub: Occurs in broad valleys, lower bajadas, plains, and low hills in the Mojave and Sonoran deserts. Shrubs form a sparse to moderately dense cover (2 to 50%), although the ground surface may be mostly barren. The dominant species are typically creosotebush (<i>Larrea tridentata</i>) and white bursage (<i>Ambrosia dumosa</i>). Other shrubs, dwarf-shrubs, and cacti may also be dominant or form sparse understories. Herbaceous species are typically sparse, but may be seasonally abundant.	58,552 acres ^f (2.4%, 3.2%)	156,519 acres (6.4%)	Moderate
3161 North American Warm Desert Playa: Consists of barren and sparsely vegetated areas (generally <10% plant cover) that are intermittently flooded; salt crusts are common. Sparse shrubs occur around the margins, and patches of grass may form in depressions. In large playas, vegetation forms rings in response to salinity. Herbaceous species may be periodically abundant.	22,056 acres (17.9%, 21.1%)	4,422 acres (3.6%)	Large
9151 North American Warm Desert Wash: Consists of intermittently flooded linear or braided strips within desert scrub or grassland landscapes on bajadas, mesas, plains, and basin floors. Although often dry, washes are associated with rapid sheet and gully flow. The vegetation varies from sparse and patchy to moderately dense and typically occurs along the banks, but may occur within the channel. Shrubs and small trees are typically intermittent to open. Common upland shrubs often occur along the edges.	13,490 acres (3.4%, 4.4%)	11,703 acres (3.0%)	Moderate
3120 North American Warm Desert Bedrock Cliff and Outcrop: Occurs on subalpine to foothill steep cliff faces, narrow canyons, rock outcrops, unstable scree and talus slopes. Consists of barren and sparsely vegetated areas (generally <10% plant cover) with desert species, especially succulents. Lichens are predominant in some areas.	9,691 acres (0.8%, 1.0%)	73,420 acres (6.2%)	Small
5265 Sonora-Mojave Mixed Salt Desert Scrub: Extensive open-canopied shrublands in the Mojave and Sonoran deserts, usually occurring around playas and in valley bottoms or basins with saline soils. Vegetation is typically composed of one or more <i>Atriplex</i> species; other salt-tolerant plants are often present or even codominant. Grasses occur at varying densities.	1,539 acres (3.4%, 5.1%)	727 acres (1.6%)	Moderate

TABLE 9.2.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	Overall Impact Magnitude ^e
3143 North American Warm Desert Pavement: Consists of unvegetated to very sparsely vegetated (<2% plant cover) areas, usually in flat basins, with ground surfaces of fine to medium gravel coated with “desert varnish.” Desert scrub species are usually present. Herbaceous species may be abundant in response to seasonal precipitation.	503 acres (1.4%, 2.0%)	1,393 acres (3.8%)	Moderate
21, 22 Developed, Open Space—Low Intensity: Includes housing, parks, golf courses, and other areas planted in developed settings. Impervious surfaces compose up to 49% of the total land cover.	427 acres (1.3%, 3.2%)	923 acres (2.8%)	Moderate
3121 North American Warm Desert Active and Stabilized Dune: Consists of unvegetated to sparsely vegetated (generally <10% plant cover) active dunes and sandsheets. Vegetation includes shrubs, forbs, and grasses. Includes unvegetated “blowouts” and stabilized areas.	209 acres (0.3%, 0.4%)	695 acres (1.1%)	Small
3180 North American Warm Desert Volcanic Rockland: Consists of barren and sparsely vegetated (<10% plant cover) areas. Vegetation is variable and typically includes scattered desert shrubs.	35 acres (<0.1%, <0.1%)	1,109 acres (0.3%)	Small
3139 Inter-Mountain Basins Shale Badland: Typically occurs on rounded hills and plains. Consists of barren and sparsely vegetated areas (<10% plant cover) with high rate of erosion and deposition. Vegetation consists of sparse dwarf shrubs and herbaceous plants.	26 acres (0.1%, 0.3%)	81 acres (0.4%)	Small
11 Open Water: Plant or soil cover is generally less than 25%.	2 acres (<0.1%, <0.1%)	7 acres (<0.1%)	Small
9182 North American Warm Desert Riparian Woodland and Shrubland: Occurs along medium to large perennial streams in canyons and desert valleys. Consists of a mix of riparian woodlands and shrublands. Vegetation is dependent upon annual or periodic flooding, along with substrate scouring, and/or a seasonally shallow water table.	<1 acre (<0.1%, <0.1%)	72 acres (0.8%)	Small

TABLE 9.2.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	Overall Impact Magnitude ^e
5259 Mojave Mid-Elevation Mixed Desert Scrub: The vegetation composition is quite variable. Dominant species include shrubs forbs, and grasses and may include <i>Yucca</i> spp.	0 acres	85 acres (0.3%)	Small
Developed, Medium-High Density: Includes housing and commercial/industrial development. Impervious surfaces compose 50–100% of the total land cover.	0 acres	7 acres (<0.1%)	Small

^a Land cover descriptions are from NatureServe (2009). Full descriptions of land cover types, including plant species, can be found in Appendix I.

^b Area in acres, determined from Sanborn Mapping (2008).

^c Includes the area of the cover type within the SEZ, the percentage that area represents of all occurrences of that cover type within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ), and the percentage that area represents of all occurrences of that cover type on BLM lands within the SEZ region. The SEZ region intersects portions of California and Arizona. However, the SEZ and affected area occur only in California.

^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from project facilities. The potential degree of indirect effects would decrease with increasing distance from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.

^e Overall impact magnitude categories were based on professional judgment and include (1) *small*: a relatively small proportion ($\leq 1\%$) of the cover type within the SEZ region would be lost; (2) *moderate*: an intermediate proportion (>1 but $\leq 10\%$) of a cover type would be lost; (3) *large*: $>10\%$ of a cover type would be lost.

^f To convert acres to km², multiply by 0.004047.

TABLE 9.2.10.1-2 Problem Weeds of the Mojave Weed Management Area

Common Name	Scientific Name
Tamarisk	<i>Tamarix ramosissima</i>
Halogeton	<i>Halogeton glomeratus</i>
White horsenettle	<i>Solanum elaeagnifolium</i>
Yellow starthistle	<i>Centaurea solstitialis</i>
Dalmatian toadflax	<i>Linaria dalmatica</i>
Russian thistle	<i>Salsola tragus</i>
Puncture vine	<i>Tribulus terrestris</i>
Camelthorn	<i>Alhagi maurorum</i>
Giant reed	<i>Arundo donax</i>
Sahara mustard	<i>Brassica tournefortii</i>
Red brome	<i>Bromus madritensis ssp. rubens</i>
Fountain grass	<i>Pennisetum setaceum</i>
Tree of heaven	<i>Ailanthus altissima</i>
Perennial peppergrass ^a	<i>Lepidium latifolium</i>
Spanish broom ^a	<i>Spartium junceum</i>

^a Additional species identified in MWMA (2008).

Source: MWMA (2002).

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9.2.10.2 Impacts

The construction of solar energy facilities within the Iron Mountain SEZ would result in direct impacts on plant communities because of the removal of vegetation within the facility footprint during land-clearing and land-grading operations. Approximately 80% (85,217 acres [344.9 km²]) of the SEZ would be expected to be cleared with full development of the SEZ. The plant communities affected would depend on facility locations, and could include any of the communities occurring on the SEZ. Therefore, for the purposes of this analysis, all the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.

Indirect effects (caused, for example, by surface runoff or dust from the SEZ) have the potential to degrade affected plant communities and may reduce biodiversity by promoting the decline or elimination of species sensitive to disturbance. Indirect effects can also cause an increase in disturbance-tolerant species or invasive species. High impact levels could result in the elimination of a community or the replacement of one community type for another. The proper implementation of programmatic design features, however, would reduce indirect effects to a minor or small level of impact.

Possible impacts from solar energy facilities on vegetation that are encountered within the SEZ are described in more detail in Section 5.10.1. Any such impacts will be minimized through the implementation of required programmatic design features described in Appendix A,

1 Section A.2.2, and from any additional mitigations applied. SEZ-specific design features are
2 described in Section 9.2.10.3.

3 4 5 **9.2.10.2.1 Impacts on Native Species** 6

7 The impacts of construction, operation, and decommissioning were considered small if
8 the impact affected a relatively small proportion (<1%) of the cover type in the SEZ region
9 (within 50 mi [80 km] of the center of the SEZ); a moderate impact (>1 but <10%) could affect
10 an intermediate proportion of cover type; a large impact could affect greater than 10% of a
11 cover type.

12
13 Solar facility construction and operation would primarily affect communities of the
14 Sonora–Mojave Creosotebush–White Bursage Desert Scrub, North American Warm Desert
15 Playa, North American Warm Desert Wash, North American Warm Desert Bedrock Cliff and
16 Outcrop cover types. Additional cover types within the SEZ that would be affected include
17 Sonora–Mojave Mixed Salt Desert Scrub, North American Warm Desert Pavement, North
18 American Warm Desert Active and Stabilized Dune, North American Warm Desert Volcanic
19 Rockland, Inter-Mountain Basins Shale Badland, Open Water, North American Warm Desert
20 Riparian Woodland and Shrubland, Mojave Mid-Elevation Mixed Desert Scrub, Developed,
21 Open Space—Low Intensity. The open water areas are likely artificial impoundments, while the
22 developed areas likely support few native plant communities. The potential impacts on native
23 species cover types resulting from solar energy facilities in the proposed Iron Mountain SEZ are
24 summarized in Table 9.2.10.1-1. Many of these cover types are relatively common in the SEZ
25 region; however, several are relatively uncommon, representing less than 1% of the land area
26 within the SEZ region: Inter-Mountain Basins Shale Badland (0.4%), North American Warm
27 Desert Pavement (0.7%), Sonora–Mojave Mixed Salt Desert Scrub (0.9%), and North American
28 Warm Desert Riparian Woodland and Shrubland (0.2%). Sand dune, playa, chenopod
29 scrub/mixed salt desert scrub (primarily associated with Danby Lake), riparian, and dry wash
30 communities are important sensitive habitats in the region.

31
32 The construction, operation, and decommissioning of solar projects within the SEZ
33 would result in large impacts on North American Warm Desert Playa. Much of this cover type
34 is associated with Danby Lake; however, solar project development in that area is unlikely
35 (see Section 2.2.2). Solar project development within the SEZ would result in moderate impacts
36 on Sonora–Mojave Creosotebush–White Bursage Desert Scrub, North American Warm Desert
37 Wash, Sonora–Mojave Mixed Salt Desert Scrub, North American Warm Desert Pavement, and
38 Developed, Open Space—Low Intensity, and small impacts on the remaining cover types in the
39 affected area.

40
41 Disturbance of vegetation in dune communities within the SEZ, such as from heavy
42 equipment operation, could result in the loss of substrate stabilization. Reestablishment of dune
43 species could be difficult due to the arid conditions and unstable substrates. Because of the arid
44 conditions, reestablishment of shrub communities in temporarily disturbed areas would likely be
45 very difficult and might require extended periods of time. In addition, noxious weeds could
46 become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing

1 restoration success and potentially resulting in widespread habitat degradation. Cryptogamic soil
2 crusts occur in many of the shrubland communities in the region and likely occur on the SEZ.
3 Damage to these crusts, by the operation of heavy equipment or other vehicles, can alter
4 important soil characteristics, such as nutrient cycling and availability, and affect plant
5 community characteristics (Lovich and Bainbridge 1999).
6

7 Communities associated with playa habitats, riparian habitats, or other intermittently
8 flooded areas within or downgradient from solar projects could be affected by ground-disturbing
9 activities. Site-clearing and -grading could disrupt surface water or groundwater flow patterns,
10 resulting in changes in the frequency, duration, depth, or extent of inundation or soil saturation;
11 could potentially alter playa or riparian plant communities, including occurrences outside of the
12 SEZ; and could affect community function. Increases in surface runoff from a solar energy
13 project site could also affect hydrologic characteristics of these communities. The introduction
14 of contaminants into these habitats could result from spills of fuels or other materials used on a
15 project site. Soil disturbance could result in sedimentation in these areas, which could degrade or
16 eliminate sensitive plant communities. Grading could also affect dry washes within the SEZ, and
17 alteration of surface drainage patterns or hydrology could adversely affect downstream dry wash
18 communities. Vegetation within these communities could be lost by erosion or desiccation. See
19 Section 9.2.9 for further discussion of impacts on washes.
20

21 Although the use of groundwater within the Iron Mountain SEZ for technologies with
22 high water requirements, such as wet-cooling systems, is considered unlikely, groundwater
23 withdrawals for such systems could reduce groundwater discharge along riparian areas.
24 Communities that depend on accessible groundwater, such as mesquite bosque communities,
25 could become degraded or lost as a result of lowered groundwater levels.
26

27 The deposition of fugitive dust from disturbed soil areas in habitats outside a solar project
28 area could result in reduced productivity or changes in plant community composition. Fugitive
29 dust deposition could affect plant communities of each of the cover types occurring within the
30 indirect impact area identified in Table 9.2.10.1-1.
31
32

33 ***9.2.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species***

34
35 On February 8, 1999, the President signed E.O. 13112, "Invasive Species," which directs
36 federal agencies to prevent the introduction of invasive species and provide for their control and
37 to minimize the economic, ecological, and human health impacts of invasive species (*Federal*
38 *Register*, Volume 64, page 61836, Feb. 8, 1999). Potential impacts of noxious weeds and
39 invasive plant species resulting from solar energy facilities are described in Section 5.10.1.
40 Despite required programmatic design features to prevent the spread of noxious weeds, project
41 disturbance could potentially increase the prevalence of noxious weeds and invasive species in
42 the affected area of the proposed Iron Mountain SEZ, and increase the probability that weeds
43 could be transported into areas that were previously relatively weed-free. This could result in
44 reduced restoration success and possible widespread habitat degradation.
45

1 Noxious weeds, including tamarisk, occur on the SEZ. Species that are known to occur in
2 the BLM Needles Field Office include cheatgrass and Sahara mustard. Additional species known
3 to occur in the Mojave Weed Management Area are given in Table 9.2.10.1-2.
4

5 Past or present land uses may affect the susceptibility of plant communities to the
6 establishment of noxious weeds and invasive species. Small areas of Developed, Open Space–
7 Low Intensity, totaling about 427 acres (1.7 km²), occur within the SEZ, and approximately
8 923 acres (14.6 km²) occur within the area of indirect effects. Because disturbance may promote
9 the establishment and spread of invasive species, developed areas may provide sources of such
10 species. Disturbance associated with existing roads, transmission lines, rail lines, and
11 recreational OHV use within the SEZ area of potential impacts also likely contributes to the
12 susceptibility of plant communities to the establishment and spread of noxious weeds and
13 invasive species.
14

15 **9.2.10.3 SEZ-Specific Design Features and Design Feature Effectiveness** 16

17
18 The implementation of required programmatic design features described in Appendix A,
19 Section A.2.2, would reduce the potential for impacts on plant communities. While some SEZ-
20 specific design features are best established when project details are considered, design features
21 that can be identified at this time include the following:
22

- 23 • An Integrated Vegetation Management Plan, addressing invasive species
24 control, and an Ecological Resources Mitigation and Monitoring Plan,
25 addressing habitat restoration, should be approved and implemented to
26 increase the potential for successful restoration of affected Sonoran Desert
27 habitats and minimize the potential for the spread of invasive species, such as
28 tamarisk, cheatgrass, and sahara mustard. Invasive species control should
29 focus on biological and mechanical methods where possible to reduce the use
30 of herbicides.
31
- 32 • All riparian, playa, chenopod scrub, sand dune, and sand transport areas and
33 desert dry wash habitats should be avoided to the extent practicable, and any
34 impacts on them should be minimized and mitigated. A buffer area should be
35 maintained around riparian areas, playas, and dry washes to reduce the
36 potential for impacts on these habitats on or near the SEZ. Appropriate
37 engineering controls should be used to minimize impacts on these areas
38 resulting from surface-water runoff, erosion, sedimentation, altered
39 hydrology, accidental spills, or fugitive dust deposition to these habitats.
40 Appropriate buffers and engineering controls would be determined through
41 agency consultation.
42
- 43 • Groundwater withdrawals should be limited to reduce the potential for indirect
44 impacts on riparian habitat associated with groundwater discharge or
45 groundwater-dependent communities, such as mesquite bosque.
46

1 If these SEZ-specific design features are implemented in addition to programmatic design
2 features, it is anticipated that a high potential for impacts from invasive species and impacts on
3 riparian habitat, dunes, and desert dry washes would be reduced to a minimal potential for
4 impact.

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1 **9.2.11 Wildlife and Aquatic Biota**

2
3 This section addresses wildlife (amphibians, reptiles, birds, and mammals) and aquatic
4 biota that could occur within the potentially affected area of the proposed Iron Mountain SEZ.
5 Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) were determined
6 from the California Wildlife Habitat Relationships System (CDFG 2008). Land cover types
7 suitable for each species were determined from SWReGAP (USGS 2004, 2005, 2007). The
8 amount of aquatic habitat within the SEZ region was determined by estimating the length of
9 linear perennial stream and canal features and the area of standing water body features
10 (i.e., ponds, lakes, and reservoirs) within 50 mi (80 km) of the SEZ using available GIS surface
11 water datasets.

12
13 The affected area considered in this assessment included the areas of direct and indirect
14 effects. The area of direct effects was defined as the area that would be physically modified
15 during project development (i.e., where ground-disturbing activities would occur within the
16 SEZ). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ
17 boundary where ground-disturbing activities would not occur but that could be indirectly
18 affected by activities in the area of direct effect (e.g., surface runoff, dust, noise, lighting, and
19 accidental spills from the SEZ). The potential degree of indirect effects would decrease with
20 increasing distance away from the SEZ. This area of indirect effect was identified on the basis
21 of professional judgment and was considered sufficiently large to bound the area that would
22 potentially be subject to indirect effects.

23
24 The affected area is the area bounded by the areas of direct and indirect effects. These
25 areas are defined and the impact assessment approach is described in Appendix M. Because
26 of the proximity of existing infrastructure, the impacts of construction and operation of
27 transmission lines outside of the SEZ are not assessed, assuming that the existing transmission
28 might be used to connect some new solar facilities to load centers and that additional project-
29 specific analysis would be conducted for new transmission construction or line upgrades.
30 Similarly, the impacts of construction of or upgrades to access roads were not assessed for this
31 SEZ because of the proximity of the existing state highway (see Section 9.2.1.2 for a discussion
32 of development assumptions for this SEZ).

33
34 Dominant vegetation in the affected area is desert scrub, and the primary land cover
35 habitat type within the affected area is Sonoran-Mojave creosotebush-white bursage desert scrub
36 (see Section 9.2.10). Aquatic and riparian habitats in the affected area occur within and along
37 Danby Lake, intermittent desert washes, and the CRA operated by the MWD (see Section 9.2.9;
38 Figure 9.2.9.1-1). Other potentially unique habitats in the affected area in which wildlife species
39 may reside include desert dunes and rocky slopes, cliffs, and outcrops.

1 **9.2.11.1 Amphibians and Reptiles**

2
3
4 **9.2.11.1.1 Affected Environment**

5
6 This section addresses amphibian and reptile species that are known to occur, or for
7 which potentially suitable habitat occurs, on or within the potentially affected area of the
8 proposed Iron Mountain SEZ. The list of amphibian and reptile species potentially present in
9 the project area was determined from range maps and habitat information available from the
10 California Wildlife Habitat Relationships System (CDFG 2008). Land cover types suitable for
11 each species were determined from SWReGAP (USGS 2004, 2005, 2007). See Appendix M for
12 additional information on the approach used.

13
14 Based on the range, habitat preferences, and/or presence of suitable land cover for the
15 amphibian species that occur within southeastern California (CDFG 2008; USGS 2004, 2005,
16 2007), the red-spotted toad (*Bufo punctatus*) would be expected to occur within the proposed
17 Iron Mountain SEZ. However, as it prefers dry, rocky areas near temporary sources of standing
18 water, its occurrence within the SEZ would be spatially limited. Danby Lake could provide
19 suitable habitat for the species. Several other amphibian species could inhabit the CRA,
20 immediately south and southwest of the SEZ: the bullfrog (*Rana catesbeiana*), Colorado River
21 toad (*Bufo alvarius*), Rio Grande leopard frog (*Rana berlandieri*), and Woodhouse's toad (*Bufo*
22 *woodhousii*). Because these species tend to occur within 300 ft (100 m) of permanent water
23 (USGS 2007), they would not be expected to occur within the SEZ.

24
25 Thirty-one reptile species could occur within the proposed Iron Mountain SEZ (CDFG
26 2008). These species include 1 tortoise, 13 lizards, and 17 snakes. Even though it is a federally
27 and state-listed threatened species, the desert tortoise (*Gopherus agassizii*) is relatively common
28 throughout the area of the SEZ. This species is discussed in Section 9.2.12. Among the more
29 common lizard species that could occur within the SEZ are the desert horned lizard (*Phrynosoma*
30 *platyrhinos*), long-nosed leopard lizard (*Gambelia wislizenii*), Mojave fringe-toed lizard (*Uma*
31 *scoparia*), side-blotched lizard (*Uta stansburiana*), western banded gecko (*Coleonyx variegatus*),
32 and zebra-tailed lizard (*Callisaurus draconoides*).

33
34 The most common snake species expected to occur within the proposed Iron Mountain
35 SEZ are the coachwhip (*Masticophis flagellum*), glossy snake (*Arizona elegans*), gophersnake
36 (*Pituophis catenifer*), groundsnake (*Sonora semiannulata*), and long-nosed snake (*Rhinocheilus*
37 *lecontei*). The Mojave rattlesnake (*Crotalus scutulatus*) and sidewinder (*C. cerastes*) would be
38 the most common poisonous snake species expected to occur on the SEZ.

39
40 Table 9.2.11.1-1 provides habitat information for representative amphibian and reptile
41 species that could occur within the proposed Iron Mountain SEZ.

TABLE 9.2.11.1-1 Representative Amphibians and Reptiles That Could Occur on or in the Affected Area of the Proposed Iron Mountain SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Amphibians				
Red-spotted toad (<i>Bufo punctatus</i>)	Rocky canyons and gullies in deserts, grasslands, and dry woodlands. When inactive, it occurs under rocks, in rock crevices, or underground. Often found near rocky areas associated with spring seepages, intermittent streams, and cattle tanks. Breeds in shallow water of temporary rain pools, spring-fed pools, and pools along intermittent streams. About 2,626,400 acres ^f of potentially suitable habitat occurs in the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,331 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Minimize development within Danby Lake.
Lizards				
Desert horned lizard (<i>Phrynosoma platyrhinos</i>)	Deserts dominated by sagebrush, creosotebush, greasewood, or cactus. Occurs on sandy flats, alluvial fans, washes, and edge of dunes. Burrows in soil during periods of inactivity. Common throughout Mojave and Colorado Deserts. About 4,786,300 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	250,226 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Long-nosed leopard lizard (<i>Gambelia wislizenii</i>)	Desert and semidesert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows that they occupy when inactive. Widely distributed in the Mojave, Colorado, and other desert areas in California. About 2,626,700 acres of potentially suitable habitat occurs in the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,331 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Lizards (Cont.)				
Mojave fringe-toed lizard (<i>Uma scoparia</i>)	Restricted to sparsely vegetated windblown sand of dunes, flats, riverbanks, and washes. Requires fine, loose sand for burrowing. About 2,525,700 acres of potentially suitable habitat occurs in the SEZ region.	58,761 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,214 acres of potentially suitable habitat (6.2% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.
Side-blotched lizard (<i>Uta stansburiana</i>)	Arid and semi-arid locations with scattered bushes or scrubby trees. Often occurs in sandy washes with scattered rocks and bushes. About 4,160,300 acres of potentially suitable habitat occurs in the SEZ region.	81,733 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	241,727 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.
Western banded gecko (<i>Coleonyx variegatus</i>)	Wide variety of habitats, including deserts with creosotebush and sagebrush and pinyon-juniper woodlands. Inhabits both rocky areas and barren dunes. Most abundant in sandy flats and desert washes. Uses rocks, burrows, and spaces beneath vegetative debris or trash during period of inactivity. About 3,156,300 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (2.7% of available potentially suitable habitat)	173,528 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 9.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Lizards (Cont.)				
Zebra-tailed lizard (<i>Callisaurus draconoides</i>)	Sparsely vegetated deserts on open sandy washes, dunes, floodplains, beaches, or desert pavement. Common and widely distributed throughout Mojave and Colorado Deserts. About 3,578,200 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	176,725 acres of potentially suitable habitat (4.9% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Snakes				
Coachwhip (<i>Masticophis flagellum</i>)	Wide variety of open terrain habitats. Most abundant in deserts, grasslands, scrub, chaparral, and pastures. Prefers relatively dry open terrain. It seeks cover in burrows, rocks, or vegetation. About 3,801,800 acres of potentially suitable habitat occurs in the SEZ region.	68,452 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	230,634 acres of potentially suitable habitat (6.1% of available potentially suitable habitat)	Moderate.
Glossy snake (<i>Arizona elegans</i>)	Variety of habitats, including barren to sparsely shrubby deserts, sagebrush flats, grasslands, and sandhills. Prefers sandy areas with scattered brush, but also occurs in rocky areas. Shelters and lays eggs underground. Common throughout southern California, particularly the desert regions. About 5,034,700 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.7% of available potentially suitable habitat)	251,163 acres of potentially suitable habitat (5.0% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 9.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Snakes (Cont.)				
Gophersnake (<i>Pituophis catenifer</i>)	Wide variety of habitats, including deserts, prairies, shrublands, woodlands, and farmlands. May dig its burrow or occupy mammal burrows. Eggs are laid in burrows or under large rocks or logs. Most widespread and common snake in California. About 3,368,100 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (2.5% of available potentially suitable habitat)	175,153 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Groundsnake (<i>Sonora semiannulata</i>)	Arid and semi-arid areas, including desert flats, sand hummocks, rocky hillsides with pockets of loose soil. Ranges from prairie and desert lowlands to pinyon-juniper and oak-pine zone. About 3,009,900 acres of potentially suitable habitat occurs in the SEZ region.	72,251 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	168,917 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Long-nosed snake (<i>Rhinocheilus lecontei</i>)	Typically inhabits deserts, dry prairies and river valleys. Occurs by day and lays eggs underground or under rocks. Burrows rapidly in loose soil. Common in desert regions. About 554,600 acres of potentially suitable habitat occurs in the SEZ region.	13,699 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	12,470 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Snakes (Cont.)				
Mojave rattlesnake (<i>Crotalus scutulatus</i>)	Mostly upland desert and lower mountain slopes including barren desert, grasslands, open woodland, and scrubland. Generally avoids broken rocky terrain or densely vegetated areas. Takes refuge in animal burrows or spaces under or among rocks. Widely distributed throughout the Mojave and extreme northern Colorado Deserts. About 2,595,600 acres of potentially suitable habitat occurs in the SEZ region.	58,552 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	156,676 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate.
Sidewinder (<i>Crotalus cerastes</i>)	Open desert terrain with fine windblown sand, desert flats with sandy washes, or sparsely vegetated sand dunes. Concentrates near washes and areas of relatively dense vegetation where mammal burrows are common. During periods of inactivity, uses underground burrows, occurs under bushes, or almost completely snuggles under sand. Widely distributed and locally abundant in the Mojave and Colorado Deserts. About 2,650,500 acres of potentially suitable habitat occurs in the SEZ region.	58,761 acres of potentially suitable habitat lost (2.2% of available potentially suitable habitat)	157,371 acres of potentially suitable habitat (5.9% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.

^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 85,217 acres (345 km²) would be developed in the SEZ.

^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ boundary.

Footnotes continued on next page.

TABLE 9.2.11.1-1 (Cont.)

-
- ^d Overall impact magnitude categories were based on professional judgment and include (1) *small*: $\leq 1\%$ of potentially suitable habitat for the species would be lost, and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>10\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.
- ^f To convert acres to km^2 , multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 **9.2.11.1.2 Impacts**
2

3 The potential for impacts on amphibians and reptiles from utility-scale solar energy
4 development within the proposed Iron Mountain SEZ is presented in this section. The types
5 of impacts that amphibians and reptiles could incur from construction, operation, and
6 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
7 such impacts would be minimized through the implementation of required programmatic design
8 features described in Appendix A, Section A.2.2, and application of any additional mitigation.
9 Section 9.2.11.1.3, below, identifies SEZ-specific design features of particular relevance to the
10 proposed Iron Mountain SEZ.
11

12 The assessment of impacts on amphibians and reptile species is based on available
13 information on the presence of species in the affected area, as presented in Section 9.2.11.1.1,
14 following the analysis approach described in Appendix M. Additional NEPA assessments and
15 coordination with state natural resource agencies may be needed to address project-specific
16 impacts more thoroughly. These assessments and consultations could result in additional
17 required actions to avoid or mitigate impacts on amphibians and reptiles (see Section 9.2.11.1.3).
18

19 In general, impacts on amphibians and reptiles would result from habitat disturbance
20 (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality
21 to individual amphibians and reptiles. On the basis of the impacts on amphibians and reptiles
22 summarized in Table 9.2.11.1-1, direct impacts on amphibian and reptile species would be
23 moderate, as 1.7 to 2.7% of potentially suitable habitats identified for the species in the SEZ
24 region would be lost. Larger areas of potentially suitable habitats for most amphibian and reptile
25 species occur within the area of potential indirect effects (e.g., up to 6.1% of available habitat for
26 the coachwhip). Other impacts on amphibians and reptiles could result from surface water and
27 sediment runoff from disturbed areas, fugitive dust generated by project activities, accidental
28 spills, collection, and harassment. These indirect impacts are expected to be negligible with
29 implementation of programmatic design features.
30

31 Decommissioning of facilities and reclamation of disturbed areas after operations cease
32 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
33 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
34 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
35 reclamation on wildlife. Of particular importance for amphibian and reptile species would be the
36 restoration of original ground surface contours, soils, and native plant communities associated
37 with semiarid shrublands.
38

39 **9.2.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness**
40

41 The implementation of required programmatic design features described in Appendix A,
42 Section A.2.2, would reduce the potential for effects on amphibians and reptiles, especially for
43 those species that utilize habitat types that can be avoided (e.g., ephemeral drainages). Indirect
44 impacts could be reduced to negligible levels by implementing programmatic design features,
45 especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive
46

1 dust. While SEZ-specific features are best established when project details are considered, the
2 design feature that can be identified at this time includes the following:

- 3
- 4 • Avoid the CRA, Homer Wash, and portions of Danby Lake.
- 5

6 If this SEZ-specific design feature is implemented in addition to other programmatic
7 design features, impacts on amphibians and reptiles could be reduced. Any residual impacts on
8 amphibians and reptiles are anticipated to be moderate given the relative abundance of
9 potentially suitable habitats in the SEZ region. However, because potentially suitable habitats for
10 a number of the amphibian and reptile species occur throughout much of the SEZ, additional
11 species-specific mitigation of direct effects for those species would be difficult or infeasible.

12

13

14 **9.2.11.2 Birds**

15

16

17 **9.2.11.2.1 Affected Environment**

18

19 This section addresses bird species that are known to occur, or for which potentially
20 suitable habitat occurs, on or within the potentially affected area of the proposed Iron Mountain
21 SEZ. The list of bird species potentially present in the project area was determined from range
22 maps and habitat information available from the California Wildlife Habitat Relationships
23 System (CDFG 2008). Land cover types suitable for each species were determined from
24 SWReGAP (USGS 2004, 2005, 2007). See Appendix M for additional information on the
25 approach used.

26

27 Nearly 100 species of birds have a range
28 that encompasses the proposed Iron Mountain
29 SEZ region. However, potentially suitable
30 habitats for about 40 of these species either do
31 not occur on or are limited within the SEZ
32 (e.g., habitat for waterfowl and wading birds).

33 In addition, the SEZ region is only within the

34 winter range (35 species) or summer range (10 species) of a number of birds. Eleven bird species
35 that may occur within the SEZ are considered focal species for the California Partners in Flight's
36 *Desert Bird Conservation Plan* (CalPIF 2009): ash-throated flycatcher (*Myiarchus cinerascens*),
37 black-tailed gnatcatcher (*Poliophtila melanura*), black-throated sparrow (*Amphispiza bilineata*),
38 burrowing owl (*Athene cunicularia*), common raven (*Corvus corax*), Costa's hummingbird
39 (*Calypte costae*), crissal thrasher (*Toxostoma crissale*), ladder-backed woodpecker (*Picoides*
40 *scalaris*), Le Conte's thrasher (*Toxostoma lecontei*), phainopepla (*Phainopepla nitens*), and
41 verdin (*Auriparus flaviceps*). Habitats for these species are described in Table 9.2.11.2-1. The
42 ash-throated flycatcher would be a summer resident within the SEZ, while the other desert focal
43 bird species could occur year-round (CalPIF 2009).

Desert Focal Bird Species

Bird species whose requirements define spatial attributes, habitat characteristics, and management regimes representative of a healthy desert system (Chase and Geupel 2005).

TABLE 9.2.11.2-1 Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Iron Mountain SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Shorebirds				
Killdeer (<i>Charadrius vociferus</i>)	Widespread throughout California. Open areas such as fields, meadows, lawns, mudflats, and shores. Nests on ground in open dry or gravelly locations. About 299,300 acres ^f of potentially suitable habitat occurs in the SEZ region. Year-round.	22,485 acres of potentially suitable habitat lost (7.5% of available potentially suitable habitat)	5,359 acres of potentially suitable habitat (1.8% of available potentially suitable habitat)	Moderate. Minimize development within Danby Lake. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Least sandpiper (<i>Calidris minutilla</i>)	Wet meadows, mudflats, flooded fields, lake shores, edge of salt marshes, and river sandbars. About 40,500 acres of potentially suitable habitat occurs in the SEZ region. Common to abundant in winter.	2 acres of potentially suitable habitat lost (<0.01% of available potentially suitable habitat)	79 acres of potentially suitable habitat (0.2% of available potentially suitable habitat)	Small. Minimize development within Danby Lake. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants</i>				
Ash-throated flycatcher (<i>Myiarchus cinerascens</i>)	Common in scrub and woodland habitats, including desert riparian and desert washes. Requires hole/cavity for nesting. Uses shrubs or small trees for foraging perches. About 3,033,400 acres of potentially suitable habitat occurs in the SEZ region. Summer.	73,581 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,106 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Black-tailed gnatcatcher (<i>Polioptila melanura</i>)	Nests in bushes mainly in wooded desert washes with dense mesquite, palo verde, ironwood, and acacia. Also occurs in desert scrub habitat. About 3,017,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	72,251 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	168,917 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Black-throated sparrow (<i>Amphispiza bilineata</i>)	Chaparral and desert scrub habitats with sparse to open stands of shrubs. Often in areas with scattered Joshua trees. Nests in thorny shrubs or cactus. About 3,027,100 acres of potentially suitable habitat occurs in the SEZ region. Year-round	59,325 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	159,882 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Brewer's sparrow (<i>Spizella breweri</i>)	Common in Mojave and Colorado deserts during winter. Occupies open desert scrub and cropland habitats. About 2,558,400 acres of potentially suitable habitat occurs in the SEZ region.	59,081 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	158,150 acres of potentially suitable habitat (6.2% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Cactus wren (<i>Campylorhynchus brunneicapillus</i>)	Desert (especially areas with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and trees in towns in arid regions. Nests in <i>Opuntia</i> spp.; twiggy, thorny trees and shrubs; and sometimes in buildings. Nests may be used as winter roost. Locally common in the Mojave and Colorado deserts. About 4,169,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	81,733 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	241,799 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Common poorwill (<i>Phalaenoptilus nuttallii</i>)	Scrubby and brushy areas, prairie, desert, rocky canyons, open woodlands, and broken forests. Mostly in arid and semi-arid habitats. Nests in open areas on a bare site. About 4,187,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	83,272 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	242,441 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants</i> (Cont.)				
Common raven (<i>Corvus corax</i>)	Occurs in most habitats. Trees and cliffs provide cover. Roosts primarily in trees. Nests on cliffs, bluffs, tall trees, or human-made structures. Forages in sparse, open terrain. About 2,793,100 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	60,518 acres of potentially suitable habitat lost (2.2% of available potentially suitable habitat)	158,333 acres of potentially suitable habitat (5.78% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Costa's hummingbird (<i>Calypte costae</i>)	Desert and semidesert areas, arid brushy foothills, and chaparral. Main habitats are desert washes, edges of desert riparian and valley foothill riparian areas, coastal shrub, desert scrub, desert succulent shrub, lower-elevation chaparral, and palm oasis. Also in mountains, meadows, and gardens during migration and winter. Most common in canyons and washes when nesting. Nests in trees, shrubs, vines, or cacti. About 3,032,700 acres of potentially suitable habitat occurs in the SEZ region. Common in summer and uncommon in winter in California.	73,581 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,106 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants</i> (Cont.)				
Greater roadrunner (<i>Geococcyx californianus</i>)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Requires thickets, large bushes, or small trees for shade, refuge, and roosting. Usually nests low in trees, shrubs, or clumps of cactus. Rarely nests on ground. About 4,534,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	85,217 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	248,575 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Horned lark (<i>Eremophila alpestris</i>)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semidesert shrublands, and alpine tundra. During migration and winter, inhabits the same habitats other than tundra, and occurs in agricultural areas. Usually occurs where plant density is low and there are exposed soils. About 2,625,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	60,091 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,331 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants</i> (Cont.)				
House finch (<i>Carpodacus mexicanus</i>)	Variety of areas, including arid scrub and brush, desert riparian areas, open woodlands, cultivated lands, and savannas. Usually forages in areas with elevated escape perches (e.g., trees, tall shrubs, transmission lines, and buildings). Roosts and nests in sheltered sites in trees; tall, dense shrubs; man-made structures; cliff crevices; or earthen banks. About 165,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	427 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	1,002 acres of potentially suitable habitat (0.6% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Ladder-backed woodpecker (<i>Picoides scalaris</i>)	Fairly common in Mojave and Colorado Deserts. Variety of habitats including deserts, arid scrub, riparian woodlands, mesquite, scrub oak, pinyon-juniper woodlands. Digs nest hole in rotted stub or dead or dying branches of various trees. Also nests in saguaro, agave, yucca, fence posts, and utility poles. Nests on ledges; branches of trees, shrubs, and cactus; and holes in trees or walls. About 2,641,688 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	60,091 acres of potentially suitable habitat lost (2.2% of available potentially suitable habitat)	157,403 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants</i> (Cont.)				
Le Conte's thrasher (<i>Toxostoma leconteii</i>)	Open desert wash, alkali desert scrub, and desert succulent shrub habitats. Prefers to nest and forage in arroyos and washes lined with dense stands of creosotebush and salt bush. About 3,038,200 acres of potentially suitable habitat occurs in the SEZ region. Year-round, but uncommon to rare.	72,251 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,002 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Lesser nighthawk (<i>Chordeiles acutipennis</i>)	Open country, desert regions, scrub, savanna, and cultivated areas. Usually near water including open marshes, salt ponds, large rivers, rice paddies, and beaches. Roosts on low perches or the ground. Nests in the open on bare sites. About 4,653,600 acres of potentially suitable habitat occurs in the SEZ region. Uncommon summer resident.	84,045 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	245,732 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants</i> (Cont.)				
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Open country with scattered trees and shrubs, savanna, desert scrub, desert riparian, Joshua tree, and occasionally, open woodland habitats. Perches on poles, wires, or fence posts (suitable hunting perches are important aspect of habitat). Nests in shrubs and small trees. About 3,159,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	74,008 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	170,029 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Phainopepla (<i>Phainopepla nitens</i>)	Common in Mojave and Colorado deserts. Desert scrub, mesquite, juniper and oak woodlands, tall brush, washes, riparian woodlands, and orchards. Nests in dense foliage of large shrubs or trees, sometimes in a clump of mistletoe. About 676,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round, but many move to more western and northern portions of California during summer.	13,699 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	12,555 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Say's phoebe (<i>Sayornis saya</i>)	Arid open country, deserts, sagebrush plains, dry barren foothills, canyons, cliffs, ranches, and rural homes. Nests in cliff crevices, holes in banks, sheltered ledges, tree cavities, under bridges and roofs, and in mines. About 3,847,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	70,209 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	231,674 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Verdin (<i>Auriparus flaviceps</i>)	Common to abundant in Colorado Desert, less common in Mojave Desert. Desert riparian, desert wash, desert scrub, and alkali desert scrub areas with large shrubs and small trees. Nests in shrubs, small trees, or cactus. About 4,162,260 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	79,455 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	175,446 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
White-throated swift (<i>Aeronautes saxatalis</i>)	Mountainous country near cliffs and canyons where breeding occurs. Forages over forest and open situations. Nests in rock crevices and canyons, sometimes in buildings. Ranges widely over most terrain and habitats, usually high in the air. About 434,970 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	17,642 acres of potentially suitable habitat lost (4.1% of available potentially suitable habitat)	20,990 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	Moderate.
Birds of Prey				
American kestrel (<i>Falco sparverius</i>)	Occurs in most open habitats, in various shrub and early successional forest habitats, forest openings, and various ecotones. Perches on trees, snags, rocks, utility poles and wires, and fence posts. Uses cavities in trees, snags, rock areas, banks, and buildings for nesting and cover. About 1,840,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	11,692 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	76,343 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Small.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Birds of Prey (Cont.)				
Golden eagle (<i>Aquila chrysaetos</i>)	Grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. Occasionally in most other habitats, especially during migration and winter. Nests on cliffs and sometimes trees in rugged areas, with breeding birds ranging widely over surrounding areas. About 4,749,700 acres of potentially suitable habitat occurs in the SEZ region. Winter.	85,217 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	248,057 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Bald and Golden Eagle Protection Act.
Prairie falcon (<i>Falco mexicanus</i>)	Associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. Nests in potholes or well-sheltered ledges on rocky cliffs or steep earth embankments. May also nest in man-made excavations on otherwise unsuitable cliffs and old nests of ravens, hawks, and eagles. Forages in large patch areas with low vegetation. May forage over irrigated croplands in winter. About 4,226,500 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	81,733 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	241,714 acres of potentially suitable habitat (5.7% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Birds of Prey (Cont.)				
Red-tailed hawk (<i>Buteo jamaicensis</i>)	Wide variety of habitats from deserts, mountains, and populated valleys. Open areas with scattered, elevated perch sites such as scrub desert, plains and montane grassland, agricultural fields, pastures urban parklands, broken coniferous forests, and deciduous woodland. Nests on cliff ledges or in tall trees. About 3,836,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	69,782 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	230,823 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate.
Turkey vulture (<i>Cathartes aura</i>)	Occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting. Migrates and forages over most open habitats. Will roost communally in trees, exposed boulders, and occasionally transmission line support towers. About 3,727,800 acres of potentially suitable habitat occurs in the SEZ region. Summer.	69,782 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	230,751 acres of potentially suitable habitat (6.2% of available potentially suitable habitat)	Moderate.
Upland Game Birds				
Gambel's quail (<i>Callipepla gambelii</i>)	Deserts, especially in areas with brushy or thorny growth, and adjacent cultivated areas. Usually occurs near water. Nests on the ground under cover of small trees, shrubs, and grass tufts. About 4,230,100 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	83,272 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	242,526 acres of potentially suitable habitat (5.7% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Upland Game Birds (Cont.)				
Mourning dove (<i>Zenaida macroura</i>)	Habitat generalist, occurring in grasslands, shrublands, croplands, lowland and foothill riparian forests, ponderosa pine forests, deserts, and urban and suburban areas. Rarely in aspen and other forests, coniferous woodlands, and alpine tundra. Nests on ground or in trees. Winters mostly in lowland riparian forests adjacent to cropland. About 3,333,200 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	85,217 acres of potentially suitable habitat lost (2.6% of available potentially suitable habitat)	174,539 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 85,217 acres (345 km²) would be developed in the SEZ.

^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ boundary.

^d Overall impact magnitude categories were based on professional judgment and include (1) *small*: ≤1% of potentially suitable habitat for the species would be lost, and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but ≤10% of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: >10% of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.

Footnotes continued on next page.

TABLE 9.2.11.2-1 (Cont.)

^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.

^f To convert acres to km², multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 **Waterfowl, Wading Birds, and Shorebirds**
2

3 As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds
4 (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and terns) are
5 among the most abundant groups of birds in the six-state study area. About 20 waterfowl,
6 wading bird, and shorebird species occur within the proposed Iron Mountain SEZ region. Within
7 the SEZ, waterfowl, wading birds, and shorebirds are uncommon because of the lack of
8 potentially suitable habitats. The killdeer (*Charadrius vociferus*) and least sandpiper (*Calidris*
9 *minutilla*) (shorebird species) would be expected to occur on the SEZ in the area of Danby Lake.
10 Some waterfowl, wading birds, and shorebirds may also make use of the Colorado River
11 Aqueduct that flows along the southern boundary of the SEZ. The Colorado River, located over
12 20 mi (32 km) southeast of the SEZ, and the Salton Sea, located over 60 mi (96 km) southwest of
13 the SEZ, would provide more productive habitat for this group of birds.
14

15
16 **Neotropical Migrants**
17

18 As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse
19 category of birds within the six-state study area. Neotropical migrants expected to occur within
20 the proposed Iron Mountain SEZ throughout the year include the black-tailed gnatcatcher, black-
21 throated sparrow, cactus wren (*Campylorhynchus brunneicapillus*), common poorwill
22 (*Phalaenoptilus nuttallii*), common raven, Costa’s hummingbird, crissal thrasher, greater
23 roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), house finch
24 (*Carpodacus mexicanus*), ladder-backed woodpecker, Le Conte’s thrasher, loggerhead shrike
25 (*Lanius ludovicianus*), phainopepla, Say’s phoebe (*Sayornis saya*), verdin, and white-throated
26 swift (*Aeronautes saxatalis*). The winter range for the Brewer’s sparrow (*Spizella breweri*),
27 green-tailed towhee (*Pipilo chlorurus*), and sage sparrow (*Amphispiza belli*) encompasses the
28 SEZ, while the summer range for the ash-throated flycatcher (*Myiarchus cinerascens*) and lesser
29 nighthawk (*Chordeiles acutipennis*) encompasses the SEZ (CDFG 2008).
30

31
32 **Birds of Prey**
33

34 Section 4.10.2.2.4 provides an overview of the birds of prey (raptors, owls, and vultures)
35 within the six-state study area. Seventeen bird-of-prey species have ranges that encompass the
36 proposed Iron Mountain SEZ (CDFG 2008). Raptor species expected to could occur within the
37 SEZ include the American kestrel (*Falco sparverius*, year-round), burrowing owl (year-round),
38 ferruginous hawk (*Buteo regalis*, winter), golden eagle (*Aquila chrysaetos*, winter), prairie falcon
39 (*Falco mexicanus*, year-round), red-tailed hawk (*Buteo jamaicensis*, year-round), and turkey
40 vulture (*Cathartes aura*, summer) (CDFG 2008). However, the American kestrel, golden eagle,
41 prairie falcon, and red-tailed hawk only make infrequent use of the desert region within which
42 the proposed Iron Mountain SEZ occurs. The golden eagle is a Fully Protected species by the
43 State of California (CDFG 2010a).
44
45
46

1 **Upland Game Birds**
2

3 Section 4.10.2.2.5 provides an overview of the upland game birds (primarily pheasants,
4 grouse, quail, and doves) that occur within the six-state study area. Upland game species that
5 could occur year-round within the proposed Iron Mountain SEZ are Gambel’s quail (*Callipepla*
6 *gambelii*) and mourning dove (*Zenaida macroura*) (CDFG 2008). Gambel’s quail is common
7 within the Colorado and Mojave Desert areas of California. It prefers riparian areas and also
8 occurs near streams, springs and water holes. While they feed in open habitats, trees or tall
9 shrubs are required for escape cover. They also require a nearby source of water, particularly
10 during hot summer months (CDFG 2008). Up to 400,000 Gambel’s quail are harvested annually
11 in California (CDFG 2008). The mourning dove is common throughout California and can be
12 found in a wide variety of habitats. Regardless of habitat occupied, it requires a nearby water
13 source (CDFG 2008).
14

15 Table 9.2.11.2-1 provides habitat information for representative bird species that could
16 occur within the proposed Iron Mountain SEZ. Because of their special status standing, the
17 burrowing owl, crissal thrasher, ferruginous hawk, and short-eared owl are discussed in
18 Section 9.2.12.1.
19

20
21 **9.2.11.2.2 Impacts**
22

23 The types of impacts that birds could incur from construction, operation, and
24 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
25 such impacts would be minimized through the implementation of required programmatic design
26 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
27 Section 9.2.11.2.3, below, identifies design features of particular relevance to the proposed Iron
28 Mountain SEZ.
29

30 The assessment of impacts on bird species is based on available information on the
31 presence of species in the affected area, as presented in Section 9.2.11.2.1, following the analysis
32 approach described in Appendix M. Additional NEPA assessments and coordination with state
33 natural resource agencies may be needed to address project-specific impacts more thoroughly.
34 These assessments and consultations could result in additional required actions to avoid or
35 mitigate impacts on birds (see Section 9.2.11.2.3).
36

37 In general, impacts on birds would result from habitat disturbance (i.e., habitat reduction,
38 fragmentation, and alteration), and from disturbance, injury, or mortality to individual birds.
39 Table 9.2.11.2-1 summarizes the potential impacts on representative bird species resulting from
40 solar energy development in the proposed Iron Mountain SEZ. Direct impacts on bird species
41 would be small for a few species (e.g., least sandpiper, house finch, and American kestrel), as
42 only 0.6% or less of potentially suitable habitats for these species would be lost
43 (Table 9.2.11.2-1). Impacts on the other bird species would be moderate, as solar energy
44 development within the SEZ would impact 1.8 to 7.5% of potentially suitable habitat for these
45 species (Table 9.2.11.2-1). Larger areas of potentially suitable habitat for bird species occur
46 within the area of potential indirect effects (e.g., up to 6.2% of potentially suitable habitat for the

1 Brewer's sparrow and turkey vulture). Other impacts on birds could result from collision with
2 vehicles and buildings, surface water and sediment runoff from disturbed areas, fugitive dust
3 generated by project activities, noise, lighting, spread of invasive species, accidental spills, and
4 harassment. Indirect impacts on areas outside the SEZ (for example, impacts caused by dust
5 generation, erosion, and sedimentation) are expected to be negligible with implementation of
6 programmatic design features.
7

8 Decommissioning of facilities and reclamation of disturbed areas after operations cease
9 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
10 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
11 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
12 reclamation on wildlife. Of particular importance for bird species would be the restoration of
13 original ground surface contours, soils, and native plant communities associated with semiarid
14 shrublands.
15

16 ***9.2.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 17

18
19 The successful implementation of programmatic design features presented in
20 Appendix A, Section A.2.2, would reduce the potential for effects on birds. Indirect impacts
21 could be reduced to negligible levels by implementing programmatic design features, especially
22 those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust.
23 While some SEZ-specific design features important to reducing impacts on birds are best
24 established when project details are considered, some design features can be identified at this
25 time, as follows:
26

- 27 • Pre-disturbance surveys should be conducted within the SEZ for bird species
28 listed under the Migratory Bird Treaty Act. Impacts on potential nesting
29 habitat of these species should be avoided, particularly during the nesting
30 season.
31
- 32 • Pre-disturbance surveys should be conducted within the SEZ for the following
33 desert bird focal species (CalPIF 2009): ash-throated flycatcher, black-tailed
34 gnatcatcher, black-throated sparrow, burrowing owl, common raven, Costa's
35 hummingbird, crissal thrasher, ladder-backed woodpecker, Le Conte's
36 thrasher, phainopepla, and verdin. Impacts on potential nesting habitat of
37 these species should be avoided.
38
- 39 • Plant species that positively influence the presence and abundance of desert
40 bird focal species should be avoided to the extent practicable. These species
41 include Goodding's willow, yucca, Joshua tree, mesquite, honey mesquite,
42 screwbean, desert mistletoe, big saltbush, smoketree, and catclaw acacia
43 (CalPIF 2009).
44
- 45 • Development in Danby Lake should be minimized and development on
46 Homer Wash precluded.
47

- 1 • Take of golden eagles and other raptors should be avoided. Mitigation
2 regarding the golden eagle should be developed in consultation with the
3 USFWS and CDFG. A permit may be required under the Bald and Golden
4 Eagle Protection Act.
5

6 If these SEZ-specific design features are implemented in addition to programmatic design
7 features, impacts on bird species could be reduced. Any residual impacts on birds are anticipated
8 to be small to moderate given the relative abundance of potentially suitable habitats in the SEZ
9 region. However, as potentially suitable habitats for a number of the bird species occur
10 throughout much of the SEZ (including the entire SEZ for the greater roadrunner and mourning
11 dove), additional species-specific mitigation of direct effects for those species would be difficult
12 or infeasible.
13

14 **9.2.11.3 Mammals**

15 **9.2.11.3.1 Affected Environment**

16
17
18 This section addresses mammal species that are known to occur, or for which potentially
19 suitable habitat occurs, on or within the potentially affected area of the proposed Iron Mountain
20 SEZ. The list of mammal species potentially present in the project area was determined from
21 range maps and habitat information available from the California Wildlife Habitat Relationships
22 System (CDFG 2008). Land cover types suitable for each species were determined from
23 SWReGAP (USGS 2004, 2005, 2007). See Appendix M for additional information on the
24 approach used. Based on species distributions and habitat preferences, about 35 mammal species
25 could occur within the SEZ (CDFG 2008). The following discussion emphasizes big game and
26 other mammal species that (1) have key habitats within or near the Iron Mountain SEZ, (2) are
27 important to humans (e.g., big game, small game, and furbearer species), and/or (3) are
28 representative of other species that share similar habitats.
29
30
31

32 **Big Game**

33
34 The desert bighorn sheep (*Ovis canadensis nelsoni*) and mule deer (*Odocoileus*
35 *hemionus*) are the only big game species expected to occur in the area of the proposed Iron
36 Mountain SEZ. Because it is a BLM-sensitive species, the desert bighorn sheep is discussed in
37 Section 9.2.12. The mule deer is common to abundant throughout California, except in deserts
38 and intensely farmed areas (CDFG 2008). It prefers a mosaic of vegetation that has herbaceous
39 openings, dense brush or tree thickets, riparian areas, and abundant edges. Mule deer are
40 browsers and grazers, feeding on shrubs, forbs, and a few grasses. Brush is important for
41 escape cover and for thermal regulation in winter and summer (CDFG 2008). Mule deer in San
42 Bernardino County are found throughout the mountainous areas at elevations of 4,000 to 8,000 ft
43 (1,219 to 2,438 m) (CDFG 2010d). Therefore, mule deer would not be expected to occur with
44 any regularity within Ward Valley where the proposed Iron Mountain SEZ would be located.
45 The highest elevation of the SEZ is about 1,650 ft (503 m) (Section 9.2.1.1).
46
47

1 **Other Mammals**
2

3 A number of small game and furbearer species occur within the area of the proposed Iron
4 Mountain SEZ. These include the American badger (*Taxidea taxus*), black-tailed jackrabbit
5 (*Lepus californicus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus*
6 *audubonii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), and white-tailed antelope
7 squirrel (*Ammospermophilus leucurus*) (CDFG 2008).
8

9 Nongame (small) mammal species such as bats, mice, kangaroo rats, and shrews also
10 occur within the area of the Iron Mountain SEZ. These include the cactus mouse (*Peromyscus*
11 *eremicus*), canyon deermouse (*P. crinitus*), desert kangaroo rat (*Dipodomys deserti*), desert
12 shrew (*Notiosorex crawfordi*), desert woodrat (*Neotoma lepida*), little pocket mouse
13 (*Perognathus longimembris*), long-tailed pocket mouse (*Chaetodipus formosus*), Merriam’s
14 kangaroo rat (*Dipodomys merriami*), and southern grasshopper mouse (*Onychomys torridus*)
15 (CDFG 2008). The range of nine bat species encompasses the SEZ: big brown bat (*Eptesicus*
16 *fuscus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), Californian leaf-nosed bat (*Macrotus*
17 *californicus*), California mastiff bat (*Eumops perotis californicus*), California myotis (*Myotis*
18 *californicus*), pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), Townsend’s
19 big-eared bat (*Corynorhinus townsendii*), and western pipistrelle (*Parastrellus hesperus*). Most
20 bat species would only utilize the SEZ during foraging. Roost sites for the species (e.g., caves,
21 hollow trees, rock crevices, or buildings) are absent to scarce within the SEZ.
22

23 Table 9.2.11.3-1 provides habitat information for representative mammal species that
24 could occur within the proposed Iron Mountain SEZ. Due to their special status standing, the
25 California mastiff bat, Californian leaf-nose bat, pallid bat, and Townsend’s big-eared bat are
26 discussed in Section 9.2.12.1.
27

28
29 **9.2.11.3.2 Impacts**
30

31 The types of impacts that mammals could incur from construction, operation, and
32 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
33 such impacts would be minimized through the implementation of required programmatic design
34 features described in Appendix A, Section A.2.2, and the application of any additional
35 mitigation. Section 9.2.11.3.3, below, identifies design features of particular relevance to the
36 proposed Iron Mountain SEZ.
37

38 The assessment of impacts on mammal species is based on available information on the
39 presence of species in the affected area, as presented in Section 9.2.11.3.1, following the analysis
40 approach described in Appendix M. Additional NEPA assessments and coordination with state
41 natural resource agencies may be needed to address project-specific impacts more thoroughly.
42 These assessments and consultations could result in additional required actions to avoid or
43 mitigate impacts on mammals (see Section 9.2.11.3.3).
44
45

TABLE 9.2.11.3-1 Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Iron Mountain SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers</i>				
American badger (<i>Taxidea taxus</i>)	Open grasslands and deserts, meadows in subalpine and montane forests, alpine tundra. Digs burrows in friable soils. Most common in areas with abundant populations of ground squirrels, prairie dogs, and pocket gophers. Relatively uncommon throughout California. About 2,597,100 acres ^f of potentially suitable habitat occurs in the SEZ region.	58,552 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	156,676 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate.
Black-tailed jackrabbit (<i>Lepus californicus</i>)	Open plains, fields, and deserts with scattered thickets or patches of shrubs. Also open, early stages of forests and chaparral habitats. Rests during the day in shallow depressions, and uses shrubs for cover. About 4,592,900 acres of potentially suitable habitat occurs in the SEZ region.	82,404 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	244,526 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	Moderate.
Bobcat (<i>Lynx rufus</i>)	Occurs in nearly all habitats and successional stages. Optimal habitats include mixed woodlands and forest edges, hardwood forests, swamps, forested river bottoms, brushlands, deserts, mountains, and other area with thick undergrowth. Availability of water may limit its distribution in xeric regions. Uses rocky clefts, caves, hollow logs, spaces under fallen trees, and so forth when inactive; usually changes shelter areas daily. About 2,952,500 acres of potentially suitable habitat occurs in the SEZ region.	72,495 acres of potentially suitable habitat lost (2.5% of available potentially suitable habitat)	169,383 acres of potentially suitable habitat (5.7% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers (Cont.)</i>				
Coyote (<i>Canis latrans</i>)	Suitable habitat characterized by interspersions of brush and open areas with free water. Least common in dense coniferous forest. Where human control efforts occur, they are restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 4,936,500 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.7% of available potentially suitable habitat)	251,084 acres of potentially suitable habitat (5.1% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Desert cottontail (<i>Sylvilagus audubonii</i>)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Tickets and patches of shrubs, vines, and brush also used as cover. About 3,067,800 acres of potentially suitable habitat occurs in the SEZ region.	72,469 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,145 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate.
Round-tailed ground squirrel (<i>Spermophilus tereticaudus</i>)	Optimum habitat includes desert succulent shrub, desert wash, desert scrub, alkali desert scrub, and levees in cropland habitat. Also occurs in urban habitats. Burrows usually at base of shrubs. About 2,641,600 acres of potentially suitable habitat occurs in the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,403 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers (Cont.)</i>				
White-tailed antelope squirrel (<i>Ammospermophilus leucurus</i>)	Common to abundant in California deserts. Optimal habitats are desert scrub, sagebrush, alkali desert scrub, Joshua tree, bitterbrush, and pinyon-juniper. Fairly common in desert riparian, desert succulent shrub, and desert wash habitats. Also occurs in mixed chaparral and annual grassland habitats. Requires friable soil for burrowing. Burrows may be under shrubs or in open, often uses abandoned kangaroo rat burrows. About 4,408,700 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	251,169 acres of potentially suitable habitat (5.7% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
<i>Nongame (small) Mammals</i>				
Big brown bat (<i>Eptesicus fuscus</i>)	Deserts, forests and woodlands, old fields, shrublands, and urban/suburban areas. Uncommon in hot desert habitats. Summer roosts are in buildings, hollow trees, rock crevices, tunnels, and cliff swallow nests. Maternity colonies occur in attics, barns tree cavities, rock crevices, and caves. Caves, mines, and manmade structures used for hibernation sites. About 3,914,500 acres of potentially suitable habitat occurs in the SEZ region.	68,672 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	230,876 acres of potentially suitable habitat (5.9% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (small)</i>				
<i>Mammals (Cont.)</i>				
Brazilian free-tailed bat (<i>Tadarida brasiliensis</i>)	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, and suburban/urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 4,352,800 acres of potentially suitable habitat occurs in the SEZ region.	82,369 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	243,339 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate.
Cactus mouse (<i>Peromyscus eremicus</i>)	Deserts, shrublands, chaparral, and coniferous woodlands. Occurs on rocky areas and areas with sandy substrates and loamy soils. Nests in rock heaps, stone walls, burrows, brush fences, and woodrat houses. About 3,041,800 acres of potentially suitable habitat occurs in the SEZ region.	73,581 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,106 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate.
Californian myotis (<i>Myotis californicus</i>)	Cliffs, deserts, forests, woodlands, grasslands, savannas, shrublands and savannas. Often uses manmade structures for night roosts. Uses crevices for summer day roosts. May roost on small desert shrubs or on the ground. Hibernates in caves, mines, tunnels, or buildings. May form maternity colonies in rock crevices, under bark, or under eaves of buildings. About 4,148,500 acres of potentially suitable habitat occurs in the SEZ region.	81,733 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	241,714 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (small)</i>				
<i>Mammals (Cont.)</i>				
Canyon deermouse (<i>Peromyscus crinitus</i>)	Found in most desert and chaparral habitats. Gravelly desert pavement, talus, boulders, cliffs, and slickrock—rocky areas with virtually any type of plant cover. About 2,960,700 acres of potentially suitable habitat occurs in the SEZ region.	60,126 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	158,512 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Moderate.
Desert kangaroo rat (<i>Dipodomys deserti</i>)	Low deserts, deep wind-drifted sandy soil with sparse vegetation, alkali sinks, and shadscale or creosotebush scrub. Nests in burrows dug in mounds, usually under vegetation. About 452,000 acres of potentially suitable habitat occurs in the SEZ region.	13,699 acres of potentially suitable habitat lost (3.0% of available potentially suitable habitat)	12,398 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate.
Desert shrew (<i>Notiosorex crawfordi</i>)	Generally found in arid areas with adequate cover for nesting and resting. Deserts, semi-arid grasslands with scattered cactus and yucca, chaparral slopes, alluvial fans, sagebrush, gullies, juniper woodlands, riparian areas, and dumps. About 4,701,400 acres of potentially suitable habitat occurs in the SEZ region.	83,516 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	244,330 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate.
Desert woodrat (<i>Neotoma lepida</i>)	Sagebrush scrub; chaparral; deserts and rocky slopes with scattered cactus, yucca, pine-juniper, or other low vegetation; creosotebush desert; Joshua tree woodlands; scrub oak woodlands, pinyon-juniper woodlands; and riparian zones. Most abundant in rocky areas with Joshua trees. Dens built of debris on ground, among cacti or yucca, along cliffs, among rocks, or occasionally in trees. About 4,602,100 acres of potentially suitable habitat occurs in the SEZ region.	83,836 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	245,109 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (small)</i>				
<i>Mammals (Cont.)</i>				
Little pocket mouse (<i>Perognathus longimembris</i>)	Common to abundant in southern California deserts. Preferred habitat includes desert riparian, desert scrub, desert wash, and sagebrush. Nests in an underground burrow. Sandy soil preferred for burrowing, but also commonly burrows on gravel washes and on stony soils. About 3,078,900 acres of potentially suitable habitat occurs in the SEZ region.	73,790 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,729 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.
Long-tailed pocket mouse (<i>Chaetodipus formosus</i>)	Common in sagebrush, desert scrub, and desert succulent shrub habitats with rocky or stony groundcover. Often inhabits rocky washes and canyon mouths. Uses underground burrows. About 4,531,200 acres of potentially suitable habitat occurs in the SEZ region.	83,307 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	243,563 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.
Merriam's kangaroo rat (<i>Dipodomys merriami</i>)	Most widespread kangaroo rat in California. In southern California, occurs in desert scrub and alkali desert scrub, sagebrush, Joshua tree, and pinyon-juniper habitats. Uses desert flats or slopes with sparse to moderate canopy coverage and sandy to gravelly substrates. Uses underground burrows that are often located at the base of a shrub. About 3,121,700 acres of potentially suitable habitat occurs in the SEZ region.	74,293 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	171,122 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (small)</i>				
<i>Mammals (Cont.)</i>				
Southern grasshopper mouse (<i>Onychomys torridus</i>)	Hot, arid valleys and scrub deserts with sparse and scattered vegetation such as mesquite, creosotebush cholla, yucca, and short grasses. Frequents scrub habitats with friable soils for digging. Also uses abandoned underground burrows. About 3,095,700 acres of potentially suitable habitat occurs in the SEZ region.	73,790 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,801 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate.
Spotted bat (<i>Euderma maculatum</i>)	Mostly found in the foothills, mountains, and desert regions of southern California. Roosts in caves and cracks or crevices in cliffs and canyons. About 4,836,900 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	251,169 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Western pipistrelle (<i>Parastrellus hesperus</i>)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 4,633,600 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	251,169 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

Footnotes on next page.

TABLE 9.2.11.3-1 (Cont.)

-
- ^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).
- ^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 85,217 acres would be developed in the SEZ.
- ^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ boundary.
- ^d Overall impact magnitude categories were based on professional judgment and include (1) *small*: $\leq 1\%$ of potentially suitable habitat for the species would be lost, and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>10\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.
- ^f To convert acres to km^2 , multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 Table 9.2.11.3-1 summarizes the potential impacts on representative mammal species
2 resulting from solar energy development (with the implementation of required programmatic
3 design features) in the proposed Iron Mountain SEZ.
4

5 Direct impacts on small game, furbearers, and nongame (small) mammal species would
6 be moderate, as 1.7 to 3.0% of potential habitats identified for the species would be lost
7 (Table 9.2.11.3-1). Larger areas of potentially suitable habitat for these species occur within the
8 area of potential indirect effects (i.e., ranging from 2.7% for the desert kangaroo rat to 6.0% for
9 the American badger and round-tailed ground squirrel). Other impacts on mammals could result
10 from collision with fences and vehicles, surface water and sediment runoff from disturbed areas,
11 fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental
12 spills, and harassment. These indirect impacts are expected to be negligible with implementation
13 of programmatic design features
14

15 Decommissioning of facilities and reclamation of disturbed areas after operations cease
16 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
17 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
18 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
19 reclamation on wildlife. Of particular importance for mammal species would be the restoration
20 of original ground surface contours, soils, and native plant communities associated with semiarid
21 shrublands.
22
23

24 ***9.2.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 25

26 The implementation of required programmatic design features described in Appendix A,
27 Section A.2.2, would reduce the potential for effects on mammals. While some SEZ-specific
28 design features are best established when project details are considered, one design feature that
29 can be identified at this time is as follows:
30

- 31 • Development in Homer Wash should be avoided in order to reduce impacts on
32 species such as the round-tailed ground squirrel, white-tailed antelope
33 squirrel, little pocket mouse, long-tailed pocket mouse, and any other mammal
34 species that inhabit wash habitats.
35

36 If this SEZ-specific design feature is implemented in addition to programmatic design
37 features, impacts on mammal species could be reduced. Any residual impacts on mammals are
38 anticipated to be moderate given the relative abundance of suitable habitats in the SEZ region.
39 However, because potentially suitable habitats for a number of the mammal species occur
40 throughout much of the SEZ, additional species-specific mitigation of direct effects for those
41 species would be difficult or infeasible.
42
43
44

1 **9.2.11.4 Aquatic Biota**

2
3
4 **9.2.11.4.1 Affected Environment**

5
6 This section addresses aquatic habitats and biota that are known to occur on the proposed
7 Iron Mountain SEZ itself or within an area that could be affected, either directly or indirectly,
8 by activities associated with solar energy development within the SEZ. For the proposed Iron
9 Mountain SEZ, the area of direct effects was considered to be the entire SEZ area. As discussed
10 in Section 9.2.1.1, a new access road would not be needed because State Route 62 passes through
11 the southern portion of the SEZ. Also, for this analysis, the impacts of construction and operation
12 of transmission lines outside of the SEZ were not assessed, assuming that the existing 230-kV
13 transmission line might be used to connect some new solar facilities to load centers and that
14 additional project-specific analysis would be performed for new transmission construction or line
15 upgrades. The area of potential indirect impacts on aquatic biota from SEZ development was
16 considered to extend up to 5 mi (8 km) beyond the SEZ boundary.

17
18 No perennial surface water bodies, seeps, or springs are present on the proposed Iron
19 Mountain SEZ. Several ephemeral drainages do cross the site and drain into Danby Lake. Dry
20 lakes and associated wetlands in desert regions typically do not support aquatic habitat, but may
21 temporarily contain aquatic biota adapted to desiccating conditions (Graham 2001). On the basis
22 of information from ephemeral pools in the American Southwest, ostracods (seed shrimp) and
23 small planktonic crustaceans (e.g., copepods or cladocerans) are expected to be present, and
24 larger branchiopod crustaceans such as fairy shrimp could occur (Graham 2001). Various types
25 of insects that have aquatic larval stages, such as dragonflies and a variety of midges and other
26 fly larvae, may also occur depending on pool longevity, distance to permanent water features,
27 and the abundance of other invertebrates for prey (Graham 2001). but site-specific surveys would
28 be necessary to characterize aquatic biota, if present.

29
30 The only stream feature within the area considered for indirect effects is the constructed
31 CRA. Approximately 7 mi (11 km) of the aqueduct is immediately adjacent to the southern and
32 western SEZ boundaries, with a total of approximately 33 mi (53 km) of the aqueduct within the
33 area of indirect effects. The aqueduct, which diverts water from the Colorado River to supply
34 drinking water to portions of southern California, can contain some aquatic biota when water is
35 present. In 2007, quagga mussels (*Dreissena rostriformis bugensis*), an invasive nonnative
36 mussel species, was discovered in the aqueduct (USGS 2008a). The presence of these mussels,
37 which can attach to and clog intakes for pumps and other piping systems, is a concern for
38 operations of the aqueduct. As a consequence, various treatment programs have been
39 implemented, including periodic draining of the aqueduct and the periodic use of chlorine to kill
40 aquatic organisms that are present. However, aside from concerns regarding this invasive
41 species, important communities of aquatic biota are not present in portions of the aqueduct
42 system adjacent to the proposed Iron Mountain SEZ.

43
44 As described in Section 9.2.9.1.1, no wetlands are present within the proposed SEZ. One
45 intermittently-flooded, riverine wetland is located 5 mi (8 km) south of the proposed SEZ
46 (Figure 9.2.9-1). The NWI classification for this wetland indicates that surface water is usually

1 absent but may be present for variable periods during the year. Precipitation runoff from the SEZ
2 and surrounding areas is transmitted, via ephemeral drainages, to Danby Lake, a normally dry
3 lake bed, in the northwestern portion of the proposed SEZ (Section 9.2.9.1.1). Releases from the
4 CRA are also temporarily directed into Danby Lake during maintenance periods. Aquatic habitat
5 and communities are not likely to be present in Danby Lake for an extended time, although
6 opportunistic crustaceans and aquatic insect larvae adapted to desert conditions may be present
7 during wet periods. More detailed site survey data are needed to characterize the aquatic biota in
8 Danby Lake.

9
10 Outside of the indirect effects area, but within 50 mi of the SEZ, there are approximately
11 2 mi (3 km) of perennial streams, 11 mi (18 km) of intermittent streams, and 124 mi (200 km)
12 of canal (CRA). There are approximately 18,930 acres (77 km²) of lake and reservoir habitat
13 within 50 mi (80 km) of the SEZ, although there are no lakes or reservoirs within the area
14 considered for analysis of direct or indirect effects. Overall, the combined amount of natural
15 aquatic habitat provided by areas within the SEZ and within the area of potential indirect effects
16 is less than 1% of the amount available within the overall analysis area.

17 18 19 **9.2.11.4.2 Impacts**

20
21 The types of impacts that could occur on aquatic habitats and biota from development
22 of utility-scale solar energy facilities are discussed in Section 5.10.3.

23
24 No permanent water bodies, perennial streams, or wetlands are present within the
25 boundaries of the Iron Mountain SEZ. Consequently, there would be no direct impacts on
26 aquatic habitats from construction and operation of utility-scale solar energy facilities within
27 the proposed SEZ. Aquatic communities in Danby Lake, if present, may be affected by ground
28 disturbance, runoff, and fugitive dust during construction. See Section 5.10.3 for a detailed
29 description of potential impacts on aquatic biota resulting from solar energy development
30 activities. More detailed site surveys of ephemeral and intermittent surface waters would be
31 necessary to determine whether solar energy development activities would result in direct or
32 indirect impacts on aquatic biota.

33
34 Aside from the CRA, there are no permanent water bodies or perennial streams located
35 within the identified area of indirect effects that extends 5 mi (8 km) from the boundaries of the
36 SEZ. As discussed in Section 9.2.11.4.1, the aqueduct does not contain any important natural
37 aquatic communities. The nearest wetland area that could be indirectly affected by solar energy
38 development activities is approximately 5 mi (8 km) from the SEZ boundaries and water for that
39 wetland does not originate from the Iron Mountain SEZ. Consequently, the potential for impacts
40 on aquatic communities in that wetland would be negligible.

41
42 In arid environments, reductions in the quantity of water in aquatic habitats are of
43 particular concern. Because drainage from the Iron Mountain SEZ enters Danby Lake, which
44 is a dry lake that contains no aquatic habitat, there would be no effect on aquatic biota from
45 alterations in site runoff patterns or use of water collected from the SEZ. Water quantity in
46 aquatic habitats could also be affected if significant amounts of surface water or groundwater

1 were utilized for power plant cooling water, for washing mirrors, or for other needs. The greatest
2 need for water would occur if technologies employing wet cooling, such as parabolic trough or
3 power tower, were developed at the site; the associated impacts would ultimately depend on the
4 water source used (including groundwater from aquifers at various depths). As identified in
5 Section 9.2.9.1.3, it seems unlikely that approval could be obtained to withdraw water from the
6 CRA. Nevertheless, the aqueduct itself contains no important aquatic species that need to be
7 protected. Obtaining cooling water from other perennial surface water features in the region
8 could affect water levels and, as a consequence, aquatic organisms in those water bodies.
9 Additional details regarding the volume of water required and the types of organisms present in
10 potentially affected water bodies would be required in order to further evaluate the potential for
11 impacts from water withdrawals.

12
13 As described in Section 5.10.3, water quality in aquatic habitats could be affected by the
14 introduction of contaminants such as fuels, lubricants, or pesticides/herbicides during site
15 characterization, construction, operation, or decommissioning for a solar energy facility. There is
16 the potential for runoff containing contaminants to enter Danby Lake especially if construction
17 occurs nearby. Danby Lake is typically dry and is not expected to contain aquatic habitat.
18 However, aquatic biota may be present seasonally, and they could be affected by contaminants.
19 See Section 5.10.3 for a detailed description of potential impacts on aquatic biota resulting from
20 solar energy development activities.

21 22 23 ***9.2.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness***

24
25 The implementation of required programmatic design features described in Appendix A,
26 Section A.2.2, could greatly reduce or eliminate the potential for effects on aquatic biota and
27 aquatic habitats from development and operation of solar energy facilities. While some SEZ-
28 specific design features are best established when project details are being considered, a design
29 feature that can be identified at this time follows:

- 30
31 • The amount of ground disturbance near Danby Lake should be minimized.

32
33 If this design feature is implemented in addition to programmatic project design features
34 and if the utilization of water from groundwater or surface water sources is adequately controlled
35 to maintain sufficient water levels in nearby aquatic habitats, the potential impacts on aquatic
36 biota and habitats from solar energy development at the Iron Mountain SEZ would be negligible.
37

9.2.12 Special Status Species (Threatened, Endangered, Sensitive, and Rare Species)

This section addresses special status species that are known to occur, or for which suitable habitat occurs, on or within the potentially affected area of the proposed Iron Mountain SEZ. Special status species include the following types of species³:

- Species listed as threatened or endangered under the ESA;
- Species that are proposed for listing, are under review, or are candidates for listing under the ESA;
- Species that are listed as threatened or endangered by the State of California under the CESA or that are identified as fully protected by the state⁴;
- Species that are listed by the BLM as sensitive; and
- Species that have been ranked by the states of California or Arizona as S1 or S2, or species of concern by the state of California or the USFWS; hereafter referred to as “rare” species. Arizona does not yet maintain a separate list of species of concern.

Special status species known to occur within 50 mi (80 km) of the Iron Mountain SEZ center (i.e., the SEZ region) were determined from natural heritage records available through NatureServe Explorer (NatureServe 2010) and information provided by the CWHRS (CDFG 2010a), in the CNDDDB (CDFG 2010b), by CAREGAP (Davis et al. 1998; USGS 2010a), and by SWReGAP (USGS 2004, 2005, 2007). Information reviewed consisted of county-level occurrences as determined from NatureServe, point and polygon element occurrences as determined from CNDDDB, as well as modeled land cover types and predicted suitable habitats for the species within the 50-mi (80-km) region as determined from CAREGAP and SWReGAP. The 50-mi (80-km) SEZ region intersects Riverside and San Bernardino Counties, California, and La Paz and Mohave Counties, Arizona. However, the SEZ and affected area occur only in southern San Bernardino County and northern Riverside County, California. See Appendix M for additional information on the approach used to identify species that could be affected by development within the SEZ.

9.2.12.1 Affected Environment

The affected area considered in the assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified

³ See Section 4.6.4 for definitions of these species categories. Note that some of the categories of species included here do not fit BLM’s definition of special status species as defined in BLM Manual 6840 (BLM 2008a). These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

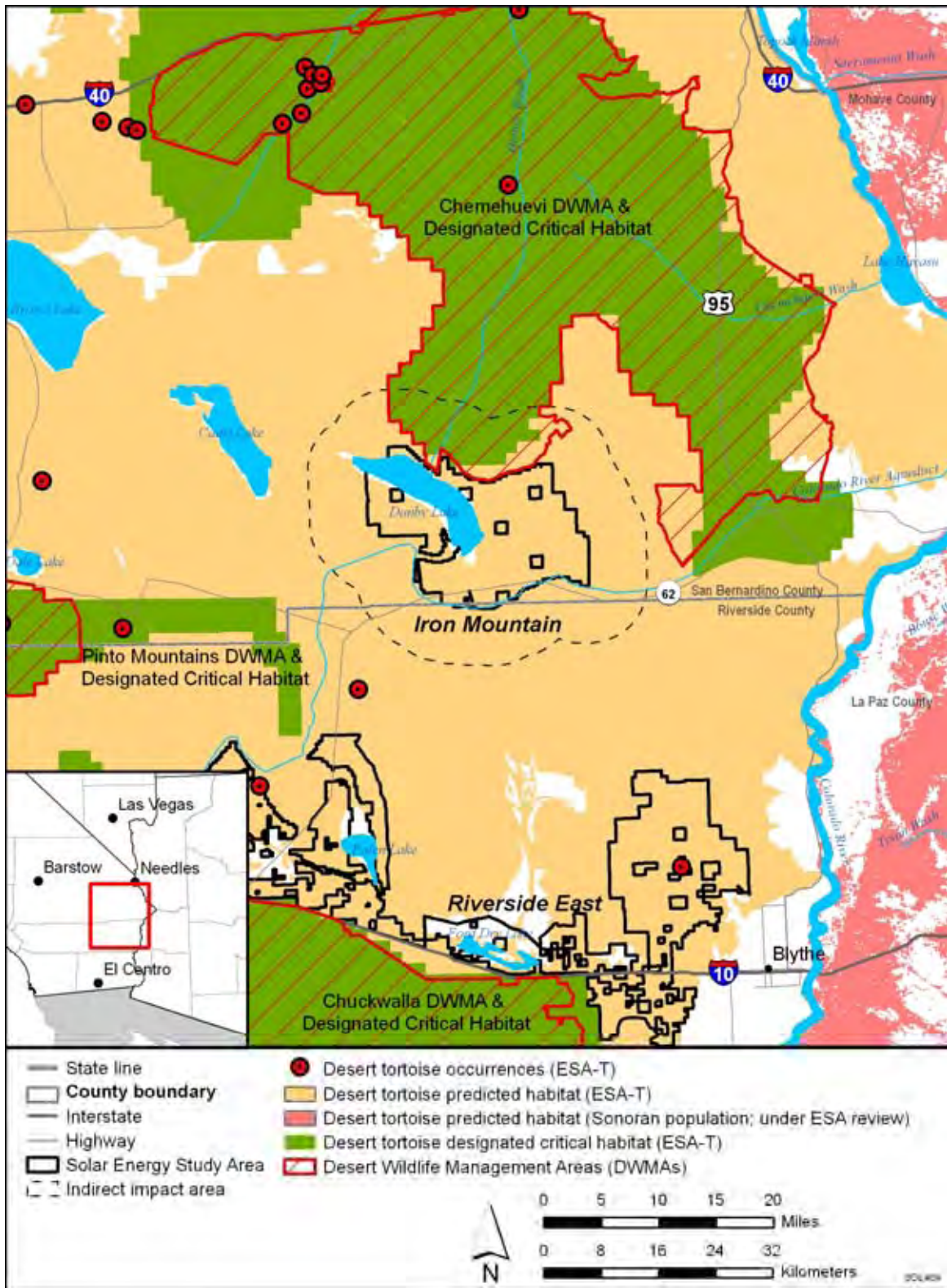
⁴ State-listed species are those listed as threatened or endangered under the CESA; California fully protected species are species that receive the strictest take provisions as identified by the CDFG.

1 during project development (i.e., where ground-disturbing activities would occur). For the
2 Iron Mountain SEZ, the area of direct effect was limited to the SEZ itself. Because of the
3 proximity of existing infrastructure, the impacts of construction and operation of transmission
4 lines outside of the SEZ are not assessed, assuming that the existing transmission might be used
5 to connect some new solar facilities to load centers and that additional project-specific analysis
6 would be conducted for new transmission construction or line upgrades. Similarly, the impacts of
7 construction or upgrades to access roads were not assessed for this SEZ because of the proximity
8 of State Route 62 (see Section 9.2.1.2 for a discussion of development assumptions for this
9 SEZ). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ
10 boundary where ground-disturbing activities would not occur but that could be indirectly
11 affected by activities in the area of direct effect. Indirect effects considered in the assessment
12 included effects from surface runoff, dust, noise, lighting, and accidental spills from the SEZ, but
13 do not include ground-disturbing activities. The potential magnitude of indirect effects would
14 decrease with increasing distance away from the SEZ. This area of indirect effect was identified
15 on the basis of professional judgment and was considered sufficiently large to bound the area
16 that would potentially be subject to indirect effects. The affected area includes both the direct
17 and indirect effects areas.

18
19 The primary habitat type in the affected area is Sonoran-Mojave creosotebush-white
20 bursage desert scrub (see Section 9.2.10). Potentially unique habitats in the affected area in
21 which special status species may reside include desert dunes, rocky cliffs and outcrops, and
22 desert playas. Aquatic and riparian habitats in the affected area occur within and along Danby
23 Lake, intermittent desert washes (e.g., Homer Wash), and the CRA operated by the MWD
24 (see Section 9.2.9; Figure 9.2.12.1-1).

25
26 All special status species that are known to occur within the Iron Mountain SEZ region
27 (i.e., within 50 mi [80 km] of the center of the SEZ) are listed, with their status, nearest recorded
28 occurrence, and habitats in Appendix J. Of these species, there are 43 that could occur on or in
29 the affected area, based on recorded occurrences or the presence of potentially suitable habitat
30 in the area. These species, their status, and their habitats are presented in Table 9.2.12.1-1. For
31 many of the species listed in the table, their predicted potential occurrence in the affected area
32 is based only on a general correspondence between mapped CAREGAP land cover types and
33 descriptions of species habitat preferences. This overall approach to identifying species in the
34 affected area probably overestimates the number of species that actually occur in the affected
35 area. For many of the species identified as having potentially suitable habitat in the affected
36 area, the nearest known occurrence is more than 20 mi (32 m) away from the SEZ.

37
38 Based on CNDDDB records and information provided by the CDFG and USFWS, there
39 are five special status species known to occur within the affected area of the Iron Mountain
40 SEZ: Harwood's eriastrum, Mojave fringe-toed lizard, Bendire's thrasher, hepatic tanager, and
41 Nelson's bighorn sheep. In addition, designated critical habitat for the desert tortoise occurs
42 within the affected area adjacent to the SEZ boundary. There are no groundwater-dependent
43 species in the vicinity of the SEZ based upon CNDDDB records, comments provided by the
44 USFWS (Stout 2009), and the evaluation of groundwater resources in the Iron Mountain SEZ
45 region (Section 9.2.9).



1

2

3

4

FIGURE 9.2.12.1-1 Known or Potential Occurrences of Species Listed as Endangered, Threatened, or under Review for Listing under the ESA That May Occur in the Proposed Iron Mountain SEZ Affected Area (Sources: CDFG 2010b)

TABLE 9.2.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Iron Mountain SEZ

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants</i>						
Abrams' spurge	<i>Chamaesyce abramsiana</i>	CA-S1	Sandy substrates within creosotebush scrub communities in the Mojave and Sonoran Deserts at elevations below 3,000 ft. ^h Nearest recorded occurrence is 38 mi ⁱ from the SEZ. About 2,463,149 acres ^j of potentially suitable habitat occurs within the SEZ region.	58,552 acres of potentially suitable habitat lost (2.4% of available habitat)	156,519 acres of potentially suitable habitat (6.4% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Note that these same potential mitigations apply to all special status plants.
California ditaxis	<i>Ditaxis serrata</i> var. <i>californica</i>	CA-S2	Sonoran Desert scrub and creosotebush scrub communities at elevations between 100 and 3,300 ft. Nearest recorded occurrence is 33 mi from the SEZ. About 2,597,477 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,246 acres of potentially suitable habitat (6.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
California satintail	<i>Imperata brevifolia</i>	CA-S2	Occurs in chaparral, coastal sage scrub, creosotebush, desert scrub, mesic riparian scrub, and alkaline meadow and seep communities. Elevation ranges between 0 and 1,650 ft. Nearest recorded occurrences are 43 mi from the SEZ. About 2,626,502 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Chaparral sand-verbena	<i>Abronia villosa</i> var. <i>aurita</i>	BLM-S; CA-S2	Endemic to southern California. Inhabits chaparral desert sand dunes at elevations between 350 and 5,250 ft. Historically occurred on and in the vicinity of the SEZ; the species has not been recorded in the project area since 1964. Most recent recorded occurrences are 30 mi south of the SEZ. About 61,037 acres of potentially suitable habitat occurs within the SEZ region.	209 acres of potentially suitable habitat lost (0.3% of available habitat)	695 acres of potentially suitable habitat (1.1% of available habitat)	Small overall impact. Avoiding or minimizing disturbance to desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Coves' cassia	<i>Senna covesii</i>	CA-S2	Sonoran Desert dry washes and slopes with sandy substrates within desert scrub and creosotebush scrub communities. Elevation ranges between 1,000 and 3,500 ft. Nearest recorded occurrence is 25 mi from the SEZ. About 3,017,394 acres of potentially suitable habitat occurs within the SEZ region.	73,581 acres of potentially suitable habitat lost (2.4% of available habitat)	169,034 acres of potentially suitable habitat (5.6% of suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Desert pincushion	<i>Coryphantha chlorantha</i>	CA-S1	Gravelly bajadas, limestone, or dolomite rocky slopes associated with desert scrub communities within pinyon-juniper woodlands and Joshua tree woodlands. Elevation ranges between 148 and 7,875 ft. Nearest recorded occurrence is 38 mi from the SEZ. About 2,626,374 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Desert spike-moss	<i>Selaginella eremophila</i>	CA-S2	Gravelly or rocky slopes within creosotebush scrub and Sonoran Desert scrub communities. Elevation ranges between 650 and 2,950 ft. Nearest recorded occurrence is 35 mi from the SEZ. About 2,597,477 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,246 acres of potentially suitable habitat (6.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Dwarf germander	<i>Teucrium cubense</i> ssp. <i>depressum</i>	CA-S2	Desert dunes, playas, riparian, creosotebush scrub, and desert scrub communities. Elevation ranges between 150 and 1,300 ft. Nearest recorded occurrence is 35 mi from the SEZ. About 2,832,948 acres of potentially suitable habitat occurs within the SEZ region.	82,356 acres of potentially suitable habitat lost (2.9% of available habitat)	162,520 acres of potentially suitable habitat (5.7% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance to playas and desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Emory's crucifixion-thorn	<i>Castela emoryi</i>	CA-S2	Slightly wet alluvial bottomlands associated with basalt flows within Mojave Desert scrub, non-saline playas, creosotebush scrub, and Sonoran Desert scrub communities. Elevation ranges between 295 and 2,200 ft. Nearest recorded occurrence is 25 mi from the SEZ. About 2,749,714 acres of potentially suitable habitat occurs within the SEZ region.	82,147 acres of potentially suitable habitat lost (3.0% of available habitat)	161,753 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance to playas could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Glandular ditaxis	<i>Ditaxis claryana</i>	CA-S1	Sandy substrates within desert scrub communities at elevations below 1,525 ft. Nearest recorded occurrence is 30 mi from the SEZ. About 2,626,372 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Harwood's eriastrum^k	<i>Eriastrum harwoodii</i>	BLM-S; CA-S2	Known from fewer than 20 occurrences in southern California on desert dunes and other sandy habitats at elevations between 650 and 3,000 ft. Known to occur on the SEZ and in the affected area. About 60,907 acres of potentially suitable habitat occurs within the SEZ region.	209 acres of potentially suitable habitat lost (0.3% of available habitat)	695 acres of potentially suitable habitat (1.1% of available habitat)	Small overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Harwood's milkvetch	<i>Astragalus insularis</i> var. <i>harwoodii</i>	CA-S2	Sonoran Desert of Arizona and California on sandy or gravelly substrates of desert dunes within desert scrub communities. Elevation ranges between 0 and 2,325 ft. Nearest occurrences are approximately 37 mi from the SEZ. About 2,687,147 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.2% of available habitat)	158,026 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Howe's hedgehog cactus	<i>Echinocereus engelmannii</i> var. <i>howei</i>	BLM-S; CA-S1; FWS-SC	Known from two locations near Needles, California in Mojave Desert scrub communities at elevations near 1,475 ft. Nearest recorded occurrences are 45 mi north of the SEZ. About 2,537,769 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.4% of available habitat)	157,331 acres of potentially suitable habitat (6.2% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Jackass-clover	<i>Wislizenia refracta</i> ssp. <i>refracta</i>	CA-S1	Mojave and northern Sonoran Deserts in dunes, sandy washes, roadsides, and playas within creosotebush scrub, alkali sink, or desert scrub communities. Elevation ranges between 2,000 and 2,600 ft. Nearest recorded occurrence is 20 mi south of the SEZ. About 614,279 acres of potentially suitable habitat occurs within the SEZ region.	36,166 acres of potentially suitable habitat lost (5.9% of available habitat)	17,682 acres of potentially suitable habitat (2.9% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems, playas, or washes could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Lobed ground-cherry	<i>Physalis lobata</i>	CA-S1	Northeastern Sonoran and southeastern Mojave Deserts on decomposed granitic substrates within creosotebush scrub, alkali sink, desert scrub, and playas communities. Elevation ranges between 1,650 and 2,600 ft. Nearest recorded occurrences are 25 mi from the SEZ. About 2,749,714 acres of potentially suitable habitat occurs within the SEZ region.	82,147 acres of potentially suitable habitat lost (3.0% of available habitat)	161,753 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Munz's cholla	<i>Opuntia munzii</i>	BLM-S; CA-S1; FWS-SC	Gravelly or sandy to rocky soils, often on lower bajadas, washes, and flats. Also occurs on hills and in canyons. Occurs in Sonoran Desert creosotebush shrub communities at elevations below 3,280 ft. Nearest recorded occurrences are 50 mi from the SEZ. About 4,404,392 acres of potentially suitable habitat occurs within the SEZ region.	82,271 acres of potentially suitable habitat lost (1.9% of available habitat)	244,144 acres of potentially suitable habitat (5.5% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Orocopia sage	<i>Salvia greatae</i>	BLM-S; CA-S2; FWS-SC	Creosotebush scrub communities and dry washes at elevations less than 2,600 ft. Nearest recorded occurrence is 33 mi southwest of the SEZ. About 2,854,303 acres of potentially suitable habitat occurs within the SEZ region.	72,042 acres of potentially suitable habitat lost (2.5% of available habitat)	168,222 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Parish's club-cholla	<i>Grusonia parishii</i>	CA-S2	Silty, sandy, or gravelly flats, dunelets, and hills within Joshua tree woodlands, creosotebush scrub, and desert scrub communities. Elevation ranges between 100 and 5,000 ft. Nearest recorded occurrences are 37 mi from the SEZ. About 2,687,147 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.2% of available habitat)	158,026 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Pink fairy-duster	<i>Calliandra eriophylla</i>	CA-S2	Sandy or rocky substrates in creosote and desert scrub communities. Elevation ranges between 390 and 4,900 ft. Nearest recorded occurrence is 35 mi from the SEZ. About 2,626,372 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Playa milkvetch	<i>Astragalus allochrous</i> var. <i>playanus</i>	CA-S1	Known from the eastern Mojave Desert on sandy soils within desert scrub communities at elevations near 2,600 ft. Nearest occurrences are approximately 15 mi from the SEZ. About 2,537,900 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.4% of available habitat)	157,331 acres of potentially suitable habitat (6.2% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Saguaro cactus	<i>Carnegiea gigantea</i>	CA-S1	Endemic to the Sonoran Desert along the Colorado River from the Whipple Mountains to Laguna Dam on rocky substrates within Sonoran desert scrub and creosote scrub communities at elevations between 160 and 4,900 ft. Nearest recorded occurrence is 35 mi from the SEZ. About 2,921,907 acres of potentially suitable habitat occurs within the SEZ region.	60,126 acres of potentially suitable habitat lost (2.1% of available habitat)	158,355 acres of potentially suitable habitat (5.4% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Sand evening-primrose	<i>Camissonia arenaria</i>	CA-S2	Sandy washes and rocky slopes within Sonoran Desert scrub communities at elevations below 3,000 ft. Nearest recorded occurrence is 48 mi from the SEZ. About 3,313,061 acres of potentially suitable habitat occurs within the SEZ region.	73,616 acres of potentially suitable habitat lost (2.2% of available habitat)	170,058 acres of potentially suitable habitat (5.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Small-flowered androstephium	<i>Androstephium breviflorum</i>	CA-S1	Dry sandy to rocky soil substrates within creosotebush scrub and Mojave Desert scrub at elevations between 720 and 2,100 ft. Nearest occurrences are approximately 15 mi from the SEZ. About 2,598,676 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.3% of available habitat)	158,026 acres of potentially suitable habitat (6.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Spear-leaf matelea	<i>Matelea parvifolia</i>	CA-S2	Endemic to southeastern California on rocky substrates within creosotebush and desert scrub communities at elevations between 1,450 and 3,600 ft. Nearest recorded occurrences are 35 mi from the SEZ. About 2,626,372 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Spiny cliff-brake	<i>Pellaea truncata</i>	CA-S2	Rocky slopes and cliffs of volcanic or granitic derivation within pinyon-juniper woodlands. Elevation ranges between 4,000 and 7,000 ft. Nearest recorded occurrences are 45 mi from the SEZ. About 1,563,400 acres of potentially suitable habitat occurs within the SEZ region.	10,000 acres of potentially suitable habitat lost (0.6% of available habitat)	76,000 acres of potentially suitable habitat (4.9% of available habitat)	Small overall impact. Avoiding or minimizing disturbance to rocky cliffs and outcrops could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Three-awned grama	<i>Bouteloua trifida</i>	CA-S2	Eastern Mojave Desert mountains on dry, rocky, often calcareous slopes within desert scrub communities. Elevation ranges between 2,300 and 6,500 ft. Nearest recorded occurrence is 19 mi east of the SEZ. About 2,537,769 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.4% of available habitat)	157,331 acres of potentially suitable habitat (6.2% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
White-margined beardtongue	<i>Penstemon albomarginatus</i>	BLM-S; CA-S1; FWS-SC	Sand dune habitats and Mojave Desert scrub communities at elevations below 3,600 ft. Nearest recorded occurrences are 25 mi northwest of the SEZ. About 2,598,676 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.3% of available habitat)	158,026 acres of potentially suitable habitat (6.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Wiggins' cholla	<i>Opuntia wigginsii</i>	CA-S1	Sandy substrates of small washes and flats within creosotebush scrub and Sonoran desert scrub communities. Elevation ranges between 100 and 2,900 ft. Nearest recorded occurrences are 50 mi from the SEZ. About 2,900,300 acres of potentially suitable habitat occurs within the SEZ region.	73,581 acres of potentially suitable habitat lost (2.5% of available habitat)	168,949 acres of potentially suitable habitat (5.8% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Arthropods</i> Bradley's cuckoo wasp	<i>Ceratochrysis bradleyi</i>	CA-S1	Endemic to California where it is known only from eastern Riverside County in Sonoran Desert scrub, creosotebush scrub, yucca and cholla cactus, saltbush, and desert dune communities. Nearest recorded occurrence is 30 mi south of the SEZ. About 2,687,147 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.2% of available habitat)	158,026 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Riverside cuckoo wasp	<i>Hedychridium argenteum</i>	CA-S1	Endemic to California where it is known only from eastern Riverside County in Sonoran Desert scrub, creosotebush scrub, yucca and cholla cactus, saltbush, and desert dune communities. Nearest recorded occurrence is 33 mi south of the SEZ. About 2,687,147 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.2% of available habitat)	158,026 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Reptiles Desert tortoise	<i>Gopherus agassizii</i>	ESA-T; CA-T; CA-S2	Mojave and Sonoran Deserts in desert creosote bush communities on firm soils for digging burrows, along riverbanks, washes, canyon bottoms, creosote flats, and desert oases. Nearest CNDDDB occurrences are 10 mi (16 km) southwest of the SEZ, but designated critical habitat within the Chemehuevi DWMA exists adjacent to the northern boundary of the SEZ within the area of indirect effects. About 4,376,963 acres of potentially suitable habitat occurs within the SEZ region.	86,823 acres of potentially suitable habitat lost (2.0% of available habitat)	248,196 acres of potentially suitable habitat (5.7% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. The potential for impact and need for mitigation should be determined in consultation with the USFWS and CDFG.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Reptiles (Cont.)</i>						
Mojave fringe-toed lizard	<i>Uma scoparia</i>	BLM-S; CA-SC	Sandy habitats in the Mojave Desert from Death Valley south to the Colorado River near Blythe, California, and extreme western Arizona. Sparsely vegetated desert areas with fine windblown sand, including dunes, flats, and washes at elevations below 3,000 ft. Known to occur on the SEZ and in the affected area. About 3,205,349 acres of potentially suitable habitat occurs within the SEZ region.	42,102 acres of potentially suitable habitat lost (1.3% of available habitat)	151,467 acres of potentially suitable habitat (4.7% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems or washes could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds Bendire's thrasher	<i>Toxostoma bendirei</i>	BLM-S; CA-SC	Summer resident in localized areas throughout the region in a variety of desert habitats with fairly large shrubs or cacti and open ground, or open woodland with scattered shrubs and trees, between 0 and 550 m elevation. Nearest recorded occurrences are 3 mi east of the SEZ within the area of indirect effects. Suitable habitat exists on the site. About 2,908,797 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.1% of available habitat)	157,331 acres of potentially suitable habitat (5.4% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Ferruginous hawk	<i>Buteo regalis</i>	BLM-S; FWS-SC	Winter resident in the SEZ region in open grasslands, sagebrush flats, desert scrub, desert valleys, and fringes of pinyon-juniper habitats. Known to occur in San Bernardino County, California, in the region of the SEZ. About 2,504,054 acres of potentially suitable foraging habitat may occur within the SEZ and throughout the affected area.	60,502 acres of potentially suitable habitat lost (2.4% of available habitat)	158,193 acres of potentially suitable habitat (6.3% of available habitat)	Moderate overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effects.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds (Cont.) Hepatic tanager	<i>Piranga flava</i>	CA-S1	Summer resident in SEZ region in open coniferous forests, montane pine-oak forests, riparian woodlands, and pine savanna. Nests high in coniferous or deciduous trees. Nearest recorded occurrences are within 5 mi from the SEZ within the area of indirect effects. About 22,181 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	72 acres of potentially suitable habitat (0.3% of available habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	BLM-S; CA-SC; CA-S2	Year-round resident within the SEZ region. Open areas with short sparse vegetation, including grasslands, agricultural fields, and disturbed areas. Nests in burrows created by mammals or tortoises. Nearest recorded occurrence is 35 mi southeast of the SEZ. About 4,749,768 acres of potentially suitable habitat occurs within the SEZ region.	40,772 acres of potentially suitable habitat lost (0.9% of available habitat)	251,180 acres of potentially suitable habitat (5.3% of available habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied burrows and habitats in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Mammals						
Arizona myotis	<i>Myotis occultus</i>	CA-S2; CA-SC; FWS-SC	Colorado River lowlands and adjacent desert mountain ranges in ponderosa pine and oak-pine woodlands in close proximity to water and in riparian forests within desert areas along the Colorado River. Nearest recorded occurrences are 40 mi from of the SEZ. About 157,649 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	72 acres of potentially suitable habitat (<0.1% of available habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
California leaf-nosed bat	<i>Macrotus californicus</i>	BLM-S; CA-S2; CA-SC; FWS-SC	Year-round resident in SEZ region in desert riparian, desert wash, desert scrub, and palm oasis habitats at elevations below 2,000 ft. Roosts in mines, caves, and buildings. Nearest recorded occurrences are 20 mi north of the SEZ. About 4,097,122 acres of potentially suitable habitat occurs within the SEZ region.	83,272 acres of potentially suitable habitat lost (2.0% of available habitat)	242,454 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Mammals (Cont.)						
Colorado Valley woodrat	<i>Neotoma albigula venusta</i>	CA-S1	Low-lying desert, creosote-mesquite, and pinyon-juniper habitats strongly influenced by the availability of den-building materials, including litter of cholla, prickly pear, mesquite, and catclaw. Nearest recorded occurrences are 40 mi from of the SEZ. About 1,726,493 acres of potentially suitable habitat occurs within the SEZ region.	11,342 acres of potentially suitable habitat lost (0.7% of available habitat)	15,882 acres of potentially suitable habitat (0.9% of available habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Nelson's bighorn sheep	<i>Ovis canadensis nelsoni</i>	BLM-S; FWS-SC	Visually open, steep rocky terrain in mountainous habitats of the eastern Mojave and Sonoran Deserts in California. Rarely uses desert lowlands, except as corridors for travel between mountain ranges. Nearest recorded occurrences are from the Old Woman Mountains Wilderness and the Turtle Mountains Wilderness, within 3 mi northwest and east of the SEZ, respectively. About 2,568,543 acres of potentially suitable habitat occurs within the SEZ region.	16,975 acres of potentially suitable habitat lost (0.7% of available habitat)	33,000 acres of potentially suitable habitat (1.3% of available habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats within the SEZ and habitats that serve as movement corridors could further reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Mammals (Cont.)						
Pallid bat	<i>Antrozous pallidus</i>	BLM-S; CA-SC; FWS-SC	Year-round resident in the SEZ region in low-elevation desert communities, including grasslands, shrublands, and woodlands. Roosts in caves, crevices, and mines. Nearest recorded occurrence is from Cadiz Lake, approximately 10 mi northwest of the SEZ. About 3,972,586 acres of potentially suitable habitat occurs within the SEZ region.	69,782 acres of potentially suitable habitat lost (1.8% of available habitat)	230,823 acres of potentially suitable habitat (5.8% of available habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM-S; CA-SC; CA-S2; FWS-SC	Year-round resident in the SEZ region in all habitats but subalpine and alpine habitats. Roosts in caves, mines, tunnels, buildings, or other human-made structures. Nearest recorded occurrence is approximately 25 mi from the SEZ. About 5,026,540 acres of potentially suitable habitat occurs within the SEZ region.	106,522 acres of potentially suitable habitat lost (2.1% of available habitat)	251,169 acres of potentially suitable habitat (5.0% of available habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Western mastiff bat	<i>Eumops perotis californicus</i>	BLM-S; CA-SC; FWS-SC	Year-round resident in the SEZ region in many open semiarid habitats, including conifer and deciduous woodlands, shrublands, grasslands, chaparral, and urban areas. Roosts in crevices in cliff faces, buildings, and tall trees. Nearest recorded occurrence is near the Colorado River, approximately 30 mi east of the SEZ. About 4,589,512 acres of potentially suitable habitat occurs within the SEZ region.	106,522 acres of potentially suitable habitat lost (2.3% of available habitat)	251,169 acres of potentially suitable habitat (5.5% of available habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

^a BLM-S = listed as a sensitive species by the BLM; CA-S1 = ranked as S1 in the State of California; CA-S2 = ranked as S2 in the State of California; CA-T = listed as threatened by the State of California; ESA-T = listed as threatened under the ESA; FWS-SC = USFWS species of concern. An asterisk denotes that the listing status applies to populations only within the State of Arizona.

^b For plant and invertebrate species, potentially suitable habitat was determined by using CAREGAP and SWReGAP land cover types. For reptile, bird, and mammal species, potentially suitable habitat was determined by using CAREGAP and SWReGAP habitat suitability models as well as CAREGAP and SWReGAP land cover models. Area of potentially suitable habitat land cover for each species is presented for the SEZ region, defined as the area within 50 mi (80 km) of the SEZ center.

^c Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using CAREGAP and SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. Impacts of access road and transmission line construction, upgrade, or operation are not assessed in this evaluation because of the proximity of existing infrastructure to the SEZ.

Footnotes continued on next page.

TABLE 9.2.12.2.-1 (Cont.)

- d Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations.
- e Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- f Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: $\leq 1\%$ of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: $>10\%$ of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- g Species-specific mitigations are suggested here, but final mitigations should be developed in consultation with state and federal agencies and should be based on pre-disturbance surveys.
- h To convert ft to m, multiply by 0.3048.
- i To convert mi to km, multiply by 1.609.
- j To convert acres to km^2 , multiply by 0.004047.
- k Species in bold text have been recorded or have designated critical habitat in the affected area.

1 **9.2.12.1.1 Species Listed under the ESA That Could Occur in the Affected Area**
2

3 In scoping comments on the proposed Iron Mountain SEZ, the USFWS expressed
4 concern for impacts of project facilities on the desert tortoise, a species listed as threatened under
5 the ESA in the state of California (Stout 2009). The desert tortoise is also listed as a threatened
6 species under the CESA. This species has the potential to occur within the SEZ on the basis of
7 observed occurrences near the SEZ, designated critical habitat within the area of indirect effects,
8 and the presence of apparently suitable habitat in the SEZ (Figure 9.2.12.1-1; Table 9.2.12.1-1).
9 Appendix J provides basic information on life history, habitat needs, and threats to populations
10 of this species.
11

12 The desert tortoise occurs in the Chemehuevi DWMA, which is adjacent to the
13 northern boundary of the proposed Iron Mountain SEZ within the area of indirect effects. In
14 2007, surveys for desert tortoises were conducted by the USFWS Desert Tortoise Recovery
15 Office in the Chemehuevi DWMA, in an area adjacent to the proposed Iron Mountain SEZ
16 (Stout 2009). On the basis of these survey results, USFWS estimated a desert tortoise density of
17 about 5 individuals/km² within the 997,808-acre (4,038-km²) DWMA. The USFWS judged that
18 overall mean density within the SEZ would be less than in the DWMA because much of the
19 SEZ is at very low elevation, and implied that the SEZ may support several hundred to more
20 than 1,000 desert tortoises.
21

22 The CNDDDB does not have recorded occurrences of the desert tortoise on the SEZ or
23 within the area of indirect effects. However, CAREGAP predicts the presence of potentially
24 suitable habitat for the species on the SEZ and throughout the area of indirect effects
25 (Figure 9.2.12.1-1; Table 9.2.12.1-1). Of this potentially suitable habitat area, the USGS desert
26 tortoise model (Nussear et al. 2009) identifies approximately 20,000 acres (80 km²) of highly
27 suitable habitat (modeled suitability value ≥ 0.8 out of 1) in the eastern portion of the SEZ. The
28 desert tortoise is also known to occur as near as 10 mi (16 km) southwest of the Iron Mountain
29 SEZ between the Joshua Tree and Palen-McCoy WAs (Figure 9.2.12.1-1).
30

31 Designated critical habitat for this species does not occur on the SEZ, but adjacent critical
32 habitat occurs north of the SEZ in the area of indirect effects within the Chemehuevi DWMA.
33 The Iron Mountain SEZ is situated between the Chemehuevi (to the north) and Pinto Mountains
34 (to the southwest) and Chuckwalla Critical Habitat units (Figure 9.2.12-1); therefore, the SEZ
35 may provide important connectivity between these two critical habitat units.
36
37

38 **9.2.12.1.2 BLM-Designated Sensitive Species**
39

40 There are 15 BLM-designated sensitive species that may occur in the affected area of the
41 Iron Mountain SEZ (Table 9.2.12.1-1). These BLM-designated sensitive species include the
42 following: (1) plants—chaparral sand-verbena, Harwood’s eriastrum, Howe’s hedgehog cactus,
43 Munz’s cholla, Orocopia sage, and white-margined beardtongue; (2) reptiles—Mojave fringe-
44 toed lizard; (3) birds—Bendire’s thrasher, ferruginous hawk, and western burrowing owl; and
45 (4) mammals—California leaf-nosed bat, Nelson’s bighorn sheep, pallid bat, Townsend’s big-
46 eared bat, and western mastiff bat. Of these species, Harwood’s eriastrum, Mojave fringe-toed

1 lizard, Bendire’s thrasher, and Nelson’s bighorn sheep have been recorded in the affected area.
2 Habitats in which these species are found, the amount of potentially suitable habitat in the
3 affected area, and known locations of the species relative to the SEZ are discussed below and
4 presented in Table 9.2.12.1-1. Additional life history information for these species is provided in
5 Appendix J.
6
7

8 **Chaparral Sand-Verbena**

9

10 The chaparral sand-verbena is an annual forb herb endemic to southern California. It
11 historically occurred on and in the vicinity of the SEZ, but it is currently known to occur only in
12 Riverside and Orange Counties outside of the area of indirect effects. Although the species has
13 not been recently recorded on the SEZ, according to the CAREGAP land cover model,
14 potentially suitable sand dune habitat still occurs on the SEZ and in other portions of the affected
15 area (Table 9.2.12.1-1).
16
17

18 **Harwood’s Eriastrum**

19

20 The Harwood’s eriastrum is an annual forb known only from the eastern Mojave Desert
21 in southern California. This species is known to occur on the SEZ. According to the CAREGAP
22 land cover model, potentially suitable desert sand dune habitat occurs on the SEZ and in other
23 portions of the affected area (Table 9.2.12.1-1).
24
25

26 **Howe’s Hedgehog Cactus**

27

28 The Howe’s hedgehog cactus is a short stout cactus endemic to southern California
29 where it is currently known from two extant occurrences near Needles, California, approximately
30 45 mi (72 km) north of the SEZ. Populations are not known to occur on the SEZ. According to
31 the CAREGAP land cover model, potentially suitable Mojavean desert scrub habitat may occur
32 on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).
33
34

35 **Munz’s Cholla**

36

37 The Munz’s cholla is a tree-like cactus endemic to southern California where it is known
38 only from the Chocolate Mountains in Imperial and Riverside Counties as near as 50 mi (80 km)
39 south of the SEZ. The species inhabits Sonoran Desert creosotebush scrub communities. The
40 species is not known to occur on the SEZ. According to the CAREGAP land cover model,
41 potentially suitable habitat occurs on the SEZ and in other portions of the affected area
42 (Table 9.2.12.1-1).
43
44
45

1 **Orocopia Sage**

2
3 The Orocopia sage is a flowering evergreen shrub endemic to southern California in
4 dry desert washes and floodplains. The species is known to occur as near as 33 mi (53 km)
5 southwest of the SEZ. According to the CAREGAP land cover model, potentially suitable
6 desert scrub habitat for the species occurs on the SEZ and in other portions of the affected area
7 (Table 9.2.12.1-1).
8
9

10 **White-Margined Beardtongue**

11
12 The white-margined beardtongue is a perennial forb that inhabits desert scrub habitats
13 in southeastern California and Arizona. The species is known in California from fewer than
14 20 occurrences. Populations are known to occur as near as 25 mi (40 km) northwest of the SEZ.
15 According to the CAREGAP land cover model, potentially suitable habitat for the species may
16 occur on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).
17
18

19 **Mojave Fringe-Toed Lizard**

20
21 The Mojave fringe-toed lizard is a fairly small smooth-skinned lizard that inhabits desert
22 sand dune habitats in southeastern California and western Arizona. The species occurs as
23 scattered populations in specialized dune habitats composed of fine, loose, wind-blown sand
24 deposits. The species is known to occur on the SEZ and in portions of the area of indirect effects.
25 According to the CAREGAP habitat suitability model, potentially suitable habitat for this species
26 occurs on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).
27
28

29 **Bendire's Thrasher**

30
31 The Bendire's thrasher is a small neotropical migrant bird that is a summer breeding
32 resident in southern California. This species inhabits desert succulent shrub and Joshua tree
33 (*Yucca brevifolia*) habitats in the Mojave Desert, where it is associated with sagebrush
34 (*Artemisia* sp.), pinyon-juniper woodlands, cholla (*Opuntia* sp.) cactus, Joshua tree, palo verde
35 (*Cercidium* sp.), mesquite (*Prosopis* sp.), and agave species. Nearest recorded occurrences are
36 3 mi (5 km) east of the SEZ. According to the CAREGAP land cover model, Mojave Desert
37 scrub habitats that may be potentially suitable foraging or nesting habitat occurs on the SEZ and
38 in other portions of the affected area (Table 9.2.12.1-1).
39
40

41 **Ferruginous Hawk**

42
43 The ferruginous hawk is a winter resident and migrant in the Iron Mountain SEZ region.
44 The species' winter range includes the entire SEZ region. The species inhabits open grasslands,
45 sagebrush flats, desert scrub, and the fringes of pinyon-juniper woodlands. This species is known
46 to occur in the SEZ region in Riverside County, California, and according to the CAREGAP land

1 cover model, potentially suitable foraging habitat occurs on the SEZ and in other portions of the
2 SEZ region (Table 9.2.12.1-1).

3 4 5 **Western Burrowing Owl**

6
7 The western burrowing owl is a year-round resident of open, dry grasslands and desert
8 habitats in southern California and Arizona. Populations occur locally in open areas with
9 sparse vegetation. Nearest recorded occurrences are 35 mi (56 km) southeast of the SEZ.
10 According to the CAREGAP habitat suitability model, potentially suitable habitat occurs on the
11 SEZ and in other portions of the affected area (Table 9.2.12.1-1). The availability of nest sites
12 (burrows) within the affected area has not been determined; shrubland habitat that may be
13 suitable for either foraging or nesting occurs throughout the affected area.

14 15 16 **California Leaf-Nosed Bat**

17
18 The California leaf-nosed bat is a large-eared bat with a leaflike flap of protective skin on
19 the tip of its nose. It primarily occurs along the Colorado River from southern Nevada, through
20 Arizona and California, to Baja, California, and Sinaloa, Mexico. The species forages in a
21 variety of desert habitats including desert riparian, desert wash, desert scrub, and palm oasis. It
22 roosts in caves, crevices, and mines. Nearest recorded occurrences are 20 mi (32 km) north of the
23 SEZ. According to the CAREGAP land cover model, potentially suitable habitat may occur on
24 the SEZ and in other portions of the affected area (Table 9.2.12.1-1). The potentially suitable
25 habitat on the SEZ and in the area of indirect effects could include foraging and roosting habitat.
26 On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km²) and
27 76,000 acres (308 km²) of rocky cliffs and outcrops on the SEZ and in the area of direct effects,
28 respectively, could be potentially suitable roosting habitat for this species.

29 30 31 **Nelson's Bighorn Sheep**

32
33 The Nelson's bighorn sheep is one of several subspecies of bighorn sheep known to occur
34 in the southwestern United States. This species occurs in desert mountain ranges in Arizona,
35 California, Nevada, Oregon, and Utah. The Nelson's bighorn sheep uses primarily montane
36 shrubland, forest, and grassland habitats and may utilize desert valleys as corridors for travel
37 between range habitats. In California, the species is known from the desert mountain ranges from
38 the White Mountains, south to the San Bernardino Mountains, and southeastward to the Mexican
39 border. Nearest recorded occurrences are from the Old Woman Mountains Wilderness and the
40 Turtle Mountains Wilderness within 3 mi (5 km) northwest and east of the SEZ, respectively.
41 According to the CAREGAP habitat suitability model, the SEZ and other portions of the affected
42 area may provide important habitat for sheep travelling between these two ranges (Table
43 9.2.12.1-1). This species may utilize portions of the SEZ as migratory habitat between the
44 Coxcomb, Old Woman, and Turtle Mountains.

1 **Pallid Bat**
2

3 The pallid bat is a large pale bat with large ears locally common in desert grasslands and
4 shrublands in the southwestern United States. It roosts in caves, crevices, and mines. The species
5 is a year-round resident throughout southern California. The nearest recorded occurrence is from
6 Cadiz Lake, approximately 10 mi (16 km) northwest of the SEZ. According to the CAREGAP
7 land cover model, potentially suitable habitat may occur on the SEZ and in other portions of the
8 affected area (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ and in the area of
9 indirect effects could include foraging and roosting habitat. On the basis of an evaluation of land
10 cover types, approximately 10,000 acres (40 km²) and 76,000 acres (308 km²) of rocky cliffs and
11 outcrops on the SEZ and in the area of direct effects, respectively, could be potentially suitable
12 roosting habitat for this species.
13
14

15 **Townsend’s Big-Eared Bat**
16

17 The Townsend’s big-eared bat is widely distributed throughout the western United States.
18 In California, the species forages year-round in a wide variety of desert and non-desert habitats.
19 The species roosts in caves, mines, tunnels, buildings, and other man-made structures. Nearest
20 recorded occurrences are approximately 25 mi (40 km) from the SEZ. According to the
21 CAREGAP land cover model, potentially suitable habitat may occur on the SEZ and in other
22 portions of the affected area (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ and
23 in the area of indirect effects could include foraging and roosting habitat. On the basis of an
24 evaluation of land cover types, approximately 10,000 acres (40 km²) and 76,000 acres (308 km²)
25 of rocky cliffs and outcrops on the SEZ and in the area of direct effects, respectively, could be
26 potentially suitable roosting habitat for this species.
27
28

29 **Western Mastiff Bat**
30

31 The western mastiff bat is a large uncommon resident of southern California and western
32 Arizona. The species forages in many open semiarid habitats including conifer and deciduous
33 woodlands, shrublands, grassland, and urban areas. It roosts in crevices, trees, and buildings.
34 Nearest recorded occurrences are from the Colorado River, approximately 30 mi (48 km) east of
35 the SEZ. According to the CAREGAP land cover model, potentially suitable habitat may occur
36 on the SEZ and in other portions of the affected area (Table 9.2.12.1-1). The potentially suitable
37 habitat on the SEZ and in the area of indirect effects could include suitable foraging and roosting
38 habitat. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km²)
39 and 76,000 acres (308 km²) of rocky cliffs and outcrops on the SEZ and in the area of direct
40 effects, respectively, could be potentially suitable roosting habitat for this species.
41
42

43 **9.2.12.1.3 State-Listed Species**
44

45 The desert tortoise is the only species listed by the State of California that may occur in
46 the Iron Mountain SEZ affected area (Table 9.2.12.1-1). This species is listed as threatened under

1 the CESA; it is also listed as threatened under the ESA and is previously discussed in
2 Section 9.2.12.1.1.

3 4 5 **9.2.12.1.4 Rare Species** 6

7 There are 42 species that have a state rank of S1 or S2 in California or that are considered
8 species of concern by the State of California or USFWS that may occur in the affected area of
9 the Iron Mountain SEZ (Table 9.2.12.1-1). Of these species, there are 27 that have not been
10 discussed as ESA-listed (Section 9.2.12.1.1), BLM-designated sensitive (Section 9.2.12.1.2), or
11 state-listed (Section 9.2.12.1.3).

12 13 14 **9.2.12.2 Impacts** 15

16 The potential for impacts on special status species from utility-scale solar energy
17 development within the proposed Iron Mountain SEZ is discussed in this section. The types of
18 impacts that special status species could incur from construction and operation of utility-scale
19 solar energy facilities are discussed in Section 5.10.4.

20
21 The assessment of impacts on special status species is based on available information
22 on the presence of species in the affected area as presented in Section 9.2.12.1 following the
23 analysis approach described in Appendix M. It is assumed that, prior to development, surveys
24 would be conducted to determine the presence of special status species and their habitats in and
25 near areas where ground-disturbing activities would occur. Additional NEPA assessments, ESA
26 consultations, and coordination with state natural resource agencies may be needed to address
27 project-specific impacts more thoroughly. These assessments and consultations could result in
28 additional required actions to avoid, minimize, or mitigate impacts on special status species
29 (see Section 9.2.12.3).

30
31 Solar energy development within the Iron Mountain SEZ could affect a variety of
32 habitats (see Section 9.2.10). These impacts on habitats could in turn affect special status species
33 that are dependent on those habitats. Based on CNDDDB records and information provided by the
34 CDFG and USFWS, there are five special status species known to occur within the affected area
35 of the Iron Mountain SEZ: **Harwood's eriastrum**, **Mojave fringe-toed lizard**, **Bendire's thrasher**,
36 **hepatic tanager**, and **Nelson's bighorn sheep**. In addition, designated critical habitat for the
37 desert tortoise occurs within the affected area adjacent to the SEZ boundary. These species are
38 listed in bold in Table 9.2.12.1-1. Other special status species may occur on the SEZ or within
39 the affected area based upon the presence of potentially suitable habitat. As discussed in
40 Section 9.2.12.1, this approach to identifying the species that could occur in the affected area
41 probably overestimates the number of species that actually occur in the affected area, and may
42 therefore overestimate impacts on some special status species.

43
44 Potential direct and indirect impacts on special status species within the SEZ and in
45 the area of indirect effect outside the SEZ are presented in Table 9.2.12.1-1. In addition, the
46 overall potential magnitude of impacts on each species (assuming design features are in place)

1 is presented along with any potential species-specific mitigation measures that could further
2 reduce impacts.

3
4 Impacts on special status species could occur during all phases of development
5 (construction, operation, and decommissioning and reclamation) of a utility-scale solar energy
6 project within the SEZ. Construction and operation activities could result in short- or long-term
7 impacts on individuals and their habitats, especially if these activities are sited in areas where
8 special status species are known to or could occur. As presented in Section 9.2.1.2, impacts of
9 access road and transmission line construction, upgrade, or operation are not assessed in this
10 evaluation because of the proximity of existing infrastructure to the SEZ.

11
12 Direct impacts would result from habitat destruction or modification. It is assumed that
13 direct impacts would occur only within the SEZ where ground-disturbing activities are expected
14 to occur. Indirect impacts could result from surface water and sediment runoff from disturbed
15 areas, fugitive dust generated by project activities, accidental spills, harassment, and lighting.
16 No ground-disturbing activities associated with project development are anticipated to occur
17 within the area of indirect effects. Decommissioning of facilities and reclamation of disturbed
18 areas after operations cease could result in short-term negative impacts on individuals and
19 habitats adjacent to project areas, but long-term benefits would accrue if original land contours
20 and native plant communities were restored in previously disturbed areas.

21
22 The successful implementation of programmatic design features (discussed in
23 Appendix A, Section A.2.2) would reduce direct impacts on some special status species,
24 especially those that depend on habitat types that can be easily avoided (e.g., dunes and sand
25 transport systems, playa and desert wash habitats). Indirect impacts on special status species
26 could be reduced to negligible levels by implementing programmatic design features, especially
27 those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust.

28 29 30 ***9.2.12.2.1 Impacts on Species Listed under the ESA***

31
32 The desert tortoise is the only species listed under the ESA that has the potential to occur
33 in the affected area of the proposed Iron Mountain SEZ and is the only ESA-listed species that
34 the USFWS identified as potentially affected by solar energy development on the Iron Mountain
35 SEZ (Stout 2009). The tortoise is known to occur in the Chemehuevi DWMA adjacent to
36 the northern boundary of the SEZ in the area of indirect effects; populations are also known to
37 occur south of the SEZ near the Pinto Mountains DWMA (Figure 9.2.12.1-1). According to the
38 CAREGAP habitat suitability model, approximately 86,823 acres (351 km²) of potentially
39 suitable habitat for the desert tortoise could be directly affected by construction and operations
40 of solar energy facilities on the SEZ (Table 9.2.12.1-1). This direct effects area represents about
41 2.0% of available suitable habitat of the desert tortoise in the SEZ region. Of this habitat, the
42 USGS desert tortoise habitat suitability model (Nussear et al. 2009) identified the highest
43 suitability in the eastern portion of the SEZ. About 248,196 acres (1,000 km²) of suitable habitat
44 occurs in the area of potential indirect effects; this area represents about 5.7% of the available
45 suitable habitat in the SEZ region (Table 9.2.12.1-1).

1 On the basis of surveys of the desert tortoise conducted in the adjacent Chemehuevi
2 DWMA, the USFWS estimated that full-scale solar energy facilities on the SEZ may directly
3 affect between several hundred to more than 1,000 desert tortoises on the SEZ (Stout 2009).
4 In addition to direct impacts, facilities on the SEZ could indirectly affect desert tortoises by
5 fragmenting and degrading their adjacent habitat (refer to Section 5.10.4 for a discussion of
6 possible indirect impacts). Fragmentation would be exacerbated by the installation of
7 exclusionary fencing at the perimeter of the SEZ or individual project areas. The SEZ is situated
8 between the Chemehuevi and Pinto Mountains DWMA's (these DWMA's also contain USFWS-
9 designated critical habitat), and terrestrial habitats within the SEZ may provide important
10 linkages between the DWMA's. Therefore, facilities on the SEZ may disrupt desert tortoise
11 population dynamics in nearby DWMA's and designated critical habitat.

12
13 The overall impact on the desert tortoise from construction, operation, and
14 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
15 considered moderate, because the amount of potentially suitable habitat for this species in the
16 area of direct effects represents between 1% and 10% of potentially suitable habitat in the SEZ
17 region. The implementation of programmatic design features alone is unlikely to substantially
18 reduce these impacts. Avoidance of all potentially suitable habitats for this species is not a
19 feasible means of mitigating impacts, because these habitats (desert scrub) are widespread
20 throughout the area of direct effects.

21
22 Development of actions to reduce impacts (e.g., reasonable and prudent alternatives,
23 reasonable and prudent measures, and terms and conditions) for the desert tortoise, including a
24 survey protocol, avoidance measures, minimization measures, and, potentially, translocation
25 actions, and compensatory mitigation, would require consultations formal consultation with the
26 USFWS under Section 7 of the ESA. These consultations may be used to authorize incidental
27 take statements per Section 10 of the ESA (if necessary). In addition, the CESA provides
28 authority to the CDFG to regulate potential impacts on the desert tortoise and other species listed
29 under the CESA. Therefore, formal consultation with the CDFG also would be required to permit
30 the incidental take of desert tortoises in the SEZ.

31
32 There are inherent dangers to tortoises associated with their capture, handling, and
33 translocation from the SEZ. These actions, if done improperly, can result in injury or death.
34 To minimize these risks (and as stated above), the desert tortoise translocation plan should be
35 developed in consultation with the USFWS and the CDFG and follow the *Guidelines for*
36 *Handling Desert Tortoises During Construction Projects* (Desert Tortoise Council 1994) and
37 other current translocation guidance provided by the USFWS and CDFG. Consultation will
38 identify potentially suitable recipient locations, density thresholds for tortoise populations in
39 recipient locations, procedures for pre-disturbance clearance surveys and tortoise handling, as
40 well as disease testing and post-translocation monitoring and reporting requirements. Despite
41 some risk of mortality or decreased fitness, translocation is widely accepted as a useful strategy
42 for the conservation of the desert tortoise (Field et al. 2007).

43
44 To offset impacts of solar development on the SEZ, compensatory mitigation may be
45 needed to balance the acreage of habitat lost with acquisition of lands that would be improved
46 and protected for desert tortoise populations (USFWS 1994). Compensation can be accomplished

1 by improving the carrying capacity for the desert tortoise on the acquired lands. Other mitigation
2 actions may include funding for the habitat enhancement of the desert tortoise on existing federal
3 lands. Consultations with the USFWS and CDGF would be necessary to determine the
4 appropriate mitigation ratio to acquire, enhance, and preserve desert tortoise compensation lands.
5
6

7 ***9.2.12.2 Impacts on BLM-Designated Sensitive Species***

8

9 Impacts on the 15 BLM-designated sensitive species that have potentially suitable habitat
10 within the SEZ (i.e., the area of direct effect) are discussed below.
11
12

13 **Chaparral Sand-Verbena**

14

15 The chaparral sand-verbena historically occurred on and in the vicinity of the SEZ, but
16 it is currently known to occur only as near as Riverside County, California, outside of the area
17 of indirect effects. According to the CAREGAP land cover model, approximately 209 acres
18 (1 km²) of potentially suitable desert sand dune habitat within the SEZ may be directly affected
19 by project construction and operations (Table 9.2.12.1-1). This direct impact area represents
20 0.3% of available suitable habitat in the SEZ region. About 695 acres (3 km²) of potentially
21 suitable habitat occurs within the area of indirect effects; this area represents about 1.1% of the
22 available suitable habitat in the SEZ region (Table 9.2.12.1-1).
23

24 The overall impact on the chaparral sand-verbena from construction, operation, and
25 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
26 considered small, because the amount of potentially suitable habitat for this species in the area
27 of direct effects represents less than 1% of potentially suitable habitat in SEZ region. The
28 implementation of programmatic design features would reduce indirect impacts to negligible
29 levels.
30

31 Chaparral sand-verbena habitat (desert sand dunes) occurs in a limited portion of the SEZ
32 and could be avoided during the development of facilities and protected from indirect effects.
33 Avoiding or minimizing disturbance to occupied habitats and dunes and sand transport systems
34 would further reduce impacts on this species. If avoidance or minimization is not feasible, plants
35 could be translocated from the area of direct effects to protected areas that would not be affected
36 directly or indirectly by future development. Alternatively, or in combination with translocation,
37 a compensatory mitigation plan could be developed and implemented to mitigate direct effects
38 on occupied habitats. Compensation could involve the protection and enhancement of existing
39 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
40 mitigation strategy that used one or more of these options could be designed to completely offset
41 the impacts of development. The need for mitigation, other than programmatic design features,
42 should be determined by conducting pre-disturbance surveys for the species and its habitat on
43 the SEZ.
44
45
46

1 **Harwood’s Eriastrum**

2
3 The Harwood’s eriastrum is known to occur on and in the vicinity of the Iron Mountain
4 SEZ. According to the CAREGAP land cover model, approximately 209 acres (1 km²) of
5 suitable desert sand dune habitat on the SEZ could be directly affected by construction and
6 operations (Table 9.2.12.1-1). This direct impact area represents about 0.3% of available suitable
7 habitat in the SEZ region. About 695 acres (3 km²) of suitable habitat occurs in the area of
8 potential indirect effects; this area represents about 1.1% of the available suitable habitat in the
9 SEZ region (Table 9.2.12.1-1).

10
11 The overall impact on the Harwood’s eriastrum from construction, operation, and
12 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
13 considered small, because the amount of potentially suitable habitat for this species in the
14 area of direct effects represents <1% of potentially suitable habitat in the SEZ region. The
15 implementation of programmatic design features is expected to reduce indirect impacts to
16 negligible levels.

17
18 Harwood’s eriastrum habitat (desert sand dunes) occupies a limited portion of the SEZ
19 and could be avoided during solar development and protected from indirect effects. Avoiding
20 or minimizing disturbance to occupied habitats and dunes and sand transport systems, and the
21 mitigation measures described previously for the chaparral sand-verbena, could further reduce
22 impacts on this species.

23
24
25 **Howe’s Hedgehog Cactus**

26
27 The Howe’s hedgehog cactus is not known to occur in the affected area of the Iron
28 Mountain SEZ; however, according to the CAREGAP land cover model, approximately 60,091
29 acres (243 km²) of potentially suitable desert scrub habitat on the SEZ could be directly affected
30 by construction and operations (Table 9.2.12.1-1). This direct impact area represents 2.4% of
31 available suitable habitat in the SEZ region. About 157,331 acres (637 km²) of potentially
32 suitable habitat occurs in the area of potential indirect effects; this area represents about 6.2% of
33 the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

34
35 The overall impact on the Howe’s hedgehog cactus from construction, operation, and
36 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
37 considered moderate, because the amount of potentially suitable habitat for this species in the
38 area of direct effects represents more than 1% but less than 10% of potentially suitable habitat
39 in the SEZ region. The implementation of programmatic design features is expected to reduce
40 indirect impacts to negligible levels.

41
42 The avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts
43 on the Howe’s hedgehog cactus, because these habitats (mostly desert scrub) are widespread
44 throughout the area of direct effects. However, the implementation of mitigation options
45 described previously for the chaparral sand-verbena could reduce impacts on this species.

1 **Munz’s Cholla**

2
3 The Munz’s cholla is not known to occur in the affected area of the Iron Mountain SEZ.
4 According to the CAREGAP land cover model, however, approximately 82,271 acres (333 km²)
5 of potentially suitable desert scrub and wash habitats on the SEZ could be directly affected by
6 construction and operations (Table 9.2.12.1-1). This direct impact area represents about 1.9%
7 of available suitable habitat in the SEZ region. About 244,144 acres (988 km²) of potentially
8 suitable habitat occurs in the area of potential indirect effects; this area represents about 5.5%
9 of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

10
11 The overall impact on the Munz’s cholla from construction, operation, and
12 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
13 considered moderate, because the amount of potentially suitable habitat for this species in the
14 area of direct effects represents more than 1% but less than 10% of potentially suitable habitat
15 in the SEZ region. The implementation of programmatic design features is expected to reduce
16 indirect impacts to negligible levels.

17
18 Avoidance of all potentially suitable habitats to mitigate impacts on the Munz’s cholla is
19 not feasible, because these habitats (mostly desert scrub) are widespread throughout the area of
20 direct effects. However, the implementation of mitigation options described previously for the
21 chaparral sand-verbena could reduce impacts on this species.

22
23
24 **Orocopia Sage**

25
26 The Orocopia sage is not known to occur in the affected area of the Iron Mountain SEZ.
27 According to the CAREGAP land cover model, however, approximately 72,042 acres (333 km²)
28 of potentially suitable desert scrub and wash habitats on the SEZ could be directly affected by
29 construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.5%
30 of available suitable habitat in the SEZ region. About 168,222 acres (680 km²) of potentially
31 suitable habitat occurs in the area of potential indirect effects; this area represents about 5.9%
32 of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

33
34 The overall impact on the Orocopia sage from construction, operation, and
35 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
36 considered moderate, because the amount of potentially suitable habitat for this species in the
37 area of direct effects represents more than 1% but less than 10% of potentially suitable habitat
38 in the SEZ region. The implementation of programmatic design features is expected to reduce
39 indirect impacts to negligible levels.

40
41 Avoidance of all potentially suitable habitats to mitigate impacts on the Orocopia sage
42 is not feasible, because potentially suitable desert scrub habitats are widespread throughout
43 the area of direct effects. However, the implementation of mitigation options described
44 previously for the chaparral sand-verbena could reduce impacts on this species.

1 **White-Margined Beardtongue**

2
3 The white-margined beardtongue is not known to occur in the affected area of the Iron
4 Mountain SEZ. According to the CAREGAP land cover model, however, approximately
5 60,300 acres (244 km²) of potentially suitable desert scrub and dune habitats on the SEZ could
6 be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area
7 represents about 2.3% of available suitable habitat in the SEZ region. About 158,026 acres
8 (640 km²) of potentially suitable habitat occurs in the area of potential indirect effects; this area
9 represents about 6.1% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

10
11 The overall impact on the white-margined beardtongue from construction, operation,
12 and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
13 considered moderate, because the amount of potentially suitable habitat for this species in the
14 area of direct effects represents more than 1% but less than 10% of potentially suitable habitat
15 in the SEZ region. The implementation of programmatic design features is expected to reduce
16 indirect impacts to negligible levels.

17
18 Avoidance of all potentially suitable habitats to mitigate impacts on the white-margined
19 beardtongue is not feasible, because potentially suitable desert scrub habitats are widespread
20 throughout the area of direct effect. However, the implementation of mitigation options
21 described previously for the chaparral sand-verbena could reduce impacts on this species.

22
23
24 **Mojave Fringe-Toed Lizard**

25
26 The Mojave fringe-toed lizard is known to occur on and in the vicinity of the Iron
27 Mountain SEZ in specialized desert dune habitats within desert scrub communities. According to
28 the CAREGAP habitat suitability model, approximately 42,102 acres (170 km²) of potentially
29 suitable habitat on the SEZ could be directly affected by construction and operations
30 (Table 9.2.12.1-1). This direct impact area represents about 1.3% of available suitable foraging
31 habitat in the SEZ region. About 151,467 acres (613 km²) of potentially suitable foraging habitat
32 occurs in the area of potential indirect effects; this area represents about 4.7% of the available
33 suitable habitat in the SEZ region (Table 9.2.12.1-1).

34
35 The overall impact on the Mojave fringe-toed lizard from construction, operation, and
36 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
37 considered moderate, because the amount of potentially suitable habitat for this species in the
38 area of direct effects represents more than 1% but less than 10% of potentially suitable habitat
39 in the SEZ region. The implementation of programmatic design features is expected to reduce
40 indirect impacts to negligible levels.

41
42 Although the Mojave fringe-toed lizard is dependent upon unique sandy habitats such
43 as dunes, washes, and sand transport systems, these habitats may be localized and widespread
44 throughout the Iron Mountain SEZ. Avoiding or minimizing disturbance to occupied habitats,
45 dune and sand transport systems, and desert wash habitats would reduce impacts on this
46 species. If avoidance or minimization is not feasible, impacts could be reduced by conducting

1 pre-disturbance surveys and avoiding or minimizing impacts on occupied habitats on the SEZ. If
2 avoidance or minimization is not feasible, a compensatory mitigation plan could be developed
3 and implemented to mitigate direct effects on occupied habitats. Compensation could involve the
4 protection and enhancement of existing occupied or suitable habitats to compensate for habitats
5 lost to development. A comprehensive mitigation strategy that uses one or both of these options
6 could be designed to completely offset the impacts of development.
7
8

9 **Bendire's Thrasher**

10
11 The Bendire's thrasher is a summer resident in southern California and is known to occur
12 within the affected area as near as 3 mi (5 km) east of the Iron Mountain SEZ. According to the
13 CAREGAP land cover model, approximately 60,091 acres (243 km²) of potentially suitable
14 desert shrub-scrub and arid woodland habitats on the SEZ could be directly affected by
15 construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.1%
16 of available suitable habitat in the SEZ region. About 157,331 acres (637 km²) of potentially
17 suitable habitat occurs in the area of potential indirect effect; this area represents about 5.4% of
18 the available suitable habitat in the SEZ region (Table 9.2.12.1-1).
19

20 The overall impact on the Bendire's thrasher from construction, operation, and
21 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
22 considered moderate, because the amount of potentially suitable habitat for this species in the
23 area of direct effects represents more than 1% but less than 10% of potentially suitable habitat
24 in the SEZ region. The implementation of programmatic design features is expected to reduce
25 indirect impacts to negligible levels.
26

27 Avoidance of all potentially suitable habitats to mitigate impacts on the Bendire's
28 thrasher is not feasible, because potentially suitable desert scrub habitats are widespread
29 throughout the area of direct effects. Impacts could be reduced by conducting pre-disturbance
30 surveys and avoiding or minimizing disturbance to occupied and potentially suitable habitats
31 on the SEZ, especially nesting habitats. If avoidance or minimization is not a feasible option,
32 a compensatory mitigation plan could be developed and implemented to mitigate direct effects
33 on occupied habitats. Compensation could involve the protection and enhancement of existing
34 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
35 mitigation strategy that uses one or both of these options could be designed to completely offset
36 the impacts of development.
37
38

39 **Ferruginous Hawk**

40
41 The ferruginous hawk is a winter resident in southern California within the Iron
42 Mountain region. According to the CAREGAP land cover model, approximately 60,502 acres
43 (245 km²) of potentially suitable foraging habitat on the SEZ could be directly affected by
44 construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.4%
45 of available suitable habitat in the SEZ region. About 158,193 acres (640 km²) of potentially

1 suitable habitat occurs in the area of potential indirect effect; this area represents about 6.3% of
2 the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

3
4 The overall impact on the ferruginous hawk from construction, operation, and
5 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
6 considered moderate because the amount of this habitat in the area of direct effects represents
7 more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The
8 implementation of programmatic design features is expected to be sufficient to reduce indirect
9 impacts on this species to negligible levels. Avoidance of direct impacts on all potentially
10 suitable foraging habitat is not a feasible way to mitigate impacts on the ferruginous hawk
11 because potentially suitable shrubland habitat is widespread throughout the area of direct effects
12 and readily available in other portions of the affected area.

13 14 15 **Western Burrowing Owl**

16
17 The western burrowing owl is not known to occur in the affected area of the Iron
18 Mountain SEZ. However, according to the CAREGAP habitat suitability model, approximately
19 40,772 acres (165 km²) of potentially suitable desert scrub habitat on the SEZ could be directly
20 affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents
21 about 0.9% of available suitable habitat in the SEZ region. About 251,180 acres (1,016 km²) of
22 potentially suitable habitat occurs in the area of potential indirect effects; this area represents
23 about 5.3% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1). Most of this
24 area could serve as foraging and nesting habitat (shrublands). The abundance of burrows suitable
25 for nesting on the SEZ and in the area of indirect effects has not been determined.

26
27 The overall impact on the western burrowing owl from construction, operation, and
28 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
29 considered small, because the amount of potentially suitable habitat for this species in the area
30 of direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
31 implementation of programmatic design features is expected to be sufficient to reduce indirect
32 impacts on this species to negligible levels.

33
34 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
35 western burrowing owl because potentially suitable shrubland habitats are widespread
36 throughout the area of direct effect and readily available in other portions of the SEZ region.
37 However, impacts on the western burrowing owl could be reduced by avoiding or minimizing
38 disturbance to occupied burrows and habitat in the area of direct effects. If avoidance or
39 minimization of disturbance to all occupied habitat is not a feasible option, a compensatory
40 mitigation plan could be developed and implemented to mitigate direct effects. Compensation
41 could involve the protection and enhancement of existing occupied or suitable habitats to
42 compensate for habitats lost to development. A comprehensive mitigation strategy that used
43 one or both of these options could be designed to completely offset the impacts of development.
44 The need for mitigation, other than programmatic design features, should be determined by
45 conducting pre-disturbance surveys for the species and its habitat within the area of direct
46 effects.

1 **California Leaf-Nosed Bat**
2

3 The California leaf-nosed bat is a year-round resident in southern California within
4 the Iron Mountain SEZ region. According to the CAREGAP land cover model, approximately
5 83,272 acres (337 km²) of potentially suitable habitat on the SEZ could be directly affected by
6 construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.0%
7 of available suitable foraging habitat in the SEZ region. About 242,454 acres (981 km²) of
8 potentially suitable habitat occurs in the area of indirect effects; this area represents about 5.9%
9 of the available suitable foraging habitat in the region (Table 9.2.12.1-1). The potentially suitable
10 habitat on the SEZ is primarily foraging habitat (desert shrubland); however, suitable roosting
11 habitat may occur on the SEZ. On the basis of an evaluation of land cover types, approximately
12 10,000 acres (40 km²) of rocky cliffs and outcrops that may be potentially suitable roosting
13 habitat occurs on the SEZ. An additional 76,000 acres (308 km²) of rocky cliffs and outcrops
14 occurs in the area of direct effects.
15

16 The overall impact on the California leaf-nosed bat from construction, operation, and
17 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
18 considered moderate, because the amount of potentially suitable habitat for this species in the
19 area of direct effects represents more than 1% but less than 10% of potentially suitable foraging
20 habitat in the SEZ region. The implementation of programmatic design features is expected to
21 reduce indirect impacts to negligible levels.
22

23 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
24 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
25 available in other portions of the affected area. However, avoiding or minimizing disturbance
26 of all potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and
27 could reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting
28 habitat is not a feasible option, a compensatory mitigation plan could be developed and
29 implemented to mitigate direct effects. Compensation could involve the protection and
30 enhancement of existing occupied or suitable habitats to compensate for habitats lost to
31 development. A comprehensive mitigation strategy that used one or both of these options could
32 be designed to completely offset the impacts of development. The need for mitigation, other than
33 programmatic design features, should be determined by conducting pre-disturbance surveys for
34 the species and its habitat within the area of direct effects.
35
36

37 **Nelson’s Bighorn Sheep**
38

39 The Nelson’s bighorn sheep is known to occur in the Old Woman Mountains Wilderness
40 and Turtle Mountains Wilderness within the affected area of the SEZ, and the species may utilize
41 habitats within the SEZ as migration corridors between ranges. According to the CAREGAP
42 habitat suitability model, approximately 16,975 acres (69 km²) of potentially suitable habitat on
43 the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct
44 impact area represents about 0.7% of available suitable habitat in the SEZ region. About
45 33,000 acres (134 km²) of potentially suitable habitat occurs in the area of potential indirect

1 effect; this area represents about 1.3% of the available suitable habitat in the SEZ region
2 (Table 9.2.12.1-1).

3
4 The overall impact on the Nelson's bighorn sheep from construction, operation, and
5 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
6 considered small, because the amount of potentially suitable habitat for this species in the area
7 of direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
8 implementation of programmatic design features may be sufficient to reduce indirect impacts
9 on this species to negligible levels.

10
11 Impacts on the Nelson's bighorn sheep could be further reduced by conducting
12 preconstruction surveys and avoiding or minimizing disturbance to all occupied or suitable
13 habitats and important movement corridors on the SEZ. If avoidance or minimization is not a
14 feasible option, a compensatory mitigation plan could be developed and implemented to mitigate
15 direct effects on occupied habitats. Compensation could involve the protection and enhancement
16 of existing occupied or suitable habitats to compensate for habitats lost to development. A
17 comprehensive mitigation strategy that used one or both of these options could be designed to
18 completely offset the impacts of development.

19 20 21 **Pallid Bat**

22
23 The pallid bat is a year-round resident in southern California within the Iron Mountain
24 region. According to the CAREGAP land cover model, approximately 69,782 acres (282 km²) of
25 potentially suitable habitat on the SEZ could be directly affected by construction and operations
26 (Table 9.2.12.1-1). This direct impact area represents about 1.8% of available suitable foraging
27 habitat in the SEZ region. About 230,823 acres (934 km²) of potentially suitable habitat occurs
28 in the area of potential indirect effect; this area represents about 5.8% of the available suitable
29 foraging habitat in the SEZ region (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ
30 is primarily foraging habitat (desert shrubland); however, suitable roosting habitat may occur on
31 the SEZ. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km²)
32 of rocky cliffs and outcrops that may be potentially suitable roosting habitat occurs on the SEZ.
33 An additional 76,000 acres (308 km²) of rocky cliffs and outcrops occurs in the area of direct
34 effects.

35
36 The overall impact on the pallid bat from construction, operation, and decommissioning
37 of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate,
38 because the amount of potentially suitable habitat for this species in the area of direct effects
39 represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The
40 implementation of programmatic design features is expected to reduce indirect impacts to
41 negligible levels.

42
43 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
44 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
45 available in other portions of the affected area. However, avoiding or minimizing disturbance of
46 all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and could reduce

1 impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat
2 is not a feasible option, a compensatory mitigation plan could be developed and implemented to
3 mitigate direct effects. Compensation could involve the protection and enhancement of existing
4 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
5 mitigation strategy that used one or both of these options could be designed to completely offset
6 the impacts of development. The need for mitigation, other than programmatic design features,
7 should be determined by conducting pre-disturbance surveys for the species and its habitat
8 within the area of direct effects.
9

10 **Townsend's Big-Eared Bat**

11
12
13 The Townsend's big-eared bat is a year-round resident in southern California within
14 the Iron Mountain SEZ region. According to the CAREGAP land cover model, approximately
15 106,522 acres (431 km²) of potentially suitable foraging habitat on the SEZ could be directly
16 affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents
17 about 2.1% of available suitable foraging habitat in the SEZ region. About 251,169 acres
18 (1,016 km²) of potentially suitable foraging habitat occurs in the area of potential indirect
19 effects; this area represents about 5.0% of the available suitable foraging habitat in the SEZ
20 region (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging
21 habitat (desert shrubland); however, suitable roosting habitat may occur on the SEZ. On the basis
22 of an evaluation of land cover types, approximately 10,000 acres (40 km²) of rocky cliffs and
23 outcrops that may be potentially suitable roosting habitat occurs on the SEZ. An additional
24 76,000 acres (308 km²) of rocky cliffs and outcrops occurs in the area of direct effects.
25

26 The overall impact on the Townsend's big-eared bat from construction, operation, and
27 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
28 considered moderate, because the amount of potentially suitable habitat for this species in the
29 area of direct effects represents more than 1% but less than 10% of potentially suitable habitat
30 in the SEZ region. The implementation of programmatic design features is expected to reduce
31 indirect impacts to negligible levels.
32

33 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
34 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
35 available in other portions of the affected area. However, avoiding or minimizing disturbance of
36 all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and could reduce
37 impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat
38 is not feasible, a compensatory mitigation plan could be developed and implemented to mitigate
39 direct effects. Compensation could involve the protection and enhancement of existing occupied
40 or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation
41 strategy that uses one or both of these options could be designed to completely offset the impacts
42 of development. The need for mitigation, other than programmatic design features, should be
43 determined by conducting pre-disturbance surveys for the species and its habitat within the area
44 of direct effects.
45
46

1 **Western Mastiff Bat**
2

3 The western mastiff bat is a year-round resident in southern California within the Iron
4 Mountain region. According to the CAREGAP land cover model, approximately 106,522 acres
5 (431 km²) of potentially suitable foraging habitat on the SEZ could be directly affected by
6 construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.3%
7 of available suitable foraging habitat in the SEZ region. About 251,169 acres (1,016 km²) of
8 potentially suitable foraging habitat occurs in the area of potential indirect effects; this area
9 represents about 5.5% of the available suitable foraging habitat in the SEZ region
10 (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging habitat
11 (desert shrubland); however, suitable roosting habitat may occur on the SEZ. On the basis of an
12 evaluation of land cover types, approximately 10,000 acres (40 km²) of rocky cliffs and outcrops
13 that may be potentially suitable roosting habitat occurs on the SEZ. An additional 76,000 acres
14 (308 km²) of rocky cliffs and outcrops occurs in the area of direct effects.
15

16 The overall impact on the western mastiff bat from construction, operation, and
17 decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is
18 considered moderate, because the amount of potentially suitable habitat for this species in the
19 area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in
20 the SEZ region. . The implementation of programmatic design features is expected to reduce
21 indirect impacts to negligible levels.
22

23 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
24 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
25 available in other portions of the affected area. However, avoiding or minimizing disturbance of
26 all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and could reduce
27 impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat
28 is not feasible, a compensatory mitigation plan could be developed and implemented to mitigate
29 direct effects. Compensation could involve the protection and enhancement of existing occupied
30 or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation
31 strategy that uses one or both of these options could be designed to completely offset the impacts
32 of development. The need for mitigation, other than programmatic design features, should be
33 determined by conducting pre-disturbance surveys for the species and its habitat within the area
34 of direct effects.
35
36

37 ***9.2.12.2.3 Impacts on State-Listed Species***
38

39 The desert tortoise is the only species listed by the State of California that may occur in
40 the Iron Mountain SEZ affected area (Table 9.2.12.1-1). This species is listed as threatened under
41 the CESA; it is also listed as threatened under the ESA. Impacts on this species are discussed in
42 Section 9.2.12.2.1.
43

1 **9.2.12.2.4 Impacts on Rare Species**
2

3 There are 42 species with a state status of S1 or S2 in California or species of concern by
4 the State of California or USFWS that may occur in the affected area of the Iron Mountain SEZ.
5 Impacts have been previously discussed for 15 of these species that are also ESA-listed
6 (Section 9.2.12.2.1), BLM-designated sensitive (Section 9.2.12.2.2), or state-listed
7 (Section 9.2.12.2.3). Impacts on the remaining 27 rare species that do not have any other
8 special status designation are presented in Table 9.2.12.1-1.
9

10 **9.2.12.3 SEZ-Specific Design Features and Design Feature Effectiveness**
11

12 The implementation of required programmatic design features described in Appendix A,
13 Section A.2.2, would greatly reduce or eliminate the potential for effects of utility-scale solar
14 energy development on special status species. While some SEZ-specific design features are best
15 established when project details are being considered, some design features can be identified at
16 this time, including the following:
17

- 18
- 19 • Pre-disturbance surveys should be conducted within the SEZ to determine
20 the presence and abundance of all special status species, including those
21 identified in Table 9.2.12.1-1; disturbance to occupied habitats for these
22 species should be avoided or minimized to the extent practicable. If avoiding
23 or minimizing impacts on occupied habitats is not possible, translocation of
24 individuals from areas of direct effect or compensatory mitigation of direct
25 effects on occupied habitats could reduce impacts. A comprehensive
26 mitigation strategy for special status species that uses one or more of these
27 options to offset the impacts of development should be developed in
28 coordination with the appropriate federal and state agencies.
29
 - 30 • All desert riparian, wash, and playa habitats within the SEZ should be avoided
31 to the extent practicable. In particular, development should be avoided within
32 Danby Lake, which covers approximately 25,000 acres (100 km²), and within
33 Homer Wash. Adverse impacts on the following special status species could
34 be reduced with the avoidance of desert riparian, wash, and playa habitats:
35 dwarf germander, Emory’s crucifixion jackass-clover, and Mojave fringe-toed
36 lizard.
37
 - 38 • Avoidance or minimization of disturbance to desert dunes and sand transport
39 systems on the SEZ could reduce impacts on several special status species,
40 including the chaparral sand-verbena, dwarf germander, Harwood’s eriastrum,
41 Harwood’s milkvetch, jackass-clover, small-flowered androstephium,
42 Bradley’s cuckoo wasp, Riverside cuckoo wasp, and Mojave fringe-toed
43 lizard.
44
 - 45 • Avoidance or minimization of disturbance to rocky cliff and outcrop habitats
46 on the SEZ could reduce impacts on several special status species, including

1 the spiny cliff-brake, California leaf-nosed bat (roosting), Nelson’s bighorn
2 sheep, pallid bat (roosting), Townsend’s big-eared bat (roosting), and western
3 mastiff bat (roosting).
4

- 5 • Consultations with the USFWS and the CDFG should be conducted to address
6 the potential for impacts on the desert tortoise a species listed as threatened
7 under the ESA and CESA. Consultation would identify an appropriate survey
8 protocol, avoidance measures, and, if appropriate, reasonable and prudent
9 alternatives, reasonable and prudent measures, and terms and conditions for
10 incidental take statements.
11
- 12 • Harassment or disturbance of special status species and their habitats in the
13 affected area should be mitigated. This can be accomplished by identifying
14 any additional sensitive areas and implementing necessary protection
15 measures based upon consultation with the USFWS and CDFG.
16

17 If these SEZ-specific design features are implemented in addition to required
18 programmatic design features, impacts on special status species would be reduced.
19

1 **9.2.13 Air Quality and Climate**

2
3
4 **9.2.13.1 Affected Environment**

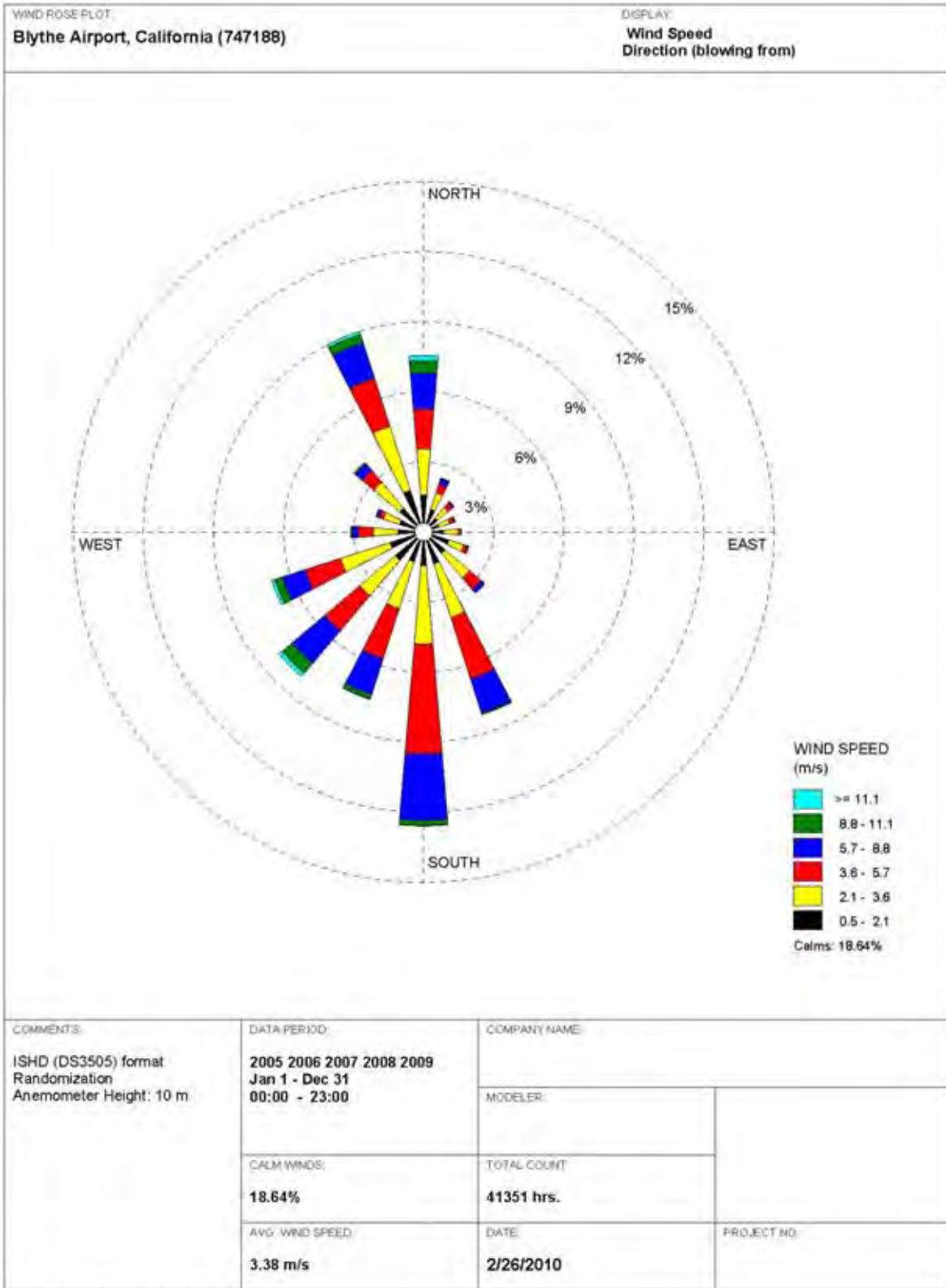
5
6
7 **9.2.13.1.1 Climate**

8
9 The proposed Iron Mountain SEZ is located mostly in the southeastern portion of
10 San Bernardino County with a small, southern portion in Riverside County, in southeastern
11 California. The SEZ has an average elevation of about 850 ft (259 m) and lies in the
12 southernmost portion of the Mojave Desert, which has a low desert climate. As a result, the area
13 surrounding the SEZ experiences an extremely arid climate, which is marked by mild winters
14 and hot summers, large daily temperature swings, scant precipitation, high evaporation rates, low
15 relative humidity, and abundant sunshine. Meteorological data collected at the Blythe Airport
16 and Iron Mountain station, which are about 33 mi (53 km) south-southeast of and about 0.6 mi
17 (1 km) west of the Iron Mountain SEZ, respectively, are summarized below.

18
19 A wind rose from the Blythe Airport in Blythe, California, for the 5-year period 2005 to
20 2009 and taken at a level of 33 ft (10 m) is presented in Figure 9.2.13.1-1. During this period,
21 the annual average wind speed at the airport was about 7.6 mph (3.4 m/s), with a prevailing
22 wind direction from the south (about 12.6% of the time) and secondarily from the north-
23 northwest (about 9.0% of the time), parallel to nearby mountain ranges. Wind directions
24 alternated between north-northwest (March, May, August, and October) and south (the rest of
25 the months) throughout the year. In California, general wind flow is from the west or northwest
26 throughout the year, but prevailing wind direction for a given site is influenced by local terrain
27 (NCDC 2010b). Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s]) occurred
28 frequently (almost one-fifth of the time) because of the stable conditions caused by strong
29 radiative cooling from late night to sunrise. Average wind speeds were relatively uniform with
30 the highest in summer and fall at 7.8 mph (3.5 m/s); lower in winter at 7.4 mph (3.3 m/s); and
31 lowest in spring at 7.2 mph (3.2 m/s).

32
33 For the 1935 to 2009 period, the annual average temperature at Iron Mountain was
34 73.7°F (23.2°C) (WRCC 2010b). January was the coldest month with an average minimum
35 temperature of 42.8°F (6.0°C), and July was the warmest month with an average maximum of
36 108.3°F (42.4°C). On most days in summer, daytime maximum temperatures were in the 100s,
37 and minimums were in the mid-70s or higher. The minimum temperatures recorded were below
38 freezing ($\leq 32^{\circ}\text{F}$ [0°C]) on fewer than two days of each of the colder months (November through
39 February), but subzero temperatures were never recorded. During the same period, the highest
40 temperature, 122°F (50.0°C), was reached in July 1998, and the lowest, 21°F (-6.1°C), was
41 reached in January 1937. In a typical year, about 168 days had a maximum temperature of
42 $\geq 90^{\circ}\text{F}$ (32.2°C), while about 3 days had a minimum temperature at or below freezing.

43
44 Pacific air masses lose most of their moisture on the windward side of mountain ranges
45 parallel to the California coastline. Thus, leeward areas like the Iron Mountain SEZ experience
46 a lack of precipitation. For the 1935 to 2009 period, annual precipitation at Iron Mountain



1

2

3

FIGURE 9.2.13.1-1 Wind Rose at 33-ft (10-m) Height at Blythe Airport, Blythe, California, 2005–2009 (Source: NCDC 2010a)

1 averaged about 3.41 in. (8.7 cm) (WRCC 2010b). There are an average of 19 days annually with
2 measurable precipitation (0.01 in. [0.025 cm] or higher). About 42% of the annual precipitation
3 occurs during winter months, and the remaining precipitation is relatively evenly distributed over
4 the other seasons. Snowfall at Iron Mountain is uncommon and limited to January. The annual
5 average snowfall is about 0.1 in. (0.3 cm), and the highest monthly snowfall recorded was 2.5 in.
6 (6.4 cm) in January 1937.

7
8 Because the area surrounding the proposed Iron Mountain SEZ is far from major water
9 bodies (more than 150 mi [240 km]) and because surrounding mountain ranges block air masses
10 from penetrating into the area, severe weather events, such as hurricanes and tornadoes, are rare.
11

12 Each year some flash flooding is reported as a result of thunderstorms with heavy rains,
13 especially in areas with steep slopes. Since 1993, 281 floods (mostly flash floods) with peaks
14 in July and August were reported in San Bernardino County (NCDC 2010c), which did cause
15 12 deaths, 48 injuries, and considerable property and crop damage in total.
16

17 In San Bernardino County, 51 hailstorms in total have been reported since 1966, which
18 caused minor property damage. Hail measuring 2.0 in. (5.1 cm) in diameter was reported in
19 1999. In San Bernardino County, 129 high-wind events, which peaked in winter months, have
20 been reported since 1996; these caused 8 deaths, 70 injuries, and significant property and crop
21 damage (NCDC 2010c). A high-wind event with a maximum wind speed of 120 mph (53.5 m/s)
22 occurred in 1999. Since 1957, 101 thunderstorms, which peaked in summer months, have been
23 reported; these caused 1 death, 5 injuries, and minor property damage. Many thunderstorms in
24 California are accompanied by little to no precipitation, and lightning strikes sometimes cause
25 forest fires (NCDC 2010b).
26

27 Since 1998, seven dust storms have been reported in San Bernardino County
28 (NCDC 2010c). The ground surface of the SEZ is covered predominantly with gravelly alluvial
29 sands and fine- to medium-grained eolian sands, which have relatively high duststorm potential.
30 High winds can trigger large amounts of blowing dust in areas of San Bernardino County that
31 have dry and loose soils with sparse vegetation. Dust storms can deteriorate air quality and
32 visibility and have adverse effects on health, particularly for people with asthma or other
33 respiratory problems.
34

35 Hurricanes and tropical storms formed off the coast of Central America and Mexico
36 weaken over the cold waters off the California coast. Accordingly, hurricanes rarely hit
37 California. Historically, three tropical storms/depressions have passed within 100 mi (160 km)
38 of the proposed Iron Mountain SEZ (CSC 2010). Tornadoes in San Bernardino County, which
39 encompasses the proposed Iron Mountain SEZ, occur infrequently. In the period 1950 to June
40 2010, a total of 29 tornadoes (0.5 per year) were reported in San Bernardino County (NCDC
41 2010c). However, most tornadoes occurring in San Bernardino County were relatively weak
42 (i.e., seven were unclassified, twenty were F0 or F1, and two were F2 on the Fujita tornado
43 scale). Several of these tornadoes caused three injuries and minor property damage in total. Most
44 tornadoes in San Bernardino County were reported far from the proposed Iron Mountain SEZ.
45
46

1 **9.2.13.1.2 Existing Air Emissions**

2
3 San Bernardino County, which encompasses most of the
4 proposed Iron Mountain SEZ, has many industrial emission
5 sources, which are mainly concentrated over the Valley Region
6 near the City of San Bernardino. No point source emissions are
7 located around the proposed SEZ, except for the Iron Mountain
8 Pumping Station (IMPS). Its annual emissions are relatively
9 minor. Mobile source emissions are substantial because the
10 county is crossed by several interstate highways, including I-
11 10, I-15, I-40, and I-215. Data on annual emissions of criteria
12 pollutants and VOCs in San Bernardino County are presented
13 in Table 9.2.13.1-1 for 2002 (WRAP 2009). Emission data are
14 classified into six source categories: point, area, onroad mobile,
15 nonroad mobile, biogenic, and fire (wildfires, prescribed fires,
16 agricultural fires, structural fires). In 2002, nonroad sources
17 were major contributors to total SO₂ emissions (about 43%)
18 and secondary contributors to total NO_x emissions (about 28%).
19 Point sources were secondary contributors to SO₂ emissions
20 (about 38%), but with contributions comparable to nonroad
21 sources. Onroad sources were major contributors to NO_x and
22 CO emissions (about 31% and 43%, respectively). Biogenic
23 sources (i.e., vegetation— including trees, plants, and crops—
24 and soils) that release naturally occurring emissions accounted
25 for most of VOC emissions (about 91%) and secondarily
26 contributed to CO emissions (about 19%). Area sources
27 accounted for about 70% of PM₁₀ and 47% of PM_{2.5}. Fire
28 sources are secondary contributors to PM_{2.5} emissions
29 (about 27%).

30
31 In 2006, California produced about 483.9 MMt of
32 *gross*⁵ carbon dioxide equivalent (CO_{2e})⁶ emissions (CARB 2010a). GHG emissions in
33 California increased by about 12% from 1990 to 2006, which was three-fourths of the increase in
34 the national rate (about 16%). In 2006, transportation (38.4%) and electricity use (21.9%) were
35 the primary contributors to gross GHG emission sources in California. Fossil fuel use in the
36 residential, commercial, and industrial (RCI) sectors combined accounted for about 29.0%
37 of total state emissions. California’s *net* emissions were about 479.8 MMt CO_{2e}, considering
38 carbon sinks from forestry activities and agricultural soils throughout the state. The U.S. EPA
39 (2009a) also estimated 2005 emissions in California. Its estimate of CO₂ emissions from

TABLE 9.2.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in San Bernardino County, California, Encompassing the Proposed Iron Mountain SEZ, 2002^a

Pollutant ^b	Emissions (tons/yr)
SO ₂	3,774
NO _x	102,722
CO	373,128
VOCs	512,377
PM ₁₀	44,722
PM _{2.5}	17,879

^a Includes point, area, onroad and nonroad mobile, biogenic, and fire emissions.

^b Notation: CO = carbon monoxide; NO_x = nitrogen oxides; PM_{2.5} = particulate matter with a diameter of ≤2.5 μm; PM₁₀ = particulate matter with a diameter of ≤10 μm; SO₂ = sulfur dioxide; and VOCs = volatile organic compounds.

Source: WRAP (2009).

⁵ Excluding GHG emissions removed as a result of forestry and other land uses and excluding GHG emissions associated with exported electricity.

⁶ A measure used to compare the emissions from various GHGs on the basis of their global warming potential, defined as the cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas, CO₂. The CO_{2e} for a gas is derived by multiplying the mass of the gas by the associated global warming potential.

1 fossil fuel combustion was 390.6 MMt, which was comparable to the state’s estimate. The
2 transportation and RCI sectors accounted for about 58.7% and 30.5% of the CO₂ emissions
3 total, respectively, while electric power generation accounted for the remainder (about 10.8%).
4
5

6 **9.2.13.1.3 Air Quality**

7

8 CAAQS address the same six criteria pollutants as the NAAQS (CARB 2010b;
9 EPA 2010a): SO₂, NO₂, CO, O₃, PM; PM₁₀, PM_{2.5}, and Pb. CAAQS are more stringent than
10 the NAAQS for most of criteria pollutants. In addition, California has set standards for some
11 pollutants that are not addressed by the NAAQS: visibility-reducing particles, sulfates, hydrogen
12 sulfide, and vinyl chloride. The NAAQS and CAAQS for criteria pollutants are presented in
13 Table 9.2.13.1-2.
14

15 Most of San Bernardino County is located administratively within the Southeast Desert
16 Intra-state Air Quality Control Region (AQCR) (Title 40, Part 81, Section 167 of the *Code of*
17 *Federal Regulations* [40 CFR 81.167]), along with parts of Kern, Los Angeles, and Riverside
18 Counties, and all of Imperial County. In addition, the Iron Mountain SEZ is located within the
19 Mojave Desert Air Basin, one of 15 geographic air basins designated for the purpose of
20 managing air resources in California, which also includes the desert portions of Kern, Los
21 Angeles, Riverside, and San Bernardino Counties. Currently, the area surrounding the proposed
22 SEZ is designated as being in attainment of NAAQS for all criteria pollutants, except PM₁₀
23 (40 CFR 81.305). However, based on 2006 to 2008 O₃ data, the California Air Resources Board
24 (CARB) recommended designating the area including the Iron Mountain SEZ as a nonattainment
25 area (CARB 2009) under the NAAQS. Further, the area is designated as a nonattainment area for
26 O₃ and PM₁₀ based on the CAAQS (CARB 2010c).
27

28 With a low population density the Mojave Desert area has no significant emission
29 sources of its own, except mobile emissions along interstate highways. Air quality in the Mojave
30 Desert area primarily depends on upwind emissions transported from the South Coast Air Basin
31 including Los Angeles. As a result of upwind emissions controls, air quality of the Mojave
32 Desert area has improved, but concentrations of ozone are still relatively high.
33

34 There are no ambient air-monitoring stations in San Bernardino County near the proposed
35 Iron Mountain SEZ. To characterize ambient air quality around the SEZ, two monitoring stations
36 in San Bernardino County were chosen: Barstow, about 110 mi (177 km) west–northwest, and
37 Victorville, about 120 mi (193 km) west of the SEZ. These monitoring stations are considered as
38 representative of the proposed SEZ. Ambient concentrations of NO₂, CO, O₃, and PM₁₀ are
39 recorded at Barstow, while those of SO₂, NO₂, CO, O₃, PM₁₀ and PM_{2.5} are recorded at
40 Victorville. No Pb measurements are made in the Mojave Desert area, so Pb measurements from
41 the City of San Bernardino are presented to demonstrate that Pb is not a concern in San
42 Bernardino County. The background concentrations of criteria pollutants at these stations for the
43 2004 to 2008 period are presented in Table 9.2.13.1-2 (EPA 2010b). Monitored SO₂, NO₂, CO,
44 and Pb levels at either station were lower than their respective standards. Monitored PM_{2.5} levels
45 were approaching the NAAQS and CAAQS, while PM₁₀ levels were lower than the NAAQS but
46 higher than the CAAQS. Monitored O₃ concentrations exceeded both the NAAQS and CAAQS.

TABLE 9.2.13.1-2 NAAQS, CAAQS, and Background Concentration Levels Representative of the Proposed Iron Mountain SEZ in San Bernardino County, California, 2004–2008

Pollutant ^a	Averaging Time	NAAQS	CAAQS	Background Concentration Level	
				Concentration ^{b,c}	Measurement Location, Year
SO ₂	1-hour	0.075 ppm ^d	0.25 ppm	0.015 ppm (NA; 6.0%)	Victorville, 2006
	3-hour	0.5 ppm	NA ^e	0.009 ppm (1.8%; NA)	Victorville, 2006
	24-hour	0.14 ppm	0.04 ppm	0.005ppm (3.6%; 13%)	Victorville, 2007
	Annual	0.030 ppm	NA	0.002 ppm (6.7%; NA)	Victorville, 2006
NO ₂	1-hour	0.100 ppm ^f	0.18 ppm	0.097 ppm (NA; 54%)	Barstow, 2004
	Annual	0.053 ppm	0.030 ppm	0.023 ppm (43%; 77%)	Barstow, 2004
CO	1-hour	35 ppm	20 ppm	2.6 ppm (7.4%; 13%)	Barstow, 2006
	8-hour	9 ppm	9.0 ppm	1.2 ppm (13%; 13%)	Barstow, 2005
O ₃	1-hour	0.12 ppm ^g	0.09 ppm	0.108 ppm (NA; 120%)	Barstow, 2006
	8-hour	0.075 ppm	0.070 ppm	0.090 ppm (120%; 129%)	Barstow, 2008
PM ₁₀	24-hour	150 µg/m ³	50 µg/m ³	103 µg/m ³ (69%; 206%)	Barstow, 2007
	Annual	NA ^h	20 µg/m ³	30 µg/m ³ (NA; 150%)	Barstow, 2007
PM _{2.5}	24-hour	35 µg/m ³	NA	33 µg/m ³ (94%; NA)	Victorville, 2004
	Annual	15.0 µg/m ³	12 µg/m ³	10.8 µg/m ³ (72%; 90%)	Victorville, 2004
Pb	30-day	NA	1.5 µg/m ³	NA	NA
	Calendar quarter	1.5 µg/m ³	NA	0.02 µg/m ³ (1.3%; NA)	San Bernardino, 2007
	Rolling 3-month	0.15 µg/m ³ ⁱ	NA	NA	NA

^a Notation: CO = carbon monoxide; NO₂ = nitrogen dioxide; O₃ = ozone; Pb = lead; PM_{2.5} = particulate matter with a diameter of ≤2.5 µm; PM₁₀ = particulate matter with a diameter of ≤10 µm; and SO₂ = sulfur dioxide.

^b Monitored concentrations are the highest for calendar-quarter Pb; second-highest for all averaging times less than or equal to 24-hour averages, except fourth-highest daily maximum for 8-hour O₃ and the 98th percentile for 24-hour PM_{2.5}; and arithmetic mean for annual SO₂, NO₂, PM₁₀, and PM_{2.5}.

^c First and second values in parentheses are background concentration levels as a percentage of NAAQS and CAAQS, respectively. Calculation of 1-hour SO₂, 1-hour NO₂, and rolling 3-month Pb to NAAQS was not made because no measurement data based on new NAAQS are available.

^d Effective August 23, 2010.

^e NA = not applicable or not available.

^f Effective April 12, 2010.

^g The EPA revoked the 1-hour O₃ standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).

^h Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of 50 µg/m³.

ⁱ Effective January 12, 2009.

Sources: CARB (2010b); EPA (2010a,b).

1 The PSD regulations (see 40 CFR 52.21), which are designed to limit the growth of air
2 pollution in clean areas, apply to a major new or modification of an existing major source
3 within an attainment or unclassified area (see Section 4.11.2.3). As a matter of policy, the EPA
4 recommends that the permitting authority notify the Federal Land Managers when a proposed
5 PSD source would locate within 62 mi (100 km) of a sensitive Class I area. There are several
6 Class I areas around the Iron Mountain SEZ, only one of which is situated within 62 mi
7 (100 km). The nearest Class I area is the Joshua Tree NP (40 CFR 81.405), about 10 mi (16 km)
8 west-southwest of the Iron Mountain SEZ. This Class I area is not located downwind
9 of prevailing winds at the Iron Mountain SEZ (Figure 9.2.13.1-1). The next nearest Class I
10 areas beyond 62 mi (100 km) are the San Jacinto and San Geronio WAs, which are located
11 about 85 mi (136 km) west-southwest and 87 mi (140 km) west of the Iron Mountain SEZ,
12 respectively.
13
14

15 **9.2.13.2 Impacts**

16
17 Potential impacts on ambient air quality associated with a solar project would be of
18 most concern during the construction phase. Impacts on ambient air quality from fugitive dust
19 emissions resulting from soil disturbances are anticipated, but they would be of short duration.
20 During the operations phase, only a few sources with generally low-level emissions would exist
21 for any of the four types of solar technologies evaluated. A solar facility would either not burn
22 fossil fuels or burn only small amounts during operation. (For facilities using HTFs, fuel could
23 be used to maintain the temperature of the HTFs for more efficient daily start-up.) Conversely,
24 solar facilities would displace air emissions that would otherwise be released from fossil fuel
25 power plants.
26

27 Air quality impacts shared by all solar technologies are discussed in detail in
28 Section 5.11.1, and technology-specific impacts are discussed in Section 5.11.2. Impacts
29 specific to the proposed Iron Mountain SEZ are presented in the following sections. Any such
30 impacts would be minimized through the implementation of required programmatic design
31 features described in Appendix A, Section A.2.2, and the application of any additional
32 mitigation. Section 9.2.13.3, below, identifies SEZ-specific design features of particular
33 relevance to the Iron Mountain SEZ.
34
35

36 **9.2.13.2.1 Construction**

37
38 The Iron Mountain SEZ has a relatively flat terrain; thus only a minimum number of site
39 preparation activities, perhaps with no large-scale earthmoving operations, would be required.
40 However, fugitive dust emissions from soil disturbances during the entire construction phase
41 would be a major concern, because of the large areas that would be disturbed in a region that
42 experiences windblown dust problems. Fugitive dusts, which are released near ground level,
43 typically have more localized impacts than similar emissions from an elevated stack, which has
44 additional plume rise induced by buoyancy and momentum effects.
45
46

1 **Methods and Assumptions**

2
3 Air quality modeling for PM₁₀ and PM_{2.5} emissions associated with construction
4 activities was performed by using the EPA-recommended AERMOD model (EPA 2009b).
5 Details for emissions estimation, the description of AERMOD, input data processing procedures,
6 and modeling assumption are described in Appendix M, Section M.13. Estimated air
7 concentrations were compared with the applicable NAAQS/CAAQS levels at the site boundaries
8 and nearby communities and with PSD increment levels at nearby Class I areas.⁷ For the Iron
9 Mountain SEZ, the modeling was conducted based on the following assumptions and input:

- 10 • Uniformly distributed emissions over the 3,000 acres (12.1 km²) each and
11 9,000 acres (36.4 km²) in total, and in the west-central portion of the SEZ,
12 close to the nearest residences within IMPS and Joshua Tree NP,
13
- 14 • Surface hourly meteorological data from the Blythe Airport and upper air
15 sounding data from Desert Rock/Mercury, Nevada for the 2005 to 2009
16 period,
17
- 18 • A regularly spaced receptor grid over a modeling domain of 62 mi × 62 mi
19 (100 km × 100 km) centered on the proposed SEZ, and
20
- 21 • Additional discrete receptors at the SEZ boundaries and at the nearest Class I
22 area—Joshua Tree NP—about 10 mi (16 km) west–southwest of the SEZ.
23

24 **Results**

25
26 The modeling results for both PM₁₀ and PM_{2.5} concentration increments and total
27 concentrations (modeled plus background concentrations) that would result from construction-
28 related fugitive emissions are summarized in Table 9.2.13.2-1. Maximum 24-hour PM₁₀
29 concentration increments modeled to occur at the site boundaries would be an estimated
30 498 µg/m³, which far exceeds the relevant standard levels of 150 or 50 µg/m³. Total 24-hour
31 PM₁₀ concentrations of 601 µg/m³ would also exceed the standard levels at the SEZ boundary.
32 However, high PM₁₀ concentrations would be limited to the immediate area surrounding the
33 SEZ boundary and would decrease quickly with distance. Predicted maximum 24-hour PM₁₀
34 concentration increments would be about 96 µg/m³ at the nearest residences within the IMPS,
35 which is located about 0.5 mi west of the SEZ boundary. Except for these residences, no other
36 residences or population centers are located within considerable distances of the SEZ. Predicted
37 maximum 24-hour PM₁₀ concentration increments would be about 10 µg/m³ at Vidal and Lake
38
39

⁷ To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS/CAAQS levels and the PSD Class I increment levels. Although the Clean Air Act exempts construction activities from PSD requirements, a comparison with the Class I increment levels was used to quantify potential impacts. Only monitored data can be used to determine the attainment status. Modeled data are used to assess potential problems and as a consideration in the permitting process.

TABLE 9.2.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Iron Mountain SEZ

Pollutant ^a	Averaging Time	Rank ^b	Concentration (µg/m ³)			Percentage of NAAQS/CAAQS ^e		
			Maximum Increment ^b	Background ^c	Total	NAAQS/CAAQS ^d	Increment	Total
PM ₁₀	24-hour	H6H	498	103	601	150/50	332/997	401/1,203
	Annual	NA ^f	86.5	30	116	NA/20	NA/432	NA/582
PM _{2.5}	24-hour	H8H	32.9	33	65.9	35/NA	94/NA	188/NA
	Annual	NA	8.6	10.8	19.4	15.0/12	58/72	130/162

- ^a PM_{2.5} = particulate matter with a diameter of ≤2.5 µm; PM₁₀ = particulate matter with a diameter of ≤10 µm.
- ^b Concentrations for attainment demonstration are presented. H6H = highest of the sixth-highest concentrations at each receptor over the 5-year period. H8H = highest of the multiyear average of the eighth-highest concentrations at each receptor over the five-year period. For the annual average, multiyear averages of annual means over the five-year period are presented. Maximum concentrations are predicted to occur at the site boundaries.
- ^c See Table 9.2.13.1-2.
- ^d First and second values are NAAQS and CAAQS, respectively.
- ^e First and second values are concentration levels as a percentage of NAAQS and CAAQS, respectively.
- ^f NA = not applicable.

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Tamarisk, which are about 20 mi (32 km) east and 29 mi (47 km) southwest of the SEZ, respectively. Annual average modeled increment and total (increment plus background) PM₁₀ concentration increments at the SEZ boundary would be about 86.5 µg/m³ and 116 µg/m³, respectively, which are much higher than the CAAQS level of 20 µg/m³. Annual PM₁₀ increments would be much lower, about 8 µg/m³, at the nearest residences, and less than 0.2 µg/m³ at Vidal and Lake Tamarisk. Total 24-hour PM_{2.5} concentrations would be 66 µg/m³ at the SEZ boundary, which is much higher than the NAAQS level of 35 µg/m³; modeled increment and background concentrations make comparable contributions to this total. The total annual average PM_{2.5} concentration at the SEZ boundary would be 19.4 µg/m³, which is above the NAAQS and CAAQS levels of 15.0 and 12 µg/m³, respectively. At the nearest residences, predicted maximum 24-hour and annual PM_{2.5} concentration increments would be about 5.4 and 0.8 µg/m³, respectively.

Predicted 24-hour and annual PM₁₀ concentration increments at the nearest Class I Area—Joshua Tree NP—would be about 28.3 and 0.6 µg/m³, or 354% and 15% of the PSD increments for Class I Areas, respectively.

In conclusion, predicted 24-hour and annual PM₁₀ and PM_{2.5} concentration levels could exceed the standard levels at the SEZ boundaries and immediate surrounding areas during the construction of solar facilities. To reduce potential impacts on ambient air quality and in

1 compliance with programmatic design features, aggressive dust control measures would be used.
2 Potential air quality impacts on the nearest residences within the IMPS and other nearby
3 residences would be much lower. Modeling indicates that construction activities could result in
4 concentrations above 24-hour, but below annual, Class I PSD PM₁₀ increments at the nearest
5 federal Class I area (Joshua Tree NP). While construction activities are not subject to the PSD
6 program and the comparison provides only a screen to gauge the size of the impact, the assumed
7 scenario—in which three construction projects would occur simultaneously near the western
8 boundary near the IMPS residences—is quite conservative. If locations of construction were
9 spread across the SEZ or the projects occurred at different times, potential impacts would be
10 anticipated to be much lower than the aforementioned values. Accordingly, it is anticipated that
11 impacts of construction activities on ambient air quality would be moderate and temporary.

12
13 Construction emissions from the engine exhaust from heavy equipment and vehicles
14 could cause impacts on AQRVs (e.g., visibility and acid deposition) at the nearby federal Class I
15 area, Joshua Tree NP, which is not located downwind of prevailing winds but is in close
16 proximity to the SEZ (about 10 mi [16 km]). SO_x emissions from engine exhaust would be very
17 low, because programmatic design features would require that ultra-low-sulfur fuel with a sulfur
18 content of 15 ppm be used. NO_x emissions from engine exhaust would be primary contributors
19 to potential impacts on AQRVs. Construction-related emissions are temporary in nature and thus
20 would cause some unavoidable but short-term impacts.

21
22 It is assumed that the existing 230-kV transmission line within the SEZ might be used
23 to connect new solar facilities to the regional grid and that additional project-specific analysis
24 would be conducted for new transmission construction or line upgrades. However, some
25 construction of transmission lines could occur within the SEZ. Potential impacts on ambient air
26 quality would be a minor component of construction impacts in comparison with solar facility
27 construction and would be temporary in nature.

28 29 30 **9.2.13.2.2 Operations**

31
32 Emission sources associated with the operation of a solar facility would include auxiliary
33 boilers; vehicle (commuter, visitor, support, and delivery) traffic; maintenance (e.g., mirror
34 cleaning and repair and replacement of damaged mirrors); and drift from cooling towers for the
35 parabolic trough or power tower technology if wet cooling were implemented (drift comprises
36 low-level PM emissions).

37
38 The type of emission sources caused by and offset by operation of a solar facility are
39 discussed in Appendix M, Section M.13.4.

40
41 Estimates of potential air emissions displaced by the solar project development at the Iron
42 Mountain SEZ are presented in Table 9.2.13.2-2. Total power generation capacity ranging from
43 9,469 to 17,043 MW is estimated for the Iron Mountain SEZ for various solar technologies
44 (see Section 9.2.2). The estimated amount of emissions avoided for the solar technologies
45 evaluated depends only on the megawatts of conventional fossil fuel-generated power
46 displaced, because a composite emission factor per megawatt-hour of power by conventional

TABLE 9.2.13.2-2 Annual Emissions from Combustion-Related Power Generation Displaced by Full Solar Development of the Proposed Iron Mountain SEZ

Area Size (acres)	Capacity (MW) ^a	Power Generation (GWh/yr) ^b	Emissions Displaced (tons/yr; 10 ³ tons/yr for CO ₂) ^c			
			SO ₂	NO _x	Hg	CO ₂
106,522	9,469–17,043	16,589–29,860	2,121–3,818 (12,530–22,555)	3,484–6,271 (18,467–33,240)	0.03–0.06 (0.15–0.26)	8,242–14,836 (13,090–23,561)
Percentage of total emissions from electric power systems in California ^d			16–28%	16–28%	16–28%	16–28%
Percentage of total emissions from all source categories in California ^e			3.0–5.4%	0.3–0.5%	NA ^f	1.9–3.5%
Percentage of total emissions from electric power systems in the six-state study area ^d			0.85–1.5% (5.0–9.0%)	0.94–1.7% (5.0–9.0%)	1.1–1.9% (5.0–9.0%)	3.1–5.7% (5.0–9.0%)
Percentage of total emissions from all source categories in the six-state study area ^e			0.45–0.81% (2.7–4.8%)	0.13–0.23% (0.68–1.2%)	NA (NA)	1.0–1.8% (1.6–2.8%)

^a It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km²) per MW (for parabolic trough technology) to 9 acres (0.036 km²) per MW (power tower, dish engine, and photovoltaic technologies) would be required.

^b Assumed a capacity factor of 20%.

^c Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 0.26, 0.42, 3.7 × 10⁻⁶, and 994 lb/MWh, respectively, were used for the state of California. Values in parentheses are estimated based on composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 1.51, 2.23, 1.8 × 10⁻⁵, and 1,578 lb/MWh, respectively, averaged over six southwestern states.

^d Emission data for all air pollutants are for 2005.

^e Emission data for SO₂ and NO_x are for 2002, while those for CO₂ are for 2005.

^f NA = not estimated.

Sources: EPA (2009a,c); WRAP (2009).

1
2
3 technologies is assumed (EPA 2009c). If the Iron Mountain SEZ were fully developed, it is
4 expected that emissions avoided would be substantial. Development of solar power in the SEZ
5 would result in avoided air emissions ranging from 16% to 28% of total emissions of SO₂, NO_x,
6 Hg, and CO₂ from electric power systems in the state of California (EPA 2009c). Avoided
7 emissions would be up to 5.7% of total emissions from electric power systems in the six-state
8 study area. When compared with all source categories, power production from the same solar
9 facilities would displace up to 5.4% of SO₂, 0.5% of NO_x, and 3.5% of CO₂ emissions in the
10 state of California (EPA 2009a; WRAP 2009). These emissions would be up to 1.8% of total
11 emissions from all source categories in the six-state study area. Power generation from fossil
12 fuel-fired power plants accounts for only 53% of the total electric power generation in
13 California, most of which is from natural gas combustion. Thus, solar facilities to be built in the

1 Iron Mountain SEZ could considerably reduce fuel combustion-related emissions in California
2 but relatively less so than those built in other states with higher fossil use rates.
3

4 About one-quarter of electricity consumed in California is generated out of state, with
5 about three-quarters of this amount coming from the southwestern states. Thus it is possible that
6 a solar facility in California would replace power from fossil fuel-fired power plants outside of
7 California but within the six-state study area. It is also possible that electric power transfer
8 between the states will increase in the future. To assess the potential region-wide emissions
9 benefit, emissions being displaced were also estimated based on composite emission factors
10 averaged over the six-state study area. For SO₂, NO_x, and Hg, composite emission factors for
11 the six-state study area would be about 5 to 6 times higher than those for California alone. For
12 CO₂, the six-state emission factor is about 60% higher than the California-only emission factor.
13 If the Iron Mountain SEZ were fully developed, emissions avoided would be considerable.
14 Development of solar power in the SEZ would result in avoided air emissions ranging from
15 5.0 to 9.0% of total emissions of SO₂, NO_x, Hg, and CO₂ from electric power systems in the
16 six southwestern states. These emissions would be up to 4.8% of total emissions from all source
17 categories in the six-state study area.
18

19 As discussed in Section 5.11.1.5, the operation of associated transmission lines would
20 generate some air pollutants from activities such as periodic inspections and maintenance.
21 However, these activities would occur infrequently, and the amount of emissions would be small.
22 In addition, transmission lines could produce minute amounts of O₃ and its precursor NO_x
23 associated with corona discharge (i.e., the breakdown of air near high-voltage conductors), which
24 is most noticeable for higher-voltage lines during rain or very humid conditions. Since the Iron
25 Mountain SEZ is located in an arid desert environment, these emissions would be small, and
26 potential impacts on ambient air quality would be negligible, considering the infrequent
27 occurrence and small amount of emissions from corona discharges.
28
29

30 **9.2.13.2.3 Decommissioning/Reclamation**

31
32 As discussed in Section 5.11.1.4, decommissioning/reclamation activities are similar to
33 construction activities but on a more limited scale and of shorter duration. Potential impacts on
34 ambient air quality would be correspondingly less than those from construction activities.
35 Decommissioning activities would last for a short period, and their potential impacts would be
36 moderate and temporary. The same design features adopted during the construction phase would
37 also be implemented during the decommissioning phase (Section 5.11.3).
38
39

40 **9.2.13.3 SEZ-Specific Design Features and Design Feature Effectiveness**

41
42 No SEZ-specific design features are required. Limiting dust generation during
43 construction and operations at the proposed Iron Mountain SEZ (such as increased watering
44 frequency or road paving or treatment) is a required design feature under BLM's Solar Energy
45 Program. These extensive fugitive dust control measures would keep off-site PM levels as low as
46 possible during construction.
47

1 **9.2.14 Visual Resources**

2
3
4 **9.2.14.1 Affected Environment**

5
6 The proposed Iron Mountain SEZ is located within the CDCA in San Bernardino County
7 in southeastern California. The SEZ occupies 106,522 acres (431 km²) within the central portion
8 of Ward Valley and extends approximately 19 mi (31 km) east to west and 14 mi (23 km) north
9 to south. The SEZ lies within the Sonoran Basin and Range ecoregion (EPA 2007), typified by
10 small, rocky mountain ranges with jagged peaks alternating with talus slopes and desert floor.
11 Flat basins form broad flat expanses of barren plains, generally with low scrub vegetation and
12 expansive views. Dark browns and garnets are the dominant mountain hues, although blues and
13 purples prevail as viewing distance increases. In contrast, lighter brown and tan soils dominate
14 the desert floor, sparsely dotted with the grey-green of Sonoran creosotebush and golden bursage
15 scrub vegetation (BLM and CEC 2010a). The SEZ and surrounding mountain ranges are shown
16 in Figure 9.2.14.1-1.

17
18 The SEZ ranges in elevation from 186 ft (57 m), at a low point in Danby Lake, to 510 ft
19 (155 m), at the base of the Turtle Mountains. The Iron Mountain SEZ is located within the
20 USFS's Cadiz-Vidal subsection, which consists of widely separated mountain ranges in desert
21 plains (USFS 1997).

22
23 The SEZ is located within the flat treeless plain of the Ward Valley floor, with the strong
24 horizon line and the forms of surrounding mountain ranges being the dominant visual features.
25 A dry soda lake bed (Danby Lake) is a visually prominent feature in the northwest portion of the
26 SEZ. Danby Lake occupies the lowest portion of the SEZ, and the valley floor slopes gently
27 toward Danby Lake in all directions.

28
29 The SEZ is closely bounded by mountain ranges to the east and west, with somewhat
30 more distant mountains to the south and southwest, but much more open views to the southeast
31 and north. The Turtle Mountains rise abruptly directly east of the SEZ, and the Iron Mountains
32 are directly west of the SEZ. The Granite Mountains are located approximately 5 mi (8 km)
33 southwest of the SEZ, and the Little Maria Mountains approximately 10 mi (16 km) to the south.
34 These ranges include peaks generally between 2,000 and 3,500 ft (600 and 1,100 m) in elevation,
35 but some peaks are higher than 5,000 ft (1,524 m) in the Old Woman Mountains. To the
36 southeast, the broad Rice Valley extends more than 15 mi (24 km) to the Big Maria Mountains.
37 The Old Woman Mountains extend northward from the northwest corner of the SEZ, but directly
38 north and slightly east of north from the SEZ, the Ward Valley floor extends more than 25 mi
39 (40 km).

40
41 Vegetation is generally sparse in much of the SEZ, with widely spaced shrubs in more or
42 less barren gravel flats. Vegetation within the SEZ is predominantly scrubland, with
43 creosotebush, white bursage, and other low shrubs dominating the Ward Valley floor.

44
45 During an August 2009 site visit, the vegetation presented a limited range of greens
46 (mostly the olive green of creosotebushes) and tans (from dried grasses and forbes), with

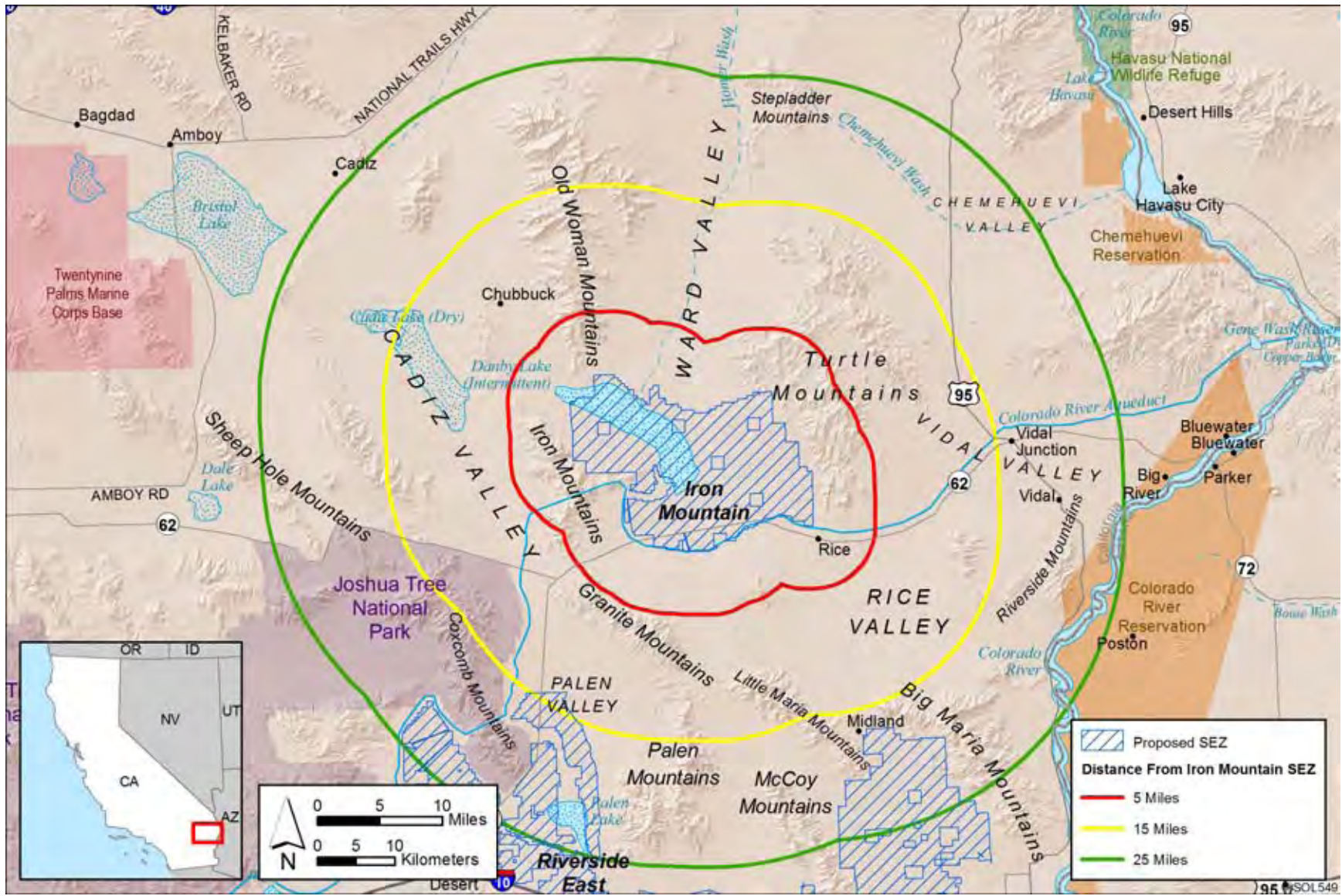


FIGURE 9.2.14.1-1 Proposed Iron Mountain SEZ and Surrounding Lands

1 medium to coarse textures and generally low visual interest. In the south-central portion of the
2 SEZ, soils are somewhat sandy, finely textured, and very light brown; in other portions of the
3 SEZ the gravel flats present a more coarse texture and light gray color.
4

5 There is no permanent surface water within the SEZ; however, Danby Lake in the
6 northwestern portion of the SEZ is subject to periodic flooding. The lake floor is visually
7 conspicuous because of the lack of vegetation and the stark white of the sodium deposits, which
8 contrast in color with the olive green of the creosotebushes and the other colors of the sparse
9 vegetation common to the gravel flats in the surrounding areas.
10

11 Cultural disturbances visible within the SEZ include State Route 62, a two-lane highway
12 that passes through the southern edge of the SEZ. While traffic volume on State Route 62 is
13 light, traffic on the highway would be visible from some locations in the southern portion of the
14 SEZ. A railroad traverses the SEZ from the northwest to the southeast, roughly bisecting the
15 SEZ. The railroad in this area is unused or very rarely used, with a few abandoned tank cars
16 present. Cadiz Road is an unpaved road adjacent to and paralleling the railroad. Views to the
17 northeast from Cadiz Road are partially blocked by the railroad embankment. The abandoned
18 town of Milligan is located in the northwest corner of the SEZ. Trailers used by sodium lease
19 operators working the active sodium lease in the northwest portion of the SEZ are visible
20 approximately 1.3 mi (2.2 km) east of Milligan on Cadiz Road. An existing 230-kV transmission
21 line runs north-south through the western portion of the SEZ. These cultural modifications
22 generally detract from the scenic quality of the SEZ; however, the SEZ is so large that from
23 many locations within the SEZ these features are either not visible or so distant as to have
24 minimal effect on views. From most locations within the SEZ, the landscape is generally natural
25 in appearance, with little disturbance visible.
26

27 The general lack of topographic relief, water, and variety results in low scenic value
28 within the SEZ itself; however, because of the flatness of the landscape, the lack of trees, and
29 the breadth of the Ward Valley, the SEZ presents a vast panoramic landscape with sweeping
30 views of the surrounding mountains that add significantly to the scenic values within the SEZ
31 viewshed. In general, the mountains appear to be devoid of vegetation, and their generally
32 jagged, irregular form and brown/garnet colors provide dramatic visual contrasts to the strong
33 horizontal line, green vegetation, and light-colored soils of the valley floor, particularly when
34 viewed from nearby locations within the SEZ. Panoramic views of the SEZ are shown in
35 Figures 9.2.14.1-2 and 9.2.14.1-3.
36

37 The mountain slopes and peaks around the SEZ are, in general, visually pristine, because
38 they are largely within congressionally designated WAs. The boundary of the Turtle Mountains
39 WA is immediately adjacent to the eastern edge of the SEZ; the Palen-McCoy WA is visible to
40 the south; and Old Woman Mountains WA is adjacent to the northwest corner of the SEZ, and
41 they are separated only by the railroad and an adjacent narrow strip of land. Southeast of the
42 SEZ, the dunes of Rice Valley WA rise 30 to 40 ft (9 to 12 m) above the surface to form a long,
43 narrow band running through the middle of the valley floor. The Iron Mountains immediately
44 west of the SEZ are not within a WA, and a pumping station managed by the MWD and located
45 at the eastern base of the Iron Mountains is visible from nearby portions of the SEZ, as is the

1



2

FIGURE 9.2.14.1-2 Approximately 180° Panoramic View of the Proposed Iron Mountain SEZ, Including Granite Mountains at Far Left (Southwest), Iron Mountains at Center (West), Old Woman Mountains at Right (Northwest), and Cadiz Road in Foreground

3

4

5

6



7

FIGURE 9.2.14.1-3 Approximately 180° Panoramic View of the Proposed Iron Mountain SEZ, Including Turtle Mountains at Left and Center (North and East), Railroad, Cadiz Road, and Arica Mountains at Right (Southeast)

8

9

10

1 service road to the pumping station. In this same general area, remnants of the WWII training
2 camps are visible but detract little from scenic values of the SEZ.

3
4 Views of the valley floor from the mountains are also important in terms of scenic
5 quality, because much of the region's recreation takes place at higher elevations. Some of these
6 peaks are popular with climbers, and hiking trails provide opportunities for solitude. In addition
7 to the four WAs discussed above, important scenic resources within the 25-mi (40-km) viewshed
8 of the SEZ are Joshua Tree NP, Joshua Tree WA, Big Maria Mountains WA, Riverside
9 Mountains WA, Whipple Mountains WA, Stepladder Mountains WA, Cadiz Dunes WA,
10 Sheephole Valley WA, Turtle Mountains Scenic ACEC, and Turtle Mountains NNL.

11
12 The BLM conducted a VRI for the SEZ and surrounding lands in 2010 (BLM 2010d).
13 The VRI evaluates BLM-administered lands based on scenic quality; sensitivity level, in terms of
14 public concern for preservation of scenic values in the evaluated lands; and distance from travel
15 routes or KOPs. Based on these three factors, BLM-administered lands are placed into one of
16 four VRI Classes, which represent the relative value of the visual resources. Class I and II are
17 the most valued; Class III represents a moderate value; and Class IV represents the least value.
18 Class I is reserved for specially designated areas, such as national wildernesses and other
19 congressionally and administratively designated areas, for which decisions have been made to
20 preserve a natural landscape. Class II is the highest rating for lands without special designation.
21 More information about VRI methodology is available in Section 5.12 and in *Visual Resource*
22 *Inventory*, BLM Manual Handbook 8410-1 (BLM 1986a).

23
24 The VRI map for the SEZ and surrounding lands is shown in Figure 9.2.14.1-4. The
25 VRI values for the SEZ and immediate surroundings are VRI Classes IV, III, and II, indicating
26 low, moderate, and high relative visual values, respectively. The majority of the SEZ is rated
27 VRI Class IV or III, with most of the northern portion of the SEZ receiving a Class IV rating,
28 and the southern portion of the SEZ receiving a Class III rating. There are two very small areas
29 of VRI Class II lands in the SEZ. An area of VRI Class II land encompassing about 58 acres
30 (0.23 km²) is located at the far eastern portion of the SEA in the Iron Mountains, and a larger
31 area (393 acres [1.59 km²]) is located in the far northeastern portion of the SEZ, at the base of
32 the Turtle Mountains.

33
34 The inventory indicates low scenic quality for the SEZ and its immediate surroundings,
35 based in part on the lack of topographic relief and water features and on the relative commonness
36 of the landscape type within the region. Positive scenic quality attributes included some variety
37 in vegetation types and color and attractive off-site views; however, these positive attributes
38 were insufficient to raise the scenic quality to the "Moderate" level. The inventory indicates
39 moderate sensitivity for the northern portion of the SEZ and its immediate surroundings, noting
40 relatively low levels of use and public interest, but high sensitivity for the southern portion of the
41 SEZ within the State Route 62 foreground/middleground viewshed because State Route 62
42 receives moderate use, and provides access to Joshua Tree National Park, nearby historical
43 military camps, and wilderness areas.

44
45 Within the Needles and Palm Springs-South Coast FOs, lands within the 25-mi (40-km),
46 650-ft (198-m) viewshed of the SEZ contain 114,638 acres (463.924 km²) of VRI Class I lands,

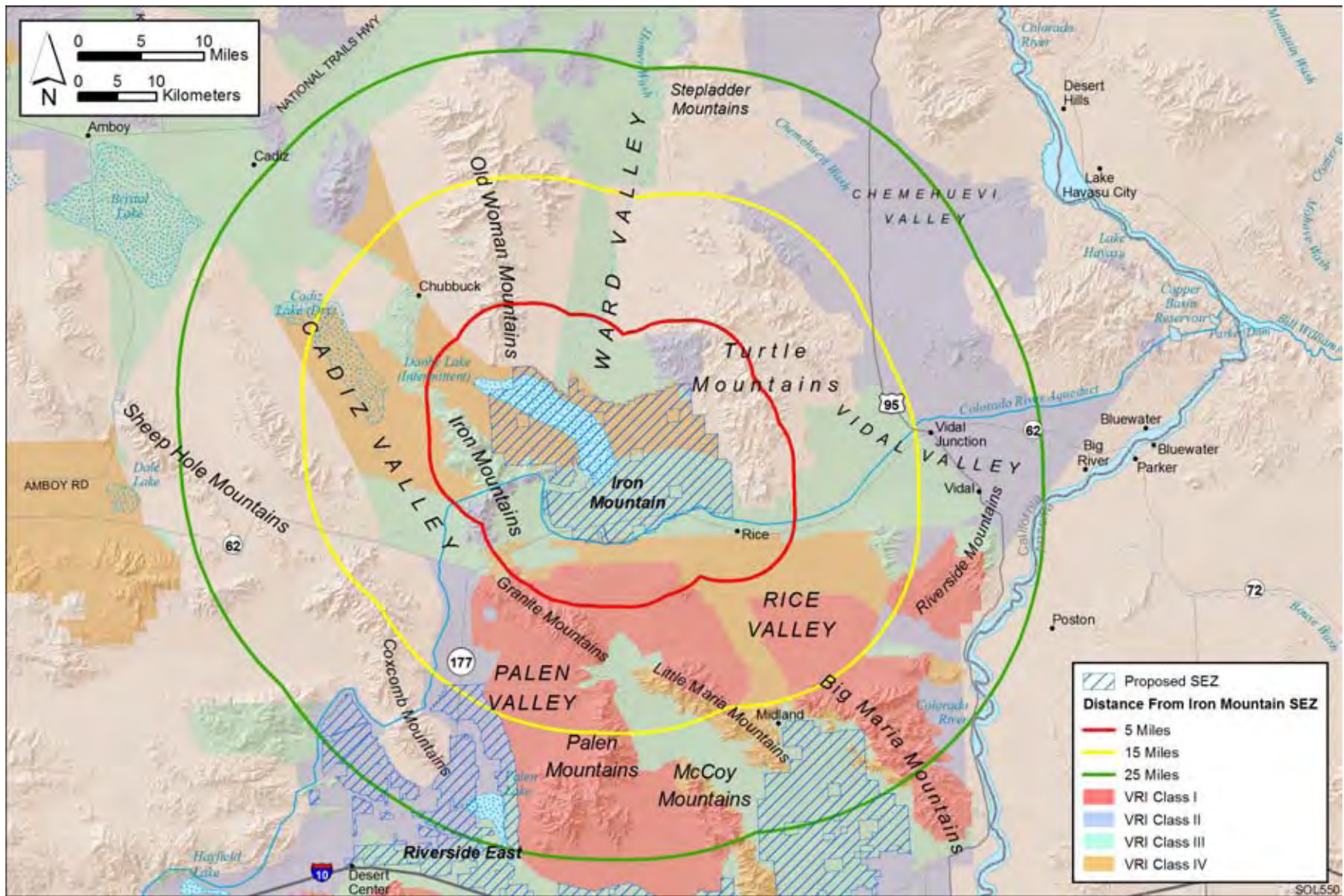


FIGURE 9.2.14.1-4 Visual Resource Inventory Values for the Proposed Iron Mountain SEZ and Surrounding Lands

1 primarily south of the SEZ in the Granite, Palen, and Big Maria Mountains; 38,979 acres
2 (157.74 km²) of VRI Class II lands, primarily northeast of the SEZ in the Turtle Mountains and
3 southwest of the SEZ in the Iron Mountains; 244,875 acres (990.974 km²) of Class III lands,
4 primarily in the Ward, Cadiz, and Vidal Valleys; and 195,350 acres (790.553 km²) of VRI
5 Class IV lands, primarily in the Ward, Cadiz, and Rice Valleys.

6
7 The BLM has not assigned VRM classes to the SEZ and surrounding lands. More
8 information about the BLM VRM program is available in Section 5.12 and in *Visual Resource*
9 *Management*, BLM Manual Handbook 8400 (BLM 1984).

10 11 12 **9.2.14.2 Impacts**

13
14 The potential for impacts from utility-scale solar energy development on visual resources
15 within the proposed Iron Mountain SEZ and surrounding lands, as well as the impacts of related
16 facilities (e.g., access roads and transmission lines) outside of the SEZ, is presented in this
17 section.

18
19 Site-specific impact assessment is needed to systematically and thoroughly assess visual
20 impact levels for a particular project. Without precise information about the location of a project
21 and a relatively complete and accurate description of its major components and their layout, it is
22 not possible to precisely assess the visual impacts associated with the facility. However, if the
23 general nature and location of a facility are known, a more generalized assessment of potential
24 visual impacts can be made by describing the range of expected visual changes and discussing
25 contrasts typically associated with these changes. In addition, a general analysis can identify
26 sensitive resources that may be at risk if a future project is sited in a particular area. Detailed
27 information about the methodology employed for the visual impact assessment used in this PEIS,
28 including assumptions and limitations, is presented in Appendix M.

29
30 *Potential Glint and Glare Impacts.* Similarly, the nature and magnitude of potential glint-
31 and glare-related visual impacts for a given solar facility is highly dependent on viewer position,
32 sun angle, the nature of the reflective surface and its orientation relative to the sun and the
33 viewer, atmospheric conditions, and other variables. The determination of potential impacts
34 from glint and glare from solar facilities within a given proposed SEZ would require precise
35 knowledge of these variables and is not possible given the scope of this PEIS. Therefore, the
36 following analysis does not describe or suggest potential contrast levels arising from glint and
37 glare for facilities that might be developed within the SEZ; however, it should be assumed that
38 glint and glare are possible visual impacts from *any* utility-scale solar facility, regardless of size,
39 landscape setting, or technology type. The occurrence of glint and glare at solar facilities could
40 potentially cause large though temporary increases in brightness and visibility of the facilities.
41 The visual contrast levels projected for sensitive visual resource areas discussed in the following
42 analysis do not account for potential glint and glare effects; however, these effects would be
43 incorporated into a future site- and project-specific assessment that would be conducted for
44 specific proposed utility-scale solar energy projects. For more information about potential
45 glint and glare impacts associated with utility-scale solar energy facilities, see Section 5.12 of
46 this PEIS.

1 **9.2.14.2.1 Impacts on the Proposed Iron Mountain SEZ**
2

3 Some or all of the SEZ could be developed for one or more utility-scale solar energy
4 projects, utilizing one or more of the solar energy technologies described in Appendix F.
5 Because of the industrial nature and large size of utility-scale solar energy facilities, large visual
6 impacts on the SEZ would occur as a result of the construction, operation, and decommissioning
7 of solar energy projects. In addition, large impacts could occur at solar facilities utilizing highly
8 reflective surfaces or major light-emitting facility components (e.g., solar dish, parabolic trough,
9 and power tower technologies), with lesser impacts associated with reflective surfaces expected
10 from PV facilities. These impacts would be expected to involve major modification of the
11 existing character of the landscape and would likely dominate the nearby views. Additional,
12 and potentially large, impacts would occur as a result of the construction, operation, and
13 decommissioning of related facilities, such as access roads and electric transmission lines. While
14 the primary visual impacts associated with solar energy development within the SEZ would
15 occur during daylight hours, lighting required for utility-scale solar energy facilities would be a
16 potential source of visual impacts at night, both within the SEZ and on surrounding lands.
17

18 Common and technology-specific visual impacts from utility-scale solar energy
19 development, as well as impacts associated with electric transmission lines, are discussed in
20 Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and
21 decommissioning, and some impacts could continue after project decommissioning. Visual
22 impacts resulting from solar energy development in the SEZ would be in addition to impacts
23 from solar energy development and other development that may occur on other public or private
24 lands within the SEZ viewshed, and are subject to cumulative effects. For discussion of
25 cumulative impacts, see Section 9.2.22.4.13 of the PEIS.
26

27 The changes described above would be expected to be consistent with BLM VRM
28 objectives for VRM Class IV, as seen from nearby KOPs. More information about impact
29 determination using the BLM VRM program is available in Section 5.12 and in *Visual Resource*
30 *Contrast Rating*, BLM Manual Handbook 8431-1 (BLM 1986b).
31

32 Implementation of the programmatic design features intended to reduce visual impacts
33 (described in Appendix A, Section A.2.2, of this PEIS) would be expected to reduce visual
34 impacts associated with utility-scale solar energy development within the SEZ. However, the
35 degree of effectiveness of these design features could be assessed only at the site- and project-
36 specific assessment level. Because of the large scale, reflective surfaces, and strong regular
37 geometry of utility-scale solar energy facilities and the lack of screening vegetation and
38 landforms within the SEZ viewshed, siting the facilities away from sensitive visual resource
39 areas and other sensitive viewing areas would be the primary means of mitigating visual impacts.
40 The effectiveness of other visual impact mitigation measures would generally be limited, but
41 would be important to reduce visual contrasts to the greatest extent possible.
42
43

44 **9.2.14.2.2 Impacts on Lands Surrounding the Proposed Iron Mountain SEZ**
45

46 Because of the large size of utility-scale solar energy facilities and the generally flat,
47 open nature of the proposed SEZ, lands outside the SEZ would be subjected to visual impacts

1 related to the construction, operation, and decommissioning of utility-scale solar energy
2 facilities. The affected areas and extent of impacts would depend on a number of visibility
3 factors and viewer distance (for a detailed discussion of visibility and related factors, see
4 Section 5. 12). A key component in determining impact levels is the intervisibility between the
5 project and potentially affected lands; if topography, vegetation, or structures screen the project
6 from viewer locations, there is no impact.

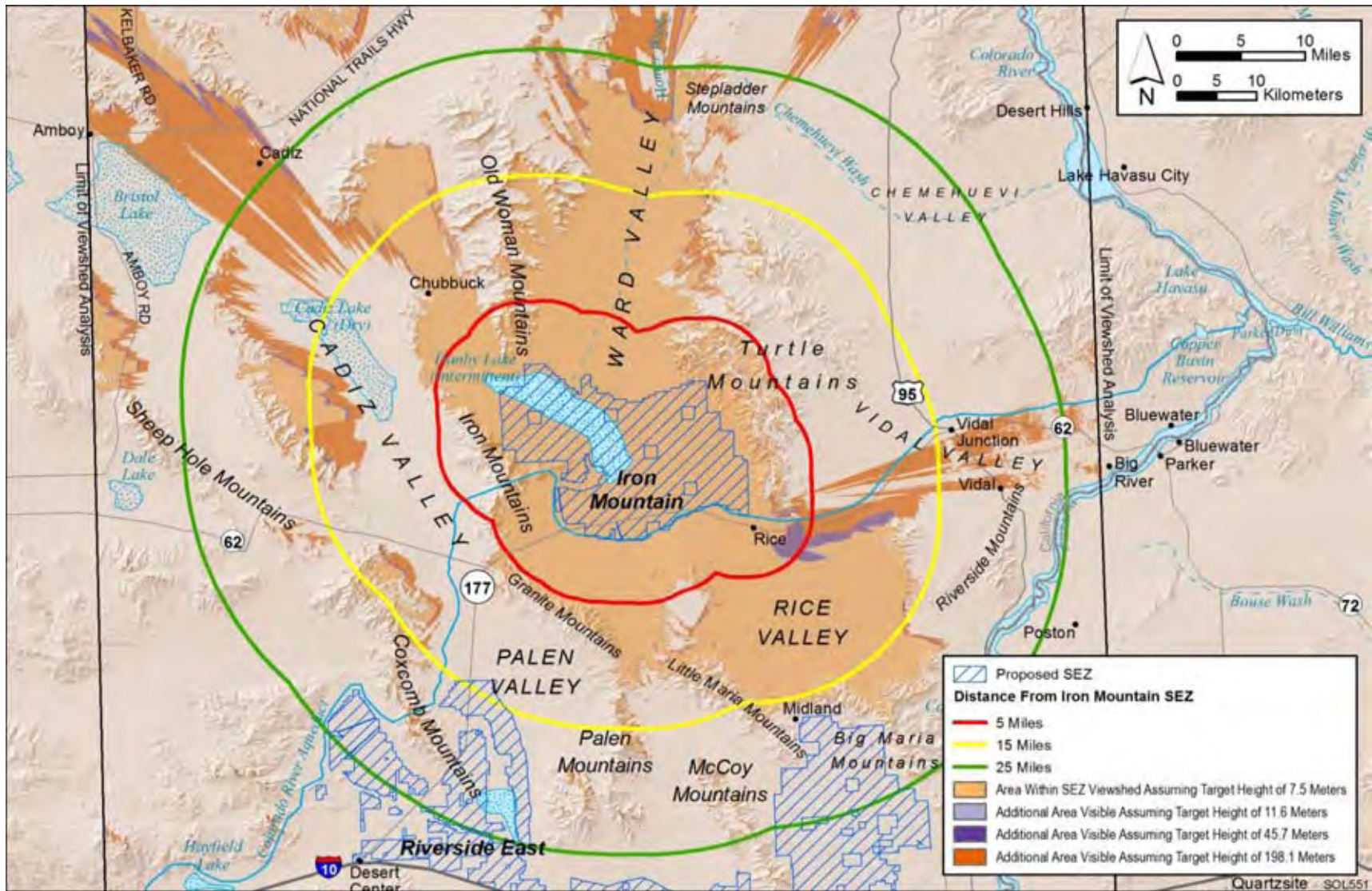
7
8 Preliminary viewshed analyses were conducted to identify which lands surrounding
9 the proposed SEZ could have views of solar facilities in at least some portion of the SEZ
10 (see Appendix N for important information on assumptions and limitations of the methods used).
11 Four viewshed analyses were conducted, assuming four different heights representative of
12 project elements associated with potential solar energy technologies: PV and parabolic trough
13 arrays (24.6 ft [7.5 m]), solar dishes and power blocks for concentrating solar power (CSP)
14 technologies (38 ft [11.6 m]), transmission towers and short solar power towers (150 ft
15 [45.7 m]), and tall solar power towers (650 ft [198.1 m]). Viewshed maps for the SEZ for all
16 four solar technology heights are presented in Appendix N.

17
18 Figure 9.2.14.2-1 shows the combined results of the viewshed analyses for all four solar
19 technologies. The colored segments indicate areas with clear lines of sight to one or more areas
20 within the SEZ and from which solar facilities within these areas of the SEZ would be expected
21 to be visible, assuming the absence of screening vegetation or structures and adequate lighting
22 and other atmospheric conditions. The light brown areas are locations from which PV and
23 parabolic trough arrays located in the SEZ could be visible. Solar dishes and power blocks for
24 CSP technologies would be visible from the areas shaded in light brown and the additional areas
25 shaded in light purple. Transmission towers and short solar power towers would be visible from
26 the areas shaded light brown and light purple and the additional areas shaded in dark purple.
27 Power tower facilities located in the SEZ could be visible from areas shaded light brown, light
28 purple, and dark purple, and at least the upper portions of power tower receivers could be visible
29 from the additional areas shaded in medium brown.

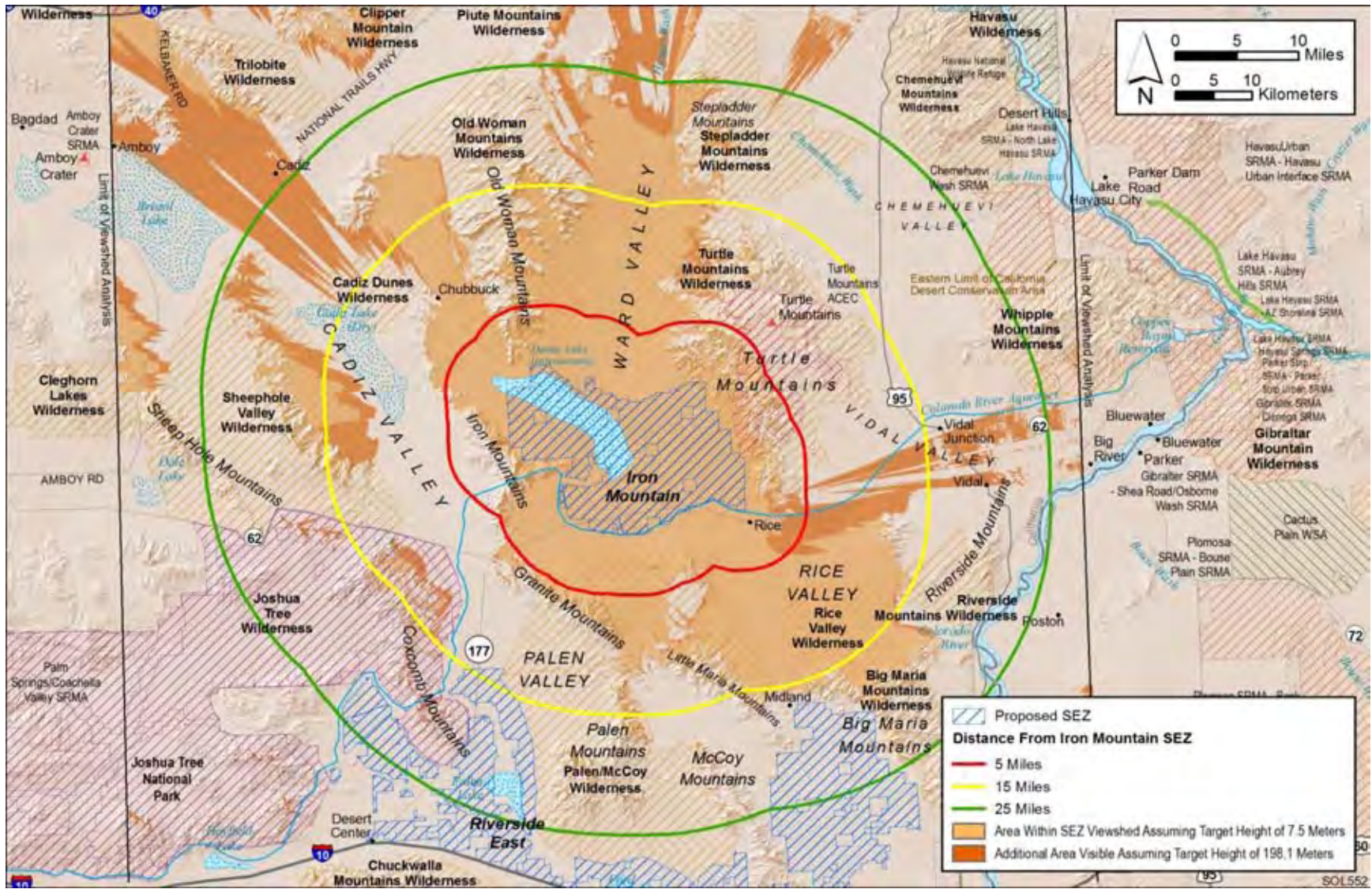
30
31 For the following visual impact discussion, the tall solar power tower (650 ft [198.1 m])
32 and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds are shown in the figures and
33 discussed in the text. These heights represent the maximum and minimum landscape visibility
34 for solar energy technologies analyzed in this PEIS. Viewsheds for solar dish and CSP
35 technology power blocks (38 ft [11.6 m]) and for transmission towers and short solar power
36 towers (150 ft [45.7 m]) are presented in Appendix N. The visibility of these facilities would fall
37 between that for tall power towers and PV and parabolic trough arrays.

40 **Impacts on Selected Federal-, State-, and BLM-Designated Sensitive Visual** 41 **Resource Areas**

42
43 Figure 9.2.14.2-2 shows the results of a GIS analysis that overlays selected federal, state,
44 and BLM-designated sensitive visual resource areas onto the combined tall solar power tower
45 (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds, in order to
46 illustrate which of these sensitive visual resource areas could have views of solar facilities within



1
2 **FIGURE 9.2.14.2-1 Viewshed Analyses for the Proposed Iron Mountain SEZ and Surrounding Lands, Assuming Solar Technology**
3 **Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development**
4 **within the SEZ could be visible)**



1
2 **FIGURE 9.2.14.2-2** Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds
3 for the Proposed Iron Mountain SEZ

1 the SEZ and therefore potentially would be subject to visual impacts from those facilities.
2 Distance zones that correspond with the BLM's VRM system-specified foreground-
3 middleground distance (5 mi [8 km]), background distance (15 mi [24 km]), and a 25-mi
4 (40-km) distance zone are shown as well, in order to indicate the effect of distance from the
5 SEZ on impact levels, which are highly dependent on distance.

6
7 The scenic resources included in the analyses were as follows:

- 8
- 9 • National Parks, National Monuments, National Recreation Areas, National
10 Preserves, National Wildlife Refuges, National Reserves, National
11 Conservation Areas, National Historic Sites;
- 12
- 13 • Congressionally authorized Wilderness Areas;
- 14
- 15 • Wilderness Study Areas;
- 16
- 17 • National Wild and Scenic Rivers;
- 18
- 19 • Congressionally authorized Wild and Scenic Study Rivers;
- 20
- 21 • National Scenic Trails and National Historic Trails;
- 22
- 23 • National Historic Landmarks and National Natural Landmarks;
- 24
- 25 • All-American Roads, National Scenic Byways, State Scenic Highways;
26 and BLM- and USFS-designated scenic highways/byways;
- 27
- 28 • BLM-designated Special Recreation Management Areas; and
- 29
- 30 • ACECs designated because of outstanding scenic qualities.
- 31

32 Potential impacts on specific sensitive resource areas visible from and within 25 mi
33 (40 km) of the proposed Iron Mountain SEZ are discussed below. The results of this analysis are
34 also summarized in Table 9.2.14.2-1. Further discussion of impacts on these areas is presented in
35 Sections 9.2.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and
36 9.2.17 (Cultural Resources) of this PEIS.

37
38 The following visual impact analysis describes *visual contrast levels*, rather than *visual*
39 *impact levels*. *Visual contrasts* are changes in the seen landscape, including changes in the forms,
40 lines, colors, and textures of objects seen in the landscape. A measure of *visual impact* includes
41 potential human reactions to the visual contrasts arising from a development activity, based on
42 viewer characteristics, including attitudes and values, expectations, and other characteristics that
43 are viewer- and situation-specific. Accurate assessment of visual impacts requires knowledge of
44 the potential types and numbers of viewers for a given development and their characteristics and
45 expectations; specific locations where the project might be viewed from; and other variables that
46 were not available or not feasible to incorporate in this PEIS analysis. These variables would be

GOOGLE EARTH™ VISUALIZATIONS

The visual impact analysis discussion in this section utilizes three-dimensional Google Earth™ perspective visualizations of hypothetical solar facilities placed within the SEZ. The visualizations include simplified wireframe models of a hypothetical solar power tower facility. The models were placed at various locations within the SEZ as visual aids for assessing the approximate size and viewing angle of utility-scale solar facilities. The visualizations are intended to show the apparent size, distance, and configuration of the SEZ, as well as the apparent size of a typical utility-scale solar power tower project and its relationship to the surrounding landscape, as viewed from potentially sensitive visual resource areas within the viewshed of the SEZ.

The visualizations are not intended to be realistic simulations of the actual appearance of the landscape or of proposed utility-scale solar energy projects. The placement of models within the SEZ did not reflect any actual planned or proposed projects within the SEZ and did not take into account engineering or other constraints that would affect the siting or choice of facilities for this particular SEZ. The number of facility models placed in the SEZ does not reflect the 80% development scenario analyzed in this PEIS, but the discussion of expected visual contrast levels does account for the 80% development scenario. A solar power tower was chosen for the models because the unique height characteristics of power tower facilities make their visual impact potential extend beyond other solar technology types.

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3 incorporated into a future site- and project-specific assessment that would be conducted for
4 specific proposed utility-scale solar energy projects. For more discussion of visual contrasts and
5 impacts, see Section 5.12 of the PEIS.
6

7 8 *National Parks* 9

- 10 • Joshua Tree—Joshua Tree National Park is located approximately 9.9 mi
11 (15.9 km) southwest of the SEZ at the point of closest approach. The vast park
12 is a popular winter climbing area and contains paved roads popular for scenic
13 driving, several miles of hiking trails, and four-wheel drive roads. There are
14 campgrounds, and backcountry camping and hiking are allowed. Stargazing is
15 popular year round, as is bird watching. Most of the park's services and
16 facilities are in the western portion of the park, as is most recreational use;
17 however, the undeveloped wilderness portions of the park, including those
18 areas near the SEZ, are visited by persons seeking solitude, or wilderness
19 experiences or engaging in other activities appropriate to the relatively
20 undisturbed environment.
21

22 As shown in Figure 9.2.14.2-2, solar energy facilities within the SEZ could be
23 visible from the far northeastern and eastern portions of the park
24 (approximately 14,606 acres [59.108 km²] in the 650-ft [198.1-m] viewshed,
25 or 1.8% of the total park acreage, and 7,551 acres [30.56 km²] in the 24.6-ft
26 [7.5 m] viewshed, or 1.0% of the total park acreage). The area of the national
27 park with potential visibility of solar facilities in the SEZ extends
28 approximately 21 mi (33 km) from the southwestern boundary of the SEZ.
29 This area includes the northeast-facing slopes of the Coxcomb Mountains,

TABLE 9.2.14.2-1 Selected Potentially Affected Sensitive Visual Resources within 25-mi Viewshed of the Proposed Iron Mountain SEZ, Assuming a Target Height of 650 ft (198.1 m)

Feature Type	Feature Name (Total Acreage)	Feature Area or Linear Distance ^a		
		Visible within 5 mi	Visible between	
			5 mi and 15 mi	15 mi and 25 mi
National Park	Joshua Tree (793,331 acres)	0 acres	8,931 acres (1.1%) ^b	5,675 acres (0.7%)
National Conservation Area	California Desert (25,919,319 acres)	308,931 acres (1.2%)	318,258 acres (1.2%)	194,332 acres (0.7%)
WAs	Big Maria Mountains (46,056 acres)	0 acres	0 acres	8,974 acres (19.5%)
	Cadiz Dunes (21,286 acres)	0 acres	79 acres (0.4%)	1,394 acres (6.6%)
	Joshua Tree (586,623 acres)	0 acres	8,898 acres (1.5%)	5,435 acres (0.9%)
	Old Woman Mountains (183,555 acres)	20,092 acres (10.9%)	53,934 acres (29.4%)	14,734 acres (8.0%)
	Palen-McCoy (224,414 acres)	19,297 acres (8.6%)	38,016 acres (16.9%)	14,734 acres (6.6%)
	Rice Valley (43,412 acres)	0 acres	34,944 acres (80.5%)	5,695 acres (13.1%)
	Riverside Mountains (24,206 acres)	0 acres	688 acres (2.8%)	130 acres (0.5%)
	Sheephole Valley (195,002 acres)	0 acres	11,755 acres (6.0%)	25,278 acres (13.0%)
	Stepladder Mountains (84,187 acres)	0 acres	0 acres	12,833 acres (15.2%)
	Turtle Mountains (182,610 acres)	26,358 acres (14.4%)	43,947 acres (24.1%)	2,787 acres (1.5%)
	Whipple Mountains (78,484 acres)	0 acres	0 acres	97 acres (0.1%)

TABLE 9.2.14.2-1 (Cont.)

Feature Type	Feature Name (Total Acreage)	Feature Area or Linear Distance ^a		
		Visible within 5 mi	Visible between	
			5 mi and 15 mi	15 mi and 25 mi
National Natural Landmark	Turtle Mountains (50,057 acres)	9,384 acres (18.7%)	640 acres (1.3%)	0 acres
ACEC designated for outstanding scenic values	Turtle Mountains (50,057 acres)	9,384 acres (18.7%)	640 acres (1.3%)	0 acres

^a To convert acres to km², multiply by 0.004047, to convert mi to km, multiply by 1.609.

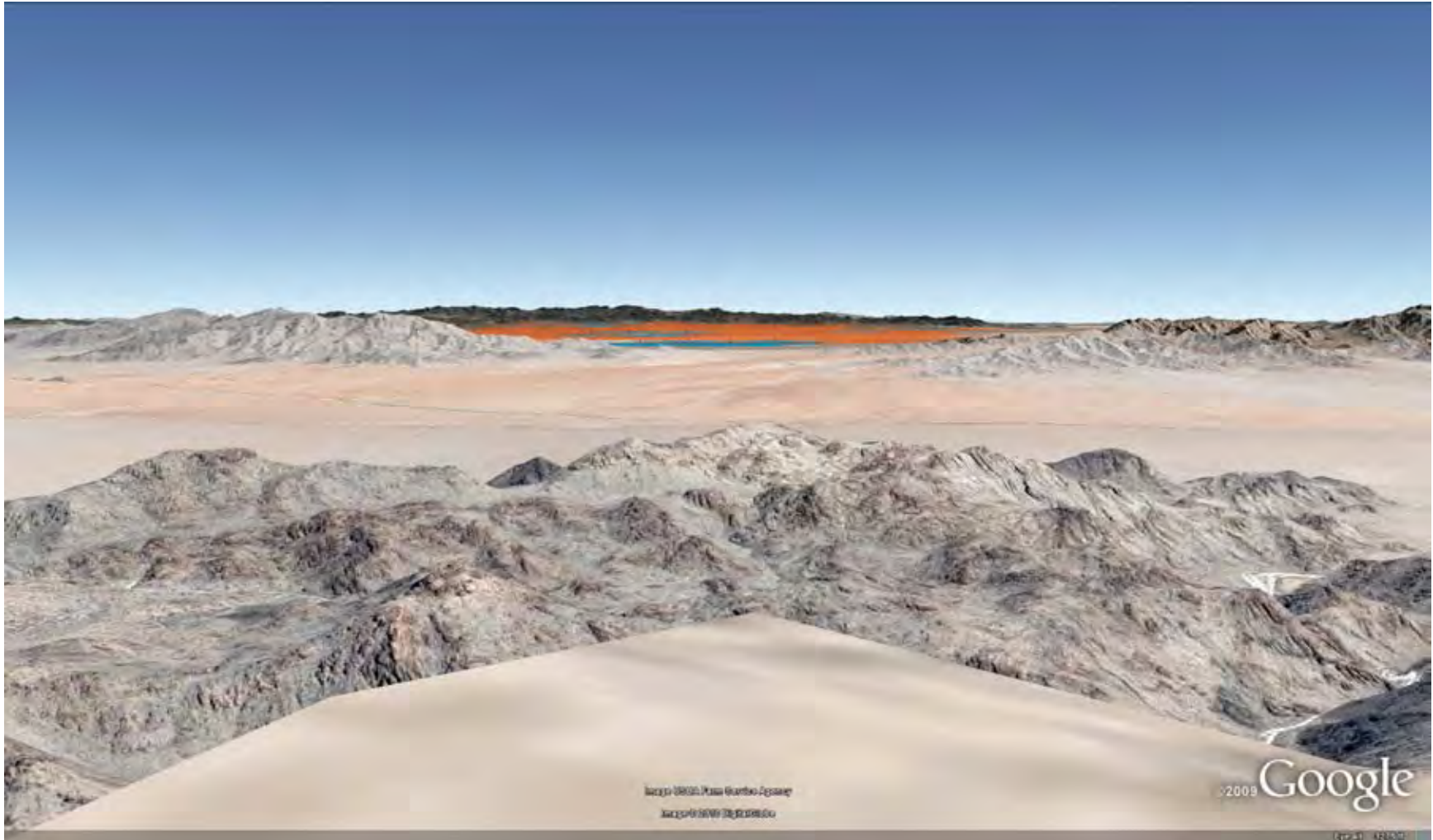
^b Percentage of total feature area for areal features.

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down to approximately 1,150 ft (350 m) in elevation at the lowest points.
Visitation to this part of the park is low.

Figure 9.2.14.2-3 is Google Earth visualization of the SEZ as seen from an unnamed peak in the northeastern portion of the national park, approximately 14 mi (23 km) from the southeast portion of the SEZ. The viewpoint is 3,000 ft (900 m) higher in elevation than the SEZ. The visualization includes simplified wireframe models of a hypothetical solar power tower facility. The models were placed within the SEZ as a visual aid for assessing the approximate size and viewing angle of utility-scale solar facilities. The receiver towers depicted in the visualization are properly scaled models of a 459-ft (139.9-m) power tower with an 867-acre (3.5-km²) field of 12-ft (3.7-m) heliostats, each representing approximately 100 MW of electric generating capacity. Five groups of four models were placed in the SEZ for this and other visualizations shown in this section of this PEIS. In the visualization, the SEZ area is depicted in orange, the heliostat fields in blue.

The upper slopes and peaks of the Coxcomb Mountains are barren, with little opportunity for screening. As shown in the visualization, a substantial portion of the SEZ would be visible from this location through a gap between the Iron Mountains to the west and the Granite Mountains to the east. At the higher elevations within the national park, the angle of view would be great enough that the tops of solar collector/reflector arrays might be visible in some locations. At lower elevations the angle of view would be lower, so that solar collector/reflector arrays would repeat the line of the plain in which the SEZ is located, tending to reduce contrast. If power towers were present within the SEZ, when operating, the receivers would likely appear as distant points of light against the backdrop of the valley floor, or possibly the Turtle Mountains, depending on viewing angle and facility location.



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FIGURE 9.2.14.2-3 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint within Joshua Tree National Park

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1 At night, if sufficiently tall, the power towers could have red or white flashing
2 hazard navigation lights that would likely be visible in the national park and
3 could attract attention, given the dark night skies in the vicinity of the SEZ.
4 Other lighting associated with solar facilities in the SEZ could potentially be
5 visible as well.
6

7 The range of contrasts from solar facilities within the SEZ that would be
8 visible in the national park would be highly dependent on viewer location
9 within the national park, especially with respect to the gap between the Iron
10 Mountains and the Granite Mountains; these mountains restrict the view
11 from many locations within the park. Under the 80% development scenario
12 analyzed in this PEIS, solar facilities within the SEZ would be expected to
13 create weak to moderate visual contrasts as viewed from the national park.
14 The highest levels of visual contrast would be expected for viewing locations
15 at higher elevations in the far northeastern portion of the park, with less
16 visibility and lower contrast levels expected at lower elevations and/or more
17 distant locations.
18

19 This location also has partial views of the much closer proposed Riverside
20 East SEZ. Under the development scenario analyzed in this PEIS, solar energy
21 development in the Riverside SEZ would be expected to result in much larger
22 visual impacts than development within the Iron Mountain SEZ, when viewed
23 from this and nearby locations within the national park, especially for those
24 portions of the park closest to the Riverside East SEZ.
25
26

27 *National Conservation Area*

28

- 29 • *California Desert*—The CDCA is a 26-million-acre (105,000-km²) parcel of
30 land in southern California designated by Congress in 1976 through the
31 Federal Land Policy and Management Act. About 10 million acres
32 (40,000 km²) of the CDCA is administered by the BLM. The proposed Iron
33 Mountain SEZ is located within the CDCA.
34

35 The CDCA management plan notes the “superb variety of scenic values” in
36 the CDCA (BLM 1999) and lists scenic resources as needing management to
37 preserve their value for future generations. The CDCA management plan
38 divides CDCA lands into multiple-use classes based on management
39 objectives. The class designations govern the type and degree of land use
40 actions allowed within the areas defined by class boundaries. All land use
41 actions and resource management activities on public lands within a multiple-
42 use class delineation must meet the guidelines given for that class.
43

44 Most of the proposed SEZ is classified as multiple-use class “M.” This class
45 provides for a wide variety of present and future uses, such as mining,
46 livestock grazing, recreation, energy, and utility development. Class M

1 management is also designed to conserve desert resources and to mitigate
2 damage to those resources caused by permitted uses.

3
4 Two small portions of the SEZ along the eastern SEZ boundary and another
5 very small parcel north of the Milligan town site are classified as multiple-use
6 class “L.” Multiple-Use Class L (Limited Use) protects sensitive, natural,
7 scenic, ecological, and cultural resource values. Public lands designated as
8 Class L are managed to provide for generally lower intensity, carefully
9 controlled multiple use of resources, while ensuring that sensitive values are
10 not significantly diminished.

11
12 A larger area in the far northwestern portion of the SEZ is classified as
13 multiple-use class “I.” Multiple-Use Class I is an “Intensive Use” class. Its
14 purpose is to provide for concentrated use of lands and resources to meet
15 human needs. Reasonable protection will be provided for sensitive natural and
16 cultural values. Mitigation of impacts on resources and rehabilitation of
17 affected areas will occur insofar as possible.

18
19 Utility-scale solar development within the SEZ would be an allowable use
20 under the CDCA management plan for areas classified as multiple-use classes
21 “M” and “I,” assuming mitigation measures would be used to minimize visual
22 impacts. However, construction and operation of solar facilities under the
23 PEIS development scenario would result in substantial visual impacts on the
24 SEZ and some surrounding lands within the SEZ viewshed that could not be
25 completely mitigated.

26
27 Portions of the CDCA within the 650-ft (198.1-m) viewshed for the Iron
28 Mountain SEZ include approximately 821,521 acres [3,324.58 km²], or 3.2%
29 of the total CDCA acreage. Portions of the CDCA within the 24.6-ft (7.5-m)
30 viewshed encompass approximately 708,349 acres (2,866.59 km²), or 2.7% of
31 the total CDCA acreage. Absent screening and other visibility factors that
32 would prevent viewers from seeing solar energy facilities within the SEZ, all
33 CDCA lands within the SEZ viewshed would be subject to visual impacts
34 from solar development within the SEZ. The nature of the visual contrasts
35 observed would vary with the distance from the SEZ, the angle of view,
36 project numbers, sizes and locations, and other project- and site-specific
37 factors.

38 39 40 ***Wilderness Areas***

- 41
- 42 • *Whipple Mountains*—The Whipple Mountains Wilderness is a 78,484-acre
43 (317.61 km²) congressionally designated WA located 22 mi (36 km) at the
44 point of closest approach east–northeast of the SEZ. The east–west oriented
45 Whipple Mountains are the dominant land form within the WA. Hiking,

1 horseback riding, hunting, camping, rock hounding, photography, and
2 backpacking are popular recreational activities for visitors to the WA.

3
4 As shown in Figure 9.2.14.2-2, within 25 mi (40 km) of the SEZ, solar energy
5 facilities within the SEZ could be visible from a very small part of the far
6 western portion of the WA (approximately 97 acres [0.39 km²]) in the 650-ft
7 (198.1-m) viewshed, or 0.1% of the total WA acreage. There would be no
8 visibility for the lower height viewsheds. Within the 25-mi (40-km) radius of
9 analysis, the visible area of the WA extends 25 mi (40 km) from the eastern
10 boundary of the SEZ. Limited visibility extends beyond 25 mi (40 km).

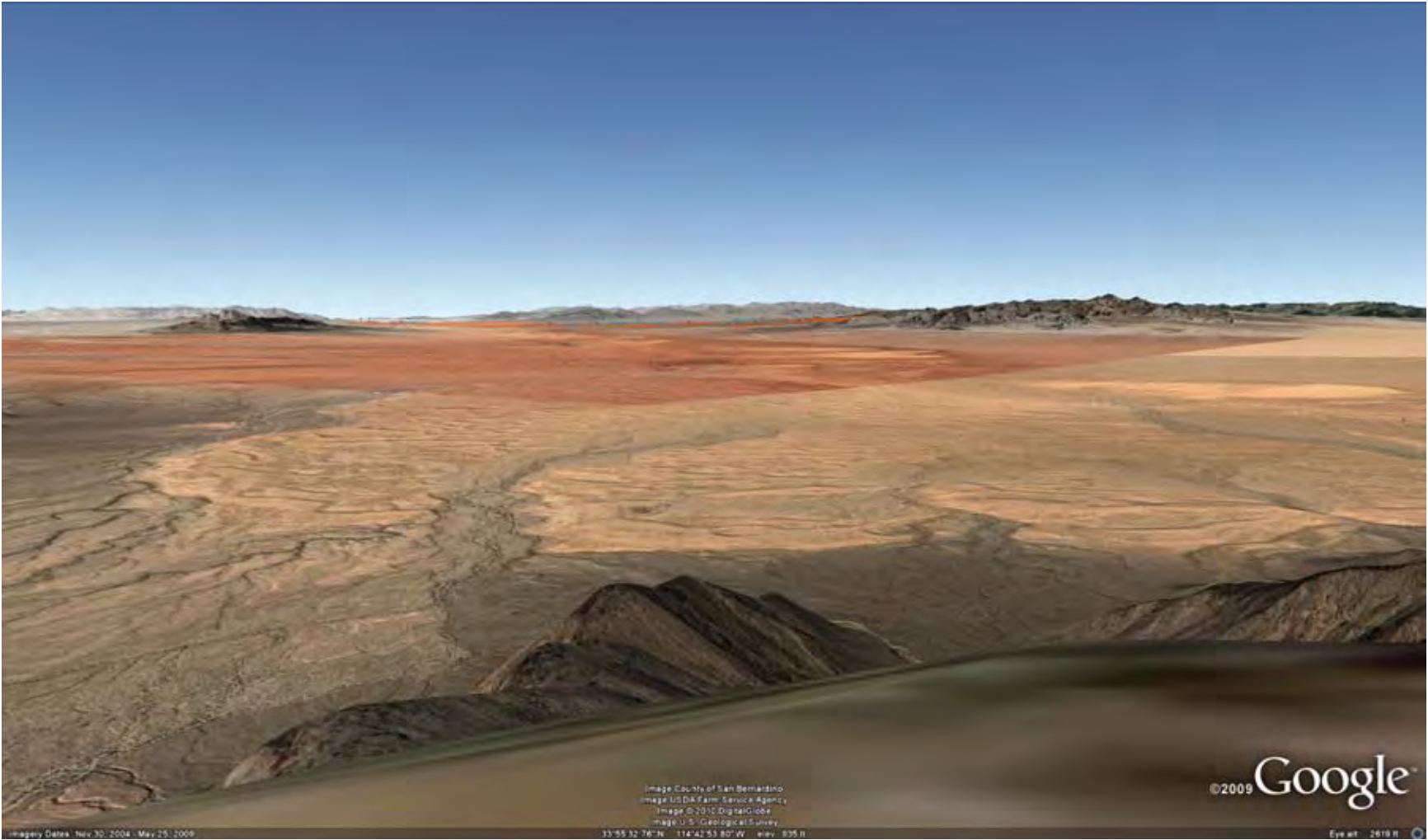
11
12 The viewshed analysis suggests that the upper portions of tall power tower
13 receivers located in the extreme southeastern portion of the SEZ would be just
14 visible through a notch in the far southern portion of the Turtle Mountains;
15 however, because of the long distance to the SEZ and the low angle of view,
16 visual impacts on the WA would be expected to be minimal. If one or more
17 power towers were situated so that they were visible through the gap and the
18 towers were of sufficient height, they could have red or white hazard
19 navigation lighting that could potentially be visible at night.

- 20
21 • *Big Maria Mountains*—The Big Maria Mountains Wilderness is a 46,056-acre
22 (186.38 km²) congressionally designated WA located about 16 mi (25 km) at
23 the point of closest approach southeast of the SEZ. The Big Maria Mountains
24 contain gently sloping bajadas and rough, craggy peaks separated by steep
25 canyons. Camping, hunting, hiking, backpacking, horseback riding, and
26 wildlife viewing are recreational activities in the WA. There are no trails, but
27 abandoned jeep tracks are used for hiking.

28
29 As shown in Figure 9.2.14.2-2, within 25 mi (40 km) of the SEZ, solar energy
30 facilities within the SEZ could be visible from much of the far northern
31 portion of the WA and from scattered locations along the northern portion of
32 the western boundary of the WA. Visible areas of the WA within the 25-mi
33 (40-km) radius of analysis total approximately 8,974 acres (36.32 km²) in the
34 650-ft (198.1-m) viewshed, or 19.5% of the total WA acreage, and 8,501 acres
35 (34.40 km²) in the 24.6-ft (7.5-m) viewshed, or 18.5% of the total WA
36 acreage. The visible area of the WA extends approximately 23.8 mi (38.3 km)
37 from the southeastern corner of the SEZ.

38
39 Figure 9.2.14.2-4 is a Google Earth visualization of the SEZ as seen from an
40 unnamed peak in the northwestern portion of the WA, approximately 18 mi
41 (29 km) from the southeast portion of the SEZ. The viewpoint is about 2,400
42 ft (730 m) higher in elevation than the SEZ. The SEZ area is depicted in
43 orange, the heliostat fields in blue.

44
45 The upper slopes and peaks of the WA are sparsely vegetated, with little
46 opportunity for screening, and a substantial portion of the SEZ would be



1

FIGURE 9.2.14.2-4 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in narrow orange and blue tinted band) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint within the Big Maria Mountains WA

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1 visible from this location. At the higher elevations within the WA, the angle
2 of view would be great enough that the tops of solar collector/reflector arrays
3 might be visible in some cases. However, because of the long distance to the
4 SEZ, the angle of view would still be low enough that the arrays would repeat
5 the line of the plain in which the SEZ is located and this would tend to reduce
6 contrast. If power towers were present within the SEZ, when operating, the
7 receivers would likely appear as distant points of light against the backdrop of
8 the Iron and Old Woman Mountains. At night, if sufficiently tall, the power
9 towers could have red or white flashing hazard navigation lights that would
10 likely be visible in the WA and could attract attention, given the dark night
11 skies in the vicinity of the SEZ.

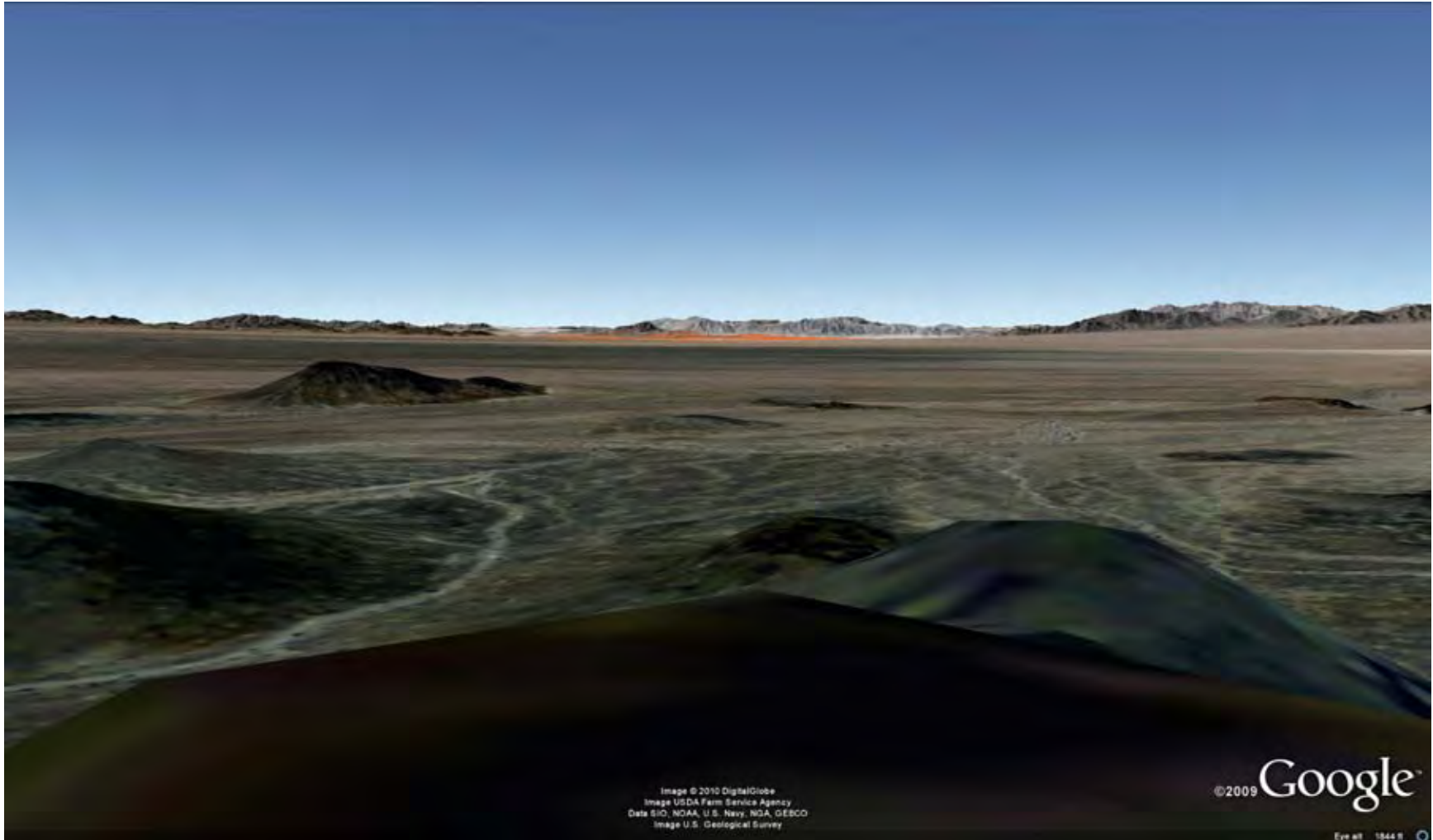
12
13 The range of visual contrasts associated with solar facilities in the SEZ as
14 observed from the WA would be highly dependent on viewer location within
15 the WA and on project location and design. Under the 80% development
16 scenario analyzed in this PEIS, solar facilities within the SEZ would be
17 expected to create minimal to weak visual contrasts as viewed from the WA.
18 The highest levels of visual contrast would be expected for viewing locations
19 at higher elevations in the far northern portion of the WA, with less visibility
20 and lower contrast levels expected at lower elevations.

21
22 This location also has a very open view of the much closer proposed Riverside
23 East SEZ. Under the development scenario analyzed in this PEIS, solar energy
24 development in the Riverside East SEZ would be expected to result in much
25 larger visual impacts than development in the Iron Mountain SEZ, when
26 viewed from this and nearby locations within the WA.

- 27
28 • *Stepladder Mountains*—The Stepladder Mountains Wilderness is an
29 84,187-acre (340.69-km²) congressionally designated WA located about 15mi
30 (24 km) at the point of closest approach north of the SEZ. The Stepladder
31 Mountains are a bleak mountain range about 10 mi (14 km) in length north to
32 south. Several trails cross the wilderness, accessible from along Turtle
33 Mountain Road. Camping, hunting, hiking, backpacking, and wildlife viewing
34 are recreational activities in the WA.

35
36 As shown in Figure 9.2.14.2-2, within the 25-mi (40-km) radius of analysis,
37 solar energy facilities within the SEZ could be visible from the far southern
38 portion of the WA (approximately 12,833 acres [51.933 km²] in the 650-ft
39 [198.1-m] viewshed, or 15.2% of the total WA, and 9,307 acres [37.66 km²]
40 in the 24.6-ft [7.5-m] viewshed, or 11.1% of the total WA acreage). The
41 visible area of the WA extends beyond 25 mi (40 km) from the northern
42 boundary of the SEZ.

43
44 Figure 9.2.14.2-5 is a Google Earth visualization of the SEZ as seen from an
45 unnamed peak in the far southern portion of the WA, approximately 16 mi
46



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FIGURE 9.2.14.2-5 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint within the Stepladder Mountains WA

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1 (26 km) from the northern boundary of the SEZ. The SEZ area is depicted in
2 orange, the heliostat fields in blue.
3

4 The upper slopes and peaks of the WA are sparsely vegetated with little
5 opportunity for screening, and the northwestern portion of the SEZ would be
6 visible from this location. Despite the elevated viewpoint, the long distance to
7 the SEZ would make the angle of view low enough that visible solar
8 collector/reflector arrays within the SEZ would repeat the line of the plain in
9 which the SEZ is located and this would tend to reduce contrast. If power
10 towers were present within the SEZ, when operating, the receivers would
11 likely appear as distant points of light against the backdrop of the Iron and
12 Palen-McCoy Mountains.
13

14 At night, if sufficiently tall, the power towers could have red or white flashing
15 hazard navigation lights that would likely be visible in the WA, and could be
16 attract attention, given the dark night skies in the vicinity of the SEZ.
17

18 The range of impact would be highly dependent on viewer location within the
19 WA and on project location and design. Under the 80% development scenario
20 analyzed in this PEIS, solar facilities within the SEZ would be expected to
21 create minimal to weak visual contrasts as viewed from the WA. The highest
22 levels of visual contrast would be expected for viewing locations at higher
23 elevations in the far southern portion of the WA, with less visibility and lower
24 contrast levels expected at lower elevations.
25

- 26 • *Cadiz Dunes*—The Cadiz Dunes Wilderness is a 21,286-acre (86.141-km²)
27 congressionally designated WA located about 11 mi (17 km) at the point of
28 closest approach northwest of the SEZ. The WA encompasses a major portion
29 of the Cadiz Dune system and desert shrub lowlands just east of the dunes.
30 The pristine nature of the dunes and the spring display of unique dune plants
31 make the area popular for photography. Camping, hiking, backpacking, and
32 wildlife viewing are recreational activities in the WA.
33

34 The upper portions of sufficiently tall power tower receivers in certain
35 locations within the SEZ could be visible through notches in the Kilbeck Hills
36 from scattered locations in the far northwestern portions of the WA
37 (approximately 1,473 acres [5.961 km²] in the 650-ft [198.1-m] viewshed, or
38 6.9% of the total WA acreage). The lower-height viewshed analyses indicate
39 there would be no visibility for solar dishes, parabolic troughs, or PV collector
40 arrays. The visible area of the WA extends approximately 18 mi (29 km) from
41 the northwest corner of the SEZ.
42

43 The portions of the WA with views of the SEZ are lower in elevation than the
44 nearest portions of the SEZ by 100 ft (30 m) or more, so the angle of view is
45 very low. Because of the limited areas of visibility, very low angle of view,

1 and the relatively long distance to the SEZ, visual impacts on the WA would
2 be expected to be minimal.

- 3
- 4 • *Riverside Mountains*—The Riverside Mountains Wilderness is a 24,206-acre
5 (97.958-km²) congressionally designated WA located 13.7 mi (22.1 km) at the
6 point of closest approach southeast of the SEZ. The WA includes the
7 Riverside Mountains and bajadas descending to the Colorado River. Camping,
8 hiking, backpacking, horseback riding, hunting, and wildlife viewing are
9 recreational activities in the WA.

10

11 As shown in Figure 9.2.14.2-2, solar energy facilities within the SEZ could be
12 visible from some locations in the far western portion of the WA, from the
13 peak of Riverside Mountain (about 21 mi [34 km] from the SEZ), and, for the
14 upper portions of power tower receivers only, some locations within the WA
15 farther east and higher than 2,000 ft (610 m) in elevation. Total WA acreage
16 within the viewshed of the SEZ is approximately 818 acres (3.31 km²) in the
17 650-ft (198.1-m) viewshed, or 3.4% of the total WA acreage, and 488 acres
18 (1.97 km²) in the 24.6-ft (7.5-m) viewshed, or 2.0% of the total WA acreage.
19 The visible area of the WA extends approximately 21 mi (34 km) from the
20 southeast boundary of the SEZ; however, the main area of visibility is located
21 approximately 16mi (26 km) from the SEZ.

22

23 The upper slopes and peaks of the WA are sparsely vegetated with little
24 opportunity for screening, and the southeastern portion of the SEZ could be
25 visible from these areas. However, because of the long distance to the SEZ,
26 the angle of view is still low enough that solar arrays would repeat the line of
27 the plain in which the SEZ is located, which would tend to reduce contrast. If
28 power towers were present within the SEZ, when operating, the receivers
29 would likely appear as distant points of light against the backdrop of the Iron
30 Mountains and possibly against a sky backdrop between the Iron Mountains
31 and the Old Woman Mountains. At night, if sufficiently tall, the power towers
32 could have red or white flashing hazard navigation lights that would likely be
33 visible in the WA and could attract attention, given the dark night skies in the
34 vicinity of the SEZ.

35

36 Under the 80% development scenario analyzed in this PEIS, solar facilities
37 within the SEZ would be expected to create minimal to weak visual contrasts
38 as viewed from the WA. The highest levels of visual contrast would be
39 expected for viewing locations at higher elevations in the far western portion
40 of the WA, with less visibility and lower contrast levels expected at lower
41 elevations. From the area around Riverside Mountain, minimal to weak levels
42 of visual contrast would be expected from solar energy facilities within the
43 SEZ.

- 44
- 45 • *Joshua Tree*—The Joshua Tree Wilderness is a 586,623-acre (2,373.98-km²)
46 congressionally designated WA located entirely within Joshua Tree National

1 Park. Areas of the WA within the viewshed of the SEZ are identical to those
2 for Joshua Tree National Park, and expected visual contrast levels are the
3 same as those expected for the park (see above).
4

- 5 • *Sheephole Valley*—The Sheephole Valley Wilderness is a 195,002-acre
6 (789.145-km²) congressionally designated WA located about 11 mi (18 km) at
7 the point of closest approach west of the SEZ. The WA includes the
8 Sheephole Mountains, the Calumet Mountains, and the Sheephole Valley. The
9 Sheepholes are a steep, boulder-strewn mountain range; the Calumets are
10 similar but much lower. Camping, hiking, backpacking, hunting, and wildlife
11 viewing are recreational activities in the WA.
12

13 As shown in Figure 9.2.14.2-2, within 25 mi (40 km) of the SEZ, solar energy
14 facilities within the SEZ could be visible from the eastern portion of the WA
15 (approximately 25,278 acres [102.30 km²] in the 1650-ft [98.1-m] viewshed,
16 or 13.1% of the total WA acreage, and 17,889 acres [72.394 km²] in the 7.5 mi
17 viewshed, or 9.2% of the total WA acreage). The visible area of the WA
18 extends approximately 25 mi (40 km) from the northwestern boundary of the
19 SEZ. Visible areas include the east-facing slopes of the Calumet Mountains,
20 down to approximately 820 ft (250 m) in elevation at the lowest point on the
21 eastern boundary of the WA.
22

23 Figure 9.2.14.2-6 is a Google Earth visualization of the SEZ as seen from an
24 unnamed peak in the east central portion of the WA, approximately 18 mi
25 (29 km) from the western boundary of the SEZ. The viewpoint is about
26 2,700 ft (820 m) higher in elevation than the SEZ. The SEZ area is depicted in
27 orange, the heliostat fields in blue.
28

29 The upper slopes and peaks of the WA are sparsely vegetated with little
30 opportunity for screening, and the far northern portion of the SEZ would be
31 visible from this location; however, the Iron Mountains screen much of the
32 view of the SEZ from this and most other locations within the WA. Despite
33 the elevated viewpoint, the 18-mi (29-km) distance to the SEZ would result in
34 an angle of view low enough that visible solar collector/reflector arrays within
35 the SEZ would repeat the line of the plain in which the SEZ is located and this
36 would tend to reduce contrast. If power towers were present within the SEZ,
37 when operating, the receivers would likely appear as distant points of light
38 against the backdrop of the valley floor or the Big Maria Mountains. The
39 range of impact would be highly dependent on viewer location within the WA
40 and on project location and design. Under the 80% development scenario
41 analyzed in this PEIS, solar facilities within the SEZ would be expected to
42 create minimal to weak visual contrasts as viewed from the WA. The highest
43 levels of visual contrast would be expected for viewing locations at higher
44 elevations in the WA, with less visibility and lower contrast levels expected at
45 lower elevations.
46



1

2 **FIGURE 9.2.14.2-6 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with**
3 **Power Tower Wireframe Models, as Seen from Viewpoint within the Sheephole Valley WA**

4

- 1 • *Rice Valley*—The Rice Valley Wilderness is a 43,412-acre (175.68-km²)
2 congressionally designated WA located 6.6 mi (10.6 km) at the point of
3 closest approach southeast of the SEZ. The WA includes a portion of the
4 broad, flat plains of Rice Valley, the northwestern tip of the Big Maria
5 Mountains, and a system of small dunes rising 30 to 40 ft (9 to 12 m) above
6 the valley floor. The valley is part of a massive sand sheet that extends from
7 Cadiz Valley through Ward Valley. Camping, hiking, backpacking, hunting,
8 and wildlife viewing are recreational activities in the WA.
9

10 Solar energy facilities within the SEZ could potentially be visible from most
11 of the WA (approximately 40,799 acres [165.11 km²] in the 650-ft [198.1-m]
12 viewshed, or 94% of the total WA acreage, and 40,329 acres [163.21 km²] in
13 the 24.6-ft [7.5-m] viewshed, or 92.9% of the total WA acreage). The visible
14 area of the WA extends approximately 18.4 mi (29.6 km) from the southeast
15 corner of the SEZ.
16

17 Most of the Rice Valley WA is located on the Rice Valley floor, which slopes
18 gently upward toward the south. The elevation in the northern portions of the
19 WA is generally as low as or lower than the nearest part of the SEZ, especially
20 in the northern portions of the WA.
21

22 Figure 9.2.14.2-7 is a Google Earth visualization of the SEZ as seen from the
23 Rice Valley floor in the far northwest portion of the WA, near the point of
24 closest approach to the SEZ. The viewpoint is approximately 6.5 mi (10.5 km)
25 from the southeast corner of the SEZ and is about 470 ft (140 m) higher in
26 elevation than the SEZ. The SEZ area is depicted in orange, the heliostat
27 fields in blue.
28

29 The visualization suggests that solar facilities within the SEZ would be visible
30 to the northwest through the gap between the Palen-McCoy Mountains to the
31 west and the Turtle Mountains to the east. To the west, the Rice Valley floor
32 rises enough to screen the western-most portions of the SEZ from view. The
33 SEZ would occupy a moderate amount of the horizontal field of view, but the
34 vertical angle of view would be very low. From this viewpoint, solar energy
35 facilities within the SEZ would appear edge-on or nearly so, which would
36 make the large areal extent and strong regular geometry of the
37 collector/reflector arrays of solar facilities in the SEZ less apparent, and would
38 cause the arrays to appear to repeat the strong line of the horizon, tending to
39 reduce visual contrast.
40

41 Tall power towers, power blocks, plumes, and transmission towers located in
42 the nearest parts of the SEZ would add very short oblique and vertical lines
43 and form elements that would likely project above the solar collector/reflector
44 arrays and tend to increase visual contrast. Depending on project and viewer
45 location, these elements could be viewed against a sky backdrop, the Turtle
46 Mountains, the Old Woman Mountains, or the Iron Mountains.



1

FIGURE 9.2.14.2-7 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in blue tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint on Valley Floor within the Rice Valley WA

1 The receivers of operating power towers in nearby portions of the SEZ could
2 appear as very bright non-point (i.e., having a cylindrical or rectangular shape)
3 light sources atop discernable tower structures. They would be likely to attract
4 visual attention. At night, if sufficiently tall, the power towers could have red
5 or white flashing hazard navigation lights that would likely be visible in the
6 WA and could be conspicuous from this viewpoint, given the dark night skies
7 in the vicinity of the SEZ. Other lighting associated with solar facilities in the
8 SEZ could potentially be visible as well.

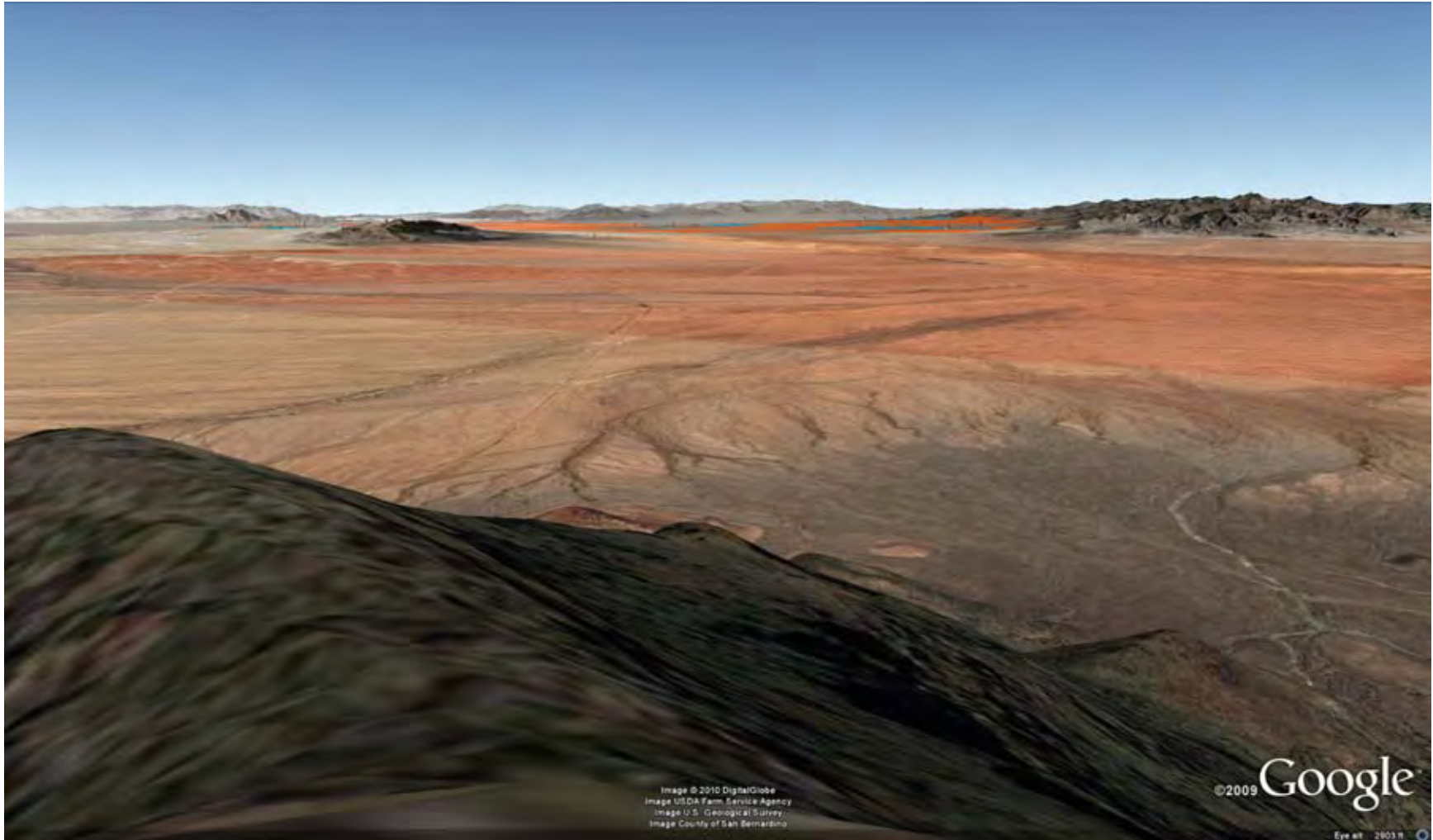
9
10 The nature of the visual contrasts from solar facilities in the SEZ as observed
11 from this viewpoint would depend on the numbers, types, sizes, and locations
12 of solar facilities in the SEZ and on other project- and site-specific factors, but
13 under the 80% development scenario analyzed in this PEIS, solar facilities
14 within the SEZ would be expected to create moderate visual contrasts.

15
16 Figure 9.2.14.2-8 is a Google Earth visualization of the SEZ as seen from the
17 far southwest portion of the WA, near the northwestern tip of the Big Maria
18 Mountains. The viewpoint is the highest point in the WA, elevated about
19 2,100 ft (640 m) above the valley floor. The viewpoint is approximately 16 mi
20 (26 km) from the southeast corner of the SEZ. The SEZ area is depicted in
21 orange, the heliostat fields in blue.

22
23 The visualization suggests that from this elevated viewpoint, the tops of solar
24 collector/reflector arrays would be visible. Most or all of the SEZ would be
25 visible, but the angle of view would be low enough that visible solar
26 collector/reflector arrays within the SEZ would repeat the line of the plain in
27 which the SEZ is located, which would tend to reduce contrast. Taller solar
28 facility components, such as transmission towers, could be visible, depending
29 on lighting, but might not be noticed by casual observers.

30
31 If power towers were present within the SEZ, when operating, the receivers
32 would likely appear as distant points of light against the backdrop of the
33 valley floor or the bajadas of the Iron and Old Woman Mountains. At night,
34 if sufficiently tall, the power towers could have red or white flashing hazard
35 navigation lights that would likely be visible from the WA.

36
37 The range of impact would be highly dependent on viewer location within
38 the WA and on the numbers, types, sizes, and locations of solar facilities in
39 the SEZ, and other project- and site-specific factors, but under the 80%
40 development scenario analyzed in this PEIS, solar facilities within the SEZ
41 would be expected to create minimal to moderate visual contrasts as viewed
42 from the WA. In general, the highest levels of visual contrast would be
43 expected for viewing locations closest to the SEZ.



1

FIGURE 9.2.14.2-8 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange and blue tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from an Elevated Viewpoint within the Rice Valley WA

2

3

4

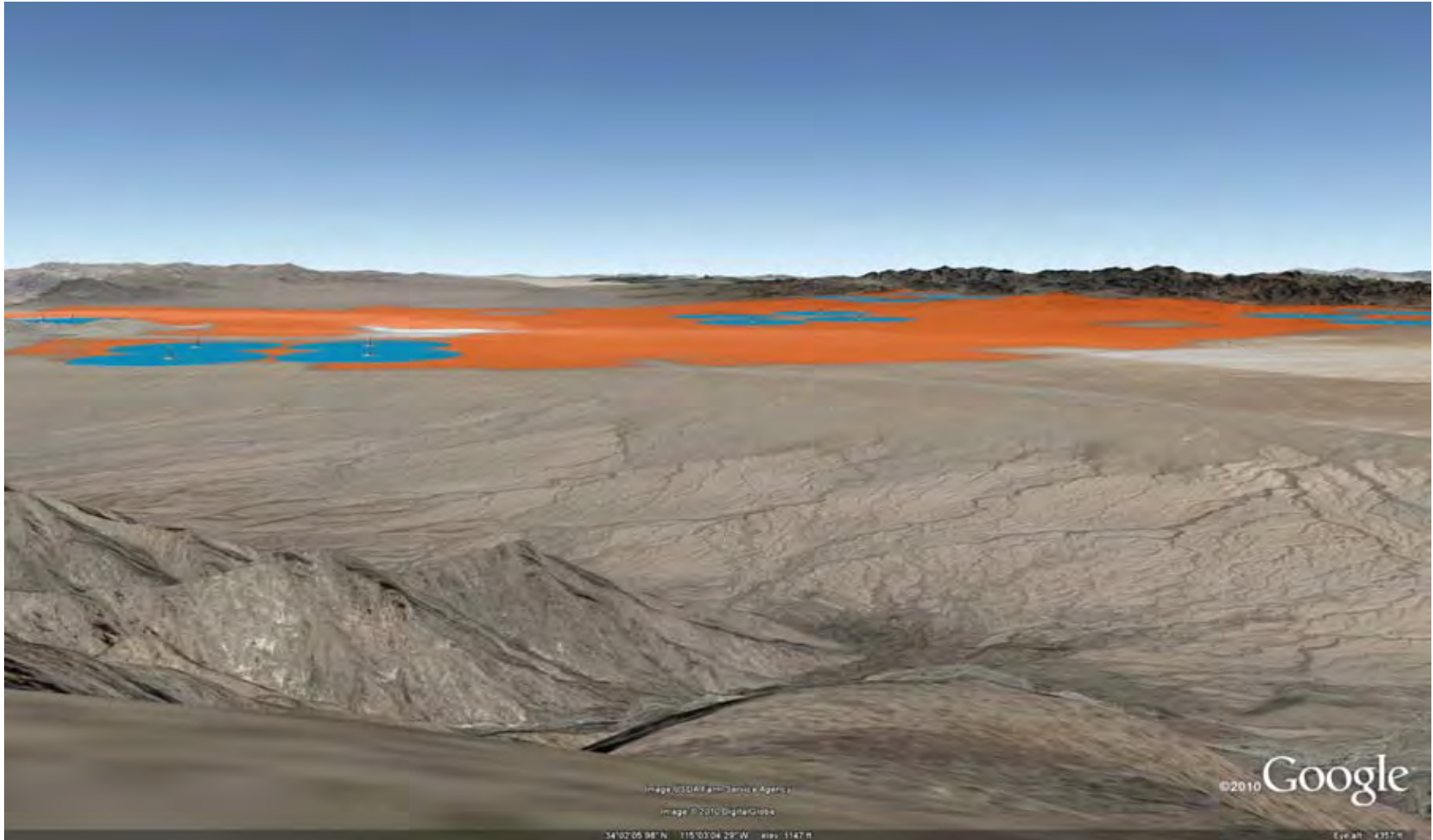
- 1 • *Palen-McCoy*—The Palen-McCoy Wilderness is a 224,414-acre
2 (908.171-km²) congressionally designated WA located 1.6 mi (2.6 km) at the
3 point of closest approach directly south of the SEZ. The WA contains five
4 separate mountain ranges separated by wide bajadas and encompasses several
5 landscape types, from desert pavement, bajadas, interior valleys, and canyons
6 to dense ironwood forests, steep canyons, and rugged peaks. Unlike most
7 other WAs around the proposed SEZ, the Palen-McCoy WA extends beyond
8 the mountains down the bajada and as much as 10 mi (16 km) out onto the
9 valley floor. Camping, hiking, backpacking, horseback riding, hunting, and
10 wildlife viewing are recreational activities in the WA.
11

12 Solar energy facilities within the SEZ could be visible from much of the WA
13 on the northeast sides of the Granite and Big Maria Mountains (approximately
14 60,341 acres [244.19 km²] in the 650-ft [198.1-m] viewshed, or 26.9% of the
15 total WA acreage, and 56,221 acres [227.52 km²] in the 24.6-ft [7.5-m]
16 viewshed, or 25.1% of the total WA acreage). The visible area of the WA
17 extends approximately 16 mi (26 km) from the southern boundary of the SEZ.
18

19 Figure 9.2.14.2-9 is a Google Earth visualization of the SEZ as seen from the
20 highest peak in the Granite Mountains (unnamed), near the southern end of
21 the mountain range. The viewpoint is the highest point in the WA, elevated
22 about 3,400 ft (1,000 m) above the valley floor at the closest point within the
23 SEZ. The viewpoint is approximately 7.3 mi (11.8 km) from the nearest point
24 on the southern boundary of the SEZ. The nearest power towers in the
25 visualization (at left) are about 9.2 mi (14.8 km) from the viewpoint. The SEZ
26 area is depicted in orange; the heliostat fields in blue.
27

28 The visualization suggests that from this elevated viewpoint the SEZ would be
29 too large to be encompassed in one view, and viewers would need to turn their
30 heads to scan across the whole SEZ. The tops of solar collector/reflector
31 arrays in the closest parts of the SEZ would be visible, and depending on
32 project size and layout, some facilities might not repeat the horizontal line of
33 the valley plain. Because of the relatively high angle of view, the large areal
34 extent, and the strong regular geometry of the collector/reflector arrays, solar
35 facilities in the SEZ would be apparent, tending to increase contrast. The
36 angle of view would be low enough that visible solar collector/reflector arrays
37 in the northeast portion of the SEZ (farthest away from this viewpoint) would
38 repeat the line of the plain in which the SEZ is located, which would tend to
39 reduce contrast.
40

41 Taller ancillary facilities, such as buildings, transmission structures, and
42 cooling towers, and plumes (if present) could be visible, projecting above the
43 collector/reflector arrays, at least for nearby facilities. The ancillary facilities
44 could create form and line contrasts with the strongly horizontal, regular, and
45 repeating forms and lines of the collector/reflector arrays.
46



1

2 **FIGURE 9.2.14.2-9 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with**
3 **Power Tower Wireframe Models, as Seen from the Granite Mountains in the Palen-McCoy WA**

4

1 If power towers were present within the SEZ, when operating, the receivers of
2 towers in the nearer parts of the SEZ would likely appear as bright points of
3 light against the backdrop of the valley floor or the bajadas of the Turtle and
4 Old Woman Mountains. At night, if sufficiently tall, the power towers could
5 have red or white flashing hazard navigation lights that would likely be visible
6 from the WA and could be conspicuous, given the dark night skies in the
7 vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ
8 could potentially be visible as well.

9
10 The potential visual contrast expected for this viewpoint would vary
11 depending on the numbers, types, sizes, and locations of solar facilities in the
12 SEZ, and other project- and site-specific factors, but under the 80%
13 development scenario analyzed in this PEIS, solar facilities within the SEZ
14 would be expected to create strong visual contrasts as viewed from this
15 location within the WA.

16
17 Figure 9.2.14.2-10 is a Google Earth visualization of the SEZ as seen from a
18 ridge in the Arica Mountains in the northeast corner of the WA. The
19 viewpoint is elevated about 1,200 ft (370 m) above the valley floor at the
20 closest point within the SEZ. The viewpoint is approximately 3.8 mi (6.1 km)
21 from the nearest point on the southern boundary of the SEZ. The nearest
22 power tower in the visualization (at right) is about 6.5 mi (10.4 km) from the
23 viewpoint. The SEZ area is depicted in orange, the heliostat fields in blue.

24
25 The visualization suggests that from this elevated viewpoint and relatively
26 short distance to the SEZ, the SEZ would be too large to be encompassed in
27 one view, and viewers would need to turn their heads to scan across the whole
28 SEZ. The tops of solar collector/reflector arrays in the closest parts of the SEZ
29 would be visible, but the angle of view is low enough that arrays in the more
30 distant parts of the SEZ would be viewed nearly edge-on, which would make
31 their large areal extent and regular geometry less apparent, and would cause
32 them to appear to repeat the horizontal line of the valley plain.

33
34 Taller ancillary facilities, such as buildings, transmission structures, and
35 cooling towers, and plumes (if present) would likely be visible, projecting
36 above the collector/reflector arrays, at least for nearby facilities. The ancillary
37 facilities could create form and line contrasts with the strongly horizontal,
38 regular, and repeating forms and lines of the collector/reflector arrays. Color
39 and texture contrasts would also be possible, but their extent would depend on
40 the materials and surface treatments utilized in the facilities.

41
42 If power towers were present within the SEZ, when operating, the receivers of
43 towers in the nearer parts of the SEZ would likely appear as very bright non-
44 point (i.e., having a cylindrical or rectangular shape) against the backdrop of
45 the valley floor or the bajadas of the Turtle and Old Woman Mountains. At
46 night, if sufficiently tall, the power towers could have red or white flashing

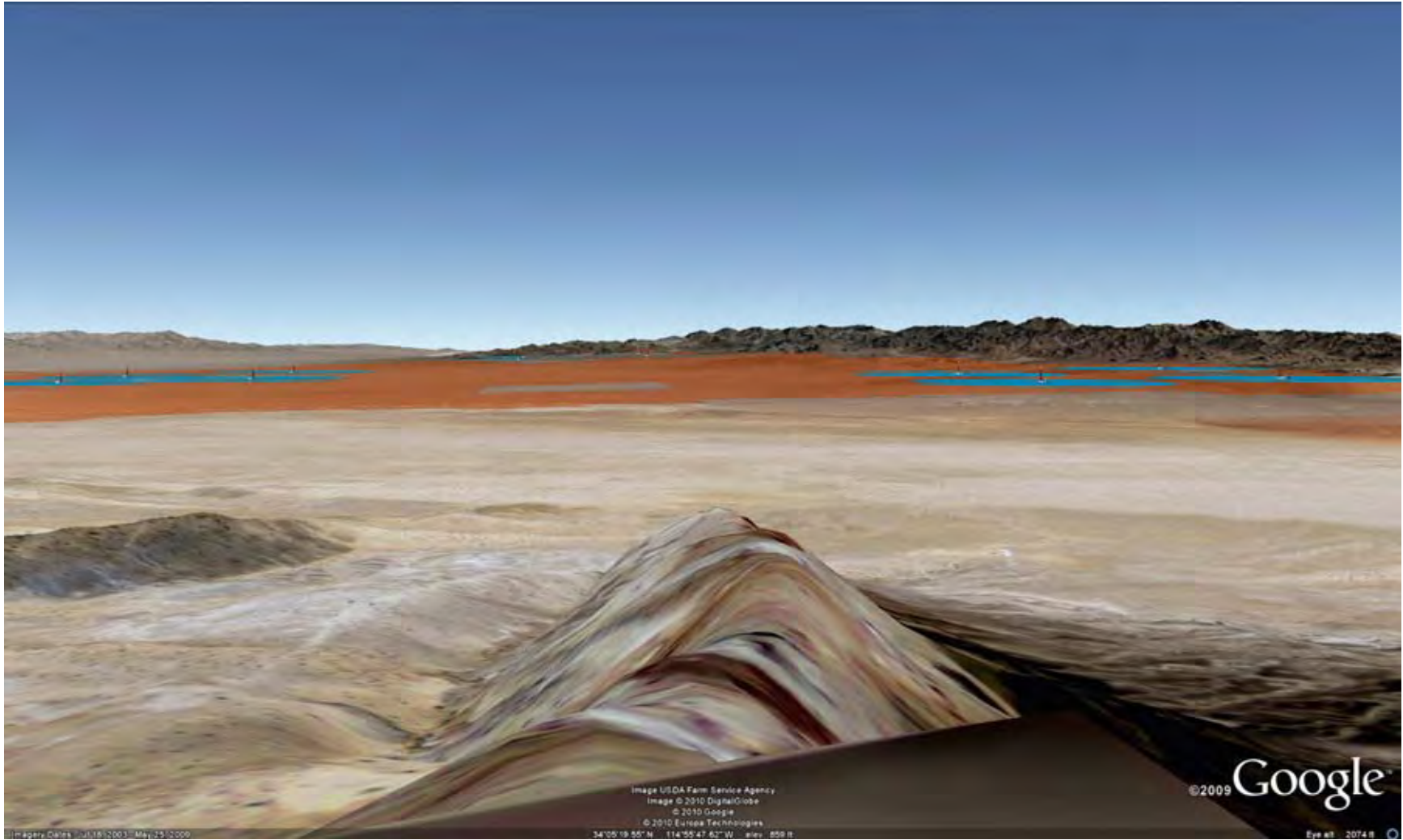


FIGURE 9.2.14.2-10 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Arica Mountains in the Palen-McCoy WA

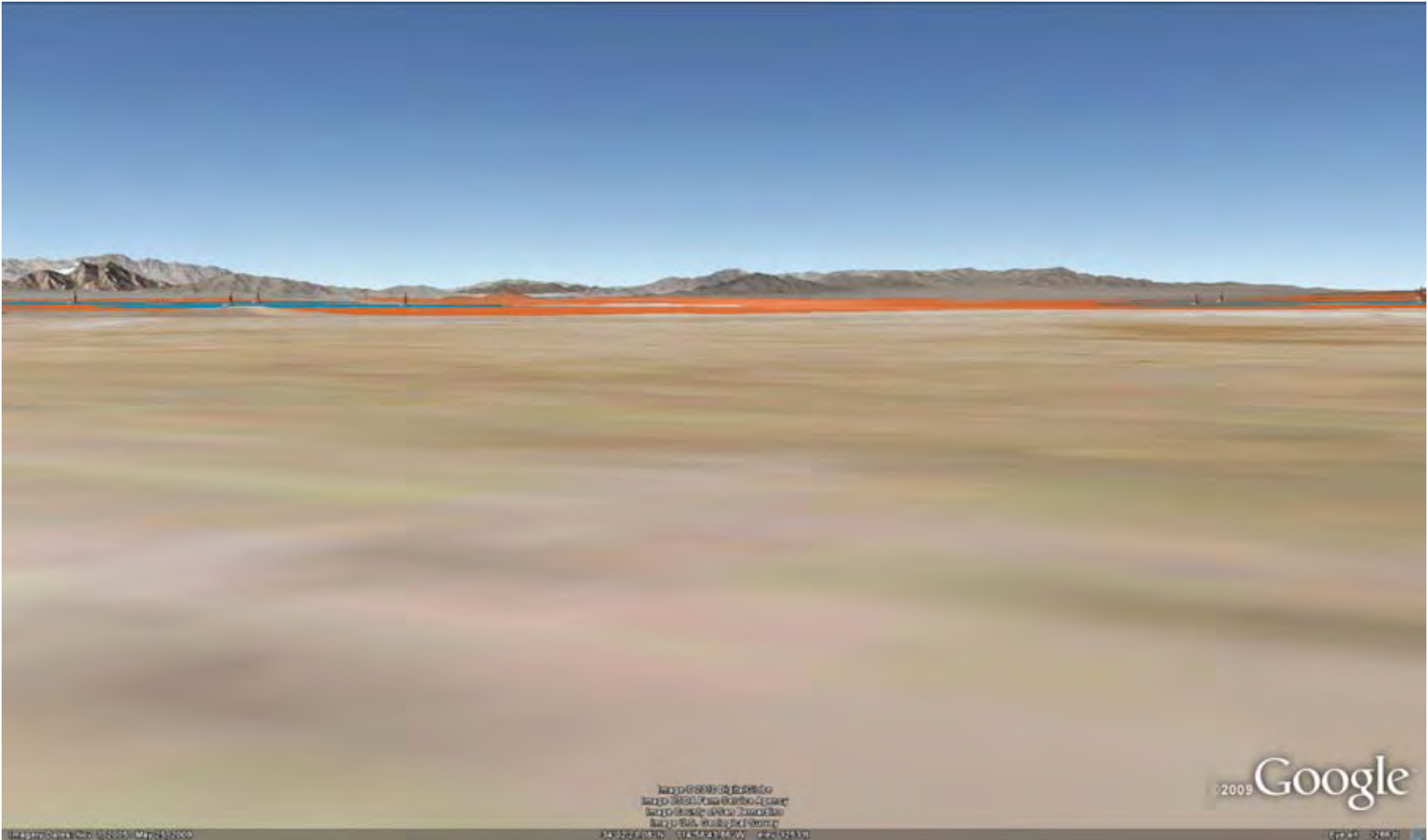
1 hazard navigation lights that would likely be visible from the WA and could
2 be very conspicuous from this viewpoint, given the dark night skies in the
3 vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ
4 would likely be visible as well.
5

6 The potential visual contrast expected for this viewpoint would vary
7 depending on the numbers, types, sizes, and locations of solar facilities in the
8 SEZ, and other project- and site-specific factors, but because the viewpoint is
9 elevated and relatively close to the SEZ, the SEZ would stretch across much
10 of the northern horizon. While one or a few solar facilities within the SEZ
11 might only give rise to moderate levels of visual contrast, under the 80%
12 development scenario analyzed in this PEIS, there could be numerous solar
13 facilities within the SEZ, with a variety of technologies employed, and a range
14 of supporting facilities that would contribute to visual impacts, such as
15 transmission towers and lines, substations, power block components, and
16 roads. Under the 80% development scenario analyzed in this PEIS, solar
17 facilities within the SEZ would be expected to create strong visual contrasts as
18 viewed from this location within the WA.
19

20 Figure 9.2.14.2-11 is a Google Earth visualization of the SEZ as seen in a
21 typical view from the bajada below the Granite Mountains in the northeast
22 corner of the SEZ. The viewpoint is elevated about 350 ft (107 m) above
23 the valley floor at the closest point within the SEZ. The viewpoint is
24 approximately 2.7 mi (4.4 km) from the nearest point on the southern
25 boundary of the SEZ. The nearest power tower in the visualization (at left)
26 is about 8.0 mi (12.8 km) from the viewpoint. The SEZ area is depicted in
27 orange, the heliostat fields in blue.
28

29 The visualization suggests that from this relatively short distance to the SEZ,
30 the SEZ would be too large to be encompassed in one view, and viewers
31 would need to turn their heads to scan across the whole SEZ. Because of the
32 relatively low elevation difference between the viewpoint and the SEZ, the
33 vertical angle of view would be very low, and solar facilities in the SEZ
34 would appear in a narrow band across the field of view. The collector/reflector
35 arrays of solar facilities in the SEZ would be viewed nearly edge-on, which
36 would make their large areal extent and regular geometry less apparent and
37 would cause them to appear to repeat the horizontal line of the valley plain.
38

39 Taller ancillary facilities, such as buildings, transmission structures, and
40 cooling towers; and plumes (if present) could be visible, projecting above the
41 collector/reflector arrays, and their structural details could be evident, at least
42 for nearby facilities. The ancillary facilities could create form and line
43 contrasts with the strongly horizontal, regular, and repeating forms and lines
44 of the collector/reflector arrays. Color and texture contrasts would also be
45 possible, but their extent would depend on the materials and surface
46 treatments utilized in the facilities.



1

2

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4

FIGURE 9.2.14.2-11 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Granite Mountains Bajada in the Palen-McCoy WA

1 If power towers were present within the SEZ, when operating, the receivers of
2 towers in the nearer parts of the SEZ would likely appear as very bright non-
3 point (i.e., having a cylindrical or rectangular shape) against the backdrop of
4 the valley floor or the bajadas of the Turtle and Old Woman Mountains. At
5 night, if sufficiently tall, the power towers could have red or white flashing
6 hazard navigation lights that would likely be visible from the WA and could
7 be very conspicuous from this viewpoint, given the dark night skies in the
8 vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ
9 would likely be visible as well.

10
11 The potential visual contrast expected for viewpoints on the bajadas would
12 vary depending on viewpoint location and on facility numbers, locations, and
13 designs as well as on other visibility factors. From some locations at lower
14 elevations, slight variations in topography could screen much of the view of
15 the SEZ, and weak levels of visual contrast might result if the angle of view
16 was sufficiently low. Where there was a clear view of the SEZ from the
17 bajada, under the 80% development scenario analyzed in this PEIS, moderate
18 to strong levels of visual contrast might be observed.

19
20 In summary, the Palen-McCoy WA is very close to the SEZ, and many
21 locations within the WA could have clear views of solar facilities in the
22 SEZ across much of the field of view to the north of the WA. Given that
23 there could be numerous solar facilities within the SEZ, with a variety of
24 technologies employed, and a range of supporting facilities that would
25 contribute to visual impacts, such as transmission towers and lines,
26 substations, power block components, and roads, the resulting visually
27 complex landscape would be essentially industrial in appearance and would
28 contrast greatly with the surrounding mostly natural-appearing landscape.
29 Under the 80% development scenario analyzed in this PEIS, strong levels of
30 visual contrast from solar facilities within the SEZ could be observed from
31 many locations within the WA, especially from elevated viewpoints.

- 32
33 • *Old Woman Mountains*—The Old Woman Mountains Wilderness is a
34 183,555-acre (742.821-km²) congressionally designated WA. The southern
35 edge of the Old Woman Mountains WA is adjacent to the northwest section
36 of the SEZ. The Old Woman Range encompasses three ecosystems and
37 includes the 5,300-ft (1,600-m) summit of Old Woman Peak. The WA
38 contains trails and old mining roads used for hiking and backpacking.
39 Camping, horseback riding, hunting, and wildlife viewing are other
40 recreational activities in the WA.

41
42 As shown in Figure 9.2.14.2-2, solar energy facilities within the SEZ could
43 be visible from much of the northwest portion of the WA (approximately
44 88,760 acres [359.20 km²] in the 650-ft [198.1-m] viewshed, or 48.4% of
45 the total WA acreage, and 83,900 acres [339.53 km²] in the 24.6-ft [7.5-m]
46 viewshed, or 45.7% of the total WA acreage). The main area of the WA with

1 potential visibility of solar facilities in the SEZ extends approximately 17 mi
2 (27 km) from the far northern boundary of the SEZ, with a few small areas of
3 visibility out to approximately 21 mi (34 km).
4

5 The Old Woman Mountains are a north-to-south oriented mountain range,
6 roughly wedge-shaped, with the point of the wedge immediately north of the
7 northwest corner of the SEZ. SEZ visibility on the western side of the Old
8 Woman Mountains is limited to the far western portions of the SEZ, generally
9 west of Danby Lake. The east-facing slopes of the Old Woman Mountains
10 have views of nearly the entire SEZ. The mountains rise abruptly just north of
11 the abandoned town of Milligan, and the WA's southern boundary is less than
12 0.5 mi (0.8 km) north of the town site. Most views of the SEZ from within the
13 WA would be from more or less elevated viewpoints and, if viewed from the
14 southern end of the mountain range, are very close to the SEZ. Because the
15 SEZ is adjacent to the WA at the south end of the Old Woman Mountains,
16 many of the visible areas at the southern end of the range would be within
17 the BLM-designated foreground–middleground distance of 3 to 5 mi (4.8 to
18 8 km).
19

20 Figure 9.2.14.2-12 is a Google Earth visualization of the SEZ as seen from an
21 unnamed peak in the Old Woman Mountains, elevated about 2,700 ft (820 m)
22 above the valley floor at the closest point within the SEZ and approximately
23 4.1 mi (6.6 km) from the nearest point on the northern boundary of the SEZ.
24 The SEZ area is depicted in orange, the heliostat fields in blue.
25

26 The visualization suggests that from this elevated viewpoint and relatively
27 short distance to the SEZ, the SEZ would be too large to be encompassed in
28 one view, and viewers would need to turn their heads to scan across the whole
29 SEZ. Five clusters of power tower facility models are visible: the left-most
30 model cluster is approximately 16 mi (26 km) from the viewpoint; the center
31 model cluster is 15 mi (24 km) from the viewpoint; and the right-most model
32 cluster is 10 mi (16 km) from the viewpoint (all distances to center points of
33 model clusters). The tops of solar collector/reflector arrays in the closest parts
34 of the SEZ would be visible, but the angle of view is low enough that arrays in
35 the more distant parts of the SEZ would be seen nearly edge-on, which would
36 make their large areal extent and regular geometry less apparent, as well as
37 make them appear to repeat the horizontal line of the valley plain. If power
38 towers were present within the SEZ, when operating, the receivers would
39 likely appear as distant points of light against the backdrop of the valley floor
40 or the bajada of the Turtle Mountains.
41

42 The potential visual contrast expected for this view point would vary
43 depending on project locations, technologies, and site designs, but because the
44 viewpoint is elevated and relatively close to the SEZ, the SEZ would occupy
45 much of the field of view. Under the 80% development scenario analyzed in
46 this PEIS, there could be numerous solar facilities within the SEZ, with a

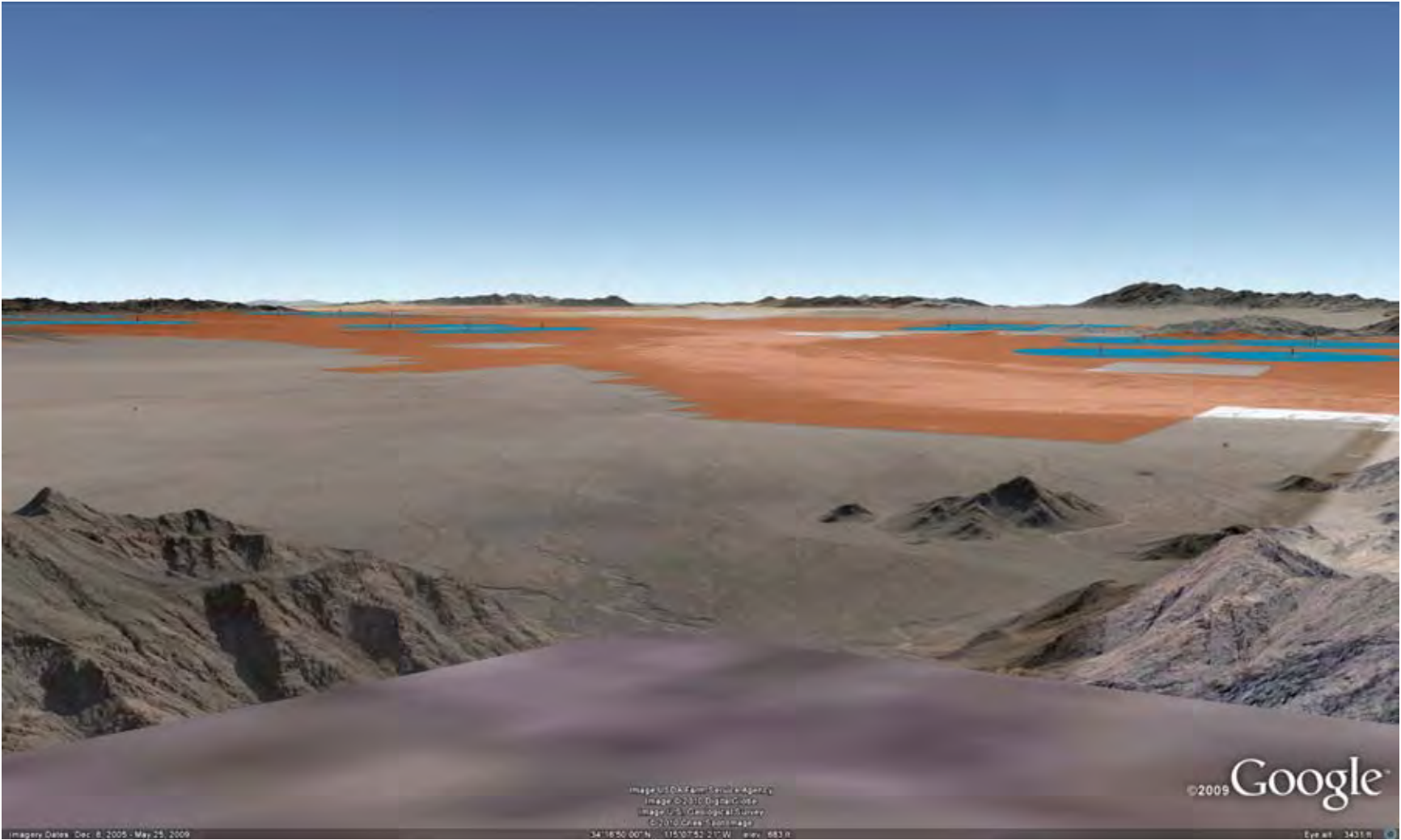


FIGURE 9.2.14.2-12 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Old Woman Mountains WA

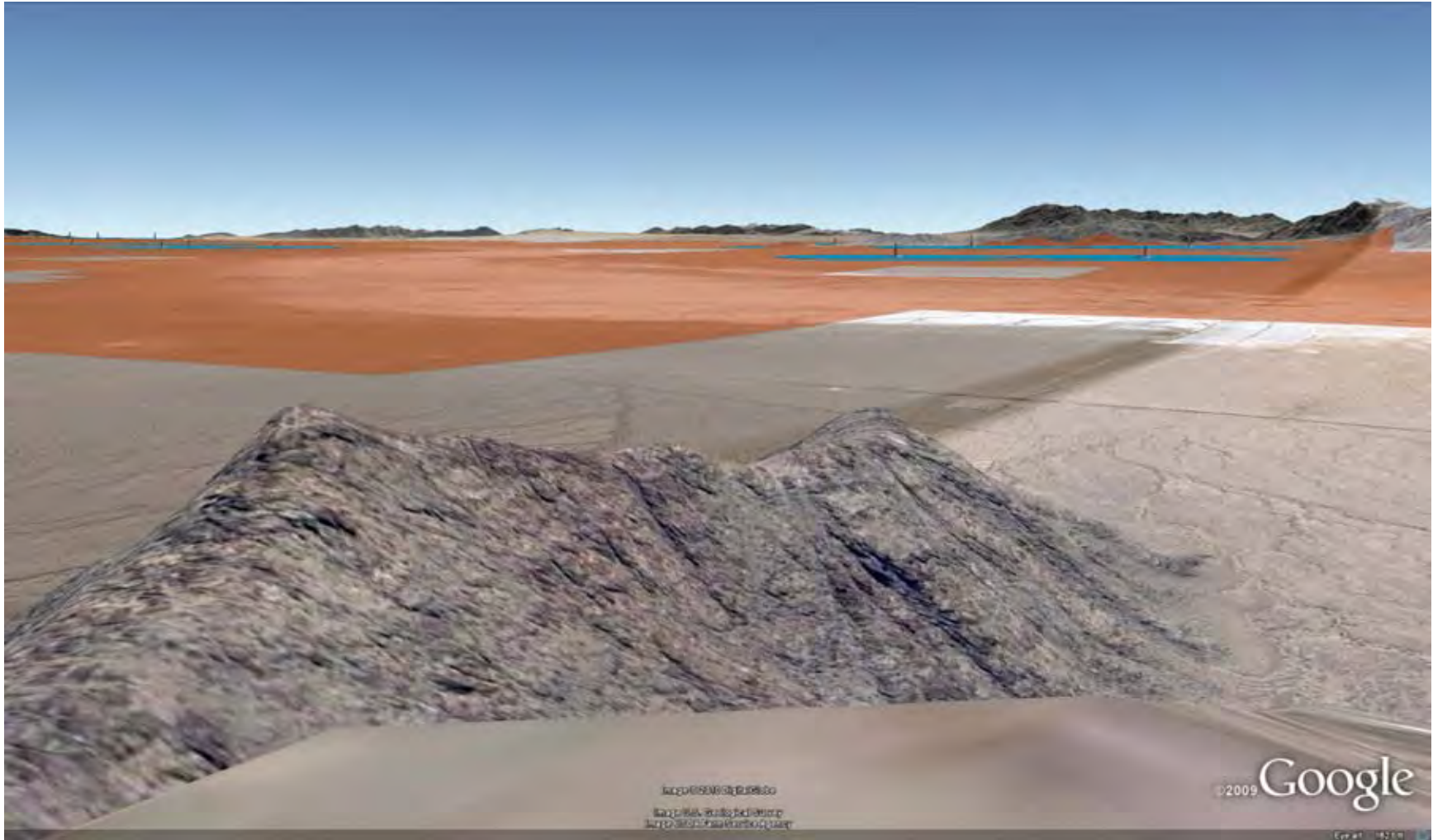
1 variety of technologies employed, and a range of supporting facilities that
2 would contribute to visual impacts, such as transmission towers and lines,
3 substations, power block components, and roads. The resulting visually
4 complex landscape could potentially dominate the view from this location.
5 Under the PEIS development scenario, solar facilities within the SEZ would
6 be expected to create moderate to strong visual contrasts as viewed from this
7 location within the WA.
8

9 Figure 9.2.14.2-13 is a Google Earth visualization of the SEZ as seen from a
10 much lower unnamed peak in the Old Woman Mountains, at the southern end
11 of the range. The viewpoint is elevated about 860 ft (260 m) above the valley
12 floor at the closest point within the SEZ and approximately 1.4 mi (2.3 km)
13 from the nearest point on the northern boundary of the SEZ.
14

15 The visualization suggests that from this elevated viewpoint and very short
16 distance to the SEZ, the SEZ would be too large to be encompassed in one
17 view, and viewers would need to turn their heads to scan across the whole
18 SEZ. Four clusters of power tower facility models are visible: the closer of the
19 left two model clusters is approximately 13.5 mi (21.7 km) from the
20 viewpoint, and the closer of the right two model clusters is 7.3 mi (11.8 km)
21 from the viewpoint (all distances to center points of model clusters). The tops
22 of solar collector/reflector arrays in the closest parts of the SEZ would be
23 visible, but the angle of view is low enough that most facilities would repeat
24 the horizontal line of the valley plain.
25

26 Taller ancillary facilities, such as buildings, transmission structures, and
27 cooling towers; and plumes (if present) would likely be visible, projecting
28 above the collector/reflector arrays, at least for nearby facilities. The ancillary
29 facilities could create form and line contrasts with the strongly horizontal,
30 regular, and repeating forms and lines of the collector/reflector arrays. Color
31 and texture contrasts would also be possible for closer facilities, but their
32 extent would depend on the materials and surface treatments utilized in the
33 facilities.
34

35 If power towers were present within the SEZ at the distances shown in the
36 visualization, when operating, the receivers would likely appear as points of
37 light against the sky, against the backdrop of the valley floor or against the
38 bajadas of the Iron or Turtle Mountains. Power towers located in the nearest
39 portions of the SEZ could be much brighter and would be likely to strongly
40 attract visual attention from this viewpoint. At night, if sufficiently tall, the
41 power towers could have red or white flashing hazard navigation lights that
42 would likely be visible from this viewpoint and could be very conspicuous,
43 given the dark night skies in the vicinity of the SEZ. Other lighting associated
44 with solar facilities in the SEZ could potentially be visible as well.
45



1

FIGURE 9.2.14.2-13 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Southern Portion of the Old Woman Mountains WA

2

3

4

1 The potential visual contrast expected for this viewpoint would vary
2 depending on the numbers, types, sizes, and locations of solar facilities in the
3 SEZ, and on other project- and site-specific factors, but because the view
4 point is elevated and very close to the SEZ, the SEZ would occupy most of the
5 field of view, and under the 80% development scenario analyzed in this PEIS,
6 solar facilities within the SEZ would likely dominate the view from this
7 location, and strong visual contrast levels would be expected.
8

9 In summary, because there could be numerous solar facilities within the SEZ,
10 with a variety of technologies employed, and a range of supporting facilities
11 that would contribute to visual impacts, a visually complex, man-made
12 appearing industrial landscape could result. This essentially industrial-
13 appearing landscape would contrast greatly with the surrounding natural-
14 appearing lands and would be expected to create strong visual contrasts as
15 viewed from many locations within the WA. Weaker levels of contrast would
16 be expected for lower elevation viewpoints in the WA, many of which would
17 have partially screened views of solar facilities in the SEZ.
18

- 19 • *Turtle Mountains*—The Turtle Mountains Wilderness is a 182,610-acre
20 (738.996-km²) congressionally designated WA. The southwest boundary of
21 Turtle Mountains WA is adjacent to the eastern edge of the SEZ. Above
22 broad, open bajadas, the WA's eroded volcanic peaks, spires, and cliffs in a
23 range of colors constitute a diverse scenic landscape, which includes the
24 Turtle Mountains scenic ACEC and the Turtle Mountains NNL. The WA
25 contains numerous trails. The WA also contains the Mopah Peaks, which are
26 rhyodactic or volcanic plugs, and the northern-most peak in the WA is a
27 landmark known as Mexican Hat. Hiking, horseback riding, hunting, camping,
28 rock hounding, photography, and backpacking are popular recreation activities
29 within the WA. Coffin, Mopah, and Mohawk Springs are popular hiking
30 destinations.
31

32 As shown in Figure 9.2.14.2-2, solar energy facilities within the SEZ could be
33 visible from much of the northwest portion of the WA (approximately
34 73,092 acres [295.79 km²] in the 650-ft [198.1-m] viewshed, or 40% of the
35 total WA acreage, and 63,275 acres [256.06 km²] in the 24.6-ft [7.5-m]
36 viewshed, or 35% of the total WA acreage). The visible area of the WA
37 extends approximately 17 mi (27 km) from the northern boundary of the SEZ
38 and approximately 5 mi (8 km) from the eastern boundary.
39

40 The Turtle Mountains WA includes most of the Turtle Mountains range
41 and a large portion of the Ward Valley floor to the northwest of the Turtle
42 Mountains. The WA thus has both elevated and non-elevated views of the
43 SEZ, and viewing distances range from 0 to 17 mi (0 to 27 km). The SEZ
44 in its entirety is visible from the western slopes of the Turtle Mountains, and
45 large portions of the SEZ are visible from the Ward Valley floor within the
46 WA. Because the SEZ is adjacent to the WA near the Turtle Mountains, most

1 of the visible areas in the mountains are within the BLM-designated
2 foreground–middleground distance of 3 to 5 mi (4.8 to 8 km). Most of the
3 views from the valley floor within the WA are beyond 5 mi (8 km).
4

5 Figure 9.2.14.2-14 is a Google Earth visualization of the SEZ as seen from an
6 unnamed peak in the Turtle Mountains, elevated about 1,400 ft (430 m) above
7 the bajada at the closest point within the SEZ and 2,400 ft (730 m) above the
8 lowest point in the SEZ. The viewpoint is approximately 1.4 mi (2.3 km) from
9 the nearest point on the eastern boundary of the SEZ. The SEZ area is
10 depicted in orange, the heliostat fields in blue.
11

12 The visualization suggests that from this elevated viewpoint and very short
13 distance to the SEZ, the SEZ would be too large to be encompassed in one
14 view, and viewers would need to turn their heads to scan across the whole
15 SEZ. Four clusters of power tower facility models are visible: the left-most
16 model cluster is approximately 15 mi (24 km) from the viewpoint; the left-
17 center model cluster is 8 mi (13 km) from the viewpoint; the right-center
18 model cluster is 17 mi (27 km) from the viewpoint; and the right-most model
19 cluster is 5 mi (8 km) from the viewpoint (all distances to center points of
20 model clusters).
21

22 The tops of solar collector/reflector arrays in the closest parts of the SEZ
23 would be visible, and the angle of view is high enough that these closer
24 facilities would not repeat the horizontal line of the valley plain. Because of
25 the oblique angle of view, the facilities would appear larger in areal extent
26 than from less elevated viewpoints at the same distance.
27

28 Taller ancillary facilities, such as buildings, transmission structures, and
29 cooling towers; and plumes (if present) would likely be visible, projecting
30 above the collector/reflector arrays, and their structural details could be
31 evident, at least for nearby facilities. The ancillary facilities could create form
32 and line contrasts with the strongly horizontal, regular, and repeating forms
33 and lines of the collector/reflector arrays. Color and texture contrasts would be
34 possible, but their extent would depend on the materials and surface
35 treatments utilized in the facilities.
36

37 If power towers were present within the nearest parts of the SEZ, when
38 operating, the receivers would likely appear as very bright non-point
39 (i.e., having a cylindrical or rectangular shape) point light sources atop
40 discernable tower structures against the backdrop of the valley floor.
41 Operating power towers in the most distant parts of the SEZ would likely
42 appear as star-like points of light against the backdrop of the bajada of the
43 Iron Mountains. At night, if sufficiently tall, the power towers could have red
44 or white flashing hazard navigation lights that would be visible from this
45 viewpoint and could be very conspicuous, given the dark night skies in the
46

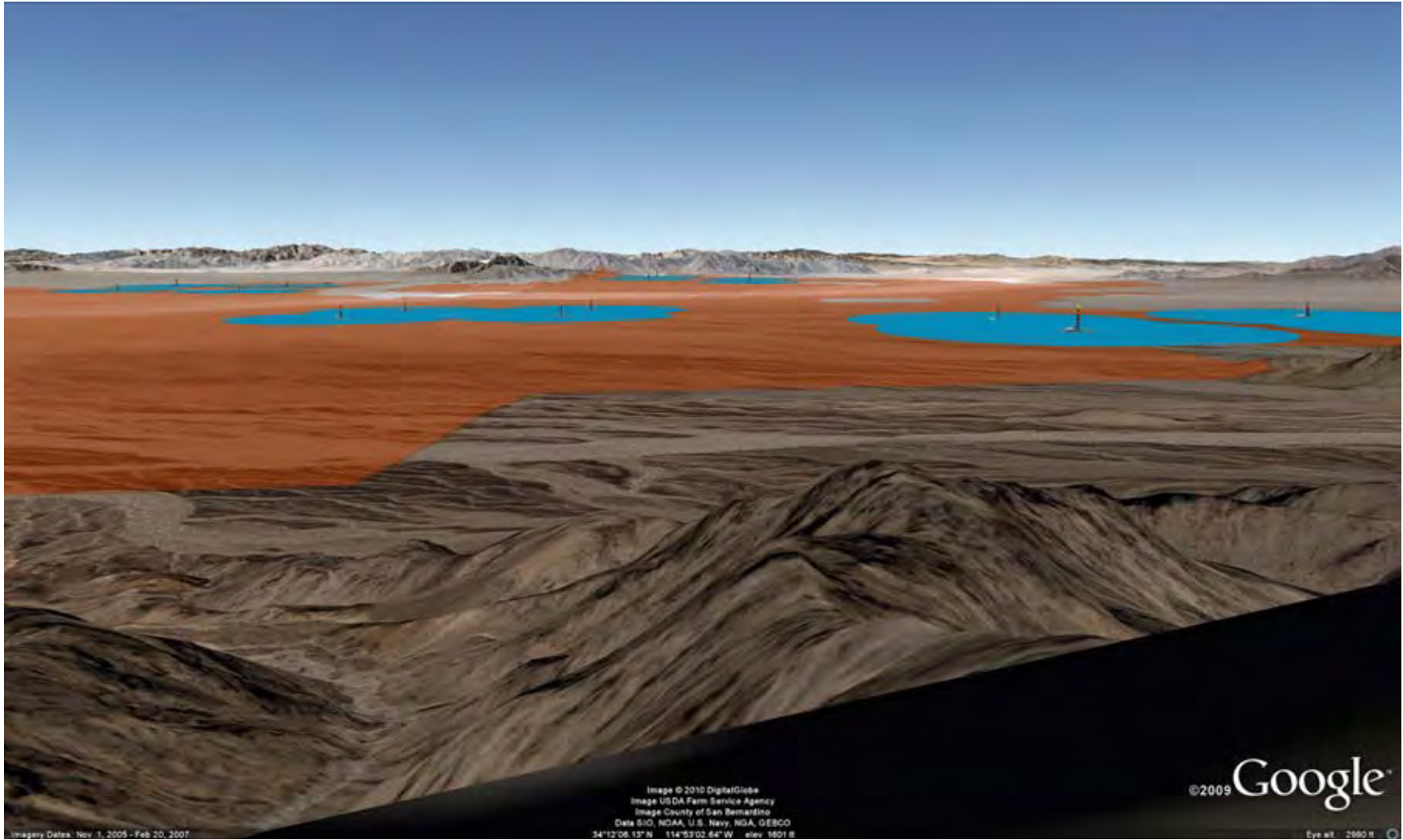


FIGURE 9.2.14.2-14 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Western Portion of the Turtle Mountains WA

1 vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ
2 could potentially be visible as well.

3
4 The potential visual contrast expected for this viewpoint would vary
5 depending on the numbers, types, sizes, and locations of solar facilities in the
6 SEZ and on other project- and site-specific factors, but because the viewpoint
7 is elevated and very close to the SEZ, the SEZ would occupy most of the field
8 of view. Under the 80% development scenario analyzed in this PEIS, , solar
9 facilities within the SEZ would likely dominate the view from this location
10 and would be expected to create strong visual contrasts as viewed from this
11 location within the WA.

12
13 Figure 9.2.14.2-15 is a Google Earth visualization of the SEZ as seen from an
14 unnamed peak in the Turtle Mountains, near the eastern limit of the visible
15 area within the Turtle Mountains and elevated about 3,300 ft (1,000 m) above
16 the lowest point in the SEZ. The viewpoint is approximately 4.6 mi (7.4 km)
17 from the nearest point on the eastern boundary of the SEZ. The SEZ area is
18 depicted in orange, the heliostat fields in blue.

19
20 The visualization suggests that from this elevated viewpoint and short distance
21 to the SEZ, the SEZ would occupy nearly the entire horizontal field of view.
22 Five clusters of power tower facility models are visible: the left-most model
23 cluster is approximately 8 mi (13 km) from the viewpoint; the center model
24 cluster is 18 mi (29 km) from the viewpoint; the right-center model cluster is
25 11 mi (18 km) from the viewpoint; the distant-right model cluster is 19 mi
26 (31 km)distant; and the right-most, partially visible model cluster is 7 mi
27 (12 km) from the viewpoint (all distances to center points of model clusters).

28
29 In this view, the Turtle Mountains west of the viewpoint screen some of the
30 far eastern part of the Ward Valley and could screen solar facilities in the far
31 eastern part of the SEZ. For facilities that are sufficiently far west in the SEZ
32 to avoid screening, the tops of solar collector/reflector arrays could be visible,
33 and the angle of view is high enough that these closer facilities might not
34 repeat the horizontal line of the valley plain. Because of the oblique angle of
35 view, the closer facilities would appear larger in areal extent than they would
36 from less elevated viewpoints at the same distance, and the strong regular
37 geometry of the arrays would be apparent.

38
39 Taller ancillary facilities, such as buildings, transmission structures, and
40 cooling towers; and plumes (if present) would likely be visible, projecting
41 above the collector/reflector arrays. The ancillary facilities could create form
42 and line contrasts with the strongly horizontal, regular, and repeating forms
43 and lines of the collector/reflector arrays. Color and texture contrasts would be
44 possible for closer facilities, but their extent would depend on the materials
45 and surface treatments utilized in the facilities.

46

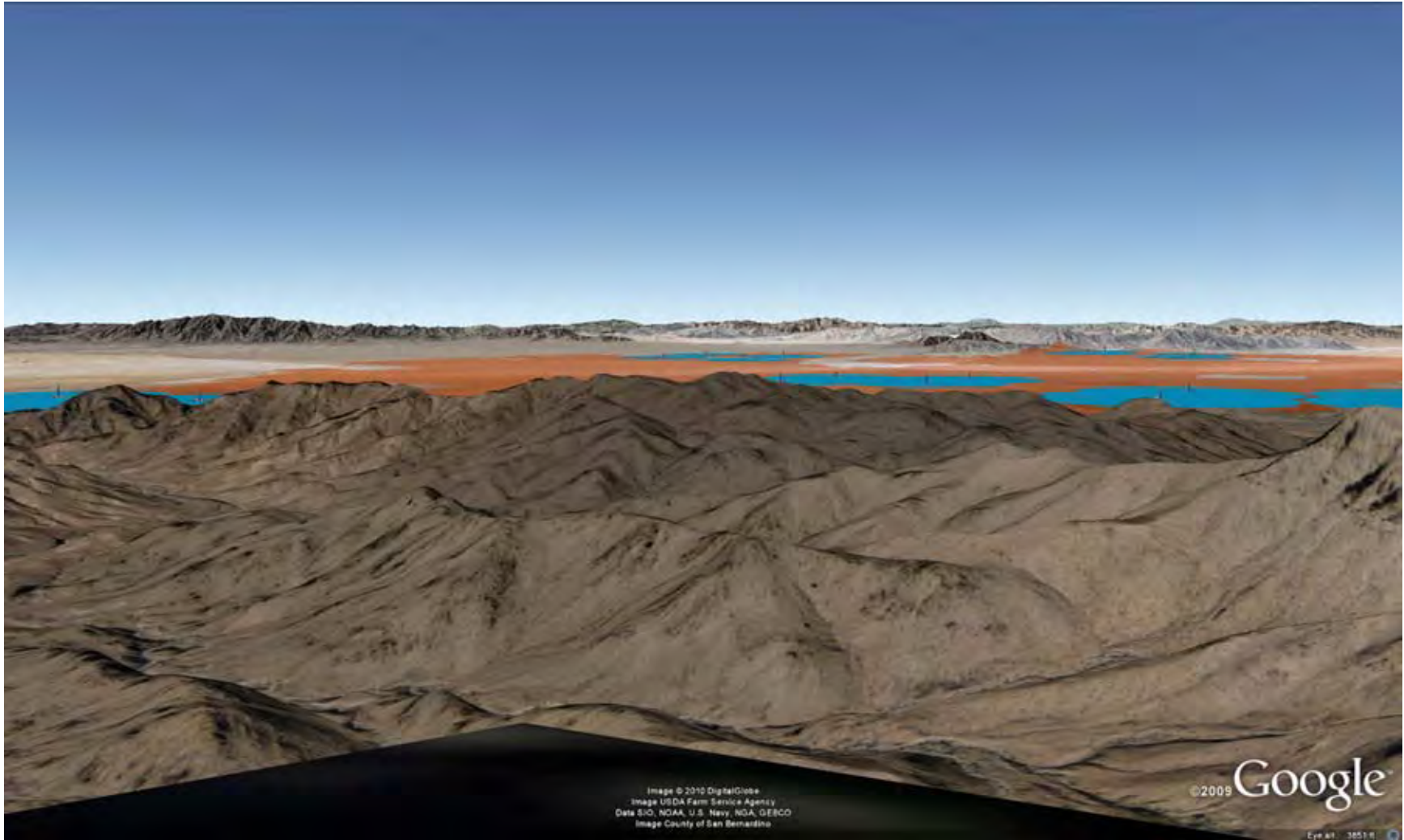


FIGURE 9.2.14.2-15 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Eastern Portion of the Turtle Mountains WA

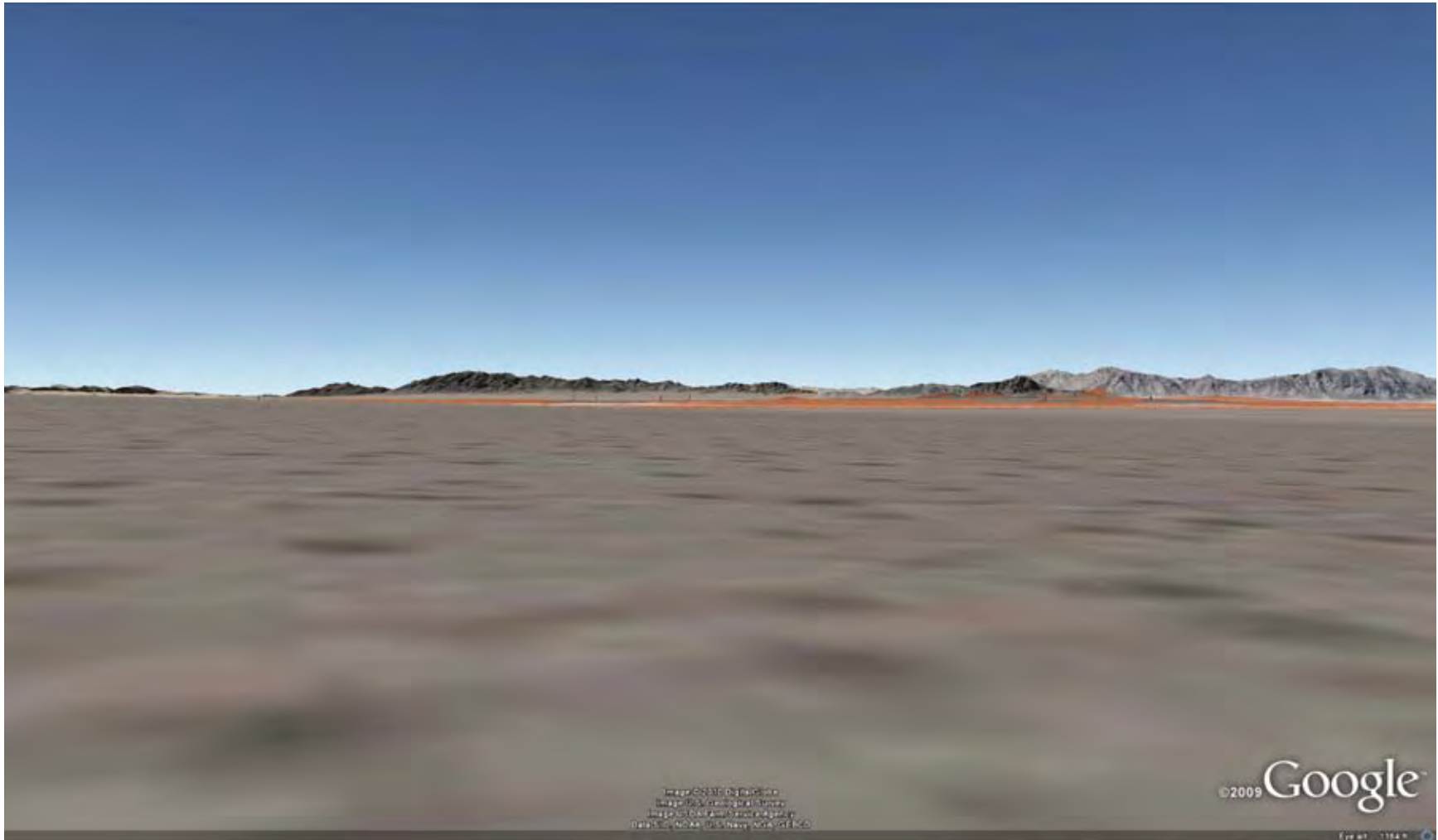
1 If power towers were present within the SEZ, when operating, the receivers
2 would likely appear as points of light against the backdrop of the valley floor
3 or the bajada of the Iron Mountains. At night, if sufficiently tall, the power
4 towers could have red or white flashing hazard navigation lights that would
5 likely be visible from this location and could be conspicuous, given the dark
6 night skies in the vicinity of the SEZ. Other lighting associated with solar
7 facilities in the SEZ could potentially be visible as well.
8

9 The potential visual contrast expected for this viewpoint would vary
10 depending on the numbers, types, sizes and locations of solar facilities in the
11 SEZ, and other project- and site-specific factors, but because the viewpoint is
12 elevated and close to the SEZ, the SEZ would occupy a significant portion of
13 the field of view, even with the foreground screening from the mountains to
14 the west of the viewpoint. Under the 80% development scenario analyzed in
15 this PEIS, solar facilities within the SEZ would likely strongly attract visual
16 attention, could potentially dominate the view from this location, and would
17 be expected to create strong visual contrasts as viewed from this location
18 within the WA.
19

20 Figure 9.2.14.2-16 is a Google Earth visualization of the SEZ as seen from
21 within the WA on the floor of Ward Valley, north of the northeastern portion
22 of the SEZ. The viewpoint is approximately 8 mi (13 km) from the nearest
23 point on the northern boundary of the SEZ.
24

25 The visualization suggests that from this viewpoint the SEZ would be too
26 large to be encompassed in one view, and viewers would need to turn their
27 heads to scan across the whole SEZ. The bajada of the Turtle Mountains
28 would screen views of the far eastern portion of the SEZ, but the upper
29 portions of sufficiently tall power tower receivers might project beyond the
30 surface of the bajada, depending on their location. Three clusters of power
31 tower facility models are visible. For the left-most model cluster, only the
32 upper portion of the power tower receivers is visible; the cluster is
33 approximately 13 mi (21 km) from the viewpoint. The center model cluster is
34 17 mi (27 km) from the viewpoint, and the right-most model cluster is 14 mi
35 (23 km) from the viewpoint (all distances to center points of model clusters).
36

37 In this view, the bajada of the Turtle Mountains southeast of the viewpoint
38 screens some of the far eastern part of the Ward Valley and could screen solar
39 development in that area. For facilities sufficiently far west in the SEZ to
40 avoid screening, the angle of view is low enough and the SEZ distant enough
41 that solar collector facilities would appear as thin horizontal bands close to the
42 horizon and repeat the strong horizontal line of the valley plain. Power tower
43 receivers, power blocks, transmission towers, and other relatively tall
44 structures could be visible above the solar collector/reflector arrays and would
45 add short vertical line contrasts to the strongly horizontal landscape.
46



1

FIGURE 9.2.14.2-16 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Ward Valley Floor in the Northern Portion of the Turtle Mountains WA

2

3

4

1 If power towers were present within the SEZ, when operating, the receivers
2 would likely appear as distant points of light against the backdrop of the
3 valley floor or the bajadas of the Palen-McCoy or Granite Mountains. At
4 night, if sufficiently tall, the power towers could have red or white flashing
5 hazard navigation lights that would likely be visible from this viewpoint and
6 could be conspicuous, given the dark night skies in the vicinity of the SEZ.
7 Other lighting associated with solar facilities in the SEZ could potentially be
8 visible as well.

9
10 The potential visual contrast expected for this viewpoint would vary
11 depending on the numbers, types, sizes, and locations of solar facilities in the
12 SEZ, and on other project- and site-specific factors, but because the viewpoint
13 is not elevated with respect to the SEZ and is 8 mi (13 km) from the nearest
14 point in the SEZ, the SEZ would occupy a smaller portion of the field of
15 view than from more elevated and/or closer viewpoints. Under the 80%
16 development scenario analyzed in this PEIS, solar facilities within the SEZ
17 would likely attract visual attention, but would be unlikely to dominate the
18 view from this location, and would be expected to create moderate visual
19 contrasts as viewed from this location within the WA.

20
21 In summary, the Turtle Mountains WA is adjacent to the SEZ, and many
22 locations within the WA would have clear views of solar facilities in the SEZ
23 across much of the field of view to the west of the WA. Visibility extends far
24 eastward into the interior of the WA. Given that there could be numerous solar
25 facilities within the SEZ, with a variety of technologies employed, and a range
26 of supporting facilities that would contribute to visual impacts, such as
27 transmission towers and lines, substations, power block components, and
28 roads, the resulting visually complex landscape would be essentially industrial
29 in appearance and would contrast greatly with the surrounding mostly natural-
30 appearing landscape. Under the 80% development scenario analyzed in this
31 PEIS, strong levels of visual contrast from solar facilities within the SEZ
32 could be observed from many locations within the WA, especially from
33 elevated viewpoints.

34 35 36 ***National Natural Landmark***

- 37
38 • *Turtle Mountains*—The Turtle Mountains NNL is a 50,057-acre (202.57-km²)
39 NNL designated for outstanding scenic values, located almost entirely within
40 the Turtle Mountains WA (see above). The Turtle Mountains NNL
41 encompasses the same lands as the Turtle Mountain Scenic ACEC.

42
43 Visual impacts on the Turtle Mountains NNL associated with utility-scale
44 solar energy development in the proposed Iron Mountain SEZ would be
45 similar to those described for the mountainous portions of the Turtle
46 Mountains WA (see above). The two-mountain viewpoint Google Earth

1 visualizations described under the WA impact analysis are from viewpoints
2 within both the NNL and the WA.

3
4
5 ***ACEC Designated for Outstandingly Remarkable Scenic Values***

- 6
7 • *Turtle Mountains*—The Turtle Mountains ACEC is a 50,057-acre
8 (202.57-km²) ACEC designated by the BLM for its outstanding scenic
9 values, located almost entirely within the Turtle Mountains WA (see above).
10 The ACEC is adjacent to the SEZ at its southern-most point. The ACEC
11 encompasses much of the Turtle Mountains but, unlike the WA, does not
12 extend into the Ward Valley floor. Many locations within the ACEC provide
13 panoramic views of the Ward Valley and the SEZ.

14
15 Solar energy facilities within the SEZ could be visible from the front slopes of
16 the Turtle Mountains in the southwestern portion of the ACEC (approximately
17 10,024 acres [40.566 km²] in the 650-ft [198.1-m] viewshed, or 20.0% of the
18 total ACEC acreage, and 8,639 acres [34.96 km²] in the 24.6-ft [7.5-m]
19 viewshed, or 17.3% of the total ACEC acreage). The main visible area of the
20 ACEC extends approximately 4.4 mi (7.1 km) from the northeast corner of the
21 SEZ, with a separate small area of visibility out to approximately 6.2 mi
22 (10 km).

23
24 Visual impacts on the Turtle Mountains ACEC associated with utility-scale
25 solar energy development in the proposed Iron Mountain SEZ would be
26 similar to those described for the mountainous portions of the Turtle
27 Mountains WA (see above). The two-mountain viewpoint Google Earth
28 visualizations described under the WA impact analysis are from viewpoints
29 within both the ACEC and the WA.

30
31 Additional scenic resources exist at the national, state, and local levels, and impacts on
32 both federal and nonfederal lands may occur, including sensitive traditional cultural properties
33 important to Tribes. Note that in addition to the resource types and specific resources analyzed
34 in this PEIS, future site-specific NEPA analyses would include state and local parks, recreation
35 areas, other sensitive visual resources, and communities close enough to the proposed project to
36 be affected by visual impacts. Selected other lands and resources are included in the discussion
37 below.

38
39 In addition to impacts associated with the solar energy facilities themselves, sensitive
40 visual resources could be affected by facilities that would be built and operated in conjunction
41 with the solar facilities. With respect to visual impacts, the most important associated facilities
42 would be access roads and transmission lines, the precise location of which cannot be determined
43 until a specific solar energy project is proposed. For this analysis, the impacts of construction
44 and operation of transmission lines outside of the SEZ were not assessed, assuming that the
45 existing 230-kV transmission line might be used to connect some new solar facilities to load
46 centers, and that additional project-specific analysis would be done for new transmission

1 construction or line upgrades. However, transmission lines to connect facilities to the existing
2 line would be required. Note that depending on project- and site-specific conditions, visual
3 impacts associated with access roads, and particularly transmission lines, could be large.
4 Detailed information about visual impacts associated with transmission lines is presented in
5 Section 5.7.1. A detailed site-specific NEPA analysis would be required to precisely determine
6 visibility and associated impacts for any future solar projects, based on more precise knowledge
7 of facility location and characteristics.
8
9

10 **Impacts on Selected Other Lands and Resources**

11
12

13 ***State Route 62 and Cadiz Road.*** State Route 62, a two-lane highway, passes through the
14 southern edge of the Iron Mountain SEZ. The AADT value for State Route 62 at Cadiz Road is
15 2,000 vehicles (Caltrans 2009), although traffic would increase slightly as a result of solar energy
16 development within the SEZ. Cadiz Road is currently an unpaved road that roughly bisects the
17 SEZ. Under the PEIS development scenario, travelers on both roadways could be subject to large
18 visual impacts from solar energy development within the SEZ.
19

20 Solar facilities within the SEZ would be in full view from both roads, and facilities
21 located near the roads would strongly attract the eye and likely dominate views from the roads.
22 Views of the Ward Valley and surrounding mountains could be completely or partially screened
23 by solar facilities, depending on the layout of solar facilities within the SEZ. Because the roads
24 pass through the SEZ, strong visual contrasts could result, depending on solar project
25 characteristics and location within the SEZ. If solar facilities were located on both sides of the
26 roads, the banks of solar collectors on both sides of the roads could form a visual “tunnel” that
27 travelers would pass through.
28

29 If power tower facilities were located in the SEZ in close proximity to the roads, the
30 receivers could appear as brilliant light sources as viewed from the roads and, if sufficiently
31 close to the roads, would likely strongly attract views. They could be a distraction to travelers.
32 Also, during certain times of the day from certain angles, sunlight on dust particles in the air
33 might result in the appearance of light streaming down from the tower.
34

35 At night, if sufficiently tall, the power towers could have red or white flashing hazard
36 navigation lights, and if the towers were close to the roads, they would be very conspicuous,
37 given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar
38 facilities in the SEZ would likely be visible as well.
39

40 ***Other impacts.*** In addition to the impacts described for the resource areas above, nearby
41 residents and visitors to the area may experience visual impacts from solar energy facilities
42 located within the SEZ (as well as any associated access roads and transmission lines) from their
43 residences, or as they travel area roads. The range of impacts experienced would be highly
44 dependent on viewer location, and on project types, locations, sizes, and layouts, as well as the
45 presence of screening. However, under the 80% development scenario analyzed in the PEIS,

1 from some locations, strong visual contrasts from solar development within the SEZ could
2 potentially be observed.

3 4 5 **9.2.14.2.3 Summary of Visual Resource Impacts for the Proposed Iron Mountain SEZ** 6

7 Under the 80% development scenario analyzed in this PEIS, there could be multiple solar
8 facilities within the Iron Mountain SEZ, a variety of technologies employed, and a range of
9 supporting facilities that would contribute to visual impacts, such as transmission towers and
10 lines, substations, power block components, and roads. The resulting visually complex landscape
11 would be essentially industrial in appearance and would contrast strongly with the surrounding
12 mostly natural-appearing landscape. Large visual impacts on the SEZ and surrounding lands
13 within the SEZ viewshed would be associated with solar energy development within the SEZ
14 because of major modification of the character of the existing landscape. Additional impacts
15 could occur from construction and operation of transmission lines and access roads within and/or
16 outside the SEZ.

17
18 The SEZ is in an area of low scenic quality. Visitors to the area, workers, and residents of
19 nearby areas may experience visual impacts from solar energy facilities located within the SEZ
20 (as well as any associated access roads and transmission lines) as they travel area roads.

21
22 Utility-scale solar energy development within the proposed Iron Mountain SEZ is likely
23 to result in strong visual contrasts for some viewpoints in: the Palen-McCoy Wilderness, located
24 1.6 mi (2.6 km) south of the SEZ; the Old Woman Mountains WA, adjacent to the SEZ; and the
25 Turtle Mountains WA, the Turtle Mountains Scenic ACEC, and the Turtle Mountains NNL, also
26 adjacent to the SEZ.

27
28 Portions of State Route 62 and Cadiz Road intersect the SEZ. Travelers on these roads
29 would be likely to observe strong visual contrasts from solar energy development within the
30 SEZ.

31
32 Moderate visual contrast levels would be expected for high-elevation viewpoints in
33 Joshua Tree National Park and WA, approximately 9.9 mi (15.9 km) southwest of the SEZ, and
34 in the Rice Valley WA, approximately 6.6 mi (10.6 km) southeast of the SEZ.

35
36 Minimal to weak visual contrasts would be expected for some viewpoints within other
37 sensitive visual resource areas within the SEZ 25-mi (40 km) viewshed.

38 39 40 **9.2.14.3 SEZ-Specific Design Features and Design Feature Effectiveness** 41

42 The presence and operation of large-scale solar energy facilities and equipment would
43 introduce major visual changes into non-industrialized landscapes and could create strong visual
44 contrasts in line, form, color, and texture that could not easily be mitigated substantially.
45 However, the implementation of required programmatic design features presented in
46 Appendix A, Section A.2.2, would reduce the magnitude of visual impacts experienced. While

1 the applicability and appropriateness of some design features would depend on site- and project-
 2 specific information that would be available only after a specific solar energy project had been
 3 proposed, some SEZ-specific design features can be identified for the Iron Mountain SEZ at this
 4 time, as follows:

- 5
- 6 • Within the SEZ, in areas visible from and within 1 mi (1.6 km) of the
 7 boundary of the Old Woman Mountains WA, visual impacts associated with
 8 solar energy project operation should be consistent with VRM Class II
 9 management objectives (see Table 9.2.14.3.-1), as experienced from key
 10 observation points (KOPs) (to be determined by the BLM) within the WA
 11 (see Table 9.2.14.3-1). In areas visible from between 1 and 3 mi (1.6 and
 12 4.8 km), visual impacts should be consistent with VRM Class III management
 13 objectives. The VRM Class II impact-level-consistency mitigation would
 14 affect approximately 2,101 acres (8.502 km²) within the western portion of
 15 the SEZ. The VRM Class III impact-level-consistency mitigation would affect
 16 approximately 9,311 additional acres (37.68 km²).
 17
- 18 • Within the SEZ, in areas visible from and south of State Route 62, visual
 19 impacts associated with solar energy project operation should be consistent
 20 with VRM Class III management objectives, as experienced from KOPs (to be
 21
 22

TABLE 9.2.14.3-1 VRM Management Class Objectives

VRM Management Class Objectives	
Class I Objective	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Source: BLM 1986b.

1 determined by the BLM) within the Palen-McCoy WA. The VRM Class III
2 impact-level-consistency mitigation would affect approximately 5,725
3 additional acres (23.168 km²).
4

- 5 • Within the SEZ, in areas visible from and within 3 mi (4.8 km) of the
6 boundary of the Turtle Mountains WA, visual impacts associated with solar
7 energy project operation should be consistent with VRM Class II management
8 objectives, as experienced from KOPs (to be determined by the BLM) within
9 the WA. In areas visible from between 3 and 5 mi (4.8 and 8 km), visual
10 impacts should be consistent with VRM Class III management objectives.
11 The VRM Class II impact-level-consistency mitigation would affect
12 approximately 21,219 acres (85.871 km²) within the western portion of the
13 SEZ. The VRM Class III impact-level-consistency mitigation would affect
14 approximately 13,301 additional acres (53.827 km²).
15

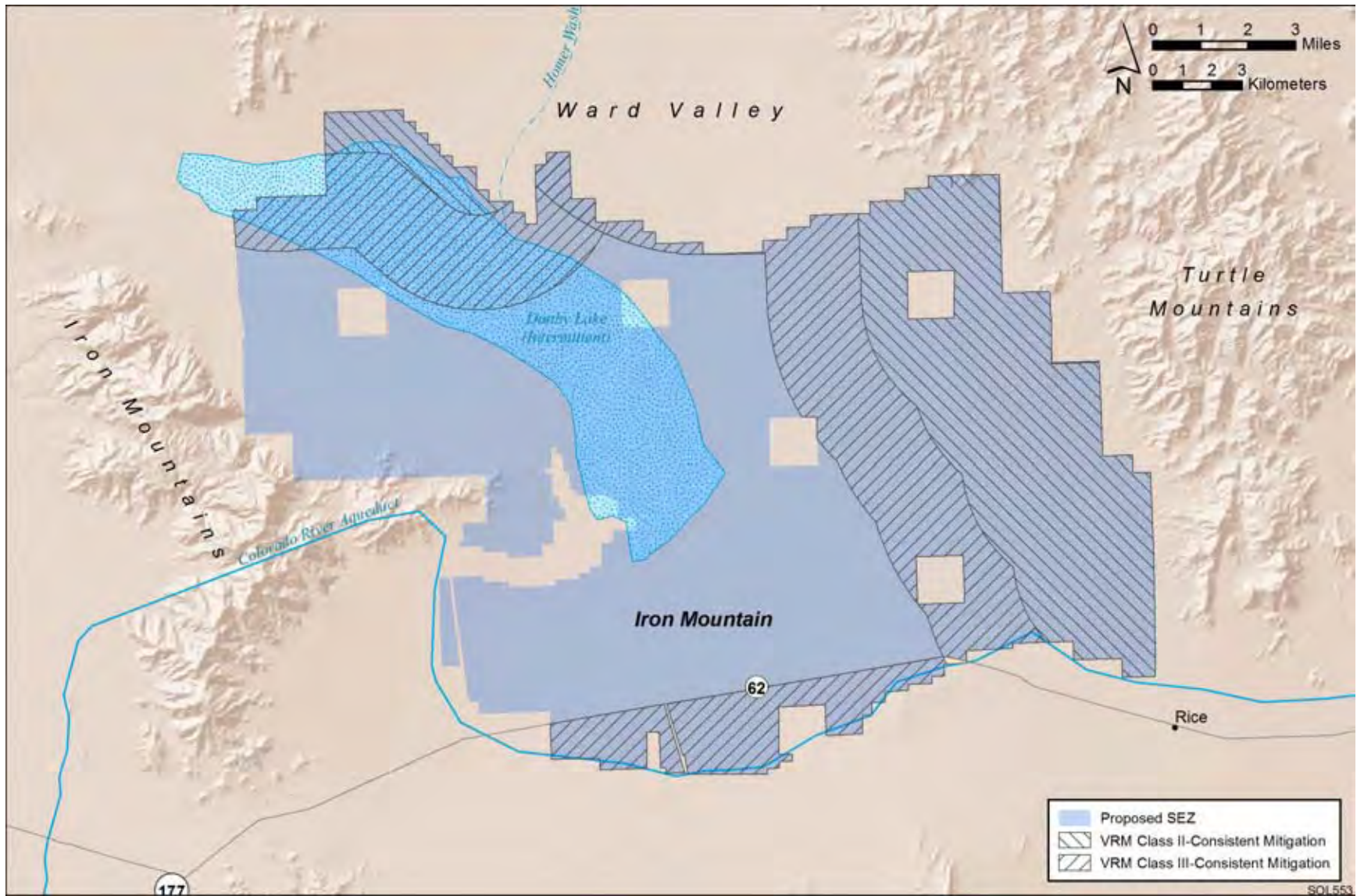
16 Because of the overlap in areas affected by the design features specified above, the total
17 acreage affected by the design features is approximately 50,984 acres (206.326 km²), or 47.9%
18 of the total SEZ acreage. The acreage affected by VRM Class II impact-level consistency is
19 23,320 acres (94.373 km²), or 21.9% of the total SEZ acreage. The acreage affected by VRM
20 Class III impact-level consistency is 27,664 acres (111.953 km²), or 26% of the total SEZ
21 acreage. The areas subject to SEZ-specific design features requiring consistency with VRM
22 Class II and Class III management objectives are shown in Figure 9.2.14.2-17.
23

24 Application of the SEZ-specific design features above would substantially reduce visual
25 impacts associated with solar energy development within the SEZ.
26

27 Application of the SEZ-specific design feature to restrict allowable visual impacts
28 associated with solar energy project operations to within 3 mi (4.8 km) of the Old Woman
29 Mountains WA would substantially reduce potential visual impacts on the WA by limiting
30 impacts within the BLM-defined foreground of the viewshed of this area, where potential
31 visual impacts would be greatest.
32

33 Application of the SEZ-specific design feature to restrict allowable visual impacts
34 associated with solar energy project operations to south of State Route 62 would substantially
35 reduce potential visual impacts on the Palen-McCoy WA by limiting impacts within the BLM-
36 defined foreground of the viewshed of this area, where potential visual impacts would be
37 greatest. This design feature would also reduce impacts on the Turtle Mountains WA, Scenic
38 ACEC, and NNL, as well as on travelers on State Route 62.
39

40 Application of the distance-based mitigation to restrict allowable visual impacts
41 associated with solar energy project operations to within 5 mi (8 km) of the Turtle Mountains
42 WA, Scenic ACEC, and NNL would substantially reduce potential visual impacts on these
43 nationally recognized scenic resource areas by limiting impacts within the BLM-defined
44 foreground–middleground distance within the viewshed of these areas, where potential visual
45 impacts would be greatest. This SEZ-specific design feature would also reduce impacts on the
46 Palen-McCoy Mountains WA, Scenic ACEC, and NNL and on travelers on State Route 62 and
47 Cadiz Road.



1
2 **FIGURE 9.2.14.2-17 Areas within the Proposed Iron Mountain SEZ Affected by SEZ-Specific Distance-Based Visual Impact Design**
3 **Features**

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1 **9.2.15 Acoustic Environment**

2
3
4 **9.2.15.1 Affected Environment**

5
6 The proposed Iron Mountain SEZ is located mostly in the southeastern portion of San
7 Bernardino County with a small, southern portion in Riverside County, in southeastern
8 California. The County of San Bernardino has established noise standards for stationary sources,
9 mobile sources, and all other structures (County of San Bernardino 2009). Noise standards
10 applicable to solar energy development are those for stationary sources based on affected land
11 use and time of day: 55 dBA daytime L_{eq} and 45 dBA nighttime L_{eq} for residential land use.
12 Combining these two levels is the same as the EPA guideline of 55 dBA as L_{dn} for residential
13 areas. In San Bernardino County, temporary construction activities between 7 a.m. and 7 p.m.,
14 except Sundays and federal holidays, are exempted from the noise regulations.

15
16 U.S. 95 lies as close as about 13 mi (21 km) east of the proposed SEZ, while State Route
17 62 passes through the southern portion of the proposed SEZ. Unpaved Cadiz Road runs
18 southeast–northwest across the SEZ. A railroad runs through the SEZ along the Cadiz Road but
19 is unused or rarely used. The nearest airport is Iron Mountain Pumping Plant Airport, located
20 within the southwestern portion of the SEZ. Several airports are within 25 mi (40 km) of the
21 SEZ: Aha-Quin Airport to the southeast, Desert Center Airport to the south–southwest, Cadiz
22 Airstrip to the northwest, and Danby Airstrip to the north-northwest. An industrial area with
23 trailers (East Milligan) in the northwestern portion of the SEZ, about 1 mi (1.6 km) east of
24 Milligan, is currently used by sodium lease operators. There is no evidence of livestock grazing
25 on-site. Therefore, noise sources around the SEZ include road traffic, infrequent railroad traffic,
26 aircraft flyover, industrial activities including sodium mining and pumping activities, and
27 activities and events at nearby IMPS residences. No sensitive receptors (e.g., hospitals, schools,
28 or nursing homes) exist around the Iron Mountain SEZ. The IMPS and a cluster of its employee
29 residences are located about 0.5 mi (0.8 km) west of the west–central portion of the SEZ. No
30 population center with schools is located within a 20-mi (32-km) radius from the proposed Iron
31 Mountain SEZ. The proposed Iron Mountain SEZ is mostly undeveloped, the overall character
32 of which is considered rural to wilderness. To date, no environmental noise survey has been
33 conducted around the Iron Mountain SEZ. On the basis of the population density in
34 San Bernardino County, the day-night average sound level (L_{dn} or DNL) is estimated to be
35 41 dBA for San Bernardino County, typical of a rural area⁸ (Eldred 1982; Miller 2002).

36
37
38 **9.2.15.2 Impacts**

39
40 Potential noise impacts associated with solar projects in the Iron Mountain SEZ would
41 occur during all phases of the projects. During the construction phase, potential noise impacts
42 associated with operation of heavy equipment and vehicular traffic on nearby residences

⁸ Rural and undeveloped areas have sound levels in the range of 33 to 47 dBA as DNL (Eldred 1982). Typically, the nighttime level is 10 dBA lower than the daytime level, and it can be interpreted as 33 to 47 dBA (mean 40 dBA) during daytime hours and 23 to 37 dBA (mean 30 dBA) during nighttime hours.

1 (within 0.5 mi [0.8 km]) would be anticipated, albeit of short duration. During the operations
2 phase, potential impacts on nearby residences would be anticipated, depending on the solar
3 technologies employed. Noise impacts shared by all solar technologies are discussed in detail
4 in Section 5.13.1, and technology-specific impacts are presented in Section 5.13.2. Impacts
5 specific to the Iron Mountain SEZ are presented in this section. Any such impacts would be
6 minimized through the implementation of required programmatic design features described in
7 Appendix A, Section A.2.2, and the application of any additional SEZ-specific design features
8 (see Section 9.2.15.3 below). This section primarily addresses potential noise impacts on
9 humans, although potential impacts on wildlife at nearby sensitive areas are discussed,
10 Additional discussion on potential noise impacts on wildlife is presented in Section 5.10.2.
11
12

13 **9.2.15.2.1 Construction**

14

15 The proposed Iron Mountain SEZ has a relatively flat terrain; thus, minimal site
16 preparation activities would be required, and associated noise levels would be lower than those
17 during general construction (e.g., erecting building structures and installing equipment, piping,
18 and electrical). Solar array construction would also generate noise, but it would be spread over a
19 wide area.
20

21 For the parabolic trough and power tower technologies, the highest construction noise
22 levels would occur at the power block area; a maximum of 95 dBA at a distance of 50 ft (15 m)
23 is assumed, if impact equipment such as pile drivers or rock drills is not being used. Typically,
24 the power block area is located in the center of the solar facility, at a distance of more than
25 0.5 mi (0.8 km) to the facility boundary. However, noise levels from construction of the solar
26 array would be lower than 95 dBA. When geometric spreading and ground effects are
27 considered, as explained in Section 4.13.1, noise levels would attenuate to about 40 dBA at a
28 distance of 1.2 mi (1.9 km) from the power block area. This noise level is typical of daytime
29 mean rural background levels. In addition, mid- and high-frequency noise from construction
30 activities is significantly attenuated by atmospheric absorption under the low-humidity
31 conditions typical of an arid desert environment and by temperature lapse conditions typical of
32 daytime hours; thus noise attenuation to background levels would occur at distances somewhat
33 shorter than 1.2 mi (1.9 km). If a 10-hour daytime work schedule is considered, the EPA
34 guideline level of 55 dBA L_{dn} for residential areas (EPA 1974) would occur at about 1,200 ft
35 (370 m) from the power block area, which would be well within the facility boundary. For
36 construction activities occurring near the residences closest to the west-central SEZ boundary,
37 estimated noise levels at the nearest residences are about 50 dBA, which is higher than a typical
38 daytime mean rural background level of 40 dBA but is below the San Bernardino County
39 regulation of 55 dBA daytime L_{eq} . In addition, 47 dBA L_{dn} ⁹ at this location falls below the
40 EPA guideline of 55 dBA for residential areas.
41

42 It is assumed that a maximum of three projects at any one time would be developed for
43 SEZs larger than 30,000 acres (121.4 km²) such as the Iron Mountain SEZ. If all three projects

⁹ For this analysis, background levels of 40 and 30 dBA for daytime and nighttime hours, respectively, are assumed, which result in day-night average noise level (L_{dn}) of 40 dBA.

1 were to be built within the SEZ near the residences at the IMPS, that is, south, east, and north
2 of the residences, noise levels would be about 3 dBA higher than the above-mentioned values.
3 While this is an unlikely scenario, combined noise levels would be only a slightly noticeable
4 increase of about 3 dB over a single project.
5

6 In addition, noise levels were estimated at the specially designated areas within 5 mi
7 (8 km) of the Iron Mountain SEZ, which is the farthest distance that noise (except extremely
8 loud noise) would be discernable. There are three specially designated areas within the range.
9 Patton Iron Mountain Divisional Camp ACEC lies as close as 0.5 mi (0.8 km) southwest of the
10 SEZ but this ASEC is not a noise-sensitive area (i.e., this area was designated as an ACEC
11 because it contains cultural resources). Chemehuevi Desert Wildlife Management Area
12 (DWMA) and Turtle Mountains Wilderness, where noise might be an issue, are adjacent to the
13 SEZ. For construction activities occurring near these specially designated areas, noise levels are
14 estimated to be about 74 dBA at the boundaries of these specially designated areas, higher than
15 the typical daytime mean rural background level of 40 dBA. Thus, if construction would occur
16 near the specially designated areas, portions of the specially designated areas close to the SEZ
17 (within approximately 1 mi [1.6 km]) could be disturbed by construction noise from the SEZ.
18 However, sound levels above 90 dB are likely to adversely affect wildlife (Manci et al. 1988).
19 Thus construction noise is not likely to adversely affect wildlife except in areas directly adjacent
20 to the construction site.
21

22 Depending on the soil conditions, pile driving might be required for installation of
23 solar dish engines. However, the pile drivers used would be relatively small and quiet, such as
24 vibratory or sonic drivers, rather than the impulsive impact pile drivers frequently seen at large-
25 scale construction sites. Potential impacts on neighboring residences would be anticipated to be
26 minor, considering the distance to the nearest residence (more than 0.5 mi [0.8 km] from the
27 SEZ boundary).
28

29 It is assumed that most construction activities would occur during the day when noise is
30 better tolerated, than at night, because of the masking effects of background noise. In addition,
31 construction activities for a utility-scale facility are temporary in nature (typically a few years).
32 Construction would cause some unavoidable but localized short-term impacts on neighboring
33 communities, particularly for activities occurring near the west-central SEZ boundary, close to
34 the nearest residences.
35

36 Construction activities could result in various degrees of ground vibration, depending
37 on the equipment used and construction methods employed. All construction equipment causes
38 ground vibration to some degree, but activities that typically generate the most severe vibrations
39 are high-explosive detonations and impact pile driving. As for noise, vibration would diminish in
40 strength with distance. For example, vibration levels at receptors beyond 140 ft (43 m) from a
41 large bulldozer (87 VdB at 25 ft [7.6 m]) would diminish below the threshold of perception for
42 humans, which is about 65 VdB (Hanson et al. 2006). During the construction phase, no major
43 construction equipment that can cause ground vibration would be used, and no residences or
44 sensitive structures are located in close proximity. Therefore, no adverse vibration impacts are
45 anticipated from construction activities, including from pile driving for dish engines.
46

1 It is assumed that the existing 230-kV transmission line located within the SEZ might be
2 used to connect new solar facilities to the regional grid and that additional project-specific
3 analysis would be conducted for new transmission construction or line upgrades. However, some
4 construction of transmission lines could occur within the SEZ. Potential noise impacts on nearby
5 residences would be a minor component of construction impacts in comparison with solar
6 facility construction and would be temporary in nature.

9 **9.2.15.2.2 Operations**

10
11 Noise sources common to all or most types of solar technologies include equipment
12 motion from solar tracking; maintenance and repair activities (e.g., washing mirrors or replacing
13 broken mirrors) at the solar array area; commuter/visitor/support/delivery traffic within and
14 around the solar facility; and control/administrative buildings, warehouses, and other auxiliary
15 buildings/structures. Diesel-fired emergency power generators and fire water pump engines
16 would be additional sources of noise, but their operations would be limited to several hours per
17 month (for preventive maintenance testing).

18
19 For the main solar energy technologies, noise-generating activities in the PV solar array
20 area would be minimal, related mainly to solar tracking, if used. Dish engine technology, which
21 employs collector and converter devices in a single unit, on the other hand, generally has the
22 strongest noise sources.

23
24 For the parabolic trough and power tower technologies, most noise sources during
25 operations would be in the power block area, including the turbine generator (typically in an
26 enclosure), pumps, boilers, and dry or wet-cooling systems. The power block is typically located
27 in the center of the facility. On the basis of a 250-MW parabolic trough facility with a cooling
28 tower (Beacon Solar, LLC 2008), simple noise modeling indicates that noise levels would be
29 more than 85 dBA around the power block, but about 51 dBA at the facility boundary, about
30 0.5 mi (0.8 km) from the power block area. For the Iron Mountain SEZ, the predicted noise level
31 from the power block would be about 45 dBA at the nearest residences located 0.5 mi (0.8 km)
32 from the facility boundary, which is higher than typical daytime mean rural background level of
33 40 dBA but well below the San Bernardino County regulation of 55 dBA daytime L_{eq} . If TES
34 were not used (i.e., if the operation were limited to daytime, 12 hours only¹⁰), the EPA guideline
35 level of 55 dBA (as L_{dn} for residential areas) would occur at about 1,370 ft (420 m) from the
36 power block area and thus would not be exceeded outside of the proposed SEZ boundary. At the
37 nearest residences, about 44 dBA as L_{dn} would be estimated, which is well below the EPA
38 guideline level. As for construction, if three parabolic trough and/or power tower facilities were
39 operating around the residences at the IMPS, combined noise levels would be only about 3 to
40 4 dBA above that for a single facility. However, day-night average noise levels higher than those
41 estimated above by using the simple noise modeling would be anticipated if TES were used
42 during nighttime hours, as explained below and in Section 4.13.1.

10 Maximum possible operating hours at the summer solstice, but limited to 7 to 8 hours at the winter solstice.

1 On a calm, clear night typical of the proposed Iron Mountain SEZ setting, the
2 air temperature would likely increase with height (temperature inversion) because of strong
3 radiative cooling. Such a temperature profile tends to focus noise downward toward the ground.
4 There would be little, if any, shadow zone¹¹ within 1 or 2 mi (2 or 3 km) of the noise source in
5 the presence of a strong temperature inversion (Beranek 1988). In particular, such conditions
6 add to the effect of noise being more discernable during nighttime hours, when the background
7 levels are the lowest. To estimate day-night average noise level (L_{dn}), 6-hour nighttime
8 generation with TES is assumed after 12-hour daytime generation. For nighttime hours under
9 temperature inversion, 10 dB is added to noise levels estimated from the uniform atmosphere
10 (see Section 4.13.1). On the basis of these assumptions, the estimated nighttime noise level at the
11 nearest residence (about 1 mi [1.6 km]) from the power block area for a solar facility located
12 near the west-central SEZ boundary) would be 55 dBA, which is higher than San Bernardino
13 County regulation of 45 dBA nighttime L_{eq} . The combined day/night noise is estimated to be
14 about 57 dBA as L_{dn} , which is a little higher than the EPA guideline of 55 dBA for residential
15 areas. The assumptions are conservative in terms of operating hours, and no credit was given to
16 other attenuation mechanisms, so it is likely that noise levels would be lower than 57 dBA at the
17 nearest IMPS residences, even if TES were used at a solar facility. If three parabolic trough
18 and/or power tower facilities were operating around the residences at the IMPS, combined noise
19 levels would be about 3 dBA above that for a single facility. Consequently, operating parabolic
20 trough or power tower facilities using TES and located near the west-central SEZ boundary
21 could result in noise levels above background levels, San Bernardino regulation levels, and EPA
22 guidance levels, and corresponding adverse noise impacts on the nearest residences.

23
24 For a single solar facility located near the Chemehuevi DWMA or Turtle Mountains
25 Wilderness, estimated daytime noise level at the boundaries of these areas would be about
26 51 dBA. Thus, areas near the boundary of these specially designated areas (say, within 1 mi
27 [1.6 km]) could be disturbed by the operational noise from the SEZ, but this noise is not
28 anticipated to adversely affect wildlife (Manci et al. 1988).

29
30 In the permitting process, refined noise propagation modeling would be warranted along
31 with measurement of background noise levels.

32
33 The solar dish engine is unique among CSP technologies, because it generates electricity
34 directly and does not require a power block. A single, large, solar dish engine has relatively low
35 noise levels, but a solar facility might employ tens of thousands of dish engines, which would
36 cause high noise levels around such a facility. For example, the proposed 750-MW SES Solar
37 Two dish engine facility in California would employ as many as 30,000 dish engines (SES Solar
38 Two, LLC 2008). At the Iron Mountain SEZ, on the basis of the assumption of a dish engine
39 facility of up to 9,469 MW covering 80% of the total area (85,217 acres [344.9 km²]), up to
40 378,740 25-kW dish engines could be employed. Also, for a large dish engine facility, several
41 thousand step-up transformers would be embedded in the dish engine solar field, along with
42 several substations; however, the noise from these sources would be masked by dish engine
43 noise.

44

¹¹ A shadow zone is defined as the region in which direct sound does not penetrate because of upward diffraction.

1 The composite noise level of a single dish engine would be about 89 dBA at a distance of
2 3 ft (0.9 m) (SES Solar Two, LLC 2008). This noise level would be attenuated to about 40 dBA
3 (typical of the mean rural daytime environment) within 340 ft (105 m). However, the combined
4 noise level from tens of thousands of dish engines operating simultaneously would be high in the
5 immediate vicinity of the facility, for example, about 53 dBA at 1.0 mi (1.6 km) and 51 dBA at
6 2 mi (3 km) from the boundary of the square-shaped dish engine solar field, both of which are
7 higher than typical daytime background levels of 40 dBA in rural areas but lower than the San
8 Bernardino County regulation of 55 dBA daytime L_{eq} . These levels would occur at somewhat
9 shorter distances, considering noise attenuation by atmospheric absorption and temperature lapse
10 during daytime hours. To estimate noise levels at the nearest residences, it was assumed that dish
11 engines were placed all over the Iron Mountain SEZ at intervals of 98 ft (30 m). Under these
12 assumptions, the estimated noise levels at the nearest receptor (0.5 mi [0.8 km] from the SEZ
13 boundary) would be about 54 dBA, which is slightly lower than the San Bernardino County
14 regulation of 55 dBA daytime L_{eq} . On the basis of 12-hour daytime operation, the estimated
15 51 dBA L_{dn} at these residences is below the EPA guideline of 55 dBA L_{dn} for residential areas.
16 Noise from dish engines could cause adverse impacts on the nearest residences, depending on
17 background noise levels and meteorological conditions. Thus, consideration of minimizing noise
18 impacts is very important during the siting of dish engine facilities. Direct mitigation of dish
19 engine noise through noise control engineering could also be considered.

20
21 For dish engines placed all over the SEZ, estimated noise levels would be about 59 and
22 61 dBA at the boundaries of the Chemehuevi DWMA or Turtle Mountains Wilderness,
23 respectively. These levels are higher than the typical daytime mean background level of 40 dBA.
24 However, dish engine noise from the SEZ would not be likely to adversely affect wildlife at
25 nearby specially designated areas (Manci et al. 1988).

26
27 During operations, no major ground-vibrating equipment would be used. In addition,
28 no sensitive structures are located close enough to the Iron Mountain SEZ to experience
29 physical damage. Therefore, potential vibration impacts on surrounding communities and
30 vibration-sensitive structures during operation of any solar facility would be minimal.

31
32 Transformer-generated humming noise and switchyard impulsive noises would be
33 generated during the operation of solar facilities. These noise sources would be located near the
34 power block area, typically near the center of a solar facility. Noise from these sources would
35 generally be limited within the facility boundary and rarely be heard at nearby residences,
36 assuming a 1-mi (1.6-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and another
37 0.5 mi [0.8 km] to the nearest residences). Accordingly, potential impacts of these noise sources
38 on the nearest residences would be minimal.

39
40 For this analysis, the impacts of construction and operation of transmission lines outside
41 of the SEZ were not assessed, assuming that the existing 230-kV transmission line might be used
42 to connect some new solar facilities to load centers, and that additional project-specific analysis
43 would be done for new transmission construction or line upgrades. However, some construction
44 of transmission lines within the SEZ could occur. For impacts from transmission line corona
45 discharge noise during rainfall events (discussed in Section 5.13.1.5), the noise level at 50 ft
46 (15 m) and 300 ft (91 m) from the center of a 230-kV transmission line towers would be about

1 39 and 31 dBA (Lee et al. 1996), respectively, typical of daytime and nighttime mean
2 background levels in rural environments. Corona noise includes high-frequency components,
3 considered to be more annoying than low-frequency environmental noise. However, corona
4 noise would not likely cause impacts, unless a residence was located close to it (e.g., within
5 500 ft [152 m] of a 230-kV transmission line). The Iron Mountain SEZ is located in an arid
6 desert environment, and incidents of corona discharge are infrequent. Therefore, potential
7 impacts on nearby residences from corona noise along the transmission line ROW would be
8 negligible.
9

10 11 **9.2.15.2.3 Decommissioning/Reclamation** 12

13 Decommissioning/reclamation requires many of the same procedures and equipment
14 used in traditional construction. Decommissioning/reclamation would include dismantling of
15 solar facilities and support facilities such as buildings/structures and mechanical/electrical
16 installations; disposal of debris; grading; and revegetation as needed. Activities for
17 decommissioning would be similar to those used for construction but on a more limited scale.
18 Potential noise impacts on surrounding communities would be correspondingly lower than those
19 for construction activities. Decommissioning activities would be of short duration, and their
20 potential impacts would be minor and temporary in nature. The same design features adopted
21 during the construction phase could also be implemented during the decommissioning phase.
22

23 Similarly, potential vibration impacts on surrounding communities and vibration-
24 sensitive structures during decommissioning of any solar facility would be lower than those
25 during construction and thus minimal.
26

27 28 **9.2.15.3 SEZ-Specific Design Features and Design Feature Effectiveness** 29

30 The implementation of required programmatic design features described in Appendix A,
31 Section A.2.2, would greatly reduce or eliminate the potential for noise impacts from
32 development and operation of solar energy facilities. While some SEZ-specific design features
33 are best established when project details are being considered, measures that can be identified at
34 this time include the following:
35

- 36 • Noise levels from cooling systems equipped with TES should be managed so
37 that levels at the nearest residences to the west of the west-central SEZ are
38 kept within applicable guidelines. This could be accomplished in several
39 ways, for example, through placing the power block approximately 1 to 2 mi
40 (1.6 to 3 km) or more from residences, limiting operations to a few hours after
41 sunset, and/or installing fan silencers.
42
- 43 • Dish engine facilities within the Iron Mountain SEZ should be located more
44 than 1 to 2 mi (1.6 to 3 km) from the nearest residences located to the west of
45 the west-central SEZ (i.e., the facilities should be located in other portions of
46 the proposed SEZ). Direct noise control measures applied to individual dish
47 engine systems could also be used to reduce noise impacts at the nearest
48 residences.

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1 **9.2.16 Paleontological Resources**

2
3
4 **9.2.16.1 Affected Environment**

5
6 The Iron Mountain SEZ is covered predominantly by Quaternary/Tertiary deposits of
7 various types. The eastern half is mostly thick alluvial deposits (more than 100 ft thick), ranging
8 in age from the Miocene to Holocene. The total acreage of the alluvial deposits within the SEZ
9 is 60,421 acres (244 km²), or 57% of the SEZ. The western half is composed mostly of eolian
10 (dune sand) and playa sediments. The total acreage of eolian sediments within the SEZ is
11 27,744 acres (112 km²), or 26% of the SEZ, and the total acreage of playa sediments is
12 17,469 acres (71 km²), or 16% of the SEZ. Peripheral sections of the west-central portion and
13 northeast corner of the SEZ are composed of igneous and metamorphic rocks. The total acreage
14 of these volcanic deposits within the SEZ is 887 acres (3.6 km²), or 1% of the SEZ. In the
15 absence of a PFYC map for the California Desert District, a preliminary classification of PFYC
16 Class 3b is assumed for the alluvial, eolian, and playa deposits. Class 3b indicates that the
17 potential for the occurrence of significant fossil materials is unknown and needs to be
18 investigated further (see Section 4.8 for a discussion of the PFYC system). The PFYC for the
19 volcanic deposits is Class 1, indicating the occurrence of significant fossil materials is
20 nonexistent or extremely rare. On the basis of a sensitivity map supplied by the field
21 archaeologist in the Needles Field Office, areas adjacent to and partially within Danby Lake have
22 been designated as having a high potential for containing paleontological material. Pleistocene
23 paleontological resources including fossil bone and teeth from extinct horse and camel and fossil
24 root casts have been found in remnant lake bed deposits from Danby Lake (Reynolds 1988).
25 These areas include playa sediments, thick alluvial sediments, and eolian sediments (dune sand).
26 This high sensitivity designation would change the preliminary classification mentioned above
27 from a PFYC Class 3b to Class 4/5, and the area would require a paleontological survey. The
28 sensitivity of the remaining areas of the Iron Mountain SEZ is identified as unknown on that
29 map, consistent with a PFYC Class 3b designation.

30
31
32 **9.2.16.2 Impacts**

33
34 The potential for impacts on significant paleontological resources at the Iron Mountain
35 SEZ in Ward Valley is unknown. A more detailed investigation of the local geological deposits
36 of the SEZ and their potential depth is needed. Once a project area has been chosen, a
37 paleontological survey may be needed based on consultation with BLM. The appropriate
38 course of action would be determined as established in BLM IM2008-009 and IM2009-011
39 (BLM 2007a, 2008b). The area around Danby Lake within the Iron Mountain SEZ has a high
40 potential to contain paleontological deposits and would require a paleontological survey.
41 Section 5.14 discusses the types of impacts that could occur to any significant paleontological
42 resources found to be present within the Iron Mountain SEZ. Impacts will be minimized through
43 the implementation of programmatic design features described in Appendix A, Section A.2.2.

44
45 Indirect impacts on paleontological resources outside of the SEZ, such as through looting
46 or vandalism, are unknown but unlikely because any such resources would be below the surface

1 and not readily accessed. Programmatic design features for controlling water runoff and
2 sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.
3

4 No new roads or transmission lines have been assessed for the proposed Iron Mountain
5 SEZ, assuming existing corridors would be used; impacts on paleontological resources related to
6 the creation of new corridors would be evaluated at the project-specific level if new road or
7 transmission construction or line upgrades are to occur.
8

9 A programmatic design feature requiring a stop work order in the event of an inadvertent
10 discovery of paleontological resources would reduce impacts by preserving some information
11 and allowing possible excavation of the resource, if warranted. Depending on the significance of
12 the find, some modification to the project footprint could also result. Since the SEZ is located in
13 an area preliminarily classified as PFYC Class 3b or greater and fossils have been found in
14 deposits associated with Danby Lake, a stipulation would be included in permitting documents to
15 alert solar energy developers to the possibility of a delay if paleontological resources were
16 uncovered during surface-disturbing activities.
17

18 **9.2.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**

19
20
21 Impacts would be minimized through the implementation of required programmatic
22 design features, including a stop-work stipulation in the event that paleontological resources are
23 encountered during construction, as described in Appendix A, Section A.2.2.
24

25 The need for and nature of any SEZ-specific design features would depend on findings of
26 paleontological surveys.
27
28

1 **9.2.17 Cultural Resources**
2

3 Although arid and at first glance forbidding, the deserts of southeastern California are
4 rich in cultural resources. The environment provides the conditions necessary for the creation of
5 dramatic resources, such as the desert pavement necessary for the creation of giant geoglyphs or
6 intaglios. Soil and climate combine to preserve the traces of an elaborate prehistoric system of
7 trails and tread imprints of WWII armored vehicles. The desert landscape includes not only the
8 traces of use and occupation by historic and prehistoric peoples, but natural features, including
9 mountains, caves, and hot springs sacred to the region's Native American inhabitants.
10

11
12 **9.2.17.1 Affected Environment**
13

14
15 **9.2.17.1.1 Prehistory**
16

17 The proposed Iron Mountain SEZ is located in a transitional area between the Colorado
18 Desert to the south and the Mojave Desert to the north. The earliest human use of the Colorado
19 and Mojave Deserts is during the Paleoindian Period sometime between 12,000 and 10,000 B.P.
20 Known sites from the region are predominantly located near inland lakes (now mostly dry, like
21 Danby Lake) and on desert terraces and suggest that subsistence during this time period was
22 focused on large game animals. The hunting-based period ended approximately 7,000 to
23 8,000 years ago when large game became scarce and ancient pluvial lakes started shrinking. The
24 earliest sites are characterized by Clovis complex fluted points, and later sites (Lake Mojave
25 complex and San Dieguito complex for the Mojave and Colorado Deserts, respectively) contain
26 scrapers, blades, distinctive crescents, and projectile points (Jones and Klar 2007).
27

28 The Archaic Period is from approximately 8,000 B.P. to 1500 B.P. The Pinto complex is
29 the primary cultural complex in the Mojave Desert during this time. Very little is known from
30 this period in the Colorado Desert; thus it has become the source of important regional research
31 questions. Archaic Period sites are generally identified through associated material culture, such
32 as distinctive projectile point types and the presence of ground stone tools for processing plant
33 resources. A Gypsum complex has also been identified in the Mojave Desert on the basis of
34 projectile point types for the later portion of this period starting 3,000 to 4,000 years ago, but it
35 does not appear to be present in the southern and eastern reaches of the desert (Jones and
36 Klar 2007). As with earlier sites, Archaic Period sites in valley bottoms that would be suitable
37 for solar energy development would be located near water sources. For example, a Pinto
38 complex site has been recorded along the edge of Danby Lake within the Iron Mountain SEZ
39 (see Section 9.2.17.1.5).
40

41 The Late Prehistoric/Protohistoric Period begins about 1,500 years ago and extends into
42 the beginning of Euro-American exploration and colonization of the area. The archaeological
43 Patayan complex is thought to be ancestral to the later Yuman cultural groups discussed in
44 Section 9.2.17.1.2. The archaeological record includes paddle-and-anvil pottery, bow-and-arrow
45 technology, subsistence agriculture along the Colorado and other rivers, rock art and intaglios. It

1 is also a time of expanding trail networks. The following section on ethnohistory describes the
2 cultural history of this time period in greater detail.
3
4

5 **9.2.17.1.2 Ethnohistory** 6

7 Although of diverse linguistic stock, the Native Americans that inhabited the southeastern
8 California deserts when Euro-Americans first arrived lived in similar environments and shared
9 similar lifeways and broadly similar beliefs, norms, and values (Halmo 2003). The mountains,
10 valleys, and lakes provided seasonally available resources that Native American groups exploited
11 in a seasonal round, moving from resource to resource in a regular pattern in lineage-based bands
12 varying in size depending on the abundance of the resource. A pattern of seasonal camps
13 combined with permanent villages emerged. Lineages tended to consider as their own, specific
14 highly productive areas, such as dense stands of mesquite, while the areas between were shared
15 not only with other lineages, but with other Tribes (Lightfoot and Parish 2009). Even when they
16 grew wild, plant resources were often managed; stands of plant resources might be pruned,
17 watered, or burned to encourage growth. The pattern of seasonal migration to exploit particular
18 resources allowed the groups to adapt to changes in their subsistence base with the arrival of new
19 cultural impulses and populations. Floodplain horticulture, adopted from the Southwest, allowed
20 for the establishment of permanent, often multiethnic villages near the Colorado River
21 (Halmo 2003). These became part of the migratory pattern that continued to take some ethnic
22 groups into the highlands to harvest resources available there. Similarly, with the discovery of
23 gold in the nineteenth century and the influx of Euro-American populations in the twentieth
24 century, Native Americans added wage labor in mines and on large irrigated farms to their
25 seasonal rounds (Bean et al. 1978).
26

27 The various Native American ethnic groups that inhabited the southeastern California
28 deserts each had an area that they considered their homeland, but the boundaries between these
29 areas were not sharply drawn. Travel to hunt, trade, or just visit neighboring groups was common
30 (Kelly and Fowler 1986). The territorial claims of the different ethnic groups who occupied the
31 Mojave and Colorado Deserts overlap each other. The boundaries between ethnic groups appear
32 to have changed from one time period to another, and groups would sometimes share territory, or
33 a group would invite its neighbors to share an abundant resource (CSRI 2002). In addition,
34 different ethnic groups shared a considerable amount of ritual and world view, including an
35 important religious song cycle sung by all groups in the language of the Mohave. This song cycle
36 was associated with a network of trails, including the Salt Song Trail. This trail is both a physical
37 and a spiritual path, connecting sacred natural features thought to be imbued with power and
38 followed particularly as part of a mortuary ritual to aid the departed in their journey to the
39 afterlife. Points along the trail are often marked with cairns, sometimes covering burials, cleared
40 sleeping circles, panels of petroglyphs, and in some areas geoglyphs and intaglios. Stopping
41 points along the trails are most often associated with springs (CSRI 1987). As discussed below
42 in Section 9.2.18.1 the Native Americans living in southeastern California tend to view the
43 landscape they inhabit holistically, each part intrinsically and inextricably connected to the
44 whole. In some sense, the network of trails tied the landscape together.
45

1 The proposed Iron Mountain SEZ lies primarily within the traditional range of the
2 Chemehuevi, a Numic speaking group often considered the southernmost group of the Southern
3 Paiute. Ward Valley was used seasonally by the Mohave Tribe who were Yuman speakers, and
4 before the early nineteenth century, by the Halchidhoma. In addition, the ranges of two Takic-
5 speaking populations, the Cahuilla and the Serrano, closely approach the SEZ on the west. Given
6 the frequent interaction between neighboring groups and the flexibility of the boundaries
7 between them, all four are discussed here.
8
9

10 Chemehuevi

11
12 The Chemehuevi, a southern Paiute group, occupied the Parker and Blythe Valleys along
13 the Colorado River at the invitation of the Mohave with whom they were allied, sometime
14 between 1825 and 1830, after the Mohave and Quechan had driven out the Halchidhoma. In the
15 late 1860s, hostilities erupted between the Mohave and Chemehuevi, and part of the Chemehuevi
16 moved west to join Cahuilla and Serrano villages near Twentynine Palms. In 1874, the Office of
17 Indian Affairs set aside part of the Mohave Reservation along the Colorado River for the
18 Chemehuevi, but many did not want to return. In 1907, a separate reservation was established
19 north of Parker, Arizona (Kelly and Fowler 1986).
20

21 The Chemehuevi occupied the eastern half of the Mojave Desert from south of Death
22 Valley to Riverside and Imperial Counties. They may be divided into two groups—those that
23 live along the Colorado River and adopted floodplain agriculture, and the Desert Chemehuevi
24 (*Tiiranniwiwi*) who occupy the Chemehuevi Valley away from the river and retained their ties to
25 the surrounding upland mountains and valleys (Farmer et al. 2009). However, even those living
26 along the river retained more reliance on hunting and gathering than their neighbors. The
27 *Tiiranniwiwi* are more likely to have been periodically present in the Iron Mountain SEZ,
28 perhaps to hunt bighorn sheep, but the river dwellers may have hunted there as well
29 (Farmer et al. 2009). Taken together, they had a diverse subsistence base, including irrigated
30 mixed horticulture, wild plant management, and hunting. Normally they produced a surplus that
31 they were able to trade (Halmo 2003).
32

33 Chemehuevi settlements were scattered, and band size varied with the season and
34 available water, plant, and animal resources. Dwellings varied from pole structures covered with
35 brush, to rock shelters, to earth-covered huts often with open fronts, adopted from the Mohave.
36 Other items of Mohave material culture were likewise adopted, including ceramic styles, square
37 metates (grinding stones), storage platforms, and personal adornment (Farmer et al. 2009).
38

39 The Chemehuevi maintained a trading relationship with the Cahuilla, and groups of
40 Chemehuevi would travel as far west as the coast to trade for shells and as far east as the Hopi
41 mesas. They were involved in a trade network that stretched from the Channel Islands to the Gila
42 River Valley and the Great Plains, with the potential to bring material culture from some distance
43 away to the Chemehuevi homeland.
44
45

1 **Mohave**
2

3 The Mohave appear to have entered the Mohave Valley some time around A.D. 1150.
4 They resided chiefly along the eastern bank of the Colorado River but travelled widely, both for
5 trade and to harvest seasonally available resources. They lived in sprawling settlements, rather
6 than villages, with houses situated on low hills above the floodplain. They did not engage in
7 irrigation agriculture but relied on seasonal inundation to water and refresh their fields. Unlike
8 most other Colorado Desert Tribes, families owned individual fields and individual mesquite
9 trees (Stewart 1983). Most of the year the Mohave lived on terraces above the Colorado River,
10 moving to the floodplain in the spring to plant crops after seasonal floods receded
11 (Kroeber 1925).
12

13 More than most other California Tribes, the Mohave have traditionally thought of
14 themselves as a nation inhabiting a territory under a hereditary great chief of the Malika clan.
15 Divided into patrilineal clans, they came together for warfare and other purposes. War leaders
16 and shamans had great influence, and power was gained by dreaming, often in sacred locations.
17 Their territorial claims are extensive, reflecting their propensity to travel. They claim as their
18 territory a much larger range than other California Tribes, including all the Mojave Desert and
19 as far south as the Turtle, Granite, and Eagle Mountains (CSRI 2002), thus encompassing the
20 Iron Mountain SEZ. This larger range was where they hunted and gathered to supplement their
21 planted crops and the fish they took from the river. They are likely to have traded, hunted,
22 and gathered in the Iron Mountain SEZ area, harvesting mesquite pods to supplement their
23 cultivated crops. Ward Valley has been identified by them as a camping and gathering location
24 (CRSI 1987). They were less reliant on hunting and gathering than the Chemehuevi who hunted
25 and gathered in much of the same area (Farmer et al. 2009).
26

27 The Mohave were well known as travelers, both for trade and to visit neighboring Tribes.
28 They established the Mohave Trail and participated in a trading network that stretched from the
29 Pacific Coast to the Pueblos of the Southwest. The Serrano were among their trading partners as
30 were the Chumash and the Chemehuevi.
31

32 In addition to travel for trade, war, and recreation, trails often had religious significance.
33 The Salt Song Trail seems to have originated with the Mohave. The Mohave revere other trails
34 such as the Keruk Trail of Dreams. The song cycles that are associated with the trails tied
35 specific songs to specific places. Many of these were considered places of power, where
36 individuals sought enlightenment, skills, and status through dreaming. These trails are considered
37 sacred, and offerings continue to be left at sacred points along them (Halmo 2003).
38
39

40 **Halchidhoma**
41

42 The Halchidhoma were a Yuman-speaking group located south of the Mohave along the
43 Colorado River. Like the Mohave they were floodplain cultivators and active traders. Culturally
44 they were similar to the Mohave and the Quechan, but politically they were their enemies. Their
45 ties were with the Maricopa and Cocopah, also Yuman speakers. Like the Mohave they were
46 great travelers and traders, establishing the Coco-Maricopa or Halchidhoma Trail, and east-west

1 route later followed by Euro-American immigrants. This trail passes well south of the Iron
2 Mountain SEZ (CSRI 2002). Their clashes with the Mohave and Quechan came to a head some
3 time around 1825. The Halchidhoma were defeated and began to move to the Gila River to join
4 their Maricopa allies. This process continued until about 1840 (Harwell and Kelly 1983).
5
6

7 **Cahuilla**

8

9 The Cahuilla occupied the Coachella Valley around Lake Cahuilla. They are believed to
10 have entered the Colorado Desert from the Great Basin sometime between 500 B.C. and
11 A.D. 500. They were hunters and gatherers living in permanent villages near reliable water. They
12 appear to have first settled on the shores of Lake Cahuilla¹² and then moved to the mountains as
13 the lake dried. The Cahuilla tended toward larger groups consisting of multiple lineages
14 (Lightfoot and Parish 2009). Preferred settlement sites were near mesquite stands or palm oases.
15 They considered the latter to be sacred (Bean et al. 1978). While villages were occupied
16 year-round, small groups would move seasonally to temporary camps to collect localized plant
17 resources or to hunt. Larger groups would travel to the mountains together with mountain allies
18 to harvest piñon nuts and acorns. These would be brought to the permanent villages for storage.
19 Species important to the Cahuilla are discussed in Section 9.2.18.
20

21 The Cahuilla were long-distance traders. The routes westward through the San Geronio
22 Pass to the coast lay within their traditional use area, and the Cahuilla maintained trading
23 relationships east of the Colorado River with the Maricopa. Like the Chemehuevi, they were
24 part of a network that stretched as far east as the Great Plains (Bean et al. 1978).
25
26

27 **Serrano**

28

29 Less is known of the Serrano, whose precise sociopolitical boundaries are difficult to
30 define. They derive their name from a Spanish term for highlander or mountaineer. Most
31 researchers place the Serrano groups in the San Bernardino Mountains east of the Cajon Pass,
32 north of Victorville in the Mojave River drainage and as far east as Twentynine Palms. Because
33 of their relative proximity to the Iron Mountain SEZ and their association with the Chemehuevi,
34 they deserve mention here.
35

36 The Serrano were a collection of localized lineages speaking the same language and
37 sharing the same culture, but with little or no overarching political structure. The Serrano appear
38 to have been primarily gatherers, supplementing their plant-based diet with hunting and fishing.
39 The altitude varies considerably within their traditional range, and, as with neighboring groups,
40 resources were collected in a number of environments. Most villages were found in the foothills,
41 but some occurred on the desert floor in locations where good water was available. At higher

¹² Lake Cahuilla formed when the Colorado River shifted course to the west and flowed into the Salton Sea Basin, then dried when the river reverted to its former course. The process of formation and desiccation was cyclical before the construction of dams on the Colorado River, with cycles lasting about 150 years (Redlands Institute 2002).

1 elevations, they gathered piñon nuts and acorns, and at lower elevations mesquite pods and yucca
2 heads. Where the resource was abundant, lineages might gather to harvest or to communally hunt
3 rabbits or deer (Bean and Smith 1978).

4
5 Limited by water supply, villages were small and consisted of clusters of tule-thatched,
6 domed, circular huts. Most often, they also included a larger ceremonial structure where the
7 lineage leader lived. Their material culture included decorated baskets, pottery, hide blankets,
8 stone pipes, yucca fiber cordage, and an assortment of musical instruments of wood, bone, and
9 shell similar to the material culture of the Cahuilla (Farmer et al. 2009).

10
11 The Serrano had little contact with the Spanish until 1819 when an *asistencia*, or mission
12 outpost, was established near Redlands. Thereafter, native lifeways rapidly faded as the majority
13 of the population was moved to the missions. By the latter part of the twentieth century, most
14 Serrano lived on the Morongo and San Manuel Reservations (Bean and Smith 1978).

15 16 17 **9.2.17.1.3 History**

18
19 European explorers first entered the southeastern California deserts in the sixteenth
20 century. Early explorers of Alta California reached the Colorado River by way of the Gulf of
21 California and proceeded up stream past the confluence of the Gila River, but explored little of
22 the interior deserts. For the next 200 years, Spanish penetration of the interior deserts was
23 intermittent resulting in a prolonged protohistoric period (see Sections 9.2.17.1.1 and 9.2.17.1.2).
24 Juan Bautista de Anza crossed the Colorado River with the assistance of the Quechan on his way
25 to Monterey in 1774. His route, which is located well south of the Iron Mountain SEZ near the
26 border of California and Mexico, became the main travel corridor between Arizona and central
27 California in the 1800s.

28
29 The nineteenth and early twentieth centuries were characterized by mining and
30 prospecting both in the Colorado and Mojave Deserts. Gold, silver, copper, gypsum, borax, and
31 manganese were the primary deposits of interest. A series of military camps and forts were
32 established in Arizona, Nevada, and California between 1848 and 1890 to protect those moving
33 into the area from hostile Tribes; tensions had increased between settlers and Native Americans
34 as a result of mass migration to the area during the Gold Rush. In addition to the trail initially
35 established by de Anza, Jedediah Smith created a new trail into California in 1826 that passed
36 through present-day Needles north of the SEZ. This new development in the deserts was
37 dependent on water and transportation. In 1872, the Southern Pacific Railroad started its way
38 toward California; by 1877, it reached Yuma, Arizona, and by 1880, the Chocolate Mountains
39 southeast of the SEZ. Water did not come to the Colorado Desert until the 1930s when the
40 Metropolitan Water District was created and work began on the CRA from Parker Dam to Los
41 Angeles; it was completed in 1938. Mining increased in the area during World Wars I and II as
42 the need for metals (gold, silver, and manganese) increased.

43
44 In 1942, the U.S. Army identified 18,000 mi² (46,600 km²) of desert in California and
45 Arizona for training troops in a desert environment in preparation for combat in North Africa.
46 The area came to be known as the Desert Training Center/California–Arizona Maneuver Area,

1 or DTC/C-AMA, in 1943, as the massive training facility expanded its size to 31,500 mi²
2 (81,600 km²) and its range of activities from training troops, testing and developing equipment
3 and supplies, and developing new techniques and tactics for desert warfare to large-scale training
4 and maneuvering. It is estimated that more than 1 million men trained at the DTC/C-AMA.
5 Although it only operated between 1942 and 1944, it represents a significant period in American
6 history and includes a number of archaeological features of importance, including the remains of
7 training camps, airfields, bivouacs, maneuver areas, and tank tracks (Bischoff 2000).
8

9 The larger context for the DTC is the early days of United States involvement in WWII.
10 The German army was advancing across Europe, and the Italian army had struck out in Libya
11 and Egypt. British forces had been able to successfully counterattack the Italian army but
12 resulted in Germany entering North Africa to help the Italians. General Erwin Rommel of the
13 German army was successful with his desert army advancing across Libya and then into Egypt
14 against the British. The prospect of Germany and Italy controlling Egypt and the Japanese
15 successes in India propelling them toward Persia, leaving Russia wide open to attack, made it
16 clear to the United States that it would need to go to North Africa. General Lesley J. McNair,
17 Chief of Staff of the Army General Headquarters, recognized the need for preparing American
18 soldiers for desert warfare in a terrain similar to that of North Africa. He placed Major General
19 George S. Patton, Jr., who had previously conducted successful training maneuvers in Louisiana,
20 in charge of the desert training center project (Bischoff 2000).
21

22 The location of the DTC was determined in March of 1942 as General Patton toured the
23 desert. Aside from the mountain ranges, the uninhabited desert of eastern California was deemed
24 sufficiently similar to that of North Africa. Patton believed that the area was ideal for large-scale
25 training exercises because it was remote and desolate, but yet water was available and three
26 railroads supplied the area. In addition, there were other military facilities nearby (in Riverside,
27 Las Vegas, Indio, Yuma, and Blythe). Patton worked out deals with the railroad companies
28 (Union Pacific, Santa Fe, and Southern Pacific) and the Municipal Water District in order to
29 supply transportation and water for the troops. Camp Young was the first camp established near
30 what is today named Chiriaco Summit, and it became the DTC headquarters. Camp Iron
31 Mountain and a camp in Needles were established next. The camps were all of temporary
32 construction, mostly tents with some wooden structures to house administrative centers or
33 hospitals. The only permanent construction was open-air chapels and large relief maps. By late
34 summer of 1942, Patton was ordered to North Africa under Operation Torch, where he
35 successfully commanded the western task force of the operation to victory. The DTC was
36 quickly placed under the command of Major General Alvan Gillem, and the first set of
37 maneuvers was conducted in the fall. This first set of maneuvers was considered unrealistic, and
38 the DTC was ordered to act like a theater of operations in a combat setting, including the
39 establishment of communications zones and combat zones. This was the first time the Army
40 simulated a theater of operation. Riverine operations across the Colorado River were also added.
41 At its height, the DTC contained 14 camps, 11 in California and 3 in Arizona, each capable of
42 holding at least 15,000 soldiers during a typical 14-week training schedule. There were also
43 airfields, hospitals, supply depots, and railheads. Rice Airfield, southeast of the Iron Mountain
44 SEZ, was one of four main army airfields for the DTC; air support was considered an integral
45 part of the desert training experience. On-the-ground troops needed to be able to conceal
46 themselves as much as possible to prevent detection during simulated air attacks. In 1943, as the

1 need for desert training waned with the close of the North African campaign, the concept and
2 name of the DTC changed to the California–Arizona Maneuver Area (C-AMA). Its mission was
3 to conduct broader based large-scale training to toughen soldiers mentally and physically and
4 provide battle conditions for conducting firing training and for testing and developing
5 equipment, supplies, and training methods. The DTC/C-AMA saw its greatest amount of activity
6 during the summer and fall of 1943. In late 1943, personnel shortages (due to the need for
7 personnel overseas) resulted in inefficient operation of the C-AMA, and General McNair
8 recommended that the facility be closed. The DTC/C-AMA was declared surplus in April 1944
9 by the War Department and was closed by the end of the month (Bischoff 2000).

10
11 Of specific interest in the vicinity of the Iron Mountain SEZ are Camp Iron Mountain
12 and Camp Granite. Camp Iron Mountain, located immediately adjacent to the proposed Iron
13 Mountain SEZ to the southwest, was one of the first divisional camps constructed in the spring
14 of 1942. It consisted of 15 shower buildings, 26 latrine buildings, 113 pyramidal tents of varying
15 sizes (single, double, and triple), an amphitheater, two chapels, and several water supply
16 installations (BLM 1984). Four firing ranges associated with the Iron Mountain Divisional
17 Camp were located west and north of the camp; a fifth was located to the south at Palen Pass
18 (BLM 1984). Camp Granite was established the summer of 1943 and contained nine artillery
19 ranges just south of the main camp. It is located at the base of the Granite Mountains south of
20 Camp Iron Mountain.

21 22 23 **9.2.17.1.4 Traditional Cultural Properties—Landscape**

24
25 As mentioned previously, the Tribes in this part of California have a holistic cosmology;
26 they see the features of their environment as an interconnected whole imbued with a life force.
27 Prominent features may be seen as places of power, as sacred places. High hills and mountains
28 tend to be regarded as sacred, although some peaks have special status. Other features that tend
29 to be regarded as sacred include caves, certain rock formations, springs and hot springs. Revered
30 locations include panels of rock art, evidence of ancestral settlements, burial or cremation areas,
31 and systems of trails. Sacred sites are often seen as places of power where offerings are left
32 (Halmo 2003). The Tribes see themselves as exercising divinely given responsibilities of
33 stewardship over the lands where they believe they were created and as retaining a divine
34 birthright to those lands. Specific mountain peaks are seen as points of emergence associated
35 with creation stories. Although adopting much of the Mohave cosmology, the Tribes have
36 retained their own identities. For example, the Chemehuevi have their own mountain of
37 creation, Charleston Peak in Nevada (Halmo 2003), distinct from the Mohave’s *Avikwaaame*
38 (Spirit Mountain) or Newberry Peak, also in Nevada. As mentioned previously, there remains
39 considerable interaction among the Tribes that inhabit the southeastern California deserts. A
40 system of alliances furthered trade and the sharing of hunting and gathering grounds.

41
42 From the Native American perspective, the Iron Mountain SEZ is situated within a sacred
43 landscape tied together by a network of sacred trails. The Chemehuevi have identified important
44 trails in the general area, one of which may pass through the southern part of the SEZ. The most
45 important trail is the Salt Song Trail. Generally, it runs north–south and links the mountains of
46 creation in Nevada with other sacred mountains in the south—Palo Verde Peak and when tied to

1 the *Xan Kwakham Trail, Avikwala*, or Pilot Knob (Johnson 2003). While close to the SEZ, it lies
2 to the west. It follows the western slope of the Old Woman Mountains in Fenner Valley, crosses
3 the smaller western arm of Ward Valley then proceeds southward west of the Iron Mountains
4 into Palen Valley (CSRI 1987). Except where it crosses the shorter arm of Ward Valley, it is
5 separated from the Iron Mountain SEZ by mountains. Native American groups from around the
6 region, including the Fort Mohave, Chemehuevi, Cocopah, Quechan, and Colorado River Indian
7 Tribes, who all share reverence for the Salt Song Trail, protested strenuously when an attempt
8 was made to establish a low-level radioactive waste repository at the northern end of Ward
9 Valley because of its association with the Salt Song Trail and because of concerns over
10 groundwater contamination (Ridder 1998).

11
12 Another trail important to the Chemehuevi, leading from the Chemehuevi Valley to
13 Twentynine Palms and the Pacific Coast, although not sacred, crosses Ward Valley well north of
14 the proposed SEZ, while a more southerly east-west route connecting Parker, Arizona, with the
15 coast, crosses Ward Valley to the Iron Mountains, most likely traversing the SEZ.

16
17 Other mountains considered sacred include the Big Maria, Coxcomb, Old Woman,
18 Riverside, and Providence Mountains (Halmo 2003). Of these, the Old Woman Mountains are
19 adjacent to and northwest of the Iron Mountain SEZ and form the western wall of Ward Valley.
20 The Riverside and Big Maria Mountains are visible through a gap in the mountains that surround
21 the SEZ, while the other mountains are shielded from view. It is possible that trails connecting
22 the mountains pass through the SEZ. There are other geophysical features that the Chemehuevi
23 deem culturally important and connected to local features. These stretch from the Eagle
24 Mountains to the southwest to the Grand Canyon of the Colorado River to the northeast. These
25 are not visible from the SEZ, nor would development in the SEZ be visible from them. The
26 Chemehuevi have also identified the Cadiz Valley located west of the Iron Mountains as
27 culturally important and have taken refuge in the Turtle Mountains northeast of the SEZ during
28 times of conflict.

29
30 The Ward Valley contains extensive seasonal collection areas, some of which are still
31 used by the Chemehuevi. There are temporary and permanent campsites throughout the valley.
32 Danby Lake in the southeastern part of the SEZ was an important area for food and salt
33 collection. Numerous campsites are reported from around the lake. A trail along the southern
34 side of the lake may well be part of the east-west trail leading from Parker, Arizona, to the
35 Pacific Coast (CSRI 1987).

36
37 According to a Sacred Lands File Search through the Native American Heritage
38 Commission, Native American burials have been recorded in 12 Township and Range sections
39 wholly or partially included in the proposed Iron Mountain SEZ. An additional burial is located
40 in a section adjacent to the proposed SEZ, and a village site has been recorded in a section that
41 lies partially within the SEZ (Singleton 2010).

42 43 44 ***9.2.17.1.5 Cultural Surveys and Known Archaeological and Historic Resources***

45
46 At least three linear surveys have been conducted within the proposed Iron Mountain
47 SEZ, resulting in the recording of three sites within the SEZ and two additional sites just west of

1 the SEZ. Three additional sites, not associated with the linear surveys, have been recorded in the
2 area, for a total of six recorded sites within the SEZ. Approximately seven sites lie within the
3 Ward Valley, including the two mentioned previously, that are located just outside of the SEZ,
4 but within 5 mi (8 km) of it. Five additional sites are recorded within 5 mi (8 km) of the SEZ
5 but are in locations within and/or beyond (on the other side of) the Iron Mountains or Turtle
6 Mountains with respect to the SEZ; these are not in locations that have the potential to
7 be affected by solar development in the valley and are therefore not discussed further.¹³
8

9 More specifically, a BLM report was published in 1977 regarding a sample survey of
10 the Cadiz Valley/Danby Lake Interim Critical Management Area 37. Twenty-two transects
11 (0.125 mi × 1.0 mi [0.2 km × 1.6 km]) were randomly selected and systematically surveyed
12 across a 278 mi² (720 km²) area. Twenty-one sites were recorded, including the following
13 two sites in the Iron Mountain SEZ: a salt mine and a prehistoric camp with a very large lithic
14 scatter,¹⁴ and the Iron Mountain Divisional Camp just outside of the SEZ. In 1980, a 200-ft
15 (61-m) wide corridor was surveyed following the centerline of a proposed racecourse, including
16 a portion crossing Danby Lake and the Iron Mountains. An isolated basalt mortar was recorded
17 just west of the SEZ, but no artifacts were recorded within the corridor that was surveyed within
18 the SEZ. In the 1980s, an archaeological survey was conducted for the All-American Pipeline, a
19 1,223-mi (1,968-km) heated oil pipeline from Santa Barbara, California, to McCamey, Texas.
20 The specific segment of the All-American Pipeline within the proposed Iron Mountain SEZ was
21 surveyed in 1985, and four sites were recorded (two prehistoric artifact scatters and two historic
22 trash scatters).
23

24 Of the six sites within the SEZ, three are prehistoric and three are historic. One of the
25 prehistoric sites is clearly eligible for listing on the NRHP and is located on the edge of Danby
26 Lake. It is a Pinto complex site with Pinto series projectile points and milling tools representative
27 of the complex. The other two are predominantly lithic scatters, one of which has some milling
28 tools present. Historic period sites include a surface trash scatter consisting of metal, glass, and
29 ceramic artifacts, a hearth with associated bottle glass and shell bead, and a salt mining
30 evaporation basin (ca. 1920s) within the Danby Lake bed.
31

32 A portion of the Iron Mountain Divisional Camp is located within the SEZ. This camp is
33 eligible for the NRHP as representative and the best preserved of the 14 camps within the DTC-
34 C-AMA. Two open-air chapels and a surviving relief map (although affected over time by sheet
35 wash erosion) are extant at the site, as well as stone-lined walkways, unit symbols, and insignias.
36 The 200-ft × 175-ft (61-m × 53-m) relief map represents the entire DTC/C-AMA to scale. The
37 map is now fenced, and a diversion channel was dug uphill to prevent further erosion. There are
38 two other known relief maps, but the one at Iron Mountain is the best preserved. The only other
39 known chapel is at Camp Coxcomb (Bischoff 2000). Camp Granite is located on the other side
40 of the highway just south of the SEZ and Camp Iron Mountain, and Camp Rice and Rice Army
41 Airfield are located to the southeast of the SEZ. Camp Granite, Camp Rice, and Rice Army
42 Airfield are potentially eligible for listing in the NRHP (Bischoff 2000). The close proximity of

¹³ Survey and site information was provided by the BLM Needles Field Office.

¹⁴ Appears to have been initially recorded as three separate sites out of the 21 recorded, but results in one BLM site form.

1 these military sites increases the likelihood of military features and artifacts being present within
2 the SEZ. Property types identified as associated with important World War II training activities
3 within the DTC/C-AMA include the divisional camps, airfields, landing strips, bivouacs,
4 maneuver areas, ranges, training areas, campsites, hospitals, quartermaster depots, railroad
5 sidings, tank tracks, and refuse deposits (Bischoff 2000). At least a portion of one of the five
6 firing ranges appears to have been located within the western part of the Iron Mountain SEZ,
7 according to a map referenced in the *Iron Mountain Divisional Camp Resource Management*
8 *Plan* (BLM 1984). Tank tracks also were observed within portions of the SEZ during a
9 preliminary site visit in August 2009.

10
11 Just west of the northwest corner of the SEZ is the railroad section camp and the townsite
12 of Milligan. The camp would have been established around 1913 to 1917 (based on the railroad
13 going in about 1913 and an approximate date for the cemetery at 1917) and likely abandoned in
14 the 1930s. The site has not been formally evaluated for the NRHP, other than being determined
15 potentially eligible for purposes of a sodium-related project in the area. It consists of a few
16 foundations, including a foundation of the station master's house; a cemetery with approximately
17 10 graves; ornamental rock planters around palo verde trees; a water tank; and an area where tent
18 platforms would have been set up. It is located just south of the Atchison Topeka & Santa Fe
19 Railroad just outside of the sodium mining operations; the cemetery is just north of the tracks.
20 Section camps were strategically established during railroad construction in remote areas near
21 water sources for railroad maintenance purposes. The community population could have reached
22 about 40 people, but was at times as few as 4 to 5 families (Murray 2009).

23
24 Also adjacent to the proposed SEZ, in the northwest, is a lithic scatter with Lake Mojave
25 points (possibly reused lanceolate points from an earlier period) on a former Danby Lake
26 shoreline. This site is potentially eligible for listing in the NRHP.

27
28 The BLM has designated several locations relatively close to the proposed Iron Mountain
29 SEZ as ACECs because of their significant cultural value. The Iron Mountain Divisional Camp
30 ACEC is adjacent to the SEZ, although portions of the historic archaeological site extend outside
31 the boundaries of the ACEC. It was designated an ACEC in 1980 as the best preserved of the
32 World War II camps in California and Arizona. The Mopah Spring ACEC is 7 mi (11 km)
33 northeast of the SEZ; it was designated for its outstanding scenery and its cultural resources. The
34 Palen Dry Lake ACEC is 25 mi (40 km) south of the SEZ and is designated for its prehistoric
35 sites. Additional ACECs are present beyond a 25-mi (40-km) radius of the SEZ; they have been
36 designated for their archaeological resources and Native American values and are reflective of
37 the cultural landscape. These include the Big Marias ACEC (Arizona) 26 mi (42 km) southeast
38 of the SEZ; Alligator Rock and Corn Springs ACECs 30 mi (38 km) and 34 mi (55 km),
39 respectively, southwest of the SEZ; Whipple Mountains ACEC 33 mi (53 km) east of the SEZ;
40 and Mule Mountains ACEC 38 mi (61 km) south of the SEZ.

41 42 43 ***National Register of Historic Places*** 44

45 There are no historic properties listed in the NRHP within the SEZ or within 5 mi (8 km)
46 of the SEZ. However, the Iron Mountain Divisional Camp is eligible for listing in the NRHP and

1 has been recommended as a representative site for the DTC/C-AMA for management purposes
2 (BLM 1984). Although it is not yet listed, it has been designated an ACEC by the BLM to better
3 protect its cultural values. The Pinto complex site that is located within the SEZ is also eligible
4 for listing in the NRHP, and so is the Lake Mojave site adjacent to the SEZ.
5
6

7 **9.2.17.2 Impacts**

8

9 Direct impacts on significant cultural resources during site preparation and construction
10 activities could occur in the proposed Iron Mountain SEZ; however, as stated in Section 9.2.17.1,
11 further investigation is needed. A cultural resource survey of the entire area of potential effects
12 would first be required to identify archaeological sites, historic structures and features, and
13 traditional cultural properties, and an evaluation would follow to determine whether any are
14 eligible for listing in the NRHP. Ward Valley, as a whole, and Danby Lake, in particular, were
15 important areas for gathering both salt and food resources for both the Mohave and Chemehuevi.
16 The remains of campsites are scattered throughout the valley, and there are panels of rock art in
17 the adjacent mountains. These locations remain important both as resource areas and for their
18 archaeological sites. Activities associated with the World War II DTC were also prominent in the
19 valley, and physical remnants of those activities, as well as tank tracks, are present within the
20 SEZ. Possible impacts from solar energy development on cultural resources that are encountered
21 within the SEZ or along related ROWs are described in more detail in Section 5.15. Impacts
22 would be minimized through the implementation of required programmatic design features
23 described in Appendix A, Section A.2.2. Programmatic design features assume that the necessary
24 surveys, evaluations, and consultations will occur.
25

26 Programmatic design features to reduce water runoff and sedimentation would prevent
27 the likelihood of indirect impacts on cultural resources resulting from erosion outside of the SEZ
28 boundary (including along ROWs). These programmatic design features will be especially
29 important in areas near the Iron Mountain Divisional Camp, as erosion has had an effect on the
30 integrity of several features at the site. Indirect impacts on cultural resources through vandalism
31 or theft are possible given the large size of the SEZ and its accessibility, as well as its proximity
32 to areas of significance to Tribes (see below) and historic resources like the Iron Mountain Camp
33 and Milligan townsite.
34

35 No new access roads or transmission lines have been assessed for the proposed Iron
36 Mountain SEZ, assuming existing corridors would be used; impacts on cultural resources related
37 to the creation of new corridors would be evaluated at the project-specific level if new road or
38 transmission construction or line upgrades are to occur.
39

40 Because of the interconnectedness of the landscape in Native American cosmology, a
41 change in one part affects the whole; thus damage to one part of the sacred landscape would
42 affect the entire network. The proposed Iron Mountain SEZ is located near to where the Salt
43 Song Trail crosses the southern end of Ward Valley. Native Americans have expressed concern
44 over the visual impacts of development on segments of the Salt Song Trail (Halmo 2003). It is
45 likely that development of the Iron Mountain SEZ would be visible from the southern end of the
46 Old Woman Mountains (see Section 9.2.14). The Iron Mountain SEZ is not pristine wilderness;

1 it is crossed by a railroad line, includes the remains of an abandoned settlement, is actively
2 leased for sodium extraction, and is scarred by tank tracks dating from World War II. However,
3 the construction of an extensive solar energy facility would very likely have more visual impact
4 on the landscape surrounding the mountains than already exists. Native Americans have also
5 expressed concern over other impacts likely to accompany development (Halmo 2003). The
6 presence of an industrial facility and the associated increase in traffic and workers are likely to
7 have a negative impact on the qualities that render a site sacred. An increase in the number of
8 people in the area would increase the potential for damage to panels of rock art and the
9 disturbance of burials and archaeological sites. While the development of the Iron Mountain SEZ
10 would necessarily increase the number of people coming to and working in Ward Valley, this
11 impact should be greatest during the construction and decommissioning phases of a facility. The
12 operation of a solar facility would require fewer personnel (see Section 9.2.19.2).

15 **9.2.17.3 SEZ-Specific Design Features and Design Feature Effectiveness**

17 Programmatic design features to mitigate adverse effects on significant cultural
18 resources, such as avoidance of burials and significant sites and cultural awareness training for
19 the workforce, are provided in Appendix A, Section A.2.2.

21 SEZ-specific design features would be determined in consultation with the California
22 SHPO and affected Tribes. Consultation efforts should include discussions on significant
23 archaeological sites and traditional cultural properties and on sacred sites and trails with views of
24 the proposed SEZ. SEZ-specific design features could include the following:

- 26 • Avoidance of NRHP-eligible sites (historic properties) within the proposed
27 SEZ, specifically in the vicinity of Danby Lake and near the Iron Mountain
28 Divisional Camp, is recommended.
- 30 • Because of the possibility for burials in the vicinity of the proposed Iron
31 Mountain SEZ and its location along the Salt Song Trail interconnecting a
32 sacred landscape and its associated sites, it is recommended that for surveys
33 conducted in the SEZ, consideration be given to include Native American
34 representatives in the development of survey designs and historic property
35 treatment and monitoring plans.
- 37 • Troops in training for World War II often used the same locations that Native
38 Americans did for similar purposes (CSRI 1987). Any excavation of historic
39 sites should take into consideration the potential for the co-location of
40 prehistoric and ethnohistoric components.

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1 **9.2.18 Native American Concerns**
2

3 As discussed in Section 9.2.17, many Native Americans view their environment
4 holistically. This section focuses on concerns that are specific to Native Americans and to which
5 Native Americans bring a distinct perspective. For a discussion of issues of possible Native
6 American concern, several sections in this PEIS should be consulted. General topics of concern
7 are addressed in Section 4.16. Specifically for the proposed Iron Mountain SEZ, Section 9.2.17
8 discusses archaeological sites, structures, landscapes, trails, and traditional cultural properties;
9 Section 9.2.8 discusses mineral resources; Section 9.2.9.1.3 discusses water rights and water use;
10 Section 9.2.10 discusses plant species; Section 9.2.11 discusses wildlife species, including
11 wildlife migration patterns; Section 9.2.13 discusses air quality; Section 9.2.14 discusses visual
12 resources; Sections 9.2.19 and 9.2.20 discuss socioeconomics and environmental justice,
13 respectively; and issues of human health and safety are discussed in Section 5.21.
14

15 Many Native Americans view the whole of the landscape as imbued with a life force,
16 including features and objects viewed by Euro-American cultures as inanimate. The importance
17 of landscapes, geophysical features, trails, rock art, and archaeological sites is discussed in
18 Section 9.2.17. This section focuses on other Native American concerns, including those that
19 have an ecological as well as cultural component. For many Native Americans, the taking of
20 game or the gathering of plants or other natural resources is seen as both a sacred and secular act
21 (Stoffle et al. 1990).
22

23 Information has been sought from all federally recognized tribes with traditional ties
24 to the Colorado Desert, including the Iron Mountain SEZ. Because Tribal land claims are
25 overlapping and because conflicts among the Tribes and with Euro-Americans resulted in
26 the dispersal of much of the original population, contacts have been initiated with a wide
27 net of Tribes that are likely to include descendants of the indigenous inhabitants of the area.
28 Table 9.2.18-1 lists the Tribes contacted with traditional ties to the SEZs in southeastern
29 California. Contacts with all federally recognized Tribes are presented in Appendix K.
30 The concerns of Native Americans, including the Chemehuevi, Mohave, Cahuilla, and Serrano,
31 over other energy development projects in the region also have been documented and are
32 summarized in the next section. These comments provide important insights into their concerns
33 over energy development in the area.
34
35

36 **9.2.18.1 Affected Environment**
37

38 As discussed in Section 9.2.17, the territorial boundaries of the tribes that inhabited the
39 Colorado Desert appear to have been fluid over time. At times they overlapped, and resources
40 were shared where abundant. The boundaries considered here are those presented by the tribes
41 themselves to the Indian Claims Commission in the 1950s. While the commission recognized the
42 individual claims for the Chemehuevi, Mohave, and Quechan, most of California, including
43 much of the southeastern part of the state, was judged to be the common territory of the “Indians
44 of California” and is so shown on maps of judicially established Native American land claims
45 (Royster 2008). This category was created by Congress to accommodate the claims of Native
46 Americans who had lost their identity as distinct tribes, bands, or villages because of the arrival

TABLE 9.2.18-1 Federally Recognized Tribes with Traditional Ties to the Southeastern California SEZs

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Cabazon Band of Cahuilla Mission Indians	Indio	California
Cahuilla Band of Mission Indians	Anza	California
Campo Kumeyaay Nation	Campo	California
Chemehuevi Indian Tribe	Havasu Lake	California
Cocopah Indian Tribe	Somerton	Arizona
Colorado River Indian Tribes	Parker	Arizona
Ewiiapaayp Band of Kumeyaay Indians	Alpine	California
Fort Mojave Indian Tribe	Needles	California
La Posta Band of Kumeyaay Indians	Boulevard	California
Los Coyotes Band of Cahuilla & Cupeno Indians	Warm Springs	California
Manzanita Band of Kumeyaay Indians	Boulevard	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
Salt River Prima-Maricopa Indian Community	Scottsdale	Arizona
San Manuel Band of Mission Indians	Patton	California
Soboba Band of Luiseño Indians	San Jacinto	California
Sycuan Band of the Kumeyaay Nation	El Cajon	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twenty-Nine Palms Band of Mission Indians	Coachella	California
Viejas Band of Kumeyaay Indians	Alpine	California

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and policies of Euro-Americans (Indian Claims Commission 1958). The claims of the Serrano and Cahuilla lie within the Indians of California territory but were also presented individually to the commission. These claims appear to respect the claims made by neighboring Tribes. The Mohave submitted two claims. One claim accepted by the commission was restricted to areas along the Colorado River, the other, reflecting their view that they were the original inhabitants of southeastern California and all others late-comers, includes much of Chemehuevi and Indians of California territory (Indian Claims Commission 1958; CSRI 2002).

9.2.18.1.1 Territorial Boundaries

Chemehuevi

Maps of Native American territorial boundaries in southeastern California usually show the southern end of Ward Valley, where the proposed Iron Mountain SEZ is located, as being in Chemehuevi territory. Iron Mountain is in the southern lobe of the territory they claimed. Their territory stretches from the Chemehuevi Reservation on the Colorado River on the east, west as far as Soda Lake beyond the Bristol Mountains, and north of the Newberry Mountains (CSRI 2002). Chemehuevi descendants may be found on the Chemehuevi Reservation and among the Twentynine Palms Band of Mission Indians.

1 **Mohave**

2
3 The territory claimed by the Mohave includes almost all land claimed by the Chemehuevi
4 and overlaps with Serrano claims. It extends as far west as the Tehachapi and San Gabriel
5 Mountains. They see themselves as the original people to dwell in the Colorado Desert. The
6 others are latecomers or distant branches of the Mohave. Their claimed territory includes the
7 northern portion of Ward Valley, and it is likely that the resources of the Iron Mountain SEZ
8 were shared (CSRI 2002). Mohave Indians may be found on the Fort Mohave Reservation and
9 the Colorado River Reservation.

10
11
12 **Serrano**

13
14 The Serrano were friendly trading partners of the Chemehuevi. Their territorial claims lie
15 just to the south of Chemehuevi territory. The proposed Iron Mountain SEZ is close to the border
16 between the two claims. Given the variable nature of the claims and the important salt deposits
17 near Danby Lake, it is likely that the Serrano had access to the valley as well (CSRI 2002).
18 Serrano descendants may be found among the San Manual and Morongo Bands of Mission
19 Indians.

20
21
22 **Cahuilla**

23
24 The Coachella Valley lies at the heart of Cahuilla territory, well to the southwest of the
25 proposed Iron Mountain SEZ. However, their eastward territorial claims extend to just west of
26 Blythe, California, which is south of the proposed Iron Mountain SEZ. However, given their
27 relative proximity and their propensity for long-distance trading and travel, it is likely that the
28 SEZ was part of their broader range (CRSI 2002). Cahuilla descendants may be found on many
29 reservations, including those of the Morongo, Agua Caliente, Cabazon, Cahuilla, Los Coyotes,
30 and Torres-Martinez Bands.

31
32
33 **9.2.18.1.2 Plant Resources**

34
35 The traditional Native American subsistence base in the Colorado Desert was a
36 combination of floodplain agriculture and hunting and gathering. The proportion of farming to
37 gathering varies with the tribe. The margins of Danby Lake may have periodically supported
38 traditional farming, but Ward Valley is more closely associated with the harvesting of wild
39 plants. Traditionally, Native American Tribes in the Colorado Desert practiced a seasonal round
40 in harvesting naturally occurring plant resources. For example, agave heads are harvested in
41 early spring, mesquite produced a summer crop, and fall might include harvests of pine nuts or
42 acorns at higher elevations (Lightfoot and Parish 2009). Proximity to valuable plant resources
43 and water were important factors in determining where Native Americans chose to build their
44 villages and camps. Native Americans commenting on nearby development projects have voiced
45 concern over the loss of culturally important plants used for food, medicine, and ritual purposes
46 and for making tools, implements, and structures. The plant communities observed or likely to be

1 present at the Iron Mountain SEZ are discussed in Section 9.2.10. Danby Lake is classified as
 2 North American Warm Desert Playa. While most of the valley floor on either side of the lake has
 3 been characterized as Sonora-Mojave Creosotebush-White Bursage Desert Scrub, a small area of
 4 Sonora-Mojave Mixed Salt desert Scrub is present to the north of the lake (NatureServe 2008).
 5 The valley bottom is dominated by creosote and burrobrush, with mesquite present in the washes.
 6

7 Table 9.2.18.1-2 lists plants important to Native Americans that were either observed at
 8 the Iron Mountain SEZ or are possible members of the cover type plant communities that have
 9 been defined for the SEZ. These plants are the dominant species; however, other plants important
 10 to Native Americans could occur in the SEZ, depending on localized conditions and the season.
 11 Food plants are present in the Iron Mountain SEZ, although they do not appear to be dominant.
 12 Food plants had other uses as well. The most important is mesquite, found in the washes of the
 13 SEZ. Its long bean-like pods are harvested in the summer, can be stored, and were widely traded
 14 in the past; its blossoms are also edible. Traditionally, mesquite groves were managed by
 15 burning. Mesquite trunks also traditionally served as a source of wood; fiber from its inner bark
 16 was made into string, its thorns were used for tattooing; and its gum was used as an adhesive, a
 17 cleansing agent, and medicine. Native Americans also harvest and eat a variety of cactus fruits
 18 and yucca heads in season. Jojoba produces an edible nut that can be ground into a meal and
 19 also has medicinal uses. Saltbush seeds can be harvested, processed, and eaten (Lightfoot and
 20 Parish 2009).
 21
 22

TABLE 9.2.18.1-2 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Iron Mountain SEZ

Common Name	Scientific Name	Status
Food		
Beavertail Prickly Pear Cactus	<i>Opuntia basilaris</i>	Observed
California Barrel Cactus	<i>Ferocactus cylindraceus</i>	Nearby
Cholla Cactus	<i>Cylindropuntia</i> spp.	Observed
Honey Mesquite	<i>Prosopis Glandolosa</i>	Observed
Jojoba	<i>Simmondsia chinensis</i>	Nearby
Saltbush	<i>Atriplex</i> spp.	Observed
Yucca	<i>Yucca</i> sp.	Observed
Medicine		
Creosotebush	<i>Larrea tridentata</i>	Observed
Greasewood	<i>Adenotsoma fasciculatum</i>	Observed
Squaw tea	<i>Ephedra nevadensis</i>	Possible
Ritual		
Ironwood	<i>Olneya tesota</i>	Observed
Raw Material		
Desert-Willow	<i>Chilopsis linaeris</i>	Observed

Sources: Field visit; Lightfoot and Parrish (2009); NatureServe (2008).

1 The proposed Iron Mountain SEZ includes other plants useful to Native Americans.
 2 The leaves of the dominant creosotebush are widely made into tea for medicinal purposes.
 3 The trunks of greasewood can be used in construction, while its leaves and branches are used
 4 in curing, as is a tea made from *Ephedra nevadensis*, or Mormon tea. Desert willow is used in
 5 basketry (Lightfoot and Parish 2009), while ironwood is considered sacred by the Cahuilla
 6 (Bean et al. 1978).

7
 8
 9 **9.2.18.1.3 Other Resources**

10
 11 The proposed Iron Mountain SEZ was also likely a hunting ground. It lies across the
 12 route taken by bighorn sheep, *Ovis Canadensis*, moving from one mountain range to the next.
 13 Ward Valley is also known as a good location to hunt rabbits (CSRI 1987). Other animal species
 14 traditionally used by Native Americans that are likely to occur in the SEZ are listed in
 15 Table 9.2.18.1-3.

16
 17 Mineral resources important to Native Americans in the Colorado Desert include clay
 18 suitable for making pottery, stone suitable for the manufacture of both cutting and grinding tools,
 19 hematite for pigment, and quartz crystals considered to have healing properties (Halmo 2003).

20
 21 As long-time desert dwellers, Native Americans have a great appreciation for the
 22 importance of water in a desert environment. They have expressed concern over the use and
 23 availability of water for solar energy installations (Halmo 2003; Jackson 2009). One of the main
 24
 25

TABLE 9.2.18.1-3 Animal Species Used by Native Americans Whose Range Includes the Proposed Iron Mountain SEZ

Common Name	Scientific Name	Status
Mammals		
Bighorn sheep	<i>Ovis Canadensis</i>	All year
Black-tailed jack rabbit	<i>Lepus californicus</i> .	All year
Bobcat	<i>Lynx rufus</i>	All year
Coyote	<i>Canis latrans</i>	All year
Desert cottontail	<i>Silvilagus audubonii</i>	All year
Squirrels	<i>Spermophilus</i> sp. & <i>Ammospermophilus</i> sp.	All year
Wood rats	<i>Neotoma</i> spp.	All year
Birds		
Gambel's quail	<i>Callipepla gambelii</i>	All year
Mourning dove	<i>Zenaida macroura</i>	All year
Reptiles		
Desert tortoise	<i>Gopherus Agassizii</i>	All year
Rattlesnakes	<i>Crotalus</i> spp.	All year

Sources: Lightfoot and Parrish (2009); Fowler (1986); Stewart (1983).

1 concerns over past industrial development planned in Ward Valley was the contamination of
2 ground water, which they see as ultimately flowing to the Colorado River and affecting the basin
3 as a whole (CSRI 1987; Ridder 1998).

4
5 Some Tribes share with the populace as a whole concerns over potential danger from
6 electromagnetic fields. In traditional Cahuilla culture, electricity, both natural (lightning) and
7 artificially generated, is considered dangerous and something to be avoided (Bean et al. 1978).
8 They may have concerns over a facility that produces electricity and its associated transmission
9 system.

10
11 In addition, Native Americans have expressed concern over ecological segmentation, that
12 is, development that fragments animal habitat and does not provide corridors for movement.
13 They would prefer solar energy development take place on land that has already been disturbed,
14 such as abandoned farmland, rather than on undisturbed ground.

15 16 17 **9.2.18.2 Impacts**

18
19 To date, no comments have been received from the Tribes specifically referencing the
20 proposed Iron Mountain SEZ. However, the Native American Land Conservancy (NALC), an
21 inter-tribal organization, has expressed concern over culturally important sites in the Iron
22 Mountains and sites associated with the Salt Song Trail (Russo 2009). Likewise, the Chemehuevi
23 Indian Tribe has previously expressed concerns over the Salt Song Trail, which passes just west
24 of the SEZ (Ridder 1998; Halmo 2003). Solar development within the SEZ is likely to be visible
25 from the trail. In a response letter, the Quechan Indian Tribe of the Fort Yuma Indian
26 Reservation stressed the importance of evaluating impacts on landscapes as a whole. Because
27 trails have both physical and spiritual components, the intrusion of industrial development
28 nearby would negatively affect the trails (Jackson 2009).

29
30 The impacts that would be expected from solar energy development within the Iron
31 Mountain SEZ on resources important to Native Americans fall into two major categories:
32 impacts on the landscape and impacts on discrete localized resources.

33
34 Potential landscape-scale impacts are those caused by the presence of an industrial
35 facility within a culturally important landscape that includes sacred mountains and other
36 geophysical features tied together by a network of sacred trails. Impacts may be visual—the
37 intrusion of an industrial feature in sacred space; audible—noise from the construction, operation
38 or decommissioning of a facility detracting from the traditional cultural values of the site; or
39 demographic—the increased presence of outsiders in the area increasing the chance that the
40 sacredness of the area would be degraded by more foot and motorized traffic in the area. As
41 consultation continues and additional analyses are undertaken, it is possible that there will be
42 Native American concerns expressed over potential visual effects of solar energy development
43 within the SEZ on the landscape, such as on Old Woman Mountain, Turtle Mountains, the Salt
44 Song Trail, and/or on the valley as a whole (see also Section 9.2.17).

1 Localized effects could occur both within the SEZ and in adjacent areas. Within the SEZ
2 these effects would include destroying or degrading important plant resources, destroying the
3 habitat of and impeding the movement of culturally important animal species, destroying
4 archaeological sites and burials, and the degradation or destruction of trails. Known resources of
5 this type within the SEZ tend to be associated with Danby Lake. Any ground-disturbing activity
6 associated with the development within the SEZ has the potential for destruction of localized
7 resources. Since solar energy facilities cover large tracts of ground, even taking into account the
8 implementation of design features, it is unlikely that avoidance of all resources would be
9 possible. Programmatic design features (see Appendix A, Section A.2.2) assume that the
10 necessary cultural surveys, site evaluations, and tribal consultations will occur. As discussed in
11 Sections 9.2.11 and 9.2.12, the effects of development in the proposed SEZ are expected to be
12 moderate. Significant areas of habitat would remain in the region. As discussed in
13 Section 9.2.10.2, effects on native plant species are expected to be small, because the affected
14 cover types would remain abundant in the region.

15
16 Affects on resources in surrounding areas include the landscape intrusions discussed
17 above and the potential for the degradation of such features as trails, rock art, shrines, and sacred
18 places in the surrounding mountains. This degradation could result from increased traffic and
19 increased numbers of people in the area, especially during construction and decommissioning
20 phases of the project.

21
22 Implementation of programmatic design features, as discussed in Appendix A,
23 Section A.2.2, should eliminate impacts on Tribes' reserved water rights and the potential for
24 groundwater contamination issues.

25 26 27 **9.2.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

28
29 Programmatic design features to mitigate impacts of potential concern to Native
30 Americans, such as avoidance of burials, sacred sites, water sources, and Tribally important
31 plant and animal species, are provided in Appendix A, Section A.2.2.

32
33 The development of solar energy facilities in the state of California requires developers
34 to follow CEC guidelines for interacting with Native Americans in addition to Federal
35 requirements (CEC 2009). Developers must obtain information from California's NAHC on the
36 presence of Native American sacred sites in the project vicinity and a list of Native Americans
37 who want to be contacted about proposed projects in the region. Table 9.2.18.3-1 lists the tribes
38 recommended for contact by the NAHC.

39
40 The need for and nature of SEZ-specific design features regarding potential issues of
41 concern, such as burials and the Salt Song Trail, would be determined during government-to-
42 government consultation with affected Tribes.

43
44 The NALC has recommended that the agencies hold a series of listening sessions with the
45 affected Tribes (such as those listed in Table 9.2.18.3-1) and meet with the leaders of the Salt
46 Song Tradition to gain a better understanding of the Salt Song cultural landscape (Russo 2009).

TABLE 9.2.18.3-1 Federally Recognized Tribes Listed by the NAHC to Contact Regarding the Proposed Iron Mountain SEZ

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Chemehuevi Indian Tribe	Havasu Lake	California
Cocopah Indian Tribe	Somerton	Arizona
Colorado River Indian Tribes	Parker	Arizona
Fort Mojave Indian Tribe	Needles	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
San Manuel Band of Mission Indians	Patton	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twentynine Palms Band of Mission Indians	Coachella	California

Source: Singleton (2010).

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In addition, the Quechan Tribe has requested that it be consulted at the inception of any solar energy project. The Quechan also suggest that the clustering of large solar energy facilities be avoided; that priority for development be given to lands that have already been disturbed by agricultural or military use; and that the feasibility of placing solar collectors on existing structures be considered, thus minimizing or avoiding the use of undisturbed land (Jackson 2009).

Mitigation of impacts on archaeological sites and traditional cultural properties is discussed in Section 9.2.17.3, in addition to programmatic design features for historic properties discussed in Appendix A, Section A.2.2.

1 **9.2.19 Socioeconomics**

2
3
4 **9.2.19.1 Affected Environment**

5
6 This section describes current socioeconomic conditions and local community services
7 within the ROI surrounding the proposed Iron Mountain SEZ. The ROI is a two-county area
8 comprising Riverside and San Bernardino Counties in California. It encompasses the area in
9 which workers are expected to spend most of their salaries and in which a portion of site
10 purchases and nonpayroll expenditures from the construction, operation, and decommissioning
11 phases of the proposed SEZ facility are expected to take place.
12

13
14 **9.2.19.1.1 ROI Employment**

15
16 In 2008, employment in the ROI stood at 1,646,312 (Table 9.2.19.1-1). Over the period
17 1999 to 2008, the annual average employment growth rate was slightly higher in Riverside
18 County (2.5%) than in San Bernardino County (1.2%). At 1.9%, growth rates in the ROI as a
19 whole were higher than the average rate for California (0.9%).
20

21 In the ROI in 2006, the services sector provided the highest percentage of employment
22 at 44.9%, followed by wholesale and retail trade at 20.7% (Table 9.2.19.1-2). Smaller
23 employment shares were held by construction (10.7%) and manufacturing (10.7%). Within
24 the two counties in the ROI, the distribution of employment across sectors is similar to that of
25 the ROI as a whole, but employment in construction (13.8%) and in agriculture (3.0%) was
26 higher in Riverside County than in the ROI as a whole.
27
28

TABLE 9.2.19.1-1 ROI Employment in the Proposed Iron Mountain SEZ

Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Riverside County	653,552	839,878	2.5
San Bernardino County	712,624	806,434	1.2
ROI	1,366,176	1,646,312	1.9
California	15,566,900	17,059,574	0.9

Sources: U.S Department of Labor (2009a,b).

TABLE 9.2.19.1-2 ROI Employment in the Proposed Iron Mountain SEZ by Sector, 2006

Sector	Riverside County		San Bernardino County		ROI	
	Employment	% of Total	Employment	% of Total	Employment	% of Total
Agriculture ^a	17,064	3.0	5,143	0.9	22,207	1.9
Mining	505	0.1	846	0.1	1,351	0.1
Construction	78,556	13.8	45,700	7.7	124,256	10.7
Manufacturing	56,582	9.9	67,306	11.4	123,888	10.7
Transportation and public utilities	21,835	3.8	49,871	8.5	71,706	6.2
Wholesale and retail trade	116,343	20.4	124,321	21.1	240,664	20.7
Finance, insurance, and real estate	26,964	4.7	28,760	4.9	55,724	4.8
Services	252,847	44.3	267,674	45.4	520,521	44.9
Other	89	0.0	46	0.0	135	0.0
Total	570,468		589,803		1,160,271	

^a Agricultural employment includes 2007 data for hired farm workers.

Sources: U.S. Bureau of the Census (2009a); USDA (2009).

1 **9.2.19.1.2 ROI Unemployment**
2

3 Unemployment rates have been similar in both counties in the ROI. Over the period
4 1999 to 2008, the average rate in Riverside County was 6.0%, slightly higher than the rate in
5 San Bernardino County (5.6%) (Table 9.2.19.1-3). The average rate in the ROI over this period
6 was 5.8%, the same as the average rate for California (5.8%). Unemployment rates for the
7 first 10 months of 2009 contrast with rates for 2008 as a whole; in Riverside County, the
8 unemployment rate increased to 13.8%, while in San Bernardino County the rate reached 13.1%.
9 The average rates for the ROI (13.5%) and for California as a whole (11.6%) were also higher
10 during this period than the corresponding average rates for 2008.
11

12
13 **9.2.19.1.3 ROI Urban Population**
14

15 The population of the ROI in 2006 to 2008 was 74% urban, with the majority of urban
16 areas located in the western portion of the ROI. The largest city, Riverside, had an estimated
17 2006 to 2008 population of 293,207; other large cities in the western portion of the county
18 include San Bernardino (198,014), Moreno Valley (188,676), Fontana (186,689), Ontario
19 (170,947), and Rancho Cucamonga (170,057) (Table 9.2.19.1-4). In addition, there are 2 cities in
20 the county with a 2008 population of between 100,000 and 150,000, and 16 cities with between
21 50,000 and 99,999 persons. All these cities are part of the larger urban region that includes Los
22 Angeles, Riverside, and San Bernardino, and most are more than 100 mi (161 km) from the site
23 of the proposed SEZ.
24

25 Population growth rates among the larger cities in the western part of the ROI have
26 varied over the period 2000 to 2008 (Table 9.2.19.1-4). Murrieta grew at an annual rate of 10.4%
27 during this period, with higher than average growth also experienced in Lake Elsinore (7.1%),
28 Victorville (6.9%), Temecula (6.5%), San Jacinto (5.9%), Fontana (4.7%), Hesperia (3.9%), and
29 Rancho Cucamonga (3.6%). The cities of Hemet (2.3%), Corona (2.2%), and
30
31

**TABLE 9.2.19.1-3 ROI Unemployment Rates
for the Proposed Iron Mountain SEZ (%)**

Location	1999–2008	2008	2009 ^a
Riverside County	6.0	8.6	13.8
San Bernardino County	5.6	8.0	13.1
ROI	5.8	8.3	13.5
California	5.8	7.2	11.6

^a Rates for 2009 are the average for January through November.

Sources: U.S. Department of Labor (2009a–c).

TABLE 9.2.19.1-4 ROI Urban Population and Income for the Proposed Iron Mountain SEZ

City	Population			Median Household Income (\$ 2008)		
	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	1999	2006–2008	Average Annual Growth Rate, 1999 and 2006–2008 (%) ^a
Riverside	255,166	293,207	1.8	53,620	56,805	0.6
San Bernardino	185,401	198,014	0.8	40,093	40,764	0.2
Moreno Valley	142,381	188,676	3.6	61,101	55,178	-1.1
Fontana	128,929	186,869	4.7	58,945	62,914	0.7
Ontario	158,007	170,947	1.0	54,658	57,184	0.5
Rancho Cucamonga	127,743	170,057	3.6	78,450	79,455	0.1
Corona	124,966	148,336	2.2	76,755	78,120	0.2
Victorville	64,029	109,313	6.9	46,591	52,507	1.3
Rialto	91,873	98,376	0.9	53,115	50,000	-0.7
Murrieta	44,282	97,935	10.4	78,424	79,135	0.1
Temecula	57,716	95,853	6.5	76,628	77,394	0.1
Hesperia	62,582	85,236	3.9	51,759	48,160	-0.8
Indio	49,116	83,475	6.9	44,579	53,824	2.1
Chino	67,168	82,435	2.6	71,330	72,373	0.2
Chino Hills	66,787	73,527	1.2	100,908	103,706	0.3
Upland	68,393	71,760	0.6	62,746	67,803	0.9
Hemet	58,812	70,821	2.3	34,556	34,974	0.1
Redlands	63,591	69,394	1.1	62,000	65,539	0.6
Perris	36,189	55,150	5.4	45,774	53,442	1.7
Cathedral City	42,647	51,790	2.5	50,068	42,026	-1.9
Highland	44,605	50,870	1.7	53,084	60,963	1.5
Palm Desert	41,155	50,490	2.6	62,208	55,218	-1.3
Colton	47,662	50,333	0.7	46,063	46,411	0.1
Lake Elsinore	28,928	50,229	7.1	53,926	58,496	0.9
La Quinta	23,694	43,229	7.8	70,237	78,898	1.3
Coachella	22,724	39,014	7.0	36,810	40,463	1.1
San Jacinto	23,779	37,475	5.9	39,433	47,127	2.0
Montclair	33,049	36,231	1.2	52,527	58,094	1.1
Twentynine Palms	28,854	33,354	1.8	40,142	43,447	0.9
Adelanto	18,130	28,330	5.7	40,678	41,875	0.3
Norco	24,157	26,455	1.1	80,537	78,141	-0.3
Barstow	21,119	24,392	1.8	45,152	48,042	0.7
Desert Hot Springs	16,582	23,996	4.7	33,459	38,465	1.6
Blythe	12,155	21,650	7.5	45,480	37,937	-2.0
Loma Linda	18,681	21,515	1.8	49,188	55,091	1.3
Yucca Valley	16,865	20,290	2.3	39,166	45,298	1.6
Rancho Mirage	13,249	16,651	2.9	77,027	NA	NA
Grand Terrace	11,626	12,160	0.6	69,074	NA	NA
Canyon Lake	9,952	11,064	1.3	90,263	NA	NA
Calimesa	7,139	7,478	0.6	48,731	NA	NA
Big Bear Lake	5,438	6,102	1.5	44,351	NA	NA
Needles	4,830	5,293	1.2	33,614	NA	NA
Indian Wells	3,816	5,113	3.7	121,008	NA	NA

^a Data are averages for the period 2006 to 2008.

Source: U.S. Bureau of the Census (2009b–d).

1 Riverside (1.8%) all experienced lower growth rates between 2000 and 2008. The cities of Rialto
2 (0.9%), San Bernardino (0.8%), Colton (0.7%), and Upland (0.6%) all experienced growth rates
3 of less than 1% between 2000 and 2008.

4
5 Riverside County contains a smaller group of cities located about 80 mi (129 km) from
6 the SEZ site: Indio (83,475), Cathedral City (51,790), Palm Desert (50,490), Coachella (39,014),
7 La Quinta (43,229), and Desert Hot Springs (23,996). Population growth in these cities between
8 2000 and 2008 has been relatively high: La Quinta (7.8%), Coachella (7.0%), Indio (6.9%), and
9 Desert Hot Springs (4.7%). One city, Blythe (21,650), is located on the eastern border of the
10 county, on the Colorado River, less than 10 mi (16 km) from the proposed SEZ location and had
11 a relatively high population growth rate (7.5%) between 2000 and 2008.

12
13 A number of smaller cities are located in San Bernardino County, to the east of the
14 San Bernardino area, within about 70 mi (113 km) of the site of the proposed SEZ. Twentynine
15 Palms (2008 population of 33,354) and Yucca Valley (20,290) are located on the perimeter of
16 the Twentynine Palms Marine Corps base and the Joshua Tree National Monument, and are
17 primarily retail centers, while Barstow (24,392) is a rail and road transportation and retail center.
18 Population growth in these cities between 2000 and 2008 has been low, with annual growth rates
19 of 2.3% in Yucca Valley and 1.8% in Twentynine Palms. Needles (5,293) is located on the
20 Colorado River, more than 100 mi (161 km) from the proposed SEZ location, and also had a
21 relatively low population growth rate (1.2%) between 2000 and 2008.

22 23 24 **9.2.19.1.4 ROI Urban Income**

25
26 Median household incomes varied considerably across cities in the ROI. A number of
27 cities in western Riverside County—Murrieta (\$79,135), Norco (\$78,141), and Temecula
28 (\$77,394)—had median incomes in 2006 to 2008 that were higher than the average for the state
29 (\$61,154) (Table 9.2.19.1-4). A number of cities in the western portion of the county had
30 relatively low median household incomes, notably Hemet (\$34,974) and San Jacinto (\$47,127).
31 A number of cities in the western San Bernardino County—Chino Hills (\$103,706), Rancho
32 Cucamonga (\$79,455), Chino (\$72,373), Upland (\$67,803), Redlands (\$65,539), and Fontana
33 (\$62,914)—had median incomes in 2006 to 2008 that were higher than the average for the state
34 (\$61,154) (Table 9.3.19.1-4). A number of cities in the western portion of the county had
35 relatively low median household incomes, notably San Bernardino (\$40,764), Adelanto
36 (\$41,875), Colton (\$46,411), and Hesperia (\$48,160).

37
38 In the western part of Riverside County, median income growth rates between 1999 and
39 2006 to 2008 were highest in San Jacinto (2.0%), Perris (1.7%), with annual growth rates of less
40 than 1% elsewhere. Moreno Valley (-1.1%) and Norco (-0.3%) had negative growth rates
41 between 1999 and 2006 to 2008. The average median household income growth rate for the state
42 as a whole over this period was less than 0.1%. Among the cities in the western part of San
43 Bernardino County, median income growth rates between 2000 and 2006 to 2008 were highest in
44 Highland (1.5%), Victorville (1.3%), Loma Linda (1.3%), and Montclair (1.1%), with annual
45 growth rates of less than 1% elsewhere. Hesperia (-0.8%) and Rialto (-0.7%) had negative

1 growth rates between 1999 and 2006 to 2008. The average median household income growth
 2 rate for the state as a whole over this period was less than 0.1%.

3
 4 In the cities in central and eastern Riverside County, La Quinta (\$78,898) had a median
 5 household income higher than the state average between 2006 and 2008, while other cities, Palm
 6 Desert (\$55,218), Indio (\$53,824), Cathedral City (\$42,026), Coachella (\$40,463), and Desert
 7 Hot Springs (\$38,465) had median incomes less than the state average. Median income in Blythe
 8 in 2006 to 2008 was \$37,937. Growth rates in these cities over the period 1999 and 2006 to 2008
 9 varied from 2.1% in Indio to -2.0% in Blythe. Of the cities in central and eastern San Bernardino
 10 County, Barstow (\$48,042) and Yucca Valley (\$45,298) both had median household incomes
 11 less than the state average between 2006 and 2008. Median income in Needles in 2000 was
 12 \$33,614. Growth rates in these cities over the period 1999 and 2006 to 2008 varied from 1.6% in
 13 Yucca Valley to 0.9% in Twentynine Palms.

14
 15
 16 **9.2.19.1.5 ROI Population**

17
 18 Table 9.2.19.1-5 presents recent and projected populations in the ROI and state as a
 19 whole. Population in the ROI stood at 4,092,831 in 2008, having grown at an average annual
 20 rate of 2.9% since 2000. Growth rates for the two counties in the ROI were higher than those
 21 in California (1.5%) over the same period.

22
 23 Both counties in the ROI experienced growth in population between 2000 and 2008;
 24 population in Riverside County grew at an annual rate of 3.8%, while in San Bernardino County,
 25 population grew by 2.0%. The ROI population is expected to increase to 5,584,241 by 2021 and
 26 to 5,780,284 by 2023.

27
 28 **TABLE 9.2.19.1-5 ROI Population for the Proposed Iron Mountain SEZ**

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Riverside County	1,559,039	2,087,917	3.8	2,965,113	3,085,643
San Bernardino County	1,721,942	2,004,914	2.0	2,619,128	2,694,641
ROI	3,280,981	4,092,831	2.9	5,584,241	5,780,284
California	33,871,648	38,129,628	1.5	44,646,420	45,667,413

Sources: U.S. Bureau of the Census (2009e,f); California Department of Finance (2010).

29
 30

1 **9.2.19.1.6 ROI Income**

2
3 Total personal income in the ROI stood at \$121.2 billion in 2007 and has grown at an
4 annual average rate of 3.4% over the period 1998 to 2007 (Table 9.2.19.1-6). Per-capita income
5 also rose over the same period at a rate of 0.7%, increasing from \$27,779 to \$29,736. Per-capita
6 incomes were higher in Riverside County (\$30,713) than in San Bernardino County (\$29,132) in
7 2007. Growth rates in total personal income have been slightly higher in Riverside County; with
8 growth in per-capita incomes higher in San Bernardino County (0.8%). Personal income growth
9 rates in both counties in the ROI were higher than the state rate (2.5%), but per-capita income
10 growth rates in the ROI (0.7%) were slightly lower than in California as a whole (1.1%).
11

12 Median household income in 2006 to 2008 varied from \$56,575 in San Bernardino
13 County to \$58,168 in Riverside County (U.S. Bureau of the Census 2009d).
14

15
16 **9.2.19.1.7 ROI Housing**

17
18 In 2007, more than 1,433,500 housing units were located in the two ROI counties, with
19 about 53% of these located in Riverside County (Table 9.2.19.1-7). Owner-occupied units
20
21

TABLE 9.2.19.1-6 ROI Personal Income for the Proposed Iron Mountain SEZ

Location	1998	2007	Average Annual Growth Rate, 1998–2007 (%)
Riverside County			
Total income ^a	42.2	63.1	4.1
Per-capita income	28,886	30,713	0.6
San Bernardino County			
Total income ^a	44.1	58.1	2.8
Per-capita income	26,797	29,132	0.8
ROI			
Total income ^a	86.3	121.2	3.4
Per-capita income	27,779	29,736	0.7
California			
Total income ^a	1,231.7	1,573.6	2.5
Per-capita income	37,339	41,821	1.1

^a Unless indicated otherwise, values are reported in \$ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of the Census (2009e,f).

**TABLE 9.2.19.1-7 ROI Housing Characteristics
for the Proposed Iron Mountain SEZ**

Parameter	2000	2007 ^a
Riverside County		
Owner-occupied	348,532	446,017
Rental	157,686	201,426
Vacant units	78,456	106,972
Seasonal and recreational use	38,208	NA ^b
Total units	584,674	754,415
San Bernardino County		
Owner-occupied	340,933	381,697
Rental	187,661	207,361
Vacant units	72,775	90,111
Seasonal and recreational use	31,657	NA
Total units	601,369	679,169
ROI		
Owner-occupied	689,465	827,714
Rental	345,347	408,787
Vacant units	151,231	197,083
Seasonal and recreational use	69,865	NA
Total units	1,186,043	1,433,584

^a 2007 data for number of owner-occupied, rental, and vacant units for California counties are not available; data are based on 2007 total housing units and 2000 data on housing tenure.

^b NA = data not available.

Sources: U.S. Bureau of the Census (2009h-j).

1
2
3 compose approximately 67% of the occupied units in the two counties, with rental housing
4 making up 33% of the total. Vacancy rates in 2007 were 14.2% in Riverside County and 13.3%
5 in San Bernardino County; 6.5% of housing units in Riverside County and 5.3% in San
6 Bernardino County was used for seasonal or recreational purposes. With an overall vacancy rate
7 of 13.7% in the ROI, there were 197,083 vacant housing units in the ROI in 2007, of which
8 65,156 are estimated to be rental units that would be available to construction workers. There
9 were 69,865 units in seasonal, recreational, or occasional use at the time of the 2000 Census.

10
11 Housing stock in the ROI as a whole grew at an annual rate of 2.7% over the period 2000
12 to 2007, with 247,541 new units added to the existing housing stock (Table 9.2.19.1-6).

13
14 The median value of owner-occupied housing in 2008 varied from \$366,600 in San
15 Bernardino County to \$380,600 in Riverside County (U.S. Bureau of the Census 2009g).

16
17

1 **9.2.19.1.8 ROI Local Government Organizations**
2

3 The various local and county government organizations in Riverside County are listed in
4 Table 9.2.19.1-8. In addition, three Tribal governments are located in the county, with members
5 of other Tribal groups located in the state, but whose Tribal governments are located in adjacent
6 states.
7

8
9 **9.2.19.1.9 ROI Community and Social Services**
10

11 This section describes educational, health care, law enforcement, and firefighting
12 resources in the ROI.
13

14
15 **Schools**
16

17 In 2007, the two-county ROI had a total of 1,019 public and private elementary, middle,
18 and high schools (NCES 2009). Table 9.2.19.1-9 provides summary statistics for enrollment and
19 educational staffing and two indices of educational quality—student-teacher ratios and levels of
20 service (number of teachers per 1,000 population). The student-teacher ratio in Riverside County
21 schools (22.1) is slightly lower than that in San Bernardino County schools (24.3), while the
22 level of service is slightly higher in Riverside County (9.3) than in San Bernardino County,
23 where there are fewer teachers per 1,000 population (8.8).
24

25
26 **Health Care**
27

28 The total number of physicians (4,176) and the number of physicians per
29 1,000 population (2.1) in San Bernardino County is slightly higher than in Riverside County
30 (3,277, 1.6) (Table 9.2.19.1-10).
31

32
33 **Public Safety**
34

35 Several state, county, and local police departments provide law enforcement in the
36 ROI (Table 9.2.19.1-11). San Bernardino County has 1,783 officers and would provide law
37 enforcement services to the SEZ; there are 1,965 officers in Riverside County. Levels of service
38 of police protection are 1.0 per 1,000 population in Riverside County and 0.9 in San Bernardino
39 County. Currently, there are 3,498 professional firefighters in the ROI (Table 9.2.19.1-11).
40

41
42 **9.2.19.1.10 ROI Social Change**
43

44 Various energy development studies have suggested that once the annual growth in
45 population is between 5 and 15% in smaller rural communities, alcoholism, depression, suicide,
46 social conflict, divorce, and delinquency would increase and levels of community satisfaction

TABLE 9.2.19.1-8 ROI Local Government Organizations and Social Institutions in the Proposed Iron Mountain SEZ

Governments	
City	
Adelanto	Lake Elsinore
Apple Valley	Loma Linda
Barstow	Montclair
Big Bear Lake	Moreno Valley
Blythe	Murrieta
Calimesa	Needles
Canyon Lake	Norco
Cathedral City	Ontario
Chino	Palm Desert
Chino Hills	Perris
Coachella	Rancho Cucamonga
Colton	Rancho Mirage
Corona	Redlands
Desert Hot Springs	Rialto
Fontana	Riverside
Grand Terrace	San Bernardino
Hemet	San Jacinto
Hesperia	Temecula
Highland	Twentynine Palms
Indian Wells	Upland
Indio	Victorville
La Quinta	Yucca Valley
County	
Riverside County	San Bernardino County
Tribal	
Agua Caliente Band of Cahuilla Indians of the Agua Caliente Indian Reservation, California	
Augustine Band of Cahuilla Mission Indians of the Augustine Reservation, California	
Cabazon Band of Mission Indians, California	
Cahuilla Band of Mission Indians of the Cahuilla Reservation, California	
Chemehuevi Indian Tribe of the Chemehuevi Reservation, California	
Ione Band of Miwok Indians of California	
Morongo Band of Cahuilla Mission Indians of the Morongo Reservation, California	
Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, California	
Ramona Band or Village of Cahuilla Mission Indians of California	
San Manuel Band of Serrano Mission Indians of the San Manuel Reservation, California	
Santa Rosa Band of Cahuilla Indians, California	
Soboba Band of Luiseno Indians, California	
Torres Martinez Desert Cahuilla Indians, California	
Twenty-Nine Palms Band of Mission Indians of California	

Sources: U.S. Bureau of the Census (2009b); U.S. Department of the Interior (2010).

TABLE 9.2.19.1-9 ROI School District Data for the Proposed Iron Mountain SEZ, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service ^a
Riverside County	421,642	19,105	22.1	9.3
San Bernardino County	427,603	17,568	24.3	8.8
ROI	849,245	36,673	23.2	9.1

^a Number of teachers per 1,000 population.

Source: NCES (2009).

1
2

TABLE 9.2.19.1-10 Physicians in the ROI for the Proposed Iron Mountain SEZ, 2007

Location	Number of Primary Care Physicians	Level of Service ^a
Riverside County	3,277	1.6
San Bernardino County	4,176	2.1
ROI	7,453	1.8

^a Number of physicians per 1,000 population.

Source: AMA (2009).

3
4

TABLE 9.2.19.1-11 Public Safety Employment in the ROI for the Proposed Iron Mountain SEZ

Location	Number of Police Officers ^a	Level of Service ^b	Number of Firefighters ^c	Level of Service
Riverside County	1,965	1.0	2,205	1.1
San Bernardino County	1,783	0.9	1,293	0.6
ROI	3,748	0.9	3,498	0.9

^a 2007 data.

^b Number per 1,000 population.

^c 2008 data; number does not include volunteers.

Sources: Department of Justice (2008); Fire Departments Network (2009).

5

would deteriorate (BLM 1980, 1983, 1996). Data on violent crime and property crime rates and on alcoholism and illicit drug use, mental health, and divorce, which might be used as indicators of social change, are presented in Tables 9.2.19.1-12 and 9.2.19.1-13, respectively.

There is some variation in the level of crime across the ROI, with slightly higher rates of violent crime in San Bernardino County (4.6 per 1,000 population) than in Riverside County (3.5) (Table 9.2.19.1-12). Property-related crime rates are also slightly higher in San Bernardino County (29.6) than in Riverside County (27.5); that is, overall crime rates in San Bernardino County (34.2) were slightly higher than in Riverside County (31.0).

Other measures of social change—alcoholism, illicit drug use, and mental health—are not available at the county level and thus are presented for the SAMHSA region in which the ROI is located. There is some variation across the two regions in which the two counties are located; rates for alcoholism and illicit drug are slightly higher in the region in which Riverside County is located and rates of mental illness are slightly higher in the region in which San Bernardino County is located (Table 9.2.19.1-13).

9.2.19.1.11 ROI Recreation

Various areas in the vicinity of the proposed Iron Mountain SEZ are used for recreational purposes, with natural, ecological, and cultural resources in the ROI attracting visitors for a range of activities, including hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback riding, mountain climbing, and sightseeing. These areas are discussed in Section 9.2.5.

TABLE 9.2.19.1-12 County and ROI Crime Rates for the Proposed Iron Mountain SEZ^a

Location	Violent Crime ^b		Property Crime ^c		All Crime	
	Offenses	Rate	Offenses	Rate	Offenses	Rate
Riverside County	7,351	3.5	57,839	27.5	65,190	31.0
San Bernardino County	9,657	4.6	61,713	29.6	71,370	34.2
ROI	17,008	4.1	119,552	28.5	135,560	32.6

^a Rates are the number of crimes per 1,000 population.

^b Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

^c Property crime includes burglary, larceny, theft, motor vehicle theft, and arson.

Sources: U.S. Department of Justice (2009a,b).

TABLE 9.2.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Iron Mountain SEZ ROI^a

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health ^b	Divorce ^c
California Region 12 (includes San Bernardino County)	7.1	2.6	8.8	– ^d
New Mexico Region 13 (includes Riverside County)	8.5	3.2	8.6	–
California				4.3

^a Data for alcoholism and drug use represent percentage of the population over 12 years of age with dependence or abuse of alcohol, illicit drugs. Data are averages for 2004 to 2006.

^b Data for mental health represent percentage of the population over 18 years of age suffering from serious psychological distress. Data are averages for 2002 to 2004.

^c Divorce rates are the number of divorces per 1,000 population. Data are for 1990.

^d A dash indicates data not available.

Sources: SAMHSA (2009); CDC (2009).

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Because the number of visitors using state and federal lands for recreational activities is not available from the various administering agencies, the value of recreational resources in these areas, based solely on the number of recorded visitors, is likely to be an underestimation. In addition to visitation rates, the economic valuation of certain natural resources can also be assessed in terms of the potential recreational destination for current and future users, that is, their nonmarket value (see Section 5.17.1.1).

Another method is to estimate the economic impact of the various recreational activities supported by natural resources on public land in the vicinity of the proposed solar development, by identifying sectors in the economy in which expenditures on recreational activities occur. Not all activities in these sectors are directly related to recreation on state and federal lands, with some activity occurring on private land (e.g., dude ranches, golf courses, bowling alleys, and movie theaters). Expenditures associated with recreational activities form an important part of the economy of the ROI. In 2007, 141,993 people were employed in the ROI in the various sectors identified as recreation, constituting 8.5% of total ROI employment (Table 9.2.19.1-14). Recreation spending also produced almost \$3,374 million in income in the ROI in 2007. The primary sources of recreation-related employment were eating and drinking places.

9.2.19.2 Impacts

The following analysis begins with a description of the common impacts of solar development, including common impacts on recreation and on social change. These impacts would occur regardless of the solar technology developed in the SEZ. The impacts of facilities employing various solar energy technologies are analyzed in detail in subsequent sections.

TABLE 9.2.19.1-14 Recreation Sector Activity in the Proposed Iron Mountain SEZ ROI, 2007

ROI	Employment	Income (\$ million)
Amusement and recreation services	7,223	221.1
Automotive rental	2,158	112.9
Eating and drinking places	105,700	2,071.9
Hotels and lodging places	11,357	376.2
Museums and historic sites,	432	27
Recreational vehicle parks and campsites	1,389	39.6
Scenic tours	6,211	361.0
Sporting goods retailers	7,523	163.9
Total ROI	141,993	3,373.7

Source: MIG, Inc. (2009).

1
2
3 **9.2.19.2.1 Common Impacts**
4

5 Construction and operation of a solar energy facility at the proposed Iron Mountain
6 SEZ would produce direct and indirect economic impacts. Direct impacts would occur as a
7 result of expenditures on wages and salaries, procurement of goods and services required for
8 project construction and operation, and the collection of state sales and income taxes. Indirect
9 impacts would occur as project wages and salaries, procurement expenditures, and tax
10 revenues subsequently circulate through the economy of each state, thereby creating additional
11 employment, income, and tax revenues. Facility construction and operation would also require
12 in-migration of workers and their families into the ROI surrounding the site, which would
13 affect population, rental housing, health service employment, and public safety employment.
14 Socioeconomic impacts common to all utility-scale solar energy facilities are discussed in detail
15 in Section 5.17. These impacts will be minimized through the implementation of programmatic
16 design features described in Appendix A, Section A.2.2.
17
18

19 **Recreation Impacts**
20

21 Estimating the impact of solar facilities on recreation is problematic because it is not
22 clear how solar development in the SEZ would affect recreational visitation and nonmarket
23 values (i.e., the value of recreational resources for potential or future visits; see
24 Section 5.17.1.2.3). While it is clear that some land in the ROI would no longer be accessible
25 for recreation, the majority of popular recreational locations would be precluded from solar
26 development. It is also possible that solar development in the ROI would be visible from popular
27 recreation locations and that construction workers temporarily residing in the ROI would occupy
28 accommodation otherwise used for recreational visits, thus reducing visitation and consequently
29 affecting the economy of the ROI.
30

Social Change

Although an extensive literature in sociology documents the most significant components of social change in energy boomtowns, the nature and magnitude of the social impact of energy development in small rural communities is still unclear (see Section 5.17.1.1.4). While some degree of social disruption is likely to accompany large-scale in-migration during the boom phase, there is insufficient evidence to predict the extent to which specific communities are likely to be affected, which population groups within each community are likely to be most affected, and the extent to which social disruption is likely to persist beyond the end of the boom period (Smith et al. 2001). Accordingly, because of the lack of adequate social baseline data, it has been suggested that social disruption is likely to occur once an arbitrary population growth rate associated with solar energy development projects has been reached, with an annual rate of between 5 and 10% growth in population assumed to result in a breakdown in social structures, with a consequent increase in alcoholism, depression, suicide, social conflict, divorce, delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983, 1996).

In overall terms, the in-migration of workers and their families into the ROI would represent an increase of less than 0.1% in county population during construction of the trough technology, with smaller increases for the power tower, dish engine and PV technologies, and during the operation of each technology. While it is possible that some construction and operations workers will choose to locate in communities closer to the SEZ, the lack of available housing in smaller rural communities in the ROI to accommodate all in-migrating workers and families and insufficient range of housing choices to suit all solar occupations, many workers are likely to commute to the SEZ from larger communities elsewhere in the ROI, thereby reducing the potential impact of solar development on social change. Regardless of the pace of population growth associated with the commercial development of solar resources and the likely residential location of in-migrating workers and families in communities some distance from the SEZ itself, the number of new residents from outside the ROI is likely to lead to some demographic and social change in small rural communities in the ROI. Communities hosting solar development are likely to be required to adapt to a different quality of life, with a transition away from a more traditional lifestyle involving ranching and taking place in small, isolated, close-knit, homogenous communities with a strong orientation toward personal and family relationships, toward a more urban lifestyle, with increasing cultural and ethnic diversity and increasing dependence on formal social relationships within the community.

9.2.19.2.2 Technology-Specific Impacts

The economic impacts of solar energy development in the proposed SEZ were measured in terms of employment, income, state tax revenues (sales and income), population in-migration, housing, and community service employment (education, health, and public safety). More information on the data and methods used in the analysis are provided in Appendix M.

The assessment of the impact of the construction and operation of each technology was based on SEZ acreage, assuming 80% of the area could be developed. To capture a range of possible impacts, solar facility size was estimated on the basis of the land requirements of

1 various solar technologies, assuming that 9 acres/MW (0.04 km²/MW) would be required for
2 power tower, dish engine, and PV technologies and 5 acres/MW (0.02 km²/MW) for solar trough
3 technologies. Impacts of multiple facilities employing a given technology at each SEZ were
4 assumed to be the same as impacts for a single facility with the same total capacity. Construction
5 impacts were assessed for a representative peak year of construction, assumed to be 2021 for
6 each technology. Construction impacts assumed that a maximum of three projects could be
7 constructed within a given year, with a corresponding maximum land disturbance of up to
8 9,000 acres (36 km²). For operations impacts, a representative first year of operations was
9 assumed to be 2023 for trough and power tower, 2022 for the minimum facility size for dish
10 engine and PV, and 2023 for the maximum facility size for these technologies. The years of
11 construction and operations were selected as representative of the entire 20-year study period
12 because they are the approximate midpoint; construction and operations could begin earlier.
13
14

15 **Solar Trough**

16
17
18 **Construction.** Total construction employment impacts in the ROI (including direct
19 and indirect impacts) from the use of solar trough technologies would be up to 16,165 jobs
20 (Table 9.2.19.2-2). Construction activities would constitute 0.7% of total ROI employment.
21 A solar facility would also produce \$969.0 million in income. Direct sales taxes would be
22 \$41.2 million, and direct income taxes, \$18.8 million.
23

24 Given the scale of construction activities and the likelihood of local worker availability
25 in the required occupational categories, construction of a solar facility would mean that some
26 in-migration of workers and their families from outside the ROI would be required, with
27 2,229 persons in-migrating into the ROI. Although in-migration may potentially affect local
28 housing markets, the relatively small number of in-migrants and the availability of temporary
29 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
30 construction on the number of vacant rental housing units would not be expected to be large,
31 with 1,114 rental units expected to be occupied in the ROI. This occupancy rate would represent
32 1.2% of the vacant rental units expected to be available in the ROI.
33

34 In addition to the potential impact on housing markets, in-migration would affect
35 community service employment (education, health, and public safety). An increase in such
36 employment would be required to meet existing levels of service in the ROI. Accordingly,
37 21 new teachers, 4 physicians, and 4 public safety employee (career firefighters and uniformed
38 police officers) would be required in the ROI. These increases would represent less than 0.1%
39 of total ROI employment expected in these occupations.
40
41

42 **Operations.** Total operations employment impacts in the ROI (including direct
43 and indirect impacts) of a build-out using solar trough technologies would be 6,138 jobs
44 (Table 9.2.19.2-2). Such a solar facility would also produce \$230.3 million in income.
45 Direct sales taxes would be \$0.6 million, and direct income taxes, \$5.9 million. Based on fees
46 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental

TABLE 9.2.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with Trough Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	5,232	3,713
Total	16,165	6,138
Income ^b		
Total	969.0	230.3
Direct state taxes ^b		
Sales	41.2	0.6
Income	18.8	5.9
In-migrants (no.)	2,229	473
BLM payments (\$ million 2008)		
Rental	NA ^d	13.4
Capacity ^e	NA	112.0
Vacant housing ^c (no.)	1,114	426
Local community service employment		
Teachers (no.)	21	4
Physicians (no.)	4	1
Public safety (no.)	4	1

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,800 MW (corresponding to 9,000 acres [36 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 17,043 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

^d Not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming a solar facility with no storage capability and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

1 payments would be \$13.4 million, and solar generating capacity payments, at least
2 \$112.0 million.

3
4 Given the likelihood of local worker availability in the required occupational categories,
5 operation of a solar facility would mean that some in-migration of workers and their families
6 from outside the ROI would be required, with 473 persons in-migrating into the ROI. Although
7 in-migration may potentially affect local housing markets, the relatively small number of
8 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
9 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
10 housing units would not be expected to be large, with 426 owner-occupied units expected to be
11 occupied in the ROI.

12
13 In addition to the potential impact on housing markets, in-migration would affect
14 community service (health, education, and public safety) employment. An increase in such
15 employment would be required to meet existing levels of service in the provision of these
16 services in the ROI. Accordingly, four new teachers, one physician, and one public safety
17 employee would be required in the ROI.

18 19 20 **Power Tower**

21
22
23 **Construction.** Total construction employment impacts in the ROI (including direct
24 and indirect impacts) from the use of power tower technologies would be up to 6,439 jobs
25 (Table 9.2.19.2-3). Construction activities would constitute 0.3% of total ROI employment. Such
26 a solar facility would also produce \$385.9 million in income. Direct sales taxes would be less
27 than \$16.4 million, with direct income taxes of \$7.5 million.

28
29 Given the scale of construction activities and the likelihood of local worker availability
30 in the required occupational categories, construction of a solar facility would mean that some
31 in-migration of workers and their families from outside the ROI would be required, with
32 888 persons in-migrating into the ROI. Although in-migration may potentially affect local
33 housing markets, the relatively small number of in-migrants and the availability of temporary
34 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
35 construction on the number of vacant rental housing units would not be expected to be large,
36 with 444 rental units expected to be occupied in the ROI. This occupancy rate would represent
37 0.5% of the vacant rental units expected to be available in the ROI.

38
39 In addition to the potential impact on housing markets, in-migration would affect
40 community service (education, health, and public safety) employment. An increase in such
41 employment would be required to meet existing levels of service in the ROI. Accordingly,
42 eight new teachers, two physicians, and two public safety employees would be required in the
43 ROI. These increases would represent less than 0.1% of total ROI employment expected in these
44 occupations.

TABLE 9.2.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with Power Tower Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	2,084	1,917
Total	6,439	2,671
Income ^b		
Total	385.9	93.1
Direct state taxes ^b		
Sales	16.4	0.1
Income	7.5	5.8
BLM payments (\$ million 2008)		
Rental	NA ^d	13.4
Capacity ^e	NA	62.2
In-migrants (no.)	888	244
Vacant housing ^c (no.)	444	220
Local community service employment		
Teachers (no.)	8	2
Physicians (no.)	2	<1
Public safety (no.)	2	<1

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,000 MW (corresponding to 9,000 acres [36 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 9,469 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

^d Not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming a solar facility with no storage capability and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

1 **Operations.** Total operations employment impacts in the ROI (including direct and
2 indirect impacts) of a build-out using power tower technologies would be 2,671 jobs
3 (Table 9.2.19.2-3). Such a solar facility would also produce \$93.1 million in income. Direct
4 sales taxes would be \$0.1 million, and direct income taxes, \$5.8 million. Based on fees
5 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental
6 payments would be \$13.4 million, and solar generating capacity payments, at least \$62.2 million.
7

8 Given the likelihood of local worker availability in the required occupational categories,
9 operation of a solar facility means that some in-migration of workers and their families from
10 outside the ROI would be required, with 244 persons in-migrating into the ROI. Although
11 in-migration may potentially affect local housing markets, the relatively small number of
12 in-migrants and the availability of temporary accommodations (hotels, motels and mobile home
13 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
14 housing units would not be expected to be large, with 220 owner-occupied units expected to be
15 required in the ROI.
16

17 In addition to the potential impact on housing markets, in-migration would affect
18 community service (education, health, and public safety) employment. An increase in such
19 employment would be required to meet existing levels of service in the ROI. Accordingly,
20 two new teachers would be required in the ROI.
21
22

23 **Dish Engine**

24
25

26 **Construction.** Total construction employment impacts in the ROI (including direct
27 and indirect impacts) from the use of dish engine technologies would be up to 2,618 jobs
28 (Table 9.2.19.2-4). Construction activities would constitute 0.1% of total ROI employment. Such
29 a solar facility would also produce \$156.9 million in income. Direct sales taxes would be less
30 than \$6.7 million, and direct income taxes, \$3.1 million.
31

32 Given the scale of construction activities and the likelihood of local worker availability
33 in the required occupational categories, construction of a solar facility would mean that some
34 in-migration of workers and their families from outside the ROI would be required, with
35 361 persons in-migrating into the ROI. Although in-migration may potentially affect local
36 housing markets, the relatively small number of in-migrants and the availability of temporary
37 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
38 construction on the number of vacant rental housing units would not be expected to be large,
39 with 180 rental units expected to be occupied in the ROI. This occupancy rate would represent
40 0.2% of the vacant rental units expected to be available in the ROI.
41

42 In addition to the potential impact on housing markets, in-migration would affect
43 community service (education, health, and public safety) employment. An increase in such
44 employment would be required to meet existing levels of service in the ROI. Accordingly, three
45 new teachers, one physician, and one public safety employee would be required in the ROI.
46 These increases would represent less than 0.1% of total ROI employment expected in these
47 occupations.

TABLE 9.2.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with Dish Engine Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	847	1,863
Total	2,618	2,596
Income ^b		
Total	156.9	90.5
Direct state taxes ^b		
Sales	6.7	0.1
Income	3.1	2.9
BLM payments (\$ million 2008)		
Rental	NA ^d	13.4
Capacity ^e	NA	62.2
In-migrants (no.)	361	237
Vacant housing ^c (no.)	180	214
Local community service employment		
Teachers (no.)	3	2
Physicians (no.)	1	<1
Public safety (no.)	1	<1

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,000 MW (corresponding to 9,000 acres [36 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 9,469 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

^d Not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming a solar facility with no storage capability and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

1 **Operations.** Total operations employment impacts in the ROI (including direct
2 and indirect impacts) of a build-out using dish engine technologies would be 2,596 jobs
3 (Table 9.2.19.2-4). Such a solar facility would also produce \$90.5 million in income.
4 Direct sales taxes would be \$0.1 million, and direct income taxes, \$2.9 million. Based on fees
5 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental
6 payments would be \$13.4 million, and solar generating capacity payments, at least \$62.2 million.
7

8 Given the likelihood of local worker availability in the required occupational categories,
9 operation of a dish engine solar facility means that some in-migration of workers and their
10 families from outside the ROI would be required, with 237 persons in-migrating into the ROI.
11 Although in-migration may potentially affect local housing markets, the relatively small number
12 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
13 home parks) mean that the impact of solar facility operation on the number of vacant owner-
14 occupied housing units would not be expected to be large, with 214 owner-occupied units
15 expected to be required in the ROI.
16

17 In addition to the potential impact on housing markets, in-migration would affect
18 community service employment (education, health, and public safety). An increase in such
19 employment would be required to meet existing levels of service in the ROI. Accordingly,
20 two new teachers would be required in the ROI.
21

22 **Photovoltaic**

23
24
25
26 **Construction.** Total construction employment impacts in the ROI (including direct and
27 indirect impacts) from the use of PV technologies would be up to 1,221 jobs (Table 9.2.19.2-5).
28 Construction activities would constitute 0.1 % of total ROI employment. Such a solar
29 development would also produce \$73.2 million in income. Direct sales taxes would be less
30 than \$3.1 million, and direct income taxes, \$1.4 million.
31

32 Given the scale of construction activities and the likelihood of local worker availability
33 in the required occupational categories, construction of a solar facility would mean that some
34 in-migration of workers and their families from outside the ROI would be required, with
35 168 persons in-migrating into the ROI. Although in-migration may potentially affect local
36 housing markets, the relatively small number of in-migrants and the availability of temporary
37 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
38 construction on the number of vacant rental housing units would not be expected to be large,
39 with 84 rental units expected to be occupied in the ROI. This occupancy rate would represent
40 0.1% of the vacant rental units expected to be available in the ROI.
41

42 In addition to the potential impact on housing markets, in-migration would affect
43 community service (education, health, and public safety) employment. An increase in such
44 employment would be required to meet existing levels of service in the ROI. Accordingly,
45 two new teachers would be required in the ROI. This increase would represent less than 0.1%
46 of total ROI employment expected in this occupation.

TABLE 9.2.19.2-5 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with PV Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	395	186
Total	1,221	259
Income ^b		
Total	73.2	9.0
Direct state taxes ^b		
Sales	3.1	<0.1
Income	1.4	0.6
BLM payments (\$ million 2008)		
Rental	NA ^d	13.4
Capacity ^e	NA	49.8
In-migrants (no.)	168	24
Vacant housing ^c (no.)	84	21
Local community service employment		
Teachers (no.)	2	<1
Physicians (no.)	<1	<1
Public safety (no.)	<1	<1

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,000 MW (corresponding to 9,000 acres [36 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 9,469 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect owner-occupied housing.

^d Not applicable.

^e The BLM annual capacity payment was based on a fee of \$5,256 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming full build-out of the site.

1
2

1 **Operations.** Total operations employment impacts in the ROI (including direct and
2 indirect impacts) of a build-out using PV technologies would be 259 jobs (Table 9.2.19.2-5).
3 Such a solar facility would also produce \$9.0 million in income. Direct sales taxes would be
4 less than \$0.1 million, and direct income taxes, less than \$0.6 million. Based on fees established
5 by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments
6 would be \$13.4 million, and solar generating capacity payments, at least \$49.8 million.
7

8 Given the likelihood of local worker availability in the required occupational categories,
9 operation of a solar facility would mean that some in-migration of workers and their families
10 from outside the ROI would be required, with 24 persons in-migrating into the ROI. Although
11 in-migration may potentially affect local housing markets, the relatively small number of
12 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
13 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
14 housing units would not be expected to be large, with 21 owner-occupied units expected to be
15 required in the ROI.
16

17 No new community service employment would be required to meet existing levels of
18 service in the ROI.
19
20

21 **9.2.19.3 SEZ-Specific Design Features and Design Feature Effectiveness** 22

23 No SEZ-specific design features addressing socioeconomic impacts have been identified
24 for the proposed Iron Mountain SEZ. Implementing the programmatic design features described
25 in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would reduce
26 the potential for socioeconomic impacts during all project phases.
27
28
29

1 **9.2.20 Environmental Justice**

2
3
4 **9.2.20.1 Affected Environment**

5
6 On February 11, 1994, the President signed E.O. 12898, “Federal Actions to Address
7 Environmental Justice in Minority Populations and Low-Income Populations,” which formally
8 requires federal agencies to incorporate environmental justice as part of their missions (*Federal*
9 *Register*, Volume 59, page 7629, Feb. 11, 1994). Specifically, it directs them to address, as
10 appropriate, any disproportionately high and adverse human health or environmental effects of
11 their actions, programs, or policies on minority and low-income populations.

12
13 The analysis of the impacts of solar energy projects on environmental justice issues
14 follows guidelines described in the Council on Environmental Quality’s (CEQ’s) *Environmental*
15 *Justice Guidance under the National Environmental Policy Act* (CEQ 1997). The analysis
16 method has three parts: (1) a description of the geographic distribution of low-income and
17 minority populations in the affected area is undertaken; (2) an assessment is conducted to
18 determine whether construction and operation would produce impacts that are high and adverse;
19 and (3) if impacts are high and adverse, a determination is made as to whether these impacts
20 disproportionately affect minority and low-income populations.

21
22 Construction and operation of solar energy projects in the proposed Iron Mountain
23 SEZ could affect environmental justice if any adverse health and environmental impacts
24 resulting from either phase of development are significantly high and if these impacts
25 disproportionately affect minority and low-income populations. If the analysis determines that
26 health and environmental impacts are not significant, there can be no disproportionate impacts
27 on minority and low-income populations. In the event impacts are significant, disproportionality
28 would be determined by comparing the proximity of any high and adverse impacts with the
29 location of low-income and minority populations.

30
31 The analysis of environmental justice issues associated with the development of solar
32 facilities considered impacts within the SEZ and an associated 50-mi (80-km) radius around the
33 boundary of the SEZ. A description of the geographic distribution of minority and low-income
34 groups in the affected area was based on demographic data from the 2000 Census (U.S. Bureau
35 of the Census 2009k,1). The following definitions were used to define minority and low-income
36 population groups:

- 37
38 • **Minority.** Persons who identify themselves as belonging to any of the
39 following racial groups: (1) Hispanic, (2) Black (not of Hispanic origin) or
40 African American, (3) American Indian or Alaska Native, (4) Asian, or
41 (5) Native Hawaiian or Other Pacific Islander.

42
43 Beginning with the 2000 Census, where appropriate, the census form allows
44 individuals to designate multiple population group categories to reflect their
45 ethnic or racial origin. In addition, persons who classify themselves as being
46 of multiple racial origin may choose up to six racial groups as the basis of

1 their racial origins. The term minority includes all persons, including those
2 classifying themselves in multiple racial categories, except those who classify
3 themselves as not of Hispanic origin and as White or “Other Race”
4 (U.S. Bureau of the Census 2009k).

5
6 The CEQ guidance proposed that minority populations should be identified
7 where either (1) the minority population of the affected area exceeds 50% or
8 (2) the minority population percentage of the affected area is meaningfully
9 greater than the minority population percentage in the general population or
10 other appropriate unit of geographic analysis.

11
12 This PEIS applies both criteria in using the Census data for census block
13 groups, wherein consideration is given to the minority population that is both
14 greater than 50% and 20 percentage points higher than in the state (the
15 reference geographic unit).

- 16
17 • **Low-Income.** Individuals who fall below the poverty line. The poverty line
18 takes into account family size and age of individuals in the family. In 1999,
19 for example, the poverty line for a family of five with three children below
20 the age of 18 was \$19,882. For any given family below the poverty line, all
21 family members are considered as being below the poverty line for the
22 purposes of analysis (U.S. Bureau of the Census 2009I).

23
24 The data in Table 9.2.20.1-1 show the minority and low-income composition of the
25 total population located in the proposed SEZ based on 2000 Census data and CEQ guidelines.
26 Individuals identifying themselves as Hispanic or Latino are included in the table as a separate
27 entry. However, because Hispanics can be of any race, this number also includes individuals
28 identifying themselves as being part of one or more of the population groups listed in the table.

29
30 A large number of minority and low-income individuals are located in the 50-mi (80-km)
31 area around the boundary of the SEZ. Within the 50-mi (80-km) radius in California, 47.4% of
32 the population is classified as minority, while 20.7% is classified as low-income. However, the
33 number of minority individuals does not exceed 50% of the total population in the area, and the
34 number of minority individuals exceeds the state average by 20 percentage points or more; thus,
35 there is no minority population in the proposed SEZ area based on 2000 Census data and CEQ
36 guidelines. The number of low-income individuals does not exceed the state average by
37 20 percentage points or more and does not exceed 50% of the total population in the area; thus,
38 there are no low-income populations in the SEZ.

39
40 In the Arizona portion of the 50-mi (80-km) radius, 18.2% of the population is classified
41 as minority, while 12.6% is classified as low-income. The number of minority individuals does
42 not exceed 50% of the total population in the area and the number of minority individuals does
43 not exceed the state average by 20 percentage points or more; thus, there is no minority
44 population in the SEZ area based on 2000 Census data and CEQ guidelines. The number of low-
45 income individuals does not exceed the state average by 20 percentage points or more and does

TABLE 9.2.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Iron Mountain SEZ

Parameter	Arizona	California
Total population	72,101	58,237
White, non-Hispanic	58,957	30,643
Hispanic or Latino	8,621	17,536
Non-Hispanic or Latino minorities	4,523	10,058
One race	3,617	8,535
Black or African American	314	5,935
American Indian or Alaskan Native	2,853	956
Asian	363	1,176
Native Hawaiian or Other Pacific Islander	48	255
Some other race	39	213
Two or more races	906	1,523
Total minority	13,144	27,594
Low-income	8,973	8,213
Percentage minority	18.2	47.4
State percentage minority	24.5	40.5
Percentage low-income	12.6	20.7
State percentage low-income	13.9	14.2

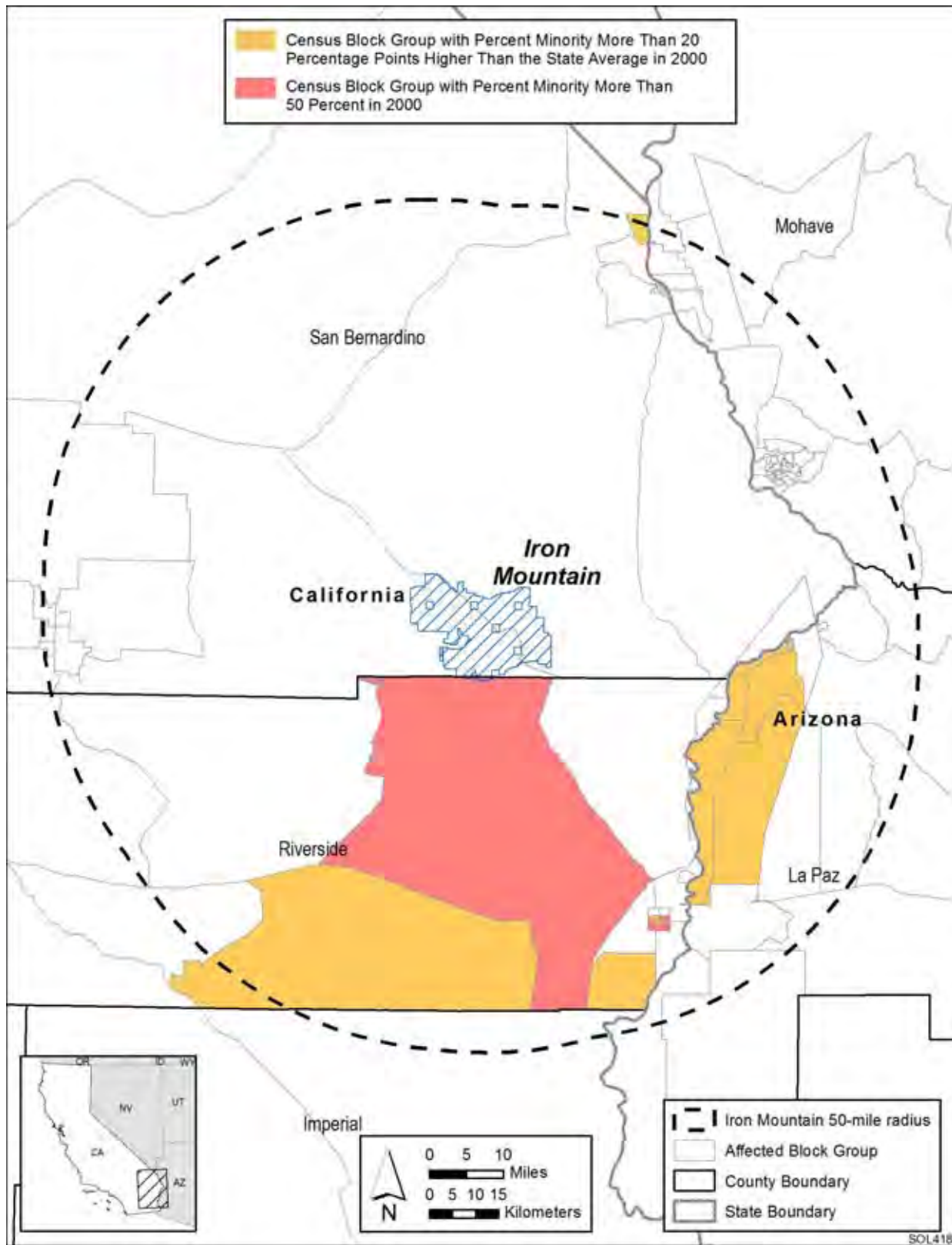
Source: U.S Bureau of the Census (2009k,l).

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not exceed 50% of the total population in the area; thus, there are no low-income populations in the SEZ.

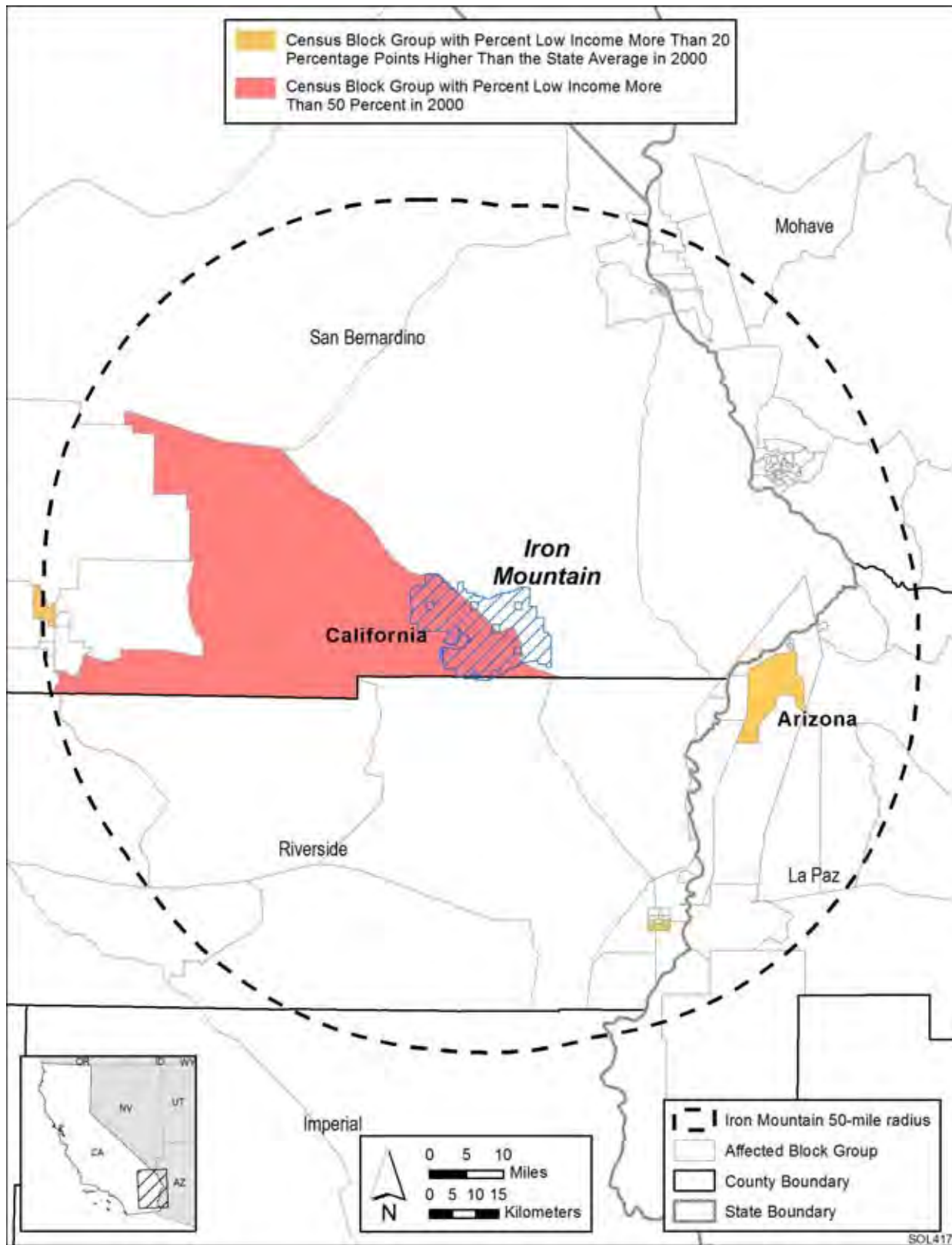
Figures 9.2.20.1-1 and 9.2.20.1-2 show the locations of the minority and low-income population groups, respectively, within the 50-mi (80-km) radius around the boundary of the SEZ.

In the California portion of the 50-mi (80-km) radius around the SEZ, more than 50% of the population is classified as minority in block groups located in the city of Blythe itself, to the immediate west and southwest of the city, and in the Fort Mohave Indian Reservation, to the south of Bullhead City. Block groups with a minority population, which is more than 20 percentage points higher than the state average, are located in the city of Blythe, to the immediate west of the city, and in the western and northeastern portions of the 50-mi (80-km) radius. In the Arizona portion of the 50-mi (80-km) radius, more than 50% of the population is



1

2 **FIGURE 9.2.20.1-1 Minority Population Groups within the 50-mi (80-km) Radius Surrounding**
 3 **the Proposed Iron Mountain SEZ**



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FIGURE 9.2.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Iron Mountain SEZ

3

1 classified as minority in block groups located in the Colorado River Indian Reservation, in the
2 city of Parker, and to the east of the Colorado River, south of Blythe.

3
4 Low-income populations in the 50-mi (80-km) radius are limited to two block groups in
5 California, in the city of Blythe and in the city of Twentynine Palms, and one in Arizona, in the
6 Colorado River Indian Reservation. There is one block group in California where the low-
7 income population is more than 20 percentage points higher than the state average, located to
8 the west of the SEZ.

9 10 11 **9.2.20.2 Impacts**

12
13 Environmental justice concerns common to all utility-scale solar energy facilities are
14 described in detail in Section 5.18. These impacts will be minimized through the implementation
15 of the programmatic design features described in Appendix A, Section A.2.2, which address the
16 underlying environmental impacts contributing to the concerns. The potentially relevant
17 environmental impacts associated with solar facilities within the proposed Iron Mountain SEZ
18 include noise and dust during the construction; noise and EMF effects associated with
19 operations; visual impacts of solar generation and auxiliary facilities, including transmission
20 lines; access to land used for economic, cultural, or religious purposes; and effects on property
21 values as areas of concern that might potentially affect minority and low-income populations.
22 Minority populations have been identified within 50 mi (80 km) of the proposed Iron Mountain
23 SEZ; no low-income populations are present (Section 9.2.20.1).

24
25 Potential impacts on low-income and minority populations could be incurred as a result
26 of the construction and operation of solar facilities involving each of the four technologies.
27 Although impacts are likely to be small, there are minority populations defined by CEQ
28 guidelines (Section 9.2.20.1) within the 50-mi (80-km) radius around the boundary of the SEZ;
29 this means that any adverse impacts of solar projects could disproportionately affect minority
30 populations. Because there are also low-income populations within the 50-mi (80-km) radius,
31 there could also be impacts on low-income populations.

32 33 34 **9.2.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**

35
36 No SEZ-specific design features addressing environmental justice impacts have been
37 identified for the proposed Iron Mountain SEZ. Implementing the programmatic design features
38 described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would
39 reduce the potential for environmental justice impacts during all project phases.

1 **9.2.21 Transportation**

2
3 The proposed Iron Mountain SEZ is accessible by road and rail. One state highway and
4 one railroad pass through the SEZ. A small municipal airport is located 55 mi (88 km) west of
5 the SEZ. General transportation considerations and impacts are discussed in Sections 3.4 and
6 5.19, respectively.
7

8
9 **9.2.21.1 Affected Environment**

10
11 State Route 62, a two-lane highway, passes through the southern edge of the Iron
12 Mountain SEZ, as shown in Figure 9.2.21.1-1. The town of Twentynine Palms is located about
13 60 mi (97 km) to the west of the SEZ along State Route 62. Parker, Arizona, is 40 mi (65 km) to
14 the east along State Route 62. Major cities such as Los Angeles to the west and Phoenix to the
15 southeast are about a 355-km (220-mi) drive via I-10, which runs east–west approximately 31 mi
16 (50 km) south of the Iron Mountain SEZ. Several local dirt roads cross the SEZ. Annual average
17 traffic volumes along State Route 62 for 2008 are provided in Table 9.2.21.1-1. Figure 9.2.21-1
18 also shows the designated open OHV routes in the proposed Iron Mountain SEZ; these routes
19 were designated under the CDCA Plan (BLM 1999).
20

21 The ARZC Railroad serves the area (RailAmerica 2008). This regional railroad originates
22 in Cadiz, approximately 25 mi (40 km) to the northwest, where it has an interchange with the
23 Burlington Northern Santa Fe (BNSF) Railroad. As shown in Figure 9.2.21.1-1, the ARZC
24 railroad traverses the Iron Mountain SEZ from the northwest to the southeast. A dirt road, Cadiz
25 Road, runs along parallel to the railroad from Cadiz to State Route 62. The railroad continues on
26 for about 150 mi (240 km), passing through Parker, Arizona, eventually joining with the BNSF
27 Railroad again in Matthie, Arizona, northwest of Phoenix. The ARZC railroad has local stops in
28 Milligan, Sablon, and Freda, which are located at the northwest edge, near the center, and at the
29 southeast edge, respectively, of the SEZ.
30

31 Five small public airports are within a driving distance of approximately 85 mi (137 km)
32 of the Iron Mountain SEZ as listed in Table 9.2.21.1-1. The nearest public airport, which is
33 suitable only for light aircraft, is the Twentynine Palms Airport, approximately 55 mi (88 km) to
34 the west of the SEZ along State Route 62 in the town of Twentynine Palms. None of the five
35 airports nearest has scheduled passenger service. The only commercial freight service occurs at
36 Lake Havasu City Municipal Airport in Arizona. In 2009, the amount of commercial freight
37 shipped from and received at the Lake Havasu Airport was 798,744 lb (362,200 kg) and
38 884,488 lb (401,100 kg), respectively (BTS 2009).
39

40
41 **9.2.21.2 Impacts**

42
43 As discussed in Section 5.19, the primary transportation impacts are anticipated to be
44 from commuting worker traffic. State Route 62 provides a regional traffic corridor that could
45 experience moderate impacts for single projects that may have up to 1,000 daily workers, with
46 an additional 2,000 vehicle trips per day (maximum). This would represent up to approximately

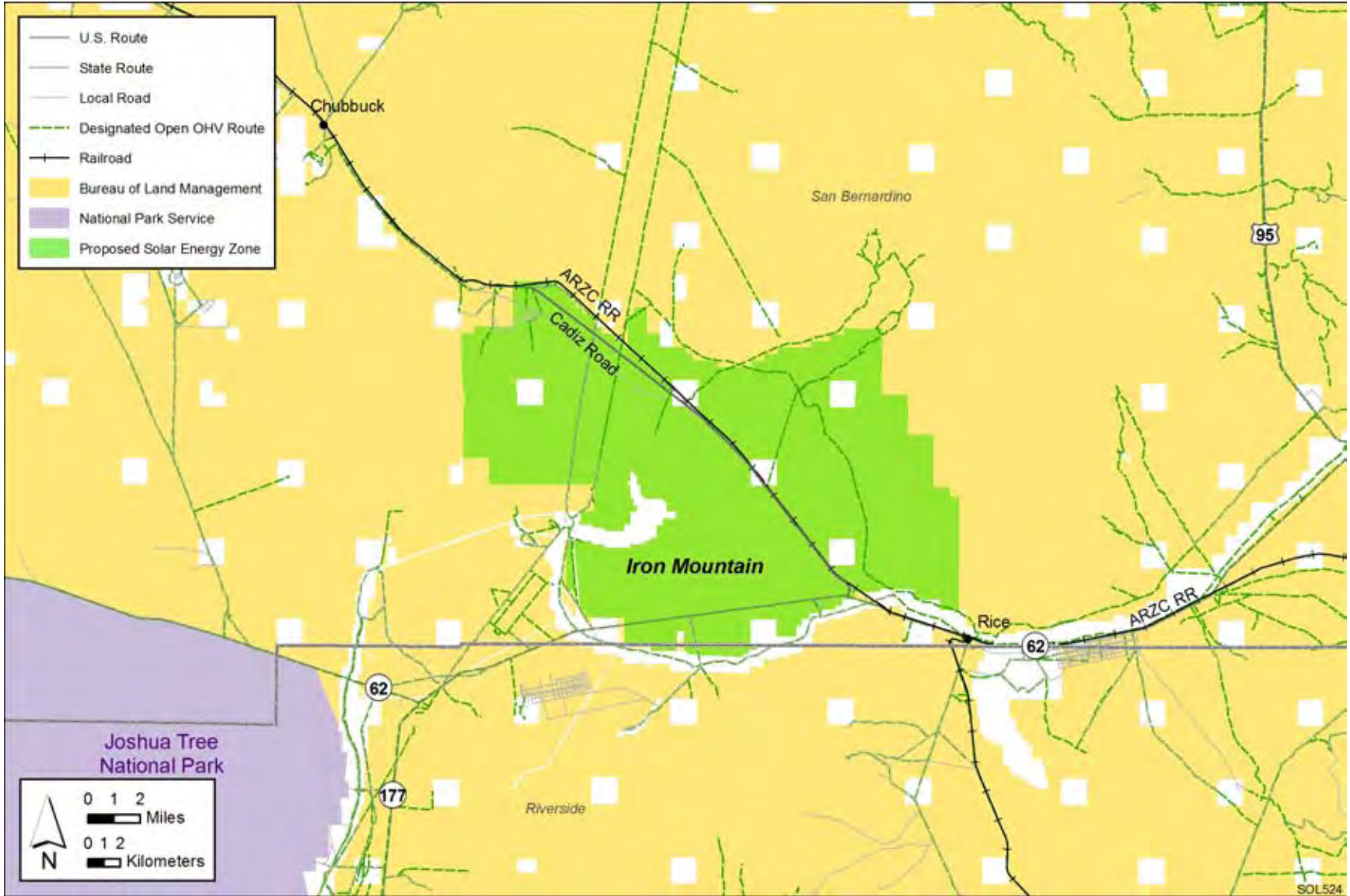


FIGURE 9.2.21.1-1 Local Transportation Network Serving the Proposed Iron Mountain SEZ

TABLE 9.2.21.1-1 AADT on Major Roads near the Proposed Iron Mountain SEZ, 2008

Road	General Direction	Location	AADT (Vehicles)
State Route 62	East–west	Junction I-10	19,000
		Junction State Route 247	28,500
		Park Boulevard (in Joshua Tree)	18,000
		Utah Trail (in Twentynine Palms)	2,700
		San Bernardino/Riverside County Line	500
		Junction State Route 177	2,200
		Cadiz Road	2,000
		Blythe Rice Road	2,000
		Junction U.S. 95	2,700
U.S. 95	North–south	Junction State Route 62	3,000

Source: Caltrans (2009).

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two times the AADT values summarized in Table 9.2.21.1-2 for State Route 62 in the vicinity of the SEZ. Local road improvements would be necessary in any portion of the SEZ along State Route 62 that might be developed in order not to overwhelm the local roads near any site access point(s).

Solar development within the SEZ would affect public access along OHV routes designated open and available for public use. Although few routes within the proposed SEZ are designated as open, open routes crossing areas granted ROWs for solar facilities would be redesignated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

Should up to three large projects with approximately 1,000 daily workers each be under development simultaneously, an additional 6,000 vehicle trips per day could be added to State Route 62 in the vicinity of the SEZ, assuming ride-sharing was not implemented. This increase in traffic would quadruple the current average daily traffic level on State Route 62 and could have serious impacts on traffic flow during peak commute times. The extent of the problem would depend on the relative locations of the projects within the SEZ, where the worker populations originate, and the work schedules. Road improvements in the vicinity of any project within the SEZ could include deceleration and acceleration lanes on State Route 62 at project access points to help maintain flow along the highway as well as other design features listed in the following for individual projects.

TABLE 9.2.21.1-2 Airports Open to the Public in the Vicinity of the Iron Mountain SEZ

Airport	Location	Owner/Operator	Runway 1 ^a			Runway 2 ^a		
			Length [ft (m)]	Type	Condition	Length [ft (m)]	Type	Condition
Avi Suquilla	Just across the border in Parker, AZ, approximately 40 mi (64 km) east of the SEZ	Colorado River Indian Tribes	6,250 (1,905)	Asphalt	Good	– ^b	–	–
Blythe Municipal	Off I-10, about 75 mi (120 km) south of the SEZ	County of Riverside/ City of Blythe	5,800 (1,768)	Asphalt	Good	6,543 (1,994)	Asphalt	Good
Lake Havasu City Municipal	Off AZ State Route 95, about 85 mi (137 km) from the SEZ to the northeast	Lake Havasu City	8,001 (2,439)	Asphalt	Good	–	–	–
Needles	About 68 mi (109 km) to the north-northeast of the SEZ on U.S. 95	County of San Bernardino	4,235 (1,291)	Asphalt	Fair	5,005 (1,526)	Asphalt	Good
Twentynine Palms	Approximately 55 mi (88 km) to the west of the SEZ along State Route 62	County of San Bernardino	3,797 (1,157)	Asphalt	Good	5,531 (1,686)	Asphalt	Good

^a Source: FAA (2009).

^b A dash indicates not applicable.

1 **9.2.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 No SEZ-specific design features have been identified related to impacts on transportation
4 systems around the Iron Mountain SEZ. The programmatic design features discussed in
5 Appendix A, Section A.2.2, including local road improvements, multiple site access locations,
6 staggered work schedules, and ride-sharing, would all provide some relief to traffic congestion
7 on local roads leading to any project site. Depending on the location of a proposed solar facility
8 within the SEZ, more specific access locations and local road improvements would be
9 implemented.
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1 **9.2.22 Cumulative Impacts**
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3 The analysis presented in this section addresses the potential cumulative impacts in the
4 vicinity of the proposed Iron Mountain SEZ in San Bernardino County, California. The CEQ
5 guidelines for implementing NEPA define cumulative impacts as environmental impacts
6 resulting from the incremental impacts of an action when added to other past, present, and
7 reasonably foreseeable future actions (40 CFR 1508.7). The impacts of other actions are
8 considered without regard to the agency (federal or nonfederal), organization, or person that
9 undertakes them. The time frame of this cumulative impacts assessment could appropriately
10 include activities that would occur up to 20 years in the future (the general time frame for PEIS
11 analyses), but little or no information is available for projects that could occur further than 5 to
12 10 years in the future.
13

14 The nearest population center is the small community of Rice, located near the southeast
15 boundary of the SEZ. The proposed Iron Mountain SEZ is in the center of an area of high
16 wilderness and scenic value. Within 25 mi (40 km) of the area, 11 WAs, including 1 within a
17 national park, are visible from the SEZ. The Turtle Mountain ACEC, which was designated
18 for its outstanding scenic resources, is included within the boundary of the Turtle Mountains
19 Wilderness. In addition, the Iron Mountain SEZ is close to the Riverside East SEZ, and in
20 some areas, impacts from the two SEZs overlap. The geographic extent of the cumulative
21 impacts analysis for potentially affected resources near the Iron Mountain SEZ is identified in
22 Section 9.2.22.1. An overview of ongoing and reasonably foreseeable future actions is presented
23 in Section 9.2.22.2. General trends in population growth, energy demand, water availability, and
24 climate change are discussed in Section 9.2.22.3. Cumulative impacts for each resource area are
25 discussed in Section 9.2.22.4.
26

27
28 **9.2.22.1 Geographic Extent of the Cumulative Impacts Analysis**
29

30 The geographic extent of the cumulative impacts analysis for potentially affected
31 resources evaluated near the Iron Mountain SEZ is provided in Table 9.2.22.1-1. These
32 geographic areas define the boundaries encompassing potentially affected resources. Their
33 extent varies on the basis of the nature of the resource being evaluated and the distance at
34 which an impact may occur (thus, for example, the evaluation of air quality may have a greater
35 regional extent of impact than that of visual resources). Most of the lands around the SEZ are
36 administered by the BLM, the NPS, or the DoD; there are also some Tribal Lands about 20 mi
37 (30 km) east and southeast of the SEZ. The BLM administers approximately 72% of the lands
38 within a 50-mi (80-km) radius of the SEZ.
39

40
41 **9.2.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
42

43 The future actions described below are those that are “reasonably foreseeable”; that is,
44 they have already occurred, are ongoing, are funded for future implementation, or are included in
45 firm near-term plans. Types of proposals with firm near-term plans are as follows:
46

TABLE 9.2.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Iron Mountain SEZ

Resource Area	Geographic Extent
Lands and Realty	Eastern San Bernardino County—Ward Valley
Specially Designated Areas and Lands with Wilderness Characteristics	Within a 25-mi (40-km) radius of the Iron Mountain SEZ
Rangeland Resources	Eastern San Bernardino and Riverside Counties
Recreation	All of San Bernardino and Riverside Counties
Military and Civilian Aviation	For Military Aviation, southeastern California and western Arizona. For Civilian Aviation, eastern San Bernardino and Riverside Counties
Soil Resources	Areas within and adjacent to the Iron Mountain SEZ
Minerals	Eastern San Bernardino and Riverside Counties
Water Resources	
Surface Water	CRA, Danby Lake, Homer Wash
Groundwater	Ward Valley and Rice Valley Basins
Air Quality and Climate	A 31-mi (50-km) radius from the center of the Iron Mountain SEZ within the Mojave Desert Air Basin
Vegetation, Wildlife and Aquatic Biota, Special Status Species	A 50-mi (80-km) radius from the center of the Iron Mountain SEZ, including portions of San Bernardino, Riverside, and Imperial Counties in California, and La Paz and Mohave Counties in Arizona
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Iron Mountain SEZ
Acoustic Environment (noise)	Areas adjacent to the Iron Mountain SEZ
Paleontological Resources	Areas within and adjacent to the Iron Mountain SEZ
Cultural Resources	Areas within and adjacent to the Iron Mountain SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the SEZ for other properties, such as traditional cultural properties.
Native American Concerns	Ward Valley and surrounding mountains; viewshed within a 25-mi (40-km) radius of the Iron Mountain SEZ
Socioeconomics	A 50-mi (80-km) radius from the center of the Iron Mountain SEZ
Environmental Justice	A 50-mi (80-km) radius from the center of the Iron Mountain SEZ
Transportation	U.S. Highway 95; State Routes 62, 177

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- 1 • Proposals for which NEPA documents are in preparation or finalized;
- 2
- 3 • Proposals in a detailed design phase;
- 4
- 5 • Proposals listed in formal NOIs published in the *Federal Register* or state
- 6 publications;
- 7
- 8 • Proposals for which enabling legislations has been passed; and
- 9
- 10 • Proposals that have been submitted to federal, state, or county regulators to
- 11 begin a permitting process.
- 12

13 Projects in the bidding or research phase or that have been put on hold were not included in the
14 cumulative impact analysis.

15
16 The ongoing and reasonably foreseeable future actions described below are grouped
17 into two categories: (1) actions that relate to energy production and distribution, including
18 potential solar energy projects under the proposed action (Section 9.2.22.2.1), and (2) other
19 ongoing and reasonably foreseeable actions, including those related to mining and mineral
20 processing, grazing management, transportation, recreation, water management, and
21 conservation (Section 9.2.22.2.2). (Table 9.2.22.2-1 lists reasonably foreseeable future actions
22 related to the “energy” and “other major actions” categories within a 50-mi [80-km] radius from
23 the center of the Iron Mountain SEZ.) Together, these actions have the potential to affect human
24 and environmental receptors within the geographic range of potential impacts over the next
25 20 years.

26 27 28 **9.2.22.2.1 Energy Production and Distribution**

29
30 Reasonably foreseeable future actions related to energy production and distribution
31 within 50 mi (80 km) of the center of the Iron Mountain SEZ are described in the following
32 sections. That area includes portions of San Bernardino, Riverside, and Imperial Counties in
33 California, and La Paz and Mohave Counties in Arizona. Future renewable energy facilities
34 are expected to be the main contributors to potential future impacts in this area, because of
35 favorable conditions in the area for their development, large acreages required, and potentially
36 large quantities of water used. The area is otherwise largely undeveloped and would be
37 expected to remain so in the absence of renewable energy development. Thus, this analysis
38 focuses on renewable energy facilities and any other foreseeable large energy projects
39 nominally covering 500 acres (2 km²) or more or requiring amounts of water on the scale of
40 utility-scale CSP. Figure 9.2.22.2-1 shows the approximate locations of the key projects.

41 42 43 **Renewable Energy Development**

44
45 Several recent executive and legislative actions in California have addressed renewable
46 energy development within the state. In November 2008, Governor Schwarzenegger signed

TABLE 9.2.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution and Other Major Actions near the Proposed Iron Mountain SEZ^a

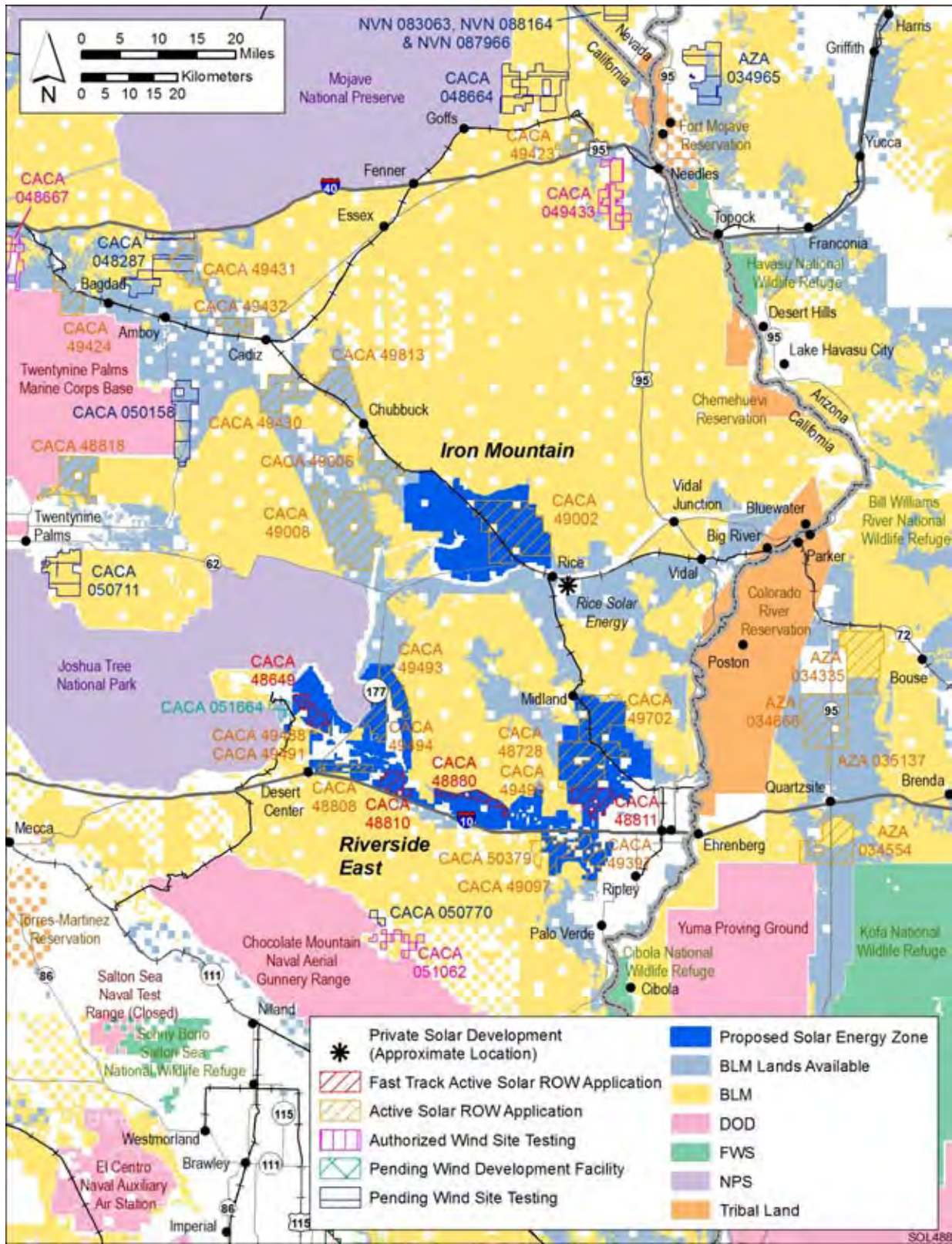
Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Project on Private Land			
Rice Solar Energy, 150-MW power tower facility; 2,560 total acres	In review; AFC ^b filed with CEC Oct. 21, 2009; CEC comments on AFC sent Nov. 23, 2009.	Land use, visual, terrestrial habitats, wildlife, groundwater	Southeast of Iron Mountain SEZ adjacent to and south of State Route 62
Fast-Track Solar Energy Projects on BLM-Administered Land			
First Solar Desert Sunlight (CACA-48649), 550-MW PV facility; 4,410 disturbed acres	NOI to prepare an EIS issued Jan 13, 2010	Land use, visual, terrestrial habitats, wildlife, groundwater	Western part of Riverside East SEZ
Solar Millennium Palen Solar Project (CACA 48810), 484-MW solar trough; 5,200 total acres	NOI to prepare an EIS issued Nov. 23, 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	West-central part of Riverside East SEZ
Solar Millennium Blythe Solar Project (CACA 48811), 986-MW trough facility; 9,480 total acres ^c	NOI to prepare an EIS issued Nov. 23, 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	Eastern part of Riverside East SEZ
NextEra Genesis Ford Dry Lake Solar Project (CACA-4880); 250 MW trough facility; 4,640 total acres ^c	NOI to prepare an EIS issued Nov. 23, 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	Central part of Riverside East SEZ
Other Projects			
Cadiz Valley Dry Year Supply Project	Under review	Disturbed areas, terrestrial habitats along railroad ROW	Areas adjacent to ARZC Railroad ROW in southern portion of the Iron Mountain SEZ
Proposed West Chocolate Mountains Renewable Energy Evaluation Area	NOI to prepare an EIS issued Feb. 10, 2010	Land use, visual, terrestrial habitats, wildlife, groundwater	About 40 mi south of the Iron Mountain SEZ

^a Projects in later stages of agency environmental review and project development.

^b AFC = application for certification.

^c Project approved. Updated information will be included in the Final EIS. See http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/fast-track_renewable.html for details

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1 E.O. S-14-08 to streamline California’s renewable energy project approval process and increase
2 the state’s RPS to the most aggressive in the nation—at 33% renewable power by 2020. On
3 September 15, 2009, the governor issued a second E.O., now requiring that 33% of all electrical
4 energy produced in the state be from renewable energy sources by the year 2020. The E.O.
5 directed the CARB to adopt regulations increasing California’s RPS to 33% by 2020.
6

7 In 2009, the California Legislature drafted bills requiring that electrical energy
8 production meet a standard of 33% from renewable sources. On October 12, 2009, Governor
9 Schwarzenegger vetoed two bills from the California Legislature on electrical energy generated
10 by renewable sources in favor of an alternative plan that would remove limits on the amount of
11 renewable power utilities could buy from other states (African American Environmentalist
12 Association 2009).
13
14

15 **Solar Energy.** Table 9.2.22.2-1 lists one project on private land, Rice Solar Energy, and
16 four foreseeable solar energy projects on public land, the so-called fast-track projects. Fast-track
17 projects are those on public lands for which the environmental review and public participation
18 process is under way and the ROW applications could be approved by December 2010
19 (BLM 2010a). The listed Rice and fast-track projects are considered foreseeable because the
20 permitting and environmental review processes are under way. The locations of these five
21 projects are shown on Figure 9.2.22.2-1. Other, more numerous, pending regular-track ROW
22 applications shown in the figure are discussed collectively at the end of this section.
23

- 24 • *Rice Solar Energy.* The proposed Rice Solar Energy Project would be a power
25 tower facility with an output of 150 MW constructed on 1,410 acres (6 km²)
26 of a 2,560-acre (10-km²) parcel on privately owned land in unincorporated
27 eastern Riverside County, California (CEC 2009). Access to the site would be
28 from State Route 62 just north of the site. The Iron Mountain SEZ is less than
29 5 mi (8 km) northwest of the site, and the eastern portion of the Riverside East
30 SEZ is about 15 mi (24 km) south. Land surrounding the project site consists
31 mostly of undeveloped open desert owned by the Federal Government and
32 managed by the BLM.
33

34 The facility would employ a liquid salt heat transfer and storage medium and
35 a conventional steam turbine. Propane would be used for auxiliary heating,
36 and no natural gas pipeline to the facility would be needed. The facility
37 would use an air-cooled condenser (dry cooling). Water use during the
38 proposed 2011 to 2013 (30-month) construction period would be 780 ac-ft/yr
39 (0.96 million m³/yr). Process water requirements for facility operations,
40 commencing by the end of 2013, are estimated to be up to 180 ac-ft/yr
41 (0.22 million m³/yr), assuming an operating capacity factor of 37%. A
42 mostly local construction workforce (averaging 280 workers) would be
43 used. Operations and maintenance of the facility would employ an
44 estimated 47 workers (CEC 2009).
45
46

1 Surveys found seven desert tortoises, along with shell-skeletal remains,
2 burrows, egg shell fragments, and scat present on the project site, along the
3 generator tie-line route, and within the 1-mi (1.6-km) wide zone surrounding
4 the project site. In addition, western burrowing owl, Mojave fringe-toed
5 lizard, and loggerhead shrike were found to be present in or near the project
6 area. Several California-listed sensitive plant species were found on the
7 project site or along the proposed transmission line ROW (CEC 2009).
8

- 9 • *First Solar Desert Sunlight (CACA 48649)*. This proposed fast-track project
10 would use a thin-film PV technology in a facility with an output of 550 MW.
11 The proposed project site is located on approximately 9,480 acres (38.4 km²)
12 and would disturb up to 4,400 acres (17.8 km²) of public land in Riverside
13 County, California, approximately 6 mi (10 km) north of the community of
14 Desert Center, California, and about 7 mi (11 km) north of the I-10
15 transmission corridor (BLM 2010b). The facility and most of the corridor for
16 the project's 230-kV generation interconnection transmission line would be
17 located in the western portion of the proposed Riverside East SEZ, about
18 25 mi (40 km) from the Iron Mountain SEZ. The project would include the
19 solar facility, an on-site substation, a 230-kV generation interconnection line
20 within the transmission corridor, and a planned 230- to 500-kV Red Bluff
21 substation. The Red Bluff substation would connect the project to the
22 Southern California Edison (SCE) regional transmission grid.
23

24 The proposed PV facility would have an estimated water requirement of
25 27 ac-ft/yr (33,000 m³/yr) during its 2011 to 2013 construction period and
26 only 4 ac-ft/yr (5,000 m³/yr) thereafter for operation (BLM and CEC 2010a).
27 On the basis of estimated employment levels for PV facilities
28 (Section 9.2.19.2.2), construction of the facility would employ about
29 220 people, while operations would require an estimated 11 full-time
30 employees.
31

- 32 • *Solar Millennium Palen Solar Project (CACA 48810)*. This proposed fast-
33 track project is a parabolic trough facility with an output of 484 MW. The
34 project site would be on public land within the western portion of the
35 proposed Riverside East SEZ, approximately 10 mi (16 km) east of Desert
36 Center, California, adjacent to the I-10 transmission corridor. The proposed
37 facility would occupy approximately 3,800 acres (15.4 km²) within a
38 proposed 5,200-acre (20.9-km²) ROW. The facility would employ two
39 adjacent and independent solar troughs with nominal output of 250 MW
40 each. It would employ dry cooling and would require about 300 ac-ft/yr
41 (0.37 million m³/yr) of groundwater drawn from two on-site wells for mirror
42 washing and other uses. Water requirements during the proposed construction
43 period of 2011 to 2013 are estimated to be 480 ac-ft/yr (0.59 million m³/yr).
44 The project would disturb about 3,000 acres (12 km²). The facility would
45 connect to the planned Red Bluff substation, to be built approximately 10 mi
46 (16 km) west of the project location. An auxiliary boiler would be fired

1 with propane. An average of 566 workers would be employed during
2 construction, and 134 full-time employees would be required for operations
3 (BLM and CEC 2010a).

4
5 Special status species of concern include desert tortoise and burrowing owl.
6 No desert tortoises and only low-quality tortoise habitat were observed during
7 spring 2009 surveys. Cultural surveys have identified both prehistoric and
8 historic cultural resources (BLM and CEC 2010a).

- 9
10 • *Solar Millennium Blythe Solar Project (CACA 48811)*. This proposed fast-
11 track project would be a parabolic trough facility with an output of 986 MW.
12 The project would be on public land within the eastern portion of the proposed
13 Riverside East SEZ, approximately 8 mi (13 km) west of Blythe, California,
14 adjacent to the I-10 transmission corridor. The proposed facility would occupy
15 approximately 9,480 acres (38.4 km²) and disturb about 7,030 acres
16 (28.5 km²). The facility would employ four adjacent and independent solar
17 troughs with nominal output of 250 MW each. It would employ dry cooling
18 and would require about 600 ac-ft/yr (0.74 million m³/yr) of groundwater
19 drawn from two on-site wells for mirror washing and other uses. Water
20 requirements during the proposed construction period of 2011 to 2015 are
21 estimated to be 620 ac-ft/yr (0.77 million m³/yr). The facility would connect
22 to a planned new substation, the Colorado River substation, to be built
23 approximately 5 mi (8 km) southwest of the project location. To supply
24 auxiliary boilers, a 9.8-mi (15.7-km) long natural gas pipeline would be built
25 to connect to an existing pipeline south of I-10; about 8 mi (13 km) of the line
26 would be on the project ROW. An average of 604 workers would be
27 employed during construction of the facility, and 221 full-time employees
28 would be required for operations (BLM and CEC 2010b).

29
30 Project construction would result in a direct loss of low- to moderate-quality
31 habitat for desert tortoise over the project site and would fragment and
32 degrade adjacent native plant and wildlife communities. The project could
33 also promote the spread of invasive non-native plants and desert tortoise
34 predators such as ravens. Five species of California-listed sensitive plant
35 species are present. Habitat for western burrowing owl, loggerhead shrike, Le
36 Conte's thrasher, black-tailed gnatcatcher, and California horned lark is also
37 present (BLM and CEC 2010b).

- 38
39 • *NextEra Genesis Ford Dry Lake Solar Project (CACA 4880)*. This proposed
40 fast-track project consists of two independent solar trough facilities using wet
41 cooling with a total output of 250 MW. The project would be located on
42 public land within the central portion of the proposed Riverside East SEZ,
43 approximately 20 mi (32 km) west of Blythe, California, north of I-10 and
44 near Dry Lake, California. The proposed facility would occupy 4,640 acres
45 (18.8 km²) and directly affect 1,800 acres (7.3 km²). The proposed facility
46 would employ wet cooling and would require about 1,640 ac-ft/yr

1 (2.0 million m³/yr) of cooling water from on-site wells. Water requirements
2 during the proposed construction period of 2011 to 2013 are estimated to be
3 870 ac-ft/yr (1.1 million m³/yr). The facility would connect to the proposed
4 Colorado River substation via a 230-kV on-site switchyard and a new
5 transmission line that would tie into the existing Blythe Energy Project
6 transmission line. The new transmission line, natural gas line, and access road
7 would be built in the same corridor that would exit the southern site boundary
8 and extend about 6.5 mi (10.5 km) south. An average of 646 workers would
9 be employed during construction of the facility, and 40 to 50 full-time
10 employees would be required for operations (BLM and CEC 2010c).

11
12 Biological surveys have identified a number of special status species,
13 including Mojave and Colorado fringe-toed lizards, loggerhead shrike,
14 Western burrowing owl, short-eared owl, prairie falcon, and northern harrier.
15 While no live desert tortoise were found, burrows and bones were present
16 on the site and tracks and carcasses in the surrounding area. As many as
17 15 cultural resource sites would be directly affected by construction of the
18 proposed Genesis Solar Energy Project (BLM and CEC 2010c).

- 19
20 • *Pending Solar ROW Applications on BLM-Administered Lands.* In addition to
21 the four fast-track solar projects described above, a number of regular-track
22 ROW applications for solar projects have been submitted to the BLM that
23 would be located either within the Iron Mountain SEZ or within 50 mi
24 (80 km) of the SEZ (BLM and USFS 2010b). Table 9.2.22.2-2 lists all
25 solar projects that had pending applications submitted to the BLM as of
26 March 2010. Figure 9.2.22.2-1 shows the locations of these applications.

27
28 Of the 25 active solar applications listed in Table 9.2.22.2-2, one application
29 is within the Iron Mountain SEZ, CACA 49002, on the eastern half of the
30 SEZ. Two applications are within 5 mi (8 km) of the boundary—CACA
31 49006, 1 mi (1.6 km) west and extending to about 6 mi (9.6 km) north of the
32 SEZ, and CACA 49008, 4 mi (6.5 km) west of the west-central portion of the
33 SEZ. All these applications, which are administered through the Needles Field
34 Office, are listed in Table 9.2.22.2-2 and shown in Figure 9.2.22.2-1.

35
36 The likelihood of any of the regular-track ROW application projects actually
37 being developed is uncertain, but is generally assumed to be less than that for
38 fast-track applications. The projects are all listed for completeness and as an
39 indication of the level of interest in development of solar energy in the region.
40 Some number of these applications would be expected to result in actual
41 projects. Thus, the cumulative impacts of these potential projects are analyzed
42 in their aggregate effects.

43
44
45 **Wind Energy.** Table 9.2.22.2-2 lists ROW grant applications for five pending wind site
46 testing, three authorized for wind site testing, and one pending wind development facility within

TABLE 9.2.22.2-2 Pending Renewable Energy Project ROW Applications on BLM-Administered Land within 50 mi (80 km) of the Proposed Iron Mountain SEZ^a

Serial No.	Project Name	Application Received	Size (acres ^b)	MW	Technology	Field Office
<i>Solar Applications</i>						
AZA 034335	Boulevard Associates, LLC	June 8, 2007	24,221	500	CSP/Trough	Lake Havasu: Yuma
AZA 034554	Nextlight Renewable Power, LLC	March 26, 2008	20,699	500	CSP/Trough	Yuma
AZA 034666	SolarReserve, LLC (Quartzsite)	May 27, 2008	25,204	100	CSP/Tower	Yuma
AZA 035137	E-on Climate & Renewables (Castle Dome)	July 2, 2009	590	100	PV	Yuma
CACA 48728	FPL Energy	Jan. 31, 2007	20,608	250	CSP	Palm Springs-Southcoast
CACA 48808	Chuckwalla Solar, LLC	Sept. 15, 2006	4,099	200	PV	Palm Springs-Southcoast
CACA 48818	First Solar (Desert Opal)	Feb. 26, 2007	15,824	1,205	PV	Barstow
CACA 49002	Leopold Company, LLC	Apr. 2, 2007	35,466	4,100	CSP	Needles
CACA 49006	Boulevard Associates, LLC	May 14, 2007	12,046	1,000	CSP	Needles
CACA 49008	Boulevard Associates, LLC	May 14, 2007	35,639	1,000	CSP	Needles
CACA 49097	Bull Frog Green Energy, LLC	Oct. 1, 2008	6,634	2,500	PV	Palm Springs-Southcoast
CACA 49397	First Solar (Desert Quartzite)	Oct. 28, 2007	7,548	600	PV	Palm Springs-Southcoast
CACA 49423	Solel, Inc.	July 23, 2007	6,614	0		Needles
CACA 49424	Solel, Inc.	July 23, 2007	7,453	600	CSP	Needles
CACA 49430	Iberdrola Renewables, Inc.	Dec. 8, 2008	13,373	N/A	CSP	Needles
CACA 49431	Boulevard Associates, LLC	Sept. 21, 2007	10,199	1,000	CSP	Needles
CACA 49432	PG&E	Sept. 24, 2007	5,315	800	Undecided	Needles
CACA 49488	Enxco, Inc.	Nov. 13, 2007	1,327	300	CSP	Palm Springs-Southcoast
CACA 49490	Enxco, Inc.	Nov. 13, 2007	20,608	300	CSP	Palm Springs-Southcoast
CACA 49491	Enxco, Inc.	Nov. 13, 2007	1,327	300	CSP	Palm Springs-Southcoast
CACA 49493	Solel, Inc.	March 27, 2008	8,750	500	CSP	Palm Springs-Southcoast
CACA 49494	Solel, Inc.	Nov. 6, 2007	7,317	500	CSP	Palm Springs-Southcoast
CACA 49702	Bull Frog Green Energy, LLC	June 1, 2008	22,717	2,500	PV	Palm Springs-Southcoast
CACA 49813	Iberdrola Renewables, Inc.	April 1, 2008	12,833	1,000	CSP	Needles
CACA 50379	Lightsource Renewables, LLC	Aug. 8, 2008	2,446	550	CSP	Palm Springs-Southcoast

TABLE 9.2.22.2-2 (Cont.)

Serial No.	Project Name	Application Received	Size (acres ^c)	MW	Technology	Field Office
Wind Applications						
Pending Wind Site Testing						
AZA 34965	Oak Creek Energy Systems, Inc.	– ^c	16,258	–	Wind	Lake Havasu: Kingman
CACA 48287	Renewergy, LLC	July 26, 2006	7,760	–	Wind	Needles
CACA 48664	Renewergy, LLC	Aug. 7, 2006	37,219	–	Wind	Needles
CACA 50711	Padoma Wind Power, LLC	March 17, 2009	23,829	–	Wind	Barstow
CACA 50770	–	–	–	–	Wind	–
Authorized Wind Site Testing		Application Last Authorized				
CACA 48667	Oak Creek Energy	June 16, 2010	23,691	–	Wind	Needles
CACA 49433	Padoma Wind Power, LLC	June 16, 2010	25,832	–	Wind	Needles
CACA 51062	John Deere Renewables, LLC	April 29, 2009	6,256		Wind	El Centro
Pending Wind Development Facility						
CACA 51664	LH Renewable, LLC	Dec. 8, 2009	3,500	–	Wind	Palm Springs

^a Information taken from pending and authorized wind energy projects listed on BLM California Desert District Web site (BLM 2010e) and downloaded from GeoCommunicator (BLM and USFS 2010b). Total solar acres = 126,168, total solar MW =20,387; total wind acres and MW not available.

^b To convert acres to km², multiply by 0.004047.

^c A dash indicates data not available.

1 a 50-mi (80-km) radius of the proposed Iron Mountain SEZ. The actual development of all
2 nine proposals is considered pending, however, since they await authorization of development
3 of wind facilities. As shown in Figure 9.2.22.2-1, the locations of the applications lie generally
4 on an arc running from north to west to south of the SEZ at a distance of approximately 30 mi
5 (48 km).
6

7 The likelihood of any of the regular-track wind projects actually being developed is
8 uncertain; the projects are listed to give an indication of the level of interest in development of
9 wind energy in the region. Most are in the wind testing stage, and EAs necessary for project
10 approval are being prepared.
11

12
13 ***Geothermal Energy.*** No geothermal applications are located within 50 mi (80 km) of the
14 Iron Mountain SEZ.
15

16 17 ***9.2.22.2.2 Other Actions*** 18

19 20 **Other Foreseeable Actions** 21

22
23 ***Cadiz Valley Dry-Year Supply Project.*** The Cadiz Valley Dry-Year Supply Project is
24 a water storage and supply program that will provide southern California with as much as
25 150,000 ac-ft/yr (185 million m³/yr) of water during years of droughts, emergencies, or other
26 periods of urgent need by utilizing the aquifer system that underlies Cadiz's 35,000 acres
27 (142 km²) of land holdings in the Cadiz and Fenner Valleys of eastern San Bernardino County
28 (Cadiz, Inc. 2008). Historically, such dry periods occur about 3 out of every 10 years. In any
29 given dry year, this water would be enough to serve more than 1.2 million people. The project
30 would involve taking water from the CRA during high rainfall years and storing it in aquifer
31 systems to supply southern California's water needs during periods of severe drought.
32

33 The project was the subject of congressional hearings in August 2009 regarding
34 Cadiz, Inc.'s controversial proposal to use a 42-mi (68-km) long stretch of a Mojave railway
35 line ROW for the water pipeline (Chance of Rain 2009). A portion of the water pipeline would
36 cross the extreme southern part of the Iron Mountain SEZ.
37

38
39 ***Proposed West Chocolate Mountains Renewable Energy Evaluation Area.*** In a
40 February 10, 2010, NOI in the *Federal Register*, the BLM El Centro Field Office announced its
41 intent to prepare an EIS to consider an amendment to the CDCA Plan to identify whether
42 21,300 acres (86.2 km²) of BLM-administered lands within the West Chocolate Mountains area
43 should be made available for geothermal, solar, or wind energy development (BLM 2010a). The
44 Evaluation Area lies about 40 mi (64.3 km) south of the proposed Iron Mountain SEZ in
45 Riverside County, east of Niland and northeast of El Centro, California. Cumulative impacts at
46 this distance would affect mainly ecological and socioeconomic resources.
47

1 **Other Ongoing Actions**
2
3

4 **Mining.** The BLM GeoCommunicator Database (BLM and USFS 2010b) shows there
5 are no mining claims for locatable minerals within the proposed Iron Mountain SEZ. About
6 23,000 acres (93 km²) of the SEZ is classified as a KSLA, and there are currently three active
7 leases in the area. Sodium is being produced from the area, and production is expected to
8 continue.
9

10
11 **Grazing.** One grazing allotment exists in the immediate vicinity of the Iron Mountain
12 SEZ (BLM and USFS 2010b). The Keoughs allotment (serial no. CACA 06001) is located
13 mostly in northern Riverside County and adjacent to the southeastern portion of the SEZ. The
14 next nearest grazing allotment (Lazy Daisy allotment, serial no. CACA 09076) is located about
15 25 to 30 mi (40 to 48 km) north of the SEZ. There is no grazing within the Iron Mountain SEZ,
16 therefore there would be no cumulative effect on the grazing industry.
17
18

19 **Communication Sites.** One communication tower (serial no. CACA 014137) is located in
20 the western portion of the Iron Mountain SEZ.
21
22

23 **Gas Pipeline.** Two natural gas pipelines cross the Iron Mountain SEZ paralleling the
24 Atchison Topeka and Santa Fe Railroad, which runs diagonally through the SEZ from southeast
25 to northwest. Major pipeline corridors parallel I-40 and I-10 north and south of the SEZ,
26 respectively.
27
28

29 **9.2.22.3 General Trends**
30
31

32 **9.2.22.3.1 Population Growth**
33

34 Table 9.2.22.3-1 presents recent and projected population numbers for the 50-mi (80-km)
35 radius two-county ROI and in California as a whole. Population in the ROI stood at 4,189,515
36 in 2008, having grown at an average annual rate of 3.1% since 2000. Growth rates for the
37 two counties in the ROI were higher than those for California as a whole (1.4%) over the same
38 period.
39

40 Both counties in the ROI have experienced growth in population since 2000. Between
41 2000 and 2008, population grew at an annual rate of 3.8% in Riverside County and 2.4% in
42 San Bernardino County. The ROI population is expected to increase to 5,584,241 by 2021 and
43 to 5,780,284 by 2023 (California Department of Finance 2010).
44

TABLE 9.2.22.3-1 ROI Population for the Proposed Iron Mountain SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Riverside County	1,559,039	2,103,050	3.8	2,965,113	3,085,643
San Bernardino County	1,721,942	2,086,465	2.4	2,619,128	2,694,641
ROI	3,280,981	4,189,515	3.1	5,584,241	5,780,284
California	34,105,437	38,129,628	1.4	44,646,420	45,667,413

Sources: U.S. Bureau of the Census (2009f); California Department of Finance (2010).

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9.2.22.3.2 Energy Demand

The growth in energy demand is related to population growth through increases in housing, commercial floor space, transportation, manufacturing, and services. With population growth expected in Imperial, Riverside, and San Bernardino Counties between 2006 and 2016, an increase in energy demand also is expected. However, the EIA projects a decline in per-capita energy use through 2030, mainly because of improvements in energy efficiency and the high cost of oil throughout the projection period. Primary energy consumption in the United States between 2007 and 2030 is expected to grow by about 0.5% each year; the fastest growth is projected for the residential, commercial and industrial sectors, which are expected to grow by about 0.5%, 0.4%, and 0.1%, respectively, (industrial) each year (EIA 2009).

9.2.22.3.3 Water Availability

Because of its remote location and lack of agricultural and residential users, the Iron Mountain SEZ is not in an area of extensive water use. The majority (98%) of the proposed Iron Mountain SEZ is located within the Ward Valley groundwater basin, and the southeastern corner (2%) is located in the Rice Valley groundwater basin. From a regional perspective, groundwater recharge in the eastern Mojave Desert is largely supplied by rainfall and snowmelt runoff at higher elevations, and groundwater discharge is primarily through interbasin flows and evaporation from low-elevation playas (MWD 2001). Information on the groundwater aquifers in the Ward Valley is limited because of the historically low level of development in this region. The groundwater storage capacity for the Ward Valley groundwater basin is estimated to be 8.7 million ac-ft (11 billion m³), on the basis of basin size and estimates of alluvium depths. The natural groundwater recharge is estimated to be 2,700 ac-ft/yr (3.3 million m³/yr), and the groundwater discharge at Danby Lake is estimated to range from 11,000 to 22,000 ac-ft/yr (13.6 million to 27.2 million m³/yr) (CDWR 2003).

1 Historically, groundwater withdrawals have been used to support small farms and
2 vineyards, railroads, and salt-mining industries (MWD 2001). Between 1901 and 1947,
3 groundwater withdrawals averaged 50 ac-ft/yr (61,700 m³/yr), but have dropped off because
4 of railroads switching from steam to diesel engines. Withdrawals currently range from 2 to
5 8 ac-ft/yr (2,500 to 9,900 m³/yr) (MWD 2001; CDWR 2003). Groundwater levels range from
6 near surface at Danby Dry Lake to 700 ft (229 m) below the surface (CDWR 2003). A USGS
7 monitoring well located on the northwestern corner of the proposed SEZ showed steady
8 groundwater levels at 93 ft (28 m) below the surface from 1964 to 1984 (USGS 2009, well
9 number 341627115102901). Other USGS wells within the adjacent Cadiz Valley and Rice
10 Valley groundwater basins have also shown steady groundwater levels (USGS 2009, well
11 numbers 340500114505801, 340424114484801, 340300114473301, 342513115220001). Well
12 yields within the Ward Valley groundwater basin have been reported between 10 and 260 gpm
13 (38 and 984 L/min) (CDWR 2003). Cadiz, Inc. reported total groundwater yields of up to
14 3,700 gpm (14,000 L/min) for its agricultural production wells, which are 25 mi (40 km)
15 northwest of the proposed SEZ in the Cadiz Valley groundwater basin (MWD 2001).
16

17 The most extensive water use in the region is in western San Bernardino County. In 2005,
18 water withdrawals from surface waters and groundwater in San Bernardino County were
19 656,900 ac-ft/yr (860 million m³/yr), 57% of which came from surface waters and 43% from
20 groundwater. The largest water use category was municipal and domestic supply, at
21 427,100 ac-ft/yr (527 million m³/yr). However, the majority of this water was used in the larger
22 cities in the southwestern portion of San Bernardino County. Agricultural water uses accounted
23 for 167,000 ac-ft/yr (206 million m³/yr), while industrial and thermoelectric water uses
24 accounted for 29,150 and 33,630 ac-ft/yr (36 million and 41 million m³/yr), respectively
25 (Kenny et al. 2009). Water uses in western San Bernardino County, however, may be too far
26 away to affect water resources at the proposed Iron Mountain SEZ.
27
28

29 **9.2.22.3.4 Climate Change**

30
31 Global warming has continued to affect many desert areas in the southwestern
32 United States with increased temperatures and prolonged drought during the past 20 to 30 years.
33 A report on global climate change in the United States prepared on behalf of the National
34 Science and Technology Council by the U.S. Global Research Program documents current
35 temperature and precipitation conditions and historic trends, and projects impacts during the
36 remainder of the 21st century through modeling using low and high scenarios of global GHG
37 emissions. The report summarizes the science of climate change and the recent and future
38 impacts of climate change on the United States (Global Climate Research Program 2009). The
39 following excerpts from that report indicate that there has been a trend for increased global
40 temperature and decreased annual precipitation in desert regions:
41

- 42 • Average temperatures in the United States increased more than 2°F (1.1°C)
43 over the period 1957 to 2007.
- 44
- 45 • Southern areas, particularly desert regions of southern Arizona and
46 southeastern California, have experienced longer droughts and are projected to

1 have more severe periods of drought during the remainder of the 21st century.
2 Much of the Southwest has experienced drought conditions since 1999. This
3 period represents the most severe drought in 110 years.
4

- 5 • The incidence of wildfires in the western United States has increased in recent
6 decades, partly because of increased drought.
7
- 8 • Temperature increases in the next 20 to 30 years are expected to be strongly
9 correlated with past emissions of heat-trapping gases, such as CO₂ and CH₄.
10
- 11 • Many extreme weather events have increased both in frequency and intensity
12 during the last 40 to 50 years. Precipitation and runoff are expected to
13 decrease in the Southwest in spring and summer based on current data and
14 anticipated temperature increases. Water use will increase over the next
15 several decades as the population of southern California grows, resulting in
16 trade-offs among competing uses.
17
- 18 • Climate project models also show a 10 to 20% decline in runoff in California
19 and Nevada for the period 2041 to 2060, compared with data from 1901 to
20 1970 used as a baseline.
21
- 22 • In the Southwest, average temperatures increased about 1.5°F (0.8°C) in
23 2000 compared to a baseline period of 1960 to 1979. By the year 2020,
24 temperatures are projected to rise 2 to 3°F (1.1 to 1.7°C) above the 1960 to
25 1979 baseline.
26

27 Increased global temperatures from GHG emissions will likely continue to exacerbate
28 drought in the southern California deserts. The State of California has prepared several reports
29 of climate change impact predictions through the remainder of the 21st century that address
30 such topics as economics, ecosystems, water use/availability, impacts on Santa Ana winds,
31 agriculture, timber production, and snowpack. The California climate change portal Web site
32 (<http://www.climatechange.ca.gov/publications/cat/index.html>) lists the Climate Action Team
33 reports that are submitted to the Governor and state legislature. These reports are included as
34 final papers of the CEC's Public Interest Energy Research Program.
35
36

37 **9.2.22.4 Cumulative Impacts on Resources**

38

39 This section addresses potential cumulative impacts in the proposed Iron Mountain SEZ
40 on the basis of the following assumptions: (1) because of the relatively large size of the proposed
41 SEZ (more than 30,000 acres [121 km²]), as many as three projects could be constructed at a
42 time, and (2) maximum total disturbance over 20 years would be about 85,217 acres (345 km²)
43 (80% of the entire proposed SEZ). For analysis, it is also assumed that no more than 3,000 acres
44 (12.1 km²) would be disturbed per project annually and 250 acres (1.01 km²) monthly on the
45 basis of construction schedules planned in current applications. For this analysis, the impacts of
46 construction and operation of transmission lines outside of the SEZ were not assessed, assuming

1 that the existing 230-kV transmission line might be used to connect some new solar facilities to
2 load centers and that additional project-specific analysis would be performed for new
3 transmission construction or line upgrades. Regarding site access, because State Route 62, a
4 two-lane highway, passes through the southern edge the SEZ, no major road construction
5 activities outside of the SEZ would be needed for development to occur in the SEZ.
6

7 Cumulative impacts in each resource area that would result from the construction,
8 operation, and decommissioning of solar energy development projects within the proposed SEZ
9 when added to other past, present, and reasonably foreseeable future actions described in the
10 previous section are discussed below. At this stage of development, because of the uncertainties
11 of the future projects in terms of location within the proposed SEZ, size, number, and the types
12 of technology that would be employed, the impacts are discussed qualitatively or semi-
13 quantitatively, with ranges given as appropriate. More detailed analyses of cumulative impacts
14 would be performed in the environmental reviews for the specific projects in relation to all other
15 existing and proposed projects in the geographic areas.
16

17 **9.2.22.4.1 Lands and Realty**

18 The area covered by the proposed Iron Mountain SEZ is in a remote, rural, and largely
19 undeveloped portion of the eastern Mojave Desert. While the SEZ comprises only BLM-
20 administered lands, about 2,560 acres (10.4 km²) of private lands and about 640 acres (2.5 km²)
21 of state lands are included within the external boundary of the SEZ. Another 560 acres (2.3 km²)
22 of state land is located adjacent to the southern boundary of the SEZ.
23
24
25

26 Development of the SEZ would introduce a highly contrasting industrialized land use
27 into an area that is largely rural. In addition, numerous renewable energy projects are proposed
28 within a 50-mi (80-km) radius of the Iron Mountain SEZ. As shown in Table 9.2.22.2-2 and
29 Figure 9.2.22-2, as many as 29 solar projects and 9 wind projects have pending applications
30 within this distance, with ROW applications totaling over 290,000 acres (1,170 km²), including
31 over 20,000 acres (81 km²) for five advanced solar proposals (Section 9.2.22.2.1). As a result of
32 the potential and likely development of other renewable energy projects and accompanying
33 transmission lines, roads, and other infrastructure within the geographic extent of effects, the
34 character of a large portion of the California Desert could be dramatically changed. The
35 contribution to cumulative impacts of utility-scale solar projects on public lands on and around
36 the Iron Mountain SEZ could be significant, particularly if the SEZ is fully developed with solar
37 projects. Development of the public lands for solar energy production may also result in similar
38 development on the state and private lands in the immediate vicinity of the SEZ.
39

40 Construction of utility-scale solar energy facilities within the SEZ would preclude use of
41 those areas occupied by the solar energy facilities for other purposes. The areas that would be
42 occupied by the solar facilities would be fenced, and access to those areas by both the general
43 public and wildlife would be eliminated.
44
45
46

1 **9.2.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics**
2

3 The Iron Mountain SEZ is surrounded by areas of high wilderness and scenic value,
4 including 11 wilderness areas with a potential view of the SEZ within 25 mi (40 km). The Turtle
5 Mountain ACEC, the Chemehuevi DWMA, and the Patton Iron Mountain Divisional Camp
6 ACEC are located nearby. Construction of utility-scale solar energy facilities within the SEZ in
7 combination with potential development of other renewable energy projects and associated
8 infrastructure would have the potential for contributing to the adverse visual impacts on these
9 specially designated areas. Development of the SEZ, especially full development, would be a
10 dominant factor in the viewshed from large portions of these specially designated areas.
11

12 Solar development of the Iron Mountain and Riverside East SEZs, together with the Rice
13 Solar Development on private land, would combine to adversely affect wilderness values in the
14 Rice Valley and Palen-McCoy WAs. Development within Iron Mountain and Riverside East
15 SEZs would also combine to affect Joshua Tree National Park and wilderness within the park.
16 The Cadiz Valley to the northwest of Iron Mountain SEZ, in particular, has a large number of
17 pending wind and solar applications that may result in cumulative effects on sensitive areas.
18
19

20 **9.2.22.4.3 Rangeland Resources**
21

22 The SEZ is not included within a grazing allotment, and, therefore, solar development
23 of the area would not contribute to any cumulative effects on livestock grazing. Likewise, since
24 SEZ is not located within either an HA or HMA, there would be no contribution to any adverse
25 effects on wild horses or burros.
26
27

28 **9.2.22.4.4 Recreation**
29

30 The Iron Mountain SEZ is flat and is of a type and quality that generally does not attract
31 recreational users. However, access into the area is easy, and low levels of recreational use do
32 occur, including backcountry driving, visiting of historical sites, hiking, recreational shooting,
33 hunting, and wildlife and wildflower viewing. It is anticipated there would not be a significant
34 loss of recreational use caused by development of the Iron Mountain SEZ, although some users
35 would be displaced. Cadiz Road that passes through the area is an important travel route for
36 people accessing areas adjacent to the SEZ. Access to public lands to the east of the SEZ could
37 be adversely affected by solar energy development if provision is not made to maintain public
38 road access around or through any solar development areas.
39

40 When SEZ development is considered in combination with other potential renewable
41 energy development within the region, a potential would exist for cumulative visual impacts on
42 recreational users of the specially designated areas surrounding the SEZ (Section 9.2.22.4.2) and
43 for users who enjoy backcountry driving. There is substantial potential for loss of wilderness and
44 scenic values throughout the California Desert wherever solar and wind energy development
45 encroaches on wilderness or on other currently undeveloped areas. The overall cumulative
46 impacts on recreational use associated with the loss of wilderness values and general open desert

1 scenery also could be large. While the effects cannot be quantified, desert users might avoid
2 areas dominated by industrial-type solar facilities. This could result a fundamental change in the
3 way the California Desert has been traditionally used.
4
5

6 ***9.2.22.4.5 Military and Civilian Aviation*** 7

8 The proposed Iron Mountain SEZ is located under five MTRs which are part of a very
9 large, interconnected system of training routes throughout the southwest. The development of
10 any solar energy or transmission facilities that encroach into the airspace of MTRs could create
11 safety issues and could conflict with military training activities. While the military has indicated
12 that solar development on portions of the Iron Mountain SEZ is compatible with its existing uses,
13 it has also commented that other portions should have height limits for facilities, and some areas
14 may be incompatible with existing military use. Potential solar development occurring
15 throughout the region, which is currently undeveloped, could result in small cumulative effects
16 on the system of MTRs. Such effects would be limited by mitigations developed in consultation
17 with the military.
18

19 There are no civilian aviation facilities in the vicinity of the SEZ and therefore there
20 would be no potential for cumulative effects.
21
22

23 ***9.2.22.4.6 Soil Resources*** 24

25 Ground-disturbing activities (e.g., grading, excavating, and drilling) during the
26 construction phase of a solar project, including any associated transmission lines, would
27 contribute to the soil loss due to erosion. Construction of new roads within the SEZ or
28 improvements to existing roads would also contribute to soil erosion. During construction,
29 operations, and decommissioning of the solar facilities, worker travel and other road use would
30 also contribute to soil loss. These losses would be in addition to losses occurring as a result of
31 disturbance caused by other users in the area, including from potential construction of several
32 other renewable energy facilities, and recreational users, such as off-road vehicle enthusiasts.
33 As discussed in Section 9.2.7.3, programmatic design features would be employed to minimize
34 erosion and loss of soil during the construction, operation, and decommissioning phases of the
35 solar facilities and any associated transmission lines. Landscaping of solar energy facility areas
36 could alter drainage patterns and lead to increased siltation of surface water streambeds, in
37 addition to that caused by other development activities. Even with the expected design features
38 in place, cumulative impacts from the disturbance of several large sites and connecting linear
39 facilities in the vicinity could be significant.
40
41

42 ***9.2.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)*** 43

44 No locatable mining claims, oil and gas leases, or geothermal leases occur within the
45 proposed Iron Mountain SEZ, and for that reason it is assumed there would be no cumulative

1 effect on these mineral resources. The SEZ is still open for discretionary mineral leasing,
2 including leasing for oil and gas and other leasable minerals.

3
4 The SEZ currently includes about 23,000 acres (93 km²) of the Danby Lake KSLA,
5 an area that has been determined by the BLM to contain valuable sodium mineral deposits.
6 Within the KSLA, multiple use-management may allow for uses other than sodium mineral
7 development, but only if those other uses do not interfere with or restrict the production of
8 sodium minerals. Solar energy development within the KSLA, while generally unsuitable due
9 to soil conditions, would be secondary to the production of sodium, and there would be no
10 impact on the sodium resource.

11 12 13 **9.2.22.4.8 Water Resources**

14
15 The water requirements for development and operation of various utility-scale solar
16 energy technologies on the proposed SEZ are described in Section 9.2.9.2. If the SEZ was fully
17 developed over 80% of its available land area, the amount of water needed during the peak
18 construction year for the various solar technologies evaluated would be 4,541 to 6,732 ac-ft
19 (5,600 to 8,300 thousand m³). The amount of water needed during decommissioning would be
20 similar to or less than the amount used during construction. During operations, the amount of
21 water needed for all solar technologies evaluated would range from 479 to 255,900 ac-ft/yr
22 (0.59 to 316 million m³/yr), with PV representing the lower end of this range. Since the
23 availability of groundwater (the primary water resource available to solar energy facilities in the
24 SEZ) is limited, it would not be feasible to obtain the upper end of the water requirements range.
25 A sustainable water use rate might be assumed to equal the estimated recharge rate for the Ward
26 Valley of 2,700 ac-ft/yr (3.3 million m³/yr), which would severely limit the amount of wet-
27 cooled trough or tower technology that could be built.

28
29 The levels of water use needed for build-out with wet cooling are clearly not feasible
30 with the water resources available to the region, and estimated recharge rates would support
31 only on the order of 500 MW of wet-cooled solar trough or power tower output. Conversely,
32 PV development would have minimal impacts on groundwater sources. Full-build out of the
33 proposed Iron Mountain SEZ with dry-cooling trough or tower facilities and/or dish engine
34 facilities would also not be possible without exceeding recharge rates under the water use
35 assumptions used in the PEIS. Implementation of water conservation measures (e.g., for mirror
36 washing) might allow increased development of these types of facilities without exceeding
37 recharge rates.

38
39 Currently one application (dated April 2, 2007) for development of a solar energy project
40 within the Iron Mountain SEZ is pending: application CACA 49002 from Leopold Company
41 LLC for a 4,100-MW CSP facility (Table 9.2.22.2-2). With technology-specific water use rates
42 (Section 9.2.9) and solar trough technology, such a facility could require up to 60,000 ac-ft/yr
43 (74 million m³/yr) if wet cooled, or 6,000 ac-ft/yr (7.4 million m³/yr) if dry cooled, assuming
44 60% operating time in each case. Impacts on the Ward Valley aquifer would be large under the
45 wet-cooling scenario, but might be sustainable under the dry-cooling scenario, assuming the
46 application of water conservation measures.

1 The development of the five advanced solar proposals identified within the geographic
2 extent of effects (Section 9.2.22.2.1) could draw up to 8,000 ac-ft (9.9 million m³/yr) of water to
3 support construction during the period 2011–2013, and up to 2,700 ac-ft/yr (3.3 million m³/yr)
4 during the following operational period of approximately 30 years. However, four of these
5 projects would be about 25 mi (40 km) south of the proposed SEZ and would not draw from the
6 Ward Valley or Rice Valley groundwater basins. Only the Rice Solar Energy Project, with
7 construction water use of 780 ac-ft/yr (0.96 million m³/yr) and operational water use of
8 180 ac-ft/yr (0.22 million m³/yr), would cumulatively affect the Iron Mountain SEZ. However,
9 only 2% of the SEZ lies over the Rice Valley basin; 98% of the SEZ lies over the Ward Valley
10 basin (Section 9.2.9.1.2). Likewise, the several pending solar energy project proposals for
11 locations west and northwest of the SEZ (Figure 9.2.22.2-1), if approved, would likely draw
12 from the Cadiz Valley groundwater basin and thus not contribute significantly to cumulative
13 impacts within the SEZ. Therefore, cumulative impacts on groundwater basins underlying the
14 Iron Mountain SEZ from currently foreseeable projects would be minimally greater than the
15 impacts from solar energy development within the SEZ.

16
17 Similarly, with respect to wastewaters, the small quantities of sanitary wastewater that
18 would be generated during the construction and operation of utility-scale solar energy facilities
19 within the Iron Mountain SEZ in combination with similarly small volumes from other
20 foreseeable projects would not be expected to strain available sanitary wastewater treatment
21 facilities in the general area of the SEZ. Blowdown water from cooling towers for wet-cooled
22 technologies would be treated within a project site (e.g., in settling ponds) and injected into the
23 ground, released to surface water bodies, or reused, and thus would not contribute cumulative
24 impacts on any nearby treatment systems.

25 26 27 **9.2.22.4.9 Vegetation**

28
29 The proposed Iron Mountain SEZ is located within the Sonoran Basin and Range
30 ecoregion, which supports creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia* sp.)
31 plant communities with large areas of palo verde (*Parkinsonia* sp.) cactus shrub and saguaro
32 cactus (*Carnegiea gigantea*) communities. No wetlands occur within the SEZ or within the 5-mi
33 (8-km) area of indirect effects. Riparian communities occur along larger washes and include
34 tamarisk, mesquite, and ironwood. Danby Lake is a dry lakebed most of the year; it is primarily
35 classified as North American Warm Desert Playa. The occurrences of the Sonora-Mojave Mixed
36 Salt Desert Scrub, North American Warm Desert Active and Stabilized Dune, and North
37 American Warm Desert Volcanic Rockland cover types in the SEZ are within Danby Lake. If
38 utility-scale solar energy projects were to be constructed within the SEZ, all vegetation within
39 the footprints of the facilities would likely be removed during land-clearing and land-grading
40 operations. Primarily affected would be communities of the Sonora–Mojave Creosotebush–
41 White Bursage Desert Scrub, North American Warm Desert Playa, North American Warm
42 Desert Wash, North American Warm Desert Bedrock Cliff and Outcrop cover types. Solar
43 development could result in large impacts on North American Warm Desert Playa associated
44 with Danby Lake (however, solar project development in that area is unlikely), moderate impacts
45 on Sonora-Mojave Creosotebush-White Bursage Desert Scrub, North American Warm Desert

1 Wash, Sonora-Mojave Mixed Salt Desert Scrub, North American Warm Desert Pavement, and
2 Developed, Open Space—Low Intensity, and small impacts on the remaining cover types.

3
4 Numerous other renewable energy projects are proposed within a 50-mi (80-km) radius
5 of the Iron Mountain SEZ. As many as 29 other solar projects and 9 wind projects have pending
6 applications within this distance, with ROW applications totaling more than 500,000 acres
7 (2,000 km²), including about 20,000 acres (81 km²) for five advanced solar proposals
8 (Section 9.2.22.2.1). Depending on the actual development of renewable energy projects within
9 and outside the SEZ and accompanying transmission lines, roads, and other infrastructure within
10 the geographic extent of effects, cumulative impacts on certain cover types could be significant,
11 particularly those that favor the basin flats, which are suitable for solar facilities.

12
13 In addition, the cumulative effects of fugitive dust generated during the construction of
14 solar facilities along with other activities in the area, such as transportation and recreation, could
15 increase the dust loading in habitats outside a solar project area, which could result in reduced
16 productivity or changes in plant community composition. Programmatic design features would
17 be implemented to reduce the impacts from solar energy projects and thus reduce the overall
18 cumulative impacts on plant communities and habitats.

21 **9.2.22.4.10 Wildlife and Aquatic Biota**

22
23 As many as 167 species of amphibians (1 species), reptiles (31 species), birds
24 (100 species), and mammals (35 species) occur in and around the proposed Iron Mountain SEZ
25 (Section 9.2.11). The construction of utility-scale solar energy projects in the SEZ and of any
26 associated transmission lines and roads in or near the SEZ would have impacts on wildlife
27 through habitat disturbance (i.e., habitat reduction, fragmentation, and alteration), wildlife
28 disturbance, loss of connectivity between natural areas (e.g., habitat fragmentation and blockage
29 of dispersal corridors for bighorn sheep and desert tortoise), and wildlife injury or mortality. In
30 general, affected species with broad distributions and occurring in a variety of habitats would be
31 less affected than species with a narrowly defined habitat within a restricted area. Programmatic
32 design features include pre-disturbance biological surveys to identify key habitat areas used by
33 wildlife, followed by avoidance or minimization of disturbance to those habitats (e.g., avoiding
34 development in Homer Wash).

35
36 Up to 29 other solar projects and 9 wind projects have pending applications within 50 mi
37 (80 km) of the SEZ, including several within the proposed Riverside East SEZ about 25 mi
38 (40 km) to the south. These ROW applications total more than 500,000 acres (2,000 km²),
39 including about 20,000 acres (81 km²) for five advanced solar proposals (Section 9.2.22.2.1).
40 Depending on the actual development of renewable energy projects within and outside the SEZ
41 and of accompanying transmission lines, roads, and other infrastructure within the geographic
42 extent of effects, cumulative impacts on some wildlife species could be significant, particularly
43 those with habitats or migratory routes in the basin flats, which are suitable for solar facilities.

44
45 While many of the wildlife species have extensive habitat available within the affected
46 counties, where projects are closely spaced, the cumulative impact on a particular species could

1 be moderate to large. Programmatic design features would be used to reduce the impacts from
2 solar energy projects and thus reduce the overall cumulative impacts on wildlife. However, even
3 with mitigations in place, cumulative impacts could be moderate within the geographic extent of
4 effects.
5

6 No wetlands are present within the proposed SEZ. However, Danby Lake, while
7 normally dry, supports high densities of aquatic invertebrates such as brine shrimp; which
8 provide important seasonal feeding resources for shorebirds and other wildlife. There would be
9 no cumulative impacts on aquatic biota and habitats resulting from solar development within the
10 SEZ as long as development in Danby Lake is avoided. Increased future demand on groundwater
11 for multiple uses, including solar power development within the SEZ, could affect surface water
12 levels outside of the SEZ, and, as a consequence, could affect aquatic organisms in those water
13 bodies.
14
15

16 **9.2.22.4.11 Special Status Species (Threatened, Endangered, Sensitive, and Rare** 17 **Species)** 18

19 Five special status species are known to occur within the affected area of the Iron
20 Mountain SEZ: Harwood's eriastrum, Mojave fringe-toed lizard, Bendire's thrasher, hepatic
21 tanager, and Nelson's bighorn sheep. In addition, designated critical habitat for the desert tortoise
22 and ESA species listed as threatened in California occurs within the affected area adjacent to the
23 SEZ boundary. Numerous additional species occurring on or in the vicinity of the SEZ are listed
24 as threatened or endangered by the states of California or Arizona or are listed as a sensitive
25 species by the BLM. Programmatic design features that could be used to reduce or eliminate the
26 potential for cumulative effects on these species from the construction and operation of utility-
27 scale solar energy projects within the geographic extent of effects include avoidance of habitat
28 and minimization of erosion, sedimentation, and dust deposition. In addition, translocation could
29 be used to minimize take of individuals.
30

31 Numerous reasonably foreseeable future actions could occur within the geographic extent
32 of effects of the proposed Iron Mountain SEZ, including 29 solar and 9 wind applications for
33 projects that would cover up to 500,000 acres (2,023.4 km²). A number of sensitive species have
34 been identified within the boundaries of the five advanced solar proposals covering 20,000 acres
35 (80.9 km²) discussed in Section 9.2.22.2. These species include the federally or state-listed
36 desert tortoise, Mojave fringe-toed lizard, Colorado fringe-toed lizard, Western burrowing owl,
37 short-eared owl, prairie falcon, northern harrier, loggerhead shrike, California horned lark, desert
38 kit fox, and several California-listed sensitive plant species.
39

40 The four fast-track solar energy proposals would occur within the proposed Riverside
41 East SEZ, about 25 mi (40 km) south of the Iron Mountain SEZ. Many special status species
42 with potential habitat impacts from solar development are common to both the Riverside East
43 and Iron Mountain SEZs, including the desert tortoise and Mojave fringe-toed lizard. However,
44 projects in these and other areas would employ design features to reduce or eliminate the impacts
45 on protected species as required by the ESA and other applicable federal and state laws and
46 regulations.
47

1 Depending on the number and size of other projects that will actually be built within the
2 next 20 to 30 years within the geographic extent of effects, there could be cumulative impacts on
3 protected species due to habitat destruction and overall development and fragmentation of the
4 area. Habitats that are particularly at risk are those in basin flats suited for solar development. In
5 particular, the functioning of the Chemehuevi DWMA could be cumulatively affected with
6 respect to connectivity, control of desert tortoise disease, and predation. Together, several new
7 solar facilities and the other associated actions would have a cumulative impact on wildlife.
8 Where projects are closely spaced, the cumulative impact on a particular species could be
9 moderate to large.

12 ***9.2.22.4.12 Air Quality and Climate***

14 While solar energy generates minimal emissions compared with fossil fuel-generated
15 energy, the site preparation and construction activities associated with solar energy facilities
16 would produce some emissions, mainly particulate matter (fugitive dust) and emissions from
17 vehicles and construction equipment. When these emissions are combined with those from other
18 projects near solar energy facilities or when they are added to natural dust generated by winds
19 and windstorms, the air quality in the general vicinity of the projects could be temporarily
20 degraded. For example, particulate matter (dust) concentration at or near the SEZ boundaries
21 could at times exceed state or federal ambient air quality standards. Generation of dust from
22 construction activities can be partially controlled by implementing aggressive dust control
23 measures, such as increased watering frequency or road paving or treatment.

25 Several other renewable energy projects are proposed or planned within the air basin
26 shared by Iron Mountain (Section 9.2.22.2.1 and Figure 9.2.22.2-1), while the Riverside East
27 SEZ lies about 25 mi (40 km) south. Concurrent construction of solar facilities at the two SEZs
28 could have cumulative impacts. Four fast-track proposed projects lie in the Riverside East SEZ,
29 while a total of 29 solar and 9 wind proposals are pending within 50 mi (80 km) of the Iron
30 Mountain SEZ. The fast-track projects have overlapping construction schedules for the period
31 2011 to 2013. These projects in combination with others with pending applications could
32 produce periods of elevated particulate emissions in the affected area.

34 Over the long term and across the region, the development of solar energy may have
35 beneficial cumulative impacts on the air quality and atmospheric values in southern California
36 by offsetting the need for energy production with fossil fuels, which result in higher levels of
37 emissions. As discussed in Section 9.2.13, air emissions from operating solar energy facilities are
38 relatively minor, while the displacement of criteria air pollutants, VOCs, TAPs, and GHG
39 emissions currently produced from fossil fuels could be relative large. For example, if the Iron
40 Mountain SEZ was fully developed (80% of its acreage) with solar facilities, the quantity of
41 pollutants avoided could be as large as 28% of all emissions from the current electric power
42 systems in California.

1 **9.2.22.4.13 Visual Resources**
2

3 The Ward Valley in the Mohave Desert is flat and is characterized by wide open views.
4 Generally good air quality and a lack of obstructions allow visibility for 50 mi (80 km) or more
5 under favorable atmospheric conditions. The proposed SEZ site is a generally flat to gently
6 rolling, largely treeless plain; the strong horizon line is the dominant visual feature. The VRI
7 values for the SEZ and immediate surroundings are VRI Class II, indicating high relative visual
8 values, Class III, indicating moderate relative visual values, and Class IV, indicating low relative
9 visual values. The inventory indicates relatively low levels of use and public interest; however,
10 the site is within the viewshed of 11 congressionally designated wilderness areas, a National
11 Natural Landmark, a scenic ACEC, and is within the California Desert Conservation Area,
12 indicating high visual sensitivity. The site is also visible from several other ACECs and in
13 general is close to other specially designated areas, indicating moderate visual sensitivity.
14

15 Development of utility-scale solar energy projects within the SEZ would contribute to the
16 cumulative visual impacts in the general vicinity of the SEZ and in the Ward Valley. However,
17 the exact nature of the visual impacts and the design features that would be appropriate would
18 depend on the specific project locations within the SEZ and on the solar technologies used. Such
19 impacts and potential design features would be considered in visual analyses conducted for
20 specific future projects. In general, large visual impacts on the SEZ would be expected to occur
21 as a result of the construction, operation, and decommissioning of utility-scale solar energy
22 projects. These impacts would be expected to involve major modification of the existing
23 character of the landscape and would likely dominate the views for some nearby viewers.
24 Additional impacts would occur as a result of the construction, operation, and decommissioning
25 of related facilities, such as access roads and electric transmission lines.
26

27 Because of the large size of utility-scale solar energy facilities, the large number of
28 pending applications on public lands in the area, and the generally flat, open nature of the
29 proposed SEZ, some lands outside the SEZ would also be subjected to visual impacts related to
30 the construction, operation, and decommissioning of utility-scale solar energy development.
31 Potential impacts would include night sky pollution, including increased skyglow, light spillage,
32 and glare. Some of the affected lands outside the SEZ would include potentially sensitive scenic
33 resource areas, including the 11 wilderness areas, the scenic ACEC, the National Natural
34 Landmark; and the CDCA. These sensitive visual resource areas would be subject to major to
35 minimal visual impacts. Visual impacts resulting from solar energy development within the SEZ
36 would be in addition to impacts caused by other potential projects in the area, such as other solar
37 facilities on private lands, transmission lines, and other renewable energy facilities, including
38 windmills. The presence of new facilities would normally be accompanied by increased numbers
39 of workers in the area, traffic on local roadways, and support facilities, all of which would add to
40 cumulative visual impacts.
41

42 As many as 29 other solar projects and 9 wind projects have pending applications on
43 public lands within 50 mi (80 km) of the SEZ, including several within the proposed Riverside
44 East SEZ about 25 mi (40 km) to the south. While the overall extent of cumulative effects of
45 renewable energy development in the area would depend on the number of projects that are
46 actually are built, it may be concluded that the general visual character of the landscape could

1 be transformed from primarily rural desert to more commercial-industrial in nature as a
2 consequence of these projects. Because of the topography of the region, solar facilities, located
3 in flat basins, would be visible at great distances from sensitive viewing locations in the
4 surrounding mountains. Also, the facilities would be located near major roads, thus the facilities
5 would be viewable by motorists. However, some portions of major roads where solar energy
6 facilities would be located are currently visually affected by transmission line corridors, towns,
7 and other infrastructure, as well as the road system itself.
8

9 In addition to cumulative visual impacts associated with views of particular future
10 facilities, as additional facilities are added, several projects might become visible from one
11 location or in succession as viewers move through the landscape, such as driving on local roads.
12 In general, the new facilities would likely vary in appearance, and depending on the number and
13 type of facilities, the resulting visual disharmony could exceed the visual absorption capability of
14 the landscape and add significantly to the cumulative visual impact. Thus, the overall cumulative
15 visual impacts in the region from solar and wind energy development would be significant.
16
17

18 ***9.2.22.4.14 Acoustic Environment*** 19

20 The areas around the proposed Iron Mountain SEZ and in Bernardino County, in general,
21 are relatively quiet. The existing noise sources include road traffic, infrequent railroad traffic,
22 aircraft flyovers, industrial activities including sodium mining and pumping activities, and
23 activities and events at nearby IMPS residences. During construction of solar energy facilities,
24 construction equipment could increase the noise levels over short durations during the day. After
25 the facilities are constructed and begin operating, there would be little or minor noise impacts for
26 any of the technologies, except from solar dish engine facilities and from parabolic trough or
27 power tower facilities using TES. It is possible that residents could be cumulatively affected by
28 more than one solar or other development built in close proximity to the SEZ, particularly at
29 night when the noise is more discernable due to relatively low background levels. However, such
30 cumulative impacts are unlikely due the expected wide separation of facilities and the sparse
31 population of the region.
32
33

34 ***9.2.22.4.15 Paleontological Resources*** 35

36 The potential for impacts on significant paleontological resources at the Iron Mountain
37 SEZ in Ward Valley is unknown. The area around Danby Lake has a high potential to contain
38 paleontological deposits and would require a paleontological survey. Further, the specific sites
39 selected for future projects would be surveyed if determined to be necessary by the BLM, and
40 any paleontological resources would be avoided or mitigated to the extent possible. A similar
41 process would be employed at other facilities constructed in the area, and no significant
42 cumulative impacts on paleontological resources are expected.
43
44
45

1 **9.2.22.4.16 Cultural Resources**
2

3 Ward Valley as a whole, and Danby Lake in particular were important areas for gathering
4 both salt and food resources for both the Mohave and Chemehuevi. The remains of campsites
5 are scattered throughout the valley, and there are panels of rock art in the adjacent mountains.
6 Direct impacts on significant cultural resources during site preparation and construction
7 activities could occur in the proposed Iron Mountain SEZ. However, further investigation would
8 be needed, including a cultural resource survey of the entire area of potential effects to identify
9 historic properties. It is possible that the development of utility-scale solar energy projects in
10 the Iron Mountain SEZ and of other projects likely to occur in the area could contribute
11 cumulatively to cultural resource impacts. However, historic properties would be avoided or
12 mitigated to the extent possible in accordance with state and federal regulations. Similarly,
13 through ongoing consultation with the California SHPO and appropriate Native American
14 governments, it is likely that many adverse effects on significant resources in the Ward Valley
15 could be mitigated to some extent. Some visual and landscape scale impacts may not be
16 mitigatable to the satisfaction of all interested parties. The increment of adverse effects from
17 solar energy development on the overall cumulative effect on cultural resources would depend
18 on the nature of the resources affected and could be significant.
19
20

21 **9.2.22.4.17 Native American Concerns**
22

23 Government-to-government consultation is under way with Native American
24 governments with possible traditional ties to the Ward Valley. In the past, the Chemehuevi have
25 expressed concerns over the Salt Song Trail, which passes just west of the SEZ, and the Quechan
26 Indian Tribe of the Fort Yuma Reservation stressed the importance of evaluating impacts on
27 landscapes as a whole within their Tribal Traditional Use Area. Solar development within the
28 SEZ could have negative effects on the trail. It is possible that the development of utility-scale
29 solar energy projects in the SEZ, when added to other potential projects likely to occur in the
30 area, including renewable energy projects outside the SEZ, could contribute cumulatively to
31 visual impacts and other Native American concerns in the valley. Continued discussions with the
32 area Tribes through government-to-government consultation is necessary to effectively consider
33 and address the Tribes' concerns related to solar energy development in the Ward Valley.
34
35

36 **9.2.22.4.18 Socioeconomics**
37

38 Solar energy development projects in the proposed Iron Mountain SEZ could
39 cumulatively contribute to socioeconomic effects in the immediate vicinity of the SEZs and
40 in the surrounding multicounty ROI. The effects could be positive (e.g., creation of jobs and
41 generation of extra income, increased revenues to local governmental organizations through
42 additional taxes paid by the developers and workers) or negative (e.g., added strain on social
43 institutions such as schools, law enforcement agencies, and health care facilities). Impacts from
44 solar development would be most intense during facility construction, but of greatest duration
45 during operations. Construction in the Iron Mountain SEZ and at other new projects in the area,
46 including other renewable energy development, would temporarily increase the number of

1 workers in the area needing housing and services. The number of workers involved in the
2 construction of solar projects in the proposed Iron Mountain SEZ alone could range from about
3 400 to 5,200 in the peak construction year, depending on the technology being employed, with
4 solar PV facilities at the low end and solar trough facilities at the high end. The total number of
5 jobs created in the area could range from approximately 1,200 (solar PV) to as high as 16,000
6 (solar trough).

7
8 Cumulative socioeconomic effects in the ROI from construction of solar facilities would
9 occur to the extent that multiple construction projects of any type were ongoing simultaneously.
10 It is a reasonable expectation that this condition would occur within a 50-mi (80 km) radius of
11 the SEZ occasionally over the 20 or more year solar development period. Five anticipated
12 projects with advanced proposals, including four fast-track projects located within the Riverside
13 East SEZ, would employ up to 2,300 construction workers during the period 2011 to 2013
14 (Section 9.2.22.2.1). This number of workers could place a modest short-term strain on local
15 resources in this sparsely populated area.

16
17 Annual impacts during the operation of solar facilities would be less, but could last 20 to
18 30 years, and could combine with those from other new projects in the area. The number of
19 workers needed at the solar facilities within the SEZ would be in the range of 190 to 3,700, with
20 approximately 260 to 6,100 total jobs created in the region. In addition, approximately
21 460 operation workers area estimated for the five projects with advanced proposals in the area
22 (Section 9.2.22.2.1). Population increases resulting from renewable energy development within
23 50 mi (80 km) of the Iron Mountain SEZ would contribute to general population growth
24 experienced in the region in recent years. The overall socioeconomic impacts would be positive,
25 through the creation of additional jobs and income. The negative impacts, including some short-
26 term disruption of rural community quality of life, would not likely be considered large enough
27 to require specific mitigation measures.

28 29 30 **9.2.22.4.19 Environmental Justice**

31
32 No minority or low-income populations have been identified within 50 mi (80 km) of the
33 proposed Iron Mountain SEZ in either California or Arizona, as defined under CEQ guidelines.
34 Thus, solar development within the proposed Iron Mountain SEZ would not be expected to
35 contribute to cumulative impacts on minority and low-income populations.

36 37 38 **9.2.22.4.20 Transportation**

39
40 During construction activities, there could be up to 1,000 workers commuting to a single
41 construction site at the SEZ, which could double the daily traffic load on State Route 62 near
42 the SEZ and have moderate cumulative impacts in combination with existing traffic levels and
43 increases from additional future projects in the area. Should up to three large projects with
44 approximately 1,000 daily workers each be under development simultaneously, an additional
45 6,000 vehicle trips per day could be added to State Route 62 in the vicinity of the SEZ, assuming
46 ride-sharing was not implemented. This increase in traffic would quadruple the current average

1 daily traffic level on State Route 62 and could have serious impacts on traffic flow during peak
2 commute times.

3

4 Further, if construction occurred concurrently in the proposed Iron Mountain and
5 Riverside East SEZs, which are about 20 mi (32 km) apart and both served by State
6 Route 177/62, the increase in traffic during shift changes could be significant. Local road
7 improvements may be necessary near site access points. Any impacts during construction
8 activities would be temporary. The impacts could be mitigated to some degree by having
9 different work hours within an SEZ or between the two SEZs. Traffic increases during operation
10 would be reduced because of the lower number of workers needed to operate solar facilities and
11 would have a smaller contribution to cumulative impacts.

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1 **9.2.23 References**

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3 *Note to Reader:* This list of references identifies Web pages and associated URLs where
4 reference data were obtained for the analyses presented in this PEIS. It is likely that at the time
5 of publication of this PEIS, some of these Web pages may no longer be available or their URL
6 addresses may have changed. The original information has been retained and is available through
7 the Public Information Docket for this PEIS.

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Draft Programmatic Environmental Impact Statement for

Solar Energy Development in Six Southwestern States



Volume 3, Part 2

Chapter 9: California Proposed Solar Energy Zones

On the cover:

Typical Solar Fields for Various Technology Types (clockwise from upper left):
Solar Parabolic Trough (Source: Hosoya et al. 2008),
Solar Power Tower (Credit: Sandia National Laboratories. Source: NREL 2010a),
Photovoltaic (Credit: Arizona Public Service. Source: NREL 2010b), and
Dish Engine (Credit: R. Montoya. Source: Sandia National Laboratories 2008).
Reference citations are available in Chapter 1.

Background photo: Parabolic trough facility from an elevated viewpoint
(Credit: Argonne National Laboratory)

Draft Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development in Six Southwestern States (DES 10-59; DOE/EIS-0403)

Responsible Agencies: The U.S. Department of the Interior (DOI) Bureau of Land Management (BLM) and the U.S. Department of Energy (DOE) are co-lead agencies. Nineteen cooperating agencies participated in the preparation of this PEIS: U.S. Department of Defense; U.S. Bureau of Reclamation; U.S. Fish and Wildlife Service; U.S. National Park Service; U.S. Environmental Protection Agency, Region 9; U.S. Army Corps of Engineers, South Pacific Division; Arizona Game and Fish Department; California Energy Commission; California Public Utilities Commission; Nevada Department of Wildlife; N-4 Grazing Board, Nevada; Utah Public Lands Policy Coordination Office; Clark County, Nevada, including Clark County Department of Aviation; Dona Ana County, New Mexico; Esmeralda County, Nevada; Eureka County, Nevada; Lincoln County, Nevada; Nye County, Nevada; and Saguache County, Colorado.

Locations: Arizona, California, Colorado, Nevada, New Mexico, and Utah.

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Abstract: The BLM and DOE are considering taking actions to facilitate solar energy development in compliance with various orders, mandates, and agency policies. For the BLM, these actions include the evaluation of a new BLM Solar Energy Program applicable to all utility-scale solar energy development on BLM-administered lands in six southwestern states (Arizona, California, Colorado, Nevada, New Mexico, and Utah). For DOE, they include the evaluation of developing new program guidance relevant to DOE-supported solar projects. The Draft PEIS assesses the environmental, social, and economic effects of the agencies' proposed actions and alternatives.

For the BLM, the Draft PEIS analyzes a no action alternative, under which solar energy development would continue on BLM-administered lands in accordance with the terms and conditions of the BLM's existing solar energy policies, and two action alternatives for implementing a new BLM Solar Energy Program. Under the solar energy development program alternative (BLM's preferred alternative), the BLM would establish a new Solar Energy Program of administration and authorization policies and required design features and would exclude solar energy development from certain BLM-administered lands. Under this alternative, approximately 22 million acres of BLM-administered lands would be available for right-of-way (ROW) application. A subset of these lands, about 677,400 acres, would be identified as solar energy zones (SEZs), or areas where the BLM would prioritize solar energy and associated transmission infrastructure development. Under the SEZ program alternative, the same policies and design features would be adopted, but development would be excluded from all BLM-administered lands except those located within the SEZs.

For DOE, the Draft PEIS analyzes a no action alternative, under which DOE would continue to conduct environmental reviews of DOE-funded solar projects on a case-by-case basis, and one action alternative, under which DOE would develop programmatic guidance to further integrate environmental considerations into its analysis and selection of solar projects that it will support.

The EPA Notice of Availability (NOA) of the Draft PEIS was published in the *Federal Register* on December 17, 2010. Comments on the Draft PEIS are due by March 17, 2011.

SOLAR PEIS CONTENTS

VOLUME 1

Reader's Guide

Executive Summary

Chapter 1: Introduction

Chapter 2: Description of Alternatives and Reasonably Foreseeable Development Scenario

Chapter 3: Overview of Solar Energy Power Production Technologies, Development, and Regulation

Chapter 4: Affected Environment

Chapter 5: Impacts of Solar Energy Development and Potential Mitigation Measures

Chapter 6: Analysis of BLM's Solar Energy Development Alternatives

Chapter 7: Analysis of DOE's Alternatives

Chapter 14: Consultation and Coordination Undertaken To Support Preparation of the PEIS

Chapter 15: List of Preparers

Chapter 16: Glossary

VOLUME 2

Chapter 8: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in Arizona

VOLUME 3, Parts 1 and 2

Chapter 9: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in California

VOLUME 4

Chapter 10: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in Colorado

VOLUME 5, Parts 1 and 2

Chapter 11: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in Nevada

VOLUME 6

Chapter 12: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in New Mexico

VOLUME 7

Chapter 13: Affected Environment and Impact Assessment for Proposed Solar Energy Zones in Utah

VOLUME 8

Appendix A: Current and Proposed Bureau of Land Management Solar Energy Development Policies and Design Features

Appendix B: Active Solar Applications

Appendix C: Proposed BLM Land Use Plan Amendments under the BLM Action Alternatives of the Solar Energy Development Programmatic Environmental Impact Statement

Appendix D: Summary of Regional Initiatives and State Plans for Solar Energy Development and Transmission Development to Support Renewable Energy Development

Appendix E: Methods for Estimating Reasonably Foreseeable Development Scenarios for Solar Energy Development

Appendix F: Solar Energy Technology Overview

Appendix G: Transmission Constraint Analysis

Appendix H: Federal, State, and County Requirements Potentially Applicable to Solar Energy Projects

Appendix I: Ecoregions of the Six-State Study Area and Land Cover Types of the Proposed Solar Energy Zones

Appendix J: Special Status Species Associated with BLM's Alternatives in the Six-State Study Area

Appendix K: Government-to-Government and Cultural Resource Consultations

Appendix L: GIS Data Sources and Methodology

Appendix M: Methodologies and Data Sources for the Analysis of Impacts of Solar Energy Development on Resources

Appendix N: Viewshed Maps for Proposed Solar Energy Zones

Reader's Guide

The detailed analysis of the proposed solar energy zones (SEZs) in California, provided in Sections 9.1 through 9.4, will be used to inform BLM decisions regarding the size, configuration, and/or management of these SEZs. These sections also include proposed mitigation requirements (termed "SEZ-specific design features"). Please note that the SEZ-specific summaries of Affected Environment use the descriptions of Affected Environment for the six-state study area presented in Chapter 4 of the PEIS as a basis. Also note that the SEZ-specific design features have been proposed with consideration of the general impact analyses for solar energy facilities presented in Chapter 5, and on the assumption that all programmatic design features presented in Appendix A, Section A.2.2, will be required for projects that will be located within the SEZs.

BLM will implement its SEZ-specific decisions through the BLM Record of Decision for the Final PEIS. Comments received during the review period for the Draft PEIS will inform BLM decisions.

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VOLUME 3, PART 2 CONTENTS

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

NOTATION.....		xlvii
ENGLISH/METRIC AND METRIC/ENGLISH EQUIVALENTS		lix
9.3 Pisgah.....		9.3-1
9.3.1 Background and Summary of Impacts.....		9.3-1
9.3.1.1 General Information.....		9.3-1
9.3.1.2 Development Assumptions for the Impact Analysis		9.3-3
9.3.1.3 Summary of Major Impacts and SEZ-Specific Design Features.....		9.3-4
9.3.2 Lands and Realty		9.3-21
9.3.2.1 Affected Environment.....		9.3-21
9.3.2.2 Impacts.....		9.3-21
9.3.2.2.1 Construction and Operations.....		9.3-21
9.3.2.2.2 Transmission Facilities and Other Off-Site Infrastructure		9.3-22
9.3.2.3 SEZ-Specific Design Features and Design Feature Effectiveness.....		9.3-22
9.3.3 Specially Designated Areas and Lands with Wilderness Characteristics.....		9.3-23
9.3.3.1 Affected Environment.....		9.3-23
9.3.3.2 Impacts.....		9.3-25
9.3.3.2.1 Construction and Operations.....		9.3-25
9.3.3.2.2 Transmission Facilities and Other Off-Site Infrastructure		9.3-29
9.3.3.3 SEZ-Specific Design Features and Design Feature Effectiveness.....		9.3-29
9.3.4 Rangeland Resources.....		9.3-31
9.3.4.1 Livestock Grazing.....		9.3-31
9.3.4.1.1 Affected Environment.....		9.3-31
9.3.4.1.2 Impacts		9.3-31
9.3.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness.....		9.3-31
9.3.4.2 Wild Horses and Burros.....		9.3-31
9.3.4.2.1 Affected Environment.....		9.3-31
9.3.4.2.2 Impacts		9.3-33
9.3.4.2.3 SEZ-Design Features and Design Feature Effectiveness		9.3-33
9.3.5 Recreation		9.3-35
9.3.5.1 Affected Environment.....		9.3-35
9.3.5.2 Impacts.....		9.3-35
9.3.5.2.1 Construction and Operations.....		9.3-35

CONTENTS (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

		9.3.5.2.2	Transmission Facilities and Other Off-Site Infrastructure		9.3-36
	9.3.5.3		SEZ-Specific Design Features and Design Feature Effectiveness		9.3-36
	9.3.6		Military and Civilian Aviation.....		9.3-37
		9.3.6.1	Affected Environment.....		9.3-37
		9.3.6.2	Impacts.....		9.3-37
		9.3.6.3	SEZ-Specific Design Features and Design Feature Effectiveness		9.3-37
	9.3.7		Geologic Setting and Soil Resources.....		9.3-39
		9.3.7.1	Affected Environment.....		9.3-39
			9.3.7.1.1 Geologic Setting.....		9.3-39
			9.3.7.1.2 Soil Resources		9.3-49
		9.3.7.2	Impacts.....		9.3-54
		9.3.7.3	SEZ-Specific Design Features and Design Feature Effectiveness		9.3-54
	9.3.8		Minerals		9.3-55
		9.3.8.1	Affected Environment.....		9.3-55
		9.3.8.2	Impacts.....		9.3-55
		9.3.8.3	SEZ-Specific Design Features and Design Feature Effectiveness		9.3-56
	9.3.9		Water Resources		9.3-57
		9.3.9.1	Affected Environment.....		9.3-57
			9.3.9.1.1 Surface Waters		9.3-57
			9.3.9.1.2 Groundwater.....		9.3-59
			9.3.9.1.3 Water Use and Water Rights Management.....		9.3-61
		9.3.9.2	Impacts.....		9.3-63
			9.3.9.2.1 Land Disturbance Impacts on Water Resources.....		9.3-63
			9.3.9.2.2 Water Use Requirements for Solar Energy Technologies.....		9.3-63
			9.3.9.2.3 Off-Site Impacts: Roads and Transmission Lines		9.3-68
			9.3.9.2.4 Summary of Impacts on Water Resources		9.3-68
		9.3.9.3	SEZ-Specific Design Features and Design Feature Effectiveness		9.3-69
	9.3.10		Vegetation		9.3-71
		9.3.10.1	Affected Environment.....		9.3-71
		9.3.10.2	Impacts.....		9.3-77
			9.3.10.2.1 Impacts on Native Species		9.3-78

CONTENTS (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

	9.3.10.2.2	Impacts from Noxious Weeds and Invasive Plant Species.....	9.3-80
	9.3.10.3	SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-81
9.3.11		Wildlife and Aquatic Biota.....	9.3-83
	9.3.11.1	Amphibians and Reptiles.....	9.3-84
	9.3.11.1.1	Affected Environment.....	9.3-84
	9.3.11.1.2	Impacts.....	9.3-84
	9.3.11.1.3	SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-85
	9.3.11.2	Birds.....	9.3-91
	9.3.11.2.1	Affected Environment.....	9.3-91
	9.3.11.2.2	Impacts.....	9.3-106
	9.3.11.2.3	SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-107
	9.3.11.3	Mammals.....	9.3-108
	9.3.11.3.1	Affected Environment.....	9.3-108
	9.3.11.3.2	Impacts.....	9.3-109
	9.3.11.3.3	SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-118
	9.3.11.4	Aquatic Biota.....	9.3-119
	9.3.11.4.1	Affected Environment.....	9.3-119
	9.3.11.4.2	Impacts.....	9.3-119
	9.3.11.4.3	SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-120
9.3.12		Special Status Species.....	9.3-121
	9.3.12.1	Affected Environment.....	9.3-121
	9.3.12.1.1	Species Listed under the ESA That Could Occur in the Affected Area.....	9.3-123
	9.3.12.1.2	BLM-Designated Sensitive Species.....	9.3-147
	9.3.12.1.3	State-Listed Species.....	9.3-154
	9.3.12.1.4	Rare Species.....	9.3-154
	9.3.12.2	Impacts.....	9.3-154
	9.3.12.2.1	Impacts on Species Listed Under the ESA.....	9.3-156
	9.3.12.2.2	Impacts on BLM-Designated Sensitive Species.....	9.3-158
	9.3.12.2.3	Impacts on State-Listed Species.....	9.3-176
	9.3.12.2.4	Impacts on Rare Species.....	9.3-176
	9.3.12.3	SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-176
9.3.13		Air Quality and Climate.....	9.3-179
	9.3.13.1	Affected Environment.....	9.3-179

CONTENTS (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

		9.3.13.1.1	Climate	9.3-179
		9.3.13.1.2	Existing Air Emissions.....	9.3-182
		9.3.13.1.3	Air Quality	9.3-183
	9.3.13.2		Impacts.....	9.3-185
		9.3.13.2.1	Construction	9.3-185
		9.3.13.2.2	Operations	9.3-188
		9.3.13.2.3	Decommissioning/Reclamation	9.3-190
	9.3.13.3		SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-191
	9.3.14		Visual Resources.....	9.3-193
		9.3.14.1	Affected Environment.....	9.3-193
		9.3.14.2	Impacts.....	9.3-198
		9.3.14.2.1	Impacts on the Proposed Pisgah SEZ.....	9.3-199
		9.3.14.2.2	Impacts on Lands Surrounding the Proposed Pisgah SEZ	9.3-200
		9.3.14.2.3	Summary of Visual Resource Impacts for the Proposed Pisgah SEZ.....	9.3-236
	9.3.14.3		SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-236
	9.3.15		Acoustic Environment	9.3-241
		9.3.15.1	Affected Environment.....	9.3-241
		9.3.15.2	Impacts.....	9.3-242
		9.3.15.2.1	Construction	9.3-242
		9.3.15.2.2	Operations	9.3-244
		9.3.15.2.3	Decommissioning/Reclamation	9.3-247
	9.3.15.3		SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-247
	9.3.16		Paleontological Resources	9.3-249
		9.3.16.1	Affected Environment.....	9.3-249
		9.3.16.2	Impacts.....	9.3-249
		9.3.16.3	SEZ-Specific Design Features and Design Feature Effectiveness.....	9.3-250
	9.3.17		Cultural Resources.....	9.3-251
		9.3.17.1	Affected Environment.....	9.3-251
		9.3.17.1.1	Prehistory	9.3-251
		9.3.17.1.2	Ethnohistory	9.3-252
		9.3.17.1.3	History	9.3-255
		9.3.17.1.4	Traditional Cultural Properties— Landscape.....	9.3-257
		9.3.17.1.5	Cultural Surveys and Known Archaeological and Historic Resources ...	9.3-257
	9.3.17.2		Impacts.....	9.3-259

CONTENTS (Cont.)

1

2

3

4 9.3.17.3 SEZ-Specific Design Features and Design Feature

5 Effectiveness..... 9.3-260

6 9.3.18 Native American Concerns..... 9.3-261

7 9.3.18.1 Affected Environment..... 9.3-262

8 9.3.18.1.1 Territorial Boundaries 9.3-262

9 9.3.18.1.2 Plant Resources 9.3-263

10 9.3.18.1.3 Other Resources 9.3-265

11 9.3.18.2 Impacts..... 9.3-266

12 9.3.18.3 SEZ-Specific Design Features and Design Feature

13 Effectiveness..... 9.3-267

14 9.3.19 Socioeconomics 9.3-269

15 9.3.19.1 Affected Environment..... 9.3-269

16 9.3.19.1.1 ROI Employment 9.3-269

17 9.3.19.1.2 ROI Unemployment 9.3-269

18 9.3.19.1.3 ROI Urban Population..... 9.3-270

19 9.3.19.1.4 ROI Urban Income..... 9.3-272

20 9.3.19.1.5 ROI Population..... 9.3-272

21 9.3.19.1.6 ROI Income 9.3-272

22 9.3.19.1.7 ROI Housing 9.3-273

23 9.3.19.1.8 ROI Local Government Organizations 9.3-274

24 9.3.19.1.9 ROI Community and Social Services 9.3-274

25 9.3.19.1.10 ROI Social Structure Change 9.3-277

26 9.3.19.1.11 ROI Recreation..... 9.3-278

27 9.3.19.2 Impacts..... 9.3-279

28 9.3.19.2.1 Common Impacts 9.3-279

29 9.3.19.2.2 Technology-Specific Impacts..... 9.3-281

30 9.3.19.3 SEZ-Specific Design Features and Design Feature

31 Effectiveness..... 9.3-289

32 9.3.20 Environmental Justice..... 9.3-291

33 9.3.20.1 Affected Environment..... 9.3-291

34 9.3.20.2 Impacts..... 9.3-293

35 9.3.20.3 SEZ-Specific Design Features and Design Feature

36 Effectiveness..... 9.3-296

37 9.3.21 Transportation..... 9.3-297

38 9.3.21.1 Affected Environment..... 9.3-297

39 9.3.21.2 Impacts..... 9.3-299

40 9.3.21.3 SEZ-Specific Design Features and Design Feature

41 Effectiveness..... 9.3-300

42 9.3.22 Cumulative Impacts 9.3-301

43 9.3.22.1 Geographic Extent of the Cumulative

44 Impacts Analysis..... 9.3-301

45 9.3.22.2 Overview of Ongoing and Reasonably Foreseeable

46 Future Actions..... 9.3-303

CONTENTS (Cont.)

1
2
3

4		9.3.22.2.1	Energy Production and Distribution.....	9.3-303
5		9.3.22.2.2	Other Actions	9.3-313
6	9.3.22.3	General Trends.....		9.3-313
7		9.3.22.3.1	Population Growth	9.3-313
8		9.3.22.3.2	Energy Demand.....	9.3-314
9		9.3.22.3.3	Water Availability	9.3-314
10		9.3.22.3.4	Climate Change	9.3-316
11	9.3.22.4	Cumulative Impacts on Resources.....		9.3-317
12		9.3.22.4.1	Lands and Realty	9.3-317
13		9.3.22.4.2	Specially Designated Areas and Lands with Wilderness Characteristics	9.3-318
14				
15		9.3.22.4.3	Rangeland Resources	9.3-318
16		9.3.22.4.4	Recreation	9.3-319
17		9.3.22.4.5	Military and Civilian Aviation	9.3-319
18		9.3.22.4.6	Soil Resources	9.3-319
19		9.3.22.4.7	Minerals.....	9.3-320
20		9.3.22.4.8	Water Resources.....	9.3-320
21		9.3.22.4.9	Vegetation	9.3-321
22		9.3.22.4.10	Wildlife and Aquatic Biota	9.3-322
23		9.3.22.4.11	Special Status Species	9.3-323
24		9.3.22.4.12	Air Quality and Climate	9.3-324
25		9.3.22.4.13	Visual Resources	9.3-324
26		9.3.22.4.14	Acoustic Environment.....	9.3-326
27		9.3.22.4.15	Paleontological Resources	9.3-326
28		9.3.22.4.16	Cultural Resources	9.3-326
29		9.3.22.4.17	Native American Concerns	9.3-327
30		9.3.22.4.18	Socioeconomics.....	9.3-327
31		9.3.22.4.19	Environmental Justice	9.3-328
32		9.3.22.4.20	Transportation	9.3-328
33	9.3.23	References.....		9.3-329
34	9.4	Riverside East		9.4-1
35	9.4.1	Background and Summary of Impacts.....		9.4-1
36		9.4.1.1	General Information.....	9.4-1
37		9.4.1.2	Development Assumptions for the Impact Analysis	9.4-3
38		9.4.1.3	Summary of Major Impacts and SEZ-Specific Design Features.....	9.4-5
39				
40	9.4.2	Lands and Realty		9.4-23
41		9.4.2.1	Affected Environment.....	9.4-23
42		9.4.2.2	Impacts.....	9.4-24
43		9.4.2.2.1	Construction and Operations.....	9.4-24
44		9.4.2.2.2	Transmission Facilities and Other Off-Site Infrastructure	9.4-25
45				
46				

CONTENTS (Cont.)

1			
2			
3			
4		9.4.2.3	SEZ-Specific Design Features and Design Feature
5			Effectiveness..... 9.4-25
6	9.4.3		Specially Designated Areas and Lands with Wilderness
7			Characteristics..... 9.4-27
8		9.4.3.1	Affected Environment..... 9.4-27
9		9.4.3.2	Impacts..... 9.4-29
10			9.4.3.2.1 Construction and Operations..... 9.4-29
11			9.4.3.2.2 Transmission Facilities and Other
12			Off-Site Infrastructure..... 9.4-35
13		9.4.3.3	SEZ-Specific Design Features and Design Feature
14			Effectiveness..... 9.4-35
15	9.4.4		Rangeland Resources..... 9.4-37
16		9.4.4.1	Livestock Grazing..... 9.4-37
17			9.4.4.1.1 Affected Environment..... 9.4-37
18			9.4.4.1.2 Impacts..... 9.4-37
19			9.4.4.1.3 SEZ-Specific Design Features and
20			Design Feature Effectiveness..... 9.4-37
21		9.4.4.2	Wild Horses and Burros..... 9.4-37
22			9.4.4.2.1 Affected Environment..... 9.4-37
23			9.4.4.2.2 Impacts..... 9.4-39
24			9.4.4.2.3 SEZ-Specific Design Features and
25			Design Feature Effectiveness..... 9.4-39
26	9.4.5		Recreation..... 9.4-41
27		9.4.5.1	Affected Environment..... 9.4-41
28		9.4.5.2	Impacts..... 9.4-41
29			9.4.5.2.1 Construction and Operations..... 9.4-41
30			9.4.5.2.2 Transmission Facilities and Other
31			Off-Site Infrastructure..... 9.4-42
32		9.4.5.3	SEZ-Specific Design Features and Design Feature
33			Effectiveness..... 9.4-42
34	9.4.6		Military and Civilian Aviation..... 9.4-45
35		9.4.6.1	Affected Environment..... 9.4-45
36		9.4.6.2	Impacts..... 9.4-45
37		9.4.6.3	SEZ-Specific Design Features and Design Feature
38			Effectiveness..... 9.4-45
39	9.4.7		Geologic Setting and Soil Resources..... 9.4-47
40		9.4.7.1	Affected Environment..... 9.4-47
41			9.4.7.1.1 Geologic Setting..... 9.4-47
42			9.4.7.1.2 Soil Resources..... 9.4-57
43		9.4.7.2	Impacts..... 9.4-57
44		9.4.7.3	SEZ-Specific Design Features and Design Feature
45			Effectiveness..... 9.4-61
46	9.4.8		Minerals..... 9.4-63

CONTENTS (Cont.)

1
2
3

4	9.4.8.1	Affected Environment.....	9.4-63
5	9.4.8.2	Impacts.....	9.4-63
6	9.4.8.3	SEZ-Specific Design Features and Design Feature	
7		Effectiveness.....	9.4-64
8	9.4.9	Water Resources.....	9.4-65
9	9.4.9.1	Affected Environment.....	9.4-65
10	9.4.9.1.1	Surface Waters.....	9.4-65
11	9.4.9.1.2	Groundwater.....	9.4-68
12	9.4.9.1.3	Water Use and Water Rights	
13		Management.....	9.4-69
14	9.4.9.2	Impacts.....	9.4-71
15	9.4.9.2.1	Land Disturbance Impacts on Water	
16		Resources.....	9.4-72
17	9.4.9.2.2	Water Use Requirements for Solar	
18		Energy Technologies.....	9.4-72
19	9.4.9.2.3	Off-Site Impacts: Roads and	
20		Transmission Lines.....	9.4-76
21	9.4.9.2.4	Summary of Impacts on Water	
22		Resources.....	9.4-77
23	9.4.9.3	SEZ-Specific Design Features and Design Feature	
24		Effectiveness.....	9.4-78
25	9.4.10	Vegetation.....	9.4-81
26	9.4.10.1	Affected Environment.....	9.4-81
27	9.4.10.2	Impacts.....	9.4-89
28	9.4.10.2.1	Impacts on Native Species.....	9.4-90
29	9.4.10.2.2	Impacts from Noxious Weeds and	
30		Invasive Plant Species.....	9.4-92
31	9.4.10.3	SEZ-Specific Design Features and Design	
32		Feature Effectiveness.....	9.4-92
33	9.4.11	Wildlife and Aquatic Biota.....	9.4-95
34	9.4.11.1	Amphibians and Reptiles.....	9.4-95
35	9.4.11.1.1	Affected Environment.....	9.4-95
36	9.4.11.1.2	Impacts.....	9.4-96
37	9.4.11.1.3	SEZ-Specific Design Features and	
38		Design Feature Effectiveness.....	9.4-103
39	9.4.11.2	Birds.....	9.4-104
40	9.4.11.2.1	Affected Environment.....	9.4-104
41	9.4.11.2.2	Impacts.....	9.4-120
42	9.4.11.2.3	SEZ-Specific Design Features and	
43		Design Feature Effectiveness.....	9.4-121
44	9.4.11.3	Mammals.....	9.4-122
45	9.4.11.3.1	Affected Environment.....	9.4-122
46	9.4.11.3.2	Impacts.....	9.4-124

CONTENTS (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

	9.4.11.3.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.4-134
	9.4.11.4	Aquatic Biota	9.4-134
	9.4.11.4.1	Affected Environment	9.4-134
	9.4.11.4.2	Impacts	9.4-136
	9.4.11.4.3	SEZ-Specific Design Features and Design Feature Effectiveness	9.4-137
9.4.12		Special Status Species.....	9.4-139
	9.4.12.1	Affected Environment.....	9.4-139
	9.4.12.1.1	Species Listed under the Endangered Species Act That Could Occur in the Affected Area	9.4-141
	9.4.12.1.2	BLM-Designated Sensitive Species	9.4-171
	9.4.12.1.3	State-Listed Species	9.4-177
	9.4.12.1.4	Rare Species	9.4-178
	9.4.12.2	Impacts.....	9.4-178
	9.4.12.2.1	Impacts on Species Listed under the ESA	9.4-179
	9.4.12.2.2	Impacts on BLM-Designated Sensitive Species.....	9.4-181
	9.4.12.2.3	Impacts on State-Listed Species.....	9.4-197
	9.4.12.2.4	Impacts on Rare Species	9.4-198
	9.4.12.3	SEZ-Specific Design Features and Design Feature Effectiveness.....	9.4-198
9.4.13		Air Quality and Climate.....	9.4-201
	9.4.13.1	Affected Environment.....	9.4-201
	9.4.13.1.1	Climate	9.4-201
	9.4.13.1.2	Existing Air Emissions.....	9.4-204
	9.4.13.1.3	Air Quality	9.4-205
	9.4.13.2	Impacts.....	9.4-207
	9.4.13.2.1	Construction	9.4-207
	9.4.13.2.2	Operations	9.4-210
	9.4.13.2.3	Decommissioning/Reclamation	9.4-212
	9.4.13.3	SEZ-Specific Mitigation Measures and Mitigation Effectiveness.....	9.4-213
9.4.14		Visual Resources.....	9.4-215
	9.4.14.1	Affected Environment.....	9.4-215
	9.4.14.2	Impacts.....	9.4-221
	9.4.14.2.1	Impacts on the Proposed Riverside East SEZ.....	9.4-222
	9.4.14.2.2	Impacts on Lands Surrounding the Proposed Riverside East SEZ.....	9.4-223

CONTENTS (Cont.)

1			
2			
3			
4		9.4.14.2.3	Summary of Visual Resource Impacts
5			for the Proposed Riverside East SEZ..... 9.4-296
6		9.4.14.3	SEZ-Specific Design Features and Design Feature
7			Effectiveness..... 9.4-296
8	9.4.15	Acoustic Environment	9.4-301
9		9.4.15.1	Affected Environment..... 9.4-301
10		9.4.15.2	Impacts..... 9.4-302
11		9.4.15.2.1	Construction
12		9.4.15.2.2	Operations
13		9.4.15.2.3	Decommissioning/Reclamation
14		9.4.15.3	SEZ-Specific Design Features and Design Feature
15			Effectiveness..... 9.4-308
16	9.4.16	Paleontological Resources	9.4-309
17		9.4.16.1	Affected Environment..... 9.4-309
18		9.4.16.2	Impacts..... 9.4-310
19		9.4.16.3	SEZ-Specific Design Features and Design Feature
20			Effectiveness..... 9.4-310
21	9.4.17	Cultural Resources.....	9.4-311
22		9.4.17.1	Affected Environment..... 9.4-311
23		9.4.17.1.1	Prehistory
24		9.4.17.1.2	Ethnohistory
25		9.4.17.1.3	History..... 9.4-317
26		9.4.17.1.4	Traditional Cultural Properties—
27			Landscape..... 9.4-320
28		9.4.17.1.5	Cultural Surveys and Known
29			Archaeological and Historic Resources ... 9.4-321
30		9.4.17.2	Impacts..... 9.4-324
31		9.4.17.3	SEZ-Specific Design Features and Design Feature
32			Effectiveness..... 9.4-325
33	9.4.18	Native American Concerns.....	9.4-327
34		9.4.18.1	Affected Environment..... 9.4-327
35		9.4.18.1.1	Territorial Boundaries
36		9.4.18.1.2	Plant Resources
37		9.4.18.1.3	Other Resources
38		9.4.18.2	Impacts..... 9.4-333
39		9.4.18.3	SEZ-Specific Design Features and Design Feature
40			Effectiveness..... 9.4-335
41	9.4.19	Socioeconomics	9.4-337
42		9.4.19.1	Affected Environment..... 9.4-337
43		9.4.19.1.1	ROI Employment
44		9.4.19.1.2	ROI Unemployment..... 9.4-337
45		9.4.19.1.3	ROI Urban Population..... 9.4-338
46		9.4.19.1.4	ROI Urban Income..... 9.4-340

CONTENTS (Cont.)

1			
2			
3			
4		9.4.19.1.5	ROI Population..... 9.4-340
5		9.4.19.1.6	ROI Income 9.4-340
6		9.4.19.1.7	ROI Housing 9.4-342
7		9.4.19.1.8	ROI Local Government Organizations 9.4-342
8		9.4.19.1.9	ROI Community and Social Services 9.4-342
9		9.4.19.1.10	ROI Social Change..... 9.4-344
10		9.4.19.1.11	ROI Recreation..... 9.4-345
11	9.4.19.2	Impacts.....	9.4-347
12		9.4.19.2.1	Common Impacts 9.4-347
13		9.4.19.2.2	Technology-Specific Impacts..... 9.4-349
14	9.4.19.3	SEZ-Specific Design Features and Design Feature	
15		Effectiveness.....	9.4-357
16	9.4.20	Environmental Justice.....	9.4-359
17		9.4.20.1	Affected Environment..... 9.4-359
18		9.4.20.2	Impacts..... 9.4-364
19		9.4.20.3	SEZ-Specific Design Features and Design Feature
20		Effectiveness.....	9.4-364
21	9.4.21	Transportation.....	9.4-365
22		9.4.21.1	Affected Environment..... 9.4-365
23		9.4.21.2	Impacts..... 9.4-368
24		9.4.21.3	SEZ-Specific Design Features and Design Feature
25		Effectiveness.....	9.4-371
26	9.4.22	Cumulative Impacts.....	9.4-373
27		9.4.22.1	Geographic Extent of the Cumulative Impacts
28		Analysis.....	9.4-373
29		9.4.22.2	Overview of Ongoing and Reasonably Foreseeable
30		Future Actions.....	9.4-375
31		9.4.22.2.1	Energy Production and Distribution..... 9.4-375
32		9.4.22.2.2	Other Actions 9.4-386
33		9.4.22.3	General Trends..... 9.4-388
34		9.4.22.3.1	Population Growth 9.4-388
35		9.4.22.3.2	Energy Demand..... 9.4-388
36		9.4.22.3.3	Water Availability 9.4-389
37		9.4.22.3.4	Climate Change..... 9.4-390
38		9.4.22.4	Cumulative Impacts on Resources..... 9.4-391
39		9.4.22.4.1	Lands and Realty..... 9.4-392
40		9.4.22.4.2	Specially Designated Areas and Lands
41		with Wilderness Characteristics.....	9.4-393
42		9.4.22.4.3	Rangeland Resources 9.4-393
43		9.4.22.4.4	Recreation 9.4-393
44		9.4.22.4.5	Military and Civilian Aviation..... 9.4-394
45		9.4.22.4.6	Soil Resources..... 9.4-394
46		9.4.22.4.7	Minerals..... 9.4-395

CONTENTS (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

9.4.22.4.8	Water Resources.....	9.4-395
9.4.22.4.9	Vegetation	9.4-396
9.4.22.4.10	Wildlife and Aquatic Biota	9.4-397
9.4.22.4.11	Special Status Species	9.4-398
9.4.22.4.12	Air Quality and Climate	9.4-399
9.4.22.4.13	Visual Resources.....	9.4-400
9.4.22.4.14	Acoustic Environment.....	9.4-401
9.4.22.4.15	Paleontological Resources	9.4-402
9.4.22.4.16	Cultural Resources	9.4-402
9.4.22.4.17	Native American Concerns	9.4-403
9.4.22.4.18	Socioeconomics.....	9.4-403
9.4.22.4.19	Environmental Justice	9.4-404
9.4.22.4.20	Transportation	9.4-404
9.4.23	References	9.4-405

FIGURES

9.3.1.1-1	Proposed Pisgah SEZ.....	9.3-2
9.3.3.1-1	Specially Designated Areas in the Vicinity of the Proposed Pisgah SEZ.....	9.3-24
9.3.4.2-1	BLM Wild Horse and Burro HMAs and USFS Wild Horse and Burro Territories Located near the Proposed Pisgah SEZ Region	9.3-32
9.3.7.1-1	Physiographic Features in the Mojave River Valley Region.....	9.3-40
9.3.7.1-2	Geologic Map of the Mojave River Valley Region.....	9.3-41
9.3.7.1-3	General Terrain of the Proposed Pisgah SEZ	9.3-43
9.3.7.1-4	Quaternary Faults and Volcanoes in Southern California	9.3-45
9.3.7.1-5	Delineated Earthquake Fault Zones near the Proposed Pisgah SEZ.....	9.3-46
9.3.7.1-6	Soil Map for the Proposed Pisgah SEZ.....	9.3-50
9.3.9.1-1	Surface Water Features near the Proposed Pisgah SEZ.....	9.3-58
9.3.10.1-1	Land Cover Types within the Proposed Pisgah SEZ.....	9.3-72

FIGURES (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

9.3.12.1-1	Known or Potential Occurrences of Species Listed as Endangered or Threatened under the ESA That May Occur in the Proposed Pisgah SEZ Affected Area.....	9.3-146
9.3.13.1-1	Wind Rose at 33 ft at Barstow-Daggett Airport, Daggett, California, 2003–2005 and 2007–2008.....	9.3-180
9.3.14.1-1	Proposed Pisgah SEZ and Surrounding Lands	9.3-194
9.3.14.1-2	Approximately 120° Panoramic View from the Far Western Portion of the Proposed Pisgah SEZ Facing East, Including Cady Mountains	9.3-195
9.3.14.1-3	Approximately 150° Panoramic View from I-40 in the South-Central Portion of the Proposed Pisgah SEZ Facing West, Including Lava Fields, Route 66, Rodman Mountains, and Cady Mountains	9.3-195
9.3.14.1-4	Approximately 180° Panoramic View from Route 66 in the Eastern Portion of the Proposed Pisgah SEZ Facing East, Including I-40 and Cady Mountains at Left, and Pisgah Crater at Far Right.....	9.3-195
9.3.14.1-5	Visual Resource Inventory Values for the Proposed Pisgah SEZ and Surrounding Lands	9.3-197
9.3.14.2-1	Viewshed Analyses for the Proposed Pisgah SEZ and Surrounding Lands, Assuming Solar Technology Heights of 24.6 ft, 37 ft, 150 ft, and 650 ft.....	9.3-201
9.3.14.2-2	Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft and 24.6-ft Viewsheds for the Proposed Pisgah SEZ	9.3-203
9.3.14.2-3	Google Earth Visualization of the Proposed Pisgah SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Newberry Mountains Wilderness	9.3-209
9.3.14.2-4	Google Earth Visualization of the Proposed Pisgah SEZ and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Rodman Mountains Wilderness	9.3-212
9.3.14.2-5	Google Earth Visualization of the Proposed Pisgah SEZ and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a Hill in the Rodman Mountains Wilderness	9.3-214

FIGURES (Cont.)

1

2

3

4 9.3.14.2-6 Google Earth Visualization of the Proposed Pisgah SEZ and
5 Surrounding Lands, with Power Tower Wireframe Model,
6 as Seen from Cady Peak in the Cady Mountains WSA 9.3-217
7

8 9.3.14.2-7 Google Earth Visualization of the Proposed Pisgah SEZ and
9 Surrounding Lands, with Power Tower Wireframe Model, as Seen
10 from a Hill in the Far Western Portion of the Cady Mountains WSA..... 9.3-219
11

12 9.3.14.2-8 Google Earth Visualization of the Proposed Pisgah SEZ and
13 Surrounding Lands, with Power Tower Wireframe Model, as Seen
14 from a Hill in the Southern Portion of the Cady Mountains WSA..... 9.3-221
15

16 9.3.14.2-9 Google Earth Visualization of the Proposed Pisgah SEZ and
17 Surrounding Lands, with Power Tower Wireframe Model, as Seen
18 from the Old Spanish National Historic Trail near Yermo, California..... 9.3-224
19

20 9.3.14.2-10 Google Earth Visualization of the Proposed Pisgah SEZ and
21 Surrounding Lands, with Power Tower Wireframe Model, as Seen
22 from the Old Spanish National Historic Trail near the Trail Fork
23 North of Newberry Springs, California 9.3-225
24

25 9.3.14.2-11 Google Earth Visualization of the Proposed Pisgah SEZ and
26 Surrounding Lands, with Power Tower Wireframe Models, as Seen
27 from I-40 Approximately 2.7 mi East of the SEZ 9.3-229
28

29 9.3.14.2-12 Google Earth Visualization of the Proposed Pisgah SEZ and
30 Surrounding Lands, with Power Tower Wireframe Models, as Seen
31 from I-40 Approximately 0.7 mi East of the SEZ 9.3-231
32

33 9.3.14.2-13 Google Earth Visualization of the Proposed Pisgah SEZ and
34 Surrounding Lands, with Power Tower Wireframe Models, as Seen
35 from Route 66 within the SEZ, 2.8 mi West of the Easternmost
36 Intersection of Route 66 and the SEZ 9.3-232
37

38 9.3.14.3-1 Areas within the Proposed Pisgah SEZ Affected by Zone-Specific
39 Distance-Based Visual Impact Design Features 9.3-239
40

41 9.3.20.1-1 Minority Population Groups within the 50-mi Radius Surrounding
42 the Proposed Pisgah SEZ 9.3-294
43

44 9.3.20.1-2 Low-Income Population Groups within the 50-mi Radius
45 Surrounding the Proposed Pisgah SEZ 9.3-295
46

FIGURES (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

9.3.21.1-1	Local Transportation Network Serving the Proposed Pisgah SEZ.....	9.3-298
9.3.22.2-1	Locations of Renewable Energy Proposals on Public Land within a 50-mi Radius of the Proposed Pisgah SEZ	9.3-307
9.4.1.1-1	Proposed Riverside East SEZ	9.4-2
9.4.3.1-1	Specially Designated Areas in the Vicinity of the Proposed Riverside East SEZ	9.4-28
9.4.4.2-1	BLM Wild Horse and Burro HMAs Located near the Proposed Riverside East SEZ Region.....	9.4-38
9.4.7.1-1	Physiographic Features in the Proposed Riverside East SEZ Region	9.4-48
9.4.7.1-2	Geologic Map of the Proposed Riverside East SEZ Region.....	9.4-49
9.4.7.1-3	General Terrain of the Proposed Riverside East SEZ.....	9.4-52
9.4.7.1-4	Quaternary Faults and Volcanoes in Southern California	9.4-53
9.4.7.1-5	Soil Map for the Proposed Riverside East SEZ.....	9.4-58
9.4.9.1-1	Surface Water Features near the Western Half of the Proposed Riverside East SEZ	9.4-66
9.4.9.1-2	Surface Water Features near the Eastern Half of the Proposed Riverside East SEZ	9.4-67
9.4.10.1-1	Land Cover Types within the Proposed Riverside East SEZ	9.4-83
9.4.10.1-2	Wetlands within the Proposed Riverside East SEZ	9.4-87
9.4.12.1-1	Known or Potential Occurrences of Species Listed as Endangered or Threatened under the ESA That May Occur in the Proposed Riverside East SEZ Affected Area	9.4-142
9.4.13.1-1	Wind Rose at 33-ft Height at Blythe Airport, Blythe, California, 2005–2009.....	9.4-202
9.4.14.1-1	Proposed Riverside East SEZ and Surrounding Lands.....	9.4-216

FIGURES (Cont.)

1

2

3

4 9.4.14.1-2 Approximately 120° Panoramic View of Western Portion of the
5 Proposed Riverside East SEZ from Desert Center Facing
6 Northeast, Including Lake Tamarisk and Coxcomb Mountains
7 in Joshua Tree NP 9.4-219
8

9 9.4.14.1-3 Approximately 180° Panoramic View of the Proposed Riverside
10 East SEZ from I-10 near Ford Dry Lake Facing North, Including
11 Chuckwalla Mountains, Palen Mountains, and McCoy Mountains 9.4-219
12

13 9.4.14.1-4 Approximately 120° Panoramic View of the Northeastern Portion
14 of the Proposed Riverside East SEZ from McCoy Wash Facing
15 Northeast, Including Big Maria Mountains 9.4-219
16

17 9.4.14.1-5 Visual Resource Inventory Values for the Proposed Riverside
18 East SEZ and Surrounding Lands 9.4-220
19

20 9.4.14.2-1 Viewshed Analyses for the Proposed Riverside East SEZ and
21 Surrounding Lands, Assuming Solar Technology Heights of 24.6 ft,
22 38 ft, 150 ft, and 650 ft 9.4-225
23

24 9.4.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto Combined
25 650-ft and 24.6-ft Viewsheds for the Proposed Riverside East SEZ 9.4-226
26

27 9.4.14.2-3 Photomap of the Proposed Riverside East SEZ and Surrounding
28 Lands in the Vicinity of Joshua Tree NP 9.4-232
29

30 9.4.14.2-4 Google Earth Visualization of the Proposed Riverside East SEZ
31 and Surrounding Lands, with Power Tower Wireframe Models,
32 as Seen from Viewpoint in Southeast Coxcomb Mountains within
33 Joshua Tree NP 9.4-233
34

35 9.4.14.2-5 Google Earth Visualization of the Proposed Riverside East SEZ and
36 Surrounding Lands, with Power Tower Wireframe Models, as Seen
37 from Viewpoint near State Route 177 within Joshua Tree NP 9.4-236
38

39 9.4.14.2-6 Google Earth Visualization of the Proposed Riverside East SEZ and
40 Surrounding Lands, with Power Tower Wireframe Models, as Seen
41 from Viewpoint in Northwest Coxcomb Mountains within Joshua
42 Tree NP 9.4-239
43

44 9.4.14.2-7 Google Earth Visualization of the Proposed Riverside East SEZ and
45 Surrounding Lands, with Power Tower Wireframe Models, as Seen
46 from Viewpoint in Eagle Mountains within Joshua Tree NP 9.4-241

FIGURES (Cont.)

1

2

3

4 9.4.14.2-8 Google Earth Visualization of the Proposed Riverside East SEZ and
5 Surrounding Lands, with Power Tower Wireframe Models, as Seen
6 from a Peak in Big Maria Mountains WA 9.4-243
7

8 9.4.14.2-9 Google Earth Visualization of the Proposed Riverside East SEZ and
9 Surrounding Lands, with Power Tower Wireframe Models, as Seen
10 from a Peak in Western Portion of Chuckwalla Mountains WA..... 9.4-246
11

12 9.4.14.2-10 Google Earth Visualization of the Proposed Riverside East SEZ
13 and Surrounding Lands, with Power Tower Wireframe Models,
14 as Seen from a Peak in Eastern Portion of Chuckwalla
15 Mountains WA..... 9.4-249
16

17 9.4.14.2-11 Google Earth Visualization of the Proposed Riverside East SEZ
18 and Surrounding Lands, with Power Tower Wireframe Models,
19 as Seen from Corn Springs Road on Bajada in Chuckwalla
20 Mountains WA..... 9.4-251
21

22 9.4.14.2-12 Google Earth Visualization of the Proposed Riverside East SEZ
23 and Surrounding Lands, with Power Tower Wireframe Models,
24 as Seen from a Peak in Eastern Portion of Little Chuckwalla
25 Mountains WA..... 9.4-254
26

27 9.4.14.2-13 Google Earth Visualization of the Proposed Riverside East SEZ
28 and Surrounding Lands, with Power Tower Wireframe Models,
29 as Seen from a Road on the Bajada in Little Chuckwalla
30 Mountains WA..... 9.4-256
31

32 9.4.14.2-14 Google Earth Visualization of the Proposed Riverside East SEZ
33 and Surrounding Lands, with Power Tower Wireframe Models,
34 as Seen from a Peak in Southern Palen-McCoy WA..... 9.4-260
35

36 9.4.14.2-15 Google Earth Visualization of the Proposed Riverside East SEZ
37 and Surrounding Lands, with Power Tower Wireframe Models,
38 as Seen from a Peak in Western Palen-McCoy WA..... 9.4-262
39

40 9.4.14.2-16 Google Earth Visualization of the Proposed Riverside East SEZ
41 and Surrounding Lands, with Power Tower Wireframe Models,
42 as Seen from a Road on the Bajada in Palen-McCoy WA 9.4-264
43

44 9.4.14.2-17 Google Earth Visualization of the Proposed Riverside East SEZ
45 and Surrounding Lands, with Power Tower Wireframe Models,
46 as Seen from Milpitas Wash Road in the Palo Verde Mountains WA 9.4-267

FIGURES (Cont.)

1

2

3

4 9.4.14.2-18 Google Earth Visualization of the Proposed Riverside East SEZ
5 and Surrounding Lands, with Power Tower Wireframe Models, as
6 Seen from Palo Verde Peak in the Palo Verde Mountains WA..... 9.4-268
7

8 9.4.14.2-19 Google Earth Visualization of the Proposed Riverside East SEZ and
9 Surrounding Lands, with Power Tower Wireframe Models, as Seen
10 from a Viewpoint in the Big Maria Mountains within the
11 Rice Valley WA..... 9.4-271
12

13 9.4.14.2-20 Google Earth Visualization of the Proposed Riverside East SEZ and
14 Surrounding Lands, with Power Tower Wireframe Models, as Seen
15 from a Viewpoint in the Trigo Mountains within the Trigo
16 Mountains WA..... 9.4-274
17

18 9.4.14.2-21 Google Earth Visualization of the Proposed Riverside East SEZ and
19 Surrounding Lands, with Power Tower Wireframe Models, as Seen
20 from a Viewpoint on Corn Springs Road within the Corn
21 Springs ACEC..... 9.4-279
22

23 9.4.14.2-22 Google Earth Visualization of the Proposed Riverside East SEZ and
24 Surrounding Lands, with Power Tower Wireframe Models, as Seen
25 from the Bradshaw Trail near the Southeast Corner of the SEZ 9.4-283
26

27 9.4.14.2-23 Google Earth Visualization of the Proposed Riverside East SEZ and
28 Surrounding Lands, with Power Tower Wireframe Models, as Seen
29 from the Bradshaw Trail near the Mule Mountains..... 9.4-285
30

31 9.4.14.2-24 Google Earth Visualization of the Proposed Riverside East SEZ and
32 Surrounding Lands, with Power Tower Wireframe Models, as Seen
33 from I-10 Approximately 7.4 mi East of the SEZ 9.4-288
34

35 9.4.14.2-25 Google Earth Visualization of the Proposed Riverside East SEZ and
36 Surrounding Lands, with Power Tower Wireframe Models, as Seen
37 from I-10 Approximately 0.7 mi East of the SEZ 9.4-289
38

39 9.4.14.3-1 Areas within the Proposed Riverside East SEZ Affected by SEZ-
40 Specific Distance-Based Visual Impact Design Features 9.4-299
41

42 9.4.20.1-1 Minority Population Groups within the 50-mi Radius
43 Surrounding the Proposed Riverside East SEZ 9.4-362
44

45 9.4.20.1-2 Low-Income Population Groups within the 50-mi Radius
46 Surrounding the Proposed Riverside East SEZ 9.4-363

FIGURES (Cont.)

1			
2			
3	9.4.21.1-1	Local Transportation Network Serving the Proposed Riverside East SEZ.....	9.4-366
4			
5			
6	9.4.22.2-1	Location of Renewable Energy Proposals on Public Land within a 50-mi Radius of the Proposed Riverside East SEZ.....	9.4-379
7			
8			
9			

TABLES

10			
11			
12			
13	9.3.1.2-1	Proposed Pisgah SEZ Development Acreages, Maximum Solar MW Output, Access Roads, and Transmission Line ROWs	9.3-4
14			
15			
16	9.3.1.3-1	Summary of Impacts of Solar Energy Development within the Proposed Pisgah SEZ and SEZ-Specific Design Features.....	9.3-5
17			
18			
19	9.3.3.2-1	Specially Designated Areas Potentially within the Viewshed of Solar Facilities within the Proposed Pisgah SEZ	9.3-26
20			
21			
22	9.3.7.1-1	Summary of Soil Series within the Proposed Pisgah SEZ.....	9.3-51
23			
24	9.3.9.2-1	Estimated Water Requirements during the Peak Construction Year for the Proposed Pisgah SEZ	9.3-65
25			
26			
27	9.3.9.2-2	Estimated Water Requirements during Normal Operations at Full Build-out Capacity at the Proposed Pisgah SEZ.....	9.3-67
28			
29			
30	9.3.10.1-1	Land Cover Types within the Potentially Affected Area of the Proposed Pisgah SEZ and Potential Impacts	9.3-73
31			
32			
33	9.3.10.1-2	Problem Weeds of the MWMA	9.3-78
34			
35	9.3.11.1-1	Representative Amphibians and Reptiles That Could Occur on or in the Affected Area of the Proposed Pisgah SEZ and Potential Impacts	9.3-86
36			
37			
38	9.3.11.2-1	Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Pisgah SEZ and Potential Impacts	9.3-92
39			
40			
41	9.3.11.3-1	Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Pisgah SEZ and Potential Impacts	9.3-110
42			
43			
44	9.3.12.1-1	Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Pisgah SEZ.....	9.3-124
45			
46			
47			

TABLES (Cont.)

1

2

3

4 9.3.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in San Bernardino
5 County, California, Encompassing the Proposed Pisgah SEZ, 2002..... 9.3-182

6

7 9.3.13.1-2 NAAQS, CAAQS, and Background Concentration Levels
8 Representative of the Proposed Pisgah SEZ in San Bernardino
9 County, California, 2004–2008..... 9.3-184

10

11 9.3.13.2-1 Maximum Air Quality Impacts from Emissions Associated with
12 Construction Activities for the Proposed Pisgah SEZ 9.3-187

13

14 9.3.13.2-2 Annual Emissions from Combustion-Related Power Generation
15 Displaced by Full Solar Development of the Proposed Pisgah SEZ 9.3-189

16

17 9.3.14.2-1 Selected Potentially Affected Sensitive Visual Resources within
18 a 25-mi Viewshed of the Proposed Pisgah SEZ, Assuming a
19 Viewshed Analysis Target Height of 650 ft 9.3-204

20

21 9.3.14.3-1 VRM Management Class Objectives..... 9.3-237

22

23 9.3.18-1 Federally Recognized Tribes with Traditional Ties to the Southeastern
24 California SEZs..... 9.3-261

25

26 9.3.18.1-1 Plant Species Important to Native Americans Observed or Likely
27 To Be Present in the Proposed Pisgah SEZ 9.3-264

28

29 9.3.18.1-2 Animal Species used by Native Americans whose Range Includes
30 the Proposed Pisgah SEZ..... 9.3-265

31

32 9.3.18.3-1 Federally Recognized Tribes Listed by the NAHC to Contact
33 Regarding the Proposed Pisgah SEZ 9.3-267

34

35 9.3.19.1-1 ROI Employment in the Proposed Pisgah SEZ 9.3-269

36

37 9.3.19.1-2 ROI Employment in the Proposed Pisgah SEZ by Sector, 2006 9.3-270

38

39 9.3.19.1-3 ROI Unemployment Rates for the Proposed Pisgah SEZ..... 9.3-270

40

41 9.3.19.1-4 ROI Urban Population and Income for the Proposed Pisgah SEZ 9.3-271

42

43 9.3.19.1-5 ROI Population for the Proposed Pisgah SEZ 9.3-273

44

45 9.3.19.1-6 ROI Personal Income for the Proposed Pisgah SEZ..... 9.3-273

46

TABLES (Cont.)

1

2

3

4 9.3.19.1-7 ROI Housing Characteristics for the Proposed Pisgah SEZ 9.3-274

5

6 9.3.19.1-8 ROI Local Government Organizations and Social Institutions

7 Associated with the Proposed Pisgah SEZ 9.3-275

8

9 9.3.19.1-9 ROI School District Data for the Proposed Pisgah SEZ, 2007 9.3-275

10

11 9.3.19.1-10 Physicians in the Proposed Pisgah SEZ ROI, 2007 9.3-276

12

13 9.3.19.1-11 Public Safety Employment in the Proposed Pisgah SEZ ROI 9.3-276

14

15 9.3.19.1-12 County and ROI Crime Rates in the Proposed Pisgah SEZ ROI 9.3-277

16

17 9.3.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed

18 Pisgah SEZ ROI 9.3-278

19

20 9.3.19.1-14 ROI Recreation Sector Activity for the Proposed Pisgah SEZ, 2007 9.3-279

21

22 9.3.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the

23 Proposed Pisgah SEZ with Trough Facilities 9.3-283

24

25 9.3.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the

26 Proposed Pisgah SEZ with Power Tower Facilities 9.3-284

27

28 9.3.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the

29 Proposed Pisgah SEZ with Dish Engine Facilities 9.3-286

30

31 9.3.19.2-5 ROI Socioeconomic Impacts Assuming Full Build-out of the

32 Proposed Pisgah SEZ with PV Facilities 9.3-288

33

34 9.3.20.1-1 Minority and Low-Income Populations within the 50-mi

35 Radius Surrounding the Proposed Pisgah SEZ 9.3-293

36

37 9.3.21.1-1 AADT on Major Roads near the Proposed Pisgah SEZ, 2008 9.3-299

38

39 9.3.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource

40 Area: Proposed Pisgah SEZ 9.3-302

41

42 9.3.22.2-1 Reasonably Foreseeable Future Actions Related to Energy

43 Development and Distribution and Other Major Actions near the

44 Proposed Pisgah SEZ 9.3-305

45

46

TABLES (Cont.)

1

2

3

4 9.3.22.2-2 Pending Renewable Energy Project Row Applications on

5 BLM-Administered Land within 50 mi of the Pisgah SEZ 9.3-309

6

7 9.3.22.3-1 ROI Population for the Proposed Pisgah SEZ 9.3-313

8

9 9.4.1.2-1 Proposed Riverside East Development Acreages, Maximum Solar

10 Megawatt Output, Access Roads, and Transmission Line ROWs..... 9.4-4

11

12 9.4.1.3-1 Summary of Impacts of Solar Energy Development within the

13 Proposed Riverside East SEZ and SEZ-Specific Design Features 9.4-6

14

15 9.4.3.2-1 Specially Designated Areas Potentially within the Viewshed of

16 Solar Facilities within the Proposed Riverside East SEZ 9.4-30

17

18 9.4.7.1-1 Summary of Soil Series within the Proposed Riverside East SEZ 9.4-59

19

20 9.4.9.2-1 Estimated Water Requirements during the Peak Construction Year

21 for the Proposed Riverside East SEZ 9.4-74

22

23 9.4.9.2-2 Estimated Water Requirements during Operations at Full Build-Out

24 Capacity at the Proposed Riverside East SEZ 9.4-75

25

26 9.4.10.1-1 Land Cover Types within the Potentially Affected Area of the

27 Proposed Riverside East SEZ and Potential Impacts..... 9.4-84

28

29 9.4.10.1-2 Wetlands of the Proposed Riverside East SEZ 9.4-88

30

31 9.4.10.1-3 Weed Species of the California Sonoran Desert Region 9.4-89

32

33 9.4.11.1-1 Representative Amphibians and Reptiles That Could Occur on or in

34 the Affected Area of the Proposed Riverside East SEZ and Potential

35 Impacts 9.4-97

36

37 9.4.11.2-1 Representative Bird Species That Could Occur on or in the Affected

38 Area of the Proposed Riverside East SEZ and Potential Impacts..... 9.4-105

39

40 9.4.11.3-1 Representative Mammal Species That Could Occur on or in the

41 Affected Area of the Proposed Riverside East SEZ and Potential

42 Impacts 9.4-125

43

44 9.4.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special

45 Status Species That Could Be Affected by Solar Energy

46 Development on the Proposed Riverside East SEZ 9.4-143

TABLES (Cont.)

1

2

3

4 9.4.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Riverside
5 County, California, Encompassing the Proposed Riverside East
6 SEZ, 2002 9.4-204
7

8 9.4.13.1-2 NAAQS, CAAQS, and Background Concentration Levels
9 Representative of the Proposed Riverside East SEZ in
10 Riverside County, California, 2004–2008 9.4-206
11

12 9.4.13.2-1 Maximum Air Quality Impacts from Emissions Associated with
13 Construction Activities for the Proposed Riverside East SEZ..... 9.4-209
14

15 9.4.13.2-2 Annual Emissions from Combustion-Related Power Generation
16 Displaced by Full Solar Development of the Proposed Riverside
17 East SEZ..... 9.4-211
18

19 9.4.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a
20 25-mi Viewshed of the Proposed Riverside East SEZ, Assuming a
21 Viewshed Analysis Target Height of 650 ft 9.4-228
22

23 9.4.14.3-1 VRM Management Class Objectives..... 9.4-298
24

25 9.4.18-1 Federally Recognized Tribes with Traditional Ties to the
26 Southeastern California SEZs 9.4-328
27

28 9.4.18.1-1 Plant Species Important to Native Americans Observed or Likely
29 To Be Present in the Proposed Riverside East SEZ..... 9.4-331
30

31 9.4.18.1-2 Animal Species Used by Native Americans Whose Range Includes
32 the Proposed Riverside East SEZ 9.4-333
33

34 9.4.18.3-1 Federally Recognized Tribes Listed by the NAHC to Contact
35 Regarding the Riverside East SEZ..... 9.4-335
36

37 9.4.18.3-2 Federally Recognized Tribes Invited to Concur on Programmatic
38 Agreements for the Fast-Track Solar Energy Projects within the
39 Proposed Riverside East SEZ 9.4-336
40

41 9.4.19.1-1 ROI Employment in the Proposed Riverside East SEZ..... 9.4-337
42

43 9.4.19.1-2 ROI Employment in the Proposed Riverside East SEZ,
44 by Sector, 2006 9.4-338
45

46 9.4.19.1-3 ROI Unemployment Rates for the Proposed Riverside East SEZ 9.4-338

TABLES (Cont.)

1			
2			
3			
4	9.4.19.1-4	ROI Urban Population and Income for the Proposed Riverside East SEZ.....	9.4-339
5			
6			
7	9.4.19.1-5	ROI Population for the Proposed Riverside East SEZ.....	9.4-341
8			
9	9.4.19.1-6	ROI Personal Income for the Proposed Riverside East SEZ	9.4-341
10			
11	9.4.19.1-7	ROI Housing Characteristics for the Proposed Riverside East SEZ.....	9.4-342
12			
13	9.4.19.1-8	ROI Local Government Organizations and Social Institutions for the Proposed Riverside East SEZ.....	9.4-343
14			
15			
16	9.4.19.1-9	ROI School District Data for the Proposed Riverside East SEZ, 2007	9.4-344
17			
18			
19	9.4.19.1-10	Physicians in the ROI for the Proposed Riverside East SEZ, 2007	9.4-344
20			
21			
22	9.4.19.1-11	Public Safety Employment in the ROI.....	9.4-345
23			
24	9.4.19.1-12	County and ROI Crime Rates in the ROI for the Proposed Riverside East SEZ	9.4-345
25			
26			
27	9.4.19.1-13	Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Riverside East SEZ ROI	9.4-346
28			
29			
30	9.4.19.1-14	ROI Recreation Sector Activity for the Proposed Riverside East SEZ, 2007	9.4-347
31			
32			
33	9.4.19.2-1	ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Riverside East SEZ with Trough Facilities.....	9.4-350
34			
35			
36	9.4.19.2-2	ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Riverside East SEZ with Power Tower Facilities.....	9.4-352
37			
38			
39	9.4.19.2-3	ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Riverside East SEZ with Dish Engine Facilities.....	9.4-354
40			
41			
42	9.4.19.2-4	ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Riverside East SEZ with PV Facilities	9.4-356
43			
44			
45	9.4.20.1-1	Minority and Low-Income Populations within the 50-mi Radius Surrounding the Proposed Riverside East SEZ	9.4-361
46			

TABLES (Cont.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

9.4.21.1-1	I-10 Freeway Exits in the Vicinity of the Proposed Riverside East SEZ.....	9.4-367
9.4.21.1-2	AADT on Major Roads near the Proposed Riverside East SEZ, 2008.....	9.4-367
9.4.21.1-3	Airports Open to the Public in the Vicinity of the Proposed Riverside East SEZ	9.4-369
9.4.22.1-1	Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Riverside East SEZ.....	9.4-374
9.4.22.2-1	Reasonably Foreseeable Future Actions Related to Energy Development and Distribution and Other Major Actions near the Proposed Riverside East SEZ	9.4-376
9.4.22.2-2	Pending Renewable Energy Project Applications on BLM-Administered Land within 50 mi of the Riverside East SEZ.....	9.4-384
9.4.22.3-1	ROI Population for the Proposed Riverside East SEZ.....	9.4-389

1
2
3
4
5
6
7
8
9
10
11
12
13
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NOTATION

The following is a list of acronyms and abbreviations, chemical names, and units of measure used in this document. Some acronyms used only in tables may be defined only in those tables.

GENERAL ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
AC	alternating current
ACC	air-cooled condenser
ACEC	Area of Critical Environmental Concern
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AERMOD	AMS/EPA Regulatory Model
AFC	Application for Certification
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AMA	active management area
AML	animal management level
ANHP	Arizona National Heritage Program
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
AQCR	Air Quality Control Region
AQRV	air quality-related value
ARB	Air Resources Board
ARRA	American Recovery and Reinvestment Act of 2009
ARRTIS	Arizona Renewable Resource and Transmission Identification Subcommittee
ARS	Agricultural Research Service
ARZC	Arizona and California
ATSDR	Agency for Toxic Substances and Disease Registry
AUM	animal unit month
AVWS	Audio Visual Warning System
AWBA	Arizona Water Banking Authority
AWEA	American Wind Energy Association
AWRM	Active Water Resource Management
AZ DOT	Arizona Department of Transportation
AZDA	Arizona Department of Agriculture
AZGFD	Arizona Game and Fish Department
AZGS	Arizona Geological Survey

1	BA	biological assessment
2	BAP	base annual production
3	BEA	Bureau of Economic Analysis
4	BISON-M	Biota Information System of New Mexico
5	BLM	Bureau of Land Management
6	BMP	best management practice
7	BNSF	Burlington Northern Santa Fe
8	BO	biological opinion
9	BOR	U.S. Bureau of Reclamation
10	BPA	Bonneville Power Administration
11	BRAC	Blue Ribbon Advisory Council on Climate Change
12	BSE	Beacon Solar Energy
13	BSEP	Beacon Solar Energy Project
14	BTS	Bureau of Transportation Statistics
15		
16	CAA	Clean Air Act
17	CAAQS	California Air Quality Standards
18	Caltrans	California Department of Transportation
19	C-AMA	California-Arizona Maneuver Area
20	CAP	Central Arizona Project
21	CARB	California Air Resources Board
22	CAReGAP	California Regional Gap Analysis Project
23	CASQA	California Stormwater Quality Association
24	CASTNET	Clean Air Status and Trends NETwork
25	CAWA	Colorado Agricultural Water Alliance
26	CCC	Civilian Conservation Corps
27	CDC	Centers for Disease Control and Prevention
28	CDCA	California Desert Conservation Area
29	CDFG	California Department of Fish and Game
30	CDOT	Colorado Department of Transportation
31	CDOW	Colorado Division of Wildlife
32	CDPHE	Colorado Department of Public Health and Environment
33	CDWR	California Department of Water Resources
34	CEC	California Energy Commission
35	CEQ	Council on Environmental Quality
36	CES	constant elasticity of substitution
37	CESA	California Endangered Species Act
38	CESF	Carrizo Energy Solar Farm
39	CFR	<i>Code of Federal Regulations</i>
40	CGE	computable general equilibrium
41	CIRA	Cooperative Institute for Research in the Atmosphere
42	CLFR	compact linear Fresnel collector
43	CPC	Center for Plant Conservation
44	CNDDDB	California Natural Diversity Database
45	CNEL	community noise equivalent level
46	CNHP	Colorado National Heritage Program

1	Colorado DWR	Colorado Department of Water Resources
2	CPUC	California Public Utilities Commission
3	CPV	concentrating photovoltaic
4	CRBSCF	Colorado River Basin Salinity Control Forum
5	CREZ	competitive renewable energy zone
6	CRSCP	Colorado River Salinity Control Program
7	CSA	Candidate Study Area
8	CSC	Coastal Services Center
9	CSFG	carbon-sequestration fossil generation
10	CSP	concentrating solar power
11	CSQA	California Stormwater Quality Association
12	CSRI	Cultural Systems Research, Incorporated
13	CTG	combustion turbine generator
14	CTPG	California Transmission Planning Group
15	CTSR	Cumbres & Toltec Scenic Railroad
16	CUP	Conditional Use Permit
17	CVP	Central Valley Project
18	CWA	Clean Water Act
19	CWCB	Colorado Water Conservation Board
20	CWHR	California Wildlife Habitat Relationship System
21		
22	DC	direct current
23	DHS	U.S. Department of Homeland Security
24	DNA	Determination of NEPA Adequacy
25	DNI	direct normal insulation
26	DNL	day-night average sound level
27	DoD	U.S. Department of Defense
28	DOE	U.S. Department of Energy
29	DOI	U.S. Department of the Interior
30	DOL	U.S. Department of Labor
31	DOT	U.S. Department of Transportation
32	DRECP	California Desert Renewable Energy Conservation Plan
33	DSM	demand side management
34	DTC/C-AMA	Desert Training Center/California–Arizona Maneuver Area
35	DWMA	Desert Wildlife Management Area
36		
37	EA	environmental assessment
38	ECAR	East Central Area Reliability Coordination Agreement
39	ECOS	Environmental Conservation Online System (USFWS)
40	EERE	Energy Efficiency and Renewable Energy (DOE)
41	Eg	band gap energy
42	EIA	Energy Information Administration
43	EIS	environmental impact statement
44	EISA	Energy Independence and Security Act of 2007
45	EMF	electromagnetic field
46	E.O.	Executive Order

1	EPA	U.S. Environmental Protection Agency
2	EPRI	Electric Power Research Institute
3	EQIP	Environmental Quality Incentives Program
4	ERCOT	Electric Reliability Council of Texas
5	ERO	Electric Reliability Organization
6	ERS	Economic Research Service
7	ESA	Endangered Species Act of 1973
8	ESRI	Environmental Systems Research Institute
9		
10	FAA	Federal Aviation Administration
11	FBI	Federal Bureau of Investigation
12	FEMA	Federal Emergency Management Agency
13	FERC	Federal Energy Regulatory Commission
14	FHWA	Federal Highway Administration
15	FIRM	Flood Insurance Rate Map
16	FLPMA	Federal Land Policy and Management Act of 1976
17	FONSI	Finding of No Significant Impact
18	FR	<i>Federal Register</i>
19	FRCC	Florida Reliability Coordinating Council
20	FSA	Final Staff Assessment
21	FTE	full-time equivalent
22	FY	fiscal year
23		
24	G&TM	Generation and Transmission Modeling
25	GCRP	U.S. Global Climate Research Program
26	GDA	generation development area
27	GHG	greenhouse gas
28	GIS	geographic information system
29	GPS	global positioning system
30	GTM	Generation and Transmission Model
31	GUAC	Groundwater Users Advisory Council
32	GWP	global warming potential
33		
34	HA	herd area
35	HAP	hazardous air pollutant
36	HAZCOM	hazard communication
37	HCE	heat collection element
38	HCP	Habitat Conservation Plan
39	HMA	Herd Management Area
40	HMMH	Harris Miller Miller & Hanson, Inc.
41	HRSG	heat recovery steam generator
42	HSPD	Homeland Security Presidential Directive
43	HTF	heat transfer fluid
44	HVAC	heating, ventilation, and air-conditioning
45		
46		

1	I	Interstate
2	IARC	International Agency for Research on Cancer
3	IBA	important bird area
4	ICE	internal combustion engine
5	ICWMA	Imperial County Weed Management Area
6	IEC	International Electrochemical Commission
7	IFR	instrument flight rule
8	IID	Imperial Irrigation District
9	IM	Instruction Memorandum
10	IMPS	Iron Mountain Pumping Station
11	IMS	interim mitigation strategy
12	INA	Irrigation Non-Expansion Area
13	IOP	Interagency Operating Procedure
14	IOU	investor-owned utility
15	IPPC	Intergovernmental Panel on Climate Change
16	ISA	Independent Science Advisor; Instant Study Area
17	ISB	Intermontane Seismic Belt
18	ISCC	integrated solar combined cycle
19	ISDRA	Imperial Sand Dunes Recreation Area
20	ISEGS	Ivanpah Solar Energy Generating System
21	ITP	incidental take permit
22	IUCNNR	International Union for Conservation of Nature and Natural Resources
23	IUCNP	International Union for Conservation of Nature Pakistan
24		
25	KGA	known geothermal resources area
26	KML	keyhole markup language
27	KOP	key observation point
28	KSLA	known sodium leasing area
29		
30	LCC	Landscape Conservation Cooperative
31	LCOE	levelized cost of energy
32	L _{dn}	day-night average sound level
33	LDWMA	Low Desert Weed Management Area
34	L _{eq}	equivalent sound pressure level
35	LLA	limited land available
36	LLRW	low-level radioactive waste (waste classification)
37	LRG	Lower Rio Grande
38	LSA	lake and streambed alteration
39	LSE	load-serving entity
40	LTVA	long-term visitor area
41		
42	MAAC	Mid-Atlantic Area Council
43	MAIN	Mid-Atlantic Interconnected Network
44	MAPP	methyl acetylene propadiene stabilizer; Mid-Continent Area Power Pool
45	MCAS	Marine Corps Air Station
46	MCL	maximum contaminant level

1	MFP	Management Framework Plan
2	MIG	Minnesota IMPLAN Group
3	MLA	maximum land available
4	MOA	military operating area
5	MOU	Memorandum of Understanding
6	MPDS	maximum potential development scenario
7	MRA	Multiple Resource Area
8	MRI	Midwest Research Institute
9	MRO	Midwest Reliability Organization
10	MSDS	Material Safety Data Sheet
11	MSL	mean sea level
12	MTR	military training route
13	MWA	Mojave Water Agency
14	MWD	Metropolitan Water District
15	MWMA	Mojave Weed Management Area
16		
17	NAAQS	National Ambient Air Quality Standards
18	NADP	National Atmospheric Deposition Program
19	NAGPRA	Native American Graves Protection and Repatriation Act
20	NAHC	Native American Heritage Commission (California)
21	NAIC	North American Industrial Classification System
22	NASA	National Aeronautics and Space Administration
23	NCA	National Conservation Area
24	NCCAC	Nevada Climate Change Advisory Committee
25	NCDC	National Climatic Data Center
26	NCES	National Center for Education Statistics
27	NDCNR	Nevada Department of Conservation and Natural Resources
28	NDEP	Nevada Division of Environmental Protection
29	NDOT	Nevada Department of Transportation
30	NDOW	Nevada Department of Wildlife
31	NDWP	Nevada Division of Water Planning
32	NDWR	Nevada Division of Water Resources
33	NEAP	Natural Events Action Plan
34	NEC	National Electric Code
35	NED	National Elevation Database
36	NEP	Natural Events Policy
37	NEPA	National Environmental Policy Act of 1969
38	NERC	North American Electricity Reliability Corporation
39	NHA	National Heritage Area
40	NHNM	National Heritage New Mexico
41	NHPA	National Historic Preservation Act of 1966
42	NID	National Inventory of Dams
43	NM DOT	New Mexico Department of Transportation
44	NLCS	National Landscape Conservation System
45	NMAC	<i>New Mexico Administrative Code</i>
46	NMBGMR	New Mexico Bureau of Geology and Mineral Resources

1	NMDGF	New Mexico Department of Game and Fish
2	NMED	New Mexico Environment Department
3	NMED-AQB	New Mexico Environment Department-Air Quality Board
4	NMFS	National Marine Fisheries Service
5	NMOSE	New Mexico Office of the State Engineer
6	NMSU	New Mexico State University
7	NNHP	Nevada Natural Heritage Program
8	NNL	National Natural Landmark
9	NNSA	National Nuclear Security Administration
10	NOA	Notice of Availability
11	NOAA	National Oceanic and Atmospheric Administration
12	NOI	Notice of Intent
13	NPDES	National Pollutant Discharge Elimination System
14	NP	National Park
15	NPL	National Priorities List
16	NPS	National Park Service
17	NRA	National Recreation Area
18	NRCS	Natural Resources Conservation Service
19	NREL	National Renewable Energy Laboratory
20	NRHP	<i>National Register of Historic Places</i>
21	NRS	<i>Nevada Revised Statutes</i>
22	NSC	National Safety Council
23	NSO	no surface occupancy
24	NSTC	National Science and Technology Council
25	NTS	Nevada Test Site
26	NTTR	Nevada Test and Training Range
27	NVCRS	Nevada Cultural Resources Inventory System
28	NV DOT	Nevada Department of Transportation
29	NWCC	National Wind Coordinating Committee
30	NWI	National Wetlands Inventory
31	NWPP	Northwest Power Pool
32	NWR	National Wildlife Refuge
33	NWSRS	National Scenic River System
34		
35	O&M	operation and maintenance
36	ODFW	Oregon Department of Fish and Wildlife
37	OHV	off-highway vehicle
38	ONA	Outstanding Natural Area
39	ORC	organic Rankine cycle
40	OSE/ISC	Office of the State Engineer/Interstate Stream Commission
41	OSHA	Occupational Safety and Health Administration
42	OTA	Office of Technology Assessment
43		
44	PA	Programmatic Agreement
45	PAD	Preliminary Application Document
46	PAH	polycyclic aromatic hydrocarbon

1	PAT	peer analysis tool
2	PCB	polychlorinated biphenyl
3	PCM	purchase change material
4	PCS	power conditioning system
5	PCU	power converting unit
6	PEIS	programmatic environmental impact statement
7	PFYC	potential fossil yield classification
8	PIER	Public Interest Energy Research
9	P.L.	Public Law
10	PLSS	Public Land Survey System
11	PM	particulate matter
12	PM _{2.5}	particulate matter with a mean aerodynamic diameter of 2.5 µm or less
13	PM ₁₀	particulate matter with a mean aerodynamic diameter of 10 µm or less
14	POD	plan of development
15	POU	publicly owned utility
16	PPA	Power Purchase Agreement
17	PPE	personal protective equipment
18	PSD	Prevention of Significant Deterioration
19	PURPA	Public Utility Regulatory Policy Act
20	PV	photovoltaic
21	PVID	Palo Verde Irrigation District
22	PWR	public water reserve
23		
24	QRA	qualified resource area
25		
26	R&I	relevance and importance
27	RCI	residential, commercial, and industrial (sector)
28	RCRA	Resource Conservation and Recovery Act of 1976
29	RD&D	research, development, and demonstration; research, development, and
30		deployment
31	RDBMS	Relational Database Management System
32	RDEP	Restoration Design Energy Project
33	REA	Rapid Ecoregional Assessment
34	REAT	Renewable Energy Action Team
35	REDI	Renewable Energy Development Infrastructure
36	ReEDS	Regional Energy Deployment System
37	REPG	Renewable Energy Policy Group
38	RETA	Renewable Energy Transmission Authority
39	RETAAC	Renewable Energy Transmission Access Advisory Committee
40	RETI	Renewable Energy Transmission Initiative
41	REZ	renewable energy zone
42	RF	radio frequency
43	RFC	Reliability First Corporation
44	RFDS	reasonably foreseeable development scenario
45	RGP	Rio Grande Project
46	RGWCD	Rio Grande Water Conservation District

1	RMP	Resource Management Plan
2	RMPA	Rocky Mountain Power Area
3	RMZ	Resource Management Zone
4	ROD	Record of Decision
5	ROI	region of influence
6	ROS	recreation opportunity spectrum
7	ROW	right-of-way
8	RPG	renewable portfolio goal
9	RPS	Renewable Portfolio Standard
10	RRC	Regional Reliability Council
11	RSEP	Rice Solar Energy Project
12	RSI	Renewable Systems Interconnection
13	RTTF	Renewable Transmission Task Force
14	RV	recreational vehicle
15		
16	SAAQS	State Ambient Air Quality Standards
17	SAMHSA	Substance Abuse and Mental Health Services Administration
18	SCADA	supervisory control and data acquisition
19	SCE	Southern California Edison
20	SCRMA	Special Cultural Resource Management Area
21	SDRREG	San Diego Regional Renewable Energy Group
22	SDWA	Safe Drinking Water Act of 1974
23	SEGIS	Solar Energy Grid Integration System
24	SEGS	Solar Energy Generating System
25	SEI	Sustainable Energy Ireland
26	SEIA	Solar Energy Industrial Association
27	SES	Stirling Energy Systems
28	SETP	Solar Energy Technologies Program (DOE)
29	SEZ	solar energy zone
30	SHPO	State Historic Preservation Office(r)
31	SIP	State Implementation Plan
32	SLRG	San Luis & Rio Grande
33	SMA	Special Management Area
34	SMP	suggested management practice
35	SNWA	Southern Nevada Water Authority
36	SPP	Southwest Power Pool
37	SRMA	Special Recreation Management Area
38	SSA	Socorro Seismic Anomaly
39	SSI	self-supplied industry
40	ST	solar thermal
41	STG	steam turbine generator
42	SUA	special use airspace
43	SWAT	Southwest Area Transmission
44	SWIP	Southwest Intertie Project
45	SWPPP	Stormwater Pollution Prevention Plan
46	SWReGAP	Southwest Regional Gap Analysis Project
47		

1	TAP	toxic air pollutant
2	TCC	Transmission Corridor Committee
3	TDS	total dissolved solids
4	TEPPC	Transmission Expansion Planning Policy Committee
5	TES	thermal energy storage
6	TSA	Transportation Security Administration
7	TSCA	Toxic Substances Control Act of 1976
8	TSDF	treatment, storage, and disposal facility
9	TSP	total suspended particulates
10		
11	UACD	Utah Association of Conservation Districts
12	UBWR	Utah Board of Water Resources
13	UDA	Utah Department of Agriculture
14	UDEQ	Utah Department of Environmental Quality
15	UDNR	Utah Department of Natural Resources
16	UDOT	Utah Department of Transportation
17	UDWQ	Utah Division of Water Quality
18	UDWR	Utah Division of Wildlife Resources
19	UGS	Utah Geological Survey
20	UNEP	United Nations Environmental Programme
21	UNPS	Utah Native Plant Society
22	UP	Union Pacific
23	UREZ	Utah Renewable Energy Zone
24	USACE	U.S. Army Corps of Engineers
25	USC	<i>United States Code</i>
26	USDA	U.S. Department of Agriculture
27	USFS	U.S. Forest Service
28	USFWS	U.S. Fish and Wildlife Service
29	USGS	U.S. Geological Survey
30	Utah DWR	Utah Division of Water Rights
31	UTTR	Utah Test and Training Range
32	UWS	Underground Water Storage, Savings and Replenishment Act
33		
34	VACAR	Virginia-Carolinas Subregion
35	VCRS	Visual Contrast Rating System
36	VFR	visual flight rule
37	VOC	volatile organic compound
38	VRI	Visual Resource Inventory
39	VRM	Visual Resource Management
40		
41	WA	Wilderness Area
42	WAPA	Western Area Power Administration
43	WECC	Western Electricity Coordinating Council
44	WECC CAN	Western Electricity Coordinating Council – Canada
45	WEG	wind erodibility group
46	WGA	Western Governors’ Association

1	WGFD	Wyoming Game and Fish Department
2	WHA	wildlife habitat area
3	WHO	World Health Organization
4	WRAP	Water Resources Allocation Program; Western Regional Air Partnership
5	WRCC	Western Regional Climate Center
6	WREZ	Western Renewable Energy Zones
7	WRRRI	Water Resources Research Institute
8	WSA	Wilderness Study Area
9	WSC	wildlife species of special concern
10	WSMR	White Sands Missile Range
11	WSR	Wild and Scenic River
12	WSRA	Wild and Scenic Rivers Act of 1968
13	WWII	World War II
14		
15	YPG	Yuma Proving Ground
16		
17	ZITA	zone identification and technical analysis
18	ZLD	zero liquid discharge
19		
20		

21 **CHEMICALS**

23	CH ₄	methane	NO ₂	nitrogen dioxide
24	CO	carbon monoxide	NO _x	nitrogen oxides
25	CO ₂	carbon dioxide		
26	CO _{2e}	carbon dioxide equivalent	O ₃	ozone
27				
28	H ₂ S	hydrogen sulfide	Pb	lead
29	Hg	mercury		
30			SF ₆	sulfur hexafluoride
31	N ₂ O	nitrous oxide	SO ₂	sulfur dioxide
32	NH ₃	ammonia	SO _x	sulfur oxides
33				
34				

35 **UNITS OF MEASURE**

37	ac-ft	acre-foot (feet)	°F	degree(s) Fahrenheit
38	bhp	brake horsepower	ft	foot (feet)
39			ft ²	square foot (feet)
40	°C	degree(s) Celsius	ft ³	cubic foot (feet)
41	cf	cubic foot (feet)		
42	cfs	cubic foot (feet) per second	g	gram(s)
43	cm	centimeter(s)	gal	gallon(s)
44			GJ	gigajoule(s)
45	dB	decibel(s)	gpcd	gallon per capita per day
46	dba	A-weighted decibel(s)	gpd	gallon(s) per day

1	gpm	gallon(s) per minute	Mgal	million gallons
2	GW	gigawatt(s)	mi	mile(s)
3	GWh	gigawatt hour(s)	mi ²	square mile(s)
4	GWh/yr	gigawatt hour(s) per year	min	minute(s)
5			mm	millimeter(s)
6	h	hour(s)	MMt	million metric ton(s)
7	ha	hectare(s)	MPa	megapascal(s)
8	Hz	hertz	mph	mile(s) per hour
9			MW	megawatt(s)
10	in.	inch(es)	MWe	megawatt(s) electric
11			MWh	megawatt-hour(s)
12	J	joule(s)		
13			ppm	part(s) per million
14	K	degree(s) Kelvin	psi	pound(s) per square inch
15	kcal	kilocalorie(s)	psia	pound(s) per square inch absolute
16	kg	kilogram(s)		
17	kHz	kilohertz	rpm	rotation(s) per minute
18	km	kilometer(s)		
19	km ²	square kilometer(s)	s	second(s)
20	kPa	kilopascal(s)	scf	standard cubic foot (feet)
21	kV	kilovolt(s)		
22	kVA	kilovolt-ampere(s)	TWh	terawatt hours
23	kW	kilowatt(s)		
24	kWh	kilowatt-hour(s)	VdB	vibration velocity decibel(s)
25	kWp	kilowatt peak		
26			W	watt(s)
27	L	liter(s)		
28	lb	pound(s)	yd ²	square yard(s)
29			yd ³	cubic yard(s)
30	m	meter(s)	yr	year(s)
31	m ²	square meter(s)		
32	m ³	cubic meter(s)	µg	microgram(s)
33	mg	milligram(s)	µm	micrometer(s)

ENGLISH/METRIC AND METRIC/ENGLISH EQUIVALENTS

The following table lists the appropriate equivalents for English and metric units.

Multiply	By	To Obtain
<i>English/Metric Equivalents</i>		
acres	0.004047	square kilometers (km ²)
acre-feet (ac-ft)	1,234	cubic meters (m ³)
cubic feet (ft ³)	0.02832	cubic meters (m ³)
cubic yards (yd ³)	0.7646	cubic meters (m ³)
degrees Fahrenheit (°F) –32	0.5555	degrees Celsius (°C)
feet (ft)	0.3048	meters (m)
gallons (gal)	3.785	liters (L)
gallons (gal)	0.003785	cubic meters (m ³)
inches (in.)	2.540	centimeters (cm)
miles (mi)	1.609	kilometers (km)
miles per hour (mph)	1.609	kilometers per hour (kph)
pounds (lb)	0.4536	kilograms (kg)
short tons (tons)	907.2	kilograms (kg)
short tons (tons)	0.9072	metric tons (t)
square feet (ft ²)	0.09290	square meters (m ²)
square yards (yd ²)	0.8361	square meters (m ²)
square miles (mi ²)	2.590	square kilometers (km ²)
yards (yd)	0.9144	meters (m)
<i>Metric/English Equivalents</i>		
centimeters (cm)	0.3937	inches (in.)
cubic meters (m ³)	0.00081	acre-feet (ac-ft)
cubic meters (m ³)	35.31	cubic feet (ft ³)
cubic meters (m ³)	1.308	cubic yards (yd ³)
cubic meters (m ³)	264.2	gallons (gal)
degrees Celsius (°C) +17.78	1.8	degrees Fahrenheit (°F)
hectares (ha)	2.471	acres
kilograms (kg)	2.205	pounds (lb)
kilograms (kg)	0.001102	short tons (tons)
kilometers (km)	0.6214	miles (mi)
kilometers per hour (kph)	0.6214	miles per hour (mph)
liters (L)	0.2642	gallons (gal)
meters (m)	3.281	feet (ft)
meters (m)	1.094	yards (yd)
metric tons (t)	1.102	short tons (tons)
square kilometers (km ²)	247.1	acres
square kilometers (km ²)	0.3861	square miles (mi ²)
square meters (m ²)	10.76	square feet (ft ²)
square meters (m ²)	1.196	square yards (yd ²)

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1 **9.3 PISGAH**

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3
4 **9.3.1 Background and Summary of Impacts**

5
6
7 **9.3.1.1 General Information**

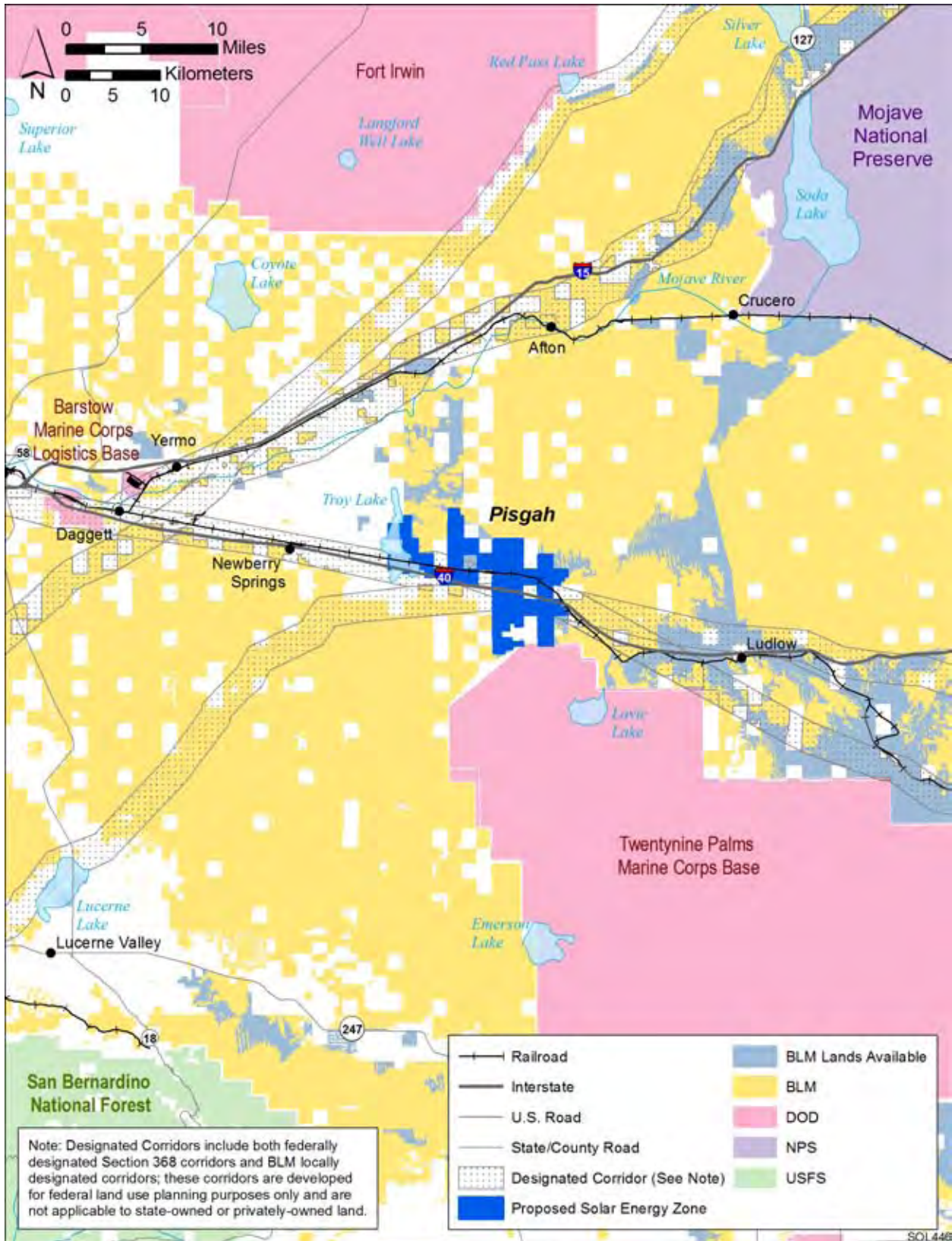
8
9 The proposed Pisgah SEZ has a total area of 23,950 acres (97 km²) and is located in
10 San Bernardino County in southeastern California, about 100 mi (160 km) northeast of Los
11 Angeles (Figure 9.3.1.1-1). In 2008, the county population was 2,086,465. The nearest
12 population center to the SEZ is the City of Barstow, which is located about 25 mi (40 km) to
13 the west of the SEZ and had a 2008 population of 24,596. Interstate 40 (I-40) runs east–west
14 through the proposed Pisgah SEZ, bisecting it into a northern portion that contains about two-
15 thirds of the SEZ acreage and a southern portion with the remainder of the acreage. Access to the
16 SEZ from I-40 is available from exits at Fort Cady Road (to the west of the SEZ), Hector Road
17 (midway through the SEZ), and Pisgah Crater Road (at the eastern end of the SEZ). Hector Road
18 runs north–south through the middle of the SEZ, and a number of other local dirt roads cross the
19 SEZ. The National Trails Highway (historic U.S. 66) also passes through the SEZ as it runs
20 south of and parallel to I-40. The BNSF Railroad serves the area and traverses the SEZ from the
21 northwest to the southeast, running approximately parallel to and about 0.8 mi (1.3 km) north of
22 I-40. Three small public airports are within about 62 mi (100 km) of the SEZ.

23
24 Four existing high-capacity transmission lines run from the southwest to the northeast
25 through the eastern portion of the SEZ. It is assumed that these transmission lines could
26 potentially provide access from the SEZ to the transmission grid (see Section 9.3.1.2). There are
27 also other lower-capacity lines running through portions of the SEZ.

28
29 As of February 2010, there were two solar development applications with boundaries
30 wholly or partially within the Pisgah SEZ. One of these, covering approximately 8,600 acres
31 (35 km²) of the SEZ, is a BLM fast-track project for which environmental reviews have begun.

32
33 The proposed Pisgah SEZ lies within the western Mojave Desert region of the Basin
34 and Range physiographic province in southern California. The site is in a northwest–southeast
35 trending valley that lies to the southeast of the Mojave Valley, between the Cady Mountains to
36 the northeast and the Rodman and Lava Bed Mountains to the southwest. The SEZ has surface
37 elevations ranging between 1,800 and 2,300 ft (549 and 701 m), with a general drainage pattern
38 from east to west along the SEZ. The area is in the western portion of the Mojave Desert, which
39 has an extremely arid climate marked by mild winters and hot summers and large daily
40 temperature swings, with annual precipitation averaging about 3.8 in. (9.7 cm). Sediments of
41 Troy Dry Lake make up about 8% of the west central portion of the SEZ.

42
43 The proposed Pisgah SEZ and other relevant information are shown in Figure 9.3.1.1-1.
44 The criteria used to identify the SEZ as an appropriate location for solar development included
45 proximity to existing transmission lines or designated corridors, proximity to existing roads, a



1

2 **FIGURE 9.3.1.1-1 Proposed Pisgah SEZ**

1 slope of generally less than 2%, and an area of more than 2,500 acres (10 km²). In addition, the
2 area was identified as being relatively free of other types of conflicts, such as USFWS-
3 designated critical habitat for threatened and endangered species, ACECs, SRMAs, and
4 NLCS lands (see Section 2.2.2.2 for the complete list of exclusions). Although these classes
5 of restricted lands were excluded from the proposed Pisgah SEZ, other restrictions might be
6 appropriate. The analyses in the following sections evaluate the affected environment and
7 potential impacts associated with utility-scale solar energy development in the proposed SEZ
8 for important environmental, cultural, and socioeconomic resources.
9

10 As initially announced in the *Federal Register* on June 30, 2009, the proposed Pisgah
11 SEZ encompassed 26,282 acres (106 km²). Subsequent to the study area scoping period, the
12 Pisgah SEZ boundaries were altered somewhat for several reasons. Border areas with irregularly
13 shaped boundaries were moved to match the section boundaries of the PLSS (BLM and
14 USFS 2010a) to facilitate the BLM's administration of the SEZ area. Some small higher slope
15 areas were also added to the borders of the SEZ acreage; although these higher slope areas would
16 not be amenable to solar facilities, inclusion in the SEZ would facilitate BLM administration of
17 the area. In addition, some lands near the Pisgah SEZ donated to the BLM for conservation
18 purposes but inadvertently included in the published Pisgah study area were excluded from the
19 boundaries of the SEZ. The revised SEZ is approximately 2,300 acres (9 km²) smaller than the
20 original SEZ as published in June 2009.
21
22

23 **9.3.1.2 Development Assumptions for the Impact Analysis**

24

25 Maximum development of the proposed Pisgah SEZ was assumed to be 80% of the total
26 SEZ area over a period of 20 years, a maximum of 19,160 acres (78 km²). These values are
27 shown in Table 9.3.1.2-1, along with other development assumptions. Full development of the
28 Pisgah SEZ would allow development of facilities with an estimated total of 2,129 MW of
29 electrical power capacity if power tower, dish engine, or PV technologies were used, assuming
30 9 acres/MW (0.04 km²/MW) of land required, and an estimated 3,832 MW of power if solar
31 trough technologies were used, assuming 5 acres/MW (0.02 km²/MW) of land required.
32

33 Availability of transmission from SEZs to load centers will be an important consideration
34 for future development in SEZs. The nearest existing transmission lines are 230-kV and 250-kV
35 lines that run through the SEZ. It is possible that these existing lines could be used to provide
36 access from the SEZ to the transmission grid, but the 230- to 250-kV capacity of those lines
37 would be inadequate for 2,129 to 3,832 MW of new capacity (a 500-kV line can accommodate
38 approximately the load of one 700-MW facility). At full build-out capacity, it is clear that
39 substantial new transmission and/or upgrades of existing transmission lines would be required to
40 bring electricity from the proposed Pisgah SEZ to load centers; however, at this time the location
41 and size of such new transmission facilities are unknown. Generic impacts of transmission and
42 associated infrastructure construction and of line upgrades for various resources are discussed in
43 Chapter 5. Project-specific analyses would need to identify the specific impacts of new
44 transmission construction and line upgrades for any projects proposed within the SEZ.
45
46

TABLE 9.3.1.2-1 Proposed Pisgah SEZ Development Acreages, Maximum Solar MW Output, Access Roads, and Transmission Line ROWs

Total Acreage and Assumed Developed Acreage (80% of Total)	Assumed Maximum SEZ Output for Various Solar Technologies	Distance to Nearest State, U.S. or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Transmission Line ROW and Road ROW	Distance to Nearest Designated Transmission Corridor ^d
23,950 acres and 19,160 acres ^a	2,129 MW ^b 3,832 MW ^c	Adjacent (I-40)	Within SEZ, 230 and 500 kV	0 acres and 0 acres	Within SEZ ^e

- ^a To convert acres to km², multiply by 0.004047.
- ^b Maximum power output if the SEZ were fully developed using power tower, dish engine, or PV technologies, assuming 9 acres/MW (0.04 km²/MW) of land required.
- ^c Maximum power output if the SEZ were fully developed using solar trough technologies, assuming 5 acres/MW (0.02 km²/MW) of land required.
- ^d BLM-designated corridors are developed for federal land use planning purposes only and are not applicable to state-owned or privately owned land.
- ^e A Section 368 federally designated energy corridor crosses through the SEZ along I-40.

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For the purposes of analysis in this PEIS, it was assumed that the four existing high-capacity transmission lines (230 and 500 kV) that run through the proposed Pisgah SEZ could provide access to the transmission grid, and thus no additional acreage disturbance for transmission line access was assessed. Access to the existing transmission lines was assumed, without additional information on whether these lines would be available to for connection of future solar facilities. If a connecting transmission line were constructed in the future to connect facilities within the SEZ to a different off-site grid location from the one assumed here, site developers would need to determine the impacts from the construction and operation of that line. In addition, developers would need to determine the impacts of line upgrades if they were needed.

Existing road access to the proposed Pisgah SEZ should be adequate to support construction and operation of solar facilities, because I-40 runs from east to west through the SEZ. Thus, no additional road construction outside of the SEZ is assumed to be required to support solar development of the SEZ.

9.3.1.3 Summary of Major Impacts and SEZ-Specific Design Features

In this section, the impacts and SEZ-specific design features assessed in Sections 9.3.2 through 9.3.21 for the proposed Pisgah SEZ are summarized in tabular form. The impacts identified in Table 9.3.1.3-1 are a comprehensive list of those discussed in these sections; the reader may reference the applicable sections for detailed support of the impact assessment.

TABLE 9.3.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Pisgah SEZ and SEZ-Specific Design Features^a

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the SEZ for utility-scale solar energy production (80% of the total area) could disturb up to 19,160 acres (77.5 km ²) and would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Utility-scale solar energy development would introduce a new and discordant land use to the area.	None.
	Private lands and the state land parcel located on the boundaries of the SEZ also could be developed in the same or a complementary manner as the public lands if landowners agree and the lands are suitable for solar energy development.	None.
	The Section 368 energy corridor running through the SEZ could constrain solar development. Alternatively, the transmission corridor capacity could be substantially reduced if the SEZ were developed for utility-scale solar energy production.	None.
Specially Designated Areas and Lands with Wilderness Characteristics	Wilderness characteristics in 20% of the Cady Mountain WSA and 27% of the Rodman Mountain WA would be adversely affected. The Ord-Rodman DWMA and Pisgah ACECs abut portions of the Pisgah SEZ and are vulnerable to increased human traffic induced by the presence of the SEZ. The Rodman Mountains Cultural area would also be vulnerable to increased traffic.	<p>Application of SEZ-specific design features for visual resource impacts may reduce the visual impact on wilderness characteristics.</p> <p>Once construction of solar energy facilities begins, the BLM would monitor to determine whether increases in traffic to the Ord-Rodman DWMA, Rodman Mountains Cultural Area, and Pisgah ACECs occur and whether additional management measures are required to protect the resources in these areas.</p>

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Rangeland Resources: Livestock Grazing	None.	None.
Rangeland Resources: Wild Horses and Burros	None.	None.
Recreation	Recreation use would be excluded from developed portions of the SEZ but it is anticipated the loss of recreation use within the SEZ would be small. The presence of solar development in the SEZ also likely would adversely affect recreational use of the Cady Mountains WSA and Rodman Mountains WA. Opportunities for primitive recreation surrounding the SEZ would be reduced.	None.
Military and Civilian Aviation	The development of any solar energy or transmission facilities that encroach into the airspace of an MTR could interfere with military training activities and could create a safety concern.	None.
	The Barstow-Daggett public airport is located about 12 mi (19 km) west of the SEZ, but no impacts on operations at that airport are expected.	None.
Geologic Setting and Soil Resources	Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase. Impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. These impacts may be impacting factors for other resources (e.g., air quality, water quality, and vegetation). The Pisgah lava field may not be a suitable location for construction.	None. The feasibility of constructing solar facilities in the lava field area of the SEZ will need to be addressed by facility developers.

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Minerals (fluids, solids, and geothermal resources)	Currently there are 103 mining claims within the SEZ, most of these are in the area south of I-40, where there has been a mining operation for many years. These mining claims represent a prior existing right that, if valid, likely would preclude solar energy development as long as they are in place.	Consideration should be given to altering the boundaries of the SEZ to remove the areas with mining claims.
Water Resources	<p>Ground-disturbance activities (affecting 17 to 25% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills.</p> <p>Construction activities may require up to 2,620 ac-ft (3.2 million m³) of water during peak construction year.</p> <p>Construction activities would generate as much as 148 ac-ft 182,600 m³) of sanitary wastewater.</p> <p>Assuming full development of the SEZ, normal operations would use the following amounts of water (Analysis Areas 1 and 2 combined):</p> <ul style="list-style-type: none"> • For parabolic trough facilities (3,832-MW capacity), 2,736 to 5,802 ac-ft/yr (3.4 million to 7.2 million m³/yr) for dry-cooled systems, and 19,214 to 57,534 ac-ft/yr (23.7 million to 71.0 million m³/yr) for wet-cooled systems; • For power tower facilities (2,129-MW capacity), 1,514 to 3,217 ac-ft/yr (1.9 million to 4.0 million m³/yr) for dry-cooled systems, and 10,668 to 31,957 ac-ft/yr (13.1 million to 39.4 million m³/yr) for wet-cooled systems; • For dish engine facilities (2,129-MW capacity), 1,088 ac-ft/yr (1.3 million m³/yr); 	<p>Water resource analysis indicates that wet-cooling options would not be feasible. Other technologies should incorporate water conservation measures.</p> <p>Land disturbance activities should avoid impacts to the extent possible in the vicinity of Troy Lake and ephemeral washes onsite.</p> <p>During site characterization, hydrologic investigations would need to identify 100-year floodplains and potential jurisdictional water bodies subject to Clean Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as being within a 100-year floodplain.</p> <p>During site characterization, coordination and permitting with CDFG regarding California's Lake and Streambed Alteration Program would be required for any proposed alterations to surface water features (both perennial and ephemeral).</p> <p>Groundwater should be used in accordance with rules and regulations set forth by the MWA regarding the Mojave River adjudicated groundwater basin for the portions of the SEZ located in Analysis Area 1.</p>

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Water Resources (Cont.)	<ul style="list-style-type: none"> • For PV facilities (2,129-MW capacity), 109 ac-ft/yr (134,400 m³/yr). <p>Assuming full development of the SEZ, normal operations would generate up to 54 ac-ft/yr (66,600 m³/yr) of sanitary wastewater and up to 1,089 ac-ft/yr (1.3 million m³/yr) of blowdown water.</p> <p>Approximately 20% of the SEZ is located within the Mojave River adjudicated groundwater basin, which is managed by the MWA:</p> <ul style="list-style-type: none"> • Basin is fully allocated, and water-rights or water transfers would need to be negotiated with existing water rights holders and the MWA; • No exports of groundwater outside the MWA boundary is permitted. 	<p>The groundwater-permitting process should be in compliance with the San Bernardino County groundwater ordinance.</p> <p>Groundwater monitoring and production wells should be constructed in accordance with standards set forth by the State of California and San Bernardino County.</p> <p>Stormwater management best management practices should be implemented according to the California Stormwater Quality Association.</p> <p>Water for potable uses would have to meet or be treated to meet water quality standards in the California Safe Drinking Water Act.</p>
Vegetation ^b	<p>Approximately 80% of the SEZ (19,160 acres [77.5 km²]) would be cleared with full development of the SEZ. The plant communities affected would depend on facility locations and could include any of the plant communities occurring on the SEZ. Therefore, for the purposes of this analysis, all of the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.</p> <p>Sand dune, playa, desert chenopod scrub, and dry wash communities are important sensitive habitats within the SEZ that could be affected.</p> <p>Indirect effects (caused, for example, by surface runoff or dust from the SEZ) outside the SEZ boundaries would have the potential to degrade</p>	<p>An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration should be approved and implemented to increase the potential for successful restoration of creosotebush–white bursage desertscrub communities and other affected habitats and to minimize the potential for the spread of tamarisk, Sahara mustard, schismus, or other invasive species. Invasive species control should focus on biological and mechanical methods to reduce the use of herbicides.</p>

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Vegetation ^b (Cont.)	<p>affected plant communities and reduce biodiversity by promoting the decline or elimination of species sensitive to disturbance. Indirect effects could also cause an increase in disturbance-tolerant species or invasive species.</p> <p>Noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus causing reduced restoration success and possible widespread habitat degradation.</p> <p>Groundwater withdrawals could affect riparian areas or groundwater-dependent communities, such as mesquite bosque.</p>	<p>All playa, chenopod scrub, sand dune and sand transport areas, and desert dry wash habitats, shall be avoided to the extent practicable, and any impacts minimized and mitigated. A buffer area shall be maintained around riparian areas, playas, and dry washes to reduce the potential for impacts on these habitats on or near the SEZ. Appropriate engineering controls shall be used to minimize impacts on these areas resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.</p> <p>Groundwater withdrawals should be prohibited to avoid the potential for indirect impacts on riparian habitat along the Mojave River or groundwater-dependent communities, such as mesquite bosque.</p>
Wildlife: Amphibians and Reptiles ^b	<p>The red-spotted toad (<i>Bufo punctatus</i>) would be expected to occur within the Pisgah SEZ. However, as it prefers dry, rocky areas near temporary sources of standing water, its occurrence within the SEZ would be spatially limited. It would most likely occur in the far western portion of the SEZ that overlaps portions of Troy Lake.</p> <p>Thirty-one reptile species (the desert tortoise, which is a federally and state-listed species; 13 lizards; and 16 snakes) could occur within the SEZ.</p>	<p>Implement design features to reduce the potential for effects on amphibians and reptiles, especially for those species that depend on habitat types that can be avoided (e.g., Troy Lake, which could provide habitat for the red-spotted toad).</p>

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Wildlife: Amphibians and Reptiles ^b (Cont.)	Direct impacts on amphibian and reptile species from SEZ development would be small (0.2 to 0.6% of potentially suitable habitats identified for the species in the SEZ region would be lost). With implementation of proposed design features, indirect impacts would be expected to be negligible.	
Wildlife: Birds ^b	<p>Almost 100 species of birds have a range that encompasses the Pisgah SEZ region. However, habitats for more than 35 of these species either do not occur on or are limited within the SEZ (e.g., habitat for waterfowl and wading birds).</p> <p>Direct impacts on bird species would be small for most bird species (0.6% or less of habitats potentially suitable for most representative bird species would be lost), although a moderate impact is indicated for the killdeer (1.7% of its potentially suitable habitat would be lost).</p> <p>Other impacts on birds could result from collision with vehicles and facility structures, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.</p> <p>Indirect impacts on areas outside the SEZ (for example, impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of proposed design features.</p>	<p>Pre-disturbance surveys should be conducted within the SEZ for desert bird focal species and bird species listed under the Migratory Bird Treaty Act. Impacts on potential nesting habitat for these species should be avoided during the nesting season.</p> <p>Plant species that positively influence the presence and abundance of the desert bird focal species should be avoided to the extent practicable. These species include Goodding's willow, yucca, Joshua tree, mesquite, honey mesquite, screwbean, desert mistletoe, big saltbush, smoketree, and catclaw acacia.</p> <p>Take of golden eagles and other raptors should be avoided.</p> <p>Development within the area of Troy Lake should be avoided.</p>

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Wildlife: Mammals ^b	<p>Direct impacts on small game, furbearers, and small mammals on the SEZ from habitat disturbance and long-term habitat reduction/fragmentation would be small (0.6% or less of potentially suitable habitats for the species in the SEZ region would be lost).</p> <p>Other impacts on mammals could result from collision with vehicles and fences, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.</p> <p>Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of proposed design features.</p>	<p>Development within the ephemeral drainages should be avoided in order to reduce impacts on species such as the round-tailed ground squirrel, white-tailed antelope squirrel, little pocket mouse, long-tailed pocket mouse, and any other mammal species that inhabit wash habitats.</p>
Aquatic Biota ^b	<p>No permanent water bodies, perennial streams, or wetlands are present within the boundaries of the Pisgah SEZ or within the 5-mi (8-km) area considered potentially susceptible to indirect impacts. Consequently, no direct or indirect impacts on aquatic habitats are expected to occur from construction and operation of utility-scale solar energy facilities at the Pisgah SEZ. However, more site specific data would be necessary to evaluate whether aquatic biota is present in ephemeral surface water features. Water quantity in surrounding aquatic habitats could be affected if significant amounts of surface water or groundwater were utilized for solar development needs.</p>	None.

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Special Status Species ^b	<p>Potentially suitable habitat for 54 special status species occurs in the affected area of the Pisgah SEZ. For most of these special status species, less than 1% of the potentially suitable habitat in the region occurs in the area of direct effects; for all special status species, less than 3% of the potentially suitable habitat in the region occurs in the area of direct effects.</p> <p>There are three groundwater dependent species that occur outside of the areas of direct and indirect effects. Potential impacts on these species could range from small to large depending on the solar energy technology deployed, the scale of development within the SEZ, and the cumulative rate of groundwater withdrawals.</p>	<p>Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species. Disturbance to occupied habitats for these species should be avoided or minimized to the extent practicable. If avoiding or minimizing impacts to occupied habitats is not possible for some species, translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that used one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies.</p> <p>Disturbance of desert playa and wash habitats within the SEZ should be avoided or minimized to the extent practicable. In particular, development should be avoided in and near Troy Lake in the western portion of the SEZ. Avoiding or minimizing disturbance of these habitats could reduce impacts on 11 special status species.</p> <p>Avoiding or minimizing disturbance of sand dunes and sand transport systems, rocky cliffs, and outcrops on the SEZ could reduce impacts on 11 special status species.</p> <p>Avoiding or minimizing groundwater withdrawals from the SEZ would reduce or prevent impacts on 3 special status species that may occur in aquatic habitats outside of the affected area.</p>

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Special Status Species ^b (Cont.)		<p>As a California fully protected species, direct and indirect impacts on the Mohave tui chub should be completely avoided. This includes the avoidance of groundwater withdrawals from the SEZ that may affect habitats at Camp Cady and in the Mojave River. Coordination with the CDFG should be conducted for the Mohave tui chub to address the potential for impact when project-related groundwater demands are better identified.</p> <p>Consultations with the USFWS and the CDFG should be conducted to address the potential for impacts on the Mohave tui chub and desert tortoise species listed as endangered and threatened, respectively, under the ESA and CESA. Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.</p> <p>Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and CDFG.</p>

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Air Quality and Climate	<p><i>Construction:</i> Temporary exceedances of AAQS for PM₁₀ and PM_{2.5} at the SEZ boundaries during construction; higher concentrations would be limited to the immediate area surrounding the SEZ boundary and would decrease quickly with distance. Modeling indicates that emissions from construction activities are not expected to exceed Class I PSD PM₁₀ increments at the nearest Federal Class I area (Joshua Tree NP). Construction emissions from the engine exhaust from heavy equipment and vehicles could cause some impacts on AQRVs (e.g., visibility and acid deposition) at the nearest federal Class I area.</p> <p><i>Operations:</i> Positive impact due to avoided emission of air pollutants from combustion-related power generation: 3.5 to 6.3% of total SO₂, NO_x, Hg, and CO₂ emissions from electric power systems in the state of California avoided (up to 858 tons/yr SO₂, 1,410 tons/yr NO_x, 0.012 tons/yr Hg, and 3,336,000 tons/yr CO₂).</p>	None.
Visual Resources	<p>Large visual impacts on the SEZ and surrounding lands within the SEZ viewed due to major modification of the character of the existing landscape; potential additional impacts from construction and operation of transmission lines and access roads within the SEZ.</p> <p>The SEZ is located within the CDCA. While renewable energy development is allowable within the SEZ under the CDCA management plan, substantial, non-mitigable visual impacts would occur within the CDCA in the SEZ and surrounding lands.</p> <p>The SEZ is located 6.0 mi (9.7 km) from the Newberry Mountains WA. Because of the open views of the SEZ and elevated viewpoints, weak to moderate visual contrasts could be observed by WA visitors.</p>	<p>Within the SEZ, in areas visible from and within 1 mi (1.6 km) of the Cady Mountains WSA, visual impacts associated with solar energy project operation should be consistent with VRM Class II management objectives, as experienced from KOPs (to be determined by the BLM) within the WSA, and in areas visible from between 1 and 3 mi (1.6 and 4.8 km); visual impacts should be consistent with VRM Class III management objectives.</p> <p>Within the SEZ, in areas located south of I-40 and visible from and between 1 and 3 mi (1.6 and 4.7 km) of the Rodman Mountains WA, visual impacts associated with solar energy project operation should be consistent with VRM Class III management objectives, as experienced from KOPs determined by the BLM within the WA.</p>

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Visual Resources (Cont.)	<p>The SEZ is located 1.2 mi (1.9 km) from the Rodman Mountains WA. Because of the short distance and elevated viewpoints, moderate to strong visual contrasts could be observed by WA visitors.</p> <p>The SEZ is adjacent to the Cady Mountains WSA. Because of the short distance and elevated viewpoints, moderate to strong visual contrasts could be observed by WSA visitors.</p> <p>Approximately 48 mi (77 km) of I-40 and Historic Route 66 are within the SEZ viewshed. Eight mi (13 km) of I-40 and 5 mi (8 km) of Historic Route 66 are within the SEZ. Strong visual contrasts could be observed within the SEZ by travelers on both roads.</p> <p>Amtrak passenger rail line serves Barstow and travels through the SEZ on BNSF tracks for approximately 9 mi (15 km). Approximately 55 mi (88 km) of the passenger service line are within the SEZ viewshed. Strong visual contrasts could be observed within the SEZ by train passengers.</p> <p>The communities of Barstow, Daggett, Yermo, Newberry Springs, and Ludlow are located within the viewshed of the SEZ, although slight variations in topography and vegetation provide some screening. Moderate visual contrasts may be observed within Newberry Springs.</p> <p>Residents, workers, and visitors to the area may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) as they travel area roads, including I-15.</p> <p>Nearby residents could be subjected to large visual impacts from solar energy development within the SEZ.</p>	

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Acoustic Environment	<p><i>Construction.</i> Estimated noise levels at the nearest residence located next to the northwestern corner of the SEZ would be about 74 dBA, which is much higher than a typical daytime mean rural background level of 40 dBA and the San Bernardino County regulation of 55 dBA daytime L_{eq}. For 10-hr daytime work schedule, about 70 dBA L_{dn} would be above the EPA guideline of 55 dBA L_{dn} for residential areas.</p> <p><i>Operations.</i> Noise levels at the nearest residence from a CSP solar facility would be about 51 dBA, which is higher than typical daytime mean rural background level of 40 dBA but lower than the San Bernardino County regulation of 55 dBA daytime L_{eq}. For 12-hour daytime operation, the estimated 49 dBA L_{dn} falls below the EPA guideline of 55 dBA L_{dn} for residential areas. However, in the case of 6-hour TES, the estimated nighttime noise level at the nearest residence would be 61 dBA, which is higher than typical nighttime mean background level of 30 dBA and San Bernardino County regulation of 45 dBA nighttime L_{eq}. The day–night average noise level is estimated to be about 63 dBA L_{dn}, which is higher than the EPA guideline of 55 dBA L_{dn}, for residential areas.</p> <p>If 80% of the SEZ were developed with dish engine facilities, the estimated noise level of 56 dBA at the nearest residence would be higher than a typical daytime mean rural background level of 40 dBA and slightly higher than the San Bernardino County regulation of 55 dBA daytime L_{eq}. For 12-hour daytime operations, the estimated 54 dBA L_{dn} would be just below the EPA guideline of 55 dBA L_{dn} for residential areas. About 3-dBA higher noise levels than those at the nearest residence were predicted at the next nearest residence (about 500 ft [150 m] south of the SEZ near I-40), but these noise levels are considerably masked by heavy road traffic noise from I-40.</p>	<p>Noise levels from cooling systems equipped with TES should be managed so that levels at the nearby residences to the northwest and to the south of the SEZ are kept within applicable guidelines. This could be accomplished in several ways, for example, through placing the power block approximately 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few hours after sunset, and/or installing fan silencers.</p> <p>Dish engine facilities within the Pisgah SEZ should be located more than 1 to 2 mi (1.6 to 3 km) from the nearest residences to the northwest and the south of the SEZ (i.e., the facilities should be located in other portions of the proposed SEZ). Direct noise control measures applied to individual dish engine systems could also be used to reduce noise impacts at the nearest residences.</p>

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Paleontological Resources	The potential for impacts on significant paleontological resources at the SEZ is relatively unknown, but could be high in some areas. A more detailed investigation of the local geological deposits of the SEZ and their potential depth is needed; a paleontological survey would likely be required prior to project approval.	The need for and the nature of any SEZ-specific design features would depend on findings of paleontological surveys.
Cultural Resources	<p>Direct impacts on significant cultural resources could occur in the proposed Pisgah SEZ; however, a cultural resource survey of the entire area of potential effect of a proposed project would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would then be needed to determine whether any are eligible for listing in the NRHP.</p> <p>Numerous prehistoric and Native American sites and trails are potentially located within the SEZ and could be impacted by solar energy development.</p>	<p>Significant historic and prehistoric sites in the vicinity of Troy Lake should be avoided.</p> <p>Areas of significant prehistoric remains within the SEZ that are identified through the Calico Solar Power Project (to date an area including a 400 ft [122 m] buffer and in some instances fencing [BLM and CA SHPO 2010]) should be avoided.</p> <p>Other possible design features specific to the SEZ would be determined through consultation with the California SHPO and affected Tribes.</p>
Native American Concerns	<p>Development of utility-scale solar energy projects in the SEZ could have direct impacts on resources important to Native Americans. The proposed Pisgah SEZ is located close to the Mohave Trail and may be visible from it. The SEZ includes plant species important to Native American, but not in abundance. There is also some potential for game animals important to Native Americans, including bighorn sheep crossing from surrounding mountains, and smaller game such as black-tailed jackrabbits. Ground-disturbing activities have the potential for adversely affecting these resources along with archaeological resources and burials important to Native Americans.</p> <p>As consultations continue, it is possible that other Native American concerns, regarding solar energy development within the SEZ will emerge.</p>	The need for and nature of SEZ-specific design features would be determined during government-to-government consultation with the affected Tribes.

TABLE 9.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Pisgah SEZ	SEZ-Specific Design Features
Socioeconomics	<p><i>Construction:</i> 806 to 10,667 total jobs; \$66 million to \$871 million income in ROI.</p> <p><i>Operations:</i> 58 to 1,385 annual total jobs; \$2.4 million to \$61 million annual income in the ROI.</p>	None.
Environmental Justice	There are both minority populations and low-income populations, as defined by CEQ guidelines, within the 50-mi (80-km) radius around the boundary of the SEZ, meaning that any adverse impacts of solar projects could disproportionately affect minority and low-income populations.	None.
Transportation	The primary transportation impacts are anticipated to be from commuting worker traffic. I-40 and the National Trails Highway provide a regional traffic corridor that would experience small impacts for single projects that may have up to 1,000 daily workers, with an additional 2,000 vehicle trips per day (maximum). Such an increase is approximately 15% of the current traffic on I-40. The exits on I-40 might experience moderate impacts with some congestion.	None.

Abbreviations: AAQS = ambient air quality standards; ACEC = Area of Critical Environmental Concern; AQRV = air quality-related value; BLM = Bureau of Land Management; BMP = best management practice; BNSF = Burlington Northern Santa Fe; CDCA = California Desert Conservation Area; CDFG = California Department of Fish and Game; CEQ = Council on Environmental Quality; CESA = California Endangered Species Act; CNDDDB = California Natural Diversity Database; CO₂ = carbon dioxide; CRA = Colorado River Aqueduct; CSP = concentrating solar power; DWMA = Desert Wildlife Management Area; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; Hg = mercury; KOP = key observation point; MTR = military training route; MWA = Mojave Water Agency; NO_x = nitrogen oxides; NRHP = *National Register of Historic Places*; PM_{2.5} = particulate matter with an aerodynamic diameter of 2.5 μm or less; PM₁₀ = particulate matter with an aerodynamic diameter of 10 μm or less; PSD = prevention of significant deterioration; PV = photovoltaic; ROI = region of influence; SEZ = solar energy zone; SHPO = State Historic Preservation Office; SO₂ = sulfur dioxide; TES = thermal energy storage; USFWS = U.S. Fish and Wildlife Service; VOC = volatile organic compound; VRM = visual resource management; WA = Wilderness Area; WSA = Wilderness Study Area.

^a The detailed programmatic design features for each resource area to be required under BLM's Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would be required for development in the proposed Pisgah SEZ.

^b The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 9.3.10 through 9.3.12.

1 Section 9.3.22 discusses potential cumulative impacts from solar development in the proposed
2 SEZ.

3

4 Only those design features specific to the Pisgah SEZ are included in Sections 9.3.2
5 through 9.3.21 and in the summary table. The detailed programmatic design features for each
6 resource area to be required under BLM's Solar Energy Program are presented in Appendix A,
7 Section A.2.2. These programmatic design features would also be required for development in
8 this and other SEZs.

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1 **9.3.2 Lands and Realty**

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4 **9.3.2.1 Affected Environment**

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6 The 23,950 acres (97 km²) of the proposed Pisgah SEZ stretch for about 12 mi (19 km)
7 along I-40, which splits the SEZ into northern and southern portions. Although the SEZ consists
8 only of BLM-administered public lands, the combination of the public land ownership pattern
9 and the topography of the area creates a large interface between public and private lands. There
10 are also about 380 acres (1.5 km²) of state land bordering the SEZ. There is a large block of
11 private land to the west and northwest of the area. The area is rural in character.
12

13 There are numerous existing ROW authorizations in the SEZ (BLM and USFS 2010b),
14 including authorizations for I-40 and the National Trails Highway (old U.S. 66), a railroad line,
15 a fiber optic line, four large transmission lines, an electrical substation, four pipelines, and a
16 county road that provides access to a mine surrounded by the SEZ. There are also additional
17 lower capacity power lines located in portions of the SEZ. A 2-mi (3-km) wide Section 368
18 designated energy corridor that follows the route of I-40 passes through portions of the SEZ.
19 This corridor was recently established as an outcome of the West-wide Corridor PEIS (DOE and
20 DOI 2008) (see also Section 3.2.5).
21

22 As of February 2010, there were two solar development applications wholly or partially
23 within the SEZ boundaries. One of these, covering approximately 8,600 acres (35 km²) of the
24 SEZ, is a BLM fast-track project for which environmental reviews have begun.
25
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27 **9.3.2.2 Impacts**

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30 **9.3.2.2.1 Construction and Operations**

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32 Development of the proposed Pisgah SEZ for utility-scale solar energy production would
33 establish a very large industrial area that would exclude many existing and potential uses of the
34 land, perhaps in perpetuity. Since the SEZ is relatively undeveloped and rural, utility-scale solar
35 energy development would be a new and discordant land use in the area. It is also possible that
36 the numerous private lands and the state land parcel located on the boundaries of the SEZ could
37 be developed in the same or a complementary manner as the public lands if the landowners are
38 willing and if these lands are suitable for solar energy development.
39

40 Existing ROW authorizations on the SEZ would not be affected by solar energy
41 development since they are prior rights. The existing pipeline, electrical transmission line, and
42 highway ROWs do remove some land from potential solar development within the SEZ. Should
43 the proposed SEZ be identified as an SEZ in the ROD for this PEIS, the BLM would still
44 have discretion to authorize additional ROWs in the area until solar energy development was
45 authorized, and then future ROWs would be subject to the rights granted for solar energy
46 development.
47

1 The designated Section 368 transmission corridor along I-40 running through portions of
2 the SEZ could limit solar development of the SEZ, because in order to avoid technical or
3 operational interference between transmission and solar energy facilities, solar energy facilities
4 cannot be constructed under transmission lines or over pipelines. Alternatively, because of the
5 existing constraints from designated WAs, one WSA, the Twentynine Palms Marine Base, and
6 topographic constraints, the transmission corridor capacity could be substantially reduced if the
7 SEZ were fully developed for utility-scale solar energy production. Transmission capacity is
8 becoming a more critical factor and reducing corridor capacity in this SEZ may have future,
9 but currently unknown, consequences. This is an administrative conflict that can be addressed
10 by the BLM, but there would be implications either for the amount of potential solar energy
11 development or for the amount of transmission capacity that can be accommodated.
12

13 The current public land ownership pattern, along with terrain features in the SEZ, could
14 lead to the creation of isolated parcels of BLM-administered land scattered among solar energy
15 facilities that would be both inaccessible to the public and difficult to manage.
16

17 ***9.3.2.2.2 Transmission Facilities and Other Off-Site Infrastructure***

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19
20 An existing 230-kV transmission line runs north–south through the eastern portion of the
21 SEZ; this line might be available to transport the power produced in this SEZ. Establishing a
22 connection to the existing line would not involve the construction of a new transmission line
23 outside of the SEZ. If a connecting transmission line were constructed in a different location
24 outside of the SEZ in the future, site developers would need to determine the impacts from
25 construction and operation of that line. In addition, developers would need to determine the
26 impacts of line upgrades, if they were needed.
27

28 Road access to the SEZ is readily available, so it is anticipated there would be no
29 additional land disturbance outside the SEZ associated with road construction to provide access
30 to the SEZ. Both internal electric transmission lines and roads would be required to support
31 development of solar energy facilities. See Section 9.3.1.2 for the analysis assumptions for the
32 SEZ.
33

34 ***9.3.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***

35
36
37 No SEZ-specific design features were identified. Implementing the programmatic design
38 features described in Appendix A, Section A.2.2, as required under BLM’s Solar Energy
39 Program would provide adequate mitigation for some identified impacts. The exceptions may be
40 impacts that are related to the exclusion of many existing and potential uses of the public land,
41 perhaps in perpetuity; the visual impact of an industrialized-looking solar facility within an
42 otherwise rural area; and induced land use changes on state and private lands.
43

9.3.3 Specially Designated Areas and Lands with Wilderness Characteristics

9.3.3.1 Affected Environment

The SEZ is located in the California Desert Conservation Area (CDCA) which is a 26-million-acre (105,000-km²) area in southern California designated by Congress in 1976 in the FLPMA. About 10.7 million acres (43,300 km²) of the CDCA are administered by the BLM. The proposed Pisgah SEZ is located within the CDCA and is surrounded by specially designated areas, including four designated WAs, one WSA, and numerous ACECs (Figure 9.3.3.1-1). None of the ACECs within the viewshed of the SEZ were designated because they possess scenic values; they were identified for the protection of plant and animal species or cultural resources. No lands with wilderness characteristics outside of designated WAs or WSAs have been identified within 25 mi (40 km) of the SEZ.

As part of the planning process for the BLM-administered lands in the CDCA, all public lands except for about 300,000 acres (1,214 km²) of scattered parcels were designated geographically into one of four multiple-use classes. The classification was based on the sensitivity of resources and kinds of uses for each geographic area. The four multiple-use classes are (BLM 1999):

- Class C is for lands either designated as wilderness or for wilderness study areas. These lands are managed to protect their wilderness characteristics.
- Class L (Limited Use) protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.
- Class M (Moderate Use) is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources caused by permitted uses.
- Class I (Intensive use) is to provide for concentrated use of lands and resources to meet human needs. Reasonable protection will be provided for sensitive natural and cultural values. Mitigation of impacts on resources and rehabilitation of affected areas will occur insofar as possible.

Land within the SEZ south of I-40 is predominantly Class L (27%), and the rest of the area is Class M (73%). The Multiple Use Class Guidelines contained in the CDCA Plan indicate that wind, solar, or geothermal electrical generation facilities could be allowed in both of these classes.

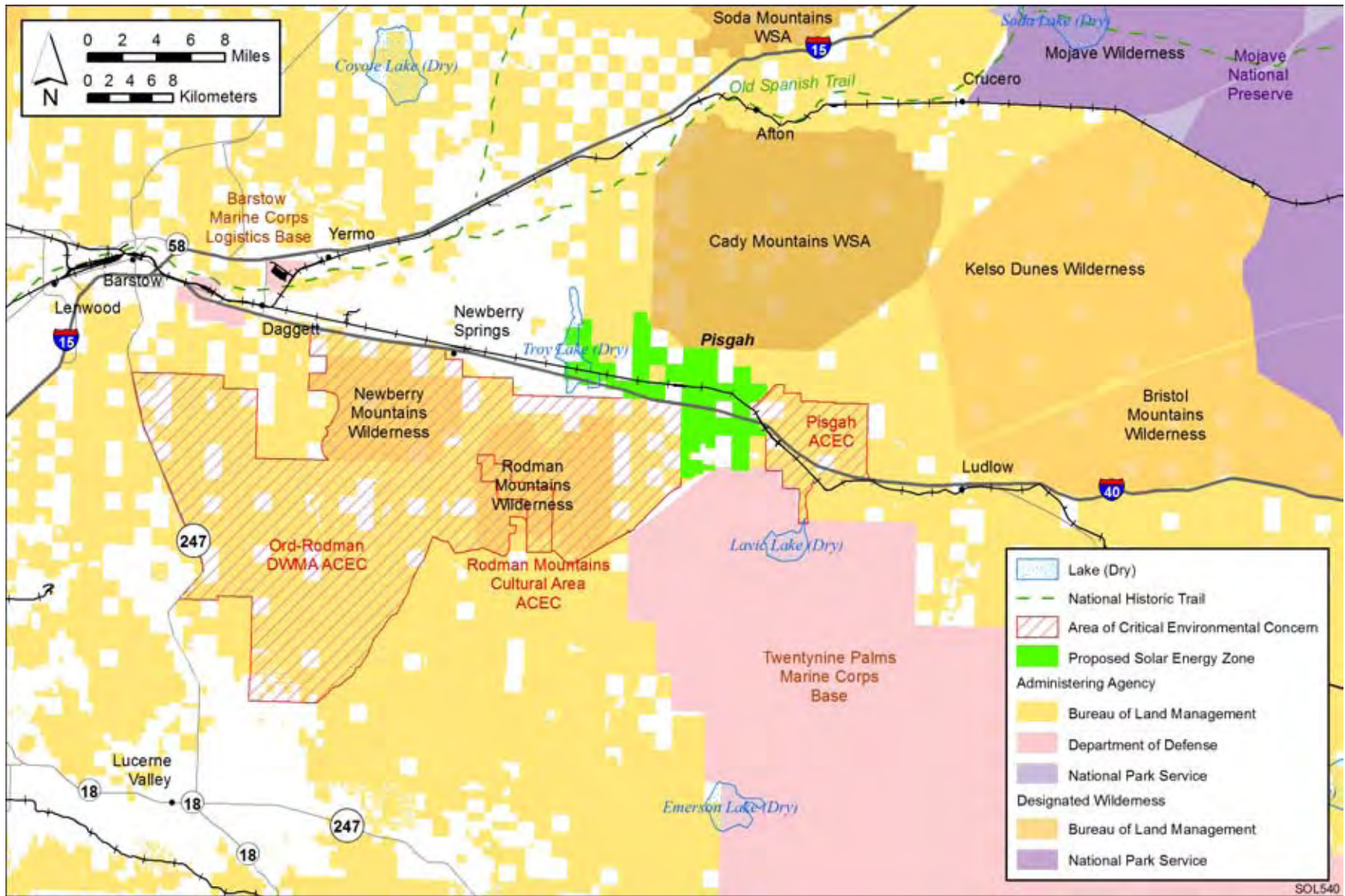


FIGURE 9.3.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Pisgah SEZ

1

2

1 **9.3.3.2 Impacts**
2
3

4 **9.3.3.2.1 Construction and Operations**
5

6 The potential impact on specially designated areas from solar development within the
7 proposed Pisgah SEZ is difficult to quantify and would vary by solar technology employed,
8 the specific area being affected, and the perception of individuals viewing the development.
9 Development of the SEZ, especially full development, would be a dominating factor in the
10 viewshed from large portions of some of these specially designated areas, as summarized in
11 Table 9.3.3.2-1. The data provided in Table 9.3.3.2-1 assume the use of the power tower solar
12 energy technology, which because of the potential height of these facilities could be visible from
13 the largest amount of land for the technologies being considered in this PEIS. The potential
14 visual impacts of solar energy projects in terms of the amount of acreage within specially
15 designated areas within the viewshed of the SEZ could be less for shorter solar energy facilities;
16 however, assessment of the visual impact of solar development on specially designated areas
17 must be conducted on a site-specific and technology-specific basis to accurately identify impacts.
18 See Section 9.3.14 for a more complete review of the visual impacts for the Pisgah SEZ. The
19 nine ACECs presented in Table 9.3.3.2-1, with the exception of the Ord-Rodman DWMA,
20 Rodman Mountains Cultural Area, and Pisgah, are presented for information only and are not
21 analyzed further. They were not analyzed because they do not have a scenic component for their
22 designation and they are far enough removed from the SEZ that they would not reasonably be
23 expected to have an increase in human use and traffic because of construction and operation of
24 solar energy facilities in the SEZ.
25

26 In general, the closer a viewer is to solar development, the greater the potential impact is
27 on an individual's perception of impact on the values within the area from which the individual
28 is viewing the SEZ. The viewing height above a solar energy development area, the size of the
29 development area, and the purpose for which a person is visiting an area are also important.
30 Individuals seeking a wilderness experience within these areas could be expected to be more
31 adversely affected than those traveling along the highway with another destination in mind. In
32 the case of the Pisgah SEZ, the low-lying location of the SEZ in relation to surrounding specially
33 designated areas would tend to highlight the industrial-like development in the SEZ. Because the
34 SEZ currently has numerous man-made features present, the impact on wilderness characteristics
35 and scenic values may be less significant than in areas that are more pristine.
36

37 The occurrence of glint and glare at solar facilities could potentially cause large, but
38 temporary, increases in brightness and visibility of the facilities. The visual contrast levels that
39 were assumed to assess potential impacts on specially designated areas (see Section 9.3.14) do
40 not account for potential glint and glare effects; however, these effects would be incorporated
41 into a future site- and project-specific assessment that would be conducted for specific proposed
42 utility-scale solar energy projects.
43

TABLE 9.3.3.2-1 Specially Designated Areas Potentially within the Viewshed of Solar Facilities within the Proposed Pisgah SEZ^a

Name	Total Acres	Acres	Percent	Acres	Percent	Acres	Percent
		within 5-mi (8-km) Viewshed	within 5-mi (8-km) Viewshed	within 15-mi (24-km) Viewshed	within 15-mi (24-km) Viewshed	within 25-mi (40-km) Viewshed	within 25-mi (40-km) Viewshed
California Desert Conservation Area	25,919,319	178,231	7	406,533	1.6	552,338	2.1
Calico Early Man Site ACEC ^b	899			684	76.1	684	76.1
Manix ACEC ^b	2,259			894	39.6	894	39.6
Mojave Fringe-toed Lizard ACEC ^b	24,695			2,728	11.0	3,411	13.8
Mojave Monkeyflower ACEC ^b	46,488			263	0.6	9,988	21.5
Ord-Rodman DWMA ACEC	224,622	35,353	15.7	63,990	28.5	65,372	29.1
Parish's Phacelia ACEC ^b	899			873	97.2	873	97.2
Pisgah ACEC	19,755	14,792	74.9	16,429	83.2	16,429	83.2
Rodman Mountains Cultural Area ACEC	6,208			1,944	31.3	1,944	31.3
Superior-Cronese ACEC ^b	542,739			58,114	10.7	135,987	25.1
Old Spanish National Historic Trail	17,362			161	0.9	190	1.1
Bristol Mountains WA	77,026			1,776	2.3	8,353	10.8
Kelso Dunes WA	154,335			694	0.4	4,383	2.8
Newberry Mountains WA	27,768			6,498	23.4	6,498	23.4
Rodman Mountains WA	34,341	9,120	26.6	19,900	57.9	19,900	57.9
Cady Mountains WSA	120,197	20,677	17.2	23,952	19.9	23,952	19.9
Soda Mountains	121,680					3,005	2.5

^a Identified assuming a power tower facility of 650 ft (198.1 m).

^b Denotes area not further discussed in the text.

1 *Cady Mountains WSA and Rodman Mountains and Newberry Mountains Wilderness*
2

- 3 • The southwestern side of the Cady Mountains WSA¹ abuts the SEZ and rises
4 quickly above it, providing a dominating view of the SEZ. Visitors in about
5 24,000 acres (97 km²), or 20% of the WSA, would have a clear view of the
6 development in the SEZ. It is likely that much of the wilderness value of this
7 portion of the WSA would be adversely affected by development within the
8 SEZ. The viewshed of the WSA includes I-40 and the railroad, which are
9 within 3 to 4 mi (5 to 6 km) of the WSA boundary; therefore the impact of
10 SEZ development on the wilderness characteristics of the WSA may be less
11 significant than in the case of a pristine viewshed.
12
- 13 • A total of about 58% of the designated Rodman Mountains Wilderness would
14 have a full view of solar development in the SEZ. Within 5 mi (8 km) of the
15 SEZ, because of the strong contrast between solar development and the
16 surrounding area, wilderness characteristics would be adversely affected in
17 areas in view of the SEZ. This area includes 9,000 acres (36 km²), or about
18 27% of the WA. Beyond 5 mi (8 km), while the SEZ would still be very
19 visible, visual impacts would begin to diminish because of increasing distance
20 and the smaller percentage of the overall viewshed covered by the SEZ.
21 Views from within the WA currently include I-40, old U.S. 66, and four
22 electrical transmission lines on the southeastern side of the SEZ. Because of
23 the presence of these features, the impact of development within the SEZ on
24 wilderness characteristics may be less significant than in the case of a pristine
25 viewshed.
26
- 27 • The Newberry Mountains Wilderness is farther away from the SEZ than the
28 two areas discussed above, and portions of the area are partially screened from
29 it. Although solar development would be visible in about 23% of the area
30 within 15 mi (24 km) of the SEZ, none of the solar facilities would be visible
31 within the most visually sensitive zone, the area within 5 mi (8 km) of the
32 SEZ. Because of this distance and the existence of visual impacts associated
33 with man-made disturbances between the WA and the SEZ, impacts on the
34 wilderness characteristics of the WA from development in the SEZ are
35 expected to be minor.
36
37
38

¹ The congressionally directed inventory and study of BLM's roadless areas received extensive public input and participation. By November 1980, the BLM had completed field inventories and designated about 25 million acres (101,000 km²) of WSAs. Since 1980, Congress has reviewed some of these areas and has designated some as wilderness and released others for non-wilderness uses. Until Congress makes a final determination on a WSA, the BLM is required by FLPMA to manage these areas in a manner so as not to impair their suitability for preservation as wilderness.

1 *Kelso Dunes and Bristol Mountains Wilderness*

- 2
- 3 • The boundaries of these two WAs range from about 11 to 14 mi (18 to 23 km)
- 4 from the eastern border of the SEZ. The Kelso Dunes Wilderness is
- 5 completely screened within 5 mi (8 km) of the SEZ, and only a very small
- 6 percentage of the area is visible out to 25 mi (40 km). No impact on
- 7 wilderness characteristics in the Kelso Dunes wilderness is expected from
- 8 development of the SEZ. The Bristol Mountains Wilderness is also
- 9 completely screened from view of the SEZ within 5 mi (8 km), and although
- 10 screened somewhat less than Kelso Dunes, again only a very small portion of
- 11 the area is visible from the SEZ out to 25 mi (40 km). There is also expected
- 12 to be no impact on wilderness characteristics within the Bristol Mountains
- 13 Wilderness.

14

15

16 *Ord-Rodman DWMA, Rodman Mountains Cultural Area, and Pisgah ACECs*

- 17
- 18 • The Ord-Rodman DWMA and Pisgah ACECs abut portions of the Pisgah
- 19 SEZ and are vulnerable to increased human traffic induced by the presence
- 20 of the SEZ. While neither of these ACECs have a visual component in their
- 21 reason for designation, they provide habitat for sensitive species. Any increase
- 22 in human use and traffic in these areas represents some level of increased risk
- 23 to the resources the areas were created to protect. The level of that risk and the
- 24 susceptibility to resource damage cannot be assessed at this time, but it is
- 25 possible that additional management efforts would be needed from the BLM
- 26 to maintain the current level of protection. The Rodman Mountains Cultural
- 27 Area also does not have a scenic resource component to its designation and is
- 28 more remote from the SEZ than the other two ACECs; however, the resources
- 29 it was established to protect are more susceptible to damage and loss. An
- 30 increase in human use and traffic in the area would be assumed to increase the
- 31 level of risk to these resources. As is the case for the other ACECs, it is likely
- 32 the BLM would have to increase its management efforts to protect these
- 33 resources if additional traffic is introduced to the area.

34

35

36 *California Desert Conservation Area*

- 37
- 38 • The viewshed within 25 mi (40 km) of the Pisgah SEZ includes about
- 39 552,000 acres (2,234 km²), or about 2% of the CDCA (Table 9.3.3.2-1), and
- 40 may be visible up to about 40 mi (64 km). Installation of renewable energy
- 41 facilities is consistent with the CDCA Plan, and although full development of
- 42 the SEZ would adversely affect wilderness characteristics in 29,717 acres
- 43 (120 km²) in one designated WA and one WSA and may have a small effect
- 44 wilderness recreation and on primitive recreation use in the immediate area of
- 45 the SEZ, impacts on the CDCA appear to be small.
- 46

1 *Old Spanish National Historic Trail*

- 2
- 3 • Two segments of the Old Spanish National Historic Trail are within 8 to 19 mi
4 (13 to 31 km) of the SEZ and, depending on the solar technology employed,
5 may have some view of the solar facilities in the SEZ. Because of the distance
6 to the trail segments it is likely there would be no impact from development of
7 the SEZ on potential management of the trail. See Section 9.3.17 for a more
8 thorough discussion of the Old Spanish National Historic Trail.
- 9

10

11 **9.3.3.2.2 Transmission Facilities and Other Off-Site Infrastructure**

12

13 Because of the availability of an existing transmission line and access to I-40, no
14 additional construction of transmission or road facilities was assessed. Should additional
15 transmission lines be required outside of the SEZ, there may be additional impacts on specially
16 designated areas. See Section 9.3.1.2 for the development assumptions underlying this analysis.

17

18

19 **9.3.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**

20

21 Implementing the programmatic design features described in Appendix A, Section A.2.2,
22 as required under BLM’s Solar Energy Program, would provide adequate mitigation for some
23 identified impacts. The exception would be adverse impacts on wilderness characteristics in
24 the Cady Mountains WSA and Rodman Mountains Wilderness that would not be fully mitigable
25 and are related to the exclusion of many existing and potential uses of the public land, perhaps in
26 perpetuity; the visual impact of an industrialized-looking solar facility within an otherwise rural
27 area; and induced land use changes on state and private lands.

28

29 Proposed design features specific to the proposed SEZ include the following:

30

- 31 • Application of SEZ-specific design features for visual resource impacts
32 (Section 9.3.14) may reduce the visual impact on wilderness characteristics.
 - 33
 - 34 • Once construction of solar energy facilities begins, the BLM would monitor
35 whether there are increases in traffic to the Ord-Rodman DWMA, Rodman
36 Mountains Cultural Area, and Pisgah ACECs and determine whether
37 additional mitigation measures are required to continue to protect the
38 resources in these areas.
- 39

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1 **9.3.4 Rangeland Resources**

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3 Rangeland resources include livestock grazing and wild horses and burros, all of
4 which are managed by the BLM. These resources and possible impacts on them from solar
5 development within the proposed Pisgah SEZ are discussed in Sections 9.3.4.1 and 9.3.4.2.
6

7
8 **9.3.4.1 Livestock Grazing**

9
10
11 **9.3.4.1.1 Affected Environment**

12
13 Only the portion of the Pisgah SEZ north of I-40 is currently included within the Cady
14 Mountain grazing allotment (BLM 2009d); the acreage within the SEZ is about 5% of the total
15 allotment. The allotment is in non-use and has been identified by the allotment operator for
16 voluntary relinquishment. Once the request for relinquishment has been processed by the BLM,
17 the allotment will no longer be available for livestock grazing (Chavez 2010).
18

19
20 **9.3.4.1.2 Impacts**

21
22 Since the current allotment is being relinquished, there would be no effect on livestock
23 grazing.
24

25
26 **9.3.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness**

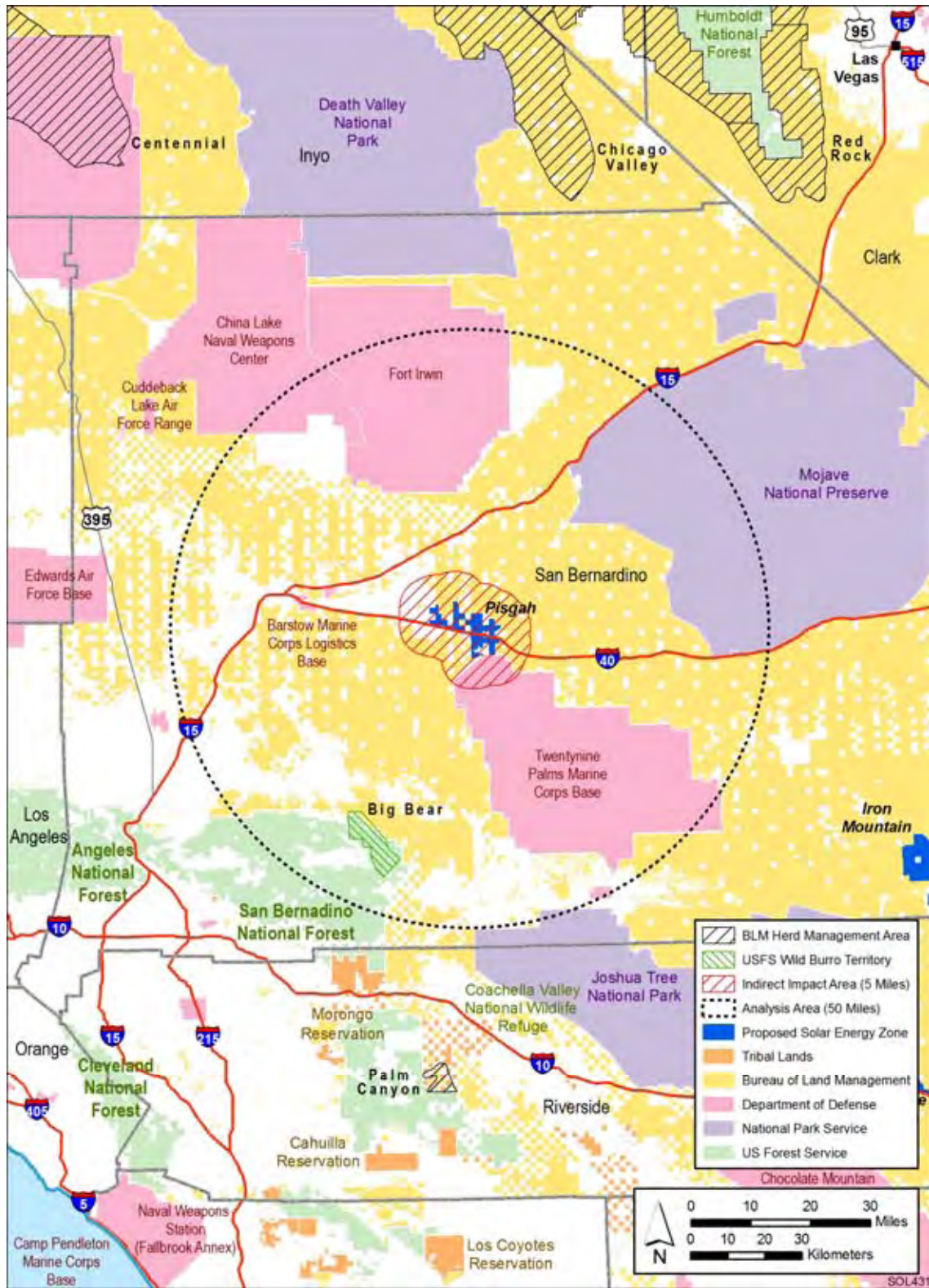
27
28 No SEZ-specific design features would be necessary to protect or minimize impacts on
29 livestock grazing.
30

31
32 **9.3.4.2 Wild Horses and Burros**

33
34
35 **9.3.4.2.1 Affected Environment**

36
37 Section 4.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) that occur
38 within the six-state study area. Twenty-two BLM wild horse and burro HMAs occur within
39 California. In addition, several HMAs in Arizona are located near the Arizona–California border.
40 None of these HMAs occur within a 50-mi (80-km) radius of the proposed Pisgah SEZ
41 (Figure 9.3.4.2-1). The closest HMAs to the SEZ are the Chicago Valley HMA, located more
42 than 70 mi (112 km) north of the SEZ, and Palm Canyon HMA, located more than 65 mi
43 (104 km) south of the SEZ.
44

45 In addition to the HMAs managed by the BLM, the USFS has 51 established wild horse
46 and burro territories in Arizona, California, Nevada, New Mexico, and Utah; it is the lead



1

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FIGURE 9.3.4.2-1 BLM Wild Horse and Burro HMA and USFS Wild Horse and Burro Territories Located near the Proposed Pisgah SEZ Region (Sources: BLM 2009a,b; USFS 2007)

1 management agency that administers 37 of these territories (Giffen 2009; USFS 2007). The
2 closest territory to the proposed Pisgah SEZ is the Big Bear Territory within the San Bernardino
3 National Forest. It is located about 32 mi (51 km) south of the SEZ (Figure 9.3.4.2-1). This
4 territory is managed for a population of 60 wild burros (USFS 2007).
5
6

7 ***9.3.4.2.2 Impacts***

8
9 Because the proposed Pisgah SEZ is 65 mi (104 km) or more from any wild horse and
10 burro HMA managed by the BLM and about 32 mi (51 km) from any wild horse and burro
11 territory administered by the USFS, solar energy development within the SEZ would not affect
12 wild horses and burros managed by these agencies.
13
14

15 ***9.3.4.2.3 SEZ-Design Features and Design Feature Effectiveness***

16
17 The implementation of required programmatic design features described in Appendix A,
18 Section A.2.2, would reduce the potential for effects on wild horses and burros. No proposed
19 Pisgah SEZ-specific design features would be necessary to protect or minimize impacts on wild
20 horses and burros.
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1 **9.3.5 Recreation**

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4 **9.3.5.1 Affected Environment**

5
6 The proposed Pisgah SEZ is very flat, largely dominated by creosote shrublands, and
7 during the summer months does not provide an environment conducive to non-motorized
8 recreation. Although there are several roads, including a county road, that provide easy access
9 to most of the area, recreational use is likely limited. The CDCA, like many remote areas of
10 the public lands, attracts individuals and families that are seeking undeveloped recreation
11 opportunities. Opportunities to explore old town sites, mining operations, and old roads, as
12 well as opportunities for hunting and backcountry camping, hiking, and wildlife and wildflower
13 viewing are important attractions throughout the CDCA. There are areas both in and adjacent
14 to the Pisgah SEZ that provide these kinds of attractions.

15
16 The area is included in the West Mojave Desert Off-Road Vehicle Designation Project
17 (BLM 2003), which provides direction for designation of roads and trails as closed, limited, or
18 open for vehicular use. There are several segments of roads in the SEZ that are designated for
19 limited use (Blaine 2010). These OHV routes designated as open within the Pisgah SEZ are
20 discussed in Section 9.3.21 and shown in Figure 9.3.21-1.

21
22
23 **9.3.5.2 Impacts**

24
25
26 **9.3.5.2.1 Construction and Operations**

27
28 Recreational users would lose the use of any portions of the SEZ developed for
29 solar energy production. Because of the impact of a large and highly visible industrial type
30 development in the SEZ, opportunities for an undeveloped and primitive recreation experience
31 around the SEZ also would be lost or reduced. Access through areas developed for solar power
32 production could be closed or rerouted, making it more difficult or impossible to access current
33 destinations although existing county roads would continue to provide general access. While
34 there are no recreational use statistics for the area of the SEZ and surrounding lands, it is
35 anticipated that the loss of recreational use caused by development of the Pisgah SEZ would
36 be small.

37
38 Open OHV routes crossing areas granted ROWs for solar facilities would be re-
39 designated as closed. However, a programmatic design feature addressing recreational impacts
40 would require consideration of the development of alternative routes that would retain a similar
41 level of access across and to public lands as a part of the project proposal (see Section 5.5.1 for
42 more details on how routes coinciding with proposed solar facilities would be treated).

43
44 On the basis of the viewshed analysis (see Table 9.3.3.2-1), the Pisgah SEZ would be
45 highly visible from the Rodman Mountain WA and the Cady Mountain WSA. The presence of
46 solar development in the SEZ would be likely to adversely affect recreational use of these areas,

1 since large portions of the areas are within the most sensitive visual zone surrounding the
2 proposed SEZ.

3 4 5 **9.3.5.2.2 Transmission Facilities and Other Off-Site Infrastructure**

6
7 Because of the availability of an existing transmission line and access to I-40, no
8 additional construction of transmission or road facilities was assessed. Should additional
9 transmission lines be required outside of the SEZ, there may be additional impacts on specially
10 designated areas. See Section 9.3.1.2 for the development assumptions underlying this analysis.

11 12 13 **9.3.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

14
15 No SEZ-specific design features were identified for addressing impacts on recreation
16 use at the proposed Pisgah SEZ. Implementing the programmatic design features described in
17 Appendix A, Section A.2.2, as required under BLM's Solar Energy Program would provide
18 some mitigation for some identified impacts. The exceptions would be the loss of recreation use
19 within the SEZ and loss of opportunities for undeveloped and primitive recreation around the
20 SEZ; wilderness recreation use in the Cady Mountains WSA and the Rodman Mountains WA
21 would also be adversely affected.

1 **9.3.6 Military and Civilian Aviation**

2
3
4 **9.3.6.1 Affected Environment**

5
6 The proposed Pisgah SEZ is completely blanketed under eight MTRs that include a
7 mixture of visual and instrument routes, with the lowest floor elevation at 200 ft (61 m) AGL.
8 The BLM has identified this as an area where advance consultation with the DoD is required
9 prior to approval of activities that could adversely affect the use of the MTRs.

10
11 The Barstow-Daggett public airport is located about 12 mi (19 km) west of the SEZ.
12

13
14 **9.3.6.2 Impacts**

15
16 The development of any solar energy or transmission facilities that encroach into the
17 airspace of an MTR could interfere with military training activities and could create a safety
18 concern. While the military has indicated that solar development on portions of the Pisgah SEZ
19 is compatible with its existing uses, it has also commented that other portions should have height
20 limits for facilities, and some areas may be incompatible with existing military use.

21
22 The system of military airspace in the Southwest overlaps much of the area of highest
23 interest for solar development and there is potential for solar development to result in cumulative
24 effects on the system of MTRs that stretch beyond just one SEZ or solar project.

25
26 No impacts are expected on the Barstow-Daggett Airport.
27

28
29 **9.3.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**

30
31 No SEZ-specific design features were identified for addressing impacts on military and
32 civilian aviation at the proposed Pisgah SEZ. Implementing the programmatic design features
33 described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program would
34 provide adequate mitigation for identified impacts.
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1 **9.3.7 Geologic Setting and Soil Resources**

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4 **9.3.7.1 Affected Environment**

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7 **9.3.7.1.1 Geologic Setting**

8
9
10 **Regional Geology**

11
12 The proposed Pisgah SEZ lies within the western Mojave Desert region of the Basin and
13 Range physiographic province in southern California. The site is in a northwest-trending alluvial
14 valley southeast of the Mojave River Valley, between the Cady Mountains to the northeast and
15 the Newberry, Rodman, and Lava Bed Mountains to the southwest (Figure 9.3.7.1-1).

16
17 Exposed sediments in the Pisgah region consist mainly of modern alluvial fan and playa
18 lake deposits (Figure 9.3.7.1-2). The Pisgah lava field is a prominent feature, covering an area of
19 about 19,770 acres (80 km²) southeast of the Pisgah SEZ. The lava field is made of a series of
20 Quaternary basalt flows (predominantly pahoehoe) erupted from the Pisgah Crater over alluvial
21 fan and lacustrine sediments. Drainage in the valley is internal, flowing to either Troy Dry Lake
22 (to the northwest of the SEZ) or Lavic Lake (to the southeast). The two dry lakes may have
23 been connected during the Pleistocene before damming by the Pisgah basalt flows and later
24 development of the playas. Lake sediments are at least 160 ft (50 m) thick above the lava flows,
25 especially in the northeast part of Lavic Lake. Portions of the Pisgah SEZ are covered by Troy
26 Dry Lake sediments and Pisgah basalt lava flows. The surrounding mountains are composed of
27 various sedimentary and volcanic rocks of Tertiary and pre-Tertiary age (Bassett and
28 Kupfer 1964; Gawarecki 1968; Wood and Keinle 1993).

29
30
31 **Topography**

32
33 The proposed Pisgah SEZ is located in an alluvial valley between the Cady Mountains
34 (to the northeast) and the Rodman and Lava Bed Mountains (to the southwest), about 7 mi
35 (11 km) southeast of the Mojave River. Elevations range from about 2,355 ft (718 m) at the
36 northeastern corner of the SEZ to less than 1,805 ft (550 m) in the center of the site
37 (Figure 9.3.7.1-3).

38
39
40 **Geologic Hazards**

41
42 The types of geologic hazards that could potentially affect solar project sites and their
43 mitigation are discussed in Sections 5.7.3 and 5.7.4. The following sections provide a
44 preliminary assessment of these hazards at the proposed Pisgah SEZ. Solar project developers
45 may need to conduct a geotechnical investigation to assess geologic hazards locally to better
46 identify facility design criteria and site-specific design features to minimize their risk.

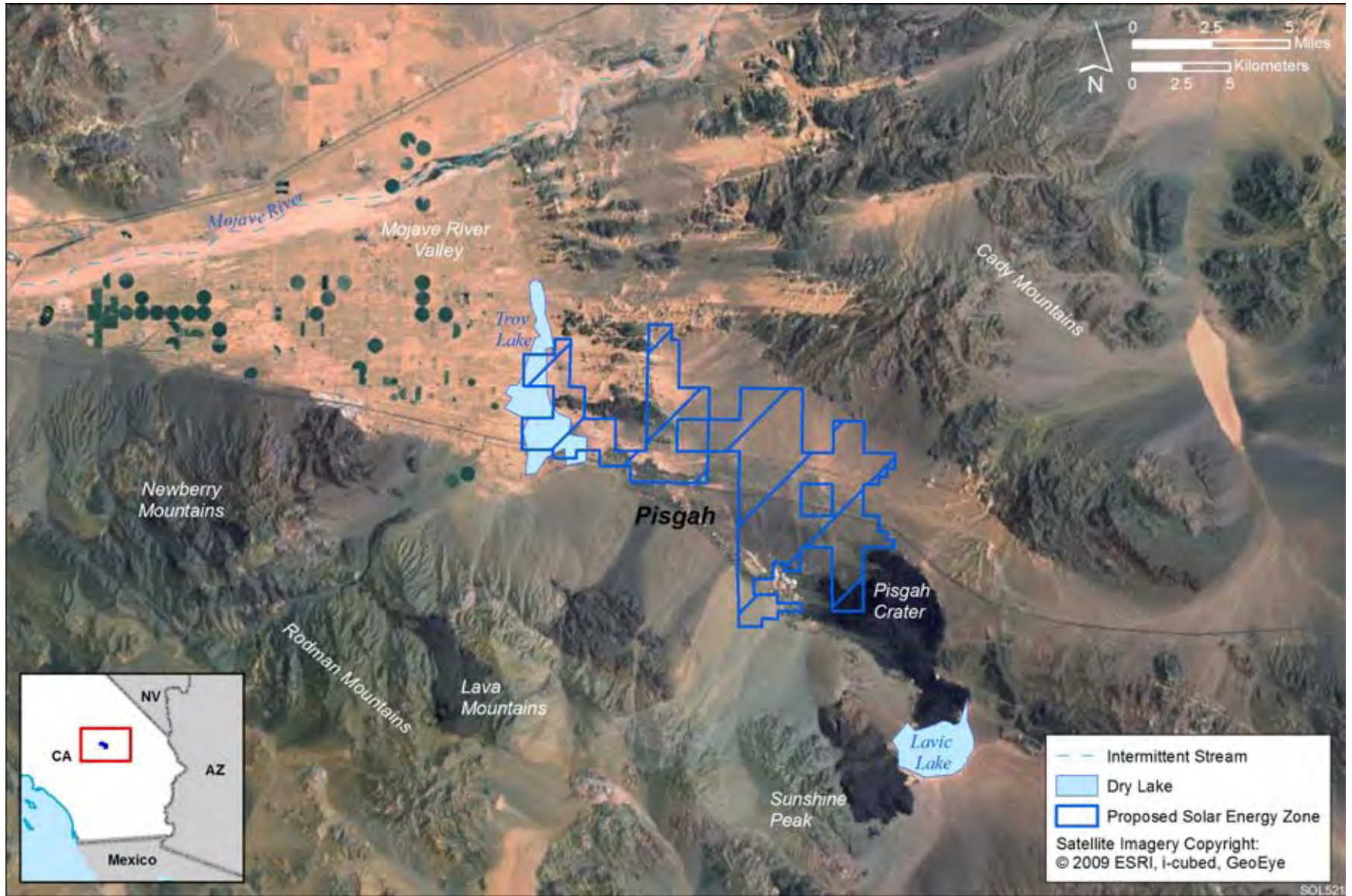
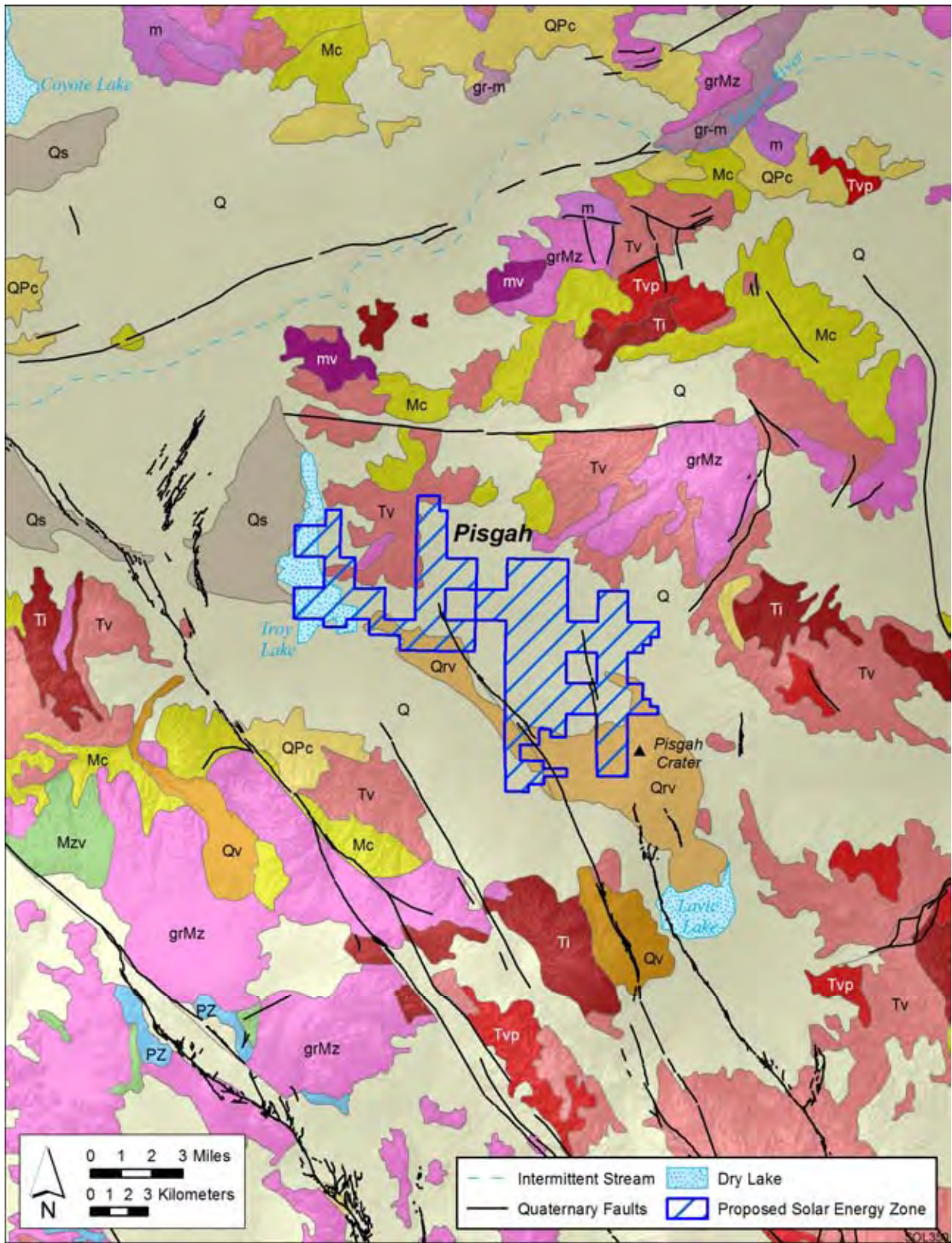


FIGURE 9.3.7.1-1 Physiographic Features in the Mojave River Valley Region



1

2

3

FIGURE 9.3.7.1-2 Geologic Map of the Mojave River Valley Region (adapted from
 Lundington et al. 2007 and Gutierrez et al. 2010)

Cenozoic (Quaternary, Tertiary)

- Q** Alluvium, lake, playa and terrace deposits
- Qs** Dune Sand
- QPc** Sandstone, shale and gravel deposits; mostly loosely consolidated (Pliocene and Pleistocene)
- Mc** Sandstone, shale, conglomerate and fanglomerate; moderately to well consolidated (Miocene)
- Qrv** Recent (Holocene) volcanic flow rocks; minor pyroclastic deposits
- Qv** Volcanic flow rocks; minor pyroclastic deposits
- Tv** Volcanic flow rocks (basalt and andesite); minor pyroclastic deposits
- Tvp** Pyroclastic and volcanic mudflow deposits
- Tj** Intrusive rocks; mostly shallow plugs and dikes

Mesozoic

- qrMz** Granite, quartz monzonite, granodiorite and quartz diorite
- gr-m** Granitic and metamorphic rocks; mostly gneiss (Precambrian to Mesozoic)
- MzV** Volcanic and metavolcanic rocks (undivided)
- mv** Metavolcanic rocks (undivided); includes latite, dacite, tuff and greenstone; commonly schistose

Precambrian to Mesozoic

- PZ** Metasedimentary rocks (undivided); includes slate, sandstone, shale, chert, conglomerate, limestone, dolomite, marble, phyllite, schist, hornfels and quartzite
- m** Metasedimentary and metavolcanic rocks; mostly slate, quartzite, hornfels, chert, phyllite, mylonite, schist, gneiss and minor marble

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1

2 **FIGURE 9.3.7.1-2 (Cont.)**

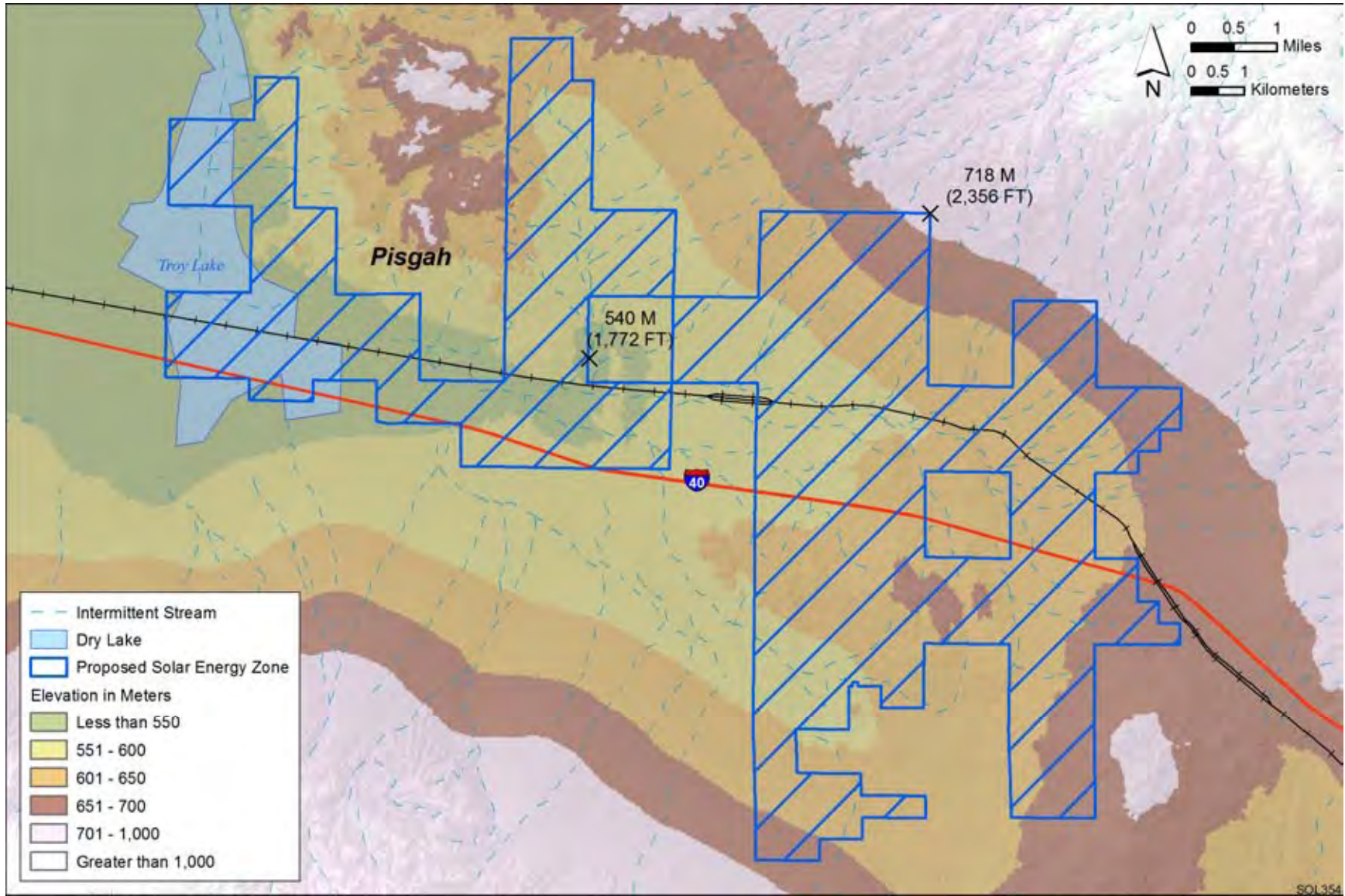


FIGURE 9.3.7.1-3 General Terrain of the Proposed Pisgah SEZ

1 **Seismicity.** The proposed Pisgah SEZ is located on the Mojave structural block at the
2 eastern margin of the Eastern California Shear Zone, a seismically active region dominated
3 by northwest-trending right-lateral strike-slip faulting and categorized as “potentially active”
4 (i.e., having surface displacement within the last 11,000 years [Holocene]) under the Alquist-
5 Priolo Earthquake Fault Zoning Act (Figure 9.3.7.1-4). The term “potentially active” generally
6 denotes that a fault has shown evidence of surface displacement during Quaternary time (the last
7 1.6 million years). However, because there are numerous such faults in California, the State
8 Geologist has introduced new, more discriminating criteria for zoning faults under the Alquist-
9 Priolo Act. Currently, zoned faults include those that are “sufficiently active,” showing evidence
10 of surface displacement within the past 11,000 years along one or more of its segments or
11 branches, and “well-defined,” having a clearly detectable trace at or just below the ground
12 surface (Bryant and Hart 2007).
13

14 The proposed Pisgah SEZ is intersected by the Pisgah section of the Pisgah-Bullion Fault
15 Zone and the Lavic Lake Fault Zone (Figure 9.3.7.1-5). The Calico section of the Calico-Hidalgo
16 Fault Zone and the Rodman Fault lie about 8 mi (13 km) and 5 mi (8 km) to the southwest,
17 respectively. These faults are major strands of a complex fault system of right-lateral strike-slip
18 faults within the Mojave structural block. Offsets of volcanic rocks of Pleistocene age (basalt
19 flows from the Pisgah and Sunshine Craters) and younger alluvial fan deposits along the Pisgah
20 section place the most recent activity at less than 15,000 years ago and the most recent event
21 within the past 3,000 years. Slip rates along the Pisgah section have been estimated at 0.6 mm/yr
22 (Dokka 1983; Treiman 2003a; Bryant and Hart 2007).
23

24 The Lavic Lake Fault is a northwest-striking fault on the same trend (and possibly
25 related to) the Pisgah-Bullion Fault Zone. It was the causative fault in the 1999 Hector Mine
26 earthquake (with a magnitude of 7.1), which resulted in an average right-lateral displacement
27 of about 8.2 ft (2.5 m) and a maximum displacement of about 18 ft (5.5 m). Estimated slip rates
28 for the fault range from about 0.2 to 1 mm/yr (Treiman 2003b).
29

30 Since 1973, more than 3,400 earthquakes have been recorded within a 61-mi (100-km)
31 radius of the Pisgah SEZ. Five of these earthquakes registered moment magnitudes² greater than
32 6.0: July 8, 1986 (Mw 6.5); April 23, 1992 (Mw 6.1); June 28, 1992 (Landers, Mw 6.5 and
33 Mw 7.3); and October 16, 1999 (Hector Mine, Mw 7.1) (USGS 2010c). The 1992 Landers
34 earthquake ruptured five separate faults within the Pisgah-Bullion Fault Zone (SCEDC 2010a)
35 and was centered about 35 mi (60 km) south of the Pisgah SEZ; the 1999 Hector Mine
36 earthquake ruptured the Lavic Lake and Bullion faults (SCEDC 2010b) and was centered about
37 12 mi (20 km) to the south-southeast.
38

39 **Liquefaction.** The proposed Pisgah SEZ lies within an area where the peak horizontal
40 acceleration with a 10% probability of exceedance in 50 years is between 0.30 and 0.50 g.
41

² Moment magnitude (Mw) is used for earthquakes with magnitudes greater than 3.5 and is based on the moment of the earthquake, equal to the rigidity of the earth times the average amount of slip on the fault times the amount of fault area that slipped (USGS 2010d).

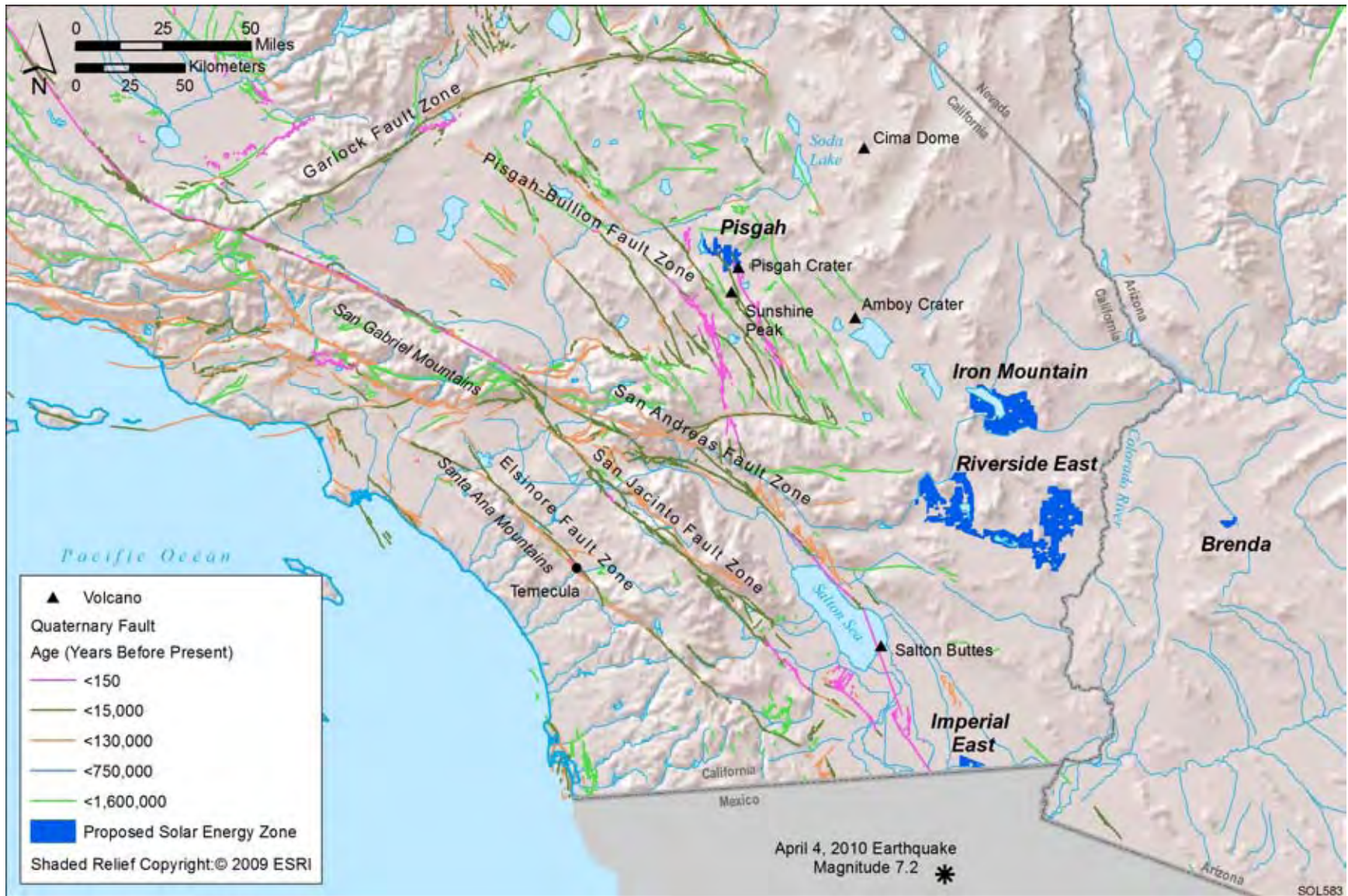


FIGURE 9.3.7.1-4 Quaternary Faults and Volcanoes in Southern California (Sources: USGS and CGS 2010; USGS 2010c)

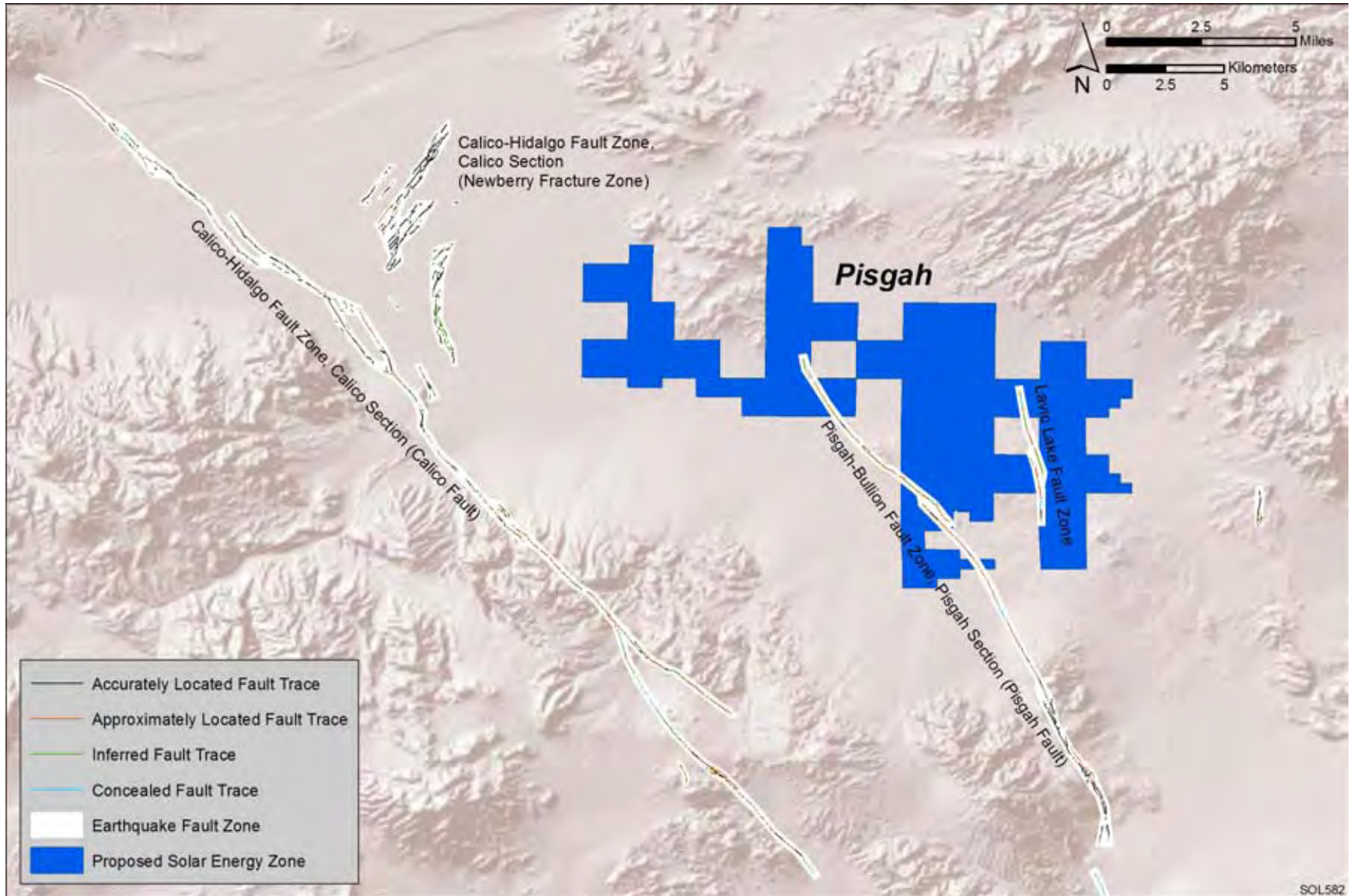


FIGURE 9.3.7.1-5 Delineated Earthquake Fault Zones near the Proposed Pisgah SEZ (CGS 2010)

1 Shaking associated with this level of acceleration is generally perceived as very strong to severe;
2 the potential damage to structures is moderate to heavy (USGS 2008).

3
4 A regional evaluation for liquefaction hazards was completed for the San Bernardino
5 Valley and vicinity in western San Bernardino County by Matti and Carson (1991); the study
6 did not include the eastern part of San Bernardino County where the Pisgah SEZ is located.
7 San Bernardino Valley is located between the San Andreas and San Jacinto Fault Zones, where
8 the peak horizontal acceleration with a 10% probability of exceedance in 50 years is much higher
9 (between 0.88 and 1.62 g) than that for the Pisgah region; therefore, only general conclusions
10 from the study are presented here.

11
12 The evaluation considered three aspects of liquefaction: susceptibility, opportunity, and
13 potential. Susceptibility identifies sedimentary materials likely to liquefy during a seismic event
14 on the basis of their physical properties, depth to groundwater, expected earthquake magnitude,
15 and strength of ground shaking. Opportunity considers the recurrence intervals for earthquake
16 shaking strong enough to cause liquefaction in susceptible materials. The potential for ground
17 failure due to liquefaction evaluation then combines the results of the susceptibility and
18 opportunity evaluations and identifies the areas most and least likely to experience liquefaction
19 (Matti and Carson 1991).

20
21 Investigators found that the level of liquefaction susceptibility was most dependent on
22 two factors: (1) depth to the groundwater table and (2) the intensity and duration of ground
23 shaking as determined by an earthquake's magnitude and the distance from the causative fault.
24 These factors in combination with penetration-resistance data from various locations within the
25 San Bernardino Valley allowed them to conclude that liquefaction susceptibility gradually
26 decreases with increasing depth to groundwater, increasing distance away from the causative
27 fault, and increasing geologic age (and induration) of sedimentary materials. Studies of the
28 effects of ground shaking after the 1999 Hector Mine earthquake (centered near the Pisgah SEZ)
29 found little damage to bridges and highways, especially along I-40. Since there were no strong-
30 motion stations near the epicenter at the time, horizontal acceleration was estimated based on
31 the displacement of rocks near the fault zone. These estimates indicated a slightly lower-than-
32 expected shaking during the earthquake (Rymer et al. 2002). For the Pisgah SEZ, the opportunity
33 for liquefaction is considered high, because it sits within a seismically active area and intersects
34 the causative fault for the 1999 Hector Mine earthquake. However, the lack of evidence for
35 liquefaction in the area as a result of the 1999 earthquake and the depth of groundwater below
36 the site (greater than 60 ft [18 m]; Section 9.3.9.1.2) suggest that the sediments in the area may
37 have a low liquefaction susceptibility. These factors combined would indicate preliminarily that
38 the liquefaction potential for the Pisgah SEZ is low.

39
40
41 **Volcanic Hazards.** The nearest volcano is the Pisgah Crater, located within the Pisgah
42 lava field (part of the Lavic Lake volcanic field) immediately adjacent to the southeast corner of
43 the proposed Pisgah SEZ (Figure 9.3.7.1-4). The 328-ft (100-m) high cinder cone is the youngest
44 vent in the basalt field. Lava flows issuing from vents within the basalt field sit above alluvial
45 fan and playa lake deposits. A similar, lesser known cinder cone and lava field also is present in
46 the Sunshine Peak area, about 6 mi (10 km) to the south. Researchers date the most recent

1 activity associated with the Pisgah volcano to about 25,000 years ago (Smithsonian 2010; Bassett
2 and Kupfer 1964). Hazards resulting from these kinds of eruptions would likely be less severe
3 than those from more silicic sources (although given the volcano's close proximity to the Pisgah
4 SEZ, could be more severe); they include the formation of cinder cones, small volumes of tephra,
5 and lava flows (Miller 1989).

6
7 The Amboy Crater and lava field (also part of the Lavic Lake volcanic field) are about
8 40 mi (64 km) southeast of the Pisgah SEZ and immediately northwest of Bristol Dry Lake
9 (Figure 9.3.7.1-4). Amboy Crater is a 250-ft (76-m) high complex basaltic cinder cone
10 surrounded by about 24 mi² (62 km²) of mafic lava flows. The basalt fields erupted from
11 several vents about 10,000 years ago (Parker 1963; Bassett and Kupfer 1964). Because of the
12 basaltic composition of the Amboy Crater lava, hazards likely would be similar to those
13 described for the Pisgah Crater but would depend on factors such as location, size, and timing
14 (season).

15
16 The Cima dome and volcanic field east of Soda Lake is about 32 mi (51 km) to the
17 northeast of the Pisgah SEZ (Figure 9.3.7.1-4). The volcanic field consists of about 40 basaltic
18 cones and more than 60 associated mafic lava flows covering an area of about 58 mi² (150 km²).
19 It has had three periods of activity from the late Miocene through the late Pleistocene, the most
20 recent having occurred about 15,000 years ago (Dohrenwend et al. 1984). Because of its basaltic
21 nature, hazards associated with the Cima volcanic field would like be similar to those described
22 for the Lavic Lake volcanic field, but would depend on factors such as location, size, and timing
23 (season).

24
25 The nearest active volcano is Mount St. Helens in the Cascade Range (Washington),
26 about 840 mi (1,350 km) to the north-northwest of the Pisgah SEZ, which has shown some
27 activity as recently as 2008. The nearest volcano that meets the criterion for an unrest episode
28 is the Long Valley Caldera in east-central California, about 240 mi (380 km) to the northwest,
29 which has experienced recurrent earthquake swarms, changes in thermal springs and gas
30 emissions, and uplift since 1980 (Diefenbach et al. 2009). The Long Valley Caldera is part of the
31 Mono-Inyo Craters volcanic chain that extends from Mammoth Mountain (on the caldera rim)
32 northward about 25 mi (40 km) to Mono Lake. Small to moderate eruptions have occurred at
33 various sites along the volcanic chain in the past 5,000 years at intervals ranging from 250 to
34 700 years. Windblown ash from some of these eruptions is known to have drifted as far east as
35 Nebraska. While the probability of an eruption within the volcanic chain in any given year is
36 small (less than 1%), serious hazards could result from a future eruption. Depending on the
37 location, size, timing (season), and type of eruption, hazards could include mudflows and
38 flooding, pyroclastic flows, small to moderate volumes of tephra, and falling ash (Hill et al.
39 1998, 2000; Miller 1989).

40
41 Earthquake swarms also occurred at Medicine Lake Volcano in northern California
42 (Cascade Range) for a few months in 1988. Medicine Lake is about 550 mi (885 km) northwest
43 of the Pisgah SEZ (Diefenbach et al. 2009). The most recent eruption at Medicine Lake was
44 rhyolitic in composition and occurred about 900 years ago (USGS 2010e). Nearby Lassen Peak
45 last erupted between 1914 and 1917; at least two blasts during this period produced mudflows
46 that inundated the valley floors of Hut and Lost Creeks to the east. Tephra from the most violent

1 eruption, occurring on May 22, 1915, was carried by prevailing winds and deposited as far as
2 310 mi (500 km) to the east (Miller 1989).

3
4
5 ***Slope Stability and Land Subsidence.*** The incidence of rock falls and slope failures can
6 be moderate to high along mountain fronts and can present a hazard to developments on the
7 relatively flat terrain of valley floors, such as the valley in which the Pisgah SEZ is located if
8 they are located at the base of steep slopes. The risk of rock falls and slope failures decreases
9 toward the flat valley center.

10
11 Numerous lava tube features have been documented in the Pisgah lava field by Harter
12 (1992). These include more than 300 small surface tube caves and semitrenches. Lava tubes
13 are sites of potential collapse if they are subjected to increased loads during construction. The
14 collapse hazard is only of potential concern for the parts of the SEZ that are covered by lava,
15 an area of about 3,479 acres (14 km²) or about 15% of the proposed Pisgah SEZ.

16
17 There has been no land subsidence monitoring within the valley to date; however, 32- to
18 64-ft (10- to 20-m) long earth fissures and 3-ft (1-m) wide sinkholes associated with subsidence
19 have been documented in the Temecula area of southwestern Riverside County, about 100 mi
20 (160 km) south-southwest of the proposed Pisgah SEZ (Figure 9.3.7.1-4). The subsidence is the
21 result of groundwater overdrafts in the Temecula-Wolf Valley that have caused differential
22 compaction in the sediments of the underlying aquifer. Land failure caused by sinkholes and
23 fissures have been significant enough to damage buildings, roads, potable water and sewer lines,
24 and other infrastructure (Corwin et al. 1991; Shlemon 1995). Land subsidence has also been
25 documented as far back as the 1970s in southern California's San Joaquin Valley, where the
26 maximum subsidence due to extensive groundwater withdrawals for irrigation is greater than
27 28 ft (9 m) (Galloway et al. 1999), and in the Wilmington Oil Field as a result of oil extraction
28 from the Los Angeles basin in southern Los Angeles County (Kovach 1974).

29
30
31 ***Other Hazards.*** Other potential hazards at the Pisgah SEZ include those associated
32 with soil compaction (restricted infiltration and increased runoff), expanding clay soils
33 (destabilization of structures), and hydro-compactable or collapsible soil (settlement).
34 Disturbance of soil crusts and desert varnish on soil surfaces may also increase the likelihood
35 of soil erosion by wind.

36
37 Alluvial fan surfaces, such as those in the Pisgah SEZ valley, can be the sites of
38 damaging high-velocity flash floods and debris flows during periods of intense and prolonged
39 rainfall. The nature of the flooding and sedimentation processes (e.g., streamflow versus debris
40 flow) will depend on specific morphology of the fan (National Research Council 1996).

41 42 43 ***9.3.7.1.2 Soil Resources***

44
45 Because soil mapping is not complete for the Mojave Desert area, the map unit
46 composition within the proposed Pisgah SEZ has not been delineated. Therefore, only soil
47 series are mapped in Figure 9.3.7.1-6 and described in Table 9.3.7.1-1. Soils within the SEZ are

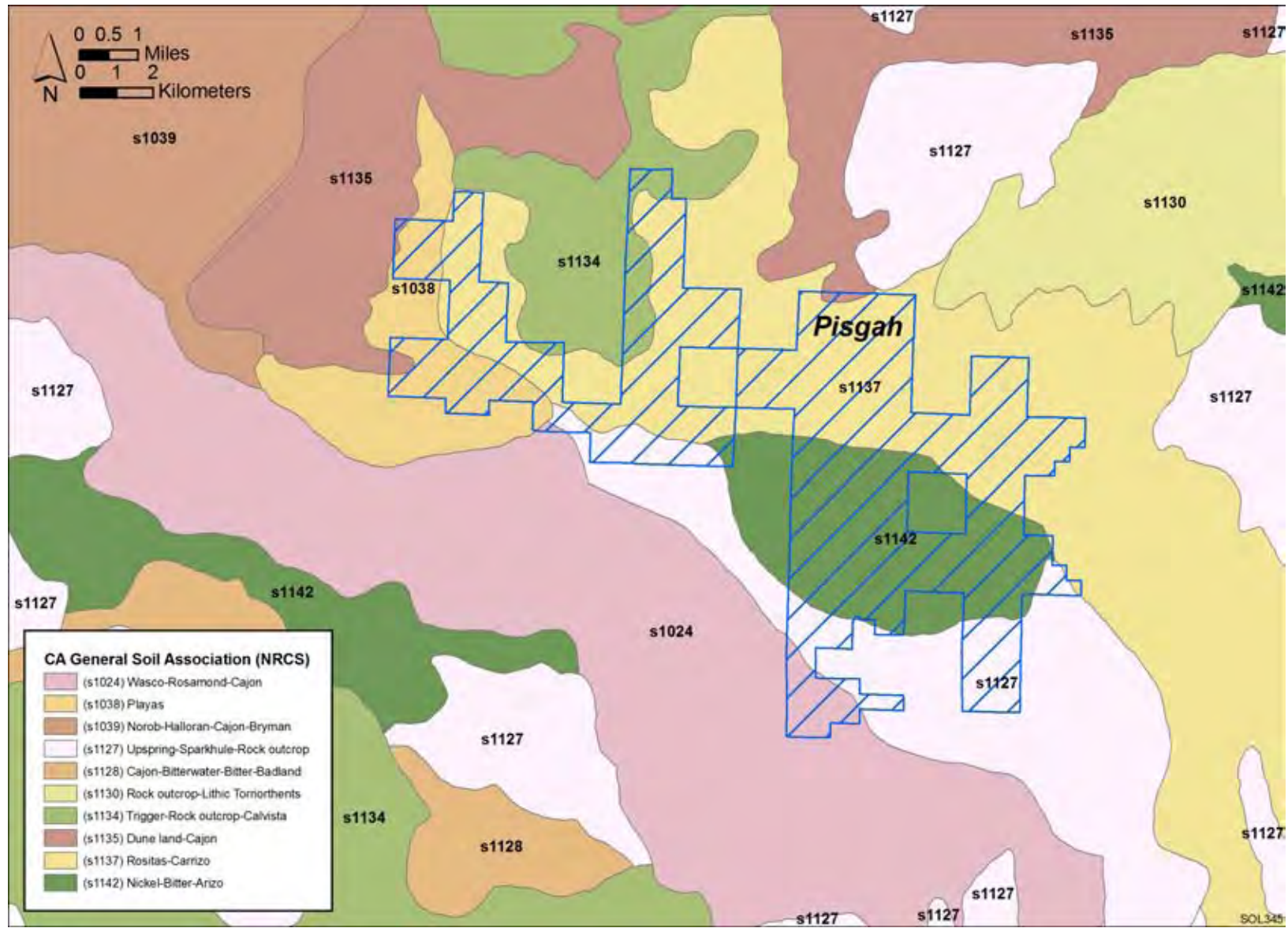


FIGURE 9.3.7.1-6 Soil Map for the Proposed Pisgah SEZ (NRCS 2008)

TABLE 9.3.7.1-1 Summary of Soil Series within the Proposed Pisgah SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential	Description	Area in Acres ^a (% of SEZ)
s1137	Rositas-Carrizo	_b	_b	<p><i>Rositas series</i> are gently sloping soils on dunes and sand sheets (gradients of 0 to 30%). Very deep and somewhat excessively drained with low surface runoff potential (high infiltration rate) and rapid permeability. Typically fine sand.</p> <p><i>Carrizo series</i> are gently sloping soils on floodplains, alluvial fans, fan piedmonts, and bolson floors (gradients of 0 to 15%). Parent material consists of alluvium from mixed sources. Very deep and excessively drained with negligible to very low surface runoff potential and rapid to very rapid permeability. Typically extremely gravelly sand. Aridic soil moisture regime. Used mainly as rangeland and wildlife habitat.</p>	11,390 (48)
s1142	Nickel-Bitter-Arizo	-	-	<p><i>Nickel series</i> are gently sloping soils on alluvial fan remnants. Parent material consists of alluvium from mixed sources. Very deep and well-drained with low to medium surface runoff potential and moderate permeability. Typically a gravelly, very fine sandy loam. <i>Bitter series</i> are gently sloping soils on dissected fan terraces. Parent material weathered from all types of rocks. Deep and well-drained with medium surface runoff potential and moderately slow permeability. Typically an extremely gravelly sandy loam. <i>Arizo series</i> are gently sloping soils on recent alluvial fans, fan aprons, fan skirts, stream terraces, and floodplains. Parent material consists of alluvium from mixed sources. Very deep and excessively drained with negligible to medium surface runoff potential and rapid to very rapid permeability. Typically a very gravelly fine sand. All series used as rangeland and desert wildlife habitat.</p>	5,972 (25)

TABLE 9.3.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential	Description	Area in Acres ^a (% of SEZ)
s1127	Upspring-Sparkhule-Rock outcrop	–	–	<i>Upspring series</i> are gently to greatly sloping soils on hills, mountains, and plateaus. Parent material derived from basic igneous rocks and pyroclastics. Very shallow and shallow and somewhat excessively drained with high to very high surface runoff potential and moderately rapid permeability over impermeable bedrock. Typically a very stony loam. Used for watershed, wildlife habitat, and recreation. <i>Sparkhule series</i> are gently sloping to sloping soils on rock pediments and hills. Parent material consists of residuum from igneous rocks. Shallow to rock and well-drained soils with high to very high surface runoff potential and moderately slow permeability. Typically a gravelly sandy loam. Used for wildlife habitat, military operations, and recreation.	2,752 (11)
s1038	Playas	–	–	Very poorly drained soils formed in flats and closed basins; moderately to strongly saline. Medium surface runoff potential and low permeability.	1,919 (8)
s1134	Trigger-Rock outcrop-Calvista	–	–	<i>Trigger series</i> are gently sloping to sloping soils on uplands. Parent material weathered from hard sedimentary rocks. Shallow and well-drained with medium to rapid surface runoff and moderately rapid permeability. Typically a gravelly sandy loam. Used for wildlife habitat, limited grazing, and recreation. <i>Calvista series</i> are gently sloping soils on mountain ridges. Parent material consists of residuum from granite. Shallow and well-drained with medium to rapid surface runoff and moderately rapid permeability. Typically a sandy loam. Used for desert range; small areas for home sites.	916 (4)

TABLE 9.3.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential	Description	Area in Acres ^a (% of SEZ)
s1024	Wasco-Rosamond-Cajon	–	–	<i>Wasco series</i> are nearly level soils on recent alluvial fans and floodplains. Parent material consists of alluvium from mixed sources. Very deep and well-drained with negligible or very low surface runoff potential and moderately rapid permeability. Typically a sandy loam. Used for growing field, forage, and row crops. <i>Rosamond series</i> soils are nearly level soils on the lower margin of alluvial fans between sloping fans and playas. Parent material derived from granitic alluvium. Deep and well-drained with medium surface runoff potential and moderate to moderately slow permeability. Typically a fine sandy loam. Used for desert range. <i>Cajon series</i> described above.	804 (3)
s1135	Dune land-Cajon	–	–	<i>Dune land</i> soils are constantly shifting, medium-grained sand deposited by wind blowing across the valley. <i>Cajon series</i> soils are gently sloping soils on alluvial fans, fan aprons, fan skirts, and river terraces. Parent material consists of sandy alluvium from granitic rocks. Very deep and somewhat excessively drained with negligible to low surface runoff potential and rapid permeability. Typically sand; used for rangeland, watershed, and recreation.	197 (<1)

^a To convert acres to km², multiply by 0.004047.

^b A dash indicates water and wind erosion potential not rated at the Soil Series taxonomic level.

Source: NRCS (2006).

1 predominantly gravelly alluvial sands and fine-grained eolian sands, which together make up
2 about 73% of the site’s soil coverage. These soils are characterized as deep and well drained,
3 with low to medium surface runoff potential and moderate to very rapid permeability. The poorly
4 drained soils of Troy Dry Lake (on the west end of the SEZ) make up about 8% of the site’s soil
5 coverage. The composition of these soils has not been reported but likely consists of brine-
6 saturated clay and evaporite deposits. The Pisgah lava field covers about 15% of the SEZ. The
7 fine-grained sands are highly susceptible to wind erosion; these sands and the clays within dry
8 lakebeds could generate fugitive dust if disturbed. Biological soil crusts and desert pavement
9 have not been documented in the SEZ but may be present.

12 **9.3.7.2 Impacts**

14 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
15 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
16 project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind,
17 soil erosion by water and surface runoff, sedimentation, and soil contamination. Such impacts are
18 common to all utility-scale solar energy developments in varying degrees and are described in
19 more detail for the four phases of development in Section 5.7 .1.

21 Because impacts on soil resources result from ground-disturbing activities in the project
22 area, soil impacts would be roughly proportional to the size of a given solar facility, with larger
23 areas of disturbed soil having a greater potential for impacts than smaller areas (Section 5.7.2).
24 The magnitude of impacts would also depend on the types of components built for a given
25 facility since some components would involve greater disturbance and would take place over a
26 longer timeframe.

28 The Pisgah lava field, which covers about 3,479 acres (14 km²) along the southern
29 portions of the SEZ, may not be a suitable location for construction because of its irregular, hard
30 surface and abundant lava tubes, which occur as open trenches or caves with openings on the
31 ground surface (as described by Harter 1992).

34 **9.3.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**

36 No SEZ-specific design features were identified for soil resources at the proposed Pisgah
37 SEZ. Implementing the programmatic design features described in Appendix A, Section A.2.2,
38 and the mitigation measures listed in Section 5.7.4 would reduce the potential for soil impacts
39 during all project phases.

41 The feasibility of constructing solar facilities in the lava field area of the SEZ will need to
42 be addressed by facility developers.

1 **9.3.8 Minerals (Fluids, Solids, and Geothermal Resources)**
2
3

4 **9.3.8.1 Affected Environment**
5

6 Public land in the Pisgah SEZ was closed in June 2009 to locatable mineral entry pending
7 the outcome of this solar energy PEIS. Currently, there are 103 mining claims (lode, placer, and
8 millsite) within the SEZ, most of which are located in the southern portion of the SEZ south of
9 I-40, where there has been a mining operation for many years (BLM and USFS 2010a). Most of
10 the land south of I-40 in the SEZ contains mining claims. There are no oil and gas leases within
11 the proposed SEZ, nor are there any geothermal leases (BLM and USFS 2010b). The area is still
12 open for discretionary mineral leasing, including leasing for oil and gas and for other leasable
13 and saleable minerals.
14

15
16 **9.3.8.2 Impacts**
17

18 If the BLM identifies the area as an SEZ to be used for utility-scale solar development, it
19 would continue to be closed to all incompatible forms of mineral development with the exception
20 of the areas with existing mining claims. These mining claims represent prior existing rights that,
21 if valid, would preclude solar energy development as long as they are in place. Development of
22 solar resources on areas with mining claims could only occur if (1) the claims are abandoned,
23 (2) the claims are demonstrated to not be valid and are vacated by the BLM, or (3) the claims are
24 purchased by a solar developer. The latter two of these approaches could require considerable
25 time, negotiation, and money to accomplish and are unlikely to occur. The mining claims
26 represent a serious impediment to moving forward with planning solar development in the areas
27 of the SEZ in which they are located, and are likely to prevent that development in the immediate
28 future.
29

30 Elsewhere in the SEZ, where there are no mining claims, it is assumed that if solar
31 development were to proceed, there would be no loss of locatable mineral production in the
32 future. Since there are no oil and gas or geothermal leases in the area, it also is assumed that
33 there would be no significant impacts on these resources if the area was developed for solar
34 energy production.
35

36 If the area is identified as a solar energy development zone, some other mineral uses
37 might be allowed on all or portions of the SEZ. For example, oil and gas development that
38 involves the use of directional drilling to access resources under the area (should any be found)
39 might be allowed. Also, the production of common minerals, such as sand, gravel, and mineral
40 materials used for road construction, might take place in areas not directly developed for solar
41 energy production.
42
43
44

1 **9.3.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Implementing the programmatic design features described in Appendix A, Section A.2.2,
4 as required under BLM’s Solar Energy Program would provide adequate mitigation for some
5 identified impacts. The exception may be related to the extensive number of mining claims
6 present in the SEZ south of I-40.
7

8 A proposed design feature specific to the proposed SEZ is the following:
9

- 10 • Consideration should be given to altering the boundaries of the SEZ to remove
11 the areas with mining claims.
12

1 **9.3.9 Water Resources**

2
3
4 **9.3.9.1 Affected Environment**

5
6 The proposed Pisgah SEZ is located within the Southern Mojave-Salton Sea subbasin
7 of the California hydrologic region (USGS 2010b) and the Basin and Range physiographic
8 province characterized by intermittent mountain ranges and desert valleys (Planert and
9 Williams 1995). The proposed SEZ has surface elevations ranging between 1,800 and 2,300 ft
10 (549 and 701 m), with a general drainage pattern from east to west along the SEZ toward the
11 southern portion of Troy Lake (Figure 9.3.9.1-1). This region is located within the Mojave
12 Desert, which is characterized by extreme daily temperature ranges with low precipitation and
13 humidity (CDWR 2009). The majority of the precipitation falls during the winter rainy season
14 from November to March, with an annual average rainfall ranging between 4 and 6 in./yr
15 (10 and 15 cm/yr) (MWA 2004; Mathany and Belitz 2008). Evapotranspiration estimates in
16 this region vary between 12 and 24 in./yr (30.5 and 61.0 cm/yr) in the riparian regions of the
17 Mojave River (Lines 1996) and pan evaporation rates are on the order of 74 in./yr (188 cm/yr)
18 (Cowherd et al. 1988; WRCC 2010a).

19
20
21 **9.3.9.1.1 Surface Waters (Including Drainages, Floodplains, and Wetlands)**

22
23 The primary surface water features within the proposed Pisgah SEZ are several
24 ephemeral washes coming off the Cady Mountains and the Lava Bed Mountains that drain east
25 to west toward the Troy Lake area (Figure 9.3.9.1-1). Troy Lake is a dry lake consisting of playa
26 and dune sediments that covers approximately 3,500 acres (14 km²); approximately 1,550 acres
27 (6 km²) of this dry lake is within the boundaries of the western portions of the proposed SEZ.
28 Additionally, the Lavic Lake dry lakebed is located 5 mi (8 km) to the southeast.

29
30 The Mojave River is an intermittent river that originates from the San Bernardino
31 Mountains and flows north and northeast into the Mojave Desert. Historically, the Mojave River
32 had several reaches with perennial flow, but currently the only reach of the Mojave River with
33 perennial flow is located near the town of Victorville, approximately 50 mi (80 km) southwest of
34 the proposed SEZ. The reach of the Mojave River that is closest to the proposed SEZ is located
35 7 mi (11 km) to the north and is typically dry at the surface except during large rainfall events
36 (Lines 1996).

37
38 Flood hazards have not been identified (Zone D) for the region surrounding the proposed
39 Pisgah SEZ (FEMA 2009). Intermittent flooding may occur along the ephemeral washes and
40 Troy Lake area with temporary ponding and erosion. Portions of the Mojave River channel and
41 riparian areas are located within an identified 100-year floodplain according to FEMA, while
42 reaches further downstream are suspected to be within a 100-year floodplain as characterized by
43 the CDWR awareness floodplain program (CDWR 2010; FEMA 2009). Floodwaters in the
44 Mojave River are typically limited to the channel region (Lines 1996). In addition, no wetlands
45 have been identified within the proposed SEZ according to the NWI (USFWS 2009a).

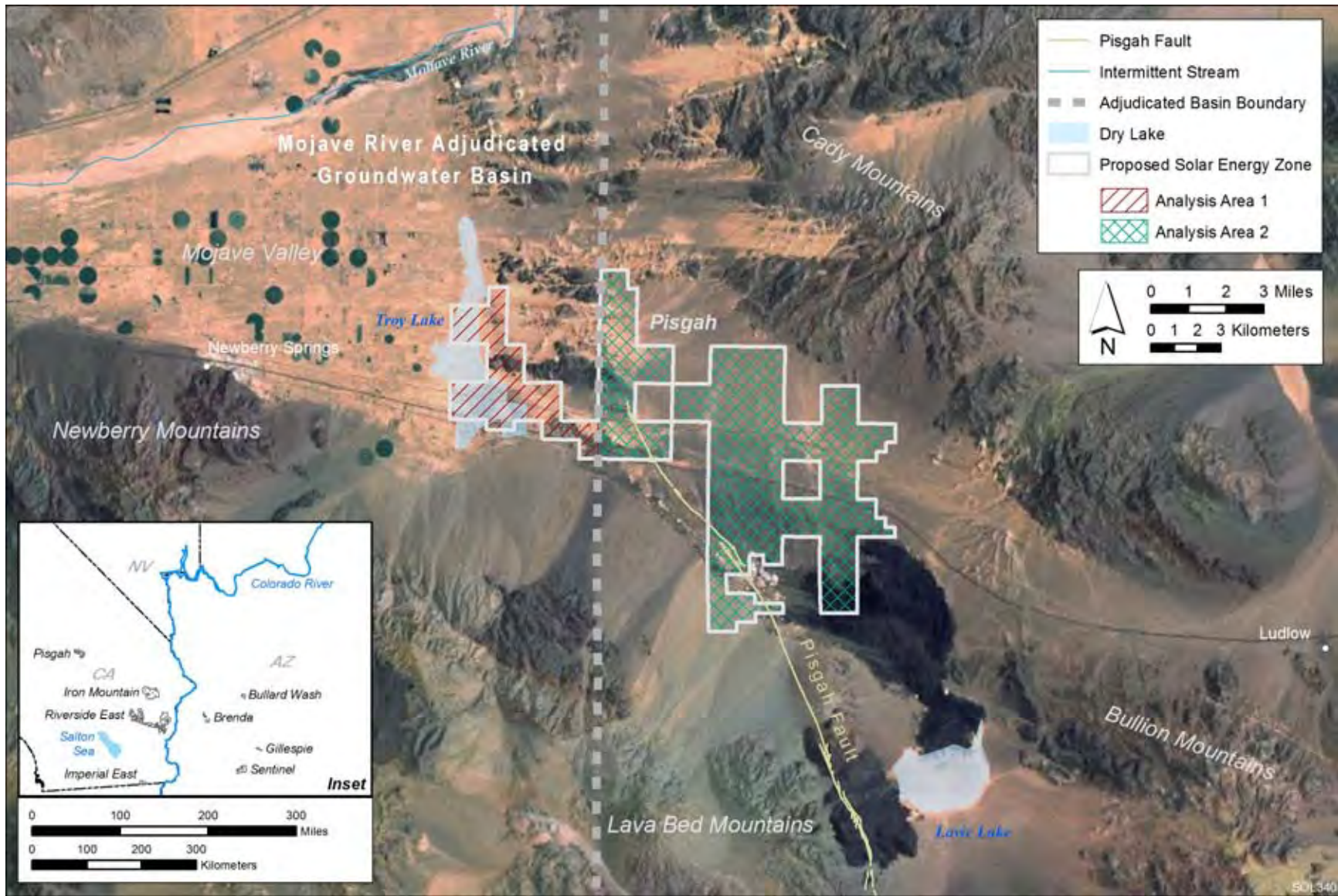


FIGURE 9.3.9.1-1 Surface Water Features near the Proposed Pisgah SEZ

1 **9.3.9.1.2 Groundwater**
2

3 The proposed Pisgah SEZ is located within two groundwater basins: the Lavic Valley
4 and Lower Mojave River Valley. The Pisgah Fault is suspected to act as a groundwater barrier
5 (CDWR 2003) that separates the two groundwater basins, with 25% of the proposed SEZ's area
6 (western portion) in the Lower Mojave River Valley and 75% of the area (central and eastern
7 portions) located in the Lavic Valley (Figure 9.3.9.1-1). The Lower Mojave Valley groundwater
8 basin consists of alluvial deposits of Quaternary age sediments (CDWR 2003; groundwater
9 basin number 6-40). There are two primary aquifers of the Mojave River: the floodplain and
10 regional aquifers. The floodplain aquifer is typically limited to an area within 1 mi (1.6 km)
11 of the Mojave River channel and consists of highly permeable deposits of sand and gravel on
12 the order of 200 ft (60 m) in thickness. The regional aquifer consists of unconsolidated to
13 partially consolidated sand, silt, and gravel deposits up to 2,000 ft (610 m) in thickness
14 (Stamos et al. 2001; Izbicki 2004). The floodplain aquifer extends from the Mojave River into
15 the proposed SEZ to include Troy Lake. The Lavic Valley groundwater basin consists of
16 alluvial fan and lacustrine deposits of Quaternary age sediments. These deposits consist of
17 unconsolidated sands, pebbles, and boulders with silts and clays in the ephemeral washes above
18 deposits of moderately consolidated gravels, sands, silts, and clays (CDWR 2003; groundwater
19 basin number 7-14). Small regions in the southern portions of the proposed SEZ contain volcanic
20 rocks at the surface originating from the Lavic Lake volcanic field (GVP 2010).
21

22 Seepage from the Mojave River is the primary recharge source for the floodplain and
23 regional aquifers of the Lower Mojave groundwater basin. Additional recharge comes from
24 direct precipitation, percolation of runoff from surrounding mountains, irrigation returns, and
25 artificial recharge (CDWR 2003). Estimates of recharge vary depending upon the time frame that
26 was examined, with the average annual recharge to the Lower Mojave Valley groundwater basin
27 estimated to range from 7,400 ac-ft/yr (9 million m³/yr) to 15,914 ac-ft/yr (19.6 million m³/yr)
28 for the analysis periods of 1931 to 1990 and 1937 to 1961, respectively (Stamos et al. 2001).
29 The variability in these recharge estimates is caused by the varying groundwater development
30 practices that have occurred in the Mojave River area. Estimates of recharge for the Lavic Valley
31 groundwater basin are not as well quantified because of the lack of development in this region.
32 The natural recharge is estimated to be approximately 300 ac-ft/yr (0.4 million m³/yr) for the
33 Lavic Valley region (CDWR 2003).
34

35 Groundwater withdrawals in the Lower Mojave Valley groundwater basin have been
36 primarily used to support agriculture dating back to the early 1900s. In 1931, groundwater
37 withdrawals were approximately 5,000 ac-ft/yr (6.1 million m³/yr), quickly rose to around
38 50,000 ac-ft/yr (61.7 million m³/yr) in the mid-1960s, and reached a maximum of 60,000 ac-ft/yr
39 (74 million m³/yr) in the mid-1990s (Stamos et al. 2001). Groundwater withdrawals are currently
40 limited to less than 40,000 ac-ft/yr (49 million m³/yr), and this limit is decreasing because of
41 groundwater management by adjudication (MWA 2009; see Section 9.3.9.1.3 for further details).
42 Additionally, groundwater discharge by evapotranspiration and underflow are estimated to be
43 approximately 1,000 ac-ft/yr (1.2 million m³/yr) each for the Lower Mojave Valley groundwater
44 basin based on a groundwater model for 1994 conditions (Stamos et al. 2001). Groundwater
45 discharge processes have not been quantified in the Lavic Valley groundwater basin.
46

1 Groundwater well yields range from 80 to 140 gpm (303 to 530 L/min) in the Lavic
2 Valley groundwater basin and from 10 to 2,700 gpm (38 to 10,220 L/min), with an average of
3 480 gpm (1817 L/min), in the Lower Mojave groundwater basin (CDWR 2003). Transmissivity
4 values in the Lower Mojave groundwater basin were modeled as 1,750 to 7,000 ft²/day (163 to
5 650 m²/day) in the floodplain aquifer and between 250 and 2,500 ft²/day (23 and 232 m²/day)
6 in the regional aquifer (Stamos et al. 2001). The general groundwater flow pattern in the
7 Lower Mojave Valley groundwater basin is toward the Mojave River channel (CDWR 2003).
8 In pre-development times, groundwater flowed from the regional aquifer to the floodplain
9 aquifer recharging the Mojave River; however, modeling has shown this flow pattern to
10 have reversed from the 1930s to 1990s because of excessive groundwater withdrawal rates
11 (Stamos et al. 2001). Groundwater in the Lavic Valley groundwater basin typically flows
12 toward Lavic Lake (CDWR 2003).
13

14 Evidence of groundwater overdraft³ with decreasing groundwater elevations has been
15 recognized in the Mojave River region since the mid-1950s (MWA 2004). Groundwater surface
16 elevations have declined at rates ranging from 0.8 to 1.3 ft/yr (0.2 to 0.4 m/yr) over the past
17 decade near Troy Lake and are currently around 60 ft (18 m) below the surface (USGS 2009;
18 well numbers 344956116352901, 345001116381701, 345053116344701, 345104116384002,
19 345109116332401, and 345142116332601). In other portions of the Lower Mojave Valley
20 groundwater basin, groundwater levels currently range between 120 and 160 ft (37 and 49 m)
21 below the surface (MWA 2009). During the period from 1930 to 1945, groundwater elevations
22 were fairly stable, and steady-state conditions (balance in recharge and discharge processes)
23 were assumed to exist in the Lower Mojave Valley groundwater basin (Stamos et al. 2001).
24 The average of the annual groundwater withdrawals during this period was 5,500 ac-ft/yr
25 (6.8 million m³/yr) and represents a reasonable estimate of the natural safe yield⁴ for the basin.
26

27 TDS concentrations in the Lower Mojave Valley groundwater basin range from 300 to
28 2,000 mg/L. Water quality impairments relating to leaking underground fuel tanks exist near
29 Barstow that introduce chemicals such as benzene, toluene, ethylbenzene, and xylene (BTEX),
30 as well as methyl-tertiary-butyl-ether (MTBE) into the groundwater; there are also elevated
31 concentrations of fluoride, boron, and arsenic found in some wells in the basin (CDWR 2003;
32 Mathany and Belitz 2008). TDS concentrations vary across the Lavic Lake groundwater basin,
33 with values around 280 mg/L in the north and values between 1,680 and 1,720 mg/L in the south
34 and east. Additional impairments to groundwater quality have been detected with regard to
35 sulfate and chloride concentrations that exceed drinking water standards (CDWR 2003). For
36 potable water supplies in California, the TDS must be below 500 mg/L and can be as high as
37 1,500 mg/L for only short periods of time to meet maximum secondary contaminant levels
38 (*California Code*, Title 22, Article 16, Section 64449).
39
40

³ Groundwater overdraft is the condition where water extractions from an aquifer exceed recharge processes in such excess as to cause substantial and sustained decreases in groundwater flows and groundwater elevations.

⁴ Safe yield is the amount of groundwater that can be withdrawn from a groundwater basin over a period of time without exceeding the long-term recharge of the basin or unreasonably affecting the basin's physical and chemical integrity.

1 **9.3.9.1.3 Water Use and Water Rights Management**
2

3 In 2005, water withdrawals from surface waters and groundwater in San Bernardino
4 County were 656,900 ac-ft/yr (860 million m³/yr), of which 57% came from surface waters and
5 43% came from groundwater. The largest water use category was municipal and domestic
6 supply, at 427,100 ac-ft/yr (527 million m³/yr). However, the majority of this water is used in the
7 larger cities located in the southwestern portion of San Bernardino County. Agricultural water
8 uses accounted for 167,000 ac-ft/yr (206 million m³/yr), while industrial and thermoelectric
9 water uses accounted for 29,150 and 33,630 ac-ft/yr (36 million and 41 million m³/yr),
10 respectively (Kenny et al. 2009). Consumptive water use in the rural areas near the proposed
11 SEZ totaled 26,400 ac-ft/yr (32.5 million m³/yr) in 2001 with 58% use by agriculture,
12 24% industrial, and 9% for municipal and recreational uses each (MWA 2004; Baja region).
13

14 California uses a “plural” system to manage water resources that consists of a mixture of
15 riparian and prior appropriation doctrines for surface waters, a separate doctrine for groundwater,
16 and pueblo rights (BLM 2001). Several agencies are involved with the management of
17 California’s water resources, including federal, state, local, and water/irrigation districts. For
18 example, water rights and water quality are managed by the State Water Board, while the
19 Department of Water Resources manages water conveyance, infrastructure, and flood
20 management (CDWR 2009). Surface water appropriations for nonriparian rights begin with a
21 permit application to the State Water Board and a review process that examines the application’s
22 beneficial use, pollution potential, and water quantity availability; the permitting, review, and
23 licensing procedure should not take more than 6 months to complete unless the application is
24 protested (BLM 2001).
25

26 Groundwater management in California is primarily implemented at the local level of
27 government through local agencies or ordinances and can also be subject to court adjudications.
28 State statute provides authority and revenue mechanisms to several types of local agencies to
29 provide water for beneficial uses, as well as manage withdrawals in order to prevent overdraft
30 of the aquifers. Local ordinances (typically at the county level) can also be used to manage
31 groundwater resources and have been adopted in 27 counties in California. Many of these local
32 groundwater ordinances are focused on controlling water exports out of the basin through
33 permitting processes. Court adjudications are the strongest form of groundwater management
34 used in California and often result in the creation of a court-appointed “watermaster” agency to
35 manage withdrawals for all users to ensure that the court-determined safe yield is achieved
36 (CDWR 2003).
37

38 Approximately 20% of the proposed Pisgah SEZ is located within the boundaries of the
39 Mojave River adjudicated groundwater basin, which is managed by the Mojave Water Agency
40 (MWA), which serves as the watermaster for the basin. The boundary of the MWA jurisdiction
41 is shown in Figure 9.3.9.1-1, and the western portion of the proposed SEZ located in the
42 adjudicated basin is labeled as Analysis Area 1. This portion of the proposed SEZ is located
43 within the Lower Mojave Valley groundwater basin described previously. The groundwater
44 within the MWA boundaries is completely allocated. Thus new groundwater users need to
45 purchase existing water rights or purchase water as a transfer from current water right holders
46 or the MWA; only minimal users that withdrawal less than 10 ac-ft/yr (12,000 m³/yr) are

1 exempt from the allocations set by adjudication (MWA 2004). A potential complication for solar
2 energy development on the proposed Pisgah SEZ is that the adjudication of the Mojave River
3 groundwater basin does not permit water exports outside of the MWA boundary (*City of*
4 *Barstow v. City of Adelanto* 1996).

5
6 The MWA establishes groundwater allocations for individual subareas of the adjudicated
7 groundwater basin as a percentage of the base annual production (BAP), which was set using
8 groundwater withdrawal rates from 1986 to 1990. The percentage of the BAP allotted to water
9 users in each subarea is reduced year to year in order to slowly bring withdrawal rates down to
10 the safe yield of the basin over time. The portion of the Mojave River adjudicated basin relevant
11 to the proposed SEZ is known as the Baja subarea, where the *production* safe yield⁵ is
12 20,679 ac-ft/yr (25.5 million m³/yr) and the BAP is 66,157 ac-ft/yr (81.6 million m³/yr), of
13 which 70% was available for users during the 2007 to 2008 water year; the available percentage
14 has been set to 65% for the 2009 to 2010 water year (MWA 2009).

15
16 The MWA has additional water, which is transported via pipeline from the California
17 Aqueduct near Victorville along the Mojave River, available through the California State Water
18 Project; the nearest discharge point is near the town of Newberry Springs, 6 mi (10 km) west of
19 the proposed SEZ (MWA 2009). While the MWA is allotted 75,800 ac-ft/yr (93.5 million m³/yr)
20 of State Water Project water, it typically only receives 40% of this amount because of limited
21 supply within the State Water Project (MWA 2004). Persistent drought conditions that have
22 occurred recently in California have reduced the SWP allocations to 15% (CDWR 2010a). The
23 MWA has many uses for SWP water, including supplying replacement water for water rights
24 holders who require more than their allotment and selling to non-water right holders. The cost
25 of replacement water was \$337 per ac-ft for the 2007 to 2008 water year (MWA 2009).

26
27 The entire proposed Pisgah SEZ falls under the management of the San Bernardino
28 County groundwater ordinance (Groundwater Management Act, *Water Code* §§ 10750 et seq.).
29 Any new groundwater wells that withdraw more than 30 ac-ft/yr (37,000 m³/yr) are subject to a
30 full review process in accordance with the California Environmental Quality Act. The permitting
31 and review process requires the applicant to provide detailed information regarding the
32 groundwater aquifer, including estimated storage capacity, recharge conditions, water quality,
33 and anticipated safe yield. Conditions of approval for the groundwater withdrawal permit may
34 include mitigation actions, as well as the establishment of a groundwater monitoring plan.

35
36
37

⁵ Production safe yield as defined by *City of Barstow v. City of Adelanto* (1996):

“The highest average annual amount of water that can be produced from a subarea: (1) over a sequence of years that is representative of long-term average natural water supply to the subarea net of long-term average annual natural outflow from the subarea, (2) under given patterns of production, applied water, return flows, and consumptive use, and (3) without resulting in a long-term net reduction of groundwater in storage in the subarea.”

1 **9.3.9.2 Impacts**
2

3 Potential impacts on water resources related to utility-scale solar energy development
4 include direct and indirect impacts on surface waters and groundwater. Direct impacts occur at
5 the place of origin and at the time of the proposed activity, while indirect impacts occur away
6 from the place of origin or later in time. Impacts on water resources considered in this analysis
7 are the result of land disturbance activities (construction, final developed site plan, as well as
8 off-site activities such as road and transmission line construction) and water use requirements for
9 solar energy technologies that take place during the four project phases: site characterization,
10 construction, normal operations, and decommissioning/reclamation. Both land disturbance and
11 consumptive water use activities can affect groundwater and surface water flows, cause
12 drawdown of groundwater surface elevations, modify natural drainage pathways, obstruct natural
13 recharge zones, and alter surface water–wetland–groundwater connectivity. Water quality can
14 also be degraded through the generation of wastewater, chemical spills, increased erosion and
15 sedimentation, and increased salinity (e.g., by excessive withdrawal from aquifers).
16
17

18 ***9.3.9.2.1 Land Disturbance Impacts on Water Resources***
19

20 Impacts related to land disturbance activities from the construction of utility-scale solar
21 energy facilities are described in Section 5.9.1 for the four phases of development; these impacts
22 will be minimized through the implementation of programmatic design features described in
23 Appendix A, Section A.2.2. In addition to the hydrologic evaluation (including identifying
24 100-year floodplains and jurisdictional waters) described in the design features (Appendix A,
25 Section A.2.2), coordination and permitting with the California Department of Fish and Game
26 (CDFG) would be needed for any proposed alterations of surface water features (both perennial
27 and ephemeral) in accordance with the Lake and Streambed Alteration Program (CDFG 2010c).
28 Land disturbance activities in the vicinity of Troy Lake could potentially disrupt natural drainage
29 patterns of the ephemeral washes and lead to erosion, as well as affecting natural groundwater
30 recharge and discharge properties. Additionally, because of the existing surface slopes, there is
31 potential for increased erosion for the northern regions of the proposed SEZ that are located just
32 off the slopes of the Cady Mountains and the Lava Bed Mountains.
33
34

35 ***9.3.9.2.2 Water Use Requirements for Solar Energy Technologies***
36
37

38 **Analysis Assumptions**
39

40 A detailed description of the water use assumptions for the four utility-scale solar energy
41 technologies (parabolic trough, power tower, dish engine, and PV systems) is presented in
42 Appendix M. Assumptions regarding water use calculations specific to the proposed Pisgah
43 SEZ include the following:
44

- 45 • Water use requirements for solar energy technologies were analyzed for two
46 separate areas: Analysis Areas 1 and 2 (Figure 9.3.9.1-1);
47

- 1 • Analysis Area 1 covers 4,417 acres (18 km²), and Analysis Area 2 covers
2 19,533 acres (79 km²);
3
- 4 • Analysis Area 1 is the portion of the proposed SEZ that is within the Mojave
5 River adjudicated groundwater basin described in Section 9.3.9.1.3;
6
- 7 • On the basis of a total area (both Analysis Areas) between 10,000 and
8 30,000 acres (40 and 121 km²), it is assumed that two solar projects could be
9 constructed during the peak construction year;
10
- 11 • Water needed for making concrete would come from an off-site source;
12
- 13 • The maximum land area disturbed for an individual solar facility during the
14 peak construction year is assumed to be 3,000 acres (12 km²);
15
- 16 • Assumptions on individual facility size and land requirements (Appendix M),
17 along with the assumed number of projects and maximum allowable land
18 disturbance, results in the potential to disturb up to 25% of the total SEZ area
19 during the peak construction year; and
20
- 21 • Water use requirements for hybrid cooling systems are assumed to be on the
22 same order of magnitude as those using dry cooling (see Section 5.9.2.1).
23
24

25 **Site Characterization**

26
27 During site characterization, water would be used mainly for controlling fugitive dust
28 and the workforce potable water supply. Impacts on water resources during this phase of
29 development are expected to be negligible since activities would be limited in area, extent,
30 and duration; water needs could be met by trucking water in from an off-site source.
31
32

33 **Construction**

34
35 Water use estimates during the peak construction year for the various solar energy
36 technologies are presented in Table 9.3.9.2-1. These estimates were based on the assumption that
37 two solar projects could be constructed during the peak construction year (based on the large
38 total area of the proposed SEZ). Because the area of Analysis Area 2 is 19,533 acres (79 km²),
39 up to two solar facilities with a total of up to 6,000 acres (24 km²) of land disturbance could be
40 constructed in Analysis Area 2 during the peak construction year if there was no construction in
41 Analysis Area 1. Because the area of Analysis Area 1 is 4,417 acres (18 km²), it was assumed
42 that up to 3,000 acres (12 km²) of land disturbance could occur in Analysis Area 1 in the peak
43 construction year and an additional 3,000 acres (12 km²) of land disturbance could occur in
44 Analysis Area 2.
45
46

TABLE 9.3.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Pisgah SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
<i>Total Water Use Requirements for Construction of Two Solar Facilities during the Peak Construction Year</i>				
Water use requirements ^a				
Fugitive dust control (ac-ft) ^{b,c}	1,686	2,530	2,530	2,530
Potable supply for workforce (ac-ft)	148	90	37	19
Total water use requirements (ac-ft)	1,834	2,620	2,567	2,549
Wastewater generated				
Sanitary wastewater (ac-ft)	148	90	37	19
<i>Water Use Requirements for Peak Year Construction of One Solar Energy Facility (Analysis Area 1)</i>				
Water use requirements ^a				
Fugitive dust control (ac-ft) ^{b,c}	845	1,267	1,267	1,267
Potable supply for workforce (ac-ft)	74	45	19	9
Total water use requirements (ac-ft)	919	1,312	1,286	1,276
Wastewater generated				
Sanitary wastewater (ac-ft)	74	45	19	9

^a Assumptions of water use for fugitive dust control, potable supply for workforce, and wastewater generation are presented in Appendix M.

^b Fugitive dust control estimation assumes a local pan evaporation rate of 74 in./yr (188 cm/yr) (Cowherd et al. 1988; WRCC 2010a).

^c To convert ac-ft to m³, multiply by 1,234.

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During construction, water would be used mainly for controlling fugitive dust and the workforce potable water supply. The water requirements for construction activities could be met by either trucking water to the sites or by using on-site groundwater resources, because there are no significant surface water bodies on the proposed Pisgah SEZ. Water requirements for fugitive dust control could be as high as 2,620 ac-ft/yr (3.2 million m³/yr) and for the potable workforce supply as high as 148 ac-ft/yr (182,600 m³/yr). Groundwater wells would have to yield an estimated 1,136 to 1,623 gpm (4,300 to 6,144 L/min) to meet the total estimated construction water requirements. These yields are on the order of large municipal and agricultural production wells (Harter 2003) and are larger than average well yields for both groundwater basins, thus multiple wells would likely be needed in order to obtain the water requirements. In addition, the generation of up to 148 ac-ft/yr (182,600 m³/yr) of sanitary wastewater would need to be treated either on-site or sent to an off-site facility.

1 **Operations**

2
3 During operations, water would be required for mirror/panel washing, the workforce
4 potable water supply, and cooling (parabolic trough and power tower only) (Table 9.3.9.2-2).
5 Water needs for cooling are a function of the type of cooling used (dry, hybrid, or wet). Further
6 refinements to water requirements for cooling would result from the percentage of time the
7 option was employed (30 to 60% range assumed) and the power of the system. The differences
8 between the water requirements reported in Table 9.3.9.2-2 for the parabolic trough and power
9 tower technologies are attributable to the assumptions of acreage per MW. As a result, the water
10 usage for the more energy-dense parabolic trough technology is estimated to be almost twice as
11 large as that for the power tower technology.

12
13 The water use estimates for solar energy technologies presented in Table 9.3.9.2-2 are
14 listed for full build-out capacity for Analysis Areas 1 and 2 separately. For Analysis Area 1,
15 water needs for mirror/panel washing are estimated to range from 20 to 353 ac-ft/yr (25,000 to
16 435,000 m³/yr) and for the workforce potable water supply up to 10 ac-ft/yr (12,000 m³/yr).
17 Technologies using wet cooling have a total water requirement of up to 10,610 ac-ft/yr
18 (13.1 million m³/yr), whereas technologies using dry cooling require up to 1,070 ac-ft/yr
19 (1.3 million m³/yr), approximately a factor of 10 times less than wet cooling. Non-cooled
20 technologies require substantially less water at full build-out capacity at 200 ac-ft/yr
21 (246,700 m³/yr) for dish engine and 20 ac-ft/yr (25,000 m³/yr) for PV. For Analysis Area 2,
22 water needs for mirror/panel washing are estimated to range from 87 to 1,563 ac-ft/yr
23 (107,000 to 1.9 million m³/yr) and for the workforce potable water supply up to 44 ac-ft/yr
24 (54,300 m³/yr). Technologies using wet cooling have a total water requirement of up to
25 46,924 ac-ft/yr (57.9 million m³/yr), whereas technologies using dry cooling require up to
26 4,732 ac-ft/yr (5.8 million m³/yr). Similar to Analysis Area 1, non-cooled technologies require
27 substantially less water at full build-out capacity, at 887 ac-ft/yr (1.1 million m³/yr) for dish
28 engine and 89 ac-ft/yr (109,800 m³/yr) for PV.

29
30 Operations would produce sanitary wastewater and system blowdown water (wet-cooling
31 technologies only) that would need to be treated either on-site or off-site. In Analysis Area 1, the
32 generation of sanitary wastewater is estimated to be as high as 10 ac-ft/yr (12,000 m³/yr) and
33 wet-cooling system blowdown water as high as 201 ac-ft/yr (248,000 m³/yr). In Analysis Area 2,
34 the generation of sanitary wastewater is estimated to be as high as 44 ac-ft/yr (54,300 m³/yr) and
35 wet-cooling system blowdown water as high as 888 ac-ft/yr (1.1 million m³/yr). Any on-site
36 treatment of wastewater would have to ensure that treatment ponds are effectively lined in order
37 to prevent any groundwater contamination.

38
39 The total water requirements for wet-cooling technologies ranges from 1,967 to
40 10,610 ac-ft/yr (2.4 million to 13.1 million m³/yr) in Analysis Area 1 (Table 9.3.9.2-2). These
41 water use estimates for wet cooling are on the same order of magnitude as the estimated safe
42 yield, natural recharge rate, and currently available State Water Project replacement water for
43 the Lower Mojave Valley groundwater basin. Additionally, of the current water right allotments
44 in the Baja subarea of the Mojave adjudicated basin, the maximum groundwater production
45 allotment is less than 5,000 ac-ft/yr (6.2 million m³/yr), with typical production rates between
46 100 and 1,500 ac-ft/yr (123,000 to 1.9 million m³/yr) (MWA 2009). Given that the Lower

TABLE 9.3.9.2-2 Estimated Water Requirements during Normal Operations at Full Build-out Capacity at the Proposed Pisgah SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
<i>Analysis Area 1 (Mojave River Adjudicated Groundwater Basin)</i>				
Full build-out capacity (MW) ^{a,b}	707	393	393	393
Water use requirements				
Mirror/panel washing (ac-ft/yr) ^{c,d}	353	196	196	20
Potable supply for workforce (ac-ft/yr)	10	4	4	<1
Dry cooling (ac-ft/yr) ^e	141–707	79–393	NA ^f	NA
Wet cooling (ac-ft/yr) ^e	3,180–10,247	1,767–5,693	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA	NA	200	20
Dry-cooled technologies (ac-ft/yr)	504–1,070	279–593	NA	NA
Wet-cooled technologies (ac-ft/yr)	3,543–10,610	1,967–5,893	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr) ^g	201	112	NA	NA
Sanitary wastewater (ac-ft/yr)	10	4	4	<1
<i>Analysis Area 2 (Areas outside MWA Jurisdiction)</i>				
Full build-out capacity (MW) ^{a,b}	3,125	1,736	1,736	1,736
Water use requirements				
Mirror/panel washing (ac-ft/yr) ^{c,d}	1,563	868	868	87
Potable supply for workforce (ac-ft/yr)	44	19	19	2
Dry cooling (ac-ft/yr) ^e	625–3,125	347–1,736	NA	NA
Wet cooling (ac-ft/yr) ^e	14,064–45,317	7,813–25,176	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA	NA	887	89
Dry-cooled technologies (ac-ft/yr)	2,232–4,732	1,234–2,623	NA	NA
Wet-cooled technologies (ac-ft/yr)	15,671–46,924	8,700–26,063	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr) ^g	888	493	NA	NA
Sanitary wastewater (ac-ft/yr)	44	19	19	2

^a Land area for parabolic trough technology was estimated at 5 acres/MW (0.02 km²/MW); land area for the power tower, dish engine, and PV technologies was estimated at 9 acres/MW (0.04 km²/MW).

^b Water needs are linearly related to power. Water usage for any other size project can be estimated by using multipliers provided in Table M.9-2 (Appendix M).

^c Value assumes a usage rate of 0.5 ac-ft/yr/MW for mirror washing for parabolic trough, power tower, and dish engine technologies and a rate of 0.05 ac-ft/yr/MW for panel washing for PV systems.

^d To convert ac-ft to m³, multiply by 1,234.

^e Dry-cooling value assumes 0.2 to 1.0 ac ft/yr per MW and wet-cooling value assumes 4.5 to 14.5 ac ft/yr per MW (range in these values represents 30 and 60% operating times) (DOE 2009).

^f NA = not applicable.

^g Value scaled from 250-MW Beacon Solar project with an annual discharge of 44 gpm (167 L/min) (AECOM 2009). Blowdown estimates are relevant to wet cooling only.

1 Mojave Valley groundwater basin is already in overdraft and that groundwater allocations will
2 be decreased over time by the MWA, there do not appear to be adequate available water
3 resources to support wet-cooling technologies in Analysis Area 1.
4

5 The groundwater resources in Analysis Area 2 have not been fully quantified because
6 of the lack of development in the region historically. However, the estimated recharge for the
7 Lavic Valley groundwater basin is very low at 300 ac-ft/yr (370,000 m³/yr) and represents
8 only 1 to 3% of the estimated water requirements for wet cooling, which range from 8,700 to
9 46,924 ac-ft/yr (10.7 million to 57.9 million m³/yr) (Table 9.3.9.2-2). It is very likely that the
10 required groundwater withdrawal rates needed for wet cooling would generate significant
11 drawdown of the groundwater elevations in the Lavic Valley groundwater basin.
12
13

14 **Decommissioning/Reclamation**

15
16 During decommissioning/reclamation, all surface structures associated with the solar
17 project would be dismantled, and the site reclaimed to its preconstruction state. Activities and
18 water needs during this phase would be similar to those during the construction phase (dust
19 suppression and potable supply for workers) and may also include water to establish vegetation
20 in some areas. However, the total volume of water needed is expected to be less. Because the
21 quantities of water needed during the decommissioning/ reclamation phase would be less than
22 those for construction, impacts on surface and groundwater resources also would be less.
23
24

25 ***9.3.9.2.3 Off-Site Impacts: Roads and Transmission Lines***

26
27 Impacts associated with the construction of roads and transmission lines primarily deal
28 with water use demands for construction, water quality concerns relating to potential chemical
29 spills, and land disturbance effects on the natural hydrology. A new access road would not be
30 needed because I-40 runs east–west along the southern edge and then through the Pisgah SEZ, as
31 described in Section 9.3.1.1. It is assumed that existing transmission lines could provide access
32 to the transmission grid, and thus no additional acreage disturbance for transmission line access
33 was assessed.
34
35

36 ***9.3.9.2.4 Summary of Impacts on Water Resources***

37
38 The impacts on water resources associated with developing solar energy in the proposed
39 Pisgah SEZ are associated with land disturbance effects on natural hydrology, water quality
40 concerns, and water use requirements for the various solar energy technologies. Land disturbance
41 impacts can cause localized ponding and erosion, especially in the areas near Troy Lake and the
42 northern portions of the proposed SEZ near the base of the Cady and Lava Bed Mountains.
43 Water quality concerns specific to the proposed SEZ deal with contamination of groundwater
44 through surface spills and with potable water supplies meeting California drinking water
45 standards, for which TDS values exceed standards in certain areas of the site.
46

1 The groundwater resources available to the proposed Pisgah SEZ are well quantified and
2 strictly managed for the portions of the site within the Mojave River adjudicated groundwater
3 basin (Analysis Area 1; Figure 9.3.9-1), but are not quantified fully for the portions of the site
4 located within the Lavic Valley groundwater basin (Analysis Area 2). Groundwater levels have
5 been decreasing for several decades, and overdraft conditions exist in the aquifers of Analysis
6 Area 1. It is highly likely that any rapid development of groundwater production in Analysis
7 Area 2 would result in declines in groundwater elevations, given the development history and
8 current conditions with respect to groundwater in the adjacent Mojave River adjudicated basin.
9 The consequences of overdraft and decreasing groundwater elevations are of particular concern
10 to minimal groundwater users in the region who typically use groundwater for domestic water
11 supply, as many of these wells are shallow (less than 250 ft [76 m] in depth) (MWA 2008). An
12 additional concern specific to decreasing groundwater elevations is at the Camp Cady Wildlife
13 Area, located 6 mi (10 km) northwest of the proposed SEZ, where groundwater is critical to
14 preserving habitat for the Mohave tui chub fish, a fish species listed as endangered under the
15 Endangered Species Act (see Section 9.3.12.2.1 for further details).

16
17 Impacts relating to water use requirements vary depending on the type of solar
18 technology built and, for technologies using cooling systems, the type of cooling (wet, dry, or
19 hybrid). The water use estimates for wet cooling at the proposed Pisgah SEZ are of a magnitude
20 that exceed the physically, and legally, available groundwater resources in Analysis Area 1, and
21 would most likely generate overdraft conditions in Analysis Area 2. Therefore, wet cooling
22 would not be a feasible option for solar energy development at the proposed Pisgah SEZ.

23 24 25 **9.3.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**

26
27 The program for solar energy development on BLM-administered lands will require the
28 programmatic design features given in Appendix A, Section A.2.2, to be implemented, thus
29 mitigating some impacts on water resources. Programmatic design features would focus on
30 coordinating with federal, state, and local agencies that regulate the use of water resources to
31 meet the requirements of permits and approvals needed to obtain water for development, and
32 conducting hydrological studies to characterize the aquifer from which groundwater would be
33 obtained (including drawdown effects, if a new point of diversion is created). The greatest
34 consideration for mitigating water impacts would be in the selection of solar technologies. The
35 mitigation of impacts would be best achieved by selecting technologies with low water demands.

36
37 Proposed design features specific to the proposed Pisgah SEZ include the following:

- 38
39 • Water resource analysis indicates that wet-cooling options would not be
40 feasible. Other technologies should incorporate water conservation measures.
- 41
42 • Land disturbance activities should avoid impacts to the extent possible in the
43 vicinity of Troy Lake and ephemeral washes onsite.
- 44
45 • During site characterization, hydrologic investigations would need to identify
46 100-year floodplains and potential jurisdictional water bodies subject to Clean

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Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as within a 100-year floodplain.

- During site characterization, coordination and permitting with CDFG regarding California’s Lake and Streambed Alteration Program would be required for any proposed alterations to surface water features (both perennial and ephemeral).
- Groundwater should be used in accordance with rules and regulations set forth by the MWA regarding the Mojave River adjudicated groundwater basin for the portions of the SEZ located in Analysis Area 1.
- The groundwater-permitting process should be in compliance with the San Bernardino County groundwater ordinance.
- Groundwater monitoring and production wells should be constructed in accordance with standards set forth by the State of California (CDWR 1991) and San Bernardino County.
- Stormwater management best management practices should be implemented according to the California Stormwater Quality Association (CASQA 2003).
- Water for potable uses would have to meet or be treated to meet water quality standards in the California Safe Drinking Water Act (*California Health and Safety Code*, Chapter 4).

1 **9.3.10 Vegetation**
2

3 This section addresses vegetation that could occur or is known to occur within the
4 potentially affected *area of the proposed Pisgah SEZ*. The affected area considered in this
5 assessment included the areas of direct and indirect effects. The area of direct effects was defined
6 as the area that would be physically modified during project development (i.e., where ground-
7 disturbing activities would occur) and included only the SEZ. The area of indirect effects was
8 defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities
9 would not occur but that could be indirectly affected by activities in the area of direct effects. No
10 area of direct or indirect effects was assumed for new transmission lines or access roads; they are
11 not expected to be needed for development on the Pisgah SEZ because of the proximity of an
12 existing transmission line and highway.
13

14 Indirect effects considered in the assessment included effects from surface runoff, dust,
15 and accidental spills from the SEZ, but not ground-disturbing activities. The potential degree of
16 indirect effects would decrease with increasing distance from the SEZ. This area of indirect
17 effects was identified on the basis of professional judgment and was considered sufficiently large
18 to bound the area that would potentially be subject to indirect effects. The affected area is the
19 area bounded by the areas of direct and indirect effects. These areas are defined and the impact
20 assessment approach is described in Appendix M.
21

22
23 **9.3.10.1 Affected Environment**
24

25 The proposed Pisgah SEZ is located within the Mojave Basin and Range Level III
26 ecoregion, which primarily supports creosotebush (*Larrea tridentata*) habitats (EPA 2007). This
27 ecoregion is characterized by broad basins and scattered mountains. Communities of sparse,
28 scattered shrubs and grasses including creosotebush, white bursage (*Ambrosia dumosa*), and big
29 galleta grass (*Pleuraphis rigida*) occur in basins; Joshua tree (*Yucca brevifolia*), other Yucca
30 species, and cacti occur on arid footslopes; woodland and shrubland communities occur on
31 mountain slopes, ridges, and hills (Bryce et al. 2003). Creosotebush, all-scale (*Atriplex*
32 *polycarpa*), brittlebush (*Encelia farinosa*), desert holly (*Atriplex hymenelytra*), white burrobrush
33 (*Hymenoclea salsola*), shadscale (*Atriplex confertifolia*), blackbrush (*Coleogyne ramosissima*),
34 and Joshua tree (*Yucca brevifolia*) are dominant species within the Mojave desertscrub biome
35 (Turner 1994). Annual precipitation in the Mojave Desert, occurring primarily in winter, is very
36 low in the area of the SEZ, averaging about 3.8 in. (98 mm) at the Daggett Airport
37 (see Section 9.3.13). Many ephemeral species (winter annuals) germinate in response to winter
38 rains (Turner 1994).
39

40 Land cover types, described and mapped under CAREGAP (NatureServe 2010), were
41 used to evaluate plant communities in and near the SEZ. Each cover type encompasses a range of
42 similar plant communities. Land cover types occurring within the potentially affected area of the
43 proposed Pisgah SEZ are shown in Figure 9.3.10.1-1. Table 9.3.10.1-1 provides the surface area
44 of each cover type within the potentially affected area.
45
46

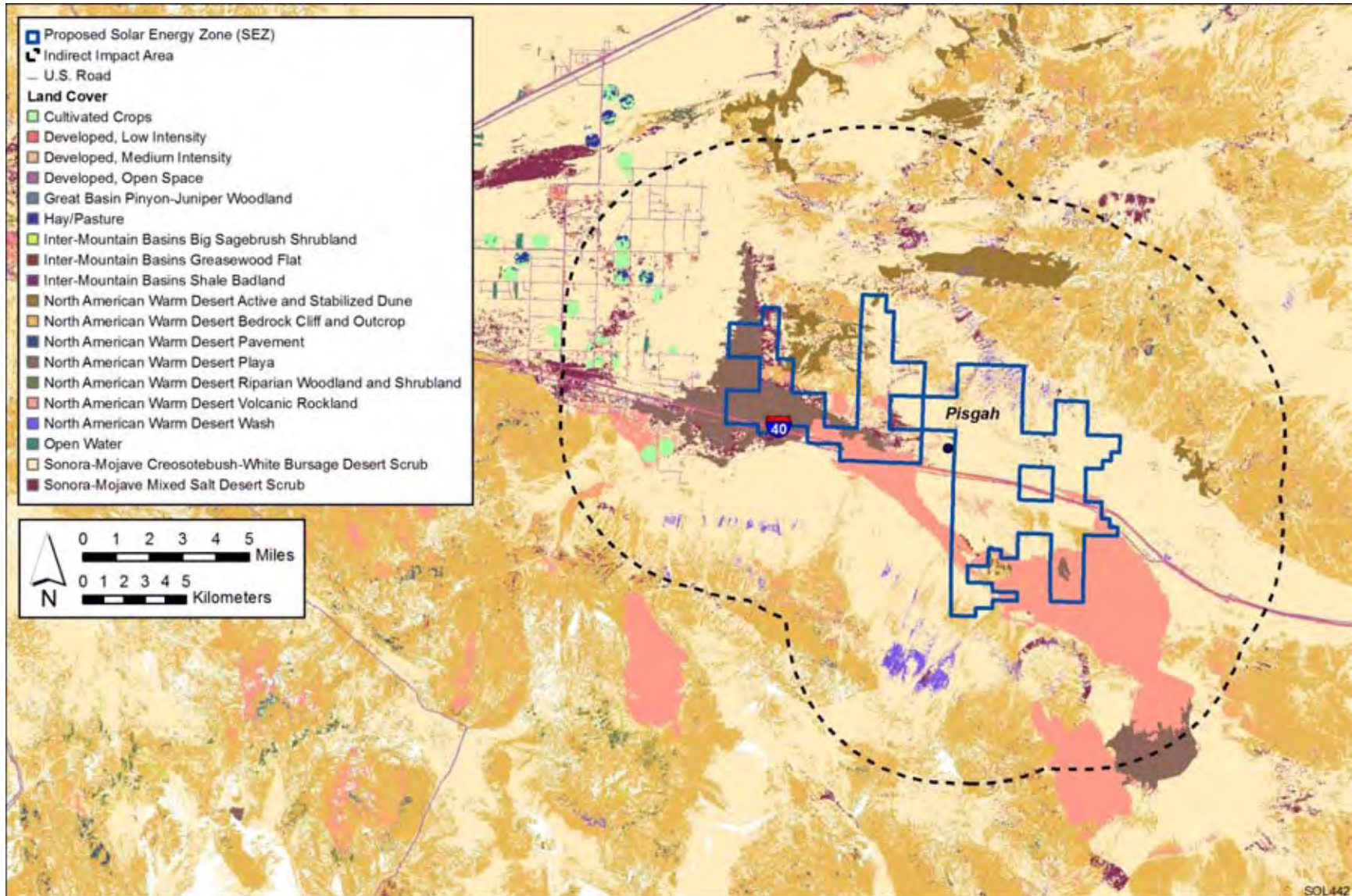


FIGURE 9.3.10.1-1 Land Cover Types within the Proposed Pisgah SEZ (Source: NatureServe 2010)

TABLE 9.3.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Pisgah SEZ and Potential Impacts

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		Overall Impact Magnitude ^e
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	
5264 Sonora-Mojave Creosotebush–White Bursage Desert Scrub: Occurs in broad valleys, lower bajadas, plains, and low hills in the Mojave and Sonoran Deserts. Shrubs form a sparse to moderately dense cover (2 to 50%), although the ground surface may be mostly barren. The dominant species are typically creosotebush (<i>Larrea tridentata</i>) and white bursage (<i>Ambrosia dumosa</i>). Other shrubs, dwarf-shrubs, and cacti may also be dominant or form sparse understories. Herbaceous species are typically sparse, but may be seasonally abundant.	14,548 acres ^f (0.6%, 1.4%)	156,519 acres (4.4%)	Small
3180 North American Warm Desert Volcanic Rockland: Consists of barren and sparsely vegetated (<10% plant cover) areas. Vegetation is variable and typically includes scattered desert shrubs.	3,193 acres (3.2%, 7.1%)	16,511 acres (16.4%)	Moderate
3161 North American Warm Desert Playa: Consists of barren and sparsely vegetated areas (generally <10% plant cover) that are intermittently flooded; salt crusts are common. Sparse shrubs occur around the margins, and patches of grass may form in depressions. In large playas, vegetation forms rings in response to salinity. Herbaceous species may be periodically abundant.	2,795 acres (2.6%, 6.1%)	4,767 acres (4.4%)	Moderate
3120 North American Warm Desert Bedrock Cliff and Outcrop: Occurs on subalpine to foothill steep cliff faces, narrow canyons, rock outcrops, unstable scree, and talus slopes. Consists of barren and sparsely vegetated areas (generally <10% plant cover) with desert species, especially succulents. Lichens are predominant in some areas.	1,505 acres (0.1%, 0.2%)	41,062 acres (3.2%)	Small
5265 Sonora-Mojave Mixed Salt Desert Scrub: Extensive open-canopied shrublands in the Mojave and Sonoran Deserts, usually occurring around playas and in valley bottoms or basins with saline soils. Vegetation typically comprises one or more <i>Atriplex</i> species; other salt-tolerant plants are often present or even co-dominant. Grasses occur at various densities.	879 acres (0.5%, 1.6%)	3,769 acres (2.0%)	Small

TABLE 9.3.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		Overall Impact Magnitude ^e
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	
3121 North American Warm Desert Active and Stabilized Dune: Consists of unvegetated to sparsely vegetated (generally <10% plant cover) active dunes and sand sheets. Vegetation includes shrubs, forbs, and grasses. Includes unvegetated “blowouts” and stabilized areas.	322 acres (0.2%, 1.3%)	5,155 acres (3.5%)	Small
9151 North American Warm Desert Wash: Consists of intermittently flooded linear or braided strips within desert scrub or grassland landscapes on bajadas, mesas, plains, and basin floors. Although often dry, washes are associated with rapid sheet and gully flow. The vegetation varies from sparse and patchy to moderately dense and typically occurs along the banks, but may occur within the channel. Shrubs and small trees are typically intermittent to open. Common upland shrubs often occur along the edges.	244 acres (0.3%, 0.8%)	1,907 acres (2.3%)	Small
23, 24 Developed, Medium-High Density: Includes housing and commercial/industrial development. Impervious surfaces compose 50 to 100% of the total land cover.	9 acres (0.2%, 10.2%)	28 acres (0.5%)	Small
3139 Inter-Mountain Basins Shale Badland: Typically occurs on rounded hills and plains. Consists of barren and sparsely vegetated areas (<10% plant cover) with high rate of erosion and deposition. Vegetation consists of sparse dwarf shrubs and herbaceous plants.	6 acres (0.1%, 0.2%)	159 acres (1.8%)	Small
3143 North American Warm Desert Pavement: Consists of unvegetated to very sparsely vegetated (<2% plant cover) areas, usually in flat basins, with ground surfaces of fine to medium gravel coated with “desert varnish.” Desert scrub species are usually present. Herbaceous species may be abundant in response to seasonal precipitation.	3 acres (<0.1%, <0.1%)	455 acres (2.3%)	Small

TABLE 9.3.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	Overall Impact Magnitude ^e
5259 Mojave Mid-Elevation Mixed Desert Scrub: The vegetation composition is quite variable. Dominant species include shrubs forbs and grasses and may include <i>Yucca</i> spp.	0 acres	2,816 acres (0.7%)	Small
81, 82 Hay/Pasture, Cultivated Crops: Areas where pasture/hay or cultivated crops account for more than 20% of total vegetation cover.	0 acres	1,182 acres (13.2%)	Small
9182 North American Warm Desert Riparian Woodland and Shrubland: Occurs along medium to large perennial streams in canyons and desert valleys. Consists of a mix of riparian woodlands and shrublands. Vegetation is dependent upon annual or periodic flooding, along with substrate scouring, and/or a seasonally shallow water table.	0 acres	56 acres (0.9%)	Small
11 Open Water: Plant or soil cover is generally less than 25%.	0 acres	47 acres (8.4%)	Small
9178 North American Warm Desert Riparian Mesquite Bosque: Occurs along perennial and intermittent streams as relatively dense riparian corridors composed of trees and shrubs. Honey mesquite (<i>Prosopis glandulosa</i>) and velvet mesquite (<i>P. velutina</i>) are the dominant trees. Vegetation is supported by groundwater when surface water is absent.	0 acres	12 acres (0.2%)	Small
5207 Inter-Mountain Basins Big Sagebrush Shrubland: Dominated by basin big sagebrush (<i>Artemisia tridentata tridentata</i>), Wyoming big sagebrush (<i>Artemisia tridentata wyomingensis</i>), or both. Other shrubs may be present. Perennial herbaceous plants are present but not abundant.	0 acres	9 acres (0.1%)	Small

TABLE 9.3.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	Overall Impact Magnitude ^e
9103 Inter-Mountain Basins Greasewood Flat: Dominated or co-dominated by greasewood (<i>Sarcobatus vermiculatus</i>) and generally occurring in areas with saline soils, a shallow water table, and intermittent flooding, although remaining dry for most growing seasons. This community type generally occurs near drainages or around playas. These areas may include or be co-dominated by other shrubs and include a graminoid herbaceous layer.	0 acres	1 acre (0.1%)	Small

^a Land cover descriptions are from NatureServe (2010). Full descriptions of land cover types, including plant species, can be found in Appendix I.

^b Area in acres, determined from Sanborn Mapping (2008),

^c Includes the area of the cover type within the SEZ, the percentage that area represents of all occurrences of that cover type within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ), and the percentage that area represents of all occurrences of that cover type on BLM lands within the SEZ region.

^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from project facilities. The potential degree of indirect effects would decrease with increasing distance from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.

^e Overall impact magnitude categories were based on professional judgment and were (1) *small*: a relatively small proportion ($\leq 1\%$) of the cover type within the SEZ region would be lost; (2) *moderate*: an intermediate proportion (>1 but $\leq 10\%$) of a cover type would be lost; (3) *large*: $>10\%$ of a cover type would be lost.

^f To convert acres to km², multiply by 0.004047.

1 Lands within the Pisgah SEZ are classified primarily as Sonora-Mojave Creosotebush-
2 White Bursage Desert Scrub. Additional cover types within the SEZ are given in
3 Table 9.3.10.2-1. Creosotebush and white burrobrush were observed to be the dominant
4 species over much of the SEZ in August 2009. Sensitive habitats on the SEZ include playa,
5 sand dune, desert dry wash, and desert chenopod scrub/mixed salt desert scrub habitats.
6

7 The area surrounding the SEZ, within 5 mi (8 km), includes 14 cover types, which are
8 listed in Table 9.3.10.1-1. The predominant cover types are Sonora-Mojave Creosotebush-White
9 Bursage Desert Scrub and North American Warm Desert Bedrock Cliff and Outcrop.
10

11 There are no wetlands mapped by the NWI that occur within the SEZ or within the 5-mi
12 (8-km) area of indirect effects. NWI maps are produced from high-altitude imagery and are
13 subject to uncertainties inherent in image interpretation (USFWS 2009a). Troy Lake, a dry
14 lakebed located in the western portion of Pisgah, occasionally holds shallow surface water and is
15 sparsely vegetated. Troy Lake is primarily classified as North American Warm Desert Playa.
16 Species occurring on the lakebed include white burrobrush and saltbush (*Atriplex* sp.). In
17 addition, a number of areas in the SEZ temporarily hold surface water after storms. These areas
18 typically have a hard, cracked substrate and are often unvegetated. Tamarisk, a nonnative
19 invasive tree or tall shrub, occurs in low areas that occasionally collect stormwater, such as along
20 railroad embankments. Numerous ephemeral dry washes occur within the SEZ. These dry
21 washes typically contain water for short periods during or following precipitation events, and
22 include temporarily flooded areas, but typically do not support wetland or riparian habitats.
23

24 The proposed Pisgah SEZ is located within the MWMA. Table 9.3.10.1-2 lists problem
25 weed species of the MWMA. Invasive species known to occur within the SEZ include tamarisk,
26 which occurs along wet areas, Sahara mustard, and shizmus (*Schismus arabicus*). Tamarisk and
27 Sahara mustard are included on the MWMA weed list.
28
29

30 **9.3.10.2 Impacts**

31

32 The construction of solar energy facilities within the Pisgah SEZ would result in direct
33 impacts on plant communities because of the removal of vegetation within the facility footprint
34 during land-clearing and land-grading operations. Approximately 80% of the SEZ (19,160 acres
35 [77.5 km²]) would be expected to be cleared with full development of the SEZ. The plant
36 communities affected would depend on facility locations and could include any of the
37 communities occurring on the SEZ. Therefore, for this analysis, all the area of each cover type
38 within the SEZ is considered to be directly affected by removal with full development of
39 the SEZ.
40

41 Indirect effects (e.g., caused by surface runoff or dust from the SEZ) have the potential
42 to degrade affected plant communities and may reduce biodiversity by promoting the decline
43 or elimination of species sensitive to disturbance. Indirect effects can also cause an increase
44 in disturbance-tolerant species or invasive species. High impact levels could result in
45 the elimination of a community or the replacement of one community type by another. The
46

TABLE 9.3.10.1-2 Problem Weeds of the MWMA

Common Name	Scientific Name
Tamarisk	<i>Tamarix ramosissima</i>
Halogeton	<i>Halogeton glomeratus</i>
White horenettle,	<i>Solanum elaeagnifolium</i>
Yellow starthistle	<i>Centaurea solstitialis</i>
Dalmatian toadflax	<i>Linaria dalmatica</i>
Russian thistle	<i>Salsola tragus</i>
Puncture vine	<i>Tribulus terrestris</i>
Camelthorn	<i>Alhagi maurorum</i>
Giant reed	<i>Arundo donax</i>
Sahara mustard	<i>Brassica tournefortii</i>
Red brome	<i>Bromus madritensis ssp. rubens</i>
Fountain grass	<i>Pennisetum setaceum</i>
Tree of heaven	<i>Ailanthus altissima</i>
Perennial peppergrass ^a	<i>Lepidium latifolium</i>
Spanish broom ^a	<i>Spartium junceum</i>

^a Additional species are identified in MWMA (2008).

Source: MWMA (2002).

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proper implementation of design features, however, would reduce indirect effects to a minor or small level of impact.

Possible impacts from solar energy facilities on vegetation that are encountered within the SEZ, as well as general mitigation measures, are described in more detail in Section 5.10.5. Any such impacts will be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2 (selected from the general mitigation measures), and from any additional mitigations applied. Design features specific to the proposed Pisgah SEZ are described in Section 9.3.10.3.

9.3.10.2.1 Impacts on Native Species

The impacts of construction, operation, and decommissioning were considered small if the impact affected a relatively small proportion (<1%) of the cover type in the SEZ region (within 50 mi [80 km] of the center of the SEZ); moderate if it could affect an intermediate proportion (>1 but <10%) of the cover type; and large if it could affect greater than 10% of the cover type.

Solar facility construction and operation would primarily affect communities of the Sonora-Mojave Creosotebush-White Bursage Desert Scrub cover type. Additional cover types within the SEZ that would be affected include North American Warm Desert Volcanic Rockland,

1 North American Warm Desert Playa, North American Warm Desert Bedrock Cliff and Outcrop,
2 Sonora-Mojave Mixed Salt Desert Scrub, North American Warm Desert Active and Stabilized
3 Dune, North American Warm Desert Wash, Inter-Mountain Basins Shale Badland, North
4 American Warm Desert Pavement. Although Developed, Open Space–Low Intensity and
5 Developed, Medium-High Density cover types occur within the SEZ, these developed areas
6 likely support few native plant communities. The potential impacts on native species cover
7 types resulting from solar energy facilities in the proposed Pisgah SEZ are summarized in
8 Table 9.3.10.2-1. Many of these cover types are relatively common in the SEZ region; however,
9 Inter-Mountain Basins Shale Badland and North American Warm Desert Pavement are relatively
10 uncommon, representing 0.2 and 0.4%, respectively, of the land area within the SEZ region.
11 Sand dune, playa, chenopod scrub/mixed salt desert scrub, riparian, and dry wash communities
12 are important sensitive habitats in the region.
13

14 The construction, operation, and decommissioning of solar projects within the SEZ
15 would result in moderate impacts on North American Warm Desert Volcanic Rockland and
16 North American Warm Desert Playa. Much of the playa cover type is associated with Troy Lake.
17 Solar project development within the SEZ would result in small impacts on the remaining cover
18 types in the affected area.
19

20 Disturbance of vegetation in dune communities within the SEZ, as by heavy equipment
21 operation, could result in the loss of substrate stabilization. Re-establishment of dune species
22 could be difficult due to the arid conditions and unstable substrates. Because of the arid
23 conditions, reestablishment of desert scrub or other communities in temporarily disturbed areas
24 would likely be very difficult and might require extended periods of time. In addition, noxious
25 weeds could become established in disturbed areas and could colonize adjacent undisturbed
26 habitats, thus reducing restoration success and potentially resulting in widespread habitat
27 degradation. Cryptogamic soil crusts occur in many of the shrubland communities in the
28 region, and likely occur on the SEZ. Damage to these crusts, caused by the operation of heavy
29 equipment or other vehicles, can alter important soil characteristics, such as nutrient cycling
30 and availability, and affect plant community characteristics (Lovich and Bainbridge 1999).
31

32 Communities associated with playa habitats or other intermittently flooded areas within
33 or downgradient from solar projects could be affected by ground-disturbing activities. Riparian
34 habitats, mesquite bosque, and greasewood communities outside the SEZ could also be affected.
35 Site-clearing and site-grading could affect community function and disrupt surface water or
36 groundwater flow patterns, resulting in changes in the frequency, duration, depth, or extent
37 of inundation or soil saturation, and could potentially alter playa communities, riparian habitats,
38 mesquite bosque, and greasewood communities, including occurrences outside of the SEZ.
39 Increases in surface runoff from a solar energy project site could also affect hydrologic
40 characteristics of these communities. The introduction of contaminants into these habitats could
41 result from spills of fuels or other materials used on a project site. Soil disturbance could result in
42 sedimentation in these areas, which could degrade or eliminate sensitive plant communities.
43 Grading could also affect dry washes within the SEZ, and alteration of surface drainage patterns
44 or hydrology could adversely affect downstream dry wash communities. Vegetation within these
45 communities could be lost by erosion or desiccation. See Section 9.3.9 for further discussion of
46 impacts on washes.
47

1 The deposition of fugitive dust from disturbed soil areas in habitats outside a solar project
2 area could result in reduced productivity or changes in plant community composition. Fugitive
3 dust deposition could affect plant communities of each of the cover types occurring within the
4 indirect effects area identified in Table 9.3.10.1-1.
5

6 Although the use of groundwater within the Pisgah SEZ for technologies with high water
7 requirements, such as wet-cooling systems, is considered unlikely, groundwater withdrawals for
8 such systems near Troy Lake playa could contribute to the further depletion of the Lower
9 Mojave Valley regional groundwater system (see Sections 9.3.9.1.2 and 9.3.12.2.1). Reductions
10 in groundwater discharges at springs and seeps along the Mojave River that support riparian
11 habitats could result in further degradation of these habitats. Communities that depend on
12 accessible groundwater, such as mesquite bosque communities, could also become degraded or
13 lost as a result of lowered groundwater levels.
14

15 **9.3.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species** 16

17
18 E.O. 13112, “Invasive Species,” directs federal agencies to prevent the introduction of
19 invasive species and provide for their control and to minimize the economic, ecological, and
20 human health impacts of invasive species (*Federal Register*, Vol. 64, page 61836, Feb. 8, 1999).
21 Potential impacts of noxious weeds and invasive plant species resulting from solar energy
22 facilities are described in Section 5.10.1. Despite programmatic design features required to
23 prevent the spread of noxious weeds, project disturbance could potentially increase the
24 prevalence of noxious weeds and invasive species in the affected area of the proposed Pisgah
25 SEZ and increase the probability that weeds could be transported into areas that were previously
26 relatively weed-free. This could result in reduced restoration success and possible widespread
27 habitat degradation.
28

29 Noxious weeds, including tamarisk, Sahara mustard, and shizmus occur on the SEZ.
30 Additional species known to occur in the MWMA are given in Table 9.3.10.1-2.
31

32 Past or present land uses may affect the susceptibility of plant communities to the
33 establishment of noxious weeds and invasive species. Small areas of Developed, Open Space–
34 Low Intensity, totaling about 430 acres (1.7 km²), occur within the SEZ, and approximately
35 2,237 acres (9.1 km²) occurs in the indirect effects area. About 9 acres (0.04 km²) of Developed,
36 Medium-High Density occurs within the SEZ, and 28 acres (0.1 km²) occurs within the indirect
37 effects area. The developed areas likely support few native plant communities. Because
38 disturbance may promote the establishment and spread of invasive species, developed areas may
39 provide sources of such species. Existing roads, rail lines, transmission lines, and recreational
40 OHV use within the SEZ region also likely contribute to the susceptibility of plant communities
41 to the establishment and spread of noxious weeds and invasive species.
42
43
44

1 **9.3.10.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 The implementation of required programmatic design features described in Appendix A,
4 Section A.2.2, would reduce the potential for impacts on plant communities. While some SEZ-
5 specific design features are best established when considering specific project details, design
6 features that can be identified at this time include the following:
7

- 8 • An Integrated Vegetation Management Plan, addressing invasive species
9 control, and an Ecological Resources Mitigation and Monitoring Plan,
10 addressing habitat restoration, should be approved and implemented to
11 increase the potential for successful restoration of creosotebush–white bursage
12 desert scrub communities and other affected habitats and to minimize the
13 potential for the spread of tamarisk, Sahara mustard, schismus, or other
14 invasive species. Invasive species control should focus on biological and
15 mechanical methods to reduce the use of herbicides.
16
- 17 • All playa, chenopod scrub, sand dune and sand transport areas, and desert dry
18 wash habitats, shall be avoided to the extent practicable, and any impacts
19 minimized and mitigated. A buffer area shall be maintained around riparian
20 areas, playas, and dry washes to reduce the potential for impacts on these
21 habitats on or near the SEZ. Appropriate engineering controls shall be used to
22 minimize impacts on these areas resulting from surface water runoff, erosion,
23 sedimentation, altered hydrology, accidental spills, or fugitive dust deposition
24 to these habitats. Appropriate buffers and engineering controls would be
25 determined through agency consultation.
26
- 27 • Groundwater withdrawals should be prohibited to avoid the potential for
28 indirect impacts on riparian habitat along the Mojave River or groundwater-
29 dependent communities such as mesquite bosque.
30

31 If these SEZ-specific design features are implemented in addition to programmatic design
32 features, it is anticipated that a high potential for impacts from invasive species and potential
33 impacts on riparian, mesquite bosque, playa, chenopod scrub, sand dune, and dry wash habitat
34 would be reduced to a minimal potential for impact.
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9.3.11 Wildlife and Aquatic Biota

This section addresses wildlife (amphibians, reptiles, birds, and mammals) and aquatic biota that could occur within the potentially affected area of the proposed Pisgah SEZ. Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) were determined from the California Wildlife Habitat Relationships System (CDFG 2008). Land cover types suitable for each species were determined from the Southwest Regional Gap Analysis Program (SWReGAP) (USGS 2004, 2005, 2007). The amount of aquatic habitat within the SEZ region was determined by estimating the length of linear perennial stream and canal features and the area of standing water body features (i.e., ponds, lakes, and reservoirs) within 50 mi (80 km) of the SEZ by using available geographic information system (GIS) surface water datasets.

The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur within the SEZ). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effects (e.g., surface runoff, dust, noise, lighting, and accidental spills from the SEZ). The potential degree of indirect effects would decrease with increasing distance from the SEZ. This area of indirect effects was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects.

The affected area is the area bounded by the areas of direct and indirect effects. These areas are defined and the impact assessment approach is described in Appendix M. Due to the proximity of existing infrastructure, the impacts of construction and operation of transmission lines outside of the SEZ are not assessed, assuming that the existing transmission might be used to connect some new solar facilities to load centers and that additional project-specific analysis would be conducted for new transmission construction or line upgrades. Similarly, the impacts of construction or upgrades to access roads were not assessed for this SEZ due to the proximity of the existing state highway (see Section 9.3.1.2 for a discussion of development assumptions for this SEZ).

Dominant vegetation in the affected area is Mojave Desertscrub, and the primary land cover habitat type within the affected area is Sonora–Mojave creosotebush–white bursage desertscrub (see Section 9.3.10). Potentially unique habitats in the affected area in which wildlife species may reside include desert dunes, cliffs and rock outcrops, volcanic rocklands, desert washes, and playa wetland habitats. Playa wetland habitats in the affected area include the Troy Lake and Lavic Lake playas. The Troy Lake playa occurs in the western portion of the SEZ; Lavic Lake occurs outside of the SEZ but within the area of indirect effects approximately 4 mi (6 km) southeast of the SEZ. The Mojave River occurs outside of the affected area but flows as near as 7 mi (11 km) northwest of the SEZ (Figure 9.3.12.1-1).

1 **9.3.11.1 Amphibians and Reptiles**

2
3
4 **9.3.11.1.1 Affected Environment**

5
6 This section addresses amphibian and reptile species that are known to occur, or for
7 which potentially suitable habitat occurs, on or within the potentially affected area of the
8 proposed Pisgah SEZ. The list of amphibian and reptile species potentially present in the project
9 area was determined from range maps and habitat information available from the California
10 Wildlife Habitat Relationships System (CWHES) (CDFG 2008). Land cover types suitable for
11 each species were determined from the SWReGAP (USGS 2004, 2005, 2007). See Appendix M
12 for additional information on the approach used.

13
14 Based on the range, habitat preferences, and/or presence of potentially suitable land cover
15 for the amphibian species that occur within southeastern California (CDFG 2008; USGS 2004,
16 2005, 2007), the red-spotted toad (*Bufo punctatus*) would be expected to occur within the
17 proposed Pisgah SEZ. However, because it prefers dry, rocky areas near temporary sources of
18 standing water, its occurrence within the SEZ would be spatially limited. It would most likely
19 occur in the far western portion of the SEZ that overlaps portions of Troy Lake.

20
21 Thirty reptile species could occur within the proposed Pisgah SEZ (CDFG 2008). These
22 species include 1 tortoise, 13 lizards, and 16 snakes. The desert tortoise (*Gopherus agassizii*) is a
23 federally and state-listed threatened species. This species is discussed in Section 9.3.12. Among
24 the more common lizard species that could occur within the SEZ are the desert horned lizard
25 (*Phrynosoma platyrhinos*), long-nosed leopard lizard (*Gambelia wislizenii*), Mojave fringe-toed
26 lizard (*Uma scoparia*), side-blotched lizard (*Uta stansburiana*), western banded gecko (*Coleonyx*
27 *variegatus*), and zebra-tailed lizard (*Callisaurus draconoides*).

28
29 The most common snake species expected to occur within the proposed Pisgah SEZ are
30 the coachwhip (*Masticophis flagellum*), glossy snake (*Arizona elegans*), gophersnake (*Pituophis*
31 *catenifer*), groundsnake (*Sonora semiannulata*), and long-nosed snake (*Rhinocheilus lecontei*).
32 The Mojave rattlesnake (*Crotalus scutulatus*) and sidewinder (*C. cerastes*) would be the most
33 common poisonous snake species expected to occur on the SEZ.

34
35 Table 9.3.11.1-1 provides habitat information for the representative amphibian and reptile
36 species that could occur on or in the affected area of the proposed Pisgah SEZ.

37
38
39 **9.3.11.1.2 Impacts**

40
41 The potential for impacts on amphibians and reptiles from utility-scale solar energy
42 development within the proposed Pisgah SEZ is presented in this section. The types of impacts
43 that amphibians and reptiles could incur from construction, operation, and decommissioning of
44 utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any such impacts would be
45 minimized through the implementation of required programmatic design features described in

1 Appendix A, Section A.2.2, and through any additional mitigation applied. Section 9.3.11.1.3
2 identifies SEZ-specific design features of particular relevance to the proposed Pisgah SEZ.
3

4 The assessment of impacts on amphibians and reptile species is based on available
5 information on the presence of species in the affected area as presented in Section 9.3.11.1.1,
6 following the analysis approach described in Appendix M. Additional NEPA assessments and
7 coordination with state natural resource agencies may be needed to address project-specific
8 impacts more thoroughly. These assessments and consultations could result in additional
9 required actions to avoid or mitigate impacts on amphibians and reptiles (see Section 9.3.11.1.3).
10

11 In general, impacts on amphibians and reptiles would result from habitat disturbance
12 (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality
13 to individual amphibians and reptiles. On the basis of the impacts on amphibians and reptiles
14 summarized in Table 9.3.11.1-1, direct impacts on amphibian and reptile species would be small,
15 because only 0.2 to 0.6% of potentially suitable habitats identified for the species in the SEZ
16 region would be lost. Larger areas of potentially suitable habitats for the amphibian and reptile
17 species occur within the area of potential indirect effects (e.g., up to 5.7% of available habitat for
18 the long-nosed leopard lizard). Other impacts on amphibians and reptiles could result from
19 surface water and sediment runoff from disturbed areas, fugitive dust generated by project
20 activities, accidental spills, collection, and harassment. These indirect impacts are expected to be
21 negligible with implementation of programmatic design features.
22

23 Decommissioning of facilities and reclamation of disturbed areas after operations cease
24 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
25 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
26 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
27 reclamation on wildlife. Of particular importance for amphibian and reptile species would be the
28 restoration of original ground surface contours, soils, and native plant communities associated
29 with semiarid shrublands.
30

31 32 ***9.3.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 33

34 The implementation of required programmatic design features described in Appendix A,
35 Section A.2.2, would reduce the potential for effects on amphibians and reptiles, especially for
36 those species that utilize habitat types that can be avoided (e.g., Troy Lake, which could provide
37 habitat for the red-spotted toad). Indirect impacts could be reduced to negligible levels by
38 implementing programmatic design features, especially those engineering controls that would
39 reduce runoff, sedimentation, spills, and fugitive dust. While SEZ-specific features are best
40 established when considering specific project details, the following SEZ-specific design feature
41 can be identified:
42

- 43 • To the extent practicable, avoid the ephemeral drainages and Troy Lake.
44

45 If this SEZ-specific design feature is implemented in addition to other programmatic
46 design features, impacts on amphibian and reptile species could be reduced. Any residual

TABLE 9.3.11.1-1 Representative Amphibians and Reptiles That Could Occur on or in the Affected Area of the Proposed Pisgah SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Amphibians				
Red-spotted toad (<i>Bufo punctatus</i>)	Rocky canyons and gullies in deserts, grasslands, and dry woodlands. When inactive, it occurs under rocks, in rock crevices, or underground. Often found near rocky areas associated with spring seepages, intermittent streams, and cattle tanks. Breeds in shallow water of temporary rain pools, spring-fed pools, and pools along intermittent streams. About 2,897,500 acres ^f of potentially suitable habitat occurs in the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small. Avoid development within Troy Lake.
Lizards				
Desert horned lizard (<i>Phrynosoma platyrhinos</i>)	Deserts dominated by sagebrush, creosotebush, greasewood, or cactus. Occurs on sandy flats, alluvial fans, washes, and edge of dunes. Burrows in soil during periods of inactivity. Common throughout Mojave and Colorado Deserts. About 4,648,400 acres of potentially suitable habitat occurs in the SEZ region.	19,160 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	177,758 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Long-nosed leopard lizard (<i>Gambelia wislizenii</i>)	Desert and semidesert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows that it occupies when inactive. Widely distributed in the Mojave, Colorado, and other desert areas in California. About 2,899,700 acres of potentially suitable habitat occurs in the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,673 acres of potentially suitable habitat (5.7% of available potentially suitable habitat)	Small

TABLE 9.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Lizards (Cont.)				
Mojave fringe-toed lizard (<i>Uma scoparia</i>)	Restricted to sparsely vegetated windblown sand of dunes, flats, riverbanks, and washes. Requires fine, loose sand for burrowing. About 2,448,500 acres of potentially suitable habitat occurs in the SEZ region.	14,870 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	106,234 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	Small
Side-blotched lizard (<i>Uta stansburiana</i>)	Arid and semiarid locations with scattered bushes or scrubby trees. Often occurs in sandy washes with scattered rocks and bushes. About 4,075,100 acres of potentially suitable habitat occurs in the SEZ region.	16,297 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	146,864 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small
Western banded gecko (<i>Coleonyx variegatus</i>)	Wide variety of habitats including deserts with creosotebush and sagebrush and pinyon-juniper woodlands. Inhabits both rocky areas and barren dunes. Most abundant in sandy flats and desert washes. Uses rocks, burrows, and spaces beneath vegetative debris or trash during period of inactivity. About 3,099,200 acres of potentially suitable habitat occurs in the SEZ region.	18,466 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	114,406 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small
Zebra-tailed lizard (<i>Callisaurus draconoides</i>)	Sparsely vegetated deserts or open sandy washes, dunes, floodplains, beaches, or desert pavement. Common and widely distributed throughout Mojave and Colorado Deserts. About 3,352,300 acres of potentially suitable habitat occurs in the SEZ region.	19,160 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	136,527 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 9.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Snakes				
Coachwhip (<i>Masticophis flagellum</i>)	Wide variety of open terrain habitats. Most abundant in deserts, grasslands, scrub, chaparral, and pastures. Prefers relatively dry open terrain. Seeks cover in burrows, rocks, or vegetation. About 3,751,200 acres of potentially suitable habitat occurs in the SEZ region.	16,375 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	147,306 acres of potentially suitable habitat (3.9% of available potentially suitable habitat)	Small
Glossy snake (<i>Arizona elegans</i>)	Variety of habitats including barren to sparsely shrubby deserts, sagebrush flats, grasslands, and sand hills. Prefers sandy areas with scattered brush, but also occurs in rocky areas. Shelters and lays eggs underground. Common throughout southern California, particularly the desert regions. About 2,542,561 acres of potentially suitable habitat occurs in the SEZ region.	15,114 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	108,162 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	Small
Gophersnake (<i>Pituophis catenifer</i>)	Wide variety of habitats including deserts, prairies, shrublands, woodlands, and farmlands. May dig its burrow or occupy mammal burrows. Eggs are laid in burrows or under large rocks or logs. Most widespread and common snake in California. About 3,346,600 acres of potentially suitable habitat occurs in the SEZ region.	19,160 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	121,835 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Groundsnake (<i>Sonora semiannulata</i>)	Arid and semiarid areas including desert flats, sand hummocks, rocky hillsides with pockets of loose soil. Ranges from prairie and desert lowlands to pinyon-juniper and oak-pine zone. About 2,729,300 acres of potentially suitable habitat occurs in the SEZ region.	14,548 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	103,972 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small

TABLE 9.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Snakes (Cont.)				
Long-nosed snake (<i>Rhinocheilus lecontei</i>)	Typically inhabits deserts, dry prairies, and river valleys. Occurs by day and lays eggs underground or rocks. Burrows rapidly in loose soil. Common in desert regions. About 242,200 acres of potentially suitable habitat occurs in the SEZ region.	566 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	7,130 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small
Mojave rattlesnake (<i>Crotalus scutulatus</i>)	Mostly upland desert and lower mountain slopes including barren desert, grasslands, open woodland, and scrubland. Generally avoids broken rocky terrain or densely vegetated areas. Takes refuge in animal burrows or spaces under or among rocks. Widely distributed throughout the Mojave and extreme northern Colorado Deserts. About 2,707,700 acres of potentially suitable habitat occurs in the SEZ region.	14,548 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	103,963 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small
Sidewinder (<i>Crotalus. cerastes</i>)	Open desert terrain with fine windblown sand, desert flats with sandy washes, or sparsely vegetated sand dunes. Concentrates near washes and areas of relatively dense vegetation where mammal burrows are common. During periods of inactivity, uses underground burrows, occurs under bushes, or almost completely snuggles under sand. Widely distributed and locally abundant in the Mojave and Colorado Deserts. About 2,850,100 acres of potentially suitable habitat occurs in the SEZ region.	14,870 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	109,106 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small

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TABLE 9.3.11.1-1 (Cont.)

-
- ^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).
- ^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 19,160 acres would be developed in the SEZ.
- ^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ boundary.
- ^d Overall impact magnitude categories were based on professional judgment and were (1) *small*: $\leq 1\%$ of potentially suitable habitat for the species would be lost and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>10\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.
- ^f To convert acres to km^2 , multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 impacts on amphibians and reptiles are anticipated to be small, given the relative abundance of
2 potentially suitable habitats in the SEZ region. However, as potentially suitable habitats for a
3 number of the amphibian and reptile species occur throughout much of the SEZ, additional
4 species-specific mitigation of direct effects for those species would be difficult or infeasible.
5
6

7 **9.3.11.2 Birds**

8 9 10 **9.3.11.2.1 Affected Environment**

11
12 This section addresses bird species that are known to occur, or for which potentially
13 suitable habitat occurs, on or within the potentially affected area of the proposed Pisgah SEZ.
14 The list of bird species potentially present in the project area was determined from range maps
15 and habitat information available from the CWHRS (CDFG 2008). Land cover types suitable for
16 each species were determined from SWReGAP (USGS 2004, 2005, 2007). See Appendix M for
17 additional information on the approach used.
18

19 Almost 100 species of birds have a
20 range that encompasses the proposed Pisgah
21 SEZ region. However, habitats for more than
22 35 of these species either do not occur on or are
23 limited within the SEZ (e.g., habitat for
24 waterfowl and wading birds). In addition, the
25 SEZ region is only within the winter range (40
26 species) or summer range (9 species) of a

27 number of the bird species. Ten bird species that could occur on or in the affected area of the
28 SEZ are considered focal species for the California Partners in Flight's *Desert Bird Conservation*
29 *Plan* (CalPIF 2009): ash-throated flycatcher (*Myiarchus cinerascens*), black-tailed gnatcatcher
30 (*Poliophtila melanura*), black-throated sparrow (*Amphispiza bilineata*), burrowing owl (*Athene*
31 *cunicularia*), common raven (*Corvus corax*), Costa's hummingbird (*Calypte costae*), ladder-
32 backed woodpecker (*Picoides scalaris*), Le Conte's thrasher (*Toxostoma lecontei*), phainopepla
33 (*Phainopepla nitens*), and verdin (*Auriparus flaviceps*). Habitats for these species are described
34 in Table 9.3.11.2-1. The ash-throated flycatcher and black-throated sparrow would be summer
35 residents within the SEZ, while the other desert focal bird species could occur year-round
36 (CalPIF 2009).
37
38

Desert Focal Bird Species

Bird species whose requirements define spatial attributes, habitat characteristics, and management regimes representative of a healthy desert system (Chase and Geupel 2005).

39 **Waterfowl, Wading Birds, and Shorebirds**

40
41 As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds
42 (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and terns)
43 are among the most abundant groups of birds in the six-state study area. Nearly 20 waterfowl,
44 wading bird, and shorebird species occur within the SEZ region. Within the SEZ, waterfowl,
45 wading birds, and shorebirds are uncommon because of the lack of perennial aquatic habitat.
46 The killdeer (*Charadrius vociferus*) and least sandpiper (*Calidris minutilla*) (shorebird species)

TABLE 9.3.11.2-1 Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Pisgah SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Shorebirds				
Killdeer (<i>Charadrius vociferus</i>)	Widespread throughout California. Open areas such as fields, meadows, lawns, mudflats, and shores. Nests on ground in open dry or gravelly locations. About 189,600 acres ^f of potentially suitable habitat occurs in the SEZ region. Year-round.	3,234 acres of potentially suitable habitat lost (1.7% of available potentially suitable habitat)	7,079 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Moderate. Avoid development within Troy Lake. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Least sandpiper (<i>Calidris minutilla</i>)	Wet meadows, mudflats, flooded fields, lake shores, edge of salt marshes, and river sandbars. About 12,100 acres of potentially suitable habitat occurs in the SEZ region. Common to abundant in winter.	0 acres of potentially suitable habitat lost (0.0% of available potentially suitable habitat)	115 acres of potentially suitable habitat (0.9% of available potentially suitable habitat)	None to small. Avoid development within Troy Lake. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants</i>				
Ash-throated flycatcher (<i>Myiarchus cinerascens</i>)	Common in scrub and woodland habitats including desert riparian and desert washes. Requires hole/cavity for nesting. Uses shrubs or small trees for foraging perches. About 3,010,200 acres of potentially suitable habitat occurs in the SEZ region. Summer.	15,671 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	109,649 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Black-tailed gnatcatcher (<i>Poliophtila melanura</i>)	Nests in bushes mainly in wooded desert washes with dense mesquite, palo verde, ironwood, and acacia. Also occurs in desert scrub habitat. About 2,536,600 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	15,114 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	108,153 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Black-throated sparrow (<i>Amphispiza bilineata</i>)	Chaparral and desert scrub habitats with sparse to open stands of shrubs. Often in areas with scattered Joshua trees. Nests in thorny shrubs or cactus. About 2,994,700 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	18,072 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	126,187 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Brewer's sparrow (<i>Spizella breweri</i>)	Common in Mojave and Colorado Deserts during winter. Occupies open desert scrub and cropland habitats. About 2,737,100 acres of potentially suitable habitat occurs in the SEZ region.	14,557 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	104,574 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Cactus wren (<i>Campylorhynchus brunneicapillus</i>)	Desert (especially areas with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and trees in towns in arid regions. Nests in <i>Opuntia</i> spp.; twiggy, thorny trees and shrubs; and sometimes in buildings. Nests may be used as winter roost. Locally common in the Mojave and Colorado Deserts. About 1,765,100 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	1,749 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	45,841 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Common poorwill (<i>Phalaenoptilus nuttallii</i>)	Scrubby and brushy areas, prairie, desert, rocky canyons, open woodlands, and broken forests. Mostly in arid and semiarid habitats. Nests in open areas on a bare site. About 3,878,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	17,176 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	147,883 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
Common raven (<i>Corvus corax</i>)	Occurs in most habitats. Trees and cliffs provide cover. Roosts primarily in trees. Nests on cliffs, bluffs, tall trees, or human-made structures. Forages in sparse, open terrain. About 3,024,200 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	15,866 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	110,007 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Costa's hummingbird (<i>Calypte costae</i>)	Desert and semidesert areas, arid brushy foothills, and chaparral. Main habitats are desert washes, edges of desert riparian and valley foothill riparian areas, coastal shrub, desert scrub, desert succulent shrub, lower-elevation chaparral, and palm oasis. Also in mountains, meadows, and gardens during migration and winter. Most common in canyons and washes when nesting. Nests are located in trees, shrubs, vines, or cacti. About 2,984,200 acres of potentially suitable habitat occurs in the SEZ region. Common in summer and uncommon in winter in California.	15,671 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	109,639 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
Greater roadrunner (<i>Geococcyx californianus</i>)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Requires thickets, large bushes, or small trees for shade, refuge, and roosting. Usually nests low in trees, shrubs, or clump of cactus. Rarely nests on ground. About 4,623,800 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	19,160 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	162,972 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Horned lark (<i>Eremophila alpestris</i>)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semidesert shrublands, and alpine tundra. During migration and winter, inhabits the same habitats other than tundra, and also occurs in agricultural areas. Usually occurs where plant density is low and there are exposed soils. About 2,882,500 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,665 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
House finch (<i>Carpodacus mexicanus</i>)	Variety of areas including arid scrub and brush, desert riparian areas, open woodlands, cultivated lands, and savannas. Usually forages in areas with elevated escape perches (e.g., trees, tall shrubs, transmission lines, and buildings). Roosts and nests in sheltered sites in trees; tall, dense shrubs; man-made structures; cliff crevices; or earthen banks. About 93,200 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	439 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	2,334 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Ladder-backed woodpecker (<i>Picoides scalaris</i>)	Fairly common in Mojave and Colorado Deserts. Variety of habitats including deserts, arid scrub, riparian woodlands, mesquite, scrub oak, pinyon-juniper woodlands. Digs nest hole in rotted stub or dead or dying branches of various trees. Also nests in saguaro, agave, yucca, fence posts, and utility poles. Nests on ledges; branches of trees, shrubs, and cactus; and holes in trees or walls. About 2,976,300 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	15,671 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	109,639 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Le Conte's thrasher (<i>Toxostoma leconteii</i>)	Open desert wash, alkali desert scrub, and desert succulent shrub habitats. Prefers to nest and forage in arroyos and washes lined with dense stands of creosotebush and salt bush. About 2,932,100 acres of potentially suitable habitat occurs in the SEZ region. Year-round, but uncommon to rare.	15,114 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	110,969 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
Lesser nighthawk (<i>Chordeiles acutipennis</i>)	Open country, desert regions, scrub, savanna, and cultivated areas. Usually near water including open marshes, salt ponds, large rivers, rice paddies, and beaches. Roosts on low perches or the ground. Nests in the open on bare sites. About 4,546,100 acres of potentially suitable habitat occurs in the SEZ region. Uncommon summer resident.	19,160 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	172,934 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Open country with scattered trees and shrubs, savanna, desert scrub, desert riparian, Joshua tree, and occasionally open woodland habitats. Perches on poles, wires, or fence posts (suitable hunting perches are important aspect of habitat). Nests in shrubs and small trees. About 3,073,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	16,101 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	111,886 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Phainopepla (<i>Phainopepla nitens</i>)	Common in Mojave and Colorado Deserts. Desert scrub, mesquite, juniper and oak woodlands, tall brush, washes, riparian woodlands, and orchards. Nests in dense foliage of large shrubs or trees, sometimes in a clump of mistletoe. About 637,700 acres of potentially suitable habitat occurs in the SEZ region. Year-round, but many move to more western and northern portions of California during summer.	566 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	9,946 acres of potentially suitable habitat (1.6% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Say's phoebe (<i>Sayornis saya</i>)	Arid open country, deserts, sagebrush plains, dry barren foothills, canyons, cliffs, ranches, and rural homes. Nests in cliff crevices, holes in banks, sheltered ledges, tree cavities, under bridges and roofs, and in mines. About 4,245,300 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	17,362 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	150,973 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Verdin (<i>Auriparus flaviceps</i>)	Common to abundant in Colorado Desert, less common in Mojave Desert. Desert riparian, desert wash, desert scrub, and alkali desert scrub areas with large shrubs and small trees. Nests in shrubs, small trees, or cactus. About 2,790,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	14,792 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	105,870 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
White-throated swift (<i>Aeronautes saxatalis</i>)	Mountainous country near cliffs and canyons where breeding occurs. Forages over forest and open situations. Nests in rock crevices and canyons, sometimes in buildings. Ranges widely over most terrain and habitats, usually high in the air. About 1,373,200 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	1,944 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	43,395 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Birds of Prey				
American kestrel (<i>Falco sparverius</i>)	Occurs in most open habitats, in various shrub and early successional forest habitats, forest openings, and various ecotones. Perches on trees, snags, rocks, utility poles and wires, and fence posts. Uses cavities in trees, snags, rock areas, banks, and buildings for nesting and cover. About 2,097,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	6,016 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	66,501 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Birds of Prey (Cont.)				
Golden eagle (<i>Aquila chrysaetos</i>)	Grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. Occasionally in most other habitats, especially during migration and winter. Nests on cliffs and sometimes trees in rugged areas, with breeding birds ranging widely over surrounding areas. About 4,481,900 acres of potentially suitable habitat occurs in the SEZ region. Winter.	19,160 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	171,977 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Bald and Golden Eagle Protection Act.
Prairie falcon (<i>Falco mexicanus</i>)	Associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. Nests in pothole or well-sheltered ledge on rocky cliff or steep earth embankment. May also nest in man-made excavations on otherwise unsuitable cliffs and old nests of ravens, hawks, and eagles. Forages in large patch areas with low vegetation. May forage over irrigated croplands in winter. About 3,681,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	16,297 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	144,104 acres of potentially suitable habitat (3.9% of available potentially suitable habitat)	Small.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Birds of Prey				
(Cont.)				
Red-tailed hawk (<i>Buteo jamaicensis</i>)	Wide variety of habitats from deserts, mountains, and populated valleys. Open areas with scattered, elevated perch sites such as scrub desert, plains and montane grassland, agricultural fields, pastures urban parklands, broken coniferous forests, and deciduous woodland. Nests on cliff ledges or in tall trees. About 662,800 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	1,309 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	8,831 acres of potentially suitable habitat (1.3% of available potentially suitable habitat)	Small.
Turkey vulture (<i>Cathartes aura</i>)	Occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting. Migrates and forages over most open habitats. Will roost communally in trees, exposed boulders, and occasionally transmission line support towers. About 4,189,700 acres of potentially suitable habitat occurs in the SEZ region. Summer.	16,932 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	148,794 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small.
Upland Game Birds				
Gambel's quail (<i>Callipepla gambelii</i>)	Deserts, especially in areas with brushy or thorny growth, and adjacent cultivated areas. Usually occurs near water. Nests on the ground under cover of small trees, shrubs, and grass tufts. About 4,263,600 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	17,176 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	150,711 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small.

TABLE 9.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Upland Game Birds (Cont.)				
Mourning dove (<i>Zenaida macroura</i>)	Habitat generalist, occurring in grasslands, shrublands, croplands, lowland and foothill riparian forests, ponderosa pine forests, deserts, and urban and suburban areas. Rarely in aspen and other forests, coniferous woodlands, and alpine tundra. Nests on ground or in trees. Winters mostly in lowland riparian forests adjacent to cropland. About 3,207,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	18,911 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	116,840 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

- ^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).
- ^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 19,160 acres would be developed in the SEZ.
- ^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ boundary.
- ^d Overall impact magnitude categories were based on professional judgment and were (1) *small*: $\leq 1\%$ of potentially suitable habitat for the species would be lost and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>10\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.

Footnotes continued on next page.

TABLE 9.3.11.2-1 (Cont.)

^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.

^f To convert acres to km², multiply by 0.004047

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 would be expected to occur on the SEZ in the area of Troy Lake. The Colorado River, located
2 more than 95 mi (153 km) east of the SEZ, and the Salton Sea, located more than 85 mi (137 km)
3 south of the SEZ, would provide more productive habitat for this group of birds.
4
5

6 **Neotropical Migrants**

7

8 As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse
9 category of birds within the six-state study area. Neotropical migrants expected to occur on or
10 in the affected area of the proposed Pisgah SEZ throughout the year include the black-tailed
11 gnatcatcher, black-throated sparrow, cactus wren (*Campylorhynchus brunneicapillus*), common
12 poorwill (*Phalaenoptilus nuttallii*), common raven, Costa's hummingbird, greater roadrunner
13 (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), house finch (*Carpodacus*
14 *mexicanus*), ladder-backed woodpecker, Le Conte's thrasher, loggerhead shrike (*Lanius*
15 *ludovicianus*), phainopepla, Say's phoebe (*Sayornis saya*), verdin, and white-throated swift
16 (*Aeronautes saxatalis*). The winter range for the Brewer's sparrow (*Spizella breweri*), green-
17 tailed towhee (*Pipilo chlorurus*), and sage sparrow (*Amphispiza belli*) encompasses the SEZ,
18 while the summer range for the ash-throated flycatcher (*Myiarchus cinerascens*) and lesser
19 nighthawk (*Chordeiles acutipennis*) encompasses the SEZ (CDFG 2008).
20
21

22 **Birds of Prey**

23

24 Section 4.10.2.2.4 provides an overview of the birds of prey (raptors, owls, and vultures)
25 within the six-state study area. Sixteen birds of prey species have ranges that encompass the
26 proposed Pisgah SEZ (CDFG 2008). Raptor species expected to occur within the SEZ include
27 the American kestrel (*Falco sparverius*, year-round), burrowing owl (year-round), ferruginous
28 hawk (*Buteo regalis*, winter), golden eagle (*Aquila chrysaetos*, winter), prairie falcon (*Falco*
29 *mexicanus*, year-round), red-tailed hawk (*Buteo jamaicensis*, year-round), and turkey vulture
30 (*Cathartes aura*, summer) (CDFG 2008). However, the American kestrel, golden eagle, prairie
31 falcon, and red-tailed hawk make infrequent use of the desert regions within which the proposed
32 Pisgah SEZ occurs. The golden eagle is a Fully Protected species in the State of California
33 (CDFG 2010a).
34
35

36 **Upland Game Birds**

37

38 Section 4.10.2.2.5 provides an overview of the upland game birds (primarily pheasants,
39 grouse, quail, and doves) that occur within the six-state study area. Upland game species that
40 could occur year-round within the Pisgah SEZ are Gambel's quail (*Callipepla gambelii*) and
41 mourning dove (*Zenaida macroura*) (CDFG 2008). Gambel's quail is common within the
42 Colorado and Mojave Desert areas of California. It prefers riparian areas and also occurs near
43 streams, springs, and water holes. While it feeds in open habitats, trees or tall shrubs are
44 required for escape cover. It also requires a nearby source of water, particularly during hot
45 summer months (CDFG 2008). Up to 400,000 Gambel's quail are harvested annually in
46 California (CDFG 2008). The mourning dove is common throughout California and can be found

1 in a wide variety of habitats. Regardless of habitat occupied, it requires a nearby water source
2 (CDFG 2008).

3
4 Table 9.3.11.2-1 provides habitat information for the representative bird species that
5 could occur on or in the affected area of the proposed Pisgah SEZ. Because of their special
6 status standing, the burrowing owl, ferruginous hawk, and short-eared owl are discussed in
7 Section 9.3.12.1.

8 9 10 **9.3.11.2.2 Impacts**

11
12 The types of impacts that birds could incur from construction, operation, and
13 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
14 such impacts would be minimized through the implementation of required programmatic design
15 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
16 Section 9.3.11.2.3, below, identifies design features of particular relevance to the proposed
17 Pisgah SEZ.

18
19 The assessment of impacts on bird species is based on available information on the
20 presence of species in the affected area as presented in Section 9.3.11.2.1 following the analysis
21 approach described in Appendix M. Additional NEPA assessments and coordination with state
22 natural resource agencies may be needed to address project-specific impacts more thoroughly.
23 These assessments and consultations could result in additional required actions to avoid or
24 mitigate impacts on birds (see Section 9.3.11.2.3).

25
26 In general, impacts on birds would result from habitat disturbance (i.e., habitat reduction,
27 fragmentation, and alteration) and from disturbance, injury, or mortality to individual birds.
28 Table 9.3.11.2-1 summarizes the potential impacts on representative bird species resulting from
29 solar energy development that could occur on or in the affected area in the proposed Pisgah SEZ.
30 Direct impacts on bird species would be small for most bird species; only 0.6% or less of habitats
31 potentially suitable for most representative bird species would be lost, although a moderate
32 impact is indicated for the killdeer, because 1.7% of its potentially suitable habitat would be lost
33 (Table 9.3.11.2-1). Larger areas of suitable habitat for bird species that occur within the area of
34 potential indirect effects (e.g., up to 4.3% of potentially suitable habitat for the black-tailed
35 gnatcatcher). Other impacts on birds could result from collision with vehicles and facility
36 structures, surface water and sediment runoff from disturbed areas, fugitive dust generated by
37 project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.
38 Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion,
39 and sedimentation) are expected to be negligible with implementation of programmatic design
40 features.

41
42 Decommissioning of facilities and reclamation of disturbed areas after operations cease
43 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
44 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
45 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
46 reclamation on wildlife. Of particular importance for bird species would be the restoration of

1 original ground surface contours, soils, and native plant communities associated with semiarid
2 shrublands.

3 4 5 ***9.3.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 6

7 The successful implementation of programmatic design features presented in
8 Appendix A, Section A.2.2, would reduce the potential for effects on birds. Indirect impacts
9 could be reduced to negligible levels by implementing programmatic design features, especially
10 those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust.
11 While some SEZ-specific design features important to reducing impacts on birds are best
12 established when project details are considered, some design features can be identified at this
13 time, as follows:

- 14
15 • Pre-disturbance surveys should be conducted within the SEZ for bird species
16 listed under the Migratory Bird Treaty Act. Impacts on potential nesting
17 habitat of these species should be avoided, particularly during the nesting
18 season.
- 19
20 • Pre-disturbance surveys should be conducted within the SEZ for the following
21 desert bird focal species (CalPIF 2009): ash-throated flycatcher, black-tailed
22 gnatcatcher, black-throated sparrow, burrowing owl, common raven, Costa's
23 hummingbird, ladder-backed woodpecker, Le Conte's thrasher, phainopepla,
24 and verdin. Impacts on potential nesting habitat of these species should be
25 avoided.
- 26
27 • Plant species that positively influence the presence and abundance of the
28 desert bird focal species should be avoided to the extent practicable. These
29 species include Goodding's willow, yucca, Joshua tree, mesquite, honey
30 mesquite, screwbean, desert mistletoe, big saltbush, smoketree, and catclaw
31 acacia (CalPIF 2009)
- 32
33 • Take of golden eagles and other raptors should be avoided. Mitigation
34 regarding the golden eagle should be developed in consultation with the
35 USFWS and CDFG. A permit may be required under the Bald and Golden
36 Eagle Protection Act.
- 37
38 • Development within the area of the ephemeral drainages and Troy Lake
39 should be avoided.
- 40

41 If these SEZ-specific design features are implemented in addition to programmatic design
42 features, impacts on bird species could be reduced. Any residual impacts on birds are anticipated
43 to be small due to the relative abundance of suitable habitats in the SEZ region. However, as
44 potentially suitable habitats for a number of the bird species occur throughout much of the SEZ,
45 species-specific mitigation of direct effects for those species would be difficult or infeasible.
46

1 **9.3.11.3 Mammals**

2
3
4 **9.3.11.3.1 Affected Environment**

5
6 This section addresses mammal species that are known to occur, or for which suitable
7 habitat occurs, on or within the potentially affected area of the Pisgah SEZ. The list of mammal
8 species potentially present in the project area was determined from range maps and habitat
9 information available from the CWHRS (CDFG 2008). Land cover types suitable for each
10 species were determined from SWReGAP (USGS 2004, 2005, 2007). See Appendix M for
11 additional information on the approach used. On the basis of species distributions and habitat
12 preferences, about 35 mammal species could occur within the SEZ (CDFG 2008). The following
13 discussion emphasizes big game and other mammal species that (1) have key habitats within or
14 near the Pisgah SEZ, (2) are important to humans (e.g., big game, small game, and furbearer
15 species), and/or (3) are representative of other species that share similar habitats.

16
17
18 **Big Game**

19
20 The desert bighorn sheep (*Ovis canadensis nelsoni*) and mule deer (*Odocoileus*
21 *hemionus*) are the only big game species expected to occur in the area of the proposed Pisgah
22 SEZ. Because it is a BLM sensitive species, the desert bighorn sheep is discussed in
23 Section 9.3.12. The mule deer is common to abundant throughout California, except in deserts
24 and intensely farmed areas (CDFG 2008). It prefers a mosaic of vegetation that has herbaceous
25 openings, dense brush or tree thickets, riparian areas, and abundant edges. Mule deer are
26 browsers and grazers, feeding on shrubs, forbs, and a few grasses. Brush is important for
27 escape cover and for thermal regulation in winter and summer (CDFG 2008). Mule deer in San
28 Bernardino County are found throughout the mountainous areas at elevations of 4,000 to 8,000 ft
29 (1,219 to 2,438 m) (CDFG 2010b). Therefore, mule deer would not be expected with any
30 regularity within the valley between Cady Mountains and the Rodman and Lava Bed Mountains
31 where the proposed Pisgah SEZ would be located. The highest elevation of the SEZ is about
32 2,300 ft (701 m) (see Section 9.3.1.1).

33
34
35 **Other Mammals**

36
37 A number of small game and furbearer species occur within the area of the proposed
38 Pisgah SEZ. These include the American badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus*
39 *californicus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus*
40 *audubonii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), and white-tailed
41 antelope squirrel (*Ammospermophilus leucurus*) (CDFG 2008).

42
43 Nongame (small) mammal species such as bats, mice, kangaroo rats, and shrews also
44 occur within the area of the proposed Pisgah SEZ. These include the cactus mouse (*Peromyscus*
45 *eremicus*), canyon deermouse (*P. crinitus*), desert kangaroo rat (*Dipodomys deserti*), desert
46 shrew (*Notiosorex crawfordi*), desert woodrat (*Neotoma lepida*), little pocket mouse

1 (*Perognathus longimembris*), long-tailed pocket mouse (*Chaetodipus formosus*), Merriam's
2 kangaroo rat (*Dipodomys merriami*), and southern grasshopper mouse (*Onychomys torridus*)
3 (CDFG 2008). The range of nine bat species encompasses the SEZ: big brown bat (*Eptesicus*
4 *fuscus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), Californian leaf-nosed bat (*Macrotus*
5 *californicus*), California mastiff bat (*Eumops perotis californicus*), California myotis (*Myotis*
6 *californicus*), pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), Townsend's
7 big-eared bat (*Corynorhinus townsendii*), and western pipistrelle (*Parastrellus hesperus*). Most
8 bat species would utilize the SEZ only during foraging. Roost sites for the species (e.g., caves,
9 hollow trees, rock crevices, or buildings) are absent to scarce on or in the affected area of the
10 SEZ.

11
12 Table 9.3.11.3-1 provides habitat information for the representative mammal species that
13 could occur on or in the affected area of the proposed Pisgah SEZ. Because of their special status
14 standing, the California mastiff bat, Californian leaf-nose bat, pallid bat, and Townsend's big-
15 eared bat are discussed in Section 9.3.12.1.

16 17 18 **9.3.11.3.2 Impacts** 19

20 The types of impacts that mammals could incur from construction, operation, and
21 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
22 such impacts would be minimized through the implementation of required programmatic design
23 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
24 Section 9.3.11.3.3, below, identifies design features of particular relevance to the proposed
25 Pisgah SEZ.

26
27 The assessment of impacts on mammal species is based on available information on the
28 presence of species in the affected area as presented in Section 9.3.11.3.1 following the analysis
29 approach described in Appendix M. Additional NEPA assessments and coordination with state
30 natural resource agencies may be needed to address project-specific impacts more thoroughly.
31 These assessments and consultations could result in additional required actions to avoid or
32 mitigate impacts on mammals (see Section 9.3.11.3.3).

33
34 Table 9.3.11.3-1 summarizes the potential impacts on representative mammal species
35 resulting from solar energy development (with the implementation of required programmatic
36 design features) in the proposed Pisgah SEZ.

37
38 Direct impacts on small game, furbearers, and nongame (small) mammal species would
39 be small, because 0.6% or less of potentially suitable habitats for representative mammal species
40 would be lost (Table 9.3.11.3-1). Larger areas of suitable habitat for these species occur within
41 the area of potential indirect effects (e.g., up to 4.2% for the desert cottontail). Other impacts on
42 mammals could result from collision with fences and vehicles, surface water and sediment runoff
43 from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of
44 invasive species, accidental spills, and harassment. These indirect impacts are expected to be
45 negligible with implementation of programmatic design features.

TABLE 9.3.11.3-1 Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Pisgah SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers</i>				
American badger (<i>Taxidea taxus</i>)	Open grasslands and deserts, meadows in subalpine and montane forests, alpine tundra. Digs burrows in friable soils. Most common in areas with abundant populations of ground squirrels, prairie dogs, and pocket gophers. Relatively uncommon throughout California. About 2,729,900 acres ^f of potentially suitable habitat occurs in the SEZ region.	14,548 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	103,973 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small.
Black-tailed jackrabbit (<i>Lepus californicus</i>)	Open plains, fields, and deserts with scattered thickets or patches of shrubs. Also open, early stages of forests and chaparral habitats. Rests during the day in shallow depressions, and uses shrubs for cover. About 4,316,500 acres of potentially suitable habitat occurs in the SEZ region.	17,049 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	154,334 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small.
Bobcat (<i>Lynx rufus</i>)	Occurs in nearly all habitats and successional stages. Optimal habitats include mixed woodlands and forest edges, hardwood forests, swamps, forested river bottoms, brushlands, deserts, mountains, and other areas with thick undergrowth. Availability of water may limit its distribution in xeric regions. Uses rocky clefts, caves, hollow logs, spaces under fallen trees, and so forth when inactive; usually changes shelter areas daily. About 2,912,600 acres of potentially suitable habitat occurs in the SEZ region.	15,228 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	108,276 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small.

TABLE 9.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers (Cont.)</i>				
Coyote (<i>Canis latrans</i>)	Suitable habitat characterized by interspersions of brush and open areas with free water. Least common in dense coniferous forest. Where human control efforts occur, it is restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 4,766,300 acres of potentially suitable habitat occurs in the SEZ region.	19,160 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	179,967 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Desert cottontail (<i>Sylvilagus audubonii</i>)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Thickets and patches of shrubs, vines, and brush also used as cover. About 2,486,400 acres of potentially suitable habitat occurs in the SEZ region.	15,222 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	105,245 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Small.
Round-tailed ground squirrel (<i>Spermophilus tereticaudus</i>)	Optimum habitat includes desert succulent shrub, desert wash, desert scrub, alkali desert scrub, and levees in cropland habitat. Also occurs in urban habitats. Burrows usually at base of shrubs. About 2,893,600 acres of potentially suitable habitat occurs in the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,732 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small.

TABLE 9.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers (Cont.)</i>				
White-tailed antelope squirrel (<i>Ammospermophilus leucurus</i>)	Common to abundant in California deserts. Optimal habitats are desert scrub, sagebrush, alkali desert scrub, Joshua tree, bitterbrush, and pinyon-juniper. Fairly common in desert riparian, desert succulent shrub, and desert wash habitats. Also occurs in mixed chaparral and annual grassland habitats. Requires friable soil for burrowing. Burrows may be under shrubs or in open; often uses abandoned kangaroo rat burrows. About 4,060,100 acres of potentially suitable habitat occurs in the SEZ region.	16,297 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	146,865 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small.
<i>Nongame (small) Mammals</i>				
Big brown bat (<i>Eptesicus fuscus</i>)	Deserts, forests and woodlands, old fields, shrublands, and urban/suburban areas. Uncommon in hot desert habitats. Summer roosts are in buildings, hollow trees, rock crevices, tunnels, and cliff swallow nests. Maternity colonies occur in attics, barns tree cavities, rock crevices, and caves. Caves, mines, and man-made structures used for hibernation sites. About 3,679,000 acres of potentially suitable habitat occurs in the SEZ region.	16,492 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	144,454 acres of potentially suitable habitat (3.9% of available potentially suitable habitat)	Small.

TABLE 9.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (small)</i>				
<i>Mammals (Cont.)</i>				
Brazilian free-tailed bat (<i>Tadarida brasiliensis</i>)	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, and suburban/urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 3,921,000 acres of potentially suitable habitat occurs in the SEZ region.	17,058 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	151,534 acres of potentially suitable habitat (3.9% of available potentially suitable habitat)	Small.
Cactus mouse (<i>Peromyscus eremicus</i>)	Deserts, shrublands, chaparral, and coniferous woodlands. Occurs on rocky areas and areas with sandy substrates and loamy soils. Nests in rock heaps, stone walls, burrows, brush fences, and woodrat houses. About 2,992,500 acres of potentially suitable habitat occurs in the SEZ region.	15,671 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	109,640 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small.
Californian myotis (<i>Myotis californicus</i>)	Cliffs, deserts, forests, woodlands, grasslands, savannas, and shrublands. Often uses man-made structures for night roosts. Uses crevices for summer day roosts. May roost on small desert shrubs or on the ground. Hibernates in caves, mines, tunnels, or buildings. Maternity colonies occur in rock crevices, under bark, or under eaves of buildings. Common to abundant below 6,000 ft. About 3,682,100 acres of potentially suitable habitat occurs in the SEZ region.	16,297 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	144,126 acres of potentially suitable habitat (3.9% of available potentially suitable habitat)	Small.

TABLE 9.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (small)</i>				
<i>Mammals (Cont.)</i>				
Canyon deermouse (<i>Peromyscus crinitus</i>)	Found in most desert and chaparral habitats. Gravelly desert pavement, talus, boulders, cliffs, and slickrock—rocky areas with virtually any type of plant cover. About 2,995,000 acres of potentially suitable habitat occurs in the SEZ region.	18,620 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	124,240 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Small.
Desert kangaroo rat (<i>Dipodomys deserti</i>)	Low deserts, deep wind-drifted sandy soil with sparse vegetation, alkali sinks, and shadscale or creosotebush scrub. Nests in burrows dug in mounds, usually under vegetation. About 230,600 acres of potentially suitable habitat occurs in the SEZ region.	566 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	7,062 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small.
Desert shrew (<i>Notiosorex crawfordi</i>)	Generally found in arid areas with adequate cover for nesting and resting. Deserts, semiarid grasslands with scattered cactus and yucca, chaparral slopes, alluvial fans, sagebrush, gullies, juniper woodlands, riparian areas, and dumps. About 4,405,300 acres of potentially suitable habitat occurs in the SEZ region.	17,498 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	155,857 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small.
Desert woodrat (<i>Neotoma lepida</i>)	Sagebrush scrub; chaparral; deserts and rocky slopes with scattered cactus, yucca, pine-juniper, or other low vegetation; creosotebush desert; Joshua tree woodlands; scrub oak woodlands, pinyon-juniper woodlands; and riparian zones. Most abundant in rocky areas with Joshua trees. Dens built of debris on ground, among cacti or yucca, along cliffs, among rocks, or occasionally in trees. About 4,408,800 acres of potentially suitable habitat occurs in the SEZ region.	19,160 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	167,836 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 9.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (small)</i>				
<i>Mammals (Cont.)</i>				
Little pocket mouse (<i>Perognathus longimembris</i>)	Common to abundant in southern California deserts. Preferred habitat includes desert riparian, desert scrub, desert wash, and sagebrush. Nests in an underground burrow. Sandy soil preferred for burrowing, but also commonly burrows on gravel washes and on stony soils. About 3,118,600 acres of potentially suitable habitat occurs in the SEZ region.	15,993 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	114,735 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small.
Long-tailed pocket mouse (<i>Chaetodipus formosus</i>)	Common in sagebrush, desert scrub, and desert succulent shrub habitats with rocky or stony groundcover. Often inhabits rocky washes and canyon mouths. Uses underground burrows. About 4,352,300 acres of potentially suitable habitat occurs in the SEZ region.	19,160 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	167,153 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Merriam's kangaroo rat (<i>Dipodomys merriami</i>)	Most widespread kangaroo rat in California. In southern California, occurs in desert scrub and alkali desert scrub, sagebrush, Joshua tree, and pinyon-juniper habitats. Uses desert flats or slopes with sparse to moderate canopy coverage and sandy to gravelly substrates. Uses underground burrows often located at the base of a shrub. About 3,144,400 acres of potentially suitable habitat occurs in the SEZ region.	15,996 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	115,203 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small.

TABLE 9.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (small)</i>				
<i>Mammals (Cont.)</i>				
Southern grasshopper mouse (<i>Onychomys torridus</i>)	Hot, arid valleys and scrub deserts with sparse and scattered vegetation such as mesquite, creosotebush cholla, yucca, and short grasses. Frequents scrub habitats with friable soils for digging. Also uses abandoned underground burrows. About 3,118,700 acres of potentially suitable habitat occurs in the SEZ region.	15,993 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	114,782 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small.
Spotted bat (<i>Euderma maculatum</i>)	Mostly found in the foothills, mountains, and desert regions of southern California. Roosts in caves and cracks or crevices in cliffs and canyons. About 4,100,900 acres of potentially suitable habitat occurs in the SEZ region.	16,297 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	146,942 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small.
Western pipistrelle (<i>Parastrellus hesperus</i>)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 3,668,800 acres of potentially suitable habitat occurs in the SEZ region.	16,492 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	144,416 acres of potentially suitable habitat (3.9% of available potentially suitable habitat)	Small.

^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 19,160 acres would be developed in the SEZ.

Footnotes continued on next page.

TABLE 9.3.11.3-1 (Cont.)

-
- ^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ boundary.
- ^d Overall impact magnitude categories were based on professional judgment and were (1) *small*: $\leq 1\%$ of potentially suitable habitat for the species would be lost and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>10\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.
- ^f To convert acres to km^2 , multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 Decommissioning of facilities and reclamation of disturbed areas after operations cease
2 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
3 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
4 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
5 reclamation on wildlife. Of particular importance for mammal species would be the restoration
6 of original ground surface contours, soils, and native plant communities associated with semiarid
7 shrublands.
8
9

10 ***9.3.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 11

12 The implementation of required programmatic design features described in Appendix A,
13 Section A.2.2, would reduce the potential for effects on mammals. While some SEZ-specific
14 design features are best established when considering specific project details, the following
15 design feature can be identified at this time:
16

- 17 • Development within the ephemeral drainages should be avoided in order to
18 reduce impacts on species such as the round-tailed ground squirrel, white-
19 tailed antelope squirrel, little pocket mouse, long-tailed pocket mouse, and
20 any other mammal species that inhabit wash habitats.
21

22 If this SEZ-specific design feature is implemented in addition to programmatic design
23 features, impacts on mammal species could be reduced. Any residual impacts on mammals are
24 anticipated to be small given the relative abundance of suitable habitats in the SEZ region.
25 However, as potentially suitable habitats for a number of the mammal species occur throughout
26 much of the SEZ, additional species-specific mitigation of direct effects for those species would
27 be difficult or infeasible.
28
29
30

1 **9.3.11.4 Aquatic Biota**

2
3
4 **9.3.11.4.1 Affected Environment**

5
6 This section addresses aquatic habitats and biota that are known to occur on the proposed
7 Pisgah SEZ itself or within an area that could be affected, either directly or indirectly, by
8 activities associated with solar energy development within the SEZ. For the proposed Pisgah
9 SEZ, the area of direct effect was considered to be the entire SEZ area. As discussed in
10 Section 9.3.1.1, a new access road would not be needed because I-40 runs east–west along the
11 southern edge and then through the Pisgah SEZ. In addition, for this analysis, the impacts of
12 construction and operation of transmission lines outside of the SEZ were not assessed, assuming
13 that the existing 230-kV transmission line might be used to connect some new solar facilities to
14 load centers, and that additional project-specific analysis would be done for new transmission
15 construction or line upgrades.

16
17 Within the Pisgah SEZ, Troy Lake is the only body of water (Figure 9.3.10-2). Troy
18 Lake is a dry lake consisting of playa and dune sediments, of which approximately 1,633 acres
19 (6.6 km²) are within the boundaries of the proposed SEZ. As a dry lake with sediments that
20 contain alkali salts, Troy Lake contains no water, and is not expected to support aquatic biota or
21 aquatic habitats. However, more site-specific data is needed to fully evaluate aquatic biota, if
22 present, in Troy Lake. No other water body, stream, or wetland features are present in the Pisgah
23 SEZ.

24
25 The area of potential indirect impacts on aquatic biota from SEZ development was
26 assumed to extend up to 5 mi (8 km) beyond the SEZ boundary. Approximately 1,953 acres
27 (8 km²) of Troy Lake and 1,249 acres (5 km²) of Lavic Lake are located within the area of
28 indirect impacts (Figure 9.3.10-2). Like Troy Lake, Lavic Lake is dry and is not expected to
29 support aquatic habitat or communities. However, more site-specific data is needed to fully
30 evaluate aquatic biota, if present, in these dry lake features. No other water body, stream or
31 wetland features are present within the area of indirect effects. Therefore, no aquatic biota or
32 habitats are expected to be present within 5 mi (8 km) of the SEZ.

33
34 Outside of the indirect effects area, but within 50 mi (80 km) of the SEZ, there are
35 approximately 2,102 acres (8.5 km²) of lake (Big Bear Lake) and 16 dry lakes, totaling
36 86,413 acres (350 km²). Also present within 50 mi (80 km) of the SEZ are 106 mi (171 km)
37 of intermittent streams. No wetlands are present.

38
39
40 **9.3.11.4.2 Impacts**

41
42 Impacts that could affect aquatic habitats and biota as a result of the development of
43 utility-scale solar energy facilities are discussed in Section 5.10.3.1. Effects particularly relevant
44 to aquatic habitats and communities include water withdrawal and changes in water, sediment,
45 and contaminant inputs associated with runoff. However, no permanent water bodies, perennial
46 streams, or wetlands are present within the boundaries of the Pisgah SEZ or within the 5-mi

1 (8-km) radius potentially susceptible to indirect impacts. Consequently, no direct or indirect
2 impacts on aquatic habitats are expected to result from construction and operation of utility-scale
3 solar energy facilities at the Pisgah SEZ. However, more detailed site surveys of ephemeral and
4 intermittent surface waters would be needed to determine whether solar energy development
5 activities would result in direct or indirect impacts on aquatic biota.
6

7 In arid environments, reduction in the quantity of water in aquatic habitats is of particular
8 concern. While no direct impacts on aquatic communities are anticipated from water withdrawal
9 at the SEZ, the amount of water in surrounding aquatic habitats could be affected if significant
10 amounts of surface water or groundwater are utilized for power-plant cooling water, for washing
11 mirrors, or for other needs. The greatest need for water would occur if technologies that
12 employed wet cooling, such as parabolic troughs or power towers, were developed at the site;
13 the associated impacts would ultimately depend on the water source used (including groundwater
14 from aquifers at various depths). As noted in Section 9.3.9.1.3, it seems unlikely that approval
15 to withdraw water from the Lower Mojave River Valley basin (already fully allocated) and
16 potentially the Lavic Valley basin could be obtained. Obtaining cooling water from other
17 perennial surface water features in the region could affect water levels and, as a consequence,
18 aquatic organisms in those water bodies. Additional details regarding the volume of water
19 required and the types of organisms present in potentially affected water bodies would be
20 required in order to further evaluate the potential for impacts from water withdrawals.
21

22 ***9.3.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness***

23 No SEZ-specific design features are identified because effects on aquatic habitats or biota
24 from solar energy development within the proposed Pisgah SEZ would be negligible.
25
26
27

9.3.12 Special Status Species (Threatened, Endangered, Sensitive, and Rare Species)

This section addresses special status species that are known to occur, or for which suitable habitat occurs, on or within the potentially affected area of the proposed Pisgah SEZ. Special status species include the following types of species⁶:

- Species listed as threatened or endangered under the ESA;
- Species that are proposed for listing, under review, or are candidates for listing under the ESA;
- Species that are listed as threatened or endangered by the State of California under the CESA, or that are identified as fully protected by the state⁷;
- Species that are listed by the BLM as sensitive; and
- Species that have been ranked by the State of California as S1 or S2, or species of concern by the State of California or the USFWS; hereafter referred to as “rare” species.

Special status species known to occur within 50 mi (80 km) of the Pisgah SEZ center (i.e., the SEZ region) were determined from natural heritage records available through NatureServe Explorer (NatureServe 2010), information provided by the California Department of Fish and Game (CDFG 2010a), CNDDDB (CDFG 2010b), and CAREGAP (Davis et al. 1998; USGS 2010a). Information reviewed consisted of county-level occurrences as determined from NatureServe, point and polygon element occurrences as determined from CNDDDB, and modeled land cover types and predicted suitable habitats for the species within the 50-mi (80-km) region as determined from CAREGAP. The 50-mi (80-km) SEZ region (including the areas of direct and indirect effects) lies entirely within San Bernardino County, California. See Appendix M for additional information on the approach used to identify species that could be affected by development within the SEZ.

9.3.12.1 Affected Environment

The affected area considered in the assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur). For the Pisgah SEZ, the area of direct effect was limited to the SEZ itself. Due to the proximity of existing infrastructure, the impacts of construction and operation of transmission lines outside of the SEZ

⁶ See Section 4.6.4 for definitions of these species categories. Note that some of the categories of species included here do not fit BLM’s definition of special status species as defined in BLM Manual 6840 (BLM 2008). These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

⁷ State-listed species are those listed as threatened or endangered under the CESA; California fully protected species are species that receive the strictest take provisions as identified by the CDFG.

1 are not assessed, assuming that the existing transmission infrastructure might be used to connect
2 some new solar facilities to load centers, and that additional project-specific analysis would
3 be conducted for new transmission construction or line upgrades. Similarly, the impacts of
4 construction or upgrades to access roads were not assessed for this SEZ due to the proximity of
5 I-40 (see Section 9.3.1.2 for a discussion of development assumptions for this SEZ). The area of
6 indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-
7 disturbing activities would not occur but that could be indirectly affected by activities in the area
8 of direct effect. Indirect effects considered in the assessment include effects from surface runoff,
9 dust, noise, lighting, and accidental spills from the SEZ, but do not include ground-disturbing
10 activities. The potential magnitude of indirect effects would decrease with increasing distance
11 away from the SEZ. This area of indirect effect was identified on the basis of professional
12 judgment and was considered sufficiently large to bound the area that would potentially be
13 subject to indirect effects. The affected area includes both the direct and indirect effects areas.
14

15 The primary habitat type in the affected area is Sonora–Mojave creosotebush–white
16 bursage desert scrub (see Section 9.3.10). Potentially unique habitats in the affected area in
17 which special status species may reside include desert dunes, rocky cliffs and outcrops, desert
18 washes, and playas. Dry lake desert playas in the affected area include Troy Lake and Lavic
19 Lake. The Troy Lake playa occurs in the western portion of the SEZ; Lavic Lake occurs outside
20 of the SEZ but within the area of indirect effects approximately 4 mi (6 km) southeast of the
21 SEZ. The Mojave River occurs outside of the affected area but flows as near as 7 mi (11 km)
22 northwest of the SEZ (Figure 9.3.12.1-1).
23

24 In scoping comments on the proposed Pisgah SEZ (Stout 2009), the USFWS expressed
25 concern that groundwater withdrawals associated with solar energy development on the SEZ
26 may reduce the groundwater supply from the regional basin that supports aquatic and riparian
27 habitat in the SEZ region, particularly artificial refugia for the federally listed endangered
28 Mohave tui chub at Camp Cady, which is approximately 6 mi (10 km) northwest of the SEZ.
29 Groundwater withdrawals within the SEZ may also affect aquatic and riparian habitats along
30 the Mojave River, approximately 6 mi (10 km) northwest of the SEZ. Although these areas are
31 outside the above-defined affected area, they are considered in the area of indirect effects for
32 this evaluation.
33

34 All special status species that are known to occur within the Pisgah SEZ region
35 (i.e., within 50 mi [80 km] of the center of the SEZ) are listed, with their status, nearest recorded
36 occurrence, and habitats in Appendix J. Of these species, 54 could be affected by solar energy
37 development within the SEZ, based on recorded occurrences or the presence of potentially
38 suitable habitat in the area. These species, their status, and their habitats are presented in
39 Table 9.3.12.1-1. For many of the species listed in the table, their predicted potential occurrence
40 in the affected area is based only on a general correspondence between mapped CAREGAP land
41 cover types and descriptions of species habitat preferences. This overall approach to identifying
42 species in the affected area probably overestimates the number of species that actually occur in
43 the affected area. For many of the species identified as having potentially suitable habitat in the
44 affected area, the nearest known occurrence is more than 20 mi (32 km) away from the SEZ.
45

1 On the basis of CNDDDB records and information provided by the CDFG and USFWS,
2 there are 10 special status species that are known to occur within the affected area of the Pisgah
3 SEZ: Emory’s crucifixion-thorn, small-flowered androstephium, white-margined beardtongue,
4 Arroyo chub, Mohave tui chub, desert tortoise, Mojave fringe-toed lizard, southwestern pond
5 turtle, Bendire’s thrasher, and Nelson’s bighorn sheep. The nearest occurrences of the Arroyo
6 chub, Mohave tui chub, and southwestern pond turtle are more than 5 mi (8 km) from the SEZ;
7 however, these species are considered to occur within the affected area because they occur in
8 areas that may be affected by groundwater withdrawal from the SEZ.

9
10
11 ***9.3.12.1.1 Species Listed under the ESA That Could Occur in the Affected Area***
12

13 In their scoping comments on the proposed Pisgah SEZ, the USFWS expressed concern
14 for impacts of project development within the Pisgah SEZ on the desert tortoise (a species listed
15 as threatened under the ESA in the State of California) and the Mojave tui chub (a species listed
16 as endangered under the ESA) (Stout 2009). Both of these species are known to occur in the
17 affected area. These species are discussed below; additional basic information on life history,
18 habitat needs, and threats to populations of these species is provided in Appendix J.

19
20
21 **Mohave Tui Chub**
22

23 The Mohave tui chub occurs in artificial refugia at the CDFG’s Camp Cady Wildlife
24 Area along the Mojave River, approximately 6 mi (10 km) northwest of the Pisgah SEZ. This
25 site is one of only three known locations for this species globally (USFWS 2009b). The
26 proximity of this location relative to the SEZ and area of indirect effects is shown in
27 Figure 9.3.12.1-1 and summarized in Table 9.3.12.1-1.

28
29 In its scoping letter for the Pisgah SEZ, the USFWS discussed the interconnection of the
30 groundwater system that supports the aquatic and riparian habitats of the Mojave River and
31 Camp Cady and groundwater associated with Troy Lake (along the western portion of the SEZ).
32 The USFWS expressed concern that groundwater withdrawals from the vicinity of Troy Lake to
33 serve solar development on the Pisgah SEZ could contribute to the depletion of the regional
34 groundwater system, which is already depleted, and could potentially affect the artificial habitat
35 for the Mojave tui chub at the Camp Cady Wildlife Area by making it difficult to pump water to
36 maintain this habitat (Stout 2009).

37
38 The USFWS has not designated critical habitat for this species.
39

40
41 **Desert Tortoise**
42

43 The desert tortoise has the potential to occur within the SEZ on the basis of observed
44 occurrences on and near the SEZ, the presence of designated critical habitat within the area of
45 indirect effects, and the presence of potentially suitable habitat in the SEZ (Figure 9.3.12.1-1;
46 Table 9.3.12.1-1).

TABLE 9.3.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Pisgah SEZ

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants</i>						
Alkali mariposa-lily	<i>Calochortus striatus</i>	BLM-S; CA-S2; FWS-SC	Alkaline seeps, springs, and meadows at elevations between 2,600 and 4,600 ft. ^{h, i} Nearest recorded occurrences are 25 mi ^j northwest of the SEZ. About 107,377 acres ^k of potentially suitable habitat occurs within the SEZ region.	2,795 acres of potentially suitable habitat associated with the Troy Lake playa lost (2.6% of available potentially suitable habitat)	4,767 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance of playa habitat on the SEZ could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ, translocation of individuals from areas of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Note that these same potential mitigations apply to all special status plants.
Barstow woolly sunflower	<i>Eriophyllum mohavense</i>	BLM-S; CA-S2; FWS-SC	Known only from area surrounding Barstow, California on sandy or rocky substrates associated with creosotebush scrub, chenopod scrub, and playas at elevations between 2,000 and 3,000 ft. Nearest recorded occurrences are 20 mi northwest of the SEZ. About 2,677,079 acres of potentially suitable habitat occurs within the SEZ region.	18,466 acres of potentially suitable habitat lost (0.7% of available potentially suitable habitat)	111,523 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Black bog-rush	<i>Schoenus nigricans</i>	CA-S2	Endemic to California on alkaline or calcareous substrates within grasslands, marshes, springs, and swamps at elevations between 500 and 6,500 ft. Nearest recorded occurrences are 45 mi from the SEZ. About 107,377 acres of potentially suitable habitat occurs within the SEZ region.	2,795 acres of potentially suitable habitat associated with the Troy Lake playa lost (2.6% of available potentially suitable habitat)	4,767 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance of playa habitat on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Booth's evening-primrose	<i>Camissonia boothii</i> ssp. <i>boothii</i>	CA-S2	Shrubby, open, or dry areas of Joshua tree and pinyon-juniper woodlands at elevations between 3,000 and 7,900 ft. Nearest recorded occurrences are 45 mi from the SEZ. About 597,859 acres of potentially suitable habitat occurs within the SEZ region.	879 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	6,585 acres of potentially suitable habitat (1.1% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
California saw-grass	<i>Cladium californicum</i>	CA-S2	Alkaline, freshwater, and riparian habitats, including meadows, marshes, swamps, and seeps at elevations between 200 and 2,000 ft. Nearest recorded occurrences are 45 mi from the SEZ. About 118,936 acres of potentially suitable habitat occurs within the SEZ region.	2,795 acres of potentially suitable habitat associated with the Troy Lake playa lost (2.4% of available potentially suitable habitat)	4,835 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance of playa habitat on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Chaparral sand-verbena	<i>Abronia villosa</i> var. <i>aurita</i>	BLM-S; CA-S2	Endemic to southern California in chaparral desert sand dunes at elevations between 350 and 5,250 ft. Nearest recorded occurrences are 30 mi west of the SEZ. About 159,724 acres of potentially suitable habitat occurs within the SEZ region.	322 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	5,155 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Clokey's cryptantha	<i>Cryptantha clokeyi</i>	BLM-S; CA-S1	Mojave desertscrub on sandy or gravelly soils at elevations between 2,625 and 2,950 ft. Nearest recorded occurrences are 22 mi northwest of the SEZ. About 2,881,951 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Coulter's goldfields	<i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	BLM-S; CA-S2	Endemic to California in salt marshes, swamps, playas, alkaline sinks, and vernal pools at elevations below 4,000 ft. Nearest recorded occurrences are 50 mi south of the SEZ. About 107,377 acres of potentially suitable habitat occurs within the SEZ region.	2,795 acres of potentially suitable habitat associated with the Troy Lake playa lost (2.6% of available potentially suitable habitat)	4,767 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance of playa habitat on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Creamy blazing-star	<i>Mentzelia tridentata</i>	BLM-S; CA-S2	Mojave desert creosotebush scrub communities on rocky and sandy substrates at elevations below 3,900 ft. Nearest recorded occurrences are 11 mi west of the SEZ. About 2,300,615 acres of potentially suitable habitat occurs within the SEZ region.	14,548 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	101,079 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Darwin rock-cress	<i>Arabis pulchra</i> var. <i>munciensis</i>	CA-S1	Carbonate substrates along canyons, slopes, and washes at elevations between 3,600 and 6,800 ft. Nearest recorded occurrences are 50 mi from the SEZ. About 1,363,295 acres of potentially suitable habitat occurs within the SEZ region.	1,749 acres of potentially suitable rocky cliff and wash habitats lost (0.1% of available potentially suitable habitat)	42,969 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert washes on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Desert bedstraw	<i>Galium proliferum</i>	CA-S2	Endemic to southern California on carbonate substrates of rocky banks and ledges within Joshua tree woodlands, creosotebush scrub, Mojave desertscrub, and pinyon-juniper woodland habitats at elevations between 3,900 and 5,150 ft. Nearest recorded occurrences are 50 mi from the SEZ. About 4,179,076 acres of potentially suitable habitat occurs within the SEZ region.	16,932 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	148,726 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Desert cymopterus	<i>Cymopterus deserticola</i>	BLM-S	Deep, loose, well-drained, fine to coarse sandy soils of alluvial fan basins, often in low sand dunes and on sandy slopes at elevations between 2,060 and 3,060 ft. Nearest recorded occurrences are 35 mi northwest of the SEZ. About 82,699 acres of potentially suitable habitat occurs within the SEZ region.	244 acres of potentially suitable desert wash habitat lost (0.3% of available potentially suitable habitat)	1,907 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of dunes and sand transport systems on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Desert pincushion	<i>Coryphantha chlorantha</i>	CA-S1	Gravelly bajadas, limestone or dolomite rocky slopes often in association with pinyon-juniper woodland and Joshua tree woodland communities at elevations between 150 and 7,900 ft. Nearest recorded occurrences are 40 mi from the SEZ. About 2,898,476 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Emory's crucifixion-thorn¹	<i>Castela emoryi</i> ¹	CA-S2	Slightly wet areas with fine-textured alluvial bottomland soils associated with basalt flows within Mojave desertscrub, non-saline playas, creosotebush scrub, and Sonoran desertscrub communities at elevations between 295 and 2,200 ft. Known to occur on the SEZ and within other portions of the affected area. About 2,989,328 acres of potentially suitable habitat occurs within the SEZ region.	18,222 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	112,431 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Flat-seeded spurge	<i>Chamaesyce platysperma</i>	BLM-S; CA-S1; FWS-SC	Sandy substrates of desert dunes within desertscrub communities at elevations below 650 ft. Nearest recorded about 20 mi southwest of the SEZ; the species has not been recorded in the project area since 1974. About 147,861 acres of potentially suitable habitat occurs within the SEZ region.	322 acres of potentially suitable desert dune habitat lost (0.2% of available potentially suitable habitat)	5,155 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species, however, translocation may not be a feasible option for this species.
Harwood's eriastrum	<i>Eriastrum harwoodii</i>	BLM-S; CA-S2	Desert dunes and other sandy habitats at elevations between 650 and 3,000 ft. Nearest recorded occurrences are 35 mi northeast of the SEZ. About 147,861 acres of potentially suitable habitat occurs within the SEZ region.	322 acres of potentially suitable desert dune habitat lost (0.2% of available potentially suitable habitat)	5,155 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of dunes and sand transport systems on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Jackass-clover	<i>Wislizenia refracta</i> ssp. <i>refracta</i>	CA-S1	Dunes, sandy washes, roadsides, and playas within creosotebush scrub, alkali sink, or desertscrub communities of the Mojave and northern Sonoran Desert at elevations between 2,000 and 2,600 ft. Nearest recorded occurrences are 30 mi from the SEZ. About 406,930 acres of potentially suitable habitat occurs within the SEZ region.	3,535 acres of potentially suitable desert dune, playa, and wash habitats lost (0.9% of available potentially suitable habitat)	13,813 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert playas and washes on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Latimer's woodland-gilia	<i>Saltugilia latimeri</i>	BLM-S; CA-S2	Mojave desertscrub communities, pinyon-juniper woodlands, and washes on rocky or sandy substrates at elevations between 1,300 and 6,500 ft. Nearest recorded occurrence is 35 mi east of the SEZ. About 2,981,173 acres of potentially suitable habitat occurs within the SEZ region.	15,671 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	109,571 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Limestone beardtongue	<i>Penstemon calcareus</i>	BLM-S; CA-S2	Mojave desertscrub communities, pinyon-juniper forests, and Joshua tree woodlands on rocky carbonate substrates at elevations between 3,280 and 6,550 ft. Nearest recorded occurrences are 45 mi east of the SEZ. About 2,898,474 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Little San Bernardino Mountains linanthus	<i>Linanthus maculatus</i>	BLM-S; CA-S1	Desert dunes and sandy flats within creosotebush scrub and Joshua tree woodland communities at elevations less than 6,900 ft. Nearest recorded occurrences are 30 mi south of the SEZ. About 147,861 acres of potentially suitable habitat occurs within the SEZ region.	322 acres of potentially suitable desert dune habitat lost (0.2% of available potentially suitable habitat)	5,155 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of dunes and sand transport systems on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Long-stem evening-primrose	<i>Oenothera longissima</i>	CA-S1	Restricted to Inyo and San Bernardino counties in California in seasonally mesic desertscrub, creosotebush scrub, and pinyon-juniper woodland habitat at elevations between 3,300 and 5,500 ft. Nearest recorded occurrences are 50 mi from the SEZ. About 2,898,474 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Mojave monkeyflower	<i>Mimulus mohavensis</i>	BLM-S; CA-S2; FWS-SC	Endemic to the western Mojave Desert in San Bernardino County, California on gravelly banks of desert washes at elevations below 3,900 ft. Nearest recorded occurrences are 8 mi west of the SEZ. About 82,699 acres of potentially suitable habitat occurs within the SEZ region.	244 acres of potentially suitable desert wash habitat lost (0.3% of available potentially suitable habitat)	1,907 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert wash habitats on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Narrow-leaved cottonwood	<i>Populus angustifolia</i>	CA-S2	Upland riparian forest habitats at elevations between 3,900 and 5,900 ft. Nearest recorded occurrences are 45 mi from the SEZ. About 11,559 acres of potentially suitable habitat occurs within the SEZ region.	0 acres of potentially suitable habitat	68 acres of potentially suitable habitat (0.6% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Palmer's mariposa-lily	<i>Calochortus palmeri</i> var. <i>palmeri</i>	BLM-S; CA-S2; FWS-SC	Moist to wet meadows or moist grassy knolls and along creeks or swales within chaparral, pinyon woodlands, and pine forest communities at elevations between 3,280 and 7,850 ft. Nearest recorded occurrences are 35 mi southwest of the SEZ. About 11,559 acres of potentially suitable habitat occurs within the SEZ region.	0 acres of potentially suitable habitat	68 acres of potentially suitable habitat (0.6% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Parish's brittle-scale	<i>Atriplex parishii</i>	BLM-S; CA-S1; FWS-SC	Chenopod scrub, playas, and vernal pools in southern California at elevations between 100 and 6,200 ft. Nearest recorded occurrences are 35 mi southwest of the SEZ. About 376,464 acres of potentially suitable habitat occurs within the SEZ region.	3,918 acres of potentially suitable desert playa and wash habitats lost (1.0% of available potentially suitable habitat)	10,444 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance of desert playa habitats on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Parish's club-cholla	<i>Grusonia parishii</i>	CA-S2	Silty, sandy, or gravelly flats, dunes, and hills within Joshua tree woodland, and desertscrub communities at elevations between 100 and 5,000 ft. Nearest recorded occurrences are 45 mi from the SEZ. About 3,150,630 acres of potentially suitable habitat occurs within the SEZ region.	18,945 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	129,785 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Parish's phacelia	<i>Phacelia parishii</i>	BLM-S; CA-S1; FWS-SC	Mojave desertscrub communities and playas on alkaline-clay soils. Elevation ranges between 1,800 and 3,900 ft. Nearest recorded occurrences are 12 mi northwest of the SEZ. About 2,989,326 acres of potentially suitable habitat occurs within the SEZ region.	18,222 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	112,431 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Prairie wedge grass	<i>Sphenopholis obtusata</i>	CA-S2	Cismontane woodland, foothill woodland, stream banks, ponds, and mesic meadows and seeps at elevations between 990 and 6,500 ft. Nearest recorded occurrences are 45 mi from the SEZ. About 11,559 acres of potentially suitable habitat occurs within the SEZ region.	0 acres of potentially suitable habitat	68 acres of potentially suitable habitat (0.6% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Purple-nerve cymopterus	<i>Cymopterus multinervatus</i>	CA-S2	Sandy or gravelly slopes within desertscrub, Joshua tree woodland, and pinyon-juniper woodland communities at elevations between 2,600 and 5,900 ft. Nearest recorded occurrences are 6 mi southwest of the SEZ. About 2,898,476 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Salt Spring checkerbloom	<i>Sidalcea neomexicana</i>	CA-S2	Alkaline or mesic substrates within riparian wetlands, marshes, springs, chaparral, coastal scrub, coniferous forest, desertscrub, and playas habitats at elevations between 50 and 5,000 ft. Nearest recorded occurrences are 35 mi from the SEZ. About 3,012,750 acres of potentially suitable habitat occurs within the SEZ region.	18,222 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	112,499 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Slender cottonheads	<i>Nemacaulis denudata</i> var. <i>gracilis</i>	CA-S2	Sandy soils within coastal dunes, desert dunes, creosotebush scrub, and desertscrub communities at elevations below 1,300 ft. Nearest recorded occurrences are 35 mi from the SEZ. About 3,029,812 acres of potentially suitable habitat occurs within the SEZ region.	15,749 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	112,819 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Small-flowered androstephium	<i>Androstephium breviflorum</i>	CA-S1	Dry sandy to rocky soil substrates within desert dunes, creosotebush scrub, and desertscrub at elevations between 720 and 2,100 ft. Known to occur on the SEZ and within other portions of the affected area. About 3,130,736 acres of potentially suitable habitat occurs within the SEZ region.	18,942 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	129,330 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Spear-leaf matelea	<i>Matelea parvifolia</i>	CA-S2	Rocky substrates within creosotebush scrub and desertscrub communities. Elevation ranges between 1,450 and 3,600 ft. Nearest recorded occurrences are 40 mi from the SEZ. About 2,881,951 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Stephens' beardtongue	<i>Penstemon stephensii</i>	BLM-S; CA-S2; FWS-SC	Restricted to Inyo and San Bernardino counties, California on rocky (usually carbonate) substrates, including rock crevices, cliffs, rocky slopes, and washes associated with pinyon-juniper and creosotebush scrub communities at elevations between 3,900 and 6,550 ft. Nearest recorded occurrences are 40 mi east of the SEZ. About 3,663,910 acres of potentially suitable habitat occurs within the SEZ region.	16,297 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	144,048 acres of potentially suitable habitat (3.9% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Three-awned grama	<i>Bouteloua trifida</i>	CA-S2	Eastern Mojave Desert mountains on dry, rocky, often calcareous slopes within desertscrub communities at elevations between 2,300 and 6,500 ft. Nearest recorded occurrence is 45 mi east of the SEZ. About 2,881,951 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
Tidestrom's milkvetch	<i>Astragalus tidestromii</i>	CA-S2	East-central Mojave Desert mountains on sandy or gravelly substrates of carbonate derivation within creosotebush and desertscrub communities at elevations between 1,950 and 5,200 ft. Nearest recorded occurrences are 35 mi from the SEZ. About 2,881,951 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Utah glasswort	<i>Sarcocornia utahensis</i>	CA-S1	Alkaline substrates within chenopod scrub and playa habitats at elevations near 1,050 ft. Known to occur as near as Harper Lake, approximately 45 mi west of the SEZ. About 376,464 acres of potentially suitable habitat occurs within the SEZ region.	3,918 acres of potentially suitable desert playa and wash habitats lost (1.0% of available potentially suitable habitat)	10,444 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance of desert playa habitats on the SEZ could reduce impacts. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
White-bracted spineflower	<i>Chorizanthe xanti</i> var. <i>leucotheca</i>	BLM-S; CA-S2	Mojave desertscrub communities and pinyon-juniper woodlands on sandy or gravelly soils at elevations below 3,925 ft. Nearest recorded occurrences are 45 mi south of the SEZ. About 2,898,476 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.
White-margined beardtongue	<i>Penstemon albomarginatus</i>	BLM-S; CA-S1; FWS-SC	Desert sand dune habitats and Mojave desertscrub communities at elevations below 3,600 ft. Known to occur on the SEZ and in other portions of the affected area. About 3,029,810 acres of potentially suitable habitat occurs within the SEZ region.	15,749 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	112,819 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. See alkali mariposa-lily for a list of potential mitigations applicable to all special status plant species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
<i>Arthropods</i>						
Borrego parnopes cuckoo wasp	<i>Parnopes borregoensis</i>	CA-S1	Endemic to California, where it is known from the Sonoran and Mojave Deserts. General habitat preferences are poorly understood. May occur in desertscrub, creosotebush scrub, yucca and cholla cactus, saltbush, and desert dune communities. Nearest recorded occurrence is 45 mi south of the SEZ. About 3,029,812 acres of potentially suitable habitat occurs within the SEZ region.	15,749 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	112,819 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance of occupied habitats on the SEZ; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
<i>Fish</i>						
Arroyo chub	<i>Gila orcuttii</i>	CA-S2	Endemic to the southern coastal drainages of California in headwaters, creeks, and small to medium rivers; often in intermittent streams. Nearest recorded occurrences are from the Mojave River, approximately 13 mi north of the SEZ. The species is unlikely to occur in the affected area due to lack of suitable habitat.	0 acres of potentially suitable habitat	0 acres of potentially suitable habitat	Small to large overall impact depending on the volume of groundwater withdrawals. Limiting withdrawals from this regional groundwater system could reduce impacts on this species to negligible levels. Note that these potential impact magnitudes and potential mitigation measures apply to all groundwater-dependent special status species that may occur in the SEZ region.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Fish (Cont.)</i> Mohave tui chub	<i>Gila bicolor mohavensis</i>	ESA-E; CA-E; CA-FP; CA-S2	Restricted to a few known locations in San Bernardino County, California in deep pools or shallow portions of mineralized, alkaline waters. Formerly in mainstream Mojave River; now in lakes and mineral spring pools. Nearest recorded occurrences are from man-made ponds created in the Camp Cady Wildlife Area, approximately 6 mi northwest (downgradient) of the SEZ. The species is unlikely to occur in the affected area due to lack of suitable habitat.	0 acres of potentially suitable habitat	0 acres of potentially suitable habitat	Small to large overall impact depending on the volume of groundwater withdrawals. See Arroyo chub for potential impacts and mitigation measures applicable to all groundwater-dependent special status species. The potential for impact and need for mitigation should be determined in consultation with the USFWS and CDFG.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Reptiles</i> Desert tortoise	<i>Gopherus agassizii</i>	ESA-T; CA-T; CA-S2	Desert creosotebush communities on firm soils for digging burrows, often along riverbanks, washes, canyon bottoms, creosote flats, and desert oases. Known to occur on the SEZ and in other portions of the affected area. About 4,001,056 acres of potentially suitable habitat occurs within the SEZ region.	16,720 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	143,604 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ, translocation of individuals from areas of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts. The potential for impact and need for mitigation should be determined in consultation with the USFWS and CDFG.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Reptiles (Cont.)</i>						
Mojave fringe-toed lizard	<i>Uma scoparia</i>	BLM-S	Sparsely vegetated desert areas with fine windblown sand, including dunes, flats, and washes at elevations below 3,000 ft. Known to occur on the SEZ and in other portions of the affected area. About 3,849,554 acres of potentially suitable habitat occurs within the SEZ region.	19,218 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	156,798 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems or washes could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ, or compensatory mitigation of direct effects, could reduce impacts.
Southwestern pond turtle	<i>Actinemys marmorata pallida</i>	CA-S2	Ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches within woodland, forest, and grassland habitats. Slow-moving, shallow waters with abundant vegetation, and either rocky or muddy bottoms. Nearest recorded occurrences are from the Mojave River, approximately 8 mi northwest of the SEZ. The species is unlikely to occur in the affected area due to lack of suitable habitat.	0 acres of potentially suitable habitat	0 acres of potentially suitable habitat	Small to large overall impact depending on the volume of groundwater withdrawals. See Arroyo chub for potential impacts and mitigation measures applicable to all groundwater-dependent special status species.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Birds</i> Bendire's thrasher	<i>Toxostoma bendirei</i>	BLM-S	Summer resident in the SEZ region. Flats associated with succulent shrub and Joshua tree woodlands of the Mojave Desert. Known to occur on the SEZ and in other portions of the affected area. About 2,898,476 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats, especially nesting habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Ferruginous hawk	<i>Buteo regalis</i>	BLM-S; FWS-SC	Winter resident in the SEZ region. Open grasslands, sagebrush flats, desertscrub, desert valleys, and fringes of pinyon-juniper habitats. Known to occur in San Bernardino County. About 2,988,171 acres of potentially suitable habitat occurs within the SEZ region.	15,598 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	110,385 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds (Cont.)						
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	BLM-S; CA-S2; FWS-SC	Year-round resident in the SEZ region. Open areas with short, sparse vegetation, including grasslands, agricultural fields, and disturbed areas. Nests in burrows created by mammals or tortoises; local abundance is determined by small mammal prey abundance. Nearest recorded occurrence is 30 mi west of the SEZ. About 4,827,058 acres of potentially suitable habitat occurs within the SEZ region.	23,932 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	180,886 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied burrows and habitats in the area of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Mammals						
Mohave ground squirrel	<i>Spermophilus mohavensis</i>	BLM-S; CA-T; CA-S2	Open desertscrub, grasslands, and Joshua tree woodlands in the Mojave Desert in San Bernardino County at elevations between 1,800 and 5,000 ft. Utilizes burrows at the bases of shrubs. Nearest recorded occurrence is in the vicinity of Barstow, California, approximately 15 mi west of the SEZ. About 2,898,476 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,664 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered populations and occupied habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats, could reduce impacts.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Mammals (Cont.)</i>						
Nelson's bighorn sheep	<i>Ovis canadensis nelsoni</i>	BLM-S; FWS-SC	Open, steep rocky terrain in mountainous habitats of the eastern Mojave and Sonoran Deserts in California. Rarely uses desert lowlands, but may use them as corridors for travel between mountain ranges. Known to occur in the affected area from the Cady Mountains within 5 mi northeast of the SEZ. Suitable mountainous habitat does not exist on the site, but the species may migrate through the SEZ. About 1,846,238 acres of potentially suitable habitat occurs within the SEZ region.	20,578 acres of potentially suitable habitat lost (1.1% of available potentially suitable habitat)	126,778 acres of potentially suitable habitat (6.9% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats within the SEZ and habitats that serve as movement corridors could further reduce impacts.
Pallid bat	<i>Antrozous pallidus</i>	BLM-S; CA-SC; FWS-SC	Year-round resident in the SEZ region. Low-elevation desert communities, including grasslands, shrublands, and woodlands. Roosts in caves, crevices, and mines. Nearest recorded occurrence is from the Mojave River, approximately 6 mi northwest of the SEZ. About 4,230,325 acres of potentially suitable habitat occurs within the SEZ region.	16,932 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	148,804 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
Spotted bat	<i>Euderma maculatum</i>	BLM-S; CA-S2; CA-SC; FWS-SC	Year-round resident in the SEZ region. Arid deserts, grasslands, and mixed conifer forests at elevations below 9,800 ft. Primarily forages within riparian habitats and washes. Roosts in rock crevices along cliffs. Nearest recorded occurrence is 45 mi south of the SEZ. About 2,893,510 acres of potentially suitable habitat occurs within the SEZ region.	15,427 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	107,732 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

TABLE 9.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Mammals (Cont.)						
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM-S; CA-S2; CA-SC; FWS-SC	Year-round resident in the SEZ region in all habitats but subalpine and alpine habitats. Roosts in caves, mines, tunnels, buildings, or other man-made structures. Nearest recorded occurrence is from the Mojave River, approximately 7 mi northwest of the SEZ. About 4,808,761 acres of potentially suitable habitat occurs within the SEZ region.	23,950 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	181,086 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
Western mastiff bat	<i>Eumops perotis californicus</i>	BLM-S; CA-SC; FWS-SC	Year-round resident in the SEZ region. in many open semiarid habitats, including conifer and deciduous woodlands, shrublands, grasslands, chaparral, and urban areas. Roosts in crevices in cliff faces, buildings, and tall trees. Nearest recorded occurrence is 32 mi southwest of the SEZ. About 4,808,761 acres of potentially suitable habitat occurs within the SEZ region.	23,950 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	181,086 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

^a BLM-S = listed as a sensitive species by the BLM; CA-S1 = ranked as S1 in the State of California; CA-S2 = ranked as S2 in the State of California; CA-SC = species of concern in the State of California; CA-E = listed as endangered by the State of California; CA-T = listed as threatened by the State of California; CA-FP = California fully protected species; ESA-E = listed as endangered under the ESA; ESA-UR = under review for ESA listing; FWS-SC = USFWS species of concern.

^b For plant and invertebrate species, potentially suitable habitat was determined using CAREGAP land cover types. For reptile, bird, and mammal species, potentially suitable habitat was determined using CAREGAP habitat suitability models as well as CAREGAP land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, defined as the area within 50 mi (80 km) of the SEZ center.

^c Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined using CAREGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. Impacts of access road and transmission line construction, upgrade, or operation are not assessed in this evaluation due to the proximity of existing infrastructure to the SEZ.

Footnotes continued on next page.

TABLE 9.3.12.1-1 (Cont.)

-
- ^d Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and maintenance of an altered environment associated with operations.
- ^e Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- ^f Overall impact magnitude categories were based on professional judgment and include (1) *small*: $\leq 1\%$ of the population or its habitat would be lost, and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: $>10\%$ of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^g Species-specific mitigations are suggested here but final mitigations should be developed in consultation with state and federal agencies, and should be based on pre-disturbance surveys.
- ^h To convert ft to m, multiply by 0.3048.
- ⁱ Elevations in the areas of direct and indirect effect range from about 1,750 ft (530 m) to 4,650 ft (1,420 m).
- ^j To convert mi to km, multiply by 1.609.
- ^k To convert acres to km², multiply by 0.004047.
- ^l Species in bold text have been recorded or have designated critical habitat in the affected area.

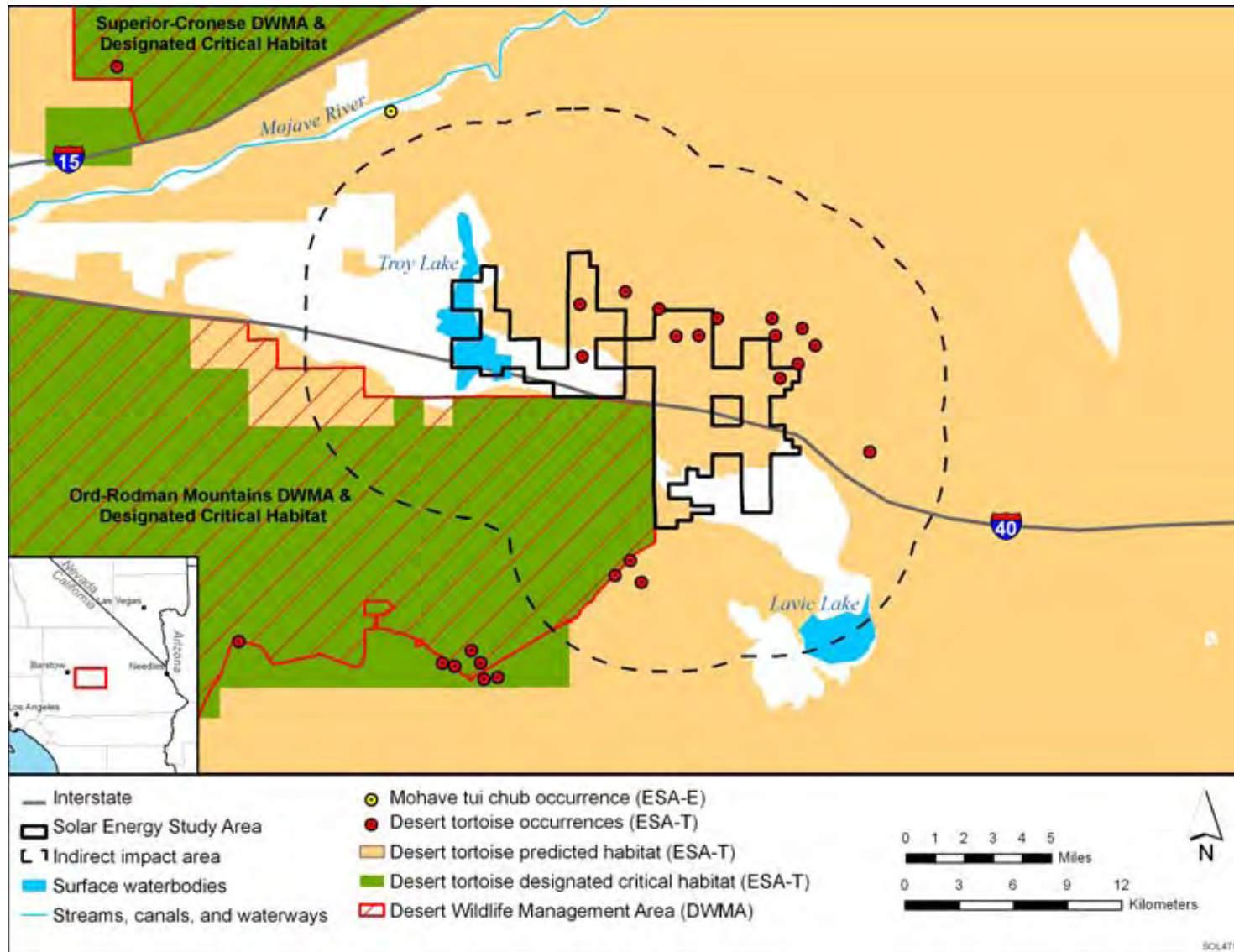


FIGURE 9.3.12.1-1 Known or Potential Occurrences of Species Listed as Endangered or Threatened under the ESA That May Occur in the Proposed Pisgah SEZ Affected Area (Sources: CDFG 2010b; USGS 2010a)

1 The desert tortoise occurs in the Ord-Rodman DWMA, which is adjacent to the southern
2 boundary of the proposed Pisgah SEZ within the area of indirect effects. In 2007, surveys for
3 desert tortoises were conducted by the USFWS Desert Tortoise Recovery Office in areas that
4 overlap the Pisgah SEZ (Stout 2009). On the basis of these survey results, the USFWS estimated
5 a desert tortoise density of about 3.5 individuals/km² within the 663,000-acre (2,682-km²)
6 survey area. Assuming the density across the Pisgah SEZ was similar to that within the survey
7 area, the USFWS estimated that the SEZ may support up to 260 desert tortoises.
8

9 CNDDDB records of desert tortoises within the SEZ are located primarily from the
10 northern portion of the SEZ near the southern slopes of the Cady Mountains (Figure 9.3.12.1-1).
11 According to the CAREGAP habitat suitability model, potentially suitable habitat for the desert
12 tortoise occurs throughout the majority of the SEZ and area of indirect effects (Figure 9.3.12.1-1;
13 Table 9.3.12.1-1). In addition, the USGS desert tortoise model (Nussear et al. 2009) predicts the
14 presence of highly suitable habitat (modeled suitability value ≥ 0.8 out of 1.0) throughout the
15 majority of the SEZ.
16

17 Designated critical habitat for this species does not occur on the SEZ, but adjacent critical
18 habitat occurs south of the SEZ in the area of indirect effects within the Ord-Rodman DWMA.
19 Designated critical habitat for the desert tortoise also occurs in the Superior-Cronese DWMA,
20 approximately 10 mi (16 km) northwest of the SEZ. The Pisgah SEZ is situated between the
21 Superior-Cronese (to the northwest) and Ord-Rodman (to the south) Critical Habitat units
22 (Figure 9.3.12-1); therefore, the SEZ may provide important connectivity between these two
23 critical habitat units.
24
25

26 **9.3.12.1.2 BLM-Designated Sensitive Species** 27

28 There are 29 BLM-designated sensitive species that may occur in the affected area of the
29 Pisgah SEZ (Table 9.3.12.1-1). BLM-designated sensitive species that may occur in the Pisgah
30 SEZ affected area include the following (1) plants: alkali mariposa-lily, Barstow woolly
31 sunflower, chaparral sand-verbena, Clokey's cryptantha, Coulter's goldfields, creamy blazing-
32 star, desert cymopterus, flat-seeded spurge, Harwood's eriastrum, Latimer's woodland-gilia,
33 limestone beardtongue, Little San Bernardino Mountains linanthus, Mojave monkeyflower,
34 Palmer's mariposa-lily, Parish's brittlescale, Parish's phacelia, Stephen's beardtongue, white-
35 bracted spineflower, and white-margined beardtongue; (2) reptiles: Mojave fringe-toed lizard;
36 (3) birds: Bendire's thrasher, ferruginous hawk, and western burrowing owl; and (4) mammals:
37 Mojave ground squirrel, Nelson's bighorn sheep, pallid bat, spotted bat, Townsend's big-eared
38 bat, and western mastiff bat. Of these species, the white-margined beardtongue, Mojave fringe-
39 toed lizard, Bendire's thrasher, and Nelson's bighorn sheep have been recorded in the affected
40 area. Habitats in which these species are found, the amount of potentially suitable habitat in the
41 affected area, and known locations of the species relative to the SEZ are discussed below and
42 presented in Table 9.3.12.1-1.
43
44
45

1 **Alkali Mariposa-Lily**

2
3 The alkali mariposa-lily is a perennial forb in the lily family that is known only from
4 wetlands in the western Mojave Desert region of southern California. It inhabits alkaline seeps,
5 springs, and meadows. The species is not known to occur on the SEZ, but potentially suitable
6 habitat does occur there and in other portions of the affected area (Table 9.3.12.1-1). The nearest
7 known occurrence of the species is about 25 mi (40 km) northwest of the Pisgah SEZ.
8
9

10 **Barstow Woolly Sunflower**

11
12 The Barstow woolly sunflower is an annual forb in the aster family that is restricted to the
13 Mojave Desert region surrounding Barstow, California. The species inhabits sandy and rocky
14 substrates within desertscrub communities and playas. The species is not known to occur on the
15 SEZ, but potentially suitable habitat does occur there and in other portions of the affected area
16 (Table 9.3.12.1-1). The nearest known occurrence of the species is about 20 mi (32 km)
17 northwest of the Pisgah SEZ.
18
19

20 **Chaparral Sand-Verbena**

21
22 The chaparral sand-verbena is a flowering herb that is endemic to southern California. It
23 historically occurred approximately 30 mi (48 km) west of the Pisgah SEZ, but it is currently
24 only known to occur in Riverside and Orange Counties outside of the area of indirect effects.
25 Although the species has not been recently recorded near the SEZ, potentially suitable sand dune
26 habitat does occur there and in other portions of the affected area (Table 9.3.12.1-1).
27
28

29 **Clokey's Cryptantha**

30
31 The Clokey's cryptantha is an annual forb in the borage family that is endemic to
32 southern California and known from only a few locations near Barstow in San Bernardino
33 County. It inhabits desertscrub communities on sandy or gravelly soils. The species is not known
34 to occur on the SEZ, but potentially suitable habitat does occur there and in other portions of the
35 affected area (Table 9.3.12.1-1). The nearest known occurrence of the species is about 22 mi (35
36 km) northwest of the Pisgah SEZ.
37
38

39 **Coulter's Goldfields**

40
41 The Coulter's goldfields is an annual forb in the aster family that is endemic to southern
42 California and northern Mexico. It inhabits salt marshes, swamps, playas, alkaline sinks, and
43 vernal pools. The species is not known to occur on the SEZ, but potentially suitable habitat does
44 occur there and in other portions of the affected area (Table 9.3.12.1-1). The nearest known
45 occurrence of the species is about 50 mi (80 km) south of the Pisgah SEZ.
46
47

1 **Creamy Blazing-Star**

2
3 The creamy blazing-star is an annual forb in the aster family that is endemic to the
4 Mojave Desert in southern California. It inhabits desert creosotebush scrub communities on
5 rocky and sandy substrates. The species is not known to occur on the SEZ, but potentially
6 suitable habitat does occur there and in other portions of the affected area (Table 9.3.12.1-1).
7 The nearest known occurrence of the species is about 11 mi (18 km) west of the Pisgah SEZ.
8

9
10 **Desert Cymopterus**

11
12 The desert cymopterus is a perennial forb in the carrot family that is endemic to the
13 western Mojave Desert in southern California. It inhabits deep, loose, well-drained, fine to
14 coarse sandy soils of alluvial fan basins and desert dunes. The species is not known to occur on
15 the SEZ, but potentially suitable habitat does occur there and in other portions of the affected
16 area (Table 9.3.12.1-1). The nearest known occurrence of the species is about 35 mi (56 km)
17 northwest of the Pisgah SEZ.
18

19
20 **Flat-Seeded Spurge**

21
22 The flat-seeded spurge is an annual forb in the spurge family that is known only from the
23 Mojave and Sonoran Deserts in southern California and southwestern Arizona. The species
24 inhabits sandy substrates of dunes within desertscrub communities. The species historically
25 occurred about 20 mi (32 km) southwest of the Pisgah SEZ but has not been recorded in the SEZ
26 region since 1974. It is not known to occur on the SEZ, but potentially suitable habitat does
27 occur there and in other portions of the affected area (Table 9.3.12.1-1).
28

29
30 **Harwood's Eriastrum**

31
32 The Harwood's eriastrum is an annual forb in the phlox family that is known only from
33 the Mojave Desert in southern California where it inhabits desert dunes. The species is not
34 known to occur on the SEZ, but potentially suitable habitat does occur there and in other portions
35 of the affected area (Table 9.3.12.1-1). The nearest known occurrence of the species is about
36 35 mi (56 km) northeast of the Pisgah SEZ.
37

38
39 **Latimer's Woodland-Gilia**

40
41 The Latimer's woodland-gilia is an annual forb in the phlox family that is endemic to
42 southern California from San Bernardino and Riverside Counties. It inhabits desertscrub, washes,
43 and pinyon-juniper woodland communities on rocky or sandy substrates. The species is not
44 known to occur on the SEZ, but potentially suitable habitat does occur there and in other portions
45 of the affected area (Table 9.3.12.1-1). The nearest known occurrence of the species is about
46 35 mi (56 km) east of the Pisgah SEZ.
47

1 **Limestone Beardtongue**

2
3 The limestone beardtongue is a perennial forb in the figwort family that is endemic to the
4 mountains of the Mojave Desert in southern California. It inhabits desertscrub communities,
5 pinyon-juniper forests, and Joshua tree woodlands. The species is not known to occur on the
6 SEZ, but potentially suitable habitat does occur there and in other portions of the affected area
7 (Table 9.3.12.1-1). The nearest known occurrence of the species is about 45 mi (72 km) east of
8 the Pisgah SEZ.

9
10
11 **Little San Bernardino Mountains Linanthus**

12
13 The Little San Bernardino Mountains linanthus is an annual forb in the phlox family that
14 is endemic to southern California in Riverside and San Bernardino Counties. It inhabits desert
15 dunes and sandy flats within creosotebush and Joshua tree woodland communities. The species
16 is not known to occur on the SEZ, but potentially suitable habitat does occur there and in other
17 portions of the affected area (Table 9.3.12.1-1). The nearest known occurrence of the species is
18 about 30 mi (48 km) south of the Pisgah SEZ.

19
20
21 **Mojave Monkeyflower**

22
23 The Mojave monkeyflower is an annual forb in the figwort family that is endemic to
24 San Bernardino County, California, where it inhabits the gravelly banks of desert washes. The
25 species is not known to occur on the SEZ, but potentially suitable habitat does occur there and
26 in other portions of the affected area (Table 9.3.12.1-1). The nearest known occurrence of the
27 species is about 8 mi (13 km) west of the Pisgah SEZ.

28
29
30 **Palmer's Mariposa-Lily**

31
32 The Palmer's mariposa-lily is a perennial forb in the lily family that is endemic to
33 California. It inhabits moist to wet meadows, grassy knolls, creek sides, pinyon-juniper
34 woodlands, and pine forests. The species is not known to occur on the SEZ, but potentially
35 suitable habitat does occur there and in other portions of the affected area (Table 9.3.12.1-1).
36 The nearest known occurrence of the species is about 35 mi (56 km) southwest of the Pisgah
37 SEZ.

38
39
40 **Parish's Brittle-scale**

41
42 The Parish's brittle-scale is an annual forb in the goosefoot family that is known from
43 only 11 occurrences in California. It is restricted to desertscrub, playas, and vernal pools. The
44 species is not known to occur on the SEZ, but potentially suitable habitat does occur there and
45 in other portions of the affected area (Table 9.3.12.1-1). The nearest known occurrence of the
46 species is about 35 mi (56 km) southwest of the Pisgah SEZ.

1 **Parish’s Phacelia**

2
3 The Parish’s phacelia is an annual forb in the waterleaf family that is known from
4 southwestern Nevada and the vicinity of Barstow, California, where it inhabits desertscrub and
5 playa communities on alkaline-clay soils. The species is not known to occur on the SEZ, but
6 potentially suitable habitat does occur there and in other portions of the affected area
7 (Table 9.3.12.1-1). The nearest known occurrence of the species is about 12 mi (19 km)
8 northwest of the Pisgah SEZ.

9
10
11 **Stephen’s Beardtongue**

12
13 The Stephen’s beardtongue is a perennial forb in the figwort family that is endemic to
14 Inyo and San Bernardino Counties, California. It inhabits rocky substrates, including rock
15 crevices, cliffs, rocky slopes, washes, and pinyon-juniper and creosote scrub communities. The
16 species is not known to occur on the SEZ, but potentially suitable habitat does occur there and in
17 other portions of the affected area (Table 9.3.12.1-1). The nearest known occurrence of the
18 species is about 40 mi (64 km) east of the Pisgah SEZ.

19
20
21 **White-Bracted Spineflower**

22
23 The white-bracted spineflower is an annual forb in the buckwheat family that is endemic
24 to the Mojave Desert of southern California, where it inhabits desertscrub communities and
25 pinyon-juniper woodlands. The species is not known to occur on the SEZ, but potentially
26 suitable habitat does occur there and in other portions of the affected area (Table 9.3.12.1-1).
27 The nearest known occurrence of the species is about 45 mi (72 km) south of the Pisgah SEZ.

28
29
30 **White-Margined Beardtongue**

31
32 The white-margined beardtongue is a perennial forb in the figwort family that occurs in
33 the deserts of Arizona, California, and Nevada. In California, it is known from fewer than 20
34 locations. It inhabits desert dunes and desertscrub communities of the Mojave Desert. This
35 species is known to occur on the SEZ; potentially suitable habitat exists on the SEZ and in other
36 portions of the affected area (Table 9.3.12.1-1).

37
38
39 **Mojave Fringe-Toed Lizard**

40
41 The Mojave fringe-toed lizard is a fairly small, smooth-skinned lizard that inhabits desert
42 sand dune habitats in the Mojave Desert of southern California. The species occurs as scattered
43 populations in specialized dune habitats composed of fine, loose, windblown sand deposits. The
44 species, and potentially suitable dune habitats for it, are known to occur on the Pisgah SEZ and
45 in other portions of the affected area (Table 9.3.12.1-1).

1 **Bendire’s Thrasher**

2
3 The Bendire’s thrasher is a small neotropical migrant bird that is a summer breeding
4 resident in southern California. This species inhabits desert succulent shrub and Joshua tree
5 habitats in the Mojave Desert where it is associated with sagebrush (*Artemisia* spp.), pinyon-
6 juniper woodlands, cholla cactus, Joshua tree, palo verde, mesquite, and agave species. The
7 species, and potentially suitable scrub and woodland habitats for it, are known to occur on the
8 SEZ and in other portions of the affected area (Table 9.3.12.1-1).

9
10
11 **Ferruginous Hawk**

12
13 The ferruginous hawk is a winter resident and migrant in the Pisgah SEZ region. The
14 species inhabits open grasslands, sagebrush flats, desertscrub, and the edges of pinyon-juniper
15 woodlands. This species is known to occur in San Bernardino County, California, and potentially
16 suitable foraging habitat occurs on the SEZ and in other portions of the affected area
17 (Table 9.3.12.1-1).

18
19
20 **Western Burrowing Owl**

21
22 The western burrowing owl is a year-round resident of open, dry grasslands and desert
23 habitats in southern California and Arizona. The species occurs locally in open areas with sparse
24 vegetation. The nearest recorded occurrences are 30 mi (48 km) west of the Pisgah SEZ.
25 Potentially suitable foraging and nesting habitat may occur on the SEZ and in other portions of
26 the affected area (Table 9.3.12.1-1). The availability of nest sites (burrows) within the affected
27 area has not been determined, shrubland habitat that may be suitable for either foraging or
28 nesting occurs throughout the affected area.

29
30
31 **Mojave Ground Squirrel**

32
33 The Mohave ground squirrel is restricted to the San Bernardino, Los Angeles, Kern,
34 and Inyo Counties of southern California. It inhabits Mojave Desertscrub, alkali desertscrub,
35 grasslands, and Joshua tree woodlands. The species is not known to occur on the SEZ, but
36 potentially suitable habitat does occur there and in other portions of the affected area
37 (Table 9.3.12.2-1). The nearest known occurrence of the species is about 15 mi (24 km) west
38 of the Pisgah SEZ.

39
40
41 **Nelson’s Bighorn Sheep**

42
43 The Nelson’s bighorn sheep is one of several subspecies of bighorn sheep known to occur
44 in the southwestern United States. This species occurs in desert mountain ranges in Arizona,
45 California, Nevada, Oregon, and Utah. The Nelson’s bighorn sheep uses primarily montane
46 shrubland, forest, and grassland habitats, and may utilize desert valleys as corridors for travel

1 between range habitats. In California, the species is known from the desert mountain ranges from
2 the White Mountains, south to the San Bernardino Mountains, and southeastward to the Mexican
3 border. The nearest recorded occurrences are from the Cady Mountains about 5 mi (8 km)
4 northeast of the Pisgah SEZ. The species is also known to occur in the Rodman Mountains
5 outside of the affected area, approximately 10 mi (16 km) west of the Pisgah SEZ. The SEZ and
6 other portions of the affected area may provide important habitat for sheep travelling between
7 these two ranges (Table 9.3.12.1-1).

10 **Pallid Bat**

11
12 The pallid bat is a large, pale bat with large ears that is locally common in desert
13 grasslands and shrublands in the southwestern United States. It roosts in caves, crevices, and
14 mines. The species is a year-round resident throughout southern California. The nearest recorded
15 occurrence is from the North Algodones Dunes Wilderness, approximately 18 mi (29 km) north
16 of the Pisgah SEZ. Potentially suitable habitat may occur on the SEZ and in other portions of the
17 affected area (Table 9.3.12.1-1). The potentially suitable habitat on the SEZ and in the area of
18 indirect effects could include foraging and roosting habitat. On the basis of an evaluation of land
19 cover types, approximately 1,500 acres (6 km²) and 41,000 acres (166 km²) of rocky cliffs and
20 outcrops on the SEZ and in the area of direct effects, respectively, could be potentially suitable
21 roosting habitat for this species.

24 **Spotted Bat**

25
26 The spotted bat is considered a rare year-round resident of southern California, where it
27 forages in mountain foothills, desert shrublands, grasslands, washes, riparian areas, and mixed
28 conifer forests. The species roosts in rock crevices along cliffs. The nearest recorded occurrences
29 are approximately 45 mi (72 km) south of the Pisgah SEZ. Potentially suitable habitat may occur
30 on the SEZ and in other portions of the affected area (Table 9.3.12.1-1). The potentially suitable
31 habitat on the SEZ and in the area of indirect effects could include foraging and roosting habitat.
32 On the basis of an evaluation of land cover types, approximately 1,500 acres (6 km²) and
33 41,000 acres (166 km²) of rocky cliffs and outcrops on the SEZ and in the area of direct effects,
34 respectively, could be potentially suitable roosting habitat for this species.

37 **Townsend's Big-Eared Bat**

38
39 The Townsend's big-eared bat is widely distributed throughout the western United States.
40 In California, the species forages year-round in a wide variety of desert and non-desert habitats.
41 The species roosts in caves, mines, tunnels, buildings, and other man-made structures. The
42 nearest recorded occurrences are approximately 35 mi (56 km) from the Pisgah SEZ.
43 Potentially suitable habitat may occur on the SEZ and in other portions of the affected area
44 (Table 9.3.12.1-1). The potentially suitable habitat on the SEZ and in the area of indirect effects
45 could include foraging and roosting habitat. On the basis of an evaluation of land cover types,
46 approximately 1,500 acres (6 km²) and 41,000 acres (166 km²) of rocky cliffs and outcrops on

1 the SEZ and in the area of direct effects, respectively, could be potentially suitable roosting
2 habitat for this species.

5 **Western Mastiff Bat**

7 The western mastiff bat is a large, uncommon resident of southern California and western
8 Arizona. The species forages in many open semiarid habitats, including conifer and deciduous
9 woodlands, shrublands, grassland, and urban areas. It roosts in crevices, trees, and buildings. The
10 nearest recorded occurrences are 16 mi (26 km) west of the Pisgah SEZ. Potentially suitable
11 habitat may occur on the SEZ and in other portions of the affected area (Table 9.3.12.1-1). The
12 potentially suitable habitat on the SEZ and in the area of indirect effects could include foraging
13 and roosting habitat. On the basis of an evaluation of land cover types, approximately
14 1,500 acres (6 km²) and 41,000 acres (166 km²) of rocky cliffs and outcrops on the SEZ and in
15 the area of direct effects, respectively, could be potentially suitable roosting habitat for this
16 species.

19 **9.3.12.1.3 State-Listed Species**

21 There are three species that are listed by the State of California that may occur in the
22 Pisgah SEZ affected area (Table 9.3.12.2-1). Of these species, there is one fish species (Mojave
23 tui chub), one reptile species (desert tortoise), and one mammal species (Mohave ground
24 squirrel). Each of these species are discussed previously due to their status under the ESA
25 (Section 9.3.12.1.1) or BLM (Section 9.3.12.1.2).

28 **9.3.12.1.4 Rare Species**

30 There are 51 rare species (i.e., state rank of S1 or S2 in California or a species of concern
31 by the State of California or USFWS) may occur in the affected area of the Pisgah SEZ
32 (Table 9.3.12.1-1). Of these species, 23 have not been discussed as ESA-listed
33 (Section 9.3.12.1.1), BLM-designated sensitive (Section 9.3.12.1.2), or state-listed
34 (Section 9.3.12.1.3).

37 **9.3.12.2 Impacts**

39 The potential for impacts on special status species from utility-scale solar energy
40 development within the proposed Pisgah SEZ is presented in this section. The types of impacts
41 that special status species could incur from construction and operation of utility-scale solar
42 energy facilities are discussed in Section 5.10.4.

44 The assessment of impacts on special status species is based on available information
45 on the presence of species in the affected area as presented in Section 9.3.12.1 following the
46 analysis approach described in Appendix M. It is assumed that, prior to development, surveys

1 would be conducted to determine the presence of special status species and their habitats in and
2 near areas where ground-disturbing activities would occur. Additional NEPA assessments, ESA
3 consultations, and coordination with state natural resource agencies may be needed to address
4 project-specific impacts more thoroughly. These assessments and consultations could result in
5 additional required actions to avoid, minimize, or mitigate impacts on special status species
6 (see Section 9.3.12.3).

7
8 Solar energy development within the Pisgah SEZ could affect a variety of habitats
9 (see Sections 9.3.9 and 9.3.10). These impacts on habitats could in turn affect special status
10 species that are dependent on those habitats. Based on CNDDDB records and information
11 provided by the CDFG and USFWS, there are ten special status species known to occur in the
12 affected area of the Pisgah SEZ: Emory's crucifixion-thorn, small-flowered androstaphylos,
13 white-margined beardtongue, Arroyo chub, Mohave tui chub, desert tortoise, Mojave fringe-toed
14 lizard, southwestern pond turtle, Bendire's thrasher, and Nelson's bighorn sheep. These species
15 are listed in bold in Table 9.3.12.1-1. No other special status species have been recorded in the
16 affected area (CDFG 2010b). Other special status species may occur on the SEZ or within the
17 affected area based on the presence of potentially suitable habitat. As discussed in
18 Section 9.3.12.1, this approach to identifying the species that could occur in the affected area
19 probably overestimates the number of species that actually occur in the affected area, and may
20 therefore overestimate impacts on some special status species.

21
22 Potential direct and indirect impacts on special status species within the SEZ and in the
23 area of indirect effect outside the SEZ are presented in Table 9.3.12.1-1. In addition, the overall
24 potential magnitude of impacts on each species (assuming programmatic design features are in
25 place) is presented along with any potential species-specific mitigation measures that could
26 further reduce impacts.

27
28 Impacts on special status species could occur during all phases of development
29 (construction, operation, and decommissioning and reclamation) of a utility-scale solar energy
30 project within the SEZ. Construction and operation activities could result in short- or long-term
31 impacts on individuals and their habitats, especially if these activities are sited in areas where
32 special status species are known to or could occur. As presented in Section 9.3.1.2, impacts of
33 access road and transmission line construction, upgrade, or operation are not assessed in this
34 evaluation due to the proximity of existing infrastructure to the SEZ.

35
36 Direct impacts would result from habitat destruction or modification. It is assumed that
37 direct impacts would occur only within the SEZ, where ground-disturbing activities are expected
38 to occur. Indirect impacts could result from surface water and sediment runoff from disturbed
39 areas, fugitive dust generated by project activities, accidental spills, harassment, and lighting. No
40 ground-disturbing activities associated with project developments are anticipated to occur within
41 the area of indirect effects. Decommissioning of facilities and reclamation of disturbed areas
42 after operations cease could result in short-term negative impacts on individuals and habitats
43 adjacent to project areas. long-term benefits would accrue if original land contours and native
44 plant communities were restored in previously disturbed areas.

1 The successful implementation of programmatic design features (discussed in
2 Appendix A, Section A.2.2) would reduce direct impacts on some special status species,
3 especially those that depend on habitat types that can be easily avoided (e.g., dunes and sand
4 transport systems, playa and desert wash habitats). Indirect impacts on special status species
5 could be reduced to negligible levels by implementing programmatic design features, especially
6 those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust.
7
8

9 ***9.3.12.2.1 Impacts on Species Listed Under the ESA***

10
11
12 Impacts on the two ESA-listed species that may occur in the Pisgah SEZ affected area, or
13 that may be affected by solar energy development on the SEZ, are discussed below.
14
15

16 **Mohave Tui Chub**

17
18 The Mohave tui chub is listed as endangered under the ESA. It is known from only three
19 locations in southern California. One location, a man-made pond at the CDFG's Camp Cady
20 Wildlife Area, is located near the Mojave River approximately 6 mi (10 km) northwest of the
21 Pisgah SEZ. Suitable habitat for this species does not occur on the SEZ or in the affected area,
22 and the nearest potential habitat along the Mojave River and known occurrences within the
23 Camp Cady refugia are outside of the affected area (Figure 9.3.12.1-1). However, the regional
24 groundwater system that supports aquatic habitats within the Mojave River and Camp Cady
25 Wildlife Area is supplemented by additive recharge from the Troy Lake playa in the western
26 portion of the Pisgah SEZ (Stout 2009; see Section 9.3.9.1.2 for further details). Therefore,
27 utilization of groundwater resources from the SEZ for cooling could affect the regional
28 groundwater supply that supports aquatic habitat for the Mohave tui chub.
29

30 Groundwater withdrawals to serve the cooling needs of solar development on the Pisgah
31 SEZ could contribute to the depletion of the regional groundwater system, which is already
32 over-depleted, and could affect the habitat for the Mohave tui chub at the Camp Cady Wildlife
33 Area by making it difficult to pump water to maintain this habitat (Stout 2009). However,
34 impacts of groundwater depletion from solar energy development in the Pisgah SEZ cannot be
35 quantified without identification of the cumulative amount of groundwater withdrawals need to
36 support development on the SEZ. Consequently, the overall impact on the Mohave tui chub
37 could range from small to large depending upon the solar energy technology deployed and the
38 scale of development within the SEZ (Table 11.1.12.1-1).
39

40 The Mohave tui chub is listed by the CDFG as a California fully protected species. As
41 such, the CDFG has the authority to prohibit direct and indirect impacts on this species under
42 any circumstance. Therefore, the direct and indirect impacts on occupied and suitable habitats at
43 Camp Cady and in the Mojave River should be completely avoided. The implementation of
44 programmatic design features and the avoidance of groundwater withdrawals in the vicinity of
45 the SEZ that would affect habitat quality and availability at Camp Cady and in the Mojave River
46 could reduce impacts on this species to negligible levels. Consultation with the USFWS and
47 CDFG should be required under the ESA and CESA to fully address the impacts of solar

1 development on the Mohave tui chub and to determine any additional mitigation requirements.
2 The strict mitigation measures provided to the Mohave tui chub may also successfully reduce or
3 eliminate impacts on other groundwater-dependent species (e.g., Arroyo chub, southwestern
4 pond turtle).

7 **Desert Tortoise**

8
9 The desert tortoise is listed as a threatened species under the ESA throughout the entire
10 Pisgah SEZ region. The desert tortoise has the potential to occur within the SEZ on the basis of
11 observed occurrences on and near the SEZ, presence of designated critical habitat within the area
12 of indirect effects, and the presence of apparently suitable habitat in the SEZ (Figure 9.3.12.1-1;
13 Table 9.3.12.1-1). The tortoise is known to occur in the Ord-Rodman DWMA within the area of
14 indirect effects adjacent to the southern boundary of the SEZ; the species is also known to occur
15 in the northern portion of the SEZ near the Cady Mountains (Figure 9.3.12.1-1). According to
16 the CAREGAP habitat suitability model, approximately 16,720 acres (68 km²) of potentially
17 suitable habitat on the SEZ could be directly affected by construction and operations of solar
18 energy facilities on the SEZ (Table 9.3.12.1-1). This direct effects area represents about 0.4% of
19 available suitable habitat of the desert tortoise in the region. Much of this habitat within the SEZ
20 is considered to be highly suitable (modeled suitability value ≥ 0.8 out of 1.0) according to the
21 USGS desert tortoise habitat suitability model (Nussear et al. 2009). About 143,604 acres
22 (581 km²) of suitable habitat occurs in the area of potential indirect effects; this area represents
23 about 3.6% of the available suitable habitat in the region (Table 9.3.12.1-2).

24
25 On the basis of desert tortoise surveys conducted in the areas near and overlapping the
26 Pisgah SEZ, the USFWS estimated that full-scale solar energy development on the SEZ may
27 directly affect up to 260 desert tortoises on the SEZ (Stout 2009). In addition to direct impacts,
28 development on the SEZ could indirectly affect desert tortoises by fragmenting and degrading
29 adjacent habitat (refer to Section 5.10.4 for a discussion of possible indirect impacts).
30 Fragmentation would be exacerbated by the installation of exclusionary fencing at the perimeter
31 of the SEZ or individual project areas. The SEZ is situated between the Ord-Rodman and
32 Superior-Cronese DWMA (these DWMA also contain USFWS-designated critical habitat),
33 and terrestrial habitats within the SEZ may provide important linkages between the DWMA.
34 Therefore, development on the SEZ may disrupt desert tortoise population dynamics in nearby
35 DWMA and designated critical habitat.

36
37 The overall impact on the desert tortoise from construction, operation, and
38 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
39 small because the amount of potentially suitable habitat for this species in the area of direct
40 effects represents less than 1% of potentially suitable habitat in the region. The implementation
41 of programmatic design features alone is unlikely to reduce these impacts to negligible levels.
42 Avoidance of all potentially suitable habitats for this species is not a feasible means of mitigating
43 impacts because these habitats (desertscrub) are widespread throughout the area of direct effect.

44
45 Development of actions to reduce impacts (e.g., reasonable and prudent alternatives,
46 reasonable and prudent measures, and terms and conditions) for the desert tortoise, including

1 development of a survey protocol, avoidance measures, minimization measures, and, potentially,
2 translocation actions and compensatory mitigation, would require formal consultation with the
3 USFWS under Section 7 of the ESA. These consultations may be used to authorize incidental
4 take statements per Section 10 of the ESA (if necessary). In addition, the CESA provides
5 authority to the CDFG to regulate potential impacts on the desert tortoise and other species listed
6 under the CESA. Therefore, formal consultation with the CDFG would also be required to permit
7 the incidental take of desert tortoises in the SEZ.
8

9 There are inherent dangers to tortoises associated with their capture, handling, and
10 translocation from the SEZ. These actions, if done improperly, can result in injury or death. To
11 minimize these risks, and as stated above, the desert tortoise translocation plan should be
12 developed in consultation with the USFWS and CDGF, and follow the *Guidelines for Handling*
13 *Desert Tortoises During Construction Projects* (Desert Tortoise Council 1994) and other current
14 translocation guidance provided by the USFWS and CDFG. Consultation will identify
15 potentially suitable recipient locations, density thresholds for tortoise populations in recipient
16 locations, procedures for pre-disturbance clearance surveys and tortoise handling, as well as
17 disease testing and post-translocation monitoring and reporting requirements. Despite some risk
18 of mortality or decreased fitness, translocation is widely accepted as a useful strategy for the
19 conservation of the desert tortoise (Field et al. 2007).
20

21 To offset impacts of solar development on the SEZ, compensatory mitigation may be
22 needed to balance the acreage of habitat lost with acquisition of lands that would be improved
23 and protected for desert tortoise populations (USFWS 1994). Compensation can be accomplished
24 by improving the carrying capacity for the desert tortoise on the acquired lands. Other mitigation
25 actions may include funding for the habitat enhancement of the desert tortoise on existing federal
26 lands. Consultations with the USFWS and CDGF would be necessary to determine the
27 appropriate mitigation ratio to acquire, enhance, and preserve desert tortoise compensation lands.
28
29

30 ***9.3.12.2.2 Impacts on BLM-Designated Sensitive Species***

31
32 Impacts on the 28 BLM-designated sensitive species that have potentially suitable habitat
33 within the SEZ and are not previously discussed as ESA-listed (Section 9.3.12.2.1) are discussed
34 below.
35
36

37 **Alkali Mariposa-Lily**

38
39 The alkali mariposa-lily is not known to occur in the affected area of the Pisgah SEZ;
40 however, according to the CAREGAP land cover model, approximately 2,795 acres (11 km²) of
41 potentially suitable desert playa habitat on the SEZ could be directly affected by construction and
42 operations (Table 9.3.12.1-1). This direct impact area represents about 2.6% of available suitable
43 habitat in the region. About 4,767 acres (19 km²) of potentially suitable habitat occurs in the area
44 of potential indirect effect; this area represents about 4.4% of the available suitable habitat in the
45 region (Table 9.3.12.1-1).
46

1 The overall impact on the alkali mariposa-lily from construction, operation, and
2 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
3 moderate because the amount of potentially suitable habitat for this species in the area of direct
4 effects represents greater than 1% but less than 10% of potentially suitable habitat in the region.
5 The implementation of programmatic design features would reduce indirect impacts to negligible
6 levels.

7
8 Potentially suitable habitat for the alkali mariposa-lily occurs in a limited portion of the
9 SEZ (primarily associated with Troy Lake) and could be completely avoided during the
10 development of facilities and protected from indirect effects. Alternatively, avoiding or
11 minimizing disturbance to occupied habitats also would reduce impacts on this species. If
12 avoidance or minimization are not feasible options, plants could be translocated from the area
13 of direct effects to protected areas that would not be affected directly or indirectly by future
14 development. Alternatively, or in combination with translocation, a compensatory mitigation
15 plan could be developed and implemented to mitigate direct effects on occupied habitats.
16 Compensation could involve the protection and enhancement of existing occupied or suitable
17 habitats to compensate for habitats lost to development. A comprehensive mitigation strategy
18 that used one or more of these options could be designed to completely offset the impacts of
19 development. The need for mitigation, other than programmatic design features, should be
20 determined by conducting pre-disturbance surveys for the species and its habitat on the SEZ.

21 22 23 **Barstow Woolly Sunflower**

24
25 The Barstow woolly sunflower is not known to occur in the affected area of the
26 Pisgah SEZ; however, according to the CAREGAP land cover model, approximately 18,466
27 acres (75 km²) of potentially suitable desertscrub and playa habitat on the SEZ could be directly
28 affected by construction and operations (Table 9.3.12.1-1). This direct impact area represents
29 about 0.7% of available suitable habitat in the region. About 111,523 acres (451 km²) of
30 potentially suitable habitat occurs in the area of potential indirect effect; this area represents
31 about 4.2% of the available suitable habitat in the region (Table 9.3.12.1-1).

32
33 The overall impact on the Barstow woolly sunflower from construction, operation, and
34 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
35 small because the amount of potentially suitable habitat for this species in the area of direct
36 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
37 implementation of programmatic design features are expected to reduce indirect impacts to
38 negligible levels.

39
40 The avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts
41 on the Barstow woolly sunflower because these habitats (mostly desert scrub) are widespread
42 throughout the area of direct effects. However, impacts could be reduced to negligible levels
43 with the implementation of programmatic design features and the mitigation options described
44 previously for the alkali mariposa-lily. The need for mitigation should first be determined by
45 conducting pre-disturbance surveys for the species and its habitat on the SEZ.

1 **Chaparral Sand-Verbena**
2

3 The chaparral sand-verbena historically occurred as near as 30 mi (48 km) west of the
4 SEZ, but it is currently only known to occur in Orange and Riverside Counties, California,
5 outside of the area of indirect effects. According to the CAREGAP land cover model,
6 approximately 322 acres (1 km²) of potentially suitable desert sand dune habitat within the SEZ
7 may be directly affected by project construction and operations (Table 9.3.12.1-1). This direct
8 impact area represents 0.2% of available suitable habitat in the region. About 5,155 acres
9 (21 km²) of potentially suitable habitat occurs within the area of indirect effects; this area
10 represents about 3.2% of the available suitable habitat in the region (Table 9.3.12.1-1).
11

12 The overall impact on the chaparral sand-verbena from construction, operation, and
13 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
14 small because the amount of potentially suitable habitat for this species in the area of direct
15 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
16 implementation of programmatic design features would reduce indirect impacts to negligible
17 levels.
18

19 Chaparral sand-verbena habitat (desert sand dunes) occupies a limited portion of the SEZ
20 and could be avoided during the development of facilities and protected from indirect effects. In
21 conjunction with the implementation of programmatic design features, avoiding or minimizing
22 disturbance of occupied habitats and desert dunes and sand transport systems, and the mitigation
23 measures described previously for the alkali mariposa-lily, could further reduce impacts on this
24 species. The need for mitigation should first be determined by conducting pre-disturbance
25 surveys for the species and its habitat on the SEZ.
26

27
28 **Clokey's Cryptantha**
29

30 The Clokey's cryptantha is not known to occur in the affected area of the Pisgah SEZ;
31 however, according to the CAREGAP land cover model, approximately 15,427 acres (62 km²)
32 of potentially suitable desertscrub and playa habitat on the SEZ could be directly affected by
33 construction and operations (Table 9.3.12.1-1). This direct impact area represents about 0.5%
34 of available suitable habitat in the region. About 107,664 acres (436 km²) of potentially suitable
35 habitat occurs in the area of potential indirect effect; this area represents about 3.7% of the
36 available suitable habitat in the region (Table 9.3.12.1-1).
37

38 The overall impact on the Clokey's cryptantha from construction, operation, and
39 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
40 small because the amount of potentially suitable habitat for this species in the area of direct
41 effects represents less than 1% of potentially suitable habitat in the region. The implementation
42 of programmatic design features would reduce indirect impacts to negligible levels.
43

44 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on
45 the Clokey's cryptantha because some of these habitats (desertscrub) are widespread throughout
46 the area of direct effect. However, impacts could be reduced to negligible levels with the

1 implementation of programmatic design features and the mitigation options described previously
2 for the alkali mariposa-lily. The need for mitigation should first be determined by conducting
3 pre-disturbance surveys for the species and its habitat on the SEZ.
4

6 **Coulter's Goldfields**

7
8 The Coulter's goldfields is not known to occur in the affected area of the Pisgah SEZ;
9 however, according to the CAREGAP land cover model, approximately 2,795 acres (11 km²) of
10 potentially suitable desert playa habitat on the SEZ could be directly affected by construction and
11 operations (Table 9.3.12.1-1). This direct impact area represents about 2.6% of available suitable
12 habitat in the region. About 4,767 acres (19 km²) of potentially suitable habitat occurs in the area
13 of potential indirect effect; this area represents about 4.4% of the available suitable habitat in the
14 region (Table 9.3.12.1-1).
15

16 The overall impact on the Coulter's goldfields from construction, operation, and
17 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
18 moderate because the amount of potentially suitable habitat for this species in the area of direct
19 effects represents greater than 1% but less than 10% of potentially suitable habitat in the region.
20 The implementation of programmatic design features would reduce indirect impacts to negligible
21 levels.
22

23 Potentially suitable habitat for the Coulter's goldfields (desert playa) occurs in a limited
24 portion of the SEZ in association with Troy Lake near the western portion of the SEZ and
25 could be avoided during the development of facilities and protected from indirect effects. In
26 conjunction with the implementation of programmatic design features, avoiding or minimizing
27 disturbance to occupied habitats and desert playa habitats, and the mitigation measures described
28 previously for the alkali mariposa-lily, could further reduce impacts on this species. The need for
29 mitigation should first be determined by conducting pre-disturbance surveys for the species and
30 its habitat on the SEZ.
31
32

33 **Creamy Blazing-Star**

34
35 The creamy blazing-star is not known to occur in the affected area of the Pisgah SEZ;
36 however, according to the CAREGAP land cover model, approximately 14,548 acres (59 km²)
37 of potentially suitable desertscrub habitat on the SEZ could be directly affected by construction
38 and operations (Table 9.3.12.1-1). This direct impact area represents about 0.6% of available
39 suitable habitat in the region. About 101,079 acres (409 km²) of potentially suitable habitat
40 occurs in the area of potential indirect effect; this area represents about 4.4% of the available
41 suitable habitat in the SEZ region (Table 9.3.12.1-1).
42

43 The overall impact on the creamy blazing-star from construction, operation, and
44 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
45 small because the amount of potentially suitable habitat for this species in the area of direct
46 effects represents less than 1% of potentially suitable habitat in the SEZ region. The

1 implementation of programmatic design features would reduce indirect impacts to negligible
2 levels.

3
4 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on
5 the creamy blazing-star because some of these habitats (desertscrub) are widespread throughout
6 the area of direct effect. However, impacts could be reduced to negligible levels with the
7 implementation of programmatic design features and the mitigation options described previously
8 for the alkali mariposa-lily. The need for mitigation should first be determined by conducting
9 pre-disturbance surveys for the species and its habitat on the SEZ.

12 **Desert Cymopterus**

13
14 The desert cymopterus is not known to occur in the affected area of the Pisgah SEZ;
15 however, according to the CAREGAP land cover model, approximately 244 acres (1 km²) of
16 potentially suitable desert wash habitat on the SEZ could be directly affected by construction and
17 operations (Table 9.3.12.1-1). This direct impact area represents about 0.3% of available suitable
18 habitat in the region. About 1,907 acres (8 km²) of potentially suitable habitat occurs in the area
19 of potential indirect effect; this area represents about 2.3% of the available suitable habitat in the
20 region (Table 9.3.12.1-1).

21
22 The overall impact on the desert cymopterus from construction, operation, and
23 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
24 small because the amount of potentially suitable habitat for this species in the area of direct
25 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
26 implementation of programmatic design features would reduce indirect impacts to negligible
27 levels.

28
29 Potentially suitable habitat of the desert cymopterus (desert wash) occurs on a limited
30 portion of the SEZ and could be avoided during the development of facilities and protected from
31 indirect effects. In conjunction with the implementation of programmatic design features,
32 avoiding or minimizing disturbance of occupied habitats and desert wash habitats, and the
33 mitigation measures described previously for the alkali mariposa-lily, could further reduce
34 impacts on this species. The need for mitigation should first be determined by conducting pre-
35 disturbance surveys for the species and its habitat on the SEZ.

38 **Flat-Seeded Spurge**

39
40 The flat-seeded spurge is not known to occur in the affected area of the Pisgah SEZ;
41 however, according to the CAREGAP land cover model, approximately 322 acres (1 km²) of
42 potentially suitable desert sand dune habitat within the SEZ may be directly affected by project
43 construction and operations (Table 9.3.12.1-1). This direct impact area represents 0.2% of
44 available suitable habitat in the region. About 5,155 acres (21 km²) of potentially suitable habitat
45 occurs within the area of indirect effects; this area represents about 3.2% of the available suitable
46 habitat in the region (Table 9.3.12.1-1).

1 The overall impact on the flat-seeded spurge from construction, operation, and
2 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
3 small because the amount of potentially suitable habitat for this species in the area of direct
4 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
5 implementation of programmatic design features would reduce indirect impacts to negligible
6 levels.
7

8 Flat-seeded spurge habitat (desert sand dunes) occupies a limited portion of the SEZ and
9 could be avoided during the development of facilities and protected from indirect effects. In
10 conjunction with the implementation of programmatic design features, avoiding or minimizing
11 disturbance of occupied habitats and desert dunes and sand transport systems, in addition to the
12 mitigation measures described previously for the alkali mariposa-lily, could further reduce
13 impacts on this species; however, translocation may not be a feasible mitigation option for this
14 species. The need for mitigation should first be determined by conducting pre-disturbance
15 surveys for the species and its habitat on the SEZ.
16
17

18 **Harwood's Eriastrum**

19

20 The Harwood's eriastrum is not known to occur in the affected area of the Pisgah SEZ;
21 however, according to the CAREGAP land cover model, approximately 322 acres (1 km²) of
22 potentially suitable desert dune habitat on the SEZ could be directly affected by construction and
23 operations (Table 9.3.12.1-1). This direct impact area represents about 0.2% of available suitable
24 habitat in the region. About 5,155 acres (21 km²) of potentially suitable habitat occurs in the area
25 of potential indirect effect; this area represents about 3.5% of the available suitable habitat in the
26 SEZ region (Table 9.3.12.1-1).
27

28 The overall impact on the Harwood's eriastrum from construction, operation, and
29 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
30 small because the amount of potentially suitable habitat for this species in the area of direct
31 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
32 implementation of programmatic design features would reduce indirect impacts to negligible
33 levels.
34

35 Potentially suitable habitat for the Harwood's eriastrum (desert sand dunes) occurs on a
36 limited portion of the SEZ and could be avoided during the development of facilities and
37 protected from indirect effects. In conjunction with the implementation of programmatic design
38 features, avoiding or minimizing disturbance to occupied habitats and desert dunes and sand
39 transport systems, and the mitigation measures described previously for the alkali mariposa-lily,
40 could further reduce impacts on this species. The need for mitigation should first be determined
41 by conducting pre-disturbance surveys for the species and its habitat on the SEZ.
42
43
44

1 **Latimer’s Woodland-Gilia**

2
3 The Latimer’s woodland-gilia is not known to occur in the affected area of the Pisgah
4 SEZ; however, according to the CAREGAP land cover model, approximately 15,671 acres
5 (63 km²) of potentially suitable desertscrub and wash habitat on the SEZ could be directly
6 affected by construction and operations (Table 9.3.12.1-1). This direct impact area represents
7 about 0.5% of available suitable habitat in the region. About 109,571 acres (443 km²) of
8 potentially suitable habitat occurs in the area of potential indirect effect; this area represents
9 about 3.7% of the available suitable habitat in the region (Table 9.3.12.1-1).

10
11 The overall impact on the Latimer’s woodland gilia from construction, operation, and
12 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
13 small because the amount of potentially suitable habitat for this species in the area of direct
14 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
15 implementation of programmatic design features would reduce indirect impacts to negligible
16 levels.

17
18 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts
19 on the Latimer’s woodland gilia because some of these habitats (desertscrub) are widespread
20 throughout the area of direct effect. However, impacts could be reduced to negligible levels with
21 the implementation of mitigation options described previously for the alkali mariposa-lily. The
22 need for mitigation should first be determined by conducting pre-disturbance surveys for the
23 species and its habitat on the SEZ.

24
25
26 **Limestone Beardtongue**

27
28 The limestone beardtongue is not known to occur in the affected area of the Pisgah SEZ;
29 however, according to the CAREGAP land cover model, approximately 15,427 acres (62 km²) of
30 potentially suitable desertscrub habitat on the SEZ could be directly affected by construction and
31 operations (Table 9.3.12.1-1). This direct impact area represents about 0.5% of available suitable
32 habitat in the SEZ region. About 107,664 acres (436 km²) of potentially suitable habitat occurs
33 in the area of potential indirect effect; this area represents about 3.7% of the available suitable
34 habitat in the region (Table 9.3.12.1-1).

35
36 The overall impact on the limestone beardtongue from construction, operation, and
37 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
38 small because the amount of potentially suitable habitat for this species in the area of direct
39 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
40 implementation of programmatic design features would reduce indirect impacts to negligible
41 levels.

42
43 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts
44 on the limestone beardtongue because some of these habitats (desertscrub) are widespread
45 throughout the area of direct effect. However, impacts could be reduced to negligible levels with
46 the implementation of mitigation options described previously for the alkali mariposa-lily. The

1 need for mitigation should first be determined by conducting pre-disturbance surveys for the
2 species and its habitat on the SEZ.
3
4

5 **Little San Bernardino Mountains Linanthus**

6

7 The Little San Bernardino Mountains linanthus is not known to occur in the affected area
8 of the Pisgah SEZ; however, according to the CAREGAP land cover model, approximately
9 322 acres (1 km²) of potentially suitable desert dune habitat on the SEZ could be directly
10 affected by construction and operations (Table 9.3.12.1-1). This direct impact area represents
11 about 0.2% of available suitable habitat in the SEZ region. About 5,155 acres (21 km²) of
12 potentially suitable habitat occurs in the area of potential indirect effect; this area represents
13 about 3.5% of the available suitable habitat in the SEZ region (Table 9.3.12.1-1).
14

15 The overall impact on the Little San Bernardino Mountains linanthus from construction,
16 operation, and decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is
17 considered small because the amount of potentially suitable habitat for this species in the area of
18 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
19 implementation of programmatic design features would reduce indirect impacts to negligible
20 levels.
21

22 Potentially suitable habitat of the Little San Bernardino Mountains linanthus (desert sand
23 dunes) occurs in a limited portion of the SEZ and could be avoided during the development of
24 facilities and protected from indirect effects. In conjunction with the implementation of
25 programmatic design features, avoiding or minimizing disturbance to occupied habitats and
26 desert dunes and sand transport systems, and the mitigation measures described previously for
27 the alkali mariposa-lily, could further reduce impacts on this species. The need for mitigation
28 should first be determined by conducting pre-disturbance surveys for the species and its habitat
29 on the SEZ.
30
31

32 **Mojave Monkeyflower**

33

34 The Mojave monkeyflower is not known to occur in the affected area of the Pisgah SEZ;
35 however, according to the CAREGAP land cover model, approximately 244 acres (1 km²) of
36 potentially suitable desert wash habitat on the SEZ could be directly affected by construction and
37 operations (Table 9.3.12.1-1). This direct impact area represents about 0.3% of available suitable
38 habitat in the region. About 1,907 acres (8 km²) of potentially suitable habitat occurs in the area
39 of potential indirect effect; this area represents about 2.3% of the available suitable habitat in the
40 SEZ region (Table 9.3.12.1-1).
41

42 The overall impact on the Mojave monkeyflower from construction, operation, and
43 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
44 small because the amount of potentially suitable habitat for this species in the area of direct
45 effects represents less than 1% of potentially suitable habitat in the SEZ region. The

1 implementation of programmatic design features would reduce indirect impacts to negligible
2 levels.

3
4 Potentially suitable habitat of the Mojave monkeyflower (desert wash) occurs on a
5 limited portion of the SEZ and could be avoided during the development of facilities and
6 protected from indirect effects. In conjunction with the implementation of programmatic design
7 features, avoiding or minimizing disturbance to occupied habitats and all desert wash habitats,
8 and the mitigation measures described previously for the alkali mariposa-lily, could further
9 reduce impacts on this species. The need for mitigation should first be determined by conducting
10 pre-disturbance surveys for the species and its habitat on the SEZ.

11 12 13 **Palmer's Mariposa-Lily**

14
15 The Palmer's mariposa-lily is not known to occur in the affected area of the Pisgah SEZ.
16 Direct impacts on this species are not expected to occur because there is no suitable riparian
17 habitat for this species on the SEZ. However, according to the CAREGAP land cover model,
18 approximately 68 acres (<1 km²) of potentially suitable riparian habitat occurs in the area of
19 potential indirect effect; this area represents about 0.6% of the available suitable habitat in the
20 SEZ region (Table 9.3.12.1-1).

21
22 The overall impact on the Palmer's mariposa-lily from construction, operation, and
23 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
24 small because no suitable habitat occurs on the SEZ and only indirect effects are possible. The
25 implementation of programmatic design features would reduce indirect impacts to negligible
26 levels. No species-specific mitigation for the Palmer's mariposa-lily is feasible or warranted.

27 28 29 **Parish's Brittlecale**

30
31 The Parish's brittlecale is not known to occur in the affected area of the Pisgah SEZ;
32 however, according to the CAREGAP land cover model, approximately 3,918 acres (16 km²)
33 of potentially suitable desert playa and wash habitat on the SEZ could be directly affected by
34 construction and operations (Table 9.3.12.1-1). This direct impact area represents about 1.0%
35 of available suitable habitat in the region. About 10,444 acres (42 km²) of potentially suitable
36 habitat occurs in the area of potential indirect effect; this area represents about 2.8% of the
37 available suitable habitat in the SEZ region (Table 9.3.12.1-1).

38
39 The overall impact on the Parish's brittlecale from construction, operation, and
40 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
41 moderate because the amount of potentially suitable habitat for this species in the area of direct
42 effects represents greater than 1% but less than 10% of potentially suitable habitat in the SEZ
43 region. The implementation of programmatic design features would reduce indirect impacts to
44 negligible levels.

1 Parish's brittle scale habitat (desert playa and wash) occupies a limited portion of the SEZ
2 and could be avoided during the development of facilities and protected from indirect effects. In
3 conjunction with the implementation of programmatic design features, avoiding or minimizing
4 disturbance to occupied habitats and all desert playa and wash habitats, and the mitigation
5 measures described previously for the alkali mariposa-lily, could further reduce impacts on this
6 species. The need for mitigation should first be determined by conducting pre-disturbance
7 surveys for the species and its habitat on the SEZ.
8
9

10 **Parish's Phacelia**

11
12 The Parish's phacelia is not known to occur in the affected area of the Pisgah SEZ;
13 however, according to the CAREGAP land cover model, approximately 18,222 acres (74 km²)
14 of potentially suitable desert scrub and playa habitat on the SEZ could be directly affected by
15 construction and operations (Table 9.3.12.1-1). This direct impact area represents about 0.6%
16 of available suitable habitat in the region. About 112,431 acres (455 km²) of potentially suitable
17 habitat occurs in the area of potential indirect effect; this area represents about 3.8% of the
18 available suitable habitat in the SEZ region (Table 9.3.12.1-1).
19

20 The overall impact on the Parish's phacelia from construction, operation,
21 and decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
22 small because the amount of potentially suitable habitat for this species in the area of direct
23 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
24 implementation of programmatic design features would reduce indirect impacts to negligible
25 levels.
26

27 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on
28 the Parish's phacelia because some of these habitats (desert scrub) are widespread throughout the
29 area of direct effect. However, impacts could be reduced to negligible levels with the
30 implementation of mitigation options described previously for the alkali mariposa-lily. The need
31 for mitigation should first be determined by conducting pre-disturbance surveys for the species
32 and its habitat on the SEZ.
33
34

35 **Stephen's Beardtongue**

36
37 The Stephen's beardtongue is not known to occur in the affected area of the Pisgah SEZ;
38 however, according to the CAREGAP land cover model, approximately 16,297 acres (66 km²)
39 of potentially suitable desert scrub and wash habitat on the SEZ could be directly affected by
40 construction and operations (Table 9.3.12.1-1). This direct impact area represents about 0.4%
41 of available suitable habitat in the region. About 144,048 acres (583 km²) of potentially suitable
42 habitat occurs in the area of potential indirect effect; this area represents about 3.9% of the
43 available suitable habitat in the SEZ region (Table 9.3.12.1-1).
44

45 The overall impact on the Stephen's beardtongue from construction, operation, and
46 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered

1 small because the amount of potentially suitable habitat for this species in the area of direct
2 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
3 implementation of programmatic design features would reduce indirect impacts to negligible
4 levels.

5
6 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts
7 on the Stephen's beardtongue because some of these habitats (desertscrub) are widespread
8 throughout the area of direct effect. However, impacts could be reduced to negligible levels
9 with the implementation of programmatic design features and the mitigation options described
10 previously for the alkali mariposa-lily. The need for mitigation should first be determined by
11 conducting pre-disturbance surveys for the species and its habitat on the SEZ.

12 13 14 **White-Bracted Spineflower**

15
16 The white-bracted spineflower is not known to occur in the affected area of the Pisgah
17 SEZ; however, according to the CAREGAP land cover model, approximately 15,427 acres
18 (62 km²) of potentially suitable desertscrub habitat on the SEZ could be directly affected by
19 construction and operations (Table 9.3.12.1-1). This direct impact area represents about 0.5%
20 of available suitable habitat in the SEZ region. About 107,664 acres (436 km²) of potentially
21 suitable habitat occurs in the area of potential indirect effect; this area represents about 3.7%
22 of the available suitable habitat in the SEZ region (Table 9.3.12.1-1).

23
24 The overall impact on the white-bracted spineflower from construction, operation, and
25 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
26 small because the amount of potentially suitable habitat for this species in the area of direct
27 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
28 implementation of programmatic design features would reduce indirect impacts to negligible
29 levels.

30
31 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
32 white-bracted spineflower because some of these habitats (desertscrub) are widespread
33 throughout the area of direct effect. However, impacts could be reduced to negligible levels with
34 the implementation of programmatic design features and the mitigation options described
35 previously for the alkali mariposa-lily. The need for mitigation should first be determined by
36 conducting pre-disturbance surveys for the species and its habitat on the SEZ.

37 38 39 **White-Margined Beardtongue**

40
41 The white-margined beardtongue is known to occur on the Pisgah SEZ and in other
42 portions of the affected area. According to the CAREGAP land cover model, approximately
43 15,749 acres (64 km²) of potentially suitable desertscrub and dune habitat on the SEZ could be
44 directly affected by construction and operations (Table 9.3.12.1-1). This direct impact area
45 represents about 0.5% of available suitable habitat in the SEZ region. About 112,819 acres

1 (457 km²) of potentially suitable habitat occurs in the area of potential indirect effect; this area
2 represents about 3.7% of the available suitable habitat in the SEZ region (Table 9.3.12.1-1).
3

4 The overall impact on the white-margined beardtongue from construction, operation, and
5 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
6 small because the amount of potentially suitable habitat for this species in the area of direct
7 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
8 implementation of programmatic design features would reduce indirect impacts to negligible
9 levels.
10

11 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on
12 the white-margined beardtongue because some of these habitats (desertscrub) are widespread
13 throughout the area of direct effect. However, impacts could be reduced to negligible levels with
14 the implementation of programmatic design features and the mitigation options described
15 previously for the alkali mariposa-lily. The need for mitigation should first be determined by
16 conducting pre-disturbance surveys for the species and its habitat on the SEZ.
17
18

19 **Mojave Fringe-Toed Lizard**

20

21 The Mojave fringe-toed lizard is known to occur on the Pisgah SEZ and in other portions
22 of the affected area. According to the CAREGAP habitat suitability model, approximately
23 19,218 acres (78 km²) of potentially suitable habitat on the SEZ could be directly affected by
24 construction and operations (Table 9.3.12.1-1). This direct impact area represents about 0.5% of
25 available suitable habitat in the SEZ region. About 156,798 acres (635 km²) of potentially
26 suitable foraging habitat occurs in the area of potential indirect effect; this area represents about
27 4.1% of the available suitable habitat in the SEZ region (Table 9.3.12.1-1).
28

29 The overall impact on the Mojave fringe-toed lizard from construction, operation, and
30 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
31 small because the amount of potentially suitable habitat for this species in the area of direct
32 effects represents less than 1% of potentially suitable habitat in the region. The implementation
33 of programmatic design features would reduce indirect impacts to negligible levels.
34

35 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts
36 on the Mojave fringe-toed lizard because, according to the CAREGAP habitat suitability model,
37 these habitats are widespread throughout the area of direct effect. However, avoiding or
38 minimizing disturbance to occupied habitats, dune and sand transport systems, and desert wash
39 habitats could reduce impacts on this species. If avoiding or minimizing is not a feasible option,
40 a compensatory mitigation plan could be developed and implemented to mitigate direct effects
41 on occupied habitats. Compensation could involve the protection and enhancement of existing
42 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
43 mitigation strategy that uses one or both of these options could be designed to completely offset
44 the impacts of development. The need for mitigation should first be determined by conducting
45 pre-disturbance surveys for the species and its habitat on the SEZ.
46
47

1 **Bendire’s Thrasher**

2
3 The Bendire’s thrasher is a summer resident in southern California and is known to
4 occur on the Pisgah SEZ and in other portions of the affected area. According to the CAREGAP
5 land cover model, approximately 15,427 acres (62 km²) of potentially suitable habitat on the
6 SEZ could be directly affected by construction and operations of solar energy development
7 (Table 9.3.12.1-1). This direct effects area represents about 0.5% of available suitable habitat in
8 the SEZ region. About 107,664 acres (436 km²) of suitable habitat occurs in the area of potential
9 indirect effects; this area represents about 3.7% of the available suitable habitat in the SEZ
10 region (Table 9.3.12.1-1).

11
12 The overall impact on the Bendire’s thrasher from construction, operation, and
13 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
14 small because the amount of potentially suitable habitat for this species in the area of direct
15 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
16 implementation of programmatic design features are expected to reduce indirect impacts to
17 negligible levels.

18
19 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
20 Bendire’s thrasher because potentially suitable desertscrub habitats are widespread throughout
21 the area of direct effect. Impacts could be reduced to negligible levels through the
22 implementation of programmatic design features and by conducting pre-disturbance surveys and
23 avoiding or minimizing disturbance to occupied habitats on the SEZ, especially nesting habitats.
24 If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be
25 developed and implemented to mitigate direct effects on occupied habitats. Compensation could
26 involve the protection and enhancement of existing occupied or suitable habitats to compensate
27 for habitats lost to development. A comprehensive mitigation strategy that used one or both of
28 these options could be designed to completely offset the impacts of development. The need for
29 mitigation should first be determined by conducting pre-disturbance surveys for the species and
30 its habitat on the SEZ.

31
32
33 **Ferruginous Hawk**

34
35 The ferruginous hawk is a winter resident in southern California within the Pisgah SEZ
36 region. According to the CAREGAP land cover model, approximately 15,598 acres (63 km²) of
37 potentially suitable foraging habitat on the SEZ could be directly affected by construction and
38 operations (Table 9.3.12.1-1). This direct impact area represents about 0.5% of available suitable
39 habitat in the SEZ region. About 110,385 acres (447 km²) of potentially suitable habitat occurs
40 in the area of potential indirect effect; this area represents about 3.7% of the available suitable
41 habitat in the SEZ region (Table 9.3.12.1-1).

42
43 The overall impact on the ferruginous hawk from construction, operation, and
44 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
45 small because direct effects would only occur on potentially suitable foraging habitat, and the
46 amount of this habitat in the area of direct effects represents less than 1% of potentially suitable

1 habitat in the SEZ region. The implementation of programmatic design features are expected to
2 reduce indirect impacts to negligible levels. Avoidance of direct impacts on all potentially
3 suitable foraging habitat is not a feasible way to mitigate impacts on the ferruginous hawk
4 because potentially suitable shrubland is widespread throughout the area of direct effects and
5 readily available in other portions of the affected area.
6
7

8 **Western Burrowing Owl**

9

10 The western burrowing owl is not known to occur in the affected area of the Pisgah SEZ.
11 However, according to the CAREGAP habitat suitability model, approximately 23,932 acres
12 (97 km²) of potentially suitable habitat on the SEZ could be directly affected by construction
13 and operations (Table 9.3.12.1-1). This direct impact area represents 0.5% of available suitable
14 habitat in the SEZ region. About 180,886 acres (732 km²) of potentially suitable habitat occurs
15 in the area of potential indirect effect; this area represents about 3.7% of the available suitable
16 habitat in the SEZ region (Table 9.3.12.1-1). Most of this area could serve as foraging and
17 nesting habitat (shrublands). The abundance of burrows suitable for nesting on the SEZ and in
18 the area of indirect effects has not been determined.
19

20 The overall impact on the western burrowing owl from construction, operation, and
21 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
22 small because the amount of potentially suitable habitat for this species in the area of direct
23 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
24 implementation of programmatic design features is expected to be sufficient to reduce
25 indirect impacts on this species to negligible levels.
26

27 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
28 ferruginous hawk because potentially suitable desertscrub habitats are widespread throughout
29 the area of direct effect. However, impacts on the western burrowing owl could be reduced by
30 avoiding or minimizing disturbance to occupied burrows and habitat in the area of direct effects.
31 If avoidance or minimization of disturbance to all occupied habitat is not a feasible option, a
32 compensatory mitigation plan could be developed and implemented to mitigate direct effects.
33 Compensation could involve the protection and enhancement of existing occupied or suitable
34 habitats to compensate for habitats lost to development. A comprehensive mitigation strategy
35 that used one or both of these options could be designed to completely offset the impacts of
36 development. The need for mitigation should first be determined by conducting pre-disturbance
37 surveys for the species and its habitat on the SEZ.
38
39

40 **Mojave Ground Squirrel**

41

42 The Mohave ground squirrel is not known to occur in the affected area of the Pisgah
43 SEZ. However, the species is known to occur about 15 mi (24 km) west of the SEZ and,
44 according to the CAREGAP land cover model, approximately 15,427 acres (62 km²) of
45 potentially suitable desertscrub habitat on the SEZ could be directly affected by construction
46 and operations (Table 9.3.12.1-1). This direct impact area represents about 0.5% of available

1 suitable foraging habitat in the SEZ region. About 107,664 acres (436 km²) of potentially
2 suitable habitat occurs in the area of potential indirect effect; this area represents about 3.7%
3 of the available suitable habitat in the SEZ region (Table 9.3.12.1-1).
4

5 The overall impact on the Mohave ground squirrel from construction, operation, and
6 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
7 small because the amount of potentially suitable habitat for this species in the area of direct
8 effects represents less than 1% of potentially suitable habitat in the region. The implementation
9 of programmatic design features is expected to be sufficient to reduce indirect impacts on this
10 species to negligible levels.
11

12 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts
13 on the Mohave ground squirrel because potentially suitable desertscrub habitats are widespread
14 throughout the area of direct effect. Impacts could be reduced to negligible levels through the
15 implementation of programmatic design features and by avoiding or minimizing disturbance
16 to occupied habitats on the SEZ. If avoidance or minimization is not a feasible option, a
17 compensatory mitigation plan could be developed and implemented to mitigate direct effects
18 on occupied habitats. Compensation could involve the protection and enhancement of existing
19 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
20 mitigation strategy that used one or both of these options could be designed to completely offset
21 the impacts of development. The need for mitigation should first be determined by conducting
22 pre-disturbance surveys for the species and its habitat on the SEZ.
23
24

25 **Nelson's Bighorn Sheep**

26

27 The Nelson's bighorn sheep (also called the desert bighorn sheep) is known to occur in
28 the affected area from the Cady Mountains within 5 mi (8 km) northeast of the Pisgah SEZ.
29 The species is also known to occur in the Rodman Mountains outside of the affected area,
30 approximately 10 mi (16 km) west of the SEZ. Sheep may utilize habitats within the SEZ as
31 migration corridors between these ranges. According to the CAREGAP habitat suitability model,
32 approximately 20,578 acres (83 km²) of potentially suitable habitat on the SEZ could be directly
33 affected by construction and operations (Table 9.3.12.1-1). This direct impact area represents
34 about 1.1% of available suitable habitat in the SEZ region. About 126,778 acres (513 km²) of
35 potentially suitable habitat occurs in the area of potential indirect effect; this area represents
36 about 6.9% of the available suitable habitat in the SEZ region (Table 9.3.12.1-1).
37

38 The overall impact on the Nelson's bighorn sheep from construction, operation, and
39 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
40 moderate because the amount of potentially suitable habitat for this species in the area of direct
41 effects represents greater than 1% but less than 10% of potentially suitable habitat in the region,
42 and the implementation of programmatic design features alone is unlikely to substantially reduce
43 impacts.
44

45 Impacts on the Nelson's bighorn sheep could be reduced to small or negligible levels by
46 avoiding or minimizing disturbance of occupied habitats and important movement corridors on

1 the SEZ. If avoidance or minimization are not a feasible options, a compensatory mitigation plan
2 could be developed and implemented to mitigate direct effects on occupied habitats.
3 Compensation could involve the protection and enhancement of existing occupied or suitable
4 habitats to compensate for habitats lost to development. A comprehensive mitigation strategy
5 that used one or both of these options could be designed to completely offset the impacts of
6 development. The need for mitigation should first be determined by conducting pre-disturbance
7 surveys for the species and its habitat on the SEZ.
8
9

10 **Pallid Bat**

11
12 The pallid bat is a year-round resident in southern California within the Pisgah SEZ
13 region. According to the CAREGAP land cover model, approximately 16,932 acres (69 km²) of
14 potentially suitable foraging habitat on the SEZ could be directly affected by construction and
15 operations (Table 9.3.12.1-1). This direct impact area represents about 0.4% of available suitable
16 foraging habitat in the SEZ region. About 148,804 acres (602 km²) of potentially suitable
17 foraging habitat occurs in the area of potential indirect effect; this area represents about 3.5% of
18 the available suitable foraging habitat in the SEZ region (Table 9.3.12.1-1). The potentially
19 suitable habitat on the SEZ is primarily foraging habitat (desert shrubland); however, suitable
20 roosting habitat may occur on the SEZ. On the basis of an evaluation of land cover types,
21 approximately 1,500 acres (6 km²) of rocky cliffs and outcrops that may be potentially suitable
22 roosting habitat occurs on the SEZ. An additional 41,000 acres (166 km²) of rocky cliffs and
23 outcrops occurs in the area of direct effects.
24

25 The overall impact on the pallid bat from construction, operation, and decommissioning
26 of utility-scale solar energy facilities within the Pisgah SEZ is considered small because the
27 amount of potentially suitable habitat for this species in the area of direct effects represents less
28 than 1% of potentially suitable habitat in the SEZ region. The implementation of programmatic
29 design features are expected to reduce indirect impacts to negligible levels.
30

31 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
32 suitable foraging habitat (shrublands) is widespread in the area of direct effect and readily
33 available in other portions of the affected area. However, avoiding or minimizing disturbance of
34 all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible, and could reduce
35 impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat
36 is not a feasible option, a compensatory mitigation plan could be developed and implemented to
37 mitigate direct effects. Compensation could involve the protection and enhancement of existing
38 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
39 mitigation strategy that used one or both of these options could be designed to completely offset
40 the impacts of development. The need for mitigation, other than programmatic design features,
41 should be determined by conducting pre-disturbance surveys for the species and its habitat
42 within the area of direct effects.
43
44
45

1 **Spotted Bat**

2
3 The spotted bat is considered to be a rare year-round resident in southern California
4 within the Pisgah SEZ region. According to the CAREGAP land cover model, approximately
5 15,427 acres (62 km²) of potentially suitable foraging habitat on the SEZ could be directly
6 affected by construction and operations (Table 9.3.12.1-1). This direct impact area represents
7 about 0.5% of available suitable foraging habitat in the SEZ region. About 107,732 acres
8 (436 km²) of potentially suitable foraging habitat occurs in the area of potential indirect effect;
9 this area represents about 3.7% of the available suitable foraging habitat in the SEZ region
10 (Table 9.3.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging habitat
11 (desert shrubland); however, suitable roosting habitat may occur on the SEZ. On the basis of an
12 evaluation of land cover types, approximately 1,500 acres (6 km²) of rocky cliffs and outcrops
13 that may be potentially suitable roosting habitat occurs on the SEZ. An additional 41,000 acres
14 (166 km²) of rocky cliffs and outcrops occurs in the area of direct effects.

15
16 The overall impact on the spotted bat from construction, operation, and decommissioning
17 of utility-scale solar energy facilities within the Pisgah SEZ is considered small because the
18 amount of potentially suitable habitat for this species in the area of direct effects represents less
19 than 1% of potentially suitable habitat in the SEZ region. The implementation of programmatic
20 design features are expected to reduce indirect impacts to negligible levels.

21
22 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
23 suitable foraging habitat (shrublands) is widespread in the area of direct effect and readily
24 available in other portions of the affected area. However, avoiding or minimizing disturbance of
25 all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible, and could reduce
26 impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat
27 is not a feasible option, a compensatory mitigation plan could be developed and implemented to
28 mitigate direct effects. Compensation could involve the protection and enhancement of existing
29 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
30 mitigation strategy that used one or both of these options could be designed to completely offset
31 the impacts of development. The need for mitigation, other than programmatic design features,
32 should be determined by conducting pre-disturbance surveys for the species and its habitat
33 within the area of direct effects.

34
35
36 **Townsend's Big-Eared Bat**

37
38 The Townsend's big-eared bat is a year-round resident in southern California within the
39 Pisgah SEZ region. According to the CAREGAP land cover model, approximately 23,950 acres
40 (97 km²) of potentially suitable foraging habitat on the SEZ could be directly affected by
41 construction and operations (Table 9.3.12.1-1). This direct impact area represents about 0.5%
42 of available suitable foraging habitat in the SEZ region. About 181,086 acres (733 km²) of
43 potentially suitable foraging habitat occurs in the area of potential indirect effect; this area
44 represents about 3.8% of the available suitable foraging habitat in the SEZ region
45 (Table 9.3.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging habitat
46 (desert shrubland); however, suitable roosting habitat may occur on the SEZ. On the basis of an

1 evaluation of land cover types, approximately 1,500 acres (6 km²) of rocky cliffs and outcrops
2 that may be potentially suitable roosting habitat occurs on the SEZ. An additional 41,000 acres
3 (166 km²) of rocky cliffs and outcrops occurs in the area of direct effects.
4

5 The overall impact on the Townsend's big-eared bat from construction, operation, and
6 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
7 small because the amount of potentially suitable habitat for this species in the area of direct
8 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
9 implementation of programmatic design features are expected to reduce indirect impacts to
10 negligible levels.
11

12 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
13 suitable foraging habitat (shrublands) is widespread in the area of direct effect and readily
14 available in other portions of the affected area. However, avoiding or minimizing disturbance of
15 all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible, and could reduce
16 impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat
17 is not a feasible option, a compensatory mitigation plan could be developed and implemented to
18 mitigate direct effects. Compensation could involve the protection and enhancement of existing
19 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
20 mitigation strategy that used one or both of these options could be designed to completely offset
21 the impacts of development. The need for mitigation, other than programmatic design features,
22 should be determined by conducting pre-disturbance surveys for the species and its habitat
23 within the area of direct effects.
24
25

26 **Western Mastiff Bat**

27

28 The western mastiff bat is a year-round resident in southern California within the
29 Pisgah SEZ region. According to the CAREGAP land cover model, approximately 23,950 acres
30 (97 km²) of potentially suitable foraging habitat on the SEZ could be directly affected by
31 construction and operations (Table 9.3.12.1-1). This direct impact area represents about 0.5%
32 of available suitable foraging habitat in the SEZ region. About 181,086 acres (733 km²) of
33 potentially suitable foraging habitat occurs in the area of potential indirect effect; this area
34 represents about 3.8% of the available suitable foraging habitat in the SEZ region
35 (Table 9.3.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging habitat
36 (desert shrubland); however, suitable roosting habitat may occur on the SEZ. On the basis of an
37 evaluation of land cover types, approximately 1,500 acres (6 km²) of rocky cliffs and outcrops
38 that may be potentially suitable roosting habitat occurs on the SEZ. An additional 41,000 acres
39 (166 km²) of rocky cliffs and outcrops occurs in the area of direct effects.
40

41 The overall impact on the western mastiff bat from construction, operation, and
42 decommissioning of utility-scale solar energy facilities within the Pisgah SEZ is considered
43 small because the amount of potentially suitable habitat for this species in the area of direct
44 effects represents less than 1% of potentially suitable habitat in the region. The implementation
45 of programmatic design features are expected to reduce indirect impacts to negligible levels.
46

1 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
2 suitable foraging habitat (shrublands) is widespread in the area of direct effect and readily
3 available in other portions of the affected area. However, avoiding or minimizing disturbance of
4 all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible, and could reduce
5 impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat
6 is not a feasible option, a compensatory mitigation plan could be developed and implemented to
7 mitigate direct effects. Compensation could involve the protection and enhancement of existing
8 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
9 mitigation strategy that used one or both of these options could be designed to completely offset
10 the impacts of development. The need for mitigation, other than programmatic design features,
11 should be determined by conducting pre-disturbance surveys for the species and its habitat
12 within the area of direct effects.
13
14

15 ***9.3.12.2.3 Impacts on State-Listed Species***

16
17 There are three species listed by the State of California that could occur in the affected
18 area of the Pisgah SEZ (Section 9.3.12.1.4; Table 9.3.12.1-1): Mojave tui chub, desert tortoise,
19 and Mohave ground squirrel. Potential impacts on each of these species is discussed in
20 Section 9.3.12.2.1 or 9.3.12.2.2 because of their status under the ESA or BLM.
21
22

23 ***9.3.12.2.4 Impacts on Rare Species***

24
25 There are 51 species with a state rank of S1 or S2 in California or considered a species of
26 concern by the State of California or the USFWS may occur in the affected area of the Pisgah
27 SEZ. Impacts have been previously discussed for 28 of these species that are also listed under the
28 ESA (Section 9.3.12.2.1), BLM-designated sensitive (Section 9.3.12.2.2), or state-listed
29 (Section 9.3.12.2.3). Impacts on the remaining 23 rare species that do not have any other special
30 status designation are presented in Table 9.3.12.1-1.
31
32

33 **9.3.12.3 SEZ-Specific Design Features and Design Feature Effectiveness**

34
35 The implementation of required programmatic design features described in Appendix A
36 would greatly reduce or eliminate the potential for effects of utility-scale solar energy
37 development on special status species. While some SEZ-specific mitigation measures are best
38 established when specific project details are being considered, some design features can be
39 identified at this time, including the following:
40

- 41 • Pre-disturbance surveys should be conducted within the SEZ to determine
42 the presence and abundance of all special status species, including those
43 identified in Table 9.3.12.1-1; disturbance of occupied habitats for these
44 species should be avoided or minimized to the extent practicable. If avoiding
45 or minimizing impacts on occupied habitats is not possible, translocation of
46 individuals from areas of direct effect, or compensatory mitigation of direct

1 effects on occupied habitats could reduce impacts. A comprehensive
2 mitigation strategy for special status species that used one or more of these
3 options to offset the impacts of development should be developed in
4 coordination with the appropriate federal and state agencies.
5

- 6 • Disturbance of desert playa and wash habitats within the SEZ should be
7 avoided or minimized to the extent practicable. In particular, development
8 should be avoided in and near Troy Lake in the western portion of the SEZ.
9 Adverse impacts on the following species could be reduced with the
10 avoidance of Troy Lake and desert wash habitats on the SEZ: alkali mariposa-
11 lily, black bog-rush, California saw-grass, Coulter's goldfields, Darwin rock-
12 cress, desert cymopterus, jackass-clover, Mojave monkeyflower, Parish's
13 brittlescale, Utah glasswort, and Mojave fringe-tailed lizard.
14
- 15 • Avoidance or minimization of disturbance to desert dunes and sand transport
16 systems on the SEZ could reduce impacts on the following special status
17 species: chaparral sand-verbena, flat-seeded spurge, Harwood's eriastrum,
18 jackass-clover, Little San Bernardino Mountains linanthus, and Mojave
19 fringe-toed lizard.
20
- 21 • Avoidance or minimization of disturbance to rocky cliff and outcrop habitats
22 on the SEZ could reduce impacts on the Nelson's bighorn sheep, pallid bat
23 (roosting), spotted bat (roosting), Townsend's big-eared bat (roosting), and
24 western mastiff bat (roosting).
25
- 26 • Avoidance of groundwater withdrawals from the SEZ would reduce or
27 prevent impacts on the following special status species that may occur in
28 aquatic habitats outside of the affected area: Arroyo chub, Mojave tui chub,
29 and southwestern pond turtle.
30
- 31 • As California fully protected species, direct and indirect impacts on the
32 Mohave tui chub should be completely avoided. This includes the avoidance
33 of groundwater withdrawals from the SEZ that may affect habitats at Camp
34 Cady and in the Mojave River. Coordination with the CDFG should be
35 conducted for the Mohave tui chub to address the potential for impact when
36 project-related groundwater demands are better identified.
37
- 38 • Consultations with the USFWS and the CDFG should be conducted to address
39 the potential for impacts on the Mojave tui chub and desert tortoise species
40 listed as endangered and threatened, respectively, under the ESA and CESA.
41 Consultation would identify an appropriate survey protocol, avoidance
42 measures, and, if appropriate, reasonable and prudent alternatives, reasonable
43 and prudent measures, and terms and conditions for incidental take statements.
44
45

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- Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and CDFG.

If these SEZ-specific design features are implemented in addition to required programmatic design features, impacts on the special status and rare species would be reduced.

1 **9.3.13 Air Quality and Climate**

2
3
4 **9.3.13.1 Affected Environment**

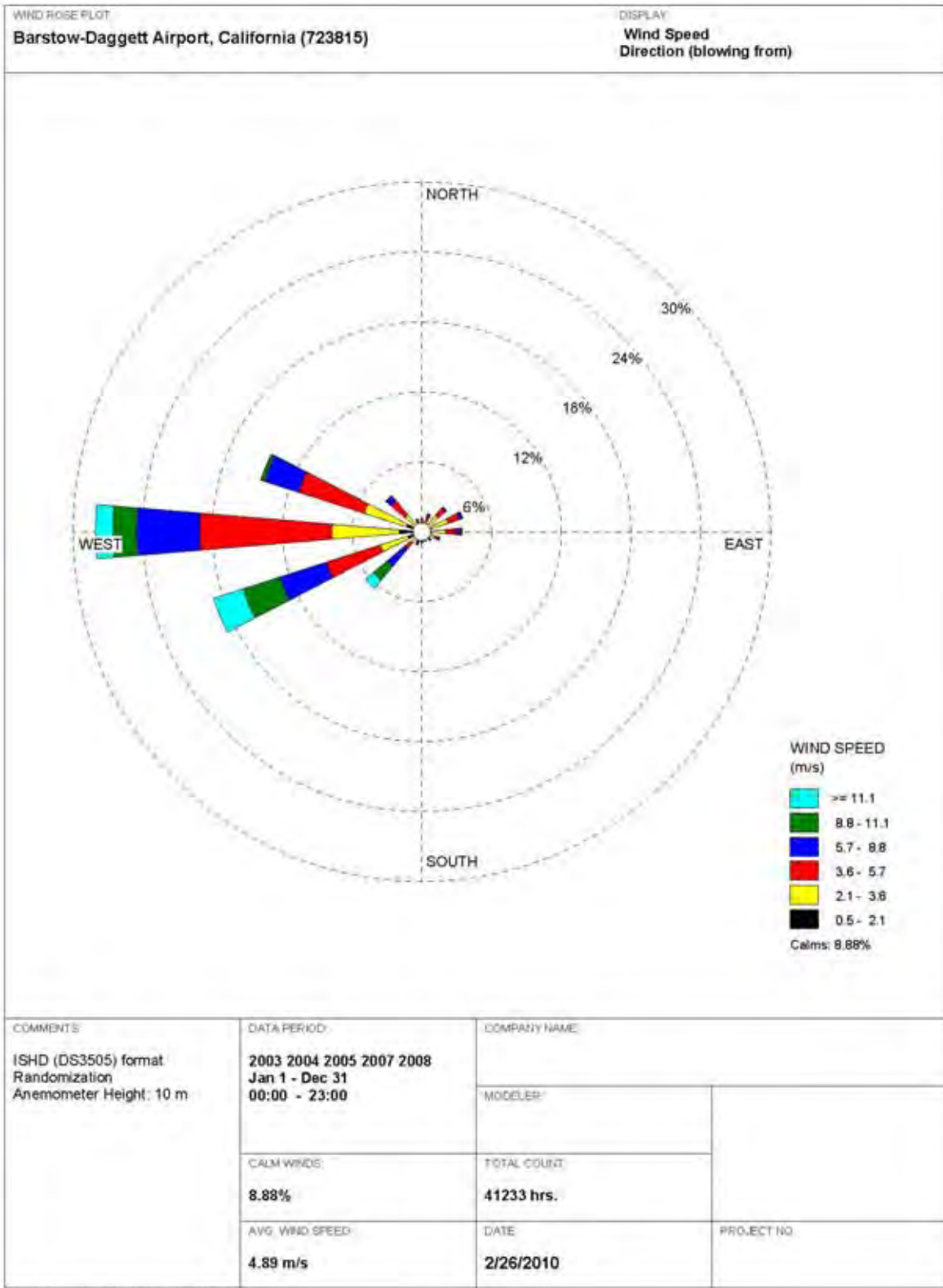
5
6
7 **9.3.13.1.1 Climate**

8
9 The proposed Pisgah SEZ is located in the central portion of San Bernardino County in
10 southeastern California. The SEZ with an average elevation of 1,980 ft (604 m) lies in the
11 western portion of the Mojave Desert, which has an extremely arid climate marked by mild
12 winters and hot summers, large daily temperature swings, scant precipitation, high evaporation
13 rates, low relative humidity, and abundant sunshine. Meteorological data collected at the
14 Barstow-Daggett Airport, which is about 12 mi (19 km) west of the Pisgah SEZ, are summarized
15 below.

16
17 A wind rose from the Barstow-Daggett Airport in Daggett, California, for the 5-year
18 period 2003 to 2005 and for 2007 to 2008 and taken at a level of 33 ft (10 m), is presented in
19 Figure 9.3.13.1-1 (NCDC 2010a). During this period, the annual average wind speed at the
20 airport was about 10.9 mph (4.9 m/s), with a predominant wind direction from the west
21 (about 28% of the time) and secondarily from the west-southwest (about 19% of the time).
22 Predominance of west wind components (about 72% in wind directions ranging from southwest
23 to northwest inclusive) is reflective of the statewide prevailing westerlies (NCDC 2010b),
24 because the airport is located far from topographic features and not affected by local terrain.
25 Winds blew predominantly from the west every month throughout the year. Wind speeds
26 categorized as calm (less than 1.1 mph [0.5 m/s]) occurred frequently (almost 9% of the time)
27 because of the stable conditions caused by strong radiative cooling from late night to sunrise.
28 Average wind speeds by season were the highest in spring at 13.7 mph (6.1 m/s); lower in
29 summer and fall at 12.2 mph (5.4 m/s) and 9.5 mph (4.2 m/s), respectively; and lowest in winter
30 at 8.4 mph (3.8 m/s).

31
32 For the 1948 to 2009 period, the annual average temperature at Barstow-Daggett Airport
33 was 67.5°F (19.7°C) (WRCC 2010b). December was the coldest month with an average
34 minimum temperature of 35.6°F (2.0°C), and July was the warmest month with an average
35 maximum of 104.3°F (40.2°C). On most days in summer, daytime maximum temperatures were
36 in the 100s, and minimums were in the upper 60s or higher. In winter, the minimum
37 temperatures recorded were below freezing ($\leq 32^{\circ}\text{F}$ [0°C]) on about 10 days of each of the colder
38 months (January and December), but subzero temperatures were never recorded. During the
39 same period, the highest temperature, 118°F (47.8°C), was reached in June 1994 and the lowest,
40 5°F (-15.0°C), in December 1985. In a typical year, about 139 days had a maximum temperature
41 of 90°F (32.2°C) or more, while about 27 days had minimum temperatures at or below freezing.

42
43 Along with prevailing westerlies, Pacific air masses lose most of their moisture on the
44 windward side of mountain ranges parallel to the California coastline. Thus, leeward areas like
45 the Pisgah SEZ area experience a lack of precipitation. For the period 1948 to 2009, annual



1

2

3

FIGURE 9.3.13.1-1 Wind Rose at 33 ft (10 m) at Barstow-Daggett Airport, Daggett, California, 2003–2005 and 2007–2008 (Source: NCDC 2010a)

1 precipitation at Barstow-Daggett Airport averaged about 3.84 in. (9.8 cm) (WRCC 2010b).
2 There is an average of 23 days annually with measurable precipitation (0.01 in. [0.025 cm] or
3 higher). About 39% of the annual precipitation occurs during winter months and the remaining
4 precipitation is relatively evenly distributed over the other seasons. Snowfall at the airport is
5 uncommon and mostly limited to December to January, infrequently in February and November.
6 The annual average snowfall is about 0.8 in. (2.0 cm), and the highest monthly snowfall recorded
7 was 14 in. (35.6 cm) in January 1949.

8
9 Because the area surrounding the proposed Pisgah SEZ is far from major water bodies
10 (more than 110 mi [177 km]) and because surrounding mountain ranges block air masses from
11 penetrating into the area, severe weather events, such as hurricanes and tornadoes, are rare.

12
13 Since 1993, 281 floods (mostly flash floods) were reported in San Bernardino County
14 (NCDC 2010c), with peaks in July and August. They caused a total of 12 deaths, 48 injuries,
15 and considerable property and crop damage.

16
17 In San Bernardino County, 51 hail events in total have been reported since 1966; they
18 caused minor property damage. Hail measuring 2.00 in. (5.1 cm) in diameter was reported in
19 1999. In San Bernardino County, 129 high wind events, which peaked in winter months, have
20 been reported since 1996; they have caused eight deaths, 70 injuries, and significant property and
21 crop damage (NCDC 2010c). A high wind event with a maximum wind speed of 120 mph
22 (53.5 m/s) occurred in 1999. Since 1957, 101 thunderstorm wind events, peaking in summer
23 months, have been reported; they caused one death, five injuries, and minor property damage.
24 Many thunderstorms in California are accompanied by little to no precipitation, and lightning
25 strikes sometimes cause forest fires (NCDC 2010b).

26
27 Since 1998, seven dust storm events were reported in San Bernardino County
28 (NCDC 2010c). The ground surface of the SEZ is predominantly covered with gravelly alluvial
29 sands and fine-grained eolian sands, which have relatively high dust storm potential. High winds
30 can trigger large amounts of blowing dust in areas of San Bernardino County that have dry and
31 loose soils with sparse vegetation. Dust storms can deteriorate air quality and visibility and have
32 adverse effects on health.

33
34 Hurricanes and tropical storms formed off the coast of Central America and Mexico
35 weaken over the cold waters off the California Coast. Accordingly, hurricanes rarely hit
36 California. Historically, two tropical depressions have passed within 100 mi (160 km) of the
37 proposed Pisgah SEZ (CSC 2010). Tornadoes in San Bernardino County, which encompasses
38 the proposed Pisgah SEZ, occur infrequently. In the period 1950 to June 2010, a total of
39 29 tornadoes (0.5 per year) were reported in San Bernardino County (NCDC 2010c). However,
40 most tornadoes occurring in San Bernardino County were relatively weak (i.e., seven were
41 uncatagorized, 20 were F0 or F1, and two were F2 on the Fujita tornado scale). Several of these
42 tornadoes caused three injuries and minor property damage in total. Most tornadoes in San
43 Bernardino County were reported far from the proposed Pisgah SEZ, except two F0 tornadoes
44 occurring near Daggett about 16 mi (26 km) west of the SEZ.

1 **9.3.13.1.2 Existing Air Emissions**

2
3 San Bernardino County, which encompasses the
4 proposed Pisgah SEZ, has many industrial emission sources,
5 which are mainly concentrated over the valley region near the
6 City of San Bernardino. No point source emissions are located
7 around the proposed Pisgah SEZ, except a natural gas
8 transmission facility about 2 mi (3 km) southwest of the SEZ.
9 Mobile source emissions are substantial, because the county is
10 crossed by several interstate highways, including I-10, I-15,
11 I-40, and I-215. Data on annual emissions of criteria pollutants
12 and VOCs in San Bernardino County for 2002 are presented in
13 Table 9.3.13.1-1 (WRAP 2009). Emission data are classified
14 into six source categories: point, area, onroad mobile, nonroad
15 mobile, biogenic, and fire (wildfires, prescribed fires,
16 agricultural fires, structural fires). In 2002, nonroad sources
17 were major contributors to total SO₂ emissions (about 43%)
18 and secondary contributors to total NO_x emissions (about 28%).
19 Point sources were secondary contributors to SO₂ emissions
20 (about 38%), but with contributions comparable to nonroad
21 sources. Onroad sources were major contributors to NO_x and
22 CO emissions (about 31% and 43%, respectively). Biogenic
23 sources (i.e., vegetation—including trees, plants, and crops—
24 and soils) that release naturally occurring emissions accounted
25 for most of VOC emissions (about 91%) and secondarily
26 contributed to CO emissions (about 19%). Area sources
27 accounted for about 70% of PM₁₀ and 47% of PM_{2.5}. Fire
28 sources are secondary contributors to PM_{2.5} emissions
29 (about 27%).

30
31 In 2006, California produced about 483.9 MMt of
32 *gross*⁸ carbon dioxide equivalent (CO_{2e})⁹ emissions (CARB
33 2010a). GHG emissions in California increased by about 12% from 1990 to 2006, which was
34 three-fourths of the increase in the national rate (about 16%). In 2006, transportation (38.4%)
35 and electricity use (21.9%) were the primary contributors to gross GHG emission sources in
36 California. Fossil fuel use in the residential, commercial, and industrial (RCI) sectors combined
37 accounted for about 29.0% of total state emissions. California's *net* emissions were about
38 479.8 MMt CO_{2e}, taking into account carbon sinks from forestry activities and agricultural soils
39 throughout the state. The EPA (EPA 2009a) also estimated 2005 emissions in California. Its

TABLE 9.3.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in San Bernardino County, California, Encompassing the Proposed Pisgah SEZ, 2002^a

Pollutant	Emissions (tons/yr)
SO ₂	3,774
NO _x	102,722
CO	373,128
VOC	512,377
PM ₁₀	44,722
PM _{2.5}	17,879

^a Includes point, area, onroad and nonroad mobile, biogenic, and fire emissions.

^b Notation: CO = carbon monoxide; NO_x = nitrogen oxides; PM_{2.5} = particulate matter with a diameter of ≤2.5 μm; PM₁₀ = particulate matter with a diameter of ≤10 μm; SO₂ = sulfur dioxide; and VOC = volatile organic compounds.

Source: WRAP (2009).

⁸ Excluding GHG emissions removed as a result of forestry and other land uses and excluding GHG emissions associated with exported electricity.

⁹ A measure used to compare the emissions from various GHGs on the basis of their global warming potential, defined as the cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas, CO₂. The CO_{2e} for a gas is derived by multiplying the mass of the gas by the associated global warming potential.

1 estimate of CO₂ emissions from fossil fuel combustion was 390.6 MMt, which was comparable
2 to the state's estimate. The transportation and RCI sectors accounted for about 58.7% and 30.5%
3 of total CO₂ emissions, respectively, while electric power generation accounted for the
4 remainder (about 10.8%).
5
6

7 **9.3.13.1.3 Air Quality** 8

9 CAAQS address the same six criteria pollutants as does NAAQS (CARB 2010b; EPA
10 2010a): SO₂, NO₂, CO, O₃, PM, PM₁₀, PM_{2.5}, and Pb. CAAQS are more stringent than NAAQS
11 for most of criteria pollutants. In addition, California has set standards for some pollutants that
12 are not addressed by NAAQS: visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl
13 chloride. The NAAQS and CAAQS for criteria pollutants are presented in Table 9.3.13.1-2.
14

15 Most San Bernardino County is located administratively within Southeast Desert
16 Intrastate AQCR (Title 40, Part 81, Section 167 of the *Code of Federal Regulations* [40 CFR
17 81.167]), along with parts of Kern, Los Angeles, and Riverside Counties, and all of Imperial
18 County. In addition, the Pisgah SEZ is located within the Mojave Desert Air Basin, one of
19 15 geographic air basins designated for the purpose of managing air resources in California,
20 which also includes the desert portions of Kern, Los Angeles, Riverside, and San Bernardino
21 Counties. Currently, the area surrounding the proposed SEZ is designated as being in
22 unclassifiable attainment of NAAQS for all criteria pollutants, except O₃ and PM₁₀
23 (40 CFR 81.305). Further, the area is designated as a nonattainment area for O₃, PM₁₀, and
24 PM_{2.5} based on CAAQS (CARB 2010c).
25

26 With a low population density, the Mojave Desert area has no significant emission
27 sources of its own, except mobile emissions along interstate highways. Air quality in the Mojave
28 Desert area primarily depends on upwind emissions transported from the South Coast Air Basin
29 including Los Angeles. As a result of upwind emissions controls, air quality of the Mojave
30 Desert area has improved, but concentrations of O₃ are still relatively high.
31

32 There are no ambient air monitoring stations in San Bernardino County near the proposed
33 Pisgah SEZ. To characterize ambient air quality around the SEZ, two monitoring stations in
34 San Bernardino County were chosen: Barstow, about 26 mi (42 km) to the west, and Victorville,
35 about 48 mi (77 km) to the west-southwest of the SEZ. These monitoring stations are considered
36 representative of the proposed SEZ. Ambient concentrations of NO₂, CO, O₃, and PM₁₀ are
37 recorded at Barstow, while those of SO₂, NO₂, CO, O₃, PM₁₀, and PM_{2.5} are recorded at
38 Victorville. No Pb measurements are made in the Mojave Desert area, so Pb measurements
39 from the City of San Bernardino are presented to demonstrate that Pb is not a concern in San
40 Bernardino County. The background concentrations of criteria pollutants at these stations for the
41 period 2004 to 2008 are presented in Table 9.3.13.1-2 (EPA 2010b). The monitored SO₂, NO₂,
42 CO, and Pb levels at either station were lower than their respective standards. Monitored PM_{2.5}
43 levels were approaching NAAQS and CAAQS, while PM₁₀ levels were lower than NAAQS but
44 higher than CAAQS. The highest O₃ concentrations exceeded both NAAQS and CAAQS.
45
46

TABLE 9.3.13.1-2 NAAQS, CAAQS, and Background Concentration Levels Representative of the Proposed Pisgah SEZ in San Bernardino County, California, 2004–2008

Pollutant ^a	Averaging Time	NAAQS	CAAQS	Background Concentration Level	
				Concentration ^{b,c}	Measurement Location, Year
SO ₂	1-hour	0.075 ppm ^d	0.25 ppm	0.015 ppm (–; 6.0%)	Victorville, 2006
	3-hour	0.5 ppm	– ^e	0.009 ppm (1.8%; –)	Victorville, 2006
	24-hour	0.14 ppm	0.04 ppm	0.005 ppm (3.6%; 13%)	Victorville, 2007
	Annual	0.030 ppm	–	0.002 ppm (6.7%; –)	Victorville, 2006
NO ₂	1-hour	0.100 ppm ^f	0.18 ppm	0.097 ppm (–; 54%)	Barstow, 2004
	Annual	0.053 ppm	0.030 ppm	0.023 ppm (43%; 77%)	Barstow, 2004
CO	1-hour	35 ppm	20 ppm	2.6 ppm (7.4%; 13%)	Barstow, 2006
	8-hour	9 ppm	9.0 ppm	1.2 ppm (13%; 13%)	Barstow, 2005
O ₃	1-hour	0.12 ppm ^g	0.09 ppm	0.108 ppm (–; 120%)	Barstow, 2006
	8-hour	0.075 ppm	0.070 ppm	0.090 ppm (120%; 129%)	Barstow, 2008
PM ₁₀	24-hour	150 µg/m ³	50 µg/m ³	103 µg/m ³ (69%; 206%)	Barstow, 2007
	Annual	– ^h	20 µg/m ³	30 µg/m ³ (–; 150%)	Barstow, 2007
PM _{2.5}	24-hour	35 µg/m ³	–	33 µg/m ³ (94%; –)	Victorville, 2004
	Annual	15.0 µg/m ³	12 µg/m ³	10.8 µg/m ³ (72%; 90%)	Victorville, 2004
Pb	30-day	–	1.5 µg/m ³	–	–
	Calendar quarter	1.5 µg/m ³	–	0.02 µg/m ³ (1.3%; –)	San Bernardino, 2007
	Rolling 3-month	0.15 µg/m ³ ⁱ	–	–	–

^a Notation: CO = carbon monoxide; NO₂ = nitrogen dioxide; O₃ = ozone; Pb = lead; PM_{2.5} = particulate matter with a diameter of ≤2.5 µm; PM₁₀ = particulate matter with a diameter of ≤10 µm; and SO₂ = sulfur dioxide.

^b Monitored concentrations are the highest for calendar-quarter Pb; second-highest for all averaging times less than or equal to 24-hour averages, except fourth-highest daily maximum for 8-hour O₃ and the 98th percentile for 24-hour PM_{2.5}; and arithmetic mean for annual SO₂, NO₂, PM₁₀, and PM_{2.5}.

^c First and second values in parentheses are background concentration levels as a percentage of NAAQS and CAAQS, respectively. Calculation of 1-hour SO₂, 1-hour NO₂, and rolling 3-month Pb to NAAQS was not made, because no measurement data based on new NAAQS standard are available.

^d Effective August 23, 2010.

^e A dash denotes “not applicable” or “not available.”

^f Effective April 12, 2010.

^g The EPA revoked the 1-hour O₃ standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).

^h Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of 50 µg/m³.

ⁱ Effective January 12, 2009.

Sources: CARB (2010b); EPA (2010a,b).

1 The PSD regulations (see 40 CFR 52.21), which are designed to limit the growth of air
2 pollution in clean areas, apply to a major new source or modification of an existing major source
3 within an attainment or unclassified area (see Section 4.11.2.3). As a matter of policy, EPA
4 recommends that the permitting authority notify the Federal Land Managers when a proposed
5 PSD source would locate within 62 mi (100 km) of a sensitive Class I area. There are several
6 Class I areas around the Pisgah SEZ, three of which are situated within 62 mi (100 km). The
7 nearest Class I area is the Joshua Tree NP (40 CFR 81.405), about 43 mi (69 km) south-
8 southeast of the Pisgah SEZ. This Class I area is not located downwind of prevailing winds at
9 the Pisgah SEZ (Figure 9.3.13.1-1). The next nearest Class I areas within 62 mi (100 km) are the
10 San Gorgonio and San Jacinto WAs, which are located about 44 mi (71 km) and 60 mi (96 km)
11 south-southwest of the Pisgah SEZ, respectively.
12
13

14 **9.3.13.2 Impacts**

15
16 Potential impacts on ambient air quality associated with a solar project would be of
17 most concern during the construction phase. Impacts on ambient air quality from fugitive dust
18 emissions resulting from soil disturbances are anticipated, but they would be of short duration.
19 During the operations phase, only a few sources with generally low-level emissions would exist
20 for any of the four types of solar technologies evaluated. A solar facility would either not burn
21 fossil fuels or burn only small amounts during operation. (For facilities using heat transfer fluids
22 [HTFs], fuel could be used to maintain the temperature of the HTFs for more efficient daily start-
23 up.) Conversely, solar facilities would displace air emissions that would otherwise be released
24 from fossil fuel-fired power plants.
25

26 Air quality impacts shared by all solar technologies are discussed in detail in
27 Section 5.11.1, and technology-specific impacts are discussed in Section 5.11.2. Impacts specific
28 to the proposed Pisgah SEZ are presented in the following sections. Any such impacts would be
29 minimized through the implementation of required programmatic design features described in
30 Appendix A, Section A.2.2, and through any additional mitigation applied. Section 9.3.13.3
31 below identifies SEZ-specific design features of particular relevance to the Pisgah SEZ.
32
33

34 **9.3.13.2.1 Construction**

35
36 The Pisgah SEZ has a relatively flat terrain, thus only a minimum number of site
37 preparation activities, perhaps with no large-scale earthmoving operations, would be required.
38 However, fugitive dust emissions from soil disturbances during the entire construction phase
39 would be a major concern because of the large areas that would be disturbed in a region that
40 experiences windblown dust problems. Fugitive dusts, which are released near ground level,
41 typically have more localized impacts than similar emissions from an elevated stack with
42 additional plume rise induced by buoyancy and momentum effects.
43
44
45

1 **Methods and Assumptions**

2
3 Air quality modeling for PM₁₀ and PM_{2.5} emissions associated with construction
4 activities was performed using the EPA-recommended AERMOD model (EPA 2009b). Details
5 for emissions estimation, the description of AERMOD, input data processing procedures, and
6 modeling assumptions are described in Section M.13 of Appendix M. Estimated air
7 concentrations were compared with the applicable NAAQS/CAAQS levels at the site boundaries
8 and nearby communities and with Prevention of Significant Deterioration (PSD) increment
9 levels at nearby Class I areas.¹⁰ However, no receptors were modeled for PSD analysis at the
10 nearest Class I area, Joshua Tree NP, because it is about 43 mi (69 km) from the SEZ, which is
11 over the maximum modeling distance of 31 mi (50 km) for the AERMOD. Rather, several
12 regularly spaced receptors in the direction of the Joshua Tree NP were selected as surrogates for
13 the PSD analysis. For the Pisgah SEZ, the modeling was conducted based on the following
14 assumptions and input:

- 15 • Emissions were uniformly distributed over the 3,000 acres (12.1 km²) each
16 and 6,000 acres (24.3 km²) in total, and in the western half of the SEZ, close
17 to the nearest residences and towns such as Newberry Springs and Daggett;
- 18 • Surface hourly meteorological data came from the Barstow-Daggett Airport
19 and upper air sounding data from Desert Rock/Mercury, Nevada, for the 2003
20 to 2005 and 2007 to 2008 period; and
- 21 • A receptor grid was regularly spaced over a modeling domain of
22 62 mi × 62 mi (100 km × 100 km), centered on the proposed SEZ, and
23 there were additional discrete receptors at the SEZ boundaries.

24 **Results**

25 The modeling results for both PM₁₀ and PM_{2.5} concentration increments and total
26 concentrations (modeled plus background concentrations) that would result from construction-
27 related fugitive emissions are summarized in Table 9.3.13.2-1. Maximum 24-hour PM₁₀
28 concentration increments modeled to occur at the site boundaries would be an estimated
29 457 µg/m³, which far exceeds the relevant NAAQS level of 150 or CAAQS level of 50 µg/m³.
30 Total 24-hour PM₁₀ concentrations of 560 µg/m³ would also exceed the NAAQS and CAAQS
31 levels at the SEZ boundary. However, high PM₁₀ concentrations would be limited to the
32 immediate areas surrounding the SEZ boundary and would decrease quickly with distance.
33 Predicted maximum 24-hour PM₁₀ concentration increments would be about 173 µg/m³ at
34 the nearby residence, which is located about 0.1 mi (0.2 km) south of the SEZ boundary.
35
36
37
38
39
40

¹⁰ To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS/CAAQS levels and the PSD Class I increment levels. Although the Clean Air Act exempts construction activities from PSD requirements, a comparison with the Class I increment levels was used to quantify potential impacts. Only monitored data can be used to determine the attainment status. Modeled data are used to assess potential problems and as a consideration in the permitting process.

TABLE 9.3.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Pisgah SEZ

Pollutant ^a	Averaging Time	Rank ^b	Concentration ($\mu\text{g}/\text{m}^3$)			Percentage of NAAQS/CAAQS ^e		
			Maximum Increment ^b	Background ^c	Total	NAAQS/CAAQS ^d	Increment	Total
PM ₁₀	24 hours	H6H	457	103	560	150/50	305/914	373/1,120
	Annual	–	83.7	30	114	– ^f /20	–/419	–/569
PM _{2.5}	24 hours	H8H	31.4	33	64.4	35/–	90/–	184/–
	Annual	–	8.4	10.8	19.2	15.0/12	56/70	128/160

^a PM_{2.5} = particulate matter with a diameter of $\leq 2.5 \mu\text{m}$; PM₁₀ = particulate matter with a diameter of $\leq 10 \mu\text{m}$.

^b Concentrations for attainment demonstration are presented. H6H = highest of the sixth-highest concentrations at each receptor over the 5-year period. H8H = highest of the multiyear average of the eighth-highest concentrations at each receptor over the five-year period. For the annual average, multiyear averages of annual means over the five-year period are presented. Maximum concentrations are predicted to occur at the site boundaries.

^c See Table 9.3.13.1-2.

^d First and second values are NAAQS and CAAQS, respectively.

^e First and second values are concentration levels as a percentage of NAAQS and CAAQS, respectively.

^f A dash denotes “not applicable.”

1
2
3 Predicted maximum 24-hour PM₁₀ concentration increments would be about 18 $\mu\text{g}/\text{m}^3$ at
4 Ludlow (a downwind receptor about 12 mi [19 km] east-southeast of the SEZ); about 10 $\mu\text{g}/\text{m}^3$
5 at Harvard and Newberry Springs; and about 4 $\mu\text{g}/\text{m}^3$ at Daggett. Annual average modeled
6 PM₁₀ concentration increments and total concentrations (increment plus background) at the
7 SEZ boundary would be about 83.7 $\mu\text{g}/\text{m}^3$ and 114 $\mu\text{g}/\text{m}^3$, respectively, which are much higher
8 than the CAAQS level of 20 $\mu\text{g}/\text{m}^3$. Annual PM₁₀ increments would be much lower, about
9 13.0 $\mu\text{g}/\text{m}^3$, at the nearest residence, adjacent to the northwestern corner of the SEZ boundary,
10 about 0.7 $\mu\text{g}/\text{m}^3$ at Ludlow, about 0.4 $\mu\text{g}/\text{m}^3$ at Newberry Springs, and about 0.1 $\mu\text{g}/\text{m}^3$ at
11 Daggett and Harvard.. Total 24-hour PM_{2.5} concentrations would be 64 $\mu\text{g}/\text{m}^3$ at the SEZ
12 boundary, which is much higher than the NAAQS level of 35 $\mu\text{g}/\text{m}^3$; modeled increment and
13 background concentrations make comparable contributions to this total. The total annual average
14 PM_{2.5} concentration would be 19.2 $\mu\text{g}/\text{m}^3$, which is above the NAAQS and CAAQS levels of
15 15.0 and 12 $\mu\text{g}/\text{m}^3$, respectively. At the nearest residence, predicted maximum 24-hour and
16 annual PM_{2.5} concentration increments would be about 7.3 and 1.3 $\mu\text{g}/\text{m}^3$, respectively.
17

18 Predicted 24-hour and annual PM₁₀ concentration increments at the surrogate receptors
19 for the nearest Class I Area—Joshua Tree NP—would be about 8.4 and 0.2 $\mu\text{g}/\text{m}^3$, or 105 and
20 4.4%, respectively, of the PSD increments for Class I area. The surrogate receptor where the
21 maximum concentration occurs is more than 28 mi (44 km) from the Joshua Tree NP, and thus

1 predicted concentrations in Joshua Tree NP would be lower than the above values (about 64%
2 of the PSD increments for 24-hour PM₁₀), considering the same decay ratio with distance.
3

4 In conclusion, predicted 24-hour and annual PM₁₀ and PM_{2.5} concentration levels could
5 exceed the standard levels at the SEZ boundaries and in immediate surrounding areas during the
6 construction of solar facilities. To reduce potential impacts on ambient air quality and in
7 compliance with programmatic design features, aggressive dust control measures would be used.
8 Potential air quality impacts on nearby communities would be much lower. Modeling indicates
9 that emissions from construction activities are not anticipated to exceed Class I PSD PM₁₀
10 increments at the nearest federal Class I area (Joshua Tree NP). Construction activities are not
11 subject to the PSD program, and the comparison provides only a screen for gauging the
12 magnitude of the impact. Accordingly, it is anticipated that impacts of construction activities on
13 ambient air quality would be moderate and temporary.
14

15 Construction emissions from the engine exhaust of heavy equipment and vehicles could
16 cause impacts on AQRVs (e.g., visibility and acid deposition) at the nearby federal Class I
17 areas. SO_x emissions from engine exhaust would be very low, because programmatic design
18 features would require that ultra-low-sulfur fuel with a sulfur content of 15 ppm be used. NO_x
19 emissions from engine exhaust would be primary contributors to potential impacts on AQRVs.
20 Construction-related emissions are temporary in nature and thus would cause some unavoidable
21 but short-term impacts.
22

23 For this analysis, the impacts of construction and operation of transmission lines outside
24 of the SEZ were not assessed, assuming that the existing regional 230-kV transmission line
25 might be used to connect some new solar facilities to load centers, and that additional project-
26 specific analysis would be done for new transmission construction or line upgrades. However,
27 some construction of transmission lines could occur within the SEZ. Potential impacts on
28 ambient air quality would be a minor component of construction impacts in comparison with
29 solar facility construction and would be temporary in nature.
30
31

32 **9.3.13.2.2 Operations**

33

34 Emission sources associated with the operation of a solar facility would include auxiliary
35 boilers; vehicle (commuter, visitor, support, and delivery) traffic; maintenance (e.g., mirror
36 cleaning and repair and replacement of damaged mirrors); and drift from cooling towers for the
37 parabolic trough or power tower technology if wet cooling was implemented (drift comprises
38 low-level particulate emissions).
39

40 The type of emission sources caused by and offset by operation of a solar facility are
41 discussed in Section M.13.4 of Appendix M.
42

43 Estimates of potential air emissions displaced by the solar project development at the
44 Pisgah SEZ are presented in Table 9.3.13.2-2. Total power generation capacity ranging from
45 2,129 to 3,832 MW is estimated for the Pisgah SEZ for various solar technologies
46 (see Section 9.3.2). The estimated amount of emissions avoided for the solar technologies

TABLE 9.3.13.2-2 Annual Emissions from Combustion-Related Power Generation Displaced by Full Solar Development of the Proposed Pisgah SEZ

Area Size (acres)	Capacity (MW) ^a	Power Generation (GWh/yr) ^b	Emissions Displaced (tons/yr; 10 ³ tons/yr for CO ₂) ^c			
			SO ₂	NO _x	Hg	CO ₂
23,950	2,129–3,832	3,730–6,714	477–858 (2,817–5,071)	783–1,410 (4,152– 7,474)	0.007–0.012 (0.033–0.059)	1,853–3,336 (2,943–5,297)
Percentage of total emissions from electric power systems in California ^d			3.5–6.3%	3.5–6.3%	3.5–6.3%	3.5–6.3%
Percentage of total emissions from all source categories in California ^e			0.67–1.2%	0.07–0.12%	– ^f	0.43–0.77%
Percentage of total emissions from electric power systems in the six-state study area ^d			0.19–0.34% (1.1–2.0%)	0.21–0.38% (1.1–2.0%)	0.24–0.42% (1.1–2.0%)	0.71–1.3% (1.1–2.0%)
Percentage of total emissions from all source categories in the six-state study area ^e			0.10–0.18% (0.60–1.1%)	0.03–0.05% (0.15–0.28%)	– (–)	0.22–0.40% (0.35–0.64%)

^a It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km²) per MW (for parabolic trough technology) to 9 acres (0.036 km²) per MW (power tower, dish engine, and PV technologies) would be required.

^b Assumed a capacity factor of 20%.

^c Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 0.26, 0.42, 3.7 × 10⁻⁶, and 994 lb/MWh, respectively, were used for the state of California. Values in parentheses are estimated based on composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 1.51, 2.23, 1.8 × 10⁻⁵, and 1,578 lb/MWh, respectively, averaged over six southwestern states.

^d Emission data for all air pollutants are for 2005.

^e Emission data for SO₂ and NO_x are for 2002, while those for CO₂ are for 2005.

^f A dash indicates “not estimated.”

Sources: EPA (2009a,c); WRAP (2009).

1
2
3 evaluated depends only on the megawatts of conventional fossil fuel-generated power displaced,
4 because a composite emission factor per megawatt-hour of power by conventional technologies
5 is assumed (EPA 2009c). If the Pisgah SEZ was fully developed, it is expected that emissions
6 avoided would be substantial. Development of solar power in the SEZ would result in avoided
7 air emissions ranging from 3.5% to 6.3% of total emissions of SO₂, NO_x, Hg, and CO₂ from
8 electric power systems in the state of California (EPA 2009c). Avoided emissions would be up
9 to 1.3% of total emissions from electric power systems in the six-state study area. When
10 compared with all source categories, power production from the solar facilities would displace
11 up to 1.2% of SO₂, 0.12% of NO_x, and 0.77% of CO₂ emissions in the state of California

1 (EPA 2009a; WRAP 2009). These emissions would be up to 0.40% of total emissions from
2 all source categories in the six-state study area. Power generation from fossil fuel–fired power
3 plants accounts for only 53% of the total electric power generation in California, most of
4 which is from natural-gas combustion. Thus, solar facilities to be built in the Pisgah SEZ
5 could considerably reduce fuel-combustion-related emissions in California but relatively less
6 so than facilities built in other states with higher fossil fuel use rates.

7
8 About one-quarter of electricity consumed in California is generated out of state, with
9 about three-quarters of this amount coming from the southwestern states. Thus it is possible that
10 a solar facility in California would replace power from fossil fuel–fired power plants outside of
11 California but within the six-state study area. It is also possible that electric power transfer
12 between the states will increase in the future. To assess the potential region-wide emissions
13 benefit, emissions being displaced were also estimated based on composite emission factors
14 averaged over the six-state study area. For SO₂, NO_x, and Hg, composite emission factors for
15 the six-state study area would be about 5 to 6 times higher than those for California alone. For
16 CO₂, the six-state emission factor is about 60% higher than the California-only emission factor.
17 If the Pisgah SEZ were fully developed, emissions avoided would be considerable. Development
18 of solar power in the SEZ would result in avoided air emissions ranging from 1.1 to 2.0% of total
19 emissions of SO₂, NO_x, Hg, and CO₂ from electric power systems in the six southwestern states.
20 These emissions would be up to 1.1% of total emissions from all source categories in the
21 six-state study area.

22
23 As discussed in Section 5.11.1.5, the operation of associated transmission lines would
24 generate some air pollutants from activities such as periodic site inspections and maintenance.
25 However, these activities would occur infrequently, and the amount of emissions would be
26 small. In addition, transmission lines could produce minute amounts of O₃ and its precursor
27 NO_x associated with corona discharge (i.e., the breakdown of air near high-voltage conductors),
28 which is most noticeable for higher voltage lines during rain or very humid conditions. Since
29 the Pisgah SEZ is located in an arid desert environment, these emissions would be small, and
30 potential impacts on ambient air quality associated with transmission lines would be negligible,
31 considering the infrequent occurrences and small amount of emissions from corona discharges.

32 33 34 **9.3.13.2.3 Decommissioning/Reclamation**

35
36 As discussed in Section 5.11.1.4, decommissioning/reclamation activities are similar to
37 construction activities but are on a more limited scale and of shorter duration. Potential impacts
38 on ambient air quality would be correspondingly less than those from construction activities.
39 Decommissioning activities would last for a short period, and their potential impacts would be
40 moderate and temporary. The same design features adopted during the construction phase would
41 also be implemented during the decommissioning phase (Section 5.11.3).

1 **9.3.13.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 No SEZ-specific design features are required. Limiting dust generation during
4 construction and operations at the proposed Pisgah SEZ (such as increased watering frequency or
5 road paving or treatment) is a required programmatic design feature under BLM’s Solar Energy
6 Program. These extensive fugitive dust control measures would keep off-site PM levels as low as
7 possible during construction.
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1 **9.3.14 Visual Resources**

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4 **9.3.14.1 Affected Environment**

5
6 The proposed Pisgah SEZ is located within the CDCA in San Bernardino County in
7 southeastern California. The SEZ (23,950 acres [97 km²]) occupies an area approximately
8 10 mi (16 km) north to south (at greatest extent) and 12 mi (19 km) east to west and is located
9 approximately 7 mi (11 km) (at closest approach) east of the community of Newberry Springs,
10 California, and 12 mi (19 km) west to northwest of the community of Ludlow. I-40 and Historic
11 Route 66 pass through the SEZ, and I-15 is 11 mi (18 km) north of the far northern boundary.
12 The SEZ and surrounding mountain ranges are shown in Figure 9.3.14.1-1. The SEZ ranges in
13 elevation from 1,783 ft (544 m) in the southwestern portion of the SEZ along I-40, to 2,370 ft
14 (722 m) near the Cady Mountains the northeastern portion of the SEZ.

15
16 The Pisgah SEZ is located in the Mojave Basin and Range ecoregion (EPA 2007) and the
17 USFS's Bullion Mountains-Bristol Lake subsection. The subsection is characterized by gently to
18 moderately sloping alluvial fans and volcanic flows, nearly level basin floor and dry lake bed,
19 steep mountains and moderately steep hills (USFS 1997).

20
21 The SEZ is located within the east-west trending Mojave Valley. The valley falls between
22 the Cady and Bristol Mountains to the north and northeast and the Bullion, Lava Bed, Rodman,
23 and Newberry Mountains to the south and southwest. The SEZ is located between the Rodman
24 and Lava Bed Mountains to the south and the Cady Mountains, which rise abruptly immediately
25 northeast of the SEZ. The valley floor ranges from approximately 1,800 to 2,200 ft (549 to
26 671 m) in elevation; the mountains rise to between 3,000 ft and 4,400 ft (914 and 1,341 m) in
27 elevation. The Pisgah SEZ is relatively flat, but the northeastern portion slopes upward toward
28 the Cady Mountains. Portions of the SEZ include dark lava flows, mostly devoid of vegetation,
29 and sandy areas with sparse vegetation. Pisgah Crater is located on the south border of the SEZ.

30
31 Vegetation consists mostly of widely spaced creosote shrubs. Because vegetation is
32 generally sparse, the blacks of lava flows, the light tans of sand, and the grays of gravel beds are
33 prominent in many areas, and the wide spacing of the creosotebushes results in generally coarse
34 foreground textures. In most locations, the vegetation is too short and too sparse to screen views.
35 There are some scattered tamarisk trees, but otherwise the SEZ lacks hardwood vegetation. This
36 landscape type is common within the region.

37
38 No permanent water features are present on the SEZ. Troy Lake is a dry lake located
39 within the western portion of the SEZ. It is subject to intermittent flooding.

40
41 The mountain ranges surrounding the SEZ generally block views to and from
42 neighboring valleys; however, the view is more open to the east of the SEZ. Within the valley,
43 the general lack of topographic relief and vegetative screening affords panoramic views of the
44 SEZ, the rest of the valley, and the surrounding mountains. Panoramic views of the SEZ are
45 shown in Figures 9.3.14.1-2, 9.3.14.1-3, and 9.3.14.1-4.

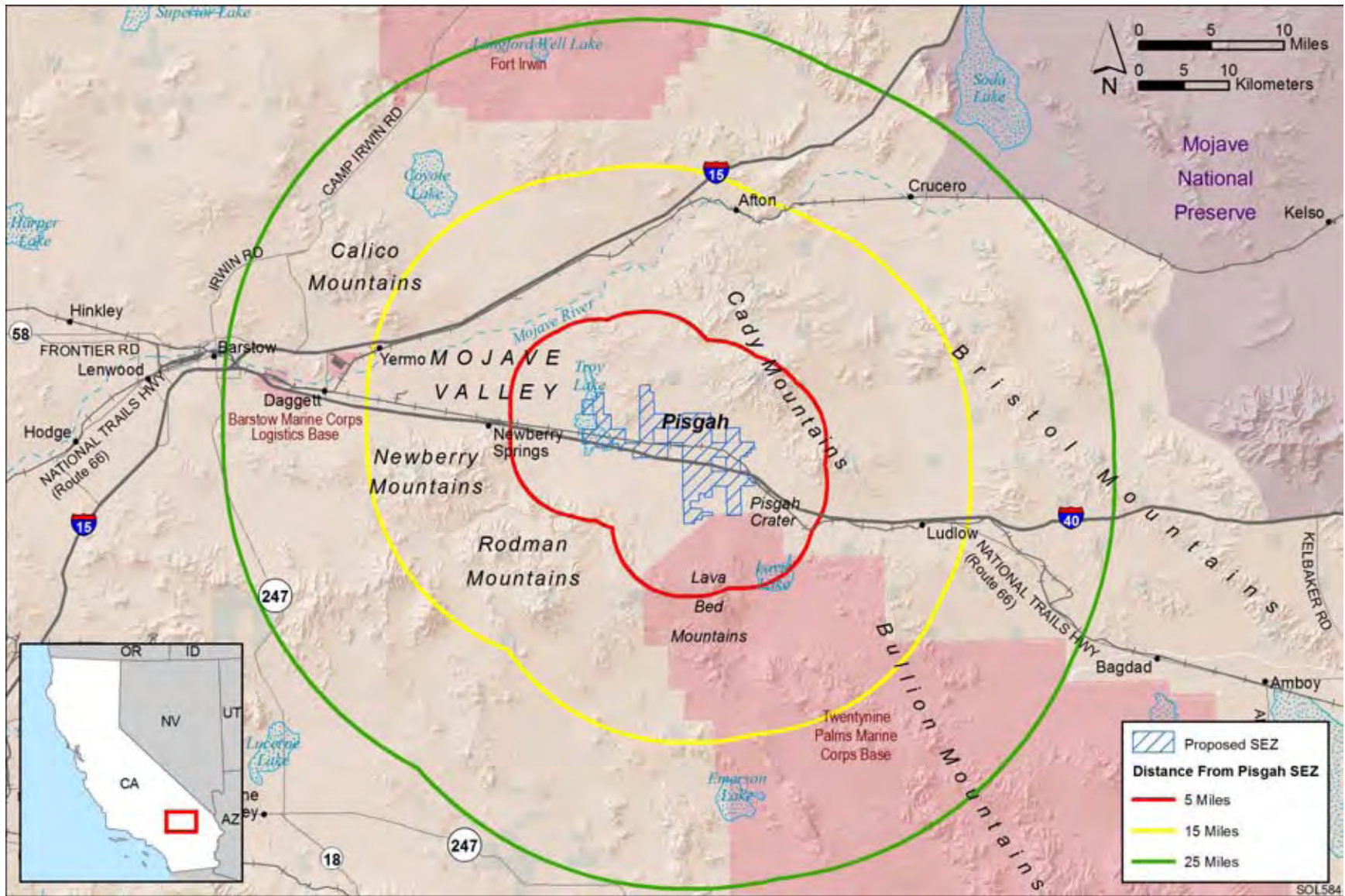


FIGURE 9.3.14.1-1 Proposed Pisgah SEZ and Surrounding Lands

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FIGURE 9.3.14.1-2 Approximately 120° Panoramic View from the Far Western Portion of the Proposed Pisgah SEZ Facing East, Including Cady Mountains

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FIGURE 9.3.14.1-3 Approximately 150° Panoramic View from I-40 in the South-Central Portion of the Proposed Pisgah SEZ Facing West, Including Lava Fields, Route 66 (Left), Rodman Mountains (Background Left), and Cady Mountains (Background Right)

8

9

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11



12

FIGURE 9.3.14.1-4 Approximately 180° Panoramic View from Route 66 in the Eastern Portion of the Proposed Pisgah SEZ Facing East, Including I-40 and Cady Mountains at Left, and Pisgah Crater at Far Right

13

1 Although the SEZ itself is generally natural appearing away from I-40, cultural
2 modifications within the SEZ detract somewhat from the SEZ's scenic quality. In addition to
3 I-40, Route 66 and several gravel and dirt roads of various sizes cross the SEZ. Traffic on I-40 is
4 visible from much of the SEZ. There is also a railroad line, transmission lines, and a substation
5 located on the SEZ; however, the SEZ is large enough that these elements do not dominate views
6 in most of the SEZ.

7
8 Off-site views are dominated by the Cady Mountains to the northeast and Rodman
9 Mountains to the southwest of the SEZ. The low, black form of Pisgah Crater is visible from
10 much of the southeast portion of the SEZ. Although the scenic quality of the valley floor is low,
11 these adjacent mountain ranges and volcanic cinder cone add to the scenic quality of the SEZ.
12 The colors of the mountains ranges are generally brown and garnet. Black lava flows visible
13 from the SEZ provide additional color contrast and visual interest.

14
15 The mountain slopes and peaks around the SEZ are generally visually pristine, as they are
16 partially within congressionally designated WAs or WSAs. The boundary of the Cady Mountains
17 WSA is immediately adjacent to portions of the northern boundary of the SEZ; the Rodman WA
18 is visible to the southwest; and the Newberry Mountains WA is visible to the west of the SEZ. In
19 addition to these areas, other important scenic resources within the 25-mi (40-km) viewshed of
20 the SEZ include the Kelso Dunes, Bristol Mountains WAs, the Soda Mountains WSA, the Old
21 Spanish National Historic Trail, and the historic Route 66 Highway.

22
23 While the lands to the north, east, and south of the SEZ are mostly undeveloped, the land
24 to the west includes agricultural fields utilizing center-pivot irrigation. Isolated ranches and
25 homes and associated structures are visible in private lands adjacent to the SEZ, as are roads and
26 local traffic. Scattered tanks and other structures associated with ranching and farming are
27 visible, primarily west of the SEZ.

28
29 The BLM conducted a VRI for the SEZ and surrounding lands in 2010 (BLM 2010h).
30 The VRI evaluates BLM-administered lands based on scenic quality; sensitivity level, in terms of
31 public concern for preservation of scenic values in the evaluated lands; and distance from travel
32 routes or KOPs. Based on these three factors, BLM-administered lands are placed into one of
33 four VRI Classes, which represent the relative value of the visual resources. Classes I and II are
34 the most valued; Class III represents a moderate value; and Class IV represents the least value.
35 Class I is reserved for specially designated areas, such as national wildernesses and other
36 congressionally and administratively designated areas where decisions have been made to
37 preserve a natural landscape. Class II is the highest rating for lands without special designation.
38 More information about VRI methodology is available in Section 5.12 and in *Visual Resource*
39 *Inventory*, BLM Manual Handbook 8410-1 (BLM 1986a).

40
41 The VRI map for the SEZ and surrounding lands is shown in Figure 9.3.14.1-5. The VRI
42 values for the SEZ and immediate surroundings are primarily VRI Class IV, indicating low
43 relative visual values, but with an area assigned VRI Class III (moderate visual values) in the far
44 northeastern portion of the SEZ near the Cady Mountains, and three smaller areas inventoried as
45 VRI Class II. One of the VRI Class II areas is associated with lava flows in the eastern portion of
46 the SEZ, while the other two VRI Class II areas are associated with areas of higher physical

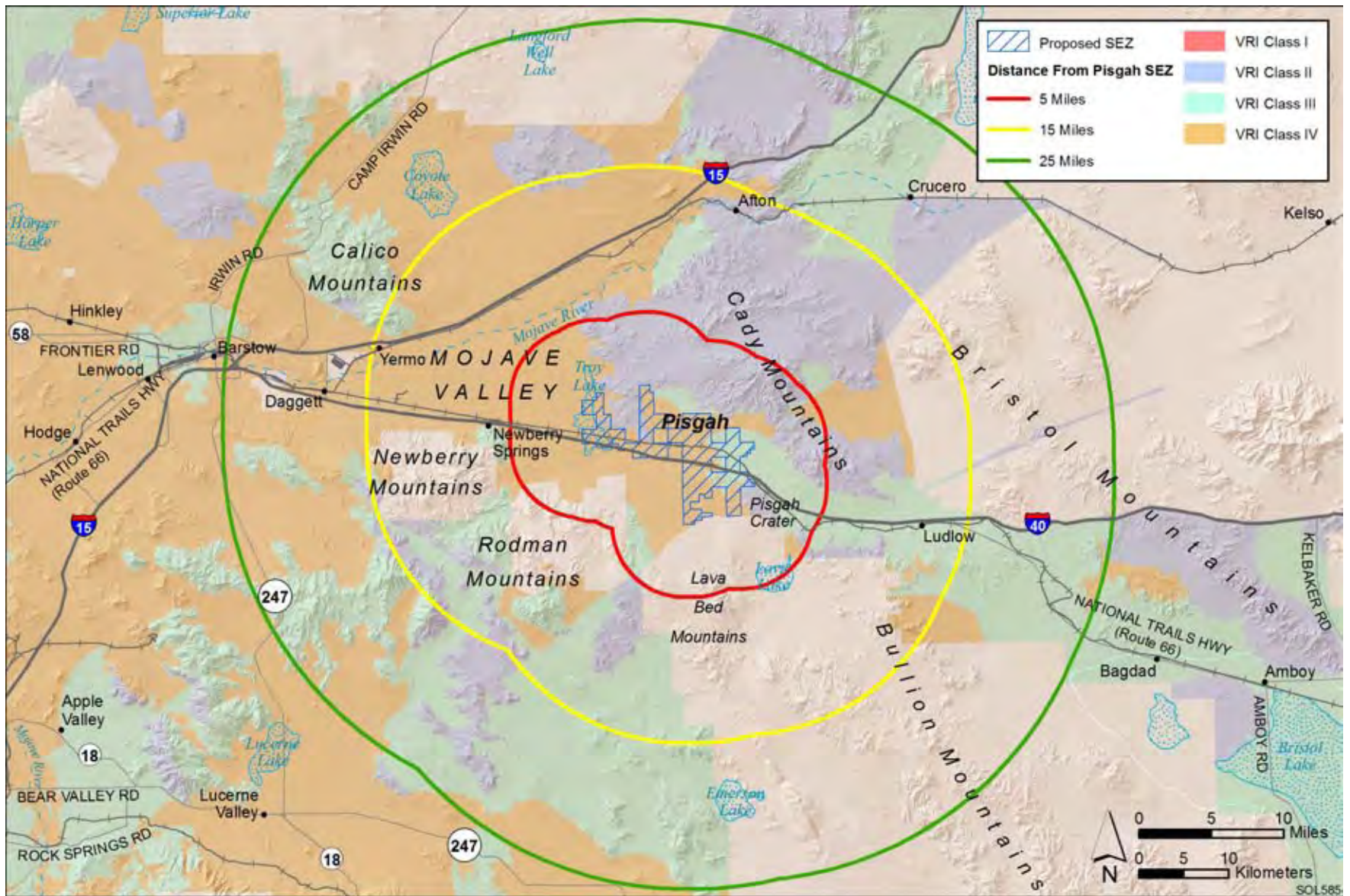


FIGURE 9.3.14.1-5 Visual Resource Inventory Values for the Proposed Pisgah SEZ and Surrounding Lands

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1 relief in the northwestern portion of the SEZ. The inventory indicates low to moderate scenic
2 quality for the SEZ and its immediate surroundings, with “moderate” ratings for portions of the
3 SEZ based in part on landscape features of interest, such as the lava flows, the dry lake, and
4 rolling terrain in some parts of the SEZ. Positive scenic quality attributes also included some
5 variety in vegetation types and color, and the off-site views of the surrounding mountain ranges.
6 The inventory indicates a moderate to high level of use, largely due to traffic on I-40 and
7 Historic Route 66, and a moderate to high level of public interest, due primarily to national
8 interest in Route 66 and the backcountry experience of Cady Mountains. Also noted in the
9 inventory is the special area sensitivity due to the Pisgah SEZ’s inclusion within the CDCA.

10
11 Lands within the 25-mi (40-km), 650-ft (198-m) viewshed of the SEZ contain
12 56,711 acres [229.50 km²] of VRI Class II areas, primarily northeast of the SEZ in the Cady
13 Mountains; 70,816 acres [286.58 km²] of Class III areas, primarily east of the SEZ in the Mojave
14 Valley; and 301,758 acres [1,221.17 km²] of VRI Class IV areas, primarily west of the SEZ in
15 the Mojave Valley.

16
17 The BLM has not assigned Visual Resource Management (VRM) classes for the SEZ and
18 surrounding BLM lands. More information about the BLM’s VRM program is available in
19 Section 5.12 and in *Visual Resource Management*, BLM Manual Handbook 8400 (BLM 1984).

20 21 22 **9.3.14.2 Impacts**

23
24 The potential for impacts from utility-scale solar energy development on visual resources
25 within the proposed Pisgah SEZ and surrounding lands, as well as the impacts of related
26 developments (e.g., access roads and transmission lines) outside of the SEZ, is presented in this
27 section.

28
29 Site-specific impact assessment is needed to systematically and thoroughly assess visual
30 impact levels for a particular project. Without precise information about the location of a project
31 and a relatively complete and accurate description of its major components and their layout, it is
32 not possible to assess precisely the visual impacts associated with the facility. However, if the
33 general nature and location of a facility are known, a more generalized assessment of potential
34 visual impacts can be made by describing the range of expected visual changes and discussing
35 contrasts typically associated with these changes. In addition, a general analysis can be used to
36 identify sensitive resources that may be at risk if a future project is sited in a particular area.
37 Detailed information about the methodology employed for the visual impact assessment for this
38 Solar Energy PEIS, including assumptions and limitations, is presented in Appendix M.

39
40
41 **Potential Glint and Glare Impacts.** Similarly, the nature and magnitude of potential
42 glint- and glare-related visual impacts for a given solar facility is highly dependent on viewer
43 position, sun angle, the nature of the reflective surface and its orientation relative to the sun and
44 the viewer, atmospheric conditions and other variables. The determination of potential impacts
45 from glint and glare from solar facilities within a given proposed SEZ would require precise
46 knowledge of these variables, and is not possible given the scope of the PEIS. Therefore, the

1 following analysis does not describe or suggest potential contrast levels arising from glint and
2 glare for facilities that might be developed within the SEZ; however, it should be assumed that
3 glint and glare are possible visual impacts from *any* utility-scale solar facility, regardless of size,
4 landscape setting, or technology type. The occurrence of glint and glare at solar facilities could
5 potentially cause large, but temporary, increases in brightness and visibility of the facilities. The
6 visual contrast levels projected for sensitive visual resource areas discussed in the following
7 analysis do not account for potential glint and glare effects; however, these effects would be
8 incorporated into a future site-and project-specific assessment that would be conducted for
9 specific proposed utility-scale solar energy projects. For more information about potential glint
10 and glare impacts associated with utility-scale solar energy facilities, see Section 5.12 of this
11 PEIS.

12 13 14 ***9.3.14.2.1 Impacts on the Proposed Pisgah SEZ*** 15

16 Some or all of the SEZ could be developed for one or more utility-scale solar energy
17 projects, utilizing one or more of the solar energy technologies described in Appendix E.
18 Because of the industrial nature and large size of utility-scale solar energy facilities, large visual
19 impacts on the SEZ would occur as a result of the construction, operation, and decommissioning
20 of solar energy projects. In addition, large impacts could occur at solar facilities utilizing highly
21 reflective surfaces or major light-emitting facility components (solar dish, parabolic trough, and
22 power tower technologies), with lesser impacts associated with reflective surfaces expected
23 from PV facilities. These impacts would be expected to involve major modification of the
24 existing character of the landscape and would likely dominate the views from nearby locations.
25 Additional, and potentially large, impacts would occur as a result of the construction, operation,
26 and decommissioning of access roads and transmission lines within the SEZ (however no new
27 transmission lines construction outside of the proposed SEZ was assessed; see Section 9.3.1.2).
28 While the primary visual impacts associated with solar energy development within the SEZ
29 would occur during daylight hours, lighting required for utility-scale solar energy facilities
30 would be a potential source of visual impacts at night, both within the SEZ and on surrounding
31 lands.

32
33 Common and technology-specific visual impacts from utility-scale solar energy
34 development, as well as impacts associated with electric transmission lines, are discussed in
35 Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and
36 decommissioning, and some impacts could continue after project decommissioning. Visual
37 impacts resulting from solar energy development in the SEZ would be in addition to impacts
38 from solar energy development and other development that may occur on other public or private
39 lands within the SEZ viewshed, and are subject to cumulative effects. For discussion of
40 cumulative impacts, see Section 9.3.22.4.13 of the PEIS.

41
42 The changes described previously would be expected to be consistent with BLM visual
43 resource management objectives for VRM Class IV, as seen from nearby KOPs. VRM Class IV
44 objectives include major modification of the existing character of the landscape. The BLM has
45 not assigned VRM classes to the SEZ and surrounding lands. More information about the BLM
46 VRM program is available in Section 5.12 and in *Visual Resource Management*, BLM Manual

1 Handbook 8400 (BLM 1984). More information about impact determination using the BLM's
2 VRM program is available in Section 5.12 and in *Visual Resource Contrast Rating*, BLM
3 Manual Handbook 8431-1 (BLM 1986b).

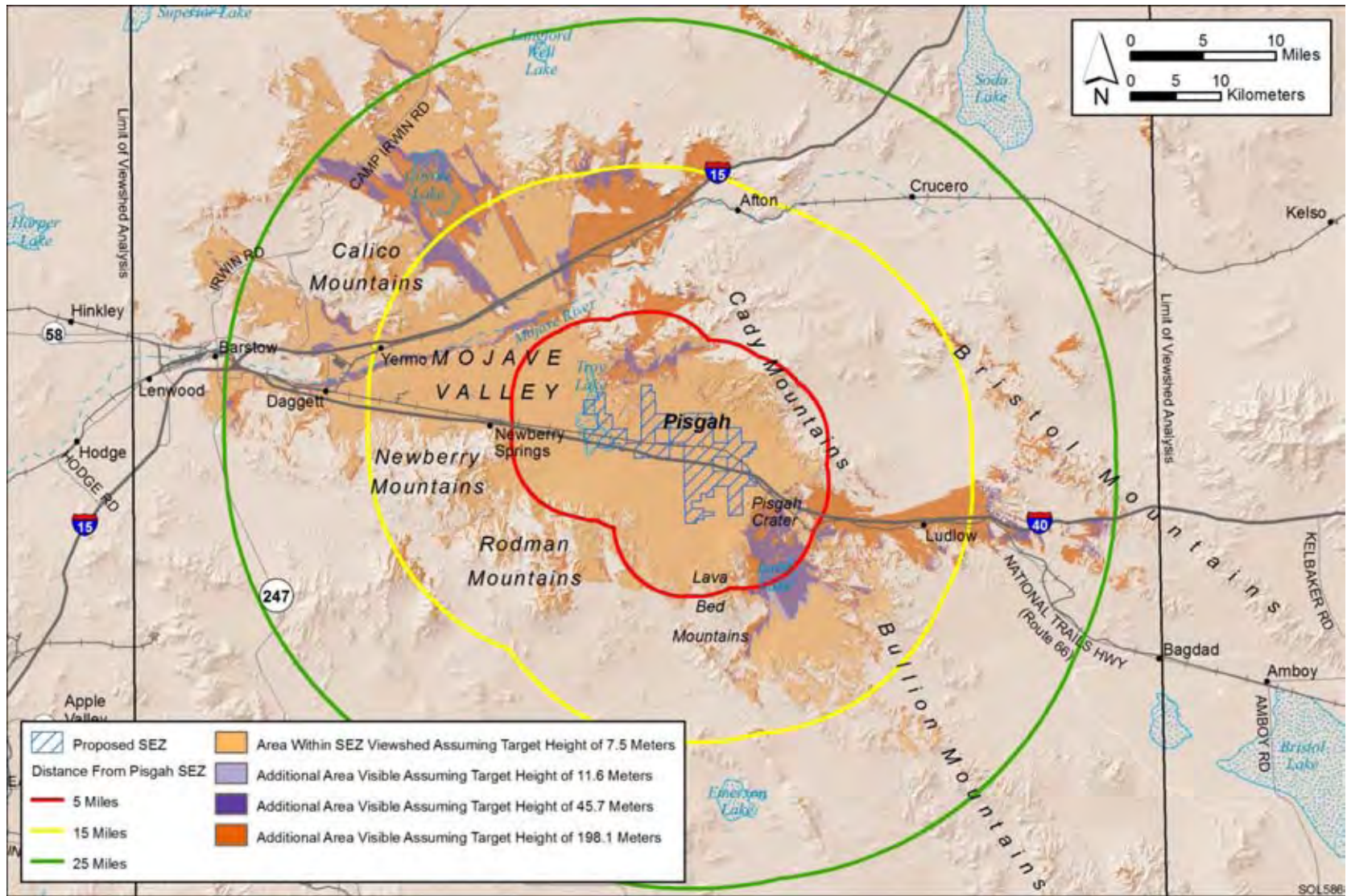
4
5 Implementation of the programmatic design features intended to reduce visual impacts
6 (described in Appendix A, Section A.2.2, of the PEIS) would be expected to reduce visual
7 impacts associated with utility-scale solar energy development within the SEZ; however, the
8 degree of effectiveness of these design features could be assessed only at the site- and project-
9 specific level. Given the large scale, reflective surfaces, and strong regular geometry of utility-
10 scale solar energy facilities, and the lack of screening vegetation and landforms within the SEZ
11 viewshed, siting the facilities away from sensitive visual resource areas and other sensitive
12 viewing areas would be the primary means of mitigating visual impacts. The effectiveness of
13 other visual impact mitigation measures would generally be limited, but would be important to
14 reduce visual contrasts to the greatest extent possible.

15 16 17 **9.3.14.2.2 Impacts on Lands Surrounding the Proposed Pisgah SEZ**

18
19 Because of the large size of utility-scale solar energy facilities and the generally flat,
20 open nature of the proposed SEZ, lands outside the SEZ would be subjected to visual impacts
21 related to construction, operation, and decommissioning of utility-scale solar energy facilities.
22 The affected areas and extent of impacts would depend on a number of visibility factors and
23 viewer distance (for a detailed discussion of visibility and related factors, see Section 5.12).
24 A key component in determining impact levels is the intervisibility between the project and
25 potentially affected lands; if topography, vegetation, or structures screen the project from viewer
26 locations, there is no impact.

27
28 Preliminary viewshed analyses were conducted to identify which lands surrounding
29 the proposed SEZ could have views of solar facilities in at least some portion of the SEZ
30 (see Appendix M for information on assumptions and limitations of the methods used).
31 Four viewshed analyses were conducted, assuming four different heights representative of
32 project elements associated with potential solar energy technologies: PV and parabolic trough
33 arrays (24.6 ft [7.5 m]), solar dishes and power blocks for CSP technologies (37 ft [11.6 m]),
34 transmission towers and short solar power towers (150 ft [45.7 m]), and tall solar power towers
35 (650 ft [198.1 m]). Viewshed maps for the SEZ for all four solar technology heights are available
36 in Appendix N.

37
38 Figure 9.3.14.2-1 shows the combined results of the viewshed analyses for all four solar
39 technologies. The colored portions indicate areas with clear lines of sight to one or more areas
40 within the SEZ and from which solar facilities within these areas of the SEZ would be expected
41 to be visible, assuming the absence of screening vegetation or structures and adequate lighting
42 and other atmospheric conditions. The light brown areas are locations from which PV and
43 parabolic trough arrays located in the SEZ could be visible. Solar dishes and power blocks
44 for CSP technologies would be visible from the areas shaded in light brown and the additional
45 areas shaded in light purple. Transmission towers and short solar power towers would be visible
46



1
2 **FIGURE 9.3.14.2-1 Viewshed Analyses for the Proposed Pisgah SEZ and Surrounding Lands, Assuming Solar Technology Heights**
3 **of 24.6 ft (7.5 m), 37 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development**
4 **within the SEZ could be visible)**

1 from the areas shaded light brown, light purple, and the additional areas shaded in dark purple.
2 Power tower facilities located in the SEZ could be visible from areas shaded light brown, light
3 purple, dark purple, and at least the upper portions of power tower receivers could be visible
4 from in the additional areas shaded in medium brown.
5

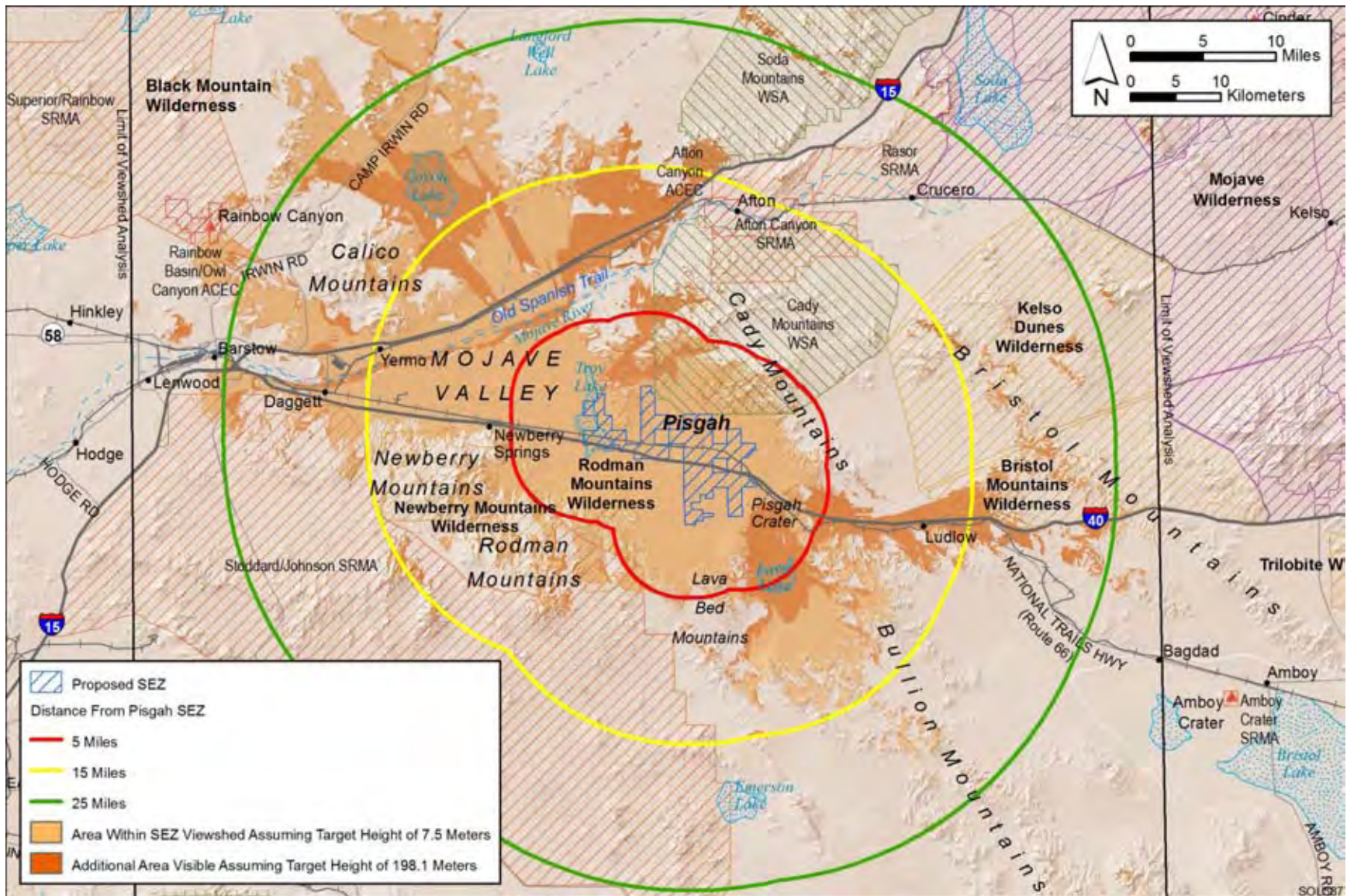
6 For the following visual impact discussion, the tall solar power tower (650 ft [198.1 m])
7 and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds are shown in the figures and
8 discussed in the text. These heights represent the maximum and minimum landscape visibility
9 for solar energy technologies analyzed in the PEIS. Viewsheds for solar dish and CSP
10 technology power blocks (37 ft [11.6 m]), and for transmission towers and short solar power
11 towers (150 ft [45.7 m]) are presented in Appendix N. The visibility of these facilities would
12 fall between that for tall power towers and PV and parabolic trough arrays.
13
14

15 **Impacts on Selected Federal-, State-, and BLM-Designated Sensitive Visual** 16 **Resource Areas** 17

18 Figure 9.3.14.2-2 shows the results of a GIS analysis that overlays selected federal-,
19 state-, and BLM-designated sensitive visual resource areas onto the combined tall solar power
20 tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds, in
21 order to illustrate which of these sensitive visual resource areas could have views of solar
22 facilities within the SEZ and therefore potentially would be subject to visual impacts from
23 those facilities. Distance zones that correspond with the BLM's VRM system-specified
24 foreground-middleground distance (5 mi [7 km]), background distance (15 mi [24 km]), and
25 a 25-mi (40-km) distance zone are shown as well, in order to indicate the effect of distance
26 from the SEZ on impact levels, which are highly dependent on distance.
27

28 The scenic resources included in the analyses were as follows:
29

- 30 • National Parks, National Monuments, National Recreation Areas, National
31 Preserves, National Wildlife Refuges, National Reserves, National
32 Conservation Areas, National Historic Sites;
- 33
- 34 • Congressionally authorized Wilderness Areas;
- 35
- 36 • Wilderness Study Areas;
- 37
- 38 • National Wild and Scenic Rivers;
- 39
- 40 • Congressionally authorized Wild and Scenic Study Rivers;
- 41
- 42 • National Scenic Trails and National Historic Trails;
- 43
- 44 • National Historic Landmarks and National Natural Landmarks;
- 45
- 46 • All-American Roads, National Scenic Byways, State Scenic highways, and
47 BLM- and USFS-designated scenic highways/byways, BLM-designated
48 Special Recreation Management Areas; and
- 49 • ACECs designated because of outstanding scenic qualities.



1
2 **FIGURE 9.3.14.2-2** Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (197.1-m) and 24.6-ft (7.5-m) Viewsheds
3 for the Proposed Pisgah SEZ

Potential impacts on specific sensitive resource areas visible from and within 25 mi (40 km) of the proposed Pisgah SEZ are discussed below. The results of this analysis are also summarized in Table 9.3.14.2-1. Further discussion of impacts on these areas is available in Sections 9.3.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and 9.3.17 (Cultural Resources) of this PEIS.

The following visual impact analysis describes *visual contrast levels* rather than *visual impact levels*. *Visual contrasts* are changes in the seen landscape, including changes in the forms, lines, colors, and textures of objects seen in the landscape. A measure of *visual impact* includes potential human reactions to the visual contrasts arising from a development activity, based on viewer characteristics, including attitudes and values, expectations, and other

TABLE 9.3.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40.2-km) Viewshed of the Proposed Pisgah SEZ, Assuming a Viewshed Analysis Target Height of 650 ft (198.1 m)

Feature Type	Feature Name and Total Acreage	Feature Area or Linear Distance ^a		
		Visible within 5 mi	Visible between	
			5 and 15 mi	15 and 25 mi
National Conservation Area	California Desert Conservation Area (25,919,319 acres)	178,231 acres (0.7%) ^b	228,302 acres (0.9%)	145,805 acres (0.6%)
National Historic Trail	Old Spanish	0 acres	33.2 mi	3.8 mi
WAs	Bristol Mountains (77,026 acres)	0 acres	1,776 acres (2.3%)	6,577 acres (8.5%)
	Kelso Dunes (154,335 acres)	0 acres	694 acres (0.4%)	3,689 acres (2.4%)
	Newberry Mountains (27,768 acres)	0 acres	6,498 acres (23.4%)	0 acres
	Rodman Mountains (34,341 acres)	9,120 acres (26.6%)	10,780 acres (31%)	0 acres
WSAs	Cady Mountains (120,197 acres)	20,677 acres (17.2%)	3,275 acres (3%)	0 acres
	Soda Mountains (121,680 acres)	0 acres	0 acres	3,005 acres (2.5%)

^a To convert acres to km², multiply by 0.004047; to convert mi to km, multiply by 1.609.

^b Percentage of total feature area for areal features.

1 characteristics that are viewer- and situation-specific. Accurate assessment of visual impacts
2 requires knowledge of the potential types and numbers of viewers for a given development and
3 their characteristics and expectations; specific locations from which the project might be viewed;
4 and other variables that were not available or not feasible to incorporate in the PEIS analysis.
5 These variables would be incorporated into a future site-and project-specific assessment that
6 would be conducted for specific proposed utility-scale solar energy projects. For more
7 discussion of visual contrasts and impacts, see Section 5.12 of the PEIS.
8
9

10 *National Conservation Areas*

- 12 • *California Desert Conservation Area*—The California Desert Conservation
13 Area (CDCA) is a 26-million-acre (105,000-km²) parcel of land in southern
14 California designated by Congress in 1976 through the FLPMA. About
15 10 million acres (40,000 km²) of the CDCA are administered by the BLM).
16 The proposed Pisgah SEZ is located within the CDCA.

17
18 Portions of the CDCA within the 650-ft (198.1-m) viewshed for the Pisgah
19 SEZ include approximately 552,338 acres (2,235 km²), or 2.1% of the total
20 CDCA acreage. Portions of the CDCA within the 24.6-ft (7.5-m) viewshed
21 encompass approximately 361,194 acres (1,462 km²), or 1.4% of the total
22 CDCA acreage.

23
24 The CDCA management plan notes the “superb variety of scenic values” in
25 the CDCA (BLM 1999) and lists scenic resources as needing management
26 to preserve their value for future generations. The CDCA management plan
27 divides CDCA lands into multiple-use classes based on management
28
29

GOOGLE EARTH™ VISUALIZATIONS

The visual impact analysis discussion in this section utilizes three-dimensional Google Earth™ perspective visualizations of hypothetical solar facilities placed within the SEZ. The visualizations include simplified wireframe models of a hypothetical solar power tower facility. The models were placed at various locations within the SEZ as visual aids for assessing the approximate size and viewing angle of utility-scale solar facilities. The visualizations are intended to show the apparent size, distance, and configuration of the SEZ, as well as the apparent size of a typical utility-scale solar power tower project and its relationship to the surrounding landscape, as viewed from potentially sensitive visual resource areas within the viewshed of the SEZ.

The visualizations are not intended to be realistic simulations of the actual appearance of the landscape or of proposed utility-scale solar energy projects. The placement of models within the SEZ did not reflect any actual planned or proposed projects within the SEZ, and did not take into account engineering or other constraints that would affect the siting or choice of facilities for this particular SEZ. The number of facility models placed in the SEZ does not reflect the 80% development scenario analyzed in the PEIS, but it should be noted that the discussion of expected visual contrast levels does account for the 80% development scenario. A solar power tower was chosen for the models because the unique height characteristics of power tower facilities make their visual impact potential extend beyond other solar technology types.

1 objectives. The class designations govern the type and degree of land use
2 actions allowed within the areas defined by class boundaries. All land use
3 actions and resource-management activities on public lands within a multiple-
4 use class delineation must meet the guidelines given for that class.

5
6 The proposed SEZ is within areas classified as multiple-use classes “L” and
7 “M.” Class “L” protects sensitive, natural, scenic, ecological, and cultural
8 resource values. Class “L” management provides for generally lower
9 intensity, carefully controlled multiple use of resources, while ensuring that
10 sensitive values are not significantly diminished. The area of the SEZ below
11 I-40 is designated as Class “L.” Multiple-Use Class “M” (Moderate Use) is
12 based upon a controlled balance between higher intensity use and protection
13 of public lands. This class provides for a wide variety of present and future
14 uses such as mining, livestock grazing, recreation, energy, and utility
15 development. Class “M” management is also designed to conserve desert
16 resources and to mitigate damage to those resources which permitted uses
17 may cause.

18
19 Utility-scale solar development within the SEZ would be an allowable use
20 under the CDCA management plan, assuming NEPA requirements were met
21 and mitigation measures were used to minimize visual impacts. However,
22 construction and operation of solar facilities under the PEIS development
23 scenario would result in substantial visual impacts on the SEZ and some
24 surrounding lands within the SEZ viewshed that could not be completely
25 mitigated.

26 27 28 **Wilderness Areas**

- 29
- 30 • *Bristol Mountains*—The 77,026-acre (312-km²) Bristol Mountains WA is a
31 congressionally designated WA located 11.9 mi (19.2 km) at the point of
32 closest approach east of the SEZ. The trail-less WA contains the tilted
33 volcanic plain called Old Dad Mountains and the northern portion of the
34 Bristol Mountains. The terrain is rolling and consists of volcanic uplands.
35 The broad Budweiser Wash drains into the eastern portion of the wilderness.
36 Hiking, horseback riding, hunting, camping, rock hounding, photography,
37 and backpacking are recreational activities within the wilderness.

38
39 Portions of the WA within the 650-ft (198.1-m) SEZ viewshed (approximately
40 8,353 acres [33.8 km²], or 10.8% of the total WA acreage) extend from the
41 point of closest approach at the eastern boundary of the SEZ to approximately
42 16 mi (26 km) from the SEZ. Approximately 775 acres (3 km²) of the WA are
43 within the 24.6-ft (7.5-m) SEZ viewshed.

44
45 As shown in Figure 9.3.14.2-2, the viewshed analysis indicates that the upper
46 western slopes and peaks of the highest mountains in the Bristol Mountains

1 WA would have views of the southeastern portion of the SEZ; however, in
2 most of the WA, views of the SEZ would be almost completely screened by
3 the Cady Mountains, and only the tops of tall power towers at certain
4 locations within the SEZ could potentially be seen. If the receivers of
5 operating power towers were visible within the SEZ, they would likely appear
6 as points of light just above the western horizon. If sufficiently tall, power
7 towers could have red or white flashing hazard navigation lights that could
8 be visible from the WA at night. From scattered locations within the SEZ,
9 portions of lower-height facilities could potentially be seen, but these areas
10 would occupy very small portions of the horizontal field of view, and the
11 viewing angle would be low. Primarily because of the near complete
12 screening of the SEZ, under the 80% development scenario analyzed in the
13 PEIS, expected visual contrast levels from solar facilities in the SEZ would
14 be expected to be minimal to weak for viewpoints in the Bristol Mountains
15 WA.

- 16
17 • *Kelso Dunes*—The 154,335-acre (625-km²) Kelso Dunes WA is located
18 approximately 12 mi (19 km) east of the SEZ at the point of closest approach.
19 A small portion of the WA (approximately 4,383 acres [18 km²], or 2.8% of
20 the total WA acreage) is within the 650-ft (197.1-m) viewshed of the SEZ.
21 The area within the viewshed extends 17 mi (27 km) from the point of closest
22 approach at the eastern boundary of the SEZ to approximately 24 mi (38 km)
23 from the SEZ. None of the WA is visible within the lower-height viewsheds.

24
25 The western portion of the WA includes parts of the Bristol Mountains, and
26 the viewshed analysis indicates that the western slopes and peaks of some of
27 the Bristol Mountains within the WA could have views of the upper portions
28 of power towers within the eastern portion of the SEZ. At a distance of
29 16.5 mi (26.6 km) to approximately 24 mi (38 km), the light from power
30 towers receivers would likely appear as distant points of light on the western
31 horizon. Only very small portions of the SEZ would be visible from the WA,
32 and the affected area within the WA is small, so impacts on the WA from
33 solar energy development within the SEZ are expected to be minimal.

- 34
35 • *Newberry Mountains*—The 27,768-acre (112-km²) Newberry Mountains WA
36 is located approximately 6 mi (10 km) west of the SEZ at the point of closest
37 approach. The Newberry Mountains WA is known for its rugged, generally
38 flat-topped volcanic mountains and deep, maze-like canyons. Elevations range
39 from 2,200 ft (671 m) in the north to 5,100 ft (1,554 m) in the south.

40
41 Solar energy facilities within the SEZ could be visible from the eastern slopes
42 of the Newberry Mountains within the WA, and from scattered peaks in the
43 western portion of the WA as well. Portions of the WA within the 650-ft
44 (198.1-m) viewshed (approximately 6,498 acres [26 km²], or 23% of the total
45 WA acreage) extend from the point of closest approach at the western
46 boundary of the SEZ to approximately 10 mi (16 km) from the SEZ.

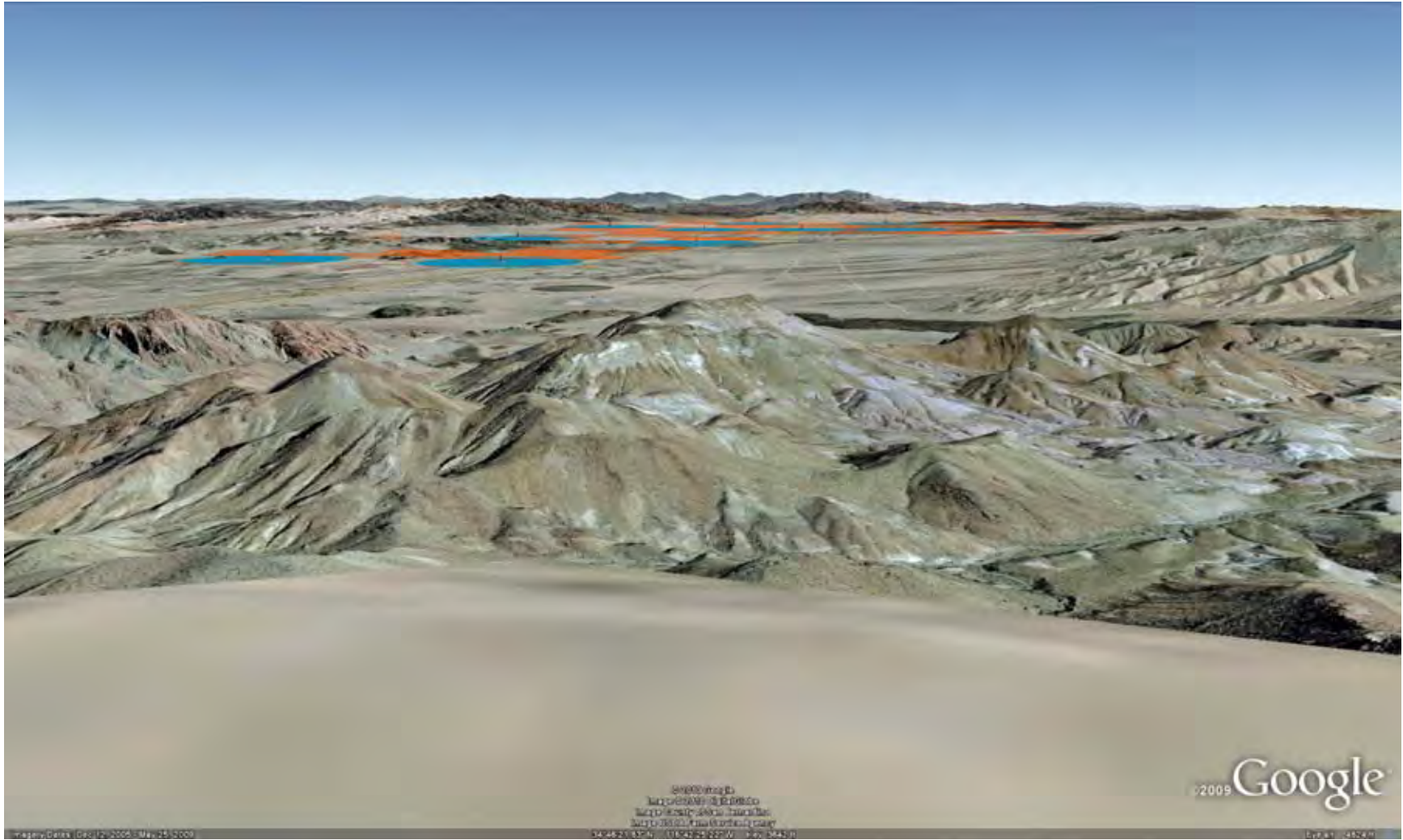
1 Approximately 5,349 acres (22 km²) of the WA are within the 24.6-ft (7.5-m)
2 SEZ viewshed.

3
4 Figure 9.3.14.2-3 is a three-dimensional Google Earth™ perspective
5 visualization of the SEZ (highlighted in orange) as seen from an unnamed
6 peak (elevation approximately 4,800 ft [1,500 m]) in the east-central portion
7 of the WA, approximately 9 mi (15 km) from the southwest corner of the
8 SEZ, and approximately 3,000 ft (900 m) above the valley floor. The
9 visualization includes simplified wireframe models of a hypothetical solar
10 power tower facility. The models were placed within the SEZ as a visual aide
11 for assessing the approximate size and viewing angle of utility-scale solar
12 facilities. The receiver towers depicted in the visualization are properly scaled
13 models of a 459-ft (139.9-m) power tower with an 867-acre (3.5-km²) field of
14 12-ft (3.7-m) heliostats, each representing approximately 100 MW of electric
15 generating capacity. Ten models were placed in the SEZ for this and other
16 visualizations shown in this section of the PEIS. In the visualization, the SEZ
17 area is depicted in orange, the heliostat fields in blue.

18
19 The upper slopes and peaks of the Newberry Mountains are barren with little
20 opportunity for screening. I-40, Route 66, agricultural fields, and other
21 cultural disturbances would be visible west of the SEZ and in the southern
22 portion of the SEZ. While the presence of these existing disturbances might
23 tend to lessen the contrast associated with the introduction of solar facilities
24 into the viewshed, the scale and strong geometry of the solar facilities would
25 be such that any reduction of contrast would be slight.

26
27 As shown in the visualization, the entire SEZ is visible from this location,
28 although the angle of view is low. The SEZ would occupy much of the
29 horizontal field of view. At the higher elevations within the WA, the angle of
30 view is great enough that the tops of collector/reflector arrays for solar
31 facilities within the SEZ might be visible in the closer portions of the SEZ,
32 which would make their large areal extent and regular geometry more
33 apparent, tending to increase associated visual contrasts. At lower elevations
34 within the WA, the angle of view is lower, so solar collector/reflector arrays
35 would be seen nearly edge-on, their size and regular geometry would be less
36 apparent, and they would appear to repeat the line of the plain in which the
37 SEZ is located, tending to reduce contrast.

38
39 Tall power towers, power blocks, plumes, and transmission towers located in
40 the nearest parts of the SEZ would add very short oblique and vertical lines
41 and form elements that would likely project above the solar collector/reflector
42 arrays and tend to increase visual contrast. In the farthest portions of the SEZ,
43 these elements might be visible but might not attract the attention of casual
44 viewers.



1

FIGURE 9.3.14.2-3 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Newberry Mountains Wilderness

2

3

4

1 If power towers were present in the closer portions of the SEZ, when
2 operating, the receivers would likely appear as bright lights atop discernable
3 tower structures against the backdrop of the valley floor, while for power
4 towers in the more distant sections of the SEZ, the receivers would likely
5 appear as distant points of light against the backdrop of the valley floor, or
6 possibly the Cady Mountains, depending on viewing angle and facility
7 location.

8
9 If sufficiently tall, the power towers could have red or white flashing hazard
10 navigation lights that would likely be visible from the WA at night, and could
11 be conspicuous from this viewpoint, given the dark night skies in the vicinity
12 of the SEZ. Other lighting associated with solar facilities in the SEZ could
13 potentially be visible as well, at least for facilities in the closest portions of
14 the SEZ.

15
16 The nature of the visual contrasts from solar facilities in the SEZ as observed
17 from this location would depend on the numbers, types, sizes and locations of
18 solar facilities in the SEZ, and other project- and site-specific factors. Under
19 the 80% development scenario analyzed in this PEIS, solar facilities within
20 the SEZ would be expected to create moderate visual contrasts as seen from
21 this viewpoint.

22
23 In general, the range of visual contrasts from solar facilities within the SEZ
24 that would be experienced by WA visitors would be highly dependent on
25 viewer location within the WA, as well as the numbers, types, sizes and
26 locations of solar facilities in the SEZ, and other project- and site-specific
27 factors. Under the 80% development scenario analyzed in this PEIS, solar
28 facilities within the SEZ would be expected to create weak to moderate visual
29 contrasts as viewed from the WA. The highest levels of visual contrast would
30 be expected for viewing locations at higher elevations in the far eastern
31 portion of the WA, with less visibility and lower contrast levels expected at
32 lower elevations and/or more distant locations.

- 33
34 • *Rodman Mountains*—The 34,341-acre (139-km²) Rodman Mountains WA
35 is located approximately 1.2 mi (1.9 km) southwest of the SEZ at the point
36 of closest approach. The Rodman Mountains reach elevations of 5,000 ft
37 (1,524 m), and the WA contains deep canyons and wide washes cutting
38 through mountain ridges and sloping bajadas that descend from the central
39 core of peaks.

40
41 As shown in Figure 9.3.14.2-2, the SEZ is visible from more than half of
42 the WA, particularly the northern and eastern portions; however, visibility
43 extends to the southern and western boundaries of the WA in some areas.
44 Portions of the WA within the 650-ft (198.1-m) viewshed (approximately
45 19,900 acres [81 km²], or 57.9% of the total WA acreage) extend from the
46 point of closest approach at the eastern boundary of the SEZ to approximately

1 9 mi (15 km) from the SEZ. Visible portions extend up to 5 mi (7 km) from
2 the northern boundary of the SEZ. Approximately 17,347 acres (70 km²) of
3 the WA are within the 24.6-ft (7.5-m) SEZ viewshed.
4

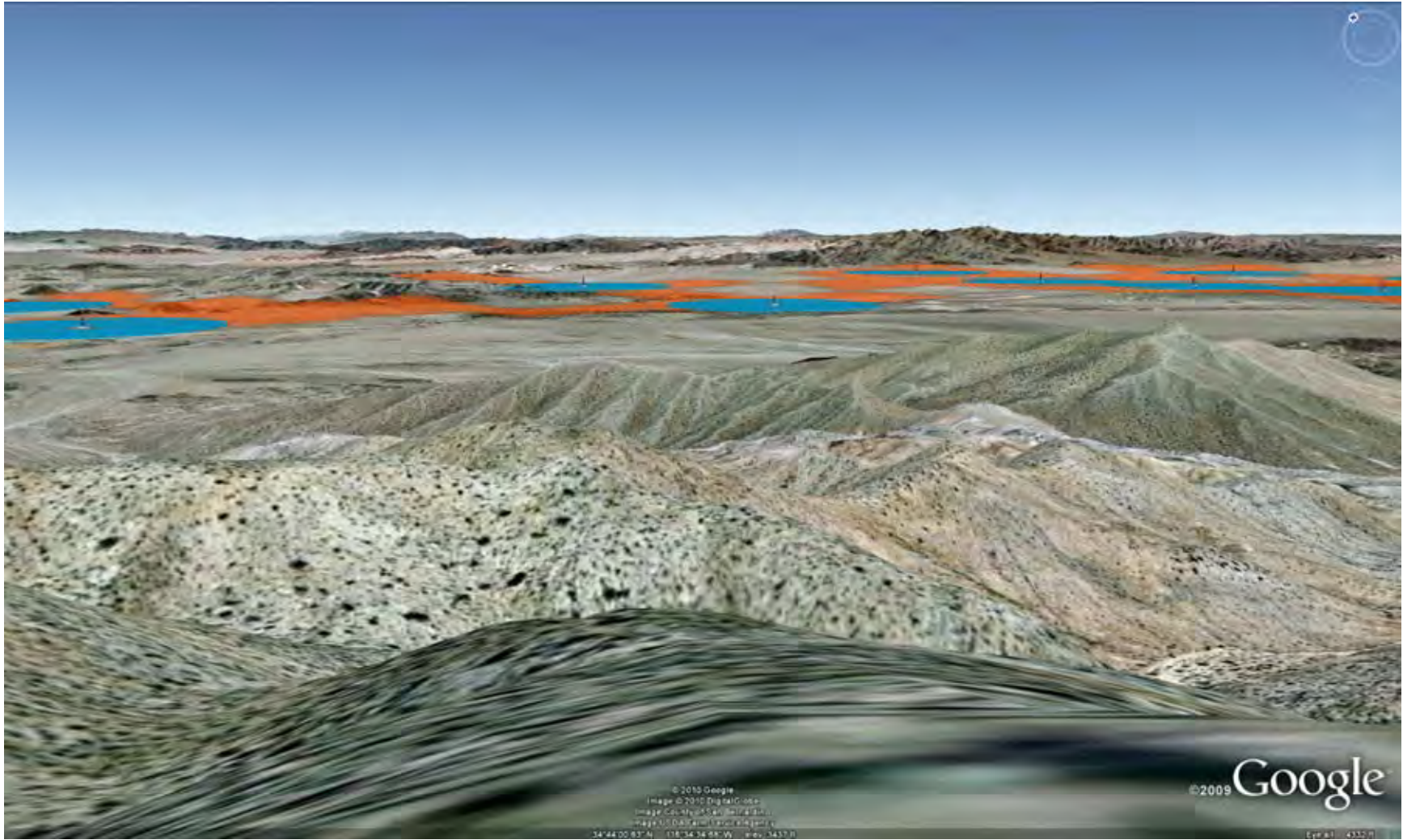
5 Figure 9.3.14.2-4 is a Google Earth visualization of the SEZ (highlighted in
6 orange) as seen from an unnamed peak (elevation approximately 4,300 ft
7 [1,300 m]) in the north-central portion of the WA, approximately 6 mi (10
8 km) from the southwest corner of the SEZ, and approximately 2,500 ft (760
9 m) above the valley floor. The nearest power tower in the visualization (at
10 left) is about 6.5 mi (10.5 km) from the viewpoint. The SEZ area is depicted
11 in orange, the heliostat fields in blue.
12

13 The upper slopes and peaks of the Rodman Mountains are barren, with little
14 opportunity for screening. I-40, Route 66, agricultural fields, and other
15 cultural disturbances would be visible west of the SEZ, and in the southern
16 portion of the SEZ. While the presence of these existing disturbances might
17 tend to lessen the contrast associated with the introduction of solar facilities
18 into the viewshed, the scale and strong geometry of the solar facilities would
19 be such that any reduction of contrast would be slight.
20

21 The visualization suggests that from this elevated viewpoint, under the 80%
22 development scenario analyzed in the PEIS, solar facilities in the SEZ would
23 fill the horizontal field of view. The tops of solar collector/reflector arrays in
24 the closest parts of the SEZ would be visible, which would make their large
25 areal extent and strong regular geometry more apparent, tending to increase
26 contrast. The angle of view would be low enough that visible solar
27 collector/reflector arrays in the northeast portion of the SEZ (farthest away
28 from this viewpoint) would be seen nearly edge-on, which would tend to
29 reduce contrast.
30

31 Taller ancillary facilities, such as buildings, transmission structures, and
32 cooling towers; and plumes (if present) could be visible projecting above the
33 collector/reflector arrays, at least for nearby facilities. The ancillary facilities
34 could create form and line contrasts with the strongly horizontal, regular, and
35 repeating forms and lines of the collector/reflector arrays.
36

37 If power towers were present within the closer parts of the SEZ, when
38 operating, the receivers would likely appear as very bright points of light atop
39 discernable tower structures, against the backdrop of the valley floor. If
40 sufficiently tall, the power towers could have red or white flashing hazard
41 navigation lights that would likely be visible from the WA at night, and could
42 be conspicuous from this viewpoint, although other lights would be visible in
43 the vicinity of the SEZ. Other lighting associated with solar facilities in the
44 SEZ could potentially be visible as well, at least for facilities in the closest
45 portions of the SEZ.
46



1

FIGURE 9.3.14.2-4 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Rodman Mountains Wilderness

2

3

4

1 The nature of the visual contrasts from solar facilities in the SEZ as observed
2 from this location would depend on the numbers, types, sizes, and locations of
3 solar facilities in the SEZ, and other project- and site-specific factors. Under
4 the 80% development scenario analyzed in this PEIS, solar facilities within
5 the SEZ would be expected to create moderate visual contrasts as seen from
6 this viewpoint.
7

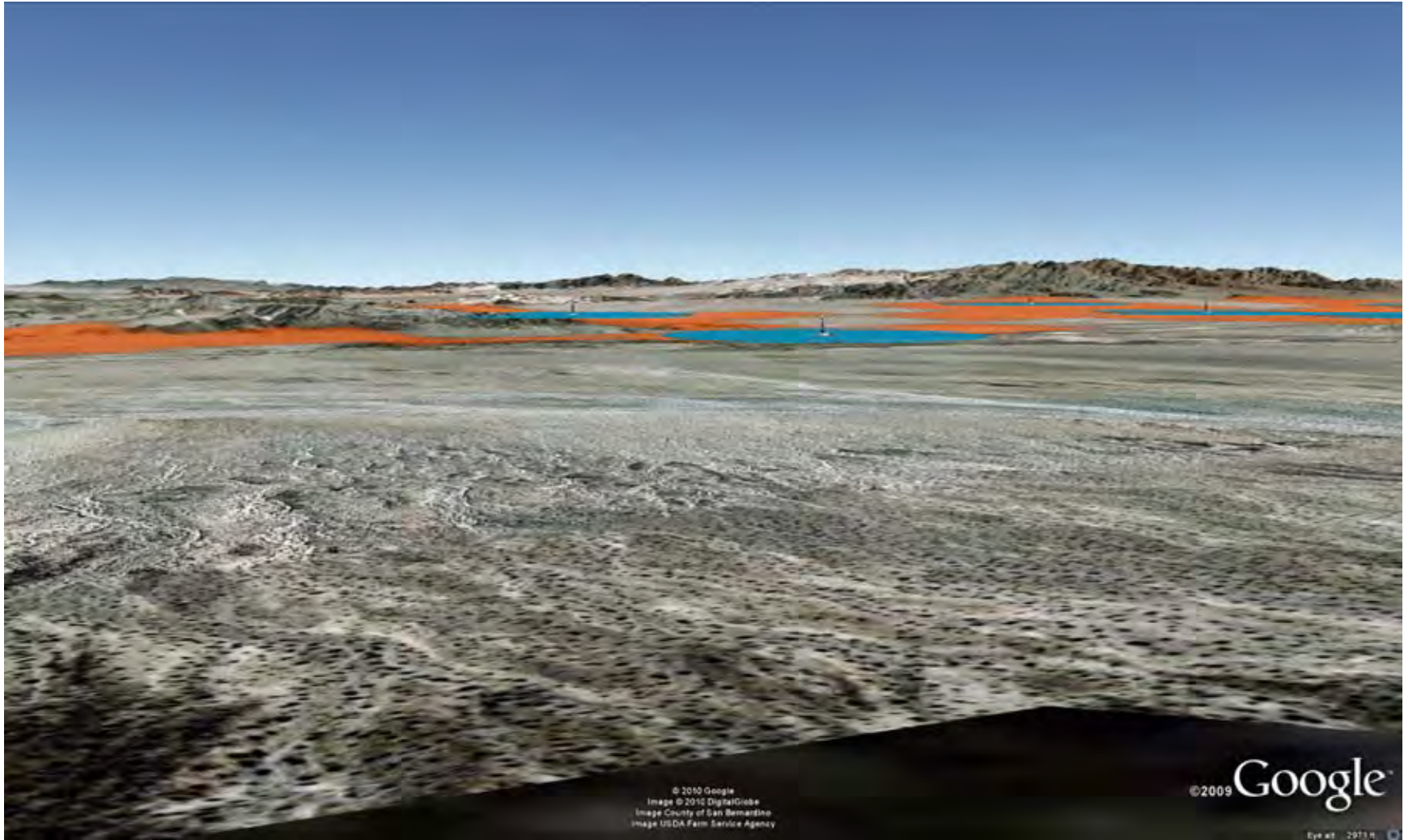
8 Figure 9.3.14.2-5 is a Google Earth visualization of the SEZ (highlighted in
9 orange) as seen from an unnamed hill (elevation approximately 3,000 ft
10 [900 m]) in the northeastern portion of the WA, approximately 4 mi (6 km)
11 from the nearest point in the SEZ, and approximately 1,200 ft (370 m) above
12 the valley floor. The nearest power tower in the visualization (at left) is about
13 5.0 mi (8.0 km) from the viewpoint. This distance is within the BLM VRM
14 Program's 3 to 5 mi (5 to 8 km) foreground-middleground distance.
15

16 The viewpoint area lacks vegetation dense or tall enough for screening.
17 From this viewpoint, I-40, Route 66, agricultural fields, and other cultural
18 disturbances would be visible in the southern portion of the SEZ. While the
19 presence of these existing disturbances might tend to lessen the contrast
20 associated with the introduction of solar facilities into the viewshed, the scale
21 and strong geometry of the solar facilities would be such that any reduction of
22 contrast would be slight.
23

24 The visualization suggests that from this elevated viewpoint, the SEZ would
25 be too large to be encompassed in one view, and viewers would need to turn
26 their heads to scan across the whole SEZ. The tops of solar collector/reflector
27 arrays in the closest parts of the SEZ would be visible, which would make
28 their large areal extent and strong regular geometry more apparent,, tending to
29 increase contrast. The angle of view would be low enough that visible solar
30 collector/reflector arrays in the northeast portion of the SEZ (farthest away
31 from this viewpoint) would be seen more nearly edge-on, which would tend to
32 reduce contrast.
33

34 Taller ancillary facilities, such as buildings, transmission structures, and
35 cooling towers; and plumes (if present) would likely be visible projecting
36 above the collector/reflector arrays, at least for nearby facilities. The ancillary
37 facilities could create form and line contrasts with the strongly horizontal,
38 regular, and repeating forms and lines of the collector/reflector arrays. Color
39 and texture contrasts would also be possible, but their extent would depend on
40 the materials and surface treatments utilized in the facilities.
41

42 If power towers were present within the SEZ, when operating, the receivers
43 would likely appear as very bright points of light against the backdrop of the
44 valley floor or the bajadas of the Cady Mountains. If sufficiently tall, the
45 power towers could have red or white flashing hazard navigation lights that
46 would likely be visible from the WA at night, and could be conspicuous from



1

FIGURE 9.3.14.2-5 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a Hill in the Rodman Mountains Wilderness

2

3

4

1 this viewpoint, although other lights would be visible in the vicinity of the
2 SEZ. Other lighting associated with solar facilities in the SEZ could
3 potentially be visible as well, at least for facilities in the closest portions of
4 the SEZ.

5
6 The potential visual contrast expected for this viewpoint would vary
7 depending on the numbers, types, sizes, and locations of solar facilities in
8 the SEZ, and other project- and site-specific factors, but under the 80%
9 development scenario analyzed in this PEIS, solar facilities within the SEZ
10 would be expected to create strong visual contrasts as viewed from this
11 location within the WA.

12
13 In summary, the Rodman Mountains WA is very close to the SEZ, and many
14 locations within the WA could have clear views of solar facilities in the SEZ
15 across much of the field of view to the northeast of the WA. Given that there
16 could be numerous solar facilities within the SEZ, with a variety of
17 technologies employed, and a range of supporting facilities that would
18 contribute to visual impacts, such as transmission towers and lines,
19 substations, power block components, and roads, the resulting visually
20 complex landscape would be essentially industrial in appearance and would
21 contrast greatly with the surrounding more natural-appearing landscape.
22 Under the 80% development scenario analyzed in the PEIS, strong levels of
23 visual contrast from solar facilities within the SEZ could be observed from
24 many locations within the WA, especially from elevated viewpoints.

25 26 27 *Wilderness Study Areas*

- 28
29 • *Soda Mountains*—The Soda Mountains WSA is located 15 mi (25 km) north
30 of the SEZ at the point of closest approach and encompasses 121,680 acres
31 (492 km²). The topography of the WSA varies from several gently sloping
32 bajadas to the rugged Soda Mountains. This highly eroded mountain range has
33 jagged ridges and sharp peaks that reach 3,663 ft (1,116 m) in elevation.

34
35 The area of the WSA within the 650-ft (198.1-m) viewshed of the SEZ
36 includes 3,005 acres (12.2 km²), or 2.5% of the total WSA acreage. None of
37 the WA is visible within the lower-height viewsheds. The visible area extends
38 from the point of the closest approach from the northernmost boundary of the
39 SEZ to approximately 18 mi (29 km) from the SEZ.

40
41 The viewshed analysis indicates that the far southwest portion of the Soda
42 Mountains WSA and the highest mountains in the central portion of the WSA
43 could have views of solar facilities in the far western portions of the SEZ. The
44 Cady Mountains screen views of most of the SEZ from locations in the WSA.
45 However, where views of the SEZ existed, because of the long distance to the

1 SEZ and the low angle of view, visual contrasts seen from the WSA would be
2 expected to be minimal.

- 3
4 • *Cady Mountains*—The Cady Mountains WSA is located directly adjacent to
5 the SEZ on the central northern boundary and encompasses 120,197 acres
6 (486 km²). Within the center of the WSA, and completely surrounded by the
7 mountains, is the large, broad area known as Hidden Valley. Major peaks
8 within the Cady Mountains include Cady Peak and Sleeping Beauty, at the
9 southern end of the range (also known as the Sleeping Beauty Mountains).
10 The Cady Peak summit is at an elevation of 4,627 ft (1,410 m). A number of
11 four-wheel drive roads provide access to the WSA.

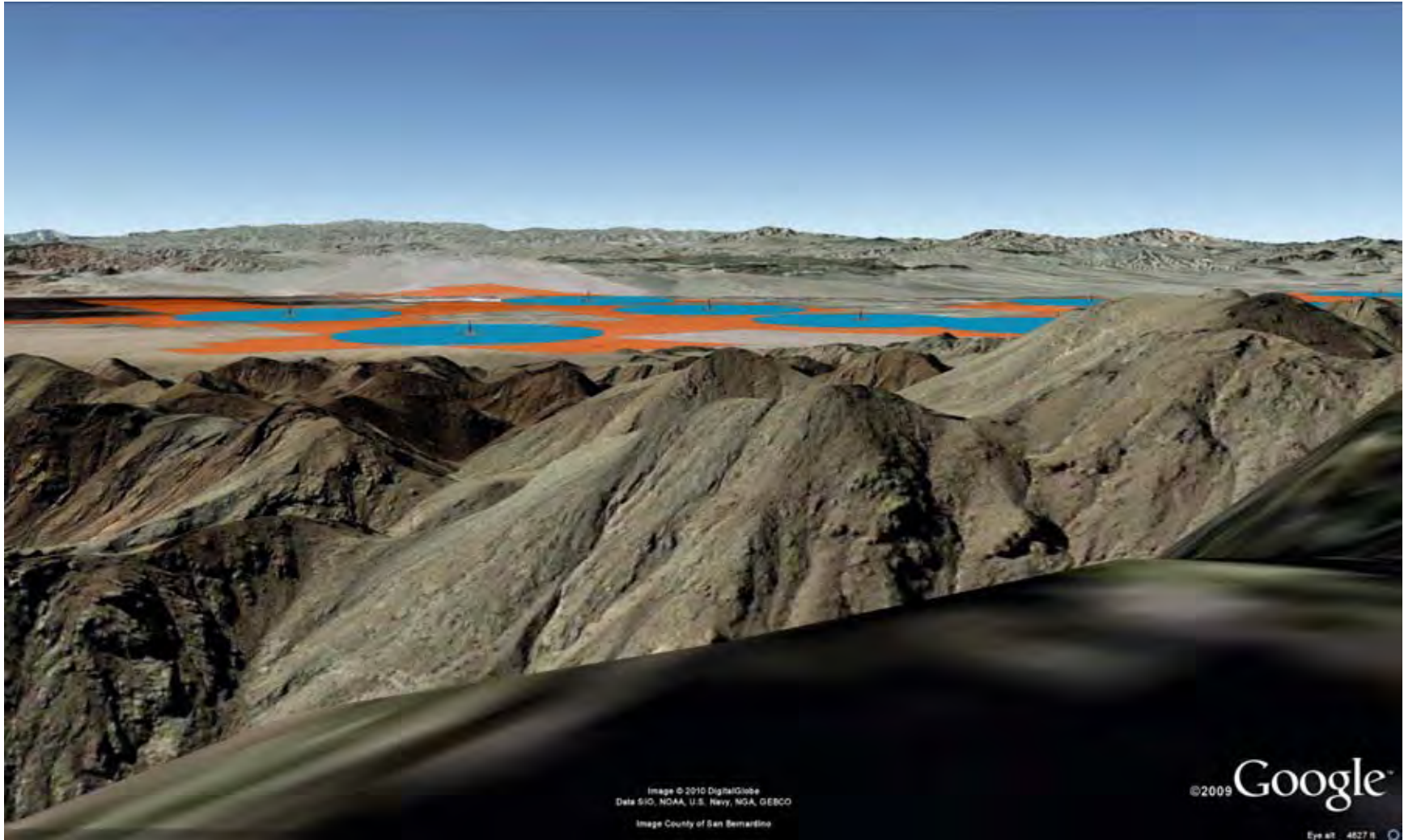
12
13 The area of the WSA within the 650-ft (198.1-m) viewshed of the SEZ
14 includes 23,952 acres (97 km²), or 19.9% of the total WSA acreage. The area
15 within the 24.6-ft (7.5-m) viewshed of the SEZ includes 16,056 acres
16 (65 km²), or 13.4% of the total WSA acreage. The area of the WSA with
17 potential visibility of solar facilities in the SEZ extends from the northeast
18 corner of the SEZ to approximately 6 mi (9 km) from the SEZ.

19
20 Figure 9.3.14.2-6 is a Google Earth visualization of the SEZ (highlighted in
21 orange) as seen from Cady Peak (elevation 4,627 ft [1,410 m]) in the south-
22 central portion of the WSA, approximately 5 mi (7 km) from the closest point
23 in the SEZ, and approximately 2,600 ft (790 m) above the valley floor. The
24 nearest power tower in the visualization (at left) is about 6.1 mi (9.8 km) from
25 the viewpoint.

26
27 The visualization suggests that from this elevated viewpoint, under the 80%
28 development scenario analyzed in the PEIS, solar facilities within the SEZ
29 would nearly fill the horizontal field of view. The tops of solar
30 collector/reflector arrays in the SEZ would be visible, which would make their
31 large areal extent and strong regular geometry more apparent, increasing
32 visual contrasts.

33
34 Taller ancillary facilities, such as buildings, transmission structures, and
35 cooling towers; and plumes (if present) would likely be visible projecting
36 above the collector/reflector arrays, at least for nearby facilities. The ancillary
37 facilities could create form and line contrasts with the strongly horizontal,
38 regular, and repeating forms and lines of the collector/reflector arrays. Color
39 and texture contrasts would also be possible, but their extent would depend on
40 the materials and surface treatments utilized in the facilities.

41
42 If power towers were present within the SEZ, when operating, the receivers
43 would likely appear as bright points of light against the backdrop of the valley
44 floor. If sufficiently tall, the power towers could have red or white flashing
45 hazard navigation lights that would likely be visible from the WSA at night,
46 and could be conspicuous from this viewpoint, although other lights would be



1

FIGURE 9.3.14.2-6 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from Cady Peak in the Cady Mountains WSA

2

3

4

1 visible in the vicinity of the SEZ. Other lighting associated with solar facilities
2 in the SEZ could potentially be visible as well, at least for facilities in the
3 closest portions of the SEZ.
4

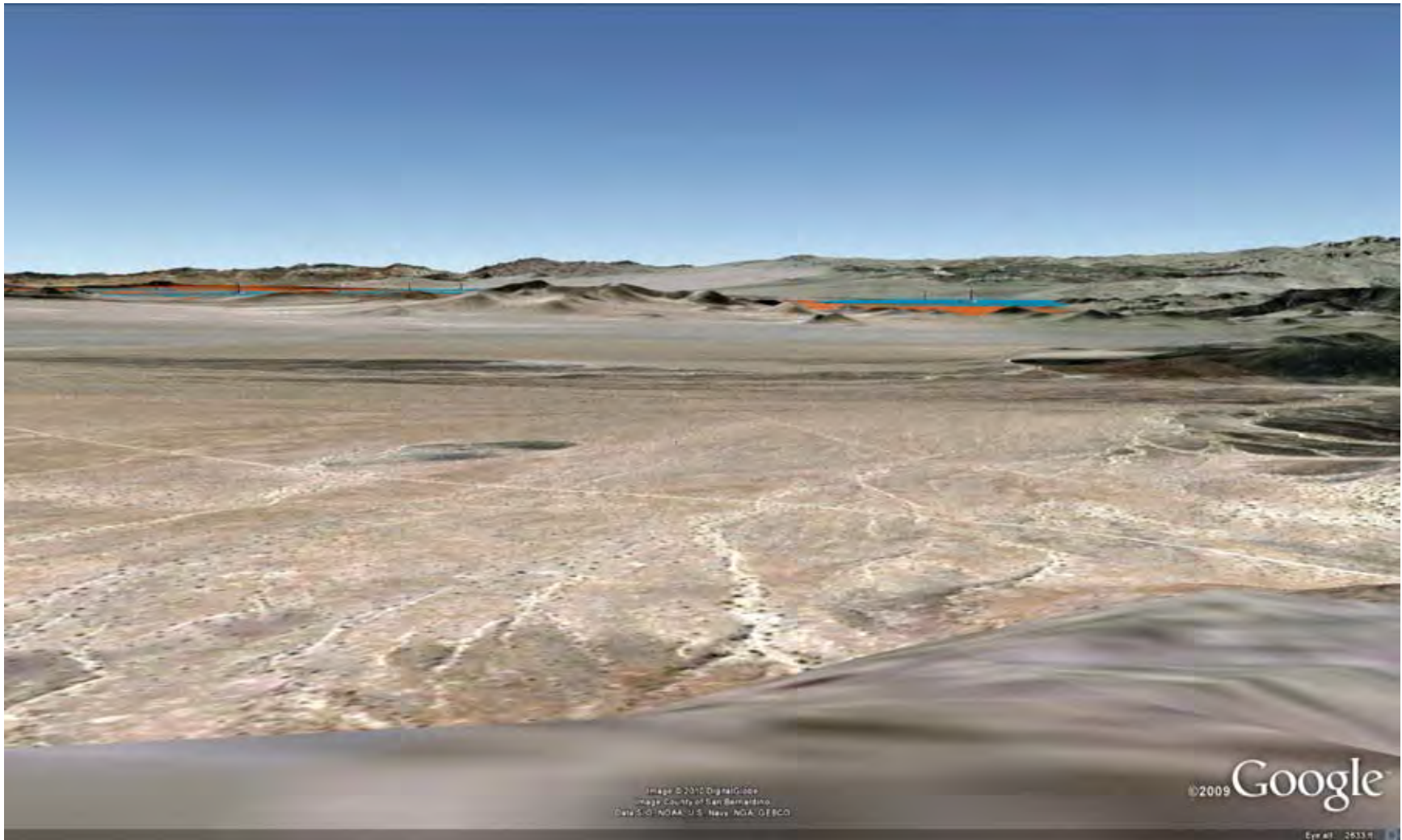
5 The potential visual contrast expected for this viewpoint would vary
6 depending on the numbers, types, sizes, and locations of solar facilities in the
7 SEZ, and other project- and site-specific factors, but under the 80%
8 development scenario analyzed in this PEIS, solar facilities within the SEZ
9 would be expected to create strong visual contrasts as viewed from this
10 location within the WSA.
11

12 Figure 9.3.14.2-7 is a Google Earth visualization of the SEZ (highlighted in
13 orange) as seen from an unnamed hill (elevation 2,626 ft [1,410 m]) in the far
14 western portion of the WSA, approximately 3 mi (5 km) from the closest point
15 in the SEZ, and approximately 600 ft (180 m) above the valley floor. The
16 nearest power tower in the visualization (at right) is about 5.6 mi (9.0 km)
17 from the viewpoint.
18

19 The visualization suggests that views of the SEZ would be partially screened
20 by intervening terrain within the WSA; however, the SEZ and solar facilities
21 within the SEZ would still likely occupy a substantial portion of the horizontal
22 field of view. Solar facilities visible within the SEZ would be seen nearly
23 edge-on, so that the collector/reflector arrays would tend to repeat the line of
24 the horizon, and their apparent size would be reduced, which would tend to
25 reduce contrast; however, taller ancillary facilities, such as buildings,
26 transmission structures, and cooling towers; and plumes (if present) would
27 likely be visible projecting above the collector/reflector arrays, at least for
28 nearby facilities. The ancillary facilities could create form and line contrasts
29 with the strongly horizontal, regular, and repeating forms and lines of the
30 collector/reflector arrays.
31

32 If power tower receivers were located within the SEZ, when operating, they
33 would likely appear as very bright point-like or nearly point-like light sources
34 against the bajadas of the Rodman Mountains. If sufficiently tall, the power
35 towers could have red or white flashing hazard navigation lights that would
36 likely be visible from the WSA at night, and could be conspicuous from this
37 viewpoint, although other lights would be visible in the vicinity of the SEZ.
38 Other lighting associated with solar facilities in the SEZ could potentially be
39 visible as well, at least for facilities in the closest portions of the SEZ.
40

41 Even though the viewpoint is close to the SEZ, solar facilities would be
42 partially screened by topography, and in addition the vertical angle of view to
43 solar facilities in the SEZ would be low. As a result, from this viewpoint,
44 under the 80% development scenario analyzed in the PEIS, solar energy



1

2

3

FIGURE 9.3.14.2-7 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a Hill in the Far Western Portion of the Cady Mountains WSA

1 development within the SEZ would be expected to create moderate visual
2 contrasts.

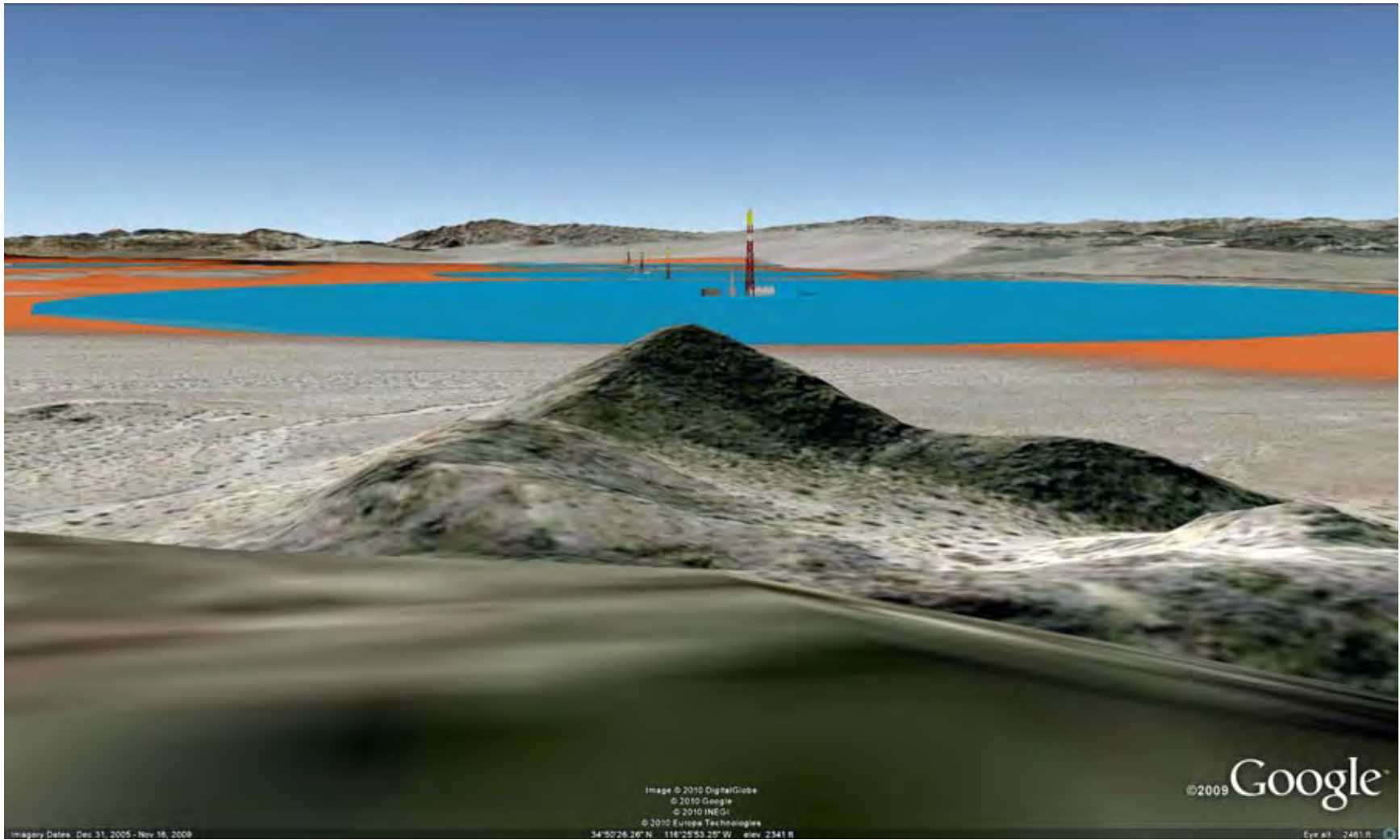
3
4 Figure 9.3.14.2-8 is a Google Earth visualization of the SEZ (highlighted in
5 orange) as seen from an unnamed hill (elevation 4,627 ft [1,410 m]) in the
6 southern portion of the WSA, approximately 0.5 mi (0.8 km) from the closest
7 point in the SEZ, and approximately 500 ft (150 m) above the valley floor.
8 The closest power tower in the visualization is about 1.3 mi (2.0 km) from
9 the viewpoint.

10
11 The visualization suggests that from this elevated viewpoint, the SEZ would
12 be too large to be encompassed in one view, and viewers would need to turn
13 their heads to scan across the whole SEZ. Solar energy facilities within the
14 closest portions of the SEZ would occupy much of the field of view looking
15 out over the valley, and would be expected to dominate views in that
16 direction. The tops of nearby solar collector/reflector arrays in the nearer
17 portions of the SEZ would be visible, which would make their large areal
18 extent and strong regular geometry more apparent, tending to increase
19 contrast. Facilities farther from the viewpoint would be seen at a lower
20 viewing angle and would therefore exhibit reduced contrast levels.

21
22 Taller ancillary facilities, such as buildings, transmission structures, and
23 cooling towers; and plumes (if present) would likely be visible projecting
24 above the collector/reflector arrays. The ancillary facilities could create strong
25 form and line contrasts with the strongly horizontal, regular, and repeating
26 forms and lines of the collector/reflector arrays. Color and texture contrasts
27 would also be likely, at least for facilities close to the viewpoint, but their
28 extent would depend on the materials and surface treatments utilized in the
29 facilities.

30
31 If power tower receivers were located in the nearest portions of the SEZ,
32 when operating, they would likely appear as brilliant nonpoint (i.e. having a
33 cylindrical or rectangular surface area) light sources projecting above the
34 collector/reflector arrays along the horizon line, and would likely strongly
35 attract visual attention, as seen from this viewpoint. In addition, during certain
36 times of the day from certain angles, sunlight on dust particles in the air might
37 result in the appearance of light streaming down from the tower(s).

38
39 If sufficiently tall, the power towers could have red or white flashing hazard
40 navigation lights that would likely be visible from the WSA at night, and
41 would likely be very conspicuous from this viewpoint, although other lights
42 would be visible in the vicinity of the SEZ. Other lighting associated with
43 solar facilities in the SEZ would likely be visible as well, at least for facilities
44 in the closest portions of the SEZ.



1

FIGURE 9.3.14.2-8 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a Hill in the Southern Portion of the Cady Mountains WSA

2

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4

1 The elevated viewpoint would make the very regular geometry of nearby solar
2 collector/reflector arrays apparent, structural details of facility components
3 could be visible, and power tower receivers and other tall solar facility
4 components (e.g., associated transmission towers) could be seen in the BLM
5 foreground-middleground distance, which would tend to increase visual
6 contrast. From this elevated viewpoint, and with the short distance to the
7 SEZ, under the 80% development scenario analyzed in the PEIS, solar
8 energy development within the SEZ would be expected to create strong
9 visual contrasts.

10
11 In summary, portions of the Cady Mountains WSA border the SEZ, and many
12 locations within the WSA could have clear views of solar facilities in the SEZ
13 across much of the field of view to the south and southwest of the WSA.
14 Given that there could be numerous solar facilities within the SEZ, with a
15 variety of technologies employed, and a range of supporting facilities that
16 would contribute to visual impacts, such as transmission towers and lines,
17 substations, power block components, and roads, the resulting visually
18 complex landscape would be essentially industrial in appearance and would
19 contrast greatly with the surrounding more natural-appearing landscape.
20 Under the 80% development scenario analyzed in the PEIS, strong levels of
21 visual contrast from solar facilities within the SEZ could be observed from
22 many locations within the WSA, especially from elevated viewpoints.

23 24 25 *National Historic Trail*

- 26
27 • *Old Spanish*—The Old Spanish National Historic Trail is a congressionally
28 designated multistate historic trail that passes within 6 mi (10 km) of the
29 SEZ at the point of closest approach on the northwest side of the SEZ.
30 Approximately 8 mi (13 km) northwest of the SEZ, the trail divides into the
31 main Northern Route and the Armijo Route. Approximately 29 mi (46 km)
32 of the trail are within the viewshed of the SEZ, including 6 mi (9 km) of the
33 Armijo segment.

34
35 Within 20 mi (32 km) of the SEZ, the trail runs generally east–west through
36 the Mojave Valley and along the Mojave River. Where the trail divides, the
37 main Northern Route runs in a north-south direction. The SEZ is within view
38 of the trail for much of the area. Within the viewshed, the trail runs through
39 alluvial plains and pediments.

40
41 From the west, the trail enters the 25-mi (40-km) SEZ in hills just north of the
42 community of Daggett, approximately 18 mi (29 km) west of the SEZ. In
43 these hills, screening vegetation is absent, and the SEZ would be visible on
44 the distant eastern horizon, but would occupy a very small portion of the field
45 of view. Power tower receivers would come into view first, likely appearing
46 as distant points of light on the eastern horizon. The viewing angle would be

1 quite low, and a variety of cultural disturbances, including the SEGS 1 and 2
2 solar power tower and parabolic trough facilities, would be visible in the
3 foreground. Trail users who followed the Mojave River bed just south of the
4 hills would not likely see the SEZ until passing the SEGS facilities, at which
5 point the upper portions of sufficiently tall power towers in the far western
6 portion of the SEZ might appear just over the horizon, absent screening by
7 vegetation or structures. At this long distance, the receivers of operating
8 power towers in the SEZ would likely appear as distant points of light on the
9 eastern horizon directly down the trail, against a sky backdrop. If sufficiently
10 tall, the power towers could have red or white flashing hazard navigation
11 lights that could be visible from the trail at night, although other lights would
12 be visible in the vicinity of the SEZ.
13

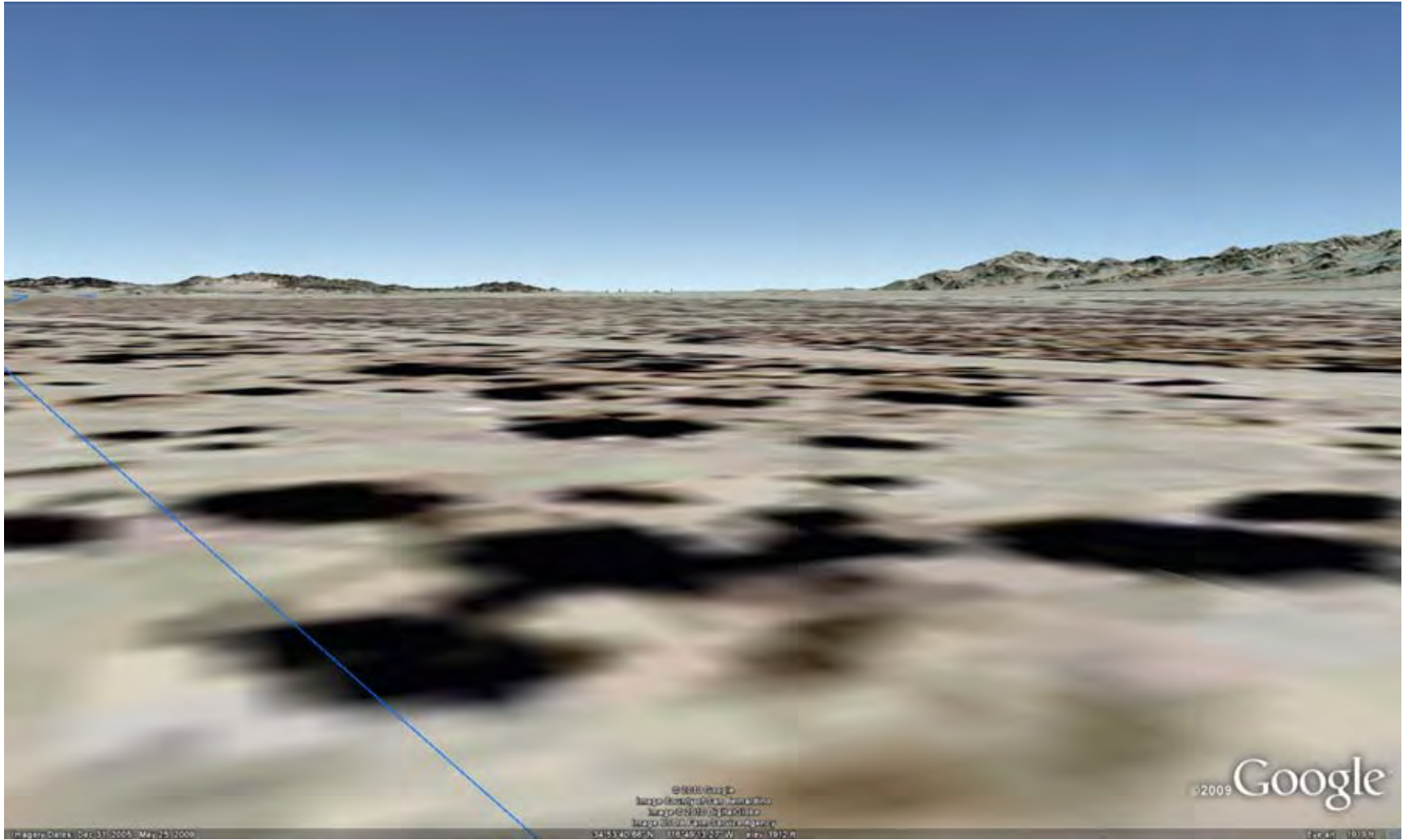
14 From Daggett eastward, the trail follows the northern edge of the bed of the
15 dry Mojave River, turning gradually northeastward, starting just south of the
16 community of Yermo. The trail changes elevation very little and is only
17 slightly higher than the SEZ; thus the angle of view would stay very low, and
18 the appearance of the SEZ (and solar development within the SEZ) would
19 change only slightly and very gradually as trail users traveled eastward on the
20 trail.
21

22 Figure 9.3.14.2-9 is a Google Earth visualization of the SEZ (highlighted in
23 orange) as seen from the Old Spanish National Historic Trail just south of the
24 community of Yermo, approximately 14 mi (23 km) from the closest point in
25 the SEZ.
26

27 The visualization suggests that at this point on the trail, only the upper
28 portions of sufficiently tall power towers would be visible just above the
29 eastern horizon. At this distance, the power tower receivers would appear as
30 distant points of light on the eastern horizon, against a sky backdrop, and
31 would be expected to create weak visual contrasts.
32

33 As the trail turns northeastward after passing south of Yermo, receivers on
34 operating power towers in the western portion of the SEZ would gradually
35 increase in brightness, project slightly higher over the horizon, and would
36 gradually move to the right in the field of view. Low-height solar facilities
37 might not be visible from some locations, and screening by vegetation or
38 structures might wholly obscure the SEZ at some viewpoints, as in this area,
39 the trail passes through agricultural lands, with roads, scattered residences,
40 and other cultural disturbances typical of a rural setting, including
41 transmission towers and lines.
42

43 At a distance of about 8 mi (14 km) from the nearest point in the SEZ, the trail
44 forks, with the Armijo segment continuing east-northeast, while the Northern
45 Route turns more northward and gradually climbs toward Alvord Mountain.
46 Figure 9.3.14.2-10 is a Google Earth visualization of the SEZ (highlighted



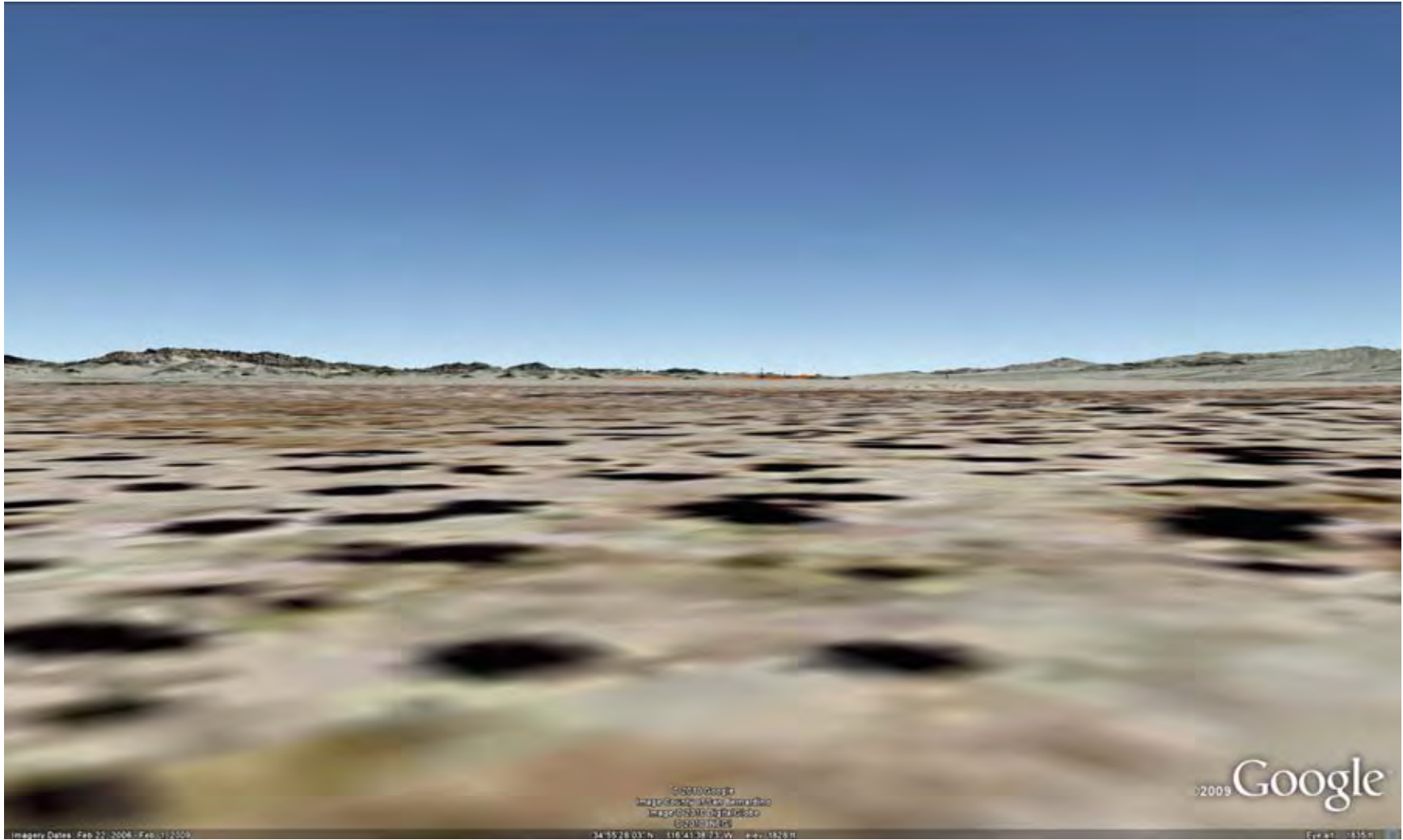
1

FIGURE 9.3.14.2-9 Google Earth Visualization of the Proposed Pisgah SEZ (power towers visible on horizon) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from the Old Spanish National Historic Trail near Yermo, California

2

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1

FIGURE 9.3.14.2-10 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from the Old Spanish National Historic Trail near the Trail Fork North of Newberry Springs, California

2

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5

1 in orange) as seen from the Old Spanish National Historic Trail near the trail
2 fork, north of the community of Newberry Springs.

3
4 The visualization suggests that at this point on the trail, lower height facilities
5 within the western portion of the SEZ could be visible, in the absence of
6 screening by vegetation or structures. At this distance, the receivers of
7 operating power towers in the SEZ would appear as distant points of light on
8 the eastern horizon, against a sky backdrop, or the bajadas of the Cady or
9 Rodman Mountains. The tower structures would likely be visible underneath
10 the receiver lights.

11
12 If sufficiently tall, the power towers could have red or white flashing hazard
13 navigation lights that could be visible from the trail at night, although other
14 lights would be visible in the vicinity of the SEZ. Other lighting associated
15 with solar facilities in the SEZ could be visible as well, at least for facilities in
16 the closest portions of the SEZ.

17
18 Because of the distance and partial screening by intervening landforms, the
19 SEZ would occupy a small portion of the field of view, and the viewing angle
20 would be low. Weak visual contrasts would be expected at this location on the
21 trail.

22
23 For trail users continuing along the Armijo segment, after the fork, the trail
24 loses elevation and passes out of the SEZ viewshed approximately 1.2 mi
25 (1.9 km) east of the fork. The Northern Route turns more northward and
26 gradually climbs approximately 100 ft (30 m) over about 10 mi (18 km)
27 to reach Alvord Mountain, and there passes out of the SEZ viewshed.

28
29 As trail users traveled northward on the Northern Route, the SEZ would be
30 behind them, and solar facilities within the western portion of the SEZ would
31 potentially be visible to the south and east. In some stretches of the trail,
32 however, only the upper portions of sufficiently tall power towers located in
33 visible portions of the SEZ could be seen. Because of the distance and partial
34 screening by intervening landforms, the SEZ would occupy a small portion of
35 the field of view, and the viewing angle would be low. Weak visual contrasts
36 would be expected.

37
38 As the trail rose into the Alvord Mountain area, slightly more of the SEZ
39 would become visible, but the distance would be great enough (15+ mi
40 [25+ km]) and the angle of view still low enough that visual contrasts would
41 be expected to remain weak.

42
43 Trail users westbound on the trail would view the SEZ to the southeast as they
44 either descended from Alvord Mountain (if traveling the Northern Route) or
45 passed the Cady Mountains and entered the viewshed 1.2 mi (1.9 km) east of
46 the trail fork (if on the Armijo segment). Travelers on the Armijo segment

1 would have already passed the SEZ when they entered the viewshed, and it
2 would be visible only briefly and with very low levels of visual contrast
3 expected. Travelers on the Northern Route would have longer views of the
4 SEZ as they traveled southward to the fork, but as noted above, visual
5 contrasts seen from this section of the trail would be expected to be very low.
6

7 In summary, although about 29 mi (46 km) of the Old Spanish National
8 Historic Trail are within the 25-mi (40-km) viewshed of the Pisgah SEZ, and
9 the trail passes within 6 mi (10 km) of the SEZ, trail viewpoints are either too
10 distant from the SEZ, partially screened from views of the SEZ, and/or have
11 too low an angle of view to the SEZ to be subject to even moderate visual
12 contrasts from solar facilities within the SEZ. The nature of the visual
13 contrasts from solar facilities in the SEZ as observed from the trail would
14 depend on viewer location, the numbers, types, sizes, and locations of solar
15 facilities in the SEZ, and other project- and site-specific factors, but under the
16 80% development scenario analyzed in the PEIS, solar facilities in the SEZ
17 would be expected to cause weak levels of visual contrast for viewpoints on
18 the Old Spanish National Historic Trail.
19

20 Additional scenic resources exist at the national, state, and local levels, and impacts on
21 both federal and nonfederal lands may occur, including sensitive traditional cultural properties
22 important to Tribes. In addition to the resource types and specific resources analyzed in this
23 PEIS, future site-specific NEPA analyses would include state and local parks, recreation areas,
24 other sensitive visual resources, and communities close enough to the proposed project to be
25 affected by visual impacts. Selected other lands and resources are included in the discussion
26 below.
27

28 In addition to impacts associated with the solar energy facilities themselves, sensitive
29 visual resources could be affected by facilities that would be built and operated in conjunction
30 with the solar facilities. With respect to visual impacts, the most important associated facilities
31 would be access roads and transmission lines, the precise location of which cannot be determined
32 until a specific solar energy project is proposed. Currently there is a 230-kV transmission line
33 within the proposed SEZ. For this analysis, the impacts of construction and operation of
34 transmission lines outside of the SEZ were not assessed, assuming that the existing 230-kV
35 transmission line might be used to connect some new solar facilities to load centers, and that
36 additional project-specific analysis would be done for new transmission construction or line
37 upgrades. Note that depending on project- and site-specific conditions, visual impacts associated
38 with access roads, and particularly transmission lines, could be large. Detailed information about
39 visual impacts associated with transmission lines is presented in Section 5.7.1. A detailed site-
40 specific NEPA analysis would be required to precisely determine visibility and associated
41 impacts for any future solar projects, based on more precise knowledge of facility location and
42 characteristics.
43
44
45

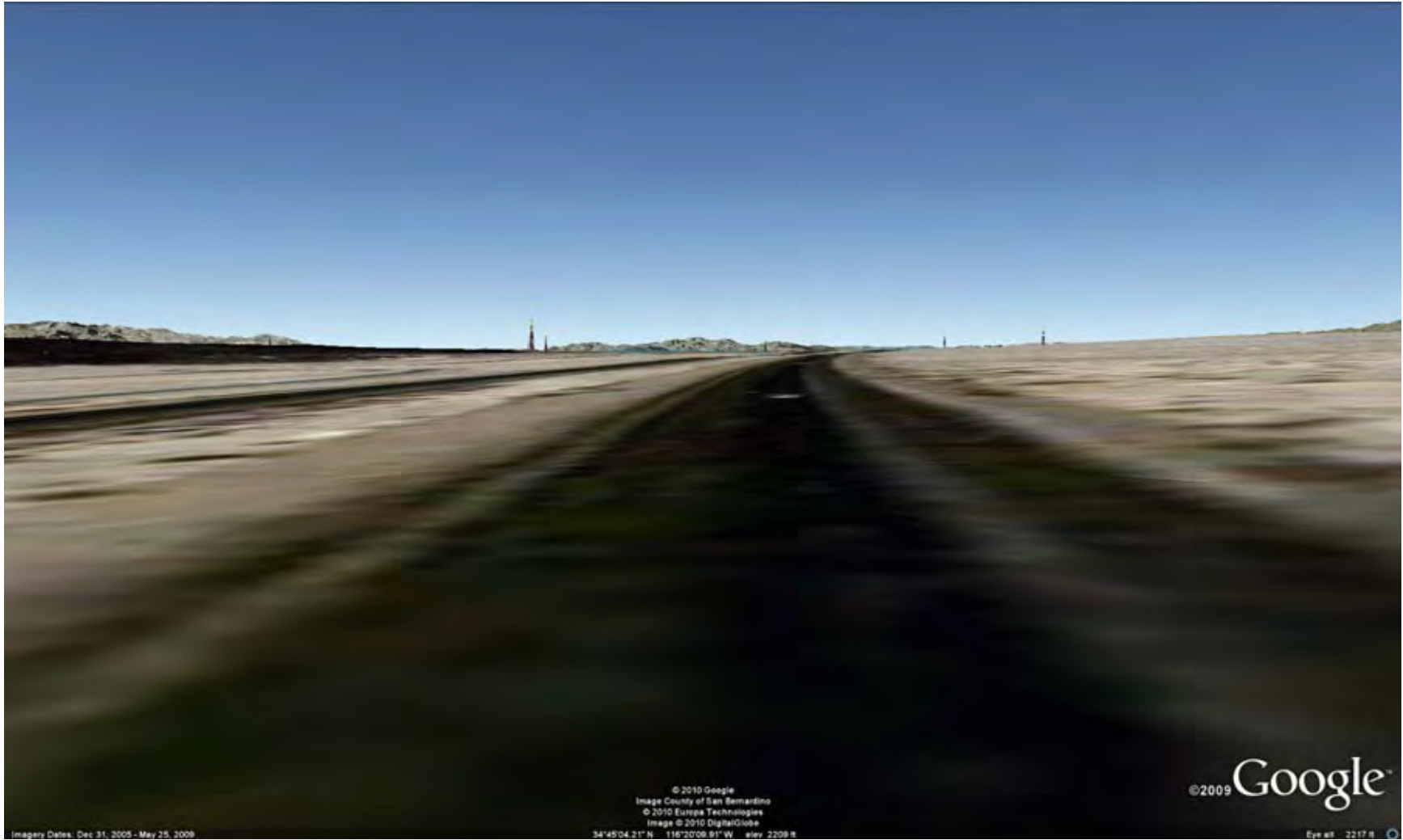
1 **Impacts on Selected Other Lands and Resources**
2
3

4 ***Historic Route 66 (National Old Trails Highway) and Interstate 40.*** Since 1990,
5 Route 66 in California has been designated as “State Historic Highway Route 66,” but
6 Route 66 is not designated as a scenic highway, though it is of nationwide historic interest.
7 I-40 is eligible for designation as a state scenic highway but has not been officially designated.
8 Traveling east from Barstow, Route 66 follows I-40. The AADT value for I-40 at Hector Road is
9 12,500 vehicles, with an expected 15% increase as a result of solar energy development within
10 the SEZ. East of Daggett, Route 66 leaves I-40, but crosses it three times. Because the two routes
11 parallel each other so closely in the area of the SEZ, they would be subject to similar levels of
12 visual contrasts from solar facilities within the SEZ, and are therefore discussed together.
13

14 As shown in Figure 9.3.14.2-2, approximately 48 mi (77 km) of Route 66 and I-40 are
15 within the 650-ft (198.1-m) viewshed of the Pisgah SEZ, with an estimated 8 mi (13 km) of I-40
16 and 5 mi (8 km) of Route 66 running through the SEZ. I-40 intersects the SEZ in five separate
17 areas ranging in lengths from approximately 0.7 to 2 mi (1 to 3 km). Route 66 intersects the
18 SEZ in four separate areas ranging in lengths from approximately 0.1 to 2 mi (0.2 to 3 km).
19 Undulations in topography as well as buildings screen views of portions of the SEZ from
20 some locations along the two roadways; however, there are generally open views of the SEZ
21 throughout the viewshed.
22

23 For westbound travelers on the roadways, the receivers of sufficiently tall power towers
24 might be just visible over the western horizon 13 mi (21 km) east of Ludlow, about 26 mi
25 (42 km) from the eastern boundary of the SEZ; however, at that distance, the impacts would be
26 minimal. As travelers crested a hill approximately 5 mi (8 km) west of the SEZ, lower height
27 solar facilities in the eastern portion of the SEZ would come into view, and contrast levels would
28 increase rapidly over the next few minutes as travelers approached the SEZ at highway speeds.
29 The road passes through several dips that might partially conceal some facilities within the SEZ
30 briefly.
31

32 Figure 9.3.14.2-11 is a Google Earth visualization of the SEZ as seen from I-40,
33 approximately 3 mi (5 km) east of the intersection of I-40 and the SEZ, facing northwest toward
34 the center of the SEZ. The visualization suggests that from this location, the SEZ would occupy
35 much of the horizontal field of view, but because the viewing angle is very low, small
36 undulations in topography might screen views of lower-height solar facilities away from the
37 roadways. Power blocks, power towers, transmission towers, and other taller facilities, as well as
38 steam plumes (if present) would likely be visible, however, and sufficiently close to cause
39 stronger visual contrasts, primarily line contrasts. The receivers of operating power towers in the
40 far eastern portion of the SEZ could appear as very bright, non-point light sources atop plainly
41 visible tower structures and would strongly attract visual attention. These bright light sources
42 could interfere with views of the distant mountains to the south and west, or could project above
43 the horizon onto a sky backdrop.
44



1

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FIGURE 9.3.14.2-11 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from I-40 Approximately 2.7 mi (4.3 km) East of the SEZ

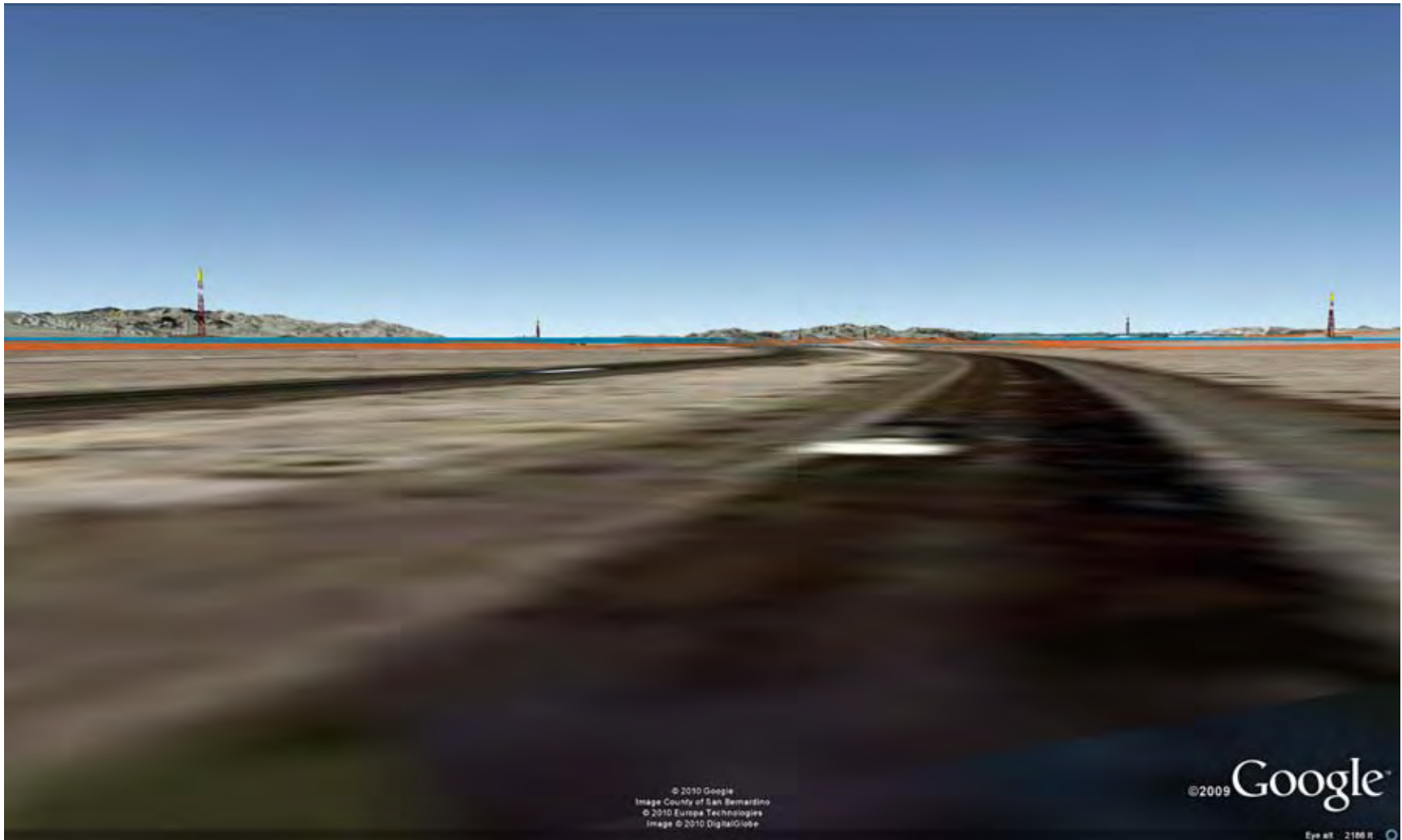
1 If sufficiently tall, power towers could have flashing red or white hazard navigation lights
2 that could be visible for long distances down the roadways at night. These lights could become
3 conspicuous as travelers approached the SEZ, and would be likely to attract visual attention.
4

5 Figure 9.3.14.2-12 is a Google Earth visualization of the SEZ as seen from I-40,
6 approximately 0.7 mi (1 km) east of the intersection of the highway and the SEZ, facing
7 northwest toward the center of the SEZ. The visualization suggests that from this location, solar
8 facilities within the SEZ would be in full view, and the SEZ would occupy more than the entire
9 field of view, and travelers would have to turn their heads to scan across the full SEZ. Facilities
10 located within the southeastern portion of the SEZ would strongly attract the eye and likely
11 dominate views from the roadways. Structural details of some facility components could be
12 visible. Views of the Mojave Valley to the west and northwest would be completely or partially
13 screened by solar facilities, and views of the Cady Mountains and Rodman Mountains could be
14 fully or near fully screened as well, depending on the layout of solar facilities within the SEZ.
15 Because of the very short distance from the roadways, strong visual contrasts could result,
16 depending on solar project characteristics and location within the SEZ.
17

18 Visual contrast would increase farther as travelers on the roadways entered the SEZ. If
19 power tower facilities were located in the SEZ, the receivers could appear as brilliant white light
20 sources on either side of the roadways and would likely strongly attract views. In addition,
21 during certain times of the day from certain angles, sunlight on dust particles in the air might
22 result in the appearance of light streaming down from the tower(s). Looking ahead down the
23 roadways, if solar facilities were located on both the north and south sides of the roads, the banks
24 of solar collectors on both sides of the byway could form a visual “tunnel” that travelers would
25 pass through briefly. If solar facilities were located close to the roadways, given the 80%
26 development scenario analyzed in the PEIS, they would be expected to dominate views from the
27 roadways and would create strong visual contrasts. After passing through the section of SEZ, the
28 SEZ would still be very close to the roadways on one or the other side of the highways, with
29 impact levels dependent on the presence of solar facilities in areas near the roadways and solar
30 facility characteristics.
31

32 Figure 9.3.14.2-13 is a Google Earth visualization of the SEZ as seen from Route 66
33 within the SEZ, 3 mi (5 km) west of the easternmost intersection of Route 66 and the SEZ,
34 facing north toward the center of the SEZ. The largest power tower receiver visible is
35 approximately 1.7 mi (2.7 km) northwest of the viewpoint.
36

37 The visualization suggests that if viewed from this location on Route 66, the SEZ would
38 occupy more than the entire field of view, and that solar energy facilities within the SEZ could
39 potentially dominate the view from Route 66, depending on the technology employed and other
40 visibility factors. Structural details of some facility components might be visible, and
41 if sufficiently tall power tower receivers were present within the SEZ, they could project above
42 mountains to the north and be visible against a sky backdrop. Steam plumes, transmission
43 towers, and other tall facility components could also project above the mountains. From this
44 viewpoint, solar collector/reflector arrays would be seen nearly edge on and would repeat the
45 horizontal line of the plain in which the SEZ is situated, which would tend to reduce visual line
46 contrast. As the viewer passed through the SEZ, however, the collector arrays could increase in



1

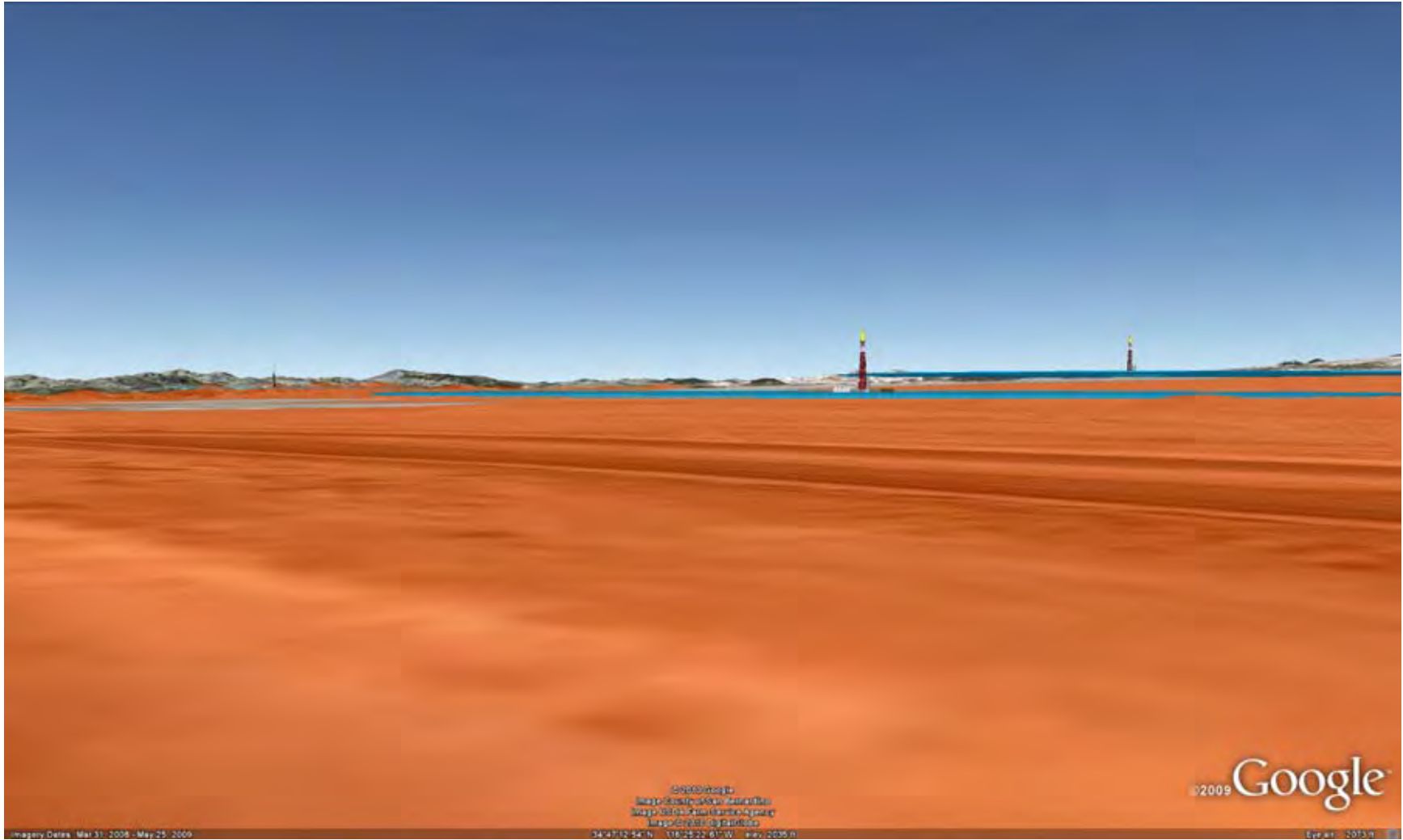
FIGURE 9.3.14.2-12 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from I-40 Approximately 0.7 mi (1 km) East of the SEZ

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FIGURE 9.3.14.2-13 Google Earth Visualization of the Proposed Pisgah SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Route 66 within the SEZ, 2.8 mi (4.5 km) West of the Easternmost Intersection of Route 66 and the SEZ

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1 apparent size until they no longer appeared as horizontal lines against the natural appearing
2 backdrop.

3
4 Road travelers heading east on the roadways would in general be subjected to the same
5 types of visual contrasts, but the order would be reversed, which could change the perceived
6 impact levels. Because of differences in topography between the eastern and western approaches
7 to the SEZ, more of the SEZ would be visible for longer distances for eastbound travelers. Solar
8 facilities within the SEZ could be visible as far as Barstow (25+ mi [41+ km]), with power tower
9 receivers appearing as distant lights on the eastern horizon at that distance.

10
11 From Barstow eastward, except for brief periods, travelers would have continuous
12 visibility of solar facilities within some part of the SEZ as they approached it. Solar facilities
13 within the SEZ would gradually increase in apparent size, with the view opening up substantially
14 (and visual contrast levels rising accordingly) as travelers approached Newberry Springs. Visual
15 dominance of the solar facilities within the SEZ would increase steadily until peaking when
16 travelers entered and passed through the SEZ.

17
18 The nature of the visual contrasts from solar facilities in the SEZ as observed from I-40
19 and Route 66 would depend on the numbers, types, sizes, and locations of solar facilities in the
20 SEZ, and other project- and site-specific factors. Under the 80% development scenario analyzed
21 in the PEIS, because the roadways pass through the SEZ, strong visual contrasts could be
22 observed from the roadways in and near the SEZ.

23
24
25 **Interstate 15.** As shown in Figure 9.3.14.2-2, approximately 34 mi (55 km) of I-15 is
26 within the 650-ft (198.1-m) viewshed of the Pisgah SEZ, with an estimated 18 mi (29 km) within
27 the 7.5-m (24.6-ft) viewshed. Undulations in topography as well as buildings screen views of
28 portions of the SEZ from some locations along I-15; however, there are generally open views of
29 the SEZ from I-15 throughout the SEZ viewshed. Visibility distances from I-15 to the SEZ
30 within the 25-mi (41-km) SEZ viewshed range from 9 to 22 mi (14 to 35 km).

31
32 For about one-half of the distance, the SEZ is in view of I-15, primarily in the northeast
33 portion of the SEZ viewshed, and intervening topography would screen all but the upper portions
34 of sufficiently tall power towers located in visible portions of the SEZ. From these areas,
35 generally 9 to 18 mi (14 to 29 km) from the SEZ, the receivers on power towers would look like
36 point-like or nearly point-like lights on the southern horizon, against the backdrop of the valley
37 floor or the Rodman Mountains. If sufficiently tall, power towers could have flashing red or
38 white hazard navigation lights that would likely be visible from I-15 at night, although other
39 lights would be visible in the vicinity.

40
41 Farther southwest on I-15, lower height solar facilities would become visible. The point
42 of closest approach to the SEZ on I-15 is north of Newberry Springs. At this distance, the power
43 tower receivers would appear as distant points of light on the eastern horizon, against a sky
44 backdrop, or bajadas of the Cady or Rodman Mountains. Depending on project-specific factors,
45 lighting, and other visibility factors, power tower structures could be visible underneath the
46 receiver lights. Because of the distance and partial screening by intervening landforms, the SEZ

1 would occupy a small portion of the field of view, and the viewing angle would be low. Weak
2 visual contrasts would be expected. Westward beyond this point, the distance to the SEZ would
3 increase, and therefore the apparent size of the SEZ and solar facilities within the SEZ would
4 decrease, and associated visual contrasts would diminish accordingly.
5
6

7 ***Burlington Northern Santa Fe Railroad.*** The Burlington Northern Santa Fe (BNSF)
8 Railroad and Union Pacific (UP) Railroad are privately run freight train services whose rail lines
9 are within the viewshed of the SEZ. The BNSF rail line also runs through the SEZ. Amtrak's
10 Southwest Chief passenger train travels these same BNSF tracks through the SEZ and within the
11 SEZ viewshed. It provides daily service between Chicago and Los Angeles and promotes the
12 scenery of the American West to its passengers. The rail line serves Barstow and travels through
13 the SEZ for approximately 9 mi (15 km). Approximately 55 mi (89 km) of the passenger service
14 line are within the SEZ viewshed. The railroad roughly parallels I-40 within the SEZ, and
15 impacts on passengers on the Southwest Chief would be similar to those described for travelers
16 on I-40 and Route 66 (see above). Strong visual contrasts would be expected under the 80%
17 development scenario analyzed in the PEIS.
18
19

20 ***Communities of Barstow, Daggett, Yermo, Newberry Springs, and Ludlow.*** The
21 viewshed analyses indicate visibility of the SEZ from the communities of Barstow
22 (approximately 25 mi [41 km] west of the SEZ), Daggett (approximately 17.7 mi [28.5 km] west
23 of the SEZ), Yermo (approximately 15 mi [23 km] northwest of the SEZ), Newberry Springs
24 (approximately 7 mi [11 km] west of the SEZ), and Ludlow (approximately 12 mi [19 km] east
25 of the SEZ). Screening by small undulations in topography, vegetation, buildings, or other
26 structures would likely restrict or eliminate visibility of the SEZ and associated solar facilities
27 within these communities, but a detailed future site-specific NEPA analysis is required to
28 determine visibility precisely. However, note that even with existing screening, solar power
29 towers, cooling towers, plumes, transmission lines and towers, or other tall structures associated
30 with the development could potentially be tall enough to exceed the height of screening and
31 cause visual impacts on these communities.
32

33 Barstow is elevated approximately 450 ft (140 m) above the western boundary of the
34 SEZ, and as the valley slopes downward gently but steadily to the east, the easternmost portions
35 of Barstow would have a view of the distant SEZ. At 25 mi (42 km), however, the SEZ would
36 occupy a very small part of the field of view, and the angle of view would be very low, so that if
37 solar facilities were visible within the SEZ, they would be viewed edge-on. The light from power
38 tower receivers within the SEZ would likely appear as distant points of light on the eastern
39 horizon. If sufficiently tall, power towers could have flashing red or white hazard navigation
40 lights that could potentially be visible from Barstow at night, although other lights would be
41 visible in the vicinity. Visual contrasts associated with solar facilities within the SEZ would be
42 minimal.
43

44 Daggett is elevated approximately 250 ft (76 m) above the western boundary of the SEZ.
45 At 18 mi (29 km), the SEZ occupies a slightly larger portion of the field of view than viewed
46 from Barstow, but the angle of view would still be very low, so that if solar facilities were visible

1 within the SEZ, they would be viewed edge-on. The light from power tower receivers within the
2 SEZ would likely appear as distant points of light on the eastern horizon. If sufficiently tall,
3 power towers could have flashing red or white hazard navigation lights that could potentially be
4 visible from Daggett at night, although other lights would be visible in the vicinity. Visual
5 contrasts associated with solar facilities within the SEZ would be expected to be weak. It should
6 be noted that a variety of industrial facilities, including the SEGS I and II solar plants, are
7 located immediately east of Daggett and likely screen much of the view of the SEZ from some
8 locations in Daggett.

9
10 Yermo is elevated approximately 250 ft (76 m) above the western boundary of the SEZ.
11 At 15 mi (23 km), the SEZ occupies a slightly larger portion of the field of view than viewed
12 from Daggett, but the angle of view would still be very low, so that if solar facilities were visible
13 within the SEZ, they would be viewed edge-on. The light from power tower receivers within the
14 SEZ would likely appear as points of light on the eastern horizon. If sufficiently tall, power
15 towers could have flashing red or white hazard navigation lights that would likely be visible
16 from Yermo at night, although other lights would be visible in the vicinity. Visual contrasts
17 associated with solar facilities within the SEZ would be expected to be weak.

18
19 Newberry Springs is elevated approximately 80 ft (24 m) above the western boundary
20 of the SEZ. At 7 mi (11 km), the SEZ would occupy a substantial portion of the field of view,
21 but the angle of view would be low, so that if solar facilities were visible within the SEZ, they
22 would be viewed edge-on and would repeat the line of the horizon, tending to reduce visual
23 contrast. The light from power tower receivers within the SEZ would likely appear as very
24 bright non-point sources of light on the eastern horizon. If sufficiently tall, power towers could
25 have flashing red or white hazard navigation lights that could potentially be conspicuous from
26 Newberry Springs at night, although other lights would be visible in the vicinity. Visual contrasts
27 associated with solar facilities within the SEZ would be expected to be moderate.

28
29 Ludlow is elevated approximately 390 ft (120 m) below the eastern boundary of the SEZ.
30 Intervening topography between Ludlow and the SEZ would screen all but the upper portions of
31 sufficiently tall power towers located in visible portions of the SEZ from view from Ludlow. At
32 12 mi (19 km) from the SEZ, the receivers on visible power towers would look like point-like or
33 nearly point-like lights on the western horizon. If sufficiently tall, power towers could have
34 flashing red or white hazard navigation lights that could potentially be visible from Ludlow at
35 night, although other lights would be visible in the vicinity. Visual contrasts associated with
36 solar facilities within the SEZ would be expected to be minimal.

37
38 Regardless of visibility from within these communities, residents, workers, and visitors
39 would be likely to experience visual impacts from solar energy facilities located within the SEZ
40 (as well as any associated access roads and transmission lines) as they travel area roads,
41 including the roads discussed above.

42
43
44 **Nearby Residents.** Scattered ranches and other residences are located on private lands
45 immediately adjacent or close to the SEZ and within the SEZ viewshed. Depending on
46 technology and project-specific factors, because of the close proximity and large size of likely

1 facilities, these residents could be subjected to large visual impacts from solar energy
2 development within the SEZ. These impacts would be determined in the course of a site-specific
3 environmental impact analysis.
4
5

6 ***9.3.14.2.3 Summary of Visual Resource Impacts for the Proposed Pisgah SEZ*** 7

8 Under the 80% development scenario analyzed in this PEIS, there could be multiple solar
9 facilities within the Pisgah SEZ, a variety of technologies employed, and a range of supporting
10 facilities that would contribute to visual impacts, such as transmission towers and lines,
11 substations, power block components, and roads. The resulting visually complex landscape
12 would be essentially industrial in appearance and would contrast strongly with the surrounding
13 more natural-appearing landscape. Large visual impacts on the SEZ and surrounding lands
14 within the SEZ viewshed would be associated with solar energy development due to major
15 modification of the character of the existing landscape. There is the potential for additional
16 impacts from construction and operation of transmission lines and access roads within the SEZ.
17

18 Residents, workers, and visitors to the area may experience visual impacts from solar
19 energy facilities located within the SEZ (as well as any associated access roads and transmission
20 lines) as they travel area roads, including I-40, I-15, and Historic Route 66. Travelers on I-40 and
21 Historic Route 66 would be likely to experience strong visual contrasts as they pass through the
22 SEZ, as would passengers on the Amtrak rail line serving Barstow. Nearby residents could be
23 subjected to large visual impacts from solar energy development within the SEZ. Of the nearby
24 communities, residents of Newberry Springs would be likely to experience moderate visual
25 contrasts.
26

27 Utility-scale solar energy development within the proposed Pisgah SEZ is likely to cause
28 moderate to strong visual impacts on highly sensitive visual resource areas within the 25-mi
29 (40-km) viewshed of the SEZ, including the Cady Mountains WSA and the Rodman Mountains
30 WA. Because the SEZ is located within the CDCA, some CDCA lands within the SEZ viewshed
31 could be subject to strong visual contrast levels as a result of solar facility development within
32 the SEZ.
33
34

35 **9.3.14.3 SEZ-Specific Design Features and Design Feature Effectiveness** 36

37 As noted in Section 5.12, the presence and operation of large-scale solar energy facilities
38 and equipment would introduce major visual changes into nonindustrialized landscapes and
39 could create strong visual contrasts in line, form, color, and texture that could not easily be
40 mitigated substantially. Implementation of the programmatic design features that are presented in
41 Appendix A, Section A.2.2, would be expected to reduce the magnitude of visual impacts
42 experienced; however, the degree of effectiveness of these design features could be assessed only
43 at the site- and project-specific level. Given the large-scale, reflective surfaces and strong regular
44 geometry of utility-scale solar energy facilities, and the typical lack of screening vegetation and
45 landforms within the SEZ viewsheds, siting the facilities away from sensitive visual resource

1 areas and other sensitive viewing areas is the primary means of mitigating visual impacts. The
 2 effectiveness of other visual impact mitigation measures would generally be limited.

3
 4 While the applicability and appropriateness of some mitigation measures would depend
 5 on site- and project-specific information that would be available only after a specific solar energy
 6 project had been proposed, the following SEZ-specific design features can be identified for the
 7 Pisgah SEZ at this time:

- 8
- 9 • Within the SEZ, in areas visible from and within 1 mi (1.6 km) of the Cady
 10 Mountains WSA, visual impacts associated with solar energy project
 11 operation should be consistent with VRM Class II management objectives
 12 (see Table 9.3.14.3-1), as experienced from KOPs (to be determined by the
 13 BLM) within the WSA, and in areas visible from between 1 and 3 mi (1.6 and
 14 4.8 km); visual impacts should be consistent with VRM Class III management
 15 objectives. The VRM Class II impact level consistency mitigation would
 16 affect approximately 2,237 acres (9 km²) within the western portion of the
 17 SEZ. The VRM Class III impact level consistency mitigation would affect
 18 approximately 7,961 additional acres (32 km²).
 19
 20

TABLE 9.3.14.3-1 VRM Management Class Objectives

VRM Management Class Objectives	
Class I Objective	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Source: BLM (1986b).

21
 22

- Within the SEZ, in areas located south of I-40 and visible from and between 1 and 3 mi (1.6 and 4.7 km) of the Rodman Mountains WA, visual impacts associated with solar energy project operation should be consistent with VRM Class III management objectives as experienced from KOPs determined by the BLM within the WA. The VRM Class III impact level consistency mitigation would affect approximately 454 acres (1.8 km²).

Figure 9.3.14.3-1 shows the areas within the SEZ affected by these SEZ-specific design features.

Application of the SEZ-specific design features above would substantially reduce visual impacts associated with solar energy development within the SEZ.

Application of the SEZ-specific design feature to restrict allowable visual impacts associated with solar energy project operations within 3 mi (4.8 km) of the Cady Mountains WSA would substantially reduce potential visual impacts on the WA by limiting impacts within the BLM-defined foreground of the viewshed of this area, where potential visual impacts would be greatest.

Application of the SEZ-specific design feature to restrict allowable visual impacts associated with solar energy project operations south of I-40 and between 1 and 3 mi (2 and 5 km) of the Rodman Mountains WA would substantially reduce potential visual impacts on the WA by limiting impacts within the BLM-defined foreground of the viewshed of this area, where potential visual impacts would be greatest. This design feature would also reduce impacts on travelers on I-40 and Route 66.

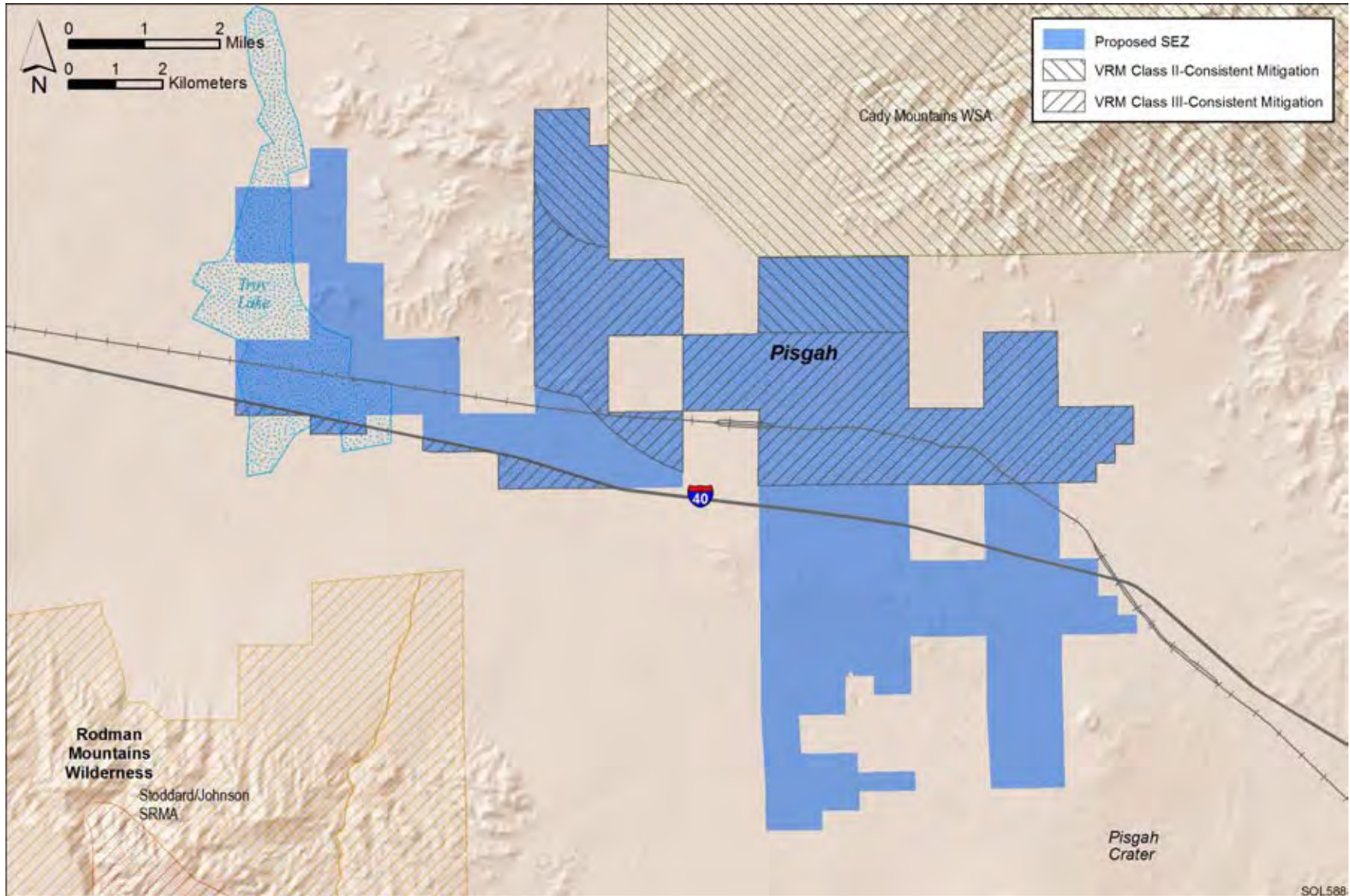


FIGURE 9.3.14.3-1 Areas within the Proposed Pisgah SEZ Affected by Zone-Specific Distance-Based Visual Impact Design Features

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1 **9.3.15 Acoustic Environment**

2
3
4 **9.3.15.1 Affected Environment**

5
6 The proposed Pisgah SEZ is located in the central portion of San Bernardino County in
7 Southeastern California. The County of San Bernardino has established noise standards for
8 stationary sources, mobile sources, and all other structures (County of San Bernardino 2009).
9 Noise standards applicable to solar energy development are those for stationary sources based on
10 affected land use and time of day: 55 dBA daytime L_{eq} and 45 dBA nighttime L_{eq} for residential
11 land use. Combining these two levels is the same as the EPA guideline of 55 dBA as L_{dn} for
12 residential areas. In San Bernardino County, temporary construction activities between 7 a.m.
13 and 7 p.m., except Sundays and federal holidays, are exempted from the noise regulations.
14

15 I-40, State Route 66 (National Trails Highway), and the BNSF Railway run east–west
16 through the proposed Pisgah SEZ, and Memorial Drive runs through the southern edge of the
17 western portion of SEZ. The nearest airports are Barstow-Daggett Airport and the privately
18 owned Ludlow Airport, which are located about 12 mi (19 km) west and east of the SEZ,
19 respectively. Twentynine Palms Marine Corps Base is located just south of the SEZ. Because of
20 the presence of the Mojave Aquifer, the largest aquifer in the western U.S., diverse agricultural
21 activities including irrigated crops, livestock, and aquaculture are scattered over the area to the
22 west of the SEZ. Many man-made water-skiing and jet-skiing lakes are also located to the west
23 of the SEZ. Mining operations exist in the southeastern portion of the SEZ. No livestock grazing
24 exists, and little recreational use and limited hunting occurs onsite. No sensitive receptors (e.g.,
25 hospitals, schools, or nursing homes) exist near the Pisgah SEZ. The nearest noise receptor lies
26 next to the northwestern corner of the SEZ boundary (about 40 ft [12 m] away). The next nearest
27 receptors are a cluster of residences within about 500 ft (150 m) of the SEZ just south of the I-40
28 rest area at the south-central edge of the western portion of the SEZ. No residences exist to the
29 east of the SEZ, downwind of prevailing westerly winds in the area. The closest population
30 center with schools is Newberry Springs, which is located about 6 mi (10 km) west of the
31 proposed Pisgah SEZ. Therefore, noise sources around the SEZ include road traffic, railroad
32 traffic, aircraft flyover, agricultural activities, industrial activities including mining, and activities
33 and events at nearby communities. The proposed Pisgah SEZ is mostly undeveloped, and its
34 overall character is considered rural to industrial. To date, no environmental noise survey has
35 been conducted near the Pisgah SEZ. On the basis of the population density in San Bernardino
36 County, the day-night average sound level (L_{dn} or DNL) is estimated to be 41 dBA for San
37 Bernardino County, typical of a rural area¹¹ (Eldred 1982; Miller 2002). However, maximum
38 noise levels in the SEZ would be over 70 dBA L_{dn} along I-40 or the BNSF Railway (County of
39 San Bernardino 2009); thus, noise levels are estimated to be higher than 55 dBA L_{dn} up to 0.3 mi
40 (0.5 km) from I-40 or the railroad. In addition, noise levels would be relatively high near the
41 western boundary of the SEZ because of agricultural and industrial activities that take place to
42 the west.
43

¹¹ Rural and undeveloped areas have sound levels in the range of 33 to 47 dBA as L_{dn} (Eldred 1982). Typically, the nighttime level is 10 dBA lower than daytime level, and it can be interpreted as 33 to 47 dBA (mean 40 dBA) during the daytime hours and 23 to 37 dBA (mean 30 dBA) during nighttime hours.

1 **9.3.15.2 Impacts**
2

3 Potential noise impacts associated with solar projects in the Pisgah SEZ would occur
4 during all phases of the projects. During the construction phase, potential noise impacts
5 associated with operation of heavy equipment and vehicular traffic would be anticipated, albeit
6 of short duration, at the nearest residence (just next to the northwestern SEZ boundary). During
7 the operations phase, potential impacts on nearby residences would be anticipated, depending on
8 the solar technologies employed. Noise impacts shared by all solar technologies are discussed in
9 detail in Section 5.13.1, and technology-specific impacts are presented in Section 5.13.2. Impacts
10 specific to the Pisgah SEZ are presented in this section. Any such impacts would be minimized
11 through the implementation of required programmatic design features described in Appendix A,
12 Section A.2.2, and through any additional SEZ-specific design features applied (see
13 Section 9.3.15.3 below). This section primarily addresses potential noise impacts on humans,
14 although potential impacts on wildlife at nearby sensitive areas are discussed. Additional
15 discussion on potential noise impacts on wildlife is presented in Section 5.10.2.
16

17
18 **9.3.15.2.1 Construction**
19

20 The proposed Pisgah SEZ has a relatively flat terrain; thus, minimal site preparation
21 activities would be required, and associated noise levels would be lower than those during
22 general construction (e.g., erecting building structures and installing equipment, piping, and
23 electrical). Solar array construction would also generate noise, but both noise and construction
24 would be spread over a wide area.
25

26 For the parabolic trough and power tower technologies, the highest construction noise
27 levels would occur at the power block area; a maximum of 95 dBA at a distance of 50 ft (15 m)
28 is assumed, if impact equipment such as pile drivers or rock drills is not being used. Typically,
29 the power block area is located in the center of the solar facility, at a distance of more than
30 0.5 mi (0.8 km) from the facility boundary. However, noise levels from construction of the solar
31 array would be lower than 95 dBA. With geometric spreading and ground effects, as explained in
32 Section 4.13.1, noise levels would attenuate to about 40 dBA at a distance of 1.2 mi (1.9 km)
33 from the power block area. This noise level is typical of daytime mean rural background level. In
34 addition, mid- and high-frequency noise from construction activities is significantly attenuated
35 by atmospheric absorption under the low-humidity conditions typical of an arid desert
36 environment, and by temperature lapse conditions typical of daytime hours; thus, noise
37 attenuation to background levels would occur at distances somewhat shorter than 1.2 mi
38 (1.9 km). If a 10-hour daytime work schedule is considered, the EPA guideline level of 55 dBA
39 L_{dn} for residential areas (EPA 1974) would occur at about 1,200 ft (370 m) from the power block
40 area, which would be well within the facility boundary. For construction activities occurring near
41 the northwestern SEZ, estimated noise levels at the nearest residence would be about 74 dBA,¹²
42 which is well above the San Bernardino County standard of 55 dBA daytime L_{eq} for residential

¹² Typically, the heavy equipment operators would not allow public access any closer than 330 ft (100 m) for safety reasons. In other words, construction and solar facility would not occur within this distance from the nearest residence.

1 land use. In addition, an estimated 70 dBA L_{dn} ¹³ at this receptor is well above the EPA guideline
2 of 55 dBA L_{dn} for residential areas.

3
4 About 72% of the time, winds in the area blow from directions ranging from southwest
5 through northwest inclusive. Accordingly, actual noise levels at the receptors, which are located
6 upwind of prevailing winds, would be much lower than the estimated noise levels due to a
7 shadow zone in the upwind area (discussed below).

8
9 It is assumed that a maximum of two projects would be developed at any one time for
10 SEZs greater than 10,000 acres (40.47 km²) and less than 30,000 acres (121.4 km²), such as the
11 Pisgah SEZ. If two projects were to be built within the SEZ near the nearest residence, noise
12 levels would be a little higher than the above-mentioned values, below a just-noticeable increase
13 of about 3 dB over a single project.

14
15 In addition, noise levels were estimated at the specially designated areas within a 5-mi
16 (8-km) range from the Pisgah SEZ, which is the farthest distance at which noise, other than
17 extremely loud noise, would be discernable. There are three specially designated areas within the
18 range where noise might be an issue. Cady Mountains WSA, Pisgah ACEC, and Ord-Rodman
19 DWMA abut the SEZ to the northeast, the east, and southwest, respectively. For construction
20 activities occurring near one of the specially designated areas, noise levels are estimated to be
21 about 74 dBA at the boundaries of these specially designated areas, higher than the typical
22 daytime mean rural background level of 40 dBA. Thus, if construction would occur near the
23 specially designated areas, portions of those areas close to the SEZ (within approximately 1 mi
24 [1.6 km]) could be disturbed by construction noise from the SEZ. However, sound levels above
25 90 dB are likely to adversely affect wildlife (Manci et al. 1988). Thus, construction noise is not
26 likely to adversely affect wildlife in nearby specially designated areas, except in areas directly
27 adjacent to the construction site.

28
29 Depending on soil conditions, pile driving might be required for the installation of
30 solar dish engines. However, relatively small and quiet pile drivers, such as vibratory or sonic
31 drivers, would be used, rather than the impulsive impact pile drivers frequently seen at large-
32 scale construction sites. Potential impacts on the nearest residence (next to the northwestern
33 SEZ boundary) would be anticipated to be minor, except when pile driving occurred near the
34 residence.

35
36 It is assumed that most construction activities would occur during the day, when noise is
37 better tolerated than at night because of the masking effects of background noise. In addition,
38 construction activities for a utility-scale facility are temporary in nature (typically a few years).
39 Construction would cause some unavoidable but localized short-term impacts on neighboring
40 communities, particularly for activities occurring near the northwestern proposed SEZ boundary,
41 close to the nearest residence.

42

¹³ For this analysis, background levels of 40 and 30 dBA for daytime and nighttime hours, respectively, are assumed, which result in day-night average noise level (L_{dn}) of 40 dBA.

1 Construction activities could result in various degrees of ground vibration, depending
2 on the equipment used and construction methods employed. All construction equipment causes
3 ground vibration to some degree, but activities that typically generate the most severe vibrations
4 are high-explosive detonations and impact pile driving. As for noise, vibration would diminish in
5 strength with distance. For example, vibration levels at receptors beyond 140 ft (43 m) from a
6 large bulldozer (87 VdB at 25 ft [7.6 m]) would diminish below the threshold of perception for
7 humans, which is around 65 VdB (Hanson et al. 2006). During the construction phase, no major
8 construction equipment that can cause ground vibration would be used, and no residences or
9 sensitive structures are located in close proximity. Therefore, no adverse vibration impacts are
10 anticipated from construction activities, except pile driving for dish engines occurring near the
11 residences.

12
13 It is assumed that the existing 230-kV transmission line located within the SEZ might be
14 used to connect new solar facilities to the regional grid, and that additional project-specific
15 analysis would be conducted for new transmission construction or line upgrades. However, some
16 construction of transmission lines could occur within the SEZ. Potential noise impacts on nearby
17 residences would be a minor component of construction impacts in comparison with solar
18 facility construction and would be temporary in nature.

21 **9.3.15.2.2 Operations**

22
23 Noise sources common to all or most types of solar technologies include equipment
24 motion from solar tracking, maintenance and repair activities (e.g., washing of mirrors or
25 replacement of broken mirrors) at the solar array area, commuter/visitor/support/delivery traffic
26 within and around the solar facility, and control/administrative buildings, warehouses, and other
27 auxiliary buildings/structures. Diesel-fired emergency power generators and fire water pump
28 engines would be additional sources of noise, but their operations would be limited to several
29 hours per month (for preventive maintenance testing).

30
31 With respect to the main solar energy technologies, noise-generating activities in the
32 PV solar array area would be minimal, related mainly to solar tracking, if used. Dish engine
33 technology, which employs collector and converter devices in a single unit, on the other hand,
34 generally has the strongest noise production.

35
36 For the parabolic trough and power tower technologies, most noise during operations
37 would come from the power block area, including the turbine generator (typically in an
38 enclosure), pumps, boilers, and dry- or wet-cooling systems. The power block is typically
39 located in the center of the facility. On the basis of a 250-MW parabolic trough facility with a
40 cooling tower (Beacon Solar, LLC 2008), simple noise modeling indicates that noise levels
41 around the power block would be more than 85 dBA, but that they would decrease to about
42 51 dBA at the facility boundary, about 0.5 mi (0.8 km) from the power block area. For a facility
43 located near the northwestern corner of the SEZ the predicted noise level would be about 51 dBA
44 at the nearest residence, just next to the SEZ boundary, which is higher than typical daytime
45 mean rural background level of 40 dBA but lower than the San Bernardino County standard of
46 55 dBA daytime L_{eq} . If TES was not used (i.e., if the operation was limited to daytime, 12 hours

1 only¹⁴), the EPA guideline level of 55 dBA (as L_{dn} for residential areas) would occur at about
2 1,370 ft (420 m) from the power block area and thus would not be exceeded outside of the
3 proposed SEZ boundary. At the nearest residence, about 49 dBA L_{dn} would be estimated, which
4 is below the EPA guideline level of 55 dBA (as L_{dn} for residential areas). As for construction, if
5 two parabolic trough and/or power tower facilities were operating close to the nearest residence,
6 combined noise levels would be a little higher than the above-mentioned values, below a just-
7 noticeable increase of about 3 dBA over a single facility. However, if TES was used during
8 nighttime hours, L_{dn} higher than those estimated above would be anticipated, as explained below
9 and in Section 4.13.1.

10
11 On a calm, clear night typical of the proposed Pisgah SEZ setting, the air temperature
12 would likely increase with height (temperature inversion) because of strong radiative cooling.
13 Such a temperature profile tends to focus noise downward toward the ground. Thus, there would
14 be little, if any, shadow zone¹⁵ within 1 or 2 mi (2 or 3 km) of the noise source in the presence of
15 a strong temperature inversion (Beranek 1988). In particular, such conditions add to the effect of
16 noise being more discernable during nighttime hours, when the background levels are the lowest.
17 To estimate L_{dn} , 6-hour nighttime generation with TES is assumed after 12-hour daytime
18 generation. For nighttime hours under temperature inversion, 10 dB is added to noise levels
19 estimated from the uniform atmosphere (see Section 4.13.1). On the basis of these assumptions,
20 the estimated nighttime noise level at the nearest residence (about 0.5 mi [0.8 km]) from the
21 power block area for a solar facility located near the northwestern SEZ boundary) would be
22 61 dBA L_{eq} , which is well above typical nighttime mean rural background level of 30 dBA and
23 the San Bernardino County regulation of 45 dBA nighttime L_{eq} . The day-night average noise
24 level at this residence is estimated to be about 63 dBA L_{dn} , which is higher than the EPA
25 guideline of 55 dBA L_{dn} for residential areas. The assumptions are conservative in terms of
26 operating hours, and no credit was given to other attenuation mechanisms, so it is likely that
27 noise levels would be lower than 63 dBA L_{dn} at the nearest residence, even if TES is used at a
28 solar facility. However, operating parabolic trough or power tower facilities using TES and
29 located near the northwestern SEZ boundary could result in noise levels above typical mean rural
30 background levels, the noise standard/guideline, and corresponding adverse noise impacts on the
31 nearest residence.

32
33 Associated with operation of a parabolic trough or power tower solar facility occurring
34 near the Cady Mountains WSA, Pisgah ACEC, and Ord-Rodman DWMA, the estimated daytime
35 level of 51 dBA at the boundary of these areas is higher than the typical daytime mean rural
36 background level of 40 dBA, while the estimated nighttime level of 61 dBA is much higher than
37 the typical nighttime mean rural background level of 30 dBA. However, operation noise from a
38 parabolic trough or power tower solar facility with TES is not likely to adversely affect wildlife
39 at the nearby specially designated areas (Manci et al. 1988).

40
41 In the permitting process, refined noise propagation modeling would be warranted, along
42 with measurement of background noise levels.

43

¹⁴ Maximum possible operating hours at the summer solstice, but limited to 7 to 8 hours at the winter solstice.

¹⁵ A shadow zone is defined as the region where direct sound does not penetrate because of upward diffraction.

1 The solar dish engine is unique among CSP technologies because it generates electricity
2 directly and does not require a power block. A single, large, solar dish engine has relatively low
3 noise levels, but a solar facility might employ tens of thousands of dish engines, which would
4 cause high noise levels around such a facility. For example, the proposed 750-MW SES Solar
5 Two dish engine facility in California would employ as many as 30,000 dish engines (SES Solar
6 Two, LLC 2008). At the Pisgah SEZ, assuming a dish engine facility of up to 2,129 MW
7 covering 80% of the total area (19,160 acres [77.54 km²]), 85,160 25-kW dish engines could be
8 employed. In addition, for a large dish engine facility, more than 1,000 step-up transformers
9 would be embedded in the dish engine solar field, along with several substations; the noise from
10 these sources, however, would be masked by dish engine noise.

11
12 The composite noise level of a single dish engine would be about 89 dBA at a distance of
13 3 ft (0.9 m) (SES Solar Two, LLC 2008). This noise level would be attenuated to about 40 dBA
14 (typical of the mean rural daytime environment) within 340 ft (105 m). However, the combined
15 noise level from tens of thousands of dish engines operating simultaneously would be high in the
16 immediate vicinity of the facility; for example, noise levels would reach about 51 dBA at 1.0 mi
17 (1.6 km) and 48 dBA at 2 mi (3 km) from the boundary of the modeled square-shaped dish
18 engine solar field, both of which are higher than the typical daytime mean rural background level
19 of 40 dBA but lower than the San Bernardino County standard of 55 dBA daytime L_{eq} . These
20 levels would occur at somewhat shorter distances than the aforementioned distances, considering
21 noise attenuation by atmospheric absorption and temperature lapse during daytime hours would
22 reduce noise levels. To estimate noise levels at the nearby residences, it was assumed that dish
23 engines were placed throughout the Pisgah SEZ at intervals of 98 ft (30 m). Under these
24 assumptions, the estimated noise level at the nearest residence (just next to the northwestern SEZ
25 boundary) would be about 56 dBA, which is much higher than the typical daytime mean rural
26 background level of 40 dBA and slightly higher than the daytime San Bernardino County
27 regulation of 55 dBA daytime L_{eq} . On the basis of 12-hour daytime operation, the estimated
28 54 dBA L_{dn} at this residence is just below the EPA guideline of 55 dBA L_{dn} for residential areas.
29 Estimated noise levels of 59 dBA and 56 dBA L_{dn} at the next nearest residence (about 500 ft
30 [150 m] south of I-40) would be higher but are considerably masked by heavy road traffic noise
31 from I-40. Accordingly, noise from dish engines could cause adverse impacts on the nearby
32 residences, depending on background noise levels and meteorological conditions.

33
34 For dish engines placed throughout the SEZ, estimated noise levels would be about
35 59 dBA at the boundaries of Cady Mountains WSA and Ord-Rodman DWMA and about 56 dBA
36 at the boundary of Pisgah ACEC, which are higher than the typical daytime mean rural
37 background level of 40 dBA. However, dish engine noise from the SEZ is not likely to adversely
38 affect the nearby specially designated areas (Manci et al. 1988).

39
40 Consideration of minimizing noise impacts is very important during the siting of dish
41 engine facilities. Direct mitigation of dish engine noise through noise control engineering could
42 also be considered.

43
44 During operations, no major ground-vibrating equipment would be used. In addition,
45 no sensitive structures are located close enough to the Pisgah SEZ to experience physical

1 damage. Therefore, potential vibration impacts on surrounding communities and vibration-
2 sensitive structures during operation of any solar facility would be minimal.

3
4 Transformer humming noises and switchyard impulsive noises would be generated
5 during the operation of solar facilities. These noise sources would be located near the power
6 block area, typically near the center of a solar facility. Noise from these sources would generally
7 be limited to within the facility boundary and rarely be heard at nearby residences, assuming a
8 0.5-mi (0.8-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and another 40 ft
9 [10 m] to the nearest residence). Accordingly, potential impacts of these noise sources on the
10 nearest residence would be minimal.

11
12 Regarding impacts from transmission line corona discharge noise during rainfall events
13 (discussed in Section 5.13.1.5), the noise level at 50 ft (15 m) and 300 ft (91 m) from the center
14 of a 230-kV transmission line's towers would be about 39 and 31 dBA (Lee et al. 1996),
15 respectively, typical of daytime and nighttime mean background levels in rural environments.
16 Corona noise includes high-frequency components, which is considered to be more annoying
17 than low-frequency environmental noise. However, corona noise would not likely cause impacts,
18 unless a residence was located close to it (e.g., within 500 ft [152 m] of a 230-kV transmission
19 line). The Pisgah SEZ is located in an arid desert environment, and incidents of corona discharge
20 are infrequent. Therefore, potential impacts on nearby residents from corona noise along the
21 transmission line ROW would be negligible.

22 23 24 **9.3.15.2.3 Decommissioning/Reclamation**

25
26 Decommissioning/reclamation requires many of the same procedures and equipment
27 as traditional construction. Decommissioning/reclamation would include dismantling of
28 solar facilities and support facilities such as buildings/structures and mechanical/electrical
29 installations, disposal of debris, grading, and revegetation as needed. Activities for
30 decommissioning would be similar to those for construction but on a more limited scale.
31 Potential noise impacts on surrounding communities would be correspondingly lower than those
32 for construction activities. Decommissioning activities would be of short duration, and their
33 potential impacts would be minor and temporary in nature. The same design features adopted
34 during the construction phase could also be implemented during the decommissioning phase.

35
36 Similarly, potential vibration impacts on surrounding communities and vibration-
37 sensitive structures during decommissioning of any solar facility would be lower than those
38 during construction and thus minimal.

39 40 41 **9.3.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**

42
43 The implementation of required programmatic design features described in Appendix A,
44 Section A.2.2, would greatly reduce or eliminate the potential for noise impacts from
45 development and operation of solar energy facilities. While some SEZ-specific design features

1 are best established when specific project details are being considered, measures that can be
2 identified at this time include the following:

- 3
4 • Noise levels from cooling systems equipped with TES should be managed so
5 that levels at the nearby residences to the northwest and to the south of the
6 SEZ are kept within applicable guidelines. This could be accomplished in
7 several ways, for example, through placing the power block approximately
8 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few
9 hours after sunset, and/or installing fan silencers.
- 10
11 • Dish engine facilities within the Pisgah SEZ should be located more than 1 to
12 2 mi (1.6 to 3 km) from the nearest residences located to the northwest and the
13 south of the SEZ (i.e., the facilities should be located in other portions of the
14 proposed SEZ). Direct noise control measures applied to individual dish
15 engine systems could also be used to reduce noise impacts at the nearest
16 residences.
- 17
18

1 **9.3.16 Paleontological Resources**

2
3
4 **9.3.16.1 Affected Environment**

5
6 The Pisgah SEZ is covered predominantly by Quaternary/Tertiary deposits of varying
7 types. The northern and eastern half is mostly thick alluvial deposits (over 100 ft [3 m] thick)
8 ranging in age from the Pliocene to Holocene. The alluvial deposits cover 16,551 acres (67 km²),
9 or about 69% of the SEZ. The southern and western sections consist primarily of eolian (dune
10 sand), playa, and lacustrine sediments. The eolian sediments cover 588 acres (2.4 km²), or less
11 than 3% of the SEZ; the playa sediments cover 2,928 acres (12 km²), or 12% of the SEZ; and the
12 lacustrine sediments cover 767 acres (3 km²) or 3% of the SEZ. The southeastern sections of the
13 SEZ are composed of volcanic rocks (basalt and andesite). These volcanic deposits cover
14 2,718 acres (11 km²), or 11% of the SEZ. Peripheral sections of the northern portions of the SEZ
15 are composed of igneous and metamorphic rocks covering 398 acres (1.6 km²), or 2% of the
16 SEZ.

17
18 In the absence of a PFYC map for the California Desert District, a preliminary
19 classification of PFYC Class 3b is assumed for the alluvial, eolian, playa, and lacustrine deposits.
20 Paleontological resources have been found in ancient lake deposits of Lake Manix, including
21 camel, horse, and a variety of invertebrates (Enzel et al 2003). Class 3 indicates that the potential
22 for the occurrence of significant fossil materials is unknown and needs to be investigated further
23 (see Section 4.8 for a discussion of the PFYC system). The PFYC for the volcanic deposits is
24 Class 1, indicating that the occurrence of significant fossil materials is nonexistent or extremely
25 rare.

26
27 A pedestrian survey was conducted in 2008 for the Calico Solar Project (then referred to
28 as the Stirling Solar One Project) to look for surface fossils and exposures of potential fossil-
29 bearing geologic units. A records search completed in addition to the field reconnaissance
30 indicated that the potential for paleontological material is mostly low for areas of younger
31 Quaternary alluvium and volcanic deposits. The potential for paleontological deposits is
32 moderate to high for areas of older Quaternary alluvium, but these deposits are buried at
33 unknown depths. Conditions of certification for the project have been proposed in the CEC staff
34 assessment and Draft EIS for the Calico Solar Project to mitigate possible adverse effects on
35 paleontological resources. These conditions include a worker education program, monitoring of
36 ground disturbance by a professional paleontologist, development of a paleontological resources
37 monitoring and mitigation plan, and instruction to stop work upon discovery of a paleontological
38 resource.

39
40
41 **9.3.16.2 Impacts**

42
43 The potential for impacts on significant paleontological resources at the Pisgah SEZ is
44 unknown. A more detailed investigation of the local geological deposits of the SEZ and their
45 potential depth is needed prior to project approval. Once a project area has been chosen, a
46 paleontological survey will likely be needed following consultation with BLM. The appropriate

1 course of action would be determined as established in BLM IM2008-009 and IM2009-011
2 (BLM 2007a, 2008). Section 5.14 discusses the types of impacts that could occur to any
3 significant paleontological resources found within the Pisgah SEZ. Impacts would be minimized
4 through the implementation of applicable general mitigation measures listed in Section 5.14,
5 such as monitoring by a qualified paleontologist and development of a management/mitigation
6 plan, as well as required programmatic design features described in Appendix A, Section A.2.2.
7

8 Indirect impacts on paleontological resources outside of the SEZ, such as through looting
9 or vandalism, are unknown but unlikely as any such resources would be below the surface and
10 not readily accessible. Programmatic design features for controlling water runoff and
11 sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.
12

13 No new roads or transmission lines have been assessed for the proposed Pisgah SEZ,
14 assuming the existing corridors would be used; impacts on paleontological resources related to
15 the creation of new corridors would be evaluated at the project-specific level if new road or
16 transmission construction or line upgrades are to occur.
17

18 A programmatic design feature requiring a stop work order in the event of an inadvertent
19 discovery of paleontological resources would reduce impacts by preserving some information
20 and allowing possible excavation of the resource, if warranted. Depending on the significance of
21 the find, some modification to the project footprint could result. Since the SEZ is located in an
22 area preliminarily classified as PFYC Class 3b or greater, a stipulation would be included in
23 permitting documents to alert solar energy developers of the possibility of a delay if
24 paleontological resources are uncovered during surface-disturbing activities.
25
26

27 **9.3.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**

28

29 Impacts would be minimized through the implementation of required programmatic
30 design features, including a stop-work stipulation in the event that paleontological resources are
31 encountered during construction, as described in Appendix A, Section A.2.2.
32

33 The need for and the nature of any SEZ-specific design features would depend on
34 findings of paleontological surveys.
35

1 **9.3.17 Cultural Resources**

2
3
4 **9.3.17.1 Affected Environment**

5
6
7 **9.3.17.1.1 Prehistory**

8
9 The proposed Pisgah SEZ is located in the central Mojave Desert. The earliest use of the
10 Mojave Desert is during the Paleoindian Period sometime between 12,000 and 10,000 B.P. Sites
11 associated with this period are located predominantly around inland pluvial lakes (notably China
12 Lake, located northwest of the Pisgah SEZ) created during the Pleistocene, and around desert
13 terraces, which suggests that subsistence was focused mainly on mega-fauna. This region is also
14 interesting because of the number of pre-Paleoindian sites that have been suggested nearby.
15 These unsubstantiated claims are a major point of contention amongst archaeologists, but the fact
16 that so many have been suggested in the Mojave Desert (Calico Man site northwest of the SEZ,
17 Tule Springs site near Las Vegas, Nevada, and Lake Manix, portions of which include Troy Lake
18 in the Pisgah SEZ) make them worth mentioning here. This hunting-intensive period came to an
19 end around 7,000 to 8,000 B.P., when the mega-fauna became extinct, likely due to intensive
20 hunting and a warming climate; this warming climate also was one of the major contributing
21 factors causing the pluvial lakes to recede. These early sites are characterized by the Clovis
22 complex of fluted points, and later by the Lake Mojave complex, characterized by core and
23 flake-based tools, crescents, choppers, planes and scrapers, and some leaf-projectile points.
24 When Troy Lake, portions of which are within the Pisgah SEZ, was surveyed in 1965, more than
25 20 sites were found in the proximity of the lake; many of these were multi-component sites that
26 contained a wide range of projectile points, affirming the chronological sequences proposed by
27 earlier archaeologists. Newberry Cave, located to the east of the SEZ, was a single-component
28 site that contained a sacred assemblage, characterized by perishable and non-perishable artifacts
29 and pictographs (Rogers 1939; Jones and Klar 2007; Moratto 1984).

30
31 The Archaic Period in the Mojave Desert lasted from approximately 8,000 to 1,500 B.P.
32 Characterized mainly by the Pinto Complex, the groups of people from this period transitioned
33 from big-game hunting to a more broadly based subsistence economy, incorporating more hard
34 seeds into their diets, as evidenced by the increase in milling stones and mortars and pestles in
35 archaeological assemblages. Sites are usually found in open settings that are in well-watered
36 areas. The Medithermal Climatic Anomaly occurred from 5,000 to 3,500 B.P., bringing about
37 cooler temperatures and a moister climate and allowing for more intensive desert occupation
38 during this time period. Other later complexes associated with the Archaic Period in the Mojave
39 Desert are the Gypsum and Rose Springs Complexes, based on changes in projectile point
40 technology and transitions in population movements (Jones and Klar 2007; Sutton 1996).

41
42 The Late Prehistoric Period began about 1,500 B.P. and extended until contact with
43 European explorers and colonization of the area. The archaeological Patayan Complex
44 characterizes this period, and is thought to be ancestral to the later Yuman ethnographic
45 groups. The archaeological assemblages related to this period include paddle-and-anvil pottery
46 (brownware ceramics and lower Colorado buff ware), bow-and-arrow technology (evidenced by

1 smaller Cottonwood and Desert side-notched points), rock art and intaglios, bedrock milling
2 features, a shift in burial practices from inhumation to cremation techniques, and an extensive
3 system of trails (notably the Mohave Trail, portions of which passed near the Pisgah SEZ) along
4 which “pot-drops,” lithic debitage, and shrines are found (Norwood 1980; Jones and Klar 2007).
5 Turquoise mines located near Halloran Springs, northeast of the Pisgah SEZ, were mined by
6 local indigenous groups, and likely were part of the larger turquoise trade that involved areas as
7 far as central Mexico and Chaco Canyon in New Mexico. The following section describes the
8 cultural history of this time period in greater detail.

9 10 11 **9.3.17.1.2 Ethnohistory** 12

13 Although of differing linguistic stock, the Native Americans that inhabited the
14 southeastern California deserts when Euro-Americans first arrived shared similar ways of life
15 and broadly similar beliefs, norms, and values (Halmo 2003). The mountains and valleys of their
16 shared environment provided a variety of seasonally available resources. Native American
17 groups harvested these resources following a regular seasonal pattern. They lived in kin-based
18 groups, or lineages, that would join together or split apart depending on the type and abundance
19 of available resources. A pattern of seasonal camps combined with semi-permanent villages or
20 rancherias emerged. Lineages tended to consider specific highly productive areas as their own,
21 while the areas between them were shared with other lineages of varying ethnicity. Wild plant
22 resources were often managed; stands of plant resources might be pruned, watered, or burned to
23 encourage growth (Lightfoot and Parish 2009). The pattern of seasonal migration to exploit
24 particular resources allowed the groups to adapt to changes in their subsistence base with the
25 arrival of new cultural impulses and populations (Halmo 2003).
26

27 The various Native American ethnic groups that inhabited the southeastern California
28 deserts each had an area that they considered their homeland, but the boundaries between these
29 areas were not sharply drawn and fluctuated over time. Travel to hunt, trade, or just visit
30 neighboring groups was common (Kelly and Fowler 1986; Knack 1980). The territorial claims of
31 the different ethnic groups overlapped each other. Lineages would sometimes share territory, or
32 one group would invite its neighbors to share an abundant resource (CSRI 2002). A network of
33 trails, often still discernable, reflect a web of social and trade links that tied the area together and
34 ultimately stretched from the Pacific coast to the Great Plains. As discussed in Section 9.3.18.1,
35 the Native Americans living in southeastern California tend to view the landscape they inhabit
36 holistically, each part intrinsically and inextricably connected to the whole. In some sense, the
37 network of trails tied the landscape together. Trails could have sacred as well as profane aspects.
38

39 Located between the Cady and the Rodman Mountains in a valley that opens onto the
40 Mojave Valley, the proposed Pisgah SEZ is about 6 mi (10 km) southeast of the Mojave River.
41 While aboriginal ethnic boundaries are difficult to delineate in this sparsely populated area,
42 Martha Knack (1980) and Alfred Kroeber (1925) considered the location to have been included
43 in the traditional use area of the Vanyume branch of the Serrano people. The Mojave River,
44 which flows eastward into the Mojave Desert, lies along the route of an important trail corridor.
45 The Mohave often traveled and traded along the corridor and consider the area within their
46 traditional use area. It is likely that it was an area used jointly by the surrounding Tribes

1 including the Kawaiisu, who ranged as far south as the Mojave River, and the Chemehuevi as
2 well.

5 **Vanyume**

7 Little is known of the Vanyume. Their population was small (Kroeber 1925) and
8 dwindled rapidly in the early nineteenth century. They are thought to have become extinct before
9 the beginning of the twentieth century. They are often thought of as the desert branch of the
10 Serrano (Knack 1980), with whom they share linguistic ties. Politically, however, they were
11 distinct, having friendly relations with the Mohave and the Chemehuevi, who were enemies to
12 most Serrano (Bean and Smith 1978). The Vanyume resided in small groups based along the
13 lower Mojave River and its sinks. Like their neighbors to the east, they lived in small kinship-
14 based groups, less politically elaborated than their Serrano cousins, who are discussed in more
15 detail in Section 9.2.17.1. They traveled in small bands to exploit food resources, following a
16 pattern tied to the season and local rainfall. These groups joined or split apart with the abundance
17 of the food resource they were harvesting (Knack 1980). Early Spanish explorers reported that
18 the Vanyume relied on mesquite, screwbeans, and tule roots for food, and though normally
19 unclothed, possessed rabbit-skin and otter-skin blankets (Kroeber 1925).

21 The Serrano had little contact with the Spanish and were not successfully missionized;
22 however, missionization and the spread of European diseases among neighboring Tribes resulted
23 in significant reductions in the native population, possibly allowing the Vanyume to retreat to
24 more lush northern mountains (Knack 1980). The Vanyume continued to dwindle. Any surviving
25 Vanyume descendants most likely have merged with Serrano or other surrounding groups.

28 **Mohave**

30 The Mohave were primarily at home along the Colorado River, from time to time
31 reaching as far south as Blythe, but they travelled and traded widely, following the Mojave River
32 to visit coastal Tribes. They are likely to have travelled through or near the Pisgah SEZ on their
33 journeys to and from the coast. They had sprawling settlements, rather than villages, with houses
34 situated on low hills above the floodplain.

36 Their traditional use area claims extend far beyond the valleys of the Colorado River,
37 reflecting their propensity for travel. They claim all the Mojave Desert and the land as far south
38 as the Turtle, Granite, and Eagle Mountains, and as far west as the Tehachapi and San Gabriel
39 Mountains (CSRI 2002), thus including the SEZ. This larger range was where they traded,
40 hunted, and gathered to supplement their planted crops and the fish they took from the river.
41 They are likely to have traded, hunted, and gathered in the Pisgah SEZ area. They were less
42 reliant on hunting and gathering than the Chemehuevi, who hunted and gathered in much of the
43 same area (Knack 1980).

1 **Chemehuevi**
2

3 The Chemehuevi are a Southern Paiute group who first entered the Parker and Blythe
4 Valleys along the Colorado at the invitation of their allies, the Mohave, sometime between 1825
5 and 1830. Although partially settled along the river, they retained their ties to mountains and
6 valleys of the Great Basin. Those retaining a desert way of life have been called Desert
7 Chemehuevi (*Tiiranniwiwi*). The Tiiranniwiwi are said to have ranged well west of the eastern
8 Mojave in search of particular resources and may have moved farther west when missionization
9 and the spread of European diseases resulted in the depopulation of some areas (Knack 1980).
10 They may have been present periodically in the Pisgah SEZ.
11

12 In the late 1860s, hostilities erupted between the Mohave and Chemehuevi, and part of
13 the Chemehuevi moved west to join Cahuilla and Serrano villages near Twentynine Palms. In
14 1874, the Office of Indian Affairs set aside part of the Mohave reservation along the Colorado
15 River for the Chemehuevi, but many did not want to return. In 1907, a separate reservation was
16 established for them north of Parker, Arizona (Kelly and Fowler 1986).
17

18 Chemehuevi settlements were scattered, and band size varied with the season and
19 available water, plant, and animal resources. Dwellings varied from pole structures covered with
20 brush to rock shelters in the desert areas to earth-covered huts, often with open fronts, adopted
21 from the Mohave along the Colorado River. Other items of Mohave material culture were
22 likewise adopted, including ceramic styles, square metates (grinding stones), storage platforms,
23 and personal adornment (Kelly and Fowler 1986).
24

25 The relations between the Chemehuevi and neighboring Tribes were mostly amicable.
26 They maintained a trading relationship with the Cahuilla. Groups of Chemehuevi would travel as
27 far west as the coast to trade for shells and as far east as the Hopi mesas. They were involved in a
28 trade network that stretched from the Channel Islands to the Gila River Valley and the Great
29 Plains, with the potential to bring material culture from some distance away to the Chemehuevi
30 homeland.
31

32 **Kawaiisu**
33

34 The territory occupied by the Kawaiisu straddled the southern portion of the Sierra
35 Nevada Mountains and extended into the Mojave Desert to the Mojave River. The proposed
36 Pisgah SEZ lies close to the southern extent of their traditional use area. They are Southern
37 Numic speakers and some linguists are of the opinion that due to their relative isolation from
38 other Numic-speaking groups, their dialect of Southern Numic was a separate language
39 (Goss 1966). It has been suggested that theirs was the central area from where the Proto-Numic
40 and Southern Numic language groups dispersed. Based on this evidence, it is thought that the
41 Kawaiisu have occupied the area for the last 2,000 years (Zigmond 1986).
42
43

44 Ethnographic accounts of the Kawaiisu suggest the group was peaceful and neither
45 violent nor warlike. Tribal unity was not a major factor in the Kawaiisu cultural mindset, and
46 consequently the chieftainship was recognized but only through tacit acknowledgment by the

1 people. Several leaders could have been accepted in local areas, the most important
2 qualifications for chieftainship being wealth and generosity. This limited political organization
3 was also reflective of their social organization, as bands of related family groups were the most
4 extensive form of social organization (Zigmond 1986). Acorns were easily accessible in the
5 region and it was this resource that was often traded, notably with Western Shoshone for
6 obsidian and salt and with the Southern Valley Yokuts Tribes (Garfinkel and Schiffman 1981).
7 The Kawaiisu congenial nature is evidenced in their participation of intertribal game drives, in
8 which nearby Tribal groups (Tubatulabal, Chumash, and Yokuts) would contribute in large
9 hunts, notably for antelope. Because acorns were the staple crop for the Kawaiisu, typical desert
10 plants such as mesquite and screwbean did not factor into the diet as heavily as in other desert-
11 residing Tribes, suggesting that the Kawaiisu were a unique hybrid California-desert and Great
12 Basin Tribal group due to their close proximity and their ability to avail themselves of both
13 resource zones so easily (Zigmond 1986).

14 15 16 **9.3.17.1.3 History** 17

18 European explorers first entered the southeastern California deserts in the sixteenth
19 century. Early explorers of Alta California reached the Colorado River by way of the Gulf of
20 Mexico and proceeded upstream past the confluence of the Gila River, but they explored little
21 of the interior deserts. For the next 200 years Spanish penetration of the interior deserts was
22 intermittent, resulting in a prolonged protohistoric period (see Sections 9.3.17.1.1 and
23 9.3.17.1.2). Juan Bautista de Anza crossed the Colorado River with the assistance of the
24 Quechan on his way to Monterey in 1774. His route, which is located well south of the Pisgah
25 SEZ, near the border of California and Mexico, became the main travel corridor between
26 Arizona and central California in the 1800s.

27
28 The Mojave Desert has a history of being a corridor, both prehistorically and historically.
29 Several trails and railroads passed through the area; however, the lack of water caused problems
30 in traversing the arid desert. The Old Spanish Trail refers to several different trails that
31 traversed the Mojave Desert, utilized for exploratory, commercial, and settlement interests.
32 Parts of the Old Spanish Trail likely followed parts of the prehistoric Mohave Trail, but there
33 were divergences in both and it is difficult to determine an exact extensive route for either trail.
34 Later referred to as Government Road, water holes were all nearly one day's travels apart,
35 causing several groups to perish along the treacherous desert crossing. Beale's Wagon Road,
36 an historic trail that ran along the 35th parallel and intersected parts of the Mohave Trail, was
37 used for a short period of time with the aid of camels to assist wagon trains in traveling from
38 the Colorado River to Los Angeles, but because it constantly encountered hostile Mojave
39 groups the trail was abandoned in 1861. Another trail that ran north of the Old Spanish Trail,
40 referred to as the Mormon Trail, connected Salt Lake City to the Mormon-established town of
41 San Bernardino, but like the other trails various routes were used. Along the Mormon Trail was
42 Salt Spring, where the first confirmed gold strike in San Bernardino County took place in 1849
43 (von Till Warren 1980).

44
45 Mining has been the most important commercial industry in San Bernardino County, with
46 1900 through 1919 referred to as "The Great Years" for mining in the area. In 1863, prior to this

1 period, silver was discovered, but copper, lead, zinc, and gold were also mined in the area, and
2 during both World Wars chromium, manganese, tungsten, and vanadium were mined there.
3 More recently, clay, talc, cinders, and aggregate mining (sand and gravel), have become more
4 profitable resources to mine. There are three mines in relatively close proximity to the Pisgah
5 SEZ: Black Butte Mine to the east, Pisgah Mine to the south, and Logan Mine to the north.
6 These sites consist of open pit mines, borrow pits, and open mines (von Till Warren 1980;
7 Shumway et. al. 1980).
8

9 Railroad development in the area facilitated the mining operations and made water more
10 readily available. The BNSF Railroad, historically known as the Atlantic and Pacific Railroad,
11 and later the Atchison, Topeka, and Santa Fe Railroad, passes directly through the Pisgah SEZ.
12 Sidings associated with this rail line were constructed in Troy, Hector, Pisgah, and Lavic, all
13 locations in close proximity to the Pisgah SEZ. A water tank was constructed at Newberry
14 Springs, east of the SEZ, and was the primary source of water for the railroad. Prior to the
15 construction of the railroad, there were few people who lived in the area except for those
16 associated with the mining industry. With the coming of the railroad, towns were built and
17 populations were sustained at several nearby locations, notably at Ludlow and Newberry
18 Springs.
19

20 As southern California began to grow, its need for resources also increased.
21 Consequently, natural gas and transmission lines had to be built to facilitate this growth. With
22 the construction of the Hoover Dam in 1937, several transmission lines crossed the SEZ and a
23 substation was built in the proposed Pisgah SEZ to provide power to the southern California
24 area.
25

26 The Mojave Desert provides ideal conditions for military use. The vast open spaces,
27 lack of population, and access to rail lines have caused the military to seek use of the Desert
28 for several of its operations. In 1860 a fort was built at Camp Cody, located northwest of the
29 SEZ, in an effort to suppress Paiute Indian attacks. More recently, military installations have
30 been constructed at Twentynine Palms, south of the SEZ, and Fort Irwin, north of the SEZ. In
31 1942, General George Patton identified an 18,000 mi² (46,800 km²) area, a vast area east of the
32 SEZ, for use in training troops for combat in the North African Desert during WWII. While this
33 Desert Training Area did not enter into the SEZ, traffic was significantly increased throughout
34 the SEZ due to the construction and operation of this and other military operations.
35

36 With the widespread adoption of the automobile after World War I, the need for roads
37 that were capable of handling automobile traffic rose. In the early twentieth century, travel in and
38 around the proposed Pisgah SEZ was basically restricted to prehistoric trails and roads that were
39 created by the railroads to aid in their construction. The National Auto Trail System was an
40 informal network of automobile routes that were marked by local organizations, and a part of this
41 Trail System was the Old National Trails Highway. This highway was established in 1912 in the
42 vicinity of old wagon roads and adjacent to the Santa Fe Railroad tracks. In 1916, the Federal
43 Highway Aid Act was passed, helping to fund the increasingly necessary road system; due to the
44 increased traffic on the roads, the section of the road in the vicinity of the proposed Pisgah SEZ
45 had been widened and oiled or covered with gravelly sand by the 1920s. By 1926 the Old
46 National Trails Highway in the Mojave Desert had been designated U.S. Route 66. It became one

1 of the first highways to provide a route of travel from Chicago to the Pacific Ocean, a major
2 artery of the National Highway System. Realignment of U.S. Route 66 occurred in the 1930s,
3 putting the road on the alignment to which it currently adheres. The new alignment eliminated
4 steep grades and straightened the road, allowing for faster speeds. The section of the road from
5 Needles, California, to Los Angeles, California, was the most heavily traveled section of the
6 highway, which encouraged paving of the road surface along this route in 1934, while the rest of
7 the highway was paved by 1938. With the establishment of this extensive road system, thousands
8 of businesses, including grocery stores, service stations, restaurants, motels, and tourist
9 attractions, opened along the route to provide services to those travelling. These businesses and
10 the road itself became an integral part of culture of America during the 1920s through the 1960s,
11 as evidenced by its mention in both songs and literature (Stirling Energy Systems 2008).

12 13 14 ***9.3.17.1.4 Traditional Cultural Properties—Landscape***

15
16 The Tribes of southeastern California tend to take a holistic view of the world; they see
17 the features of their environment as an interconnected whole imbued with a life force. Prominent
18 features may be seen as places of power—sacred places. High hills and mountains tend to be
19 regarded as sacred, while some peaks have special status. Other features that tend to be regarded
20 as sacred include caves, certain rock formations, springs, and hot springs. Revered locations
21 include panels of rock art, evidence of ancestral settlements, arranged-rock sites, burial or
22 cremation areas, and systems of trails. Sacred sites are often seen as places of power where
23 offerings are left (Halmo 2003). Tribes see themselves as exercising divinely given
24 responsibilities of stewardship over the lands where they believe they were created and as
25 retaining a divine birthright to those lands. Specific mountain peaks are seen as points of
26 emergence associated with creation stories. Hot springs and petroglyphs panels were thought to
27 be associated with supernatural power; hot springs were thought to have healing powers, and
28 petroglyphs panels were associated with the shaman’s spirit helpers (Knack 1980). During
29 consultation with the BLM regarding the Calico Solar Power Project, part of which lies within
30 the proposed SEZ, Tribal representatives found that the prehistoric rock cluster features and
31 lithic scatters that had been determined eligible for the NRHP were important components of the
32 Native American cultural landscape (BLM and CA SHPO 2010).

33
34 According to a Sacred Lands File Search through the California Native American
35 Heritage Commission (NAHC), no sacred sites were identified within the proposed Pisgah SEZ
36 (Singleton 2010).

37 38 39 ***9.3.17.1.5 Cultural Surveys and Known Archaeological and Historic Resources***

40
41 At least 19 previous surveys have been conducted in proposed Pisgah SEZ, twelve of
42 which were linear pedestrian surveys, and two of which were associated with the Calico Solar
43 Power Project (previously the Stirling Solar One Project) APE. The surveys resulted in the
44 recording of 146 archaeological sites and ten architectural resources. Of the 146 archaeological
45 sites, 108 sites need further evaluation regarding their NRHP and California Register of Historic
46 Places (CRHR) eligibility, and two of the ten historic structures are considered NRHP eligible.

1 Of the 108 sites that require further evaluation, 100 are prehistoric in nature, five are historic,
2 and three are multi-component sites (Stirling Energy Systems 2008).

3
4 There are two historic resources that intersect the Pisgah SEZ and are NRHP eligible:
5 U.S. 66, also known as National Old Trails Highway, and the Southern California Edison (SCE)
6 220-kV transmission line built in 1937. Portions of Old Route 66 are found throughout the SEZ.
7 Most are in poor condition; however, its significance as an early automobile route across the
8 Mojave Desert lends itself to its consideration for NRHP eligibility. Associated with U.S. 66 are
9 historic refuse scatters, and outside the Pisgah SEZ locations along the road that were used by
10 travelers, such as restaurants and motels. The SCE transmission line was constructed to bring
11 power from the Hoover Dam to Southern California, and its significance lies in the fact that it is
12 one of the earliest transmission lines in the area from the Hoover Dam to Southern California.

13
14 There are three prehistoric archaeological sites and two multi-component sites that are
15 located either in or within 5 mi (8 km) of the proposed Pisgah SEZ that are also potentially
16 eligible for inclusion on the NRHP. Four of these sites are located in close proximity to Troy Dry
17 Lake, and the other is in the lava fields southwest of the SEZ (Plog et al. 1989; Norwood 1980).

18
19 One of these sites, located on the edge of the Troy Dry Lake bed, is a multi-component
20 site consisting of a prehistoric lithic scatter, ground stone fragment, and two projectile points,
21 and historic railroad camp structures, with associated glass, metal, ceramics, and building
22 materials. This site could provide valuable information that has not been collected about historic
23 railroad camps, as few camps have been analyzed in the Mojave Desert region. Another multi-
24 component site, located southeast of Troy Dry Lake below Newberry Cave, consists of a
25 prehistoric artifact scatter and an historic trash scatter and buildings constructed of homemade
26 bricks. The prehistoric scatter is made up of lithic flakes, projectile points, cores, bifaces,
27 scrapers, ground stone, and ceramics. The historic component consists of porcelain, ceramics,
28 hand-blown and mold-blown bottle glass, magnesia glass, and metal and shell buttons, along
29 with the aforementioned structure. The historic component could provide critical information
30 related to settlement patterns, living conditions, and possibly trade routes among various ethnic
31 groups that inhabited the Mojave Desert in historic times. The prehistoric component is valuable
32 because analysis of the lithic material could serve to indicate variation in the manufacture of
33 lithic material compared to other archaeological assemblages in the region (Plog et al. 1989).

34
35 The dune area of Troy Dry Lake houses one of the other potentially eligible sites, a
36 prehistoric artifact scatter consisting of lithic flakes, ceramics, and fire-affected rock that may
37 be the remains of a hearth. The location of this site suggests that those who occupied it used the
38 resources of the lake environment, the value of the site being in the potential of the assemblage
39 to indicate prehistoric environmental exploitation and to contribute to the overall chronological
40 sequence of the region. The other site with potential eligibility for listing in the NRHP is a vast
41 (24 acres [0.1 km²]) lithic scatter consisting of over 980 artifacts, which, if analyzed, could
42 contribute to the regional picture of lithic production and specialization and to the chronological
43 sequence as determined by lithic material (Plog et al. 1989).

44
45 A rock shelter, located southwest of the SEZ in the lava fields, is also a potential NRHP
46 site. The site consists of lithic flakes and there is potential for subsurface remains to be present.

1 The possibility of subsurface material could indicate cultural and temporal sequences and
2 contexts and lends to the site's potential NRHP inclusion (Norwood 1980).

3
4 The BLM has designated several locations within relatively close proximity to the
5 proposed Pisgah SEZ as ACECs because of their significant cultural value. These include the
6 Rodman Mountains Cultural Area, 6 mi (10 km) to the south, known for its petroglyph panels;
7 the Calico Early Man Site, 12 mi (19 km) to the northwest, and the Mesquite Hills/Crucero
8 ACEC, 18 mi (29 km) to the northeast, for their prehistoric resources; and the Manix ACEC,
9 6 mi (10 km) north of the SEZ, for its paleontological and cultural resources. The Rainbow
10 Basin/Owl Canyon ACEC, 27 mi (44.5 km) to the northwest, includes prehistoric, geological and
11 paleontological resources, and the Cronese Basin, 20 mi, (33 km) to the north, includes both
12 cultural and wildlife resources.

13 14 15 ***National Register of Historic Places***

16
17 There are no historic properties listed in the NRHP within the SEZ or within 5 mi (8 km)
18 of the SEZ. However, as stated above, both U.S. 66 and the SCE transmission line are NRHP
19 eligible, as are the four archaeological sites associated with Troy Dry Lake and the rock shelter.

20 21 22 **9.3.17.2 Impacts**

23
24 Direct impacts on significant cultural resources could occur in the proposed Pisgah
25 SEZ; however, as stated in Section 9.3.17.1, further investigation is needed in a number of areas.
26 A cultural resource survey of the entire area of potential effect (APE) of a proposed project
27 would first need to be conducted to identify archaeological sites, historic structures and features,
28 and traditional cultural properties, and an evaluation would need to follow to determine whether
29 any are eligible for listing in the NRHP. Numerous sites, both prehistoric and historic, have been
30 identified within the SEZ. Possible impacts from solar energy development on cultural resources
31 that are encountered within the SEZ or along related ROWs, as well as general mitigation
32 measures, are described in more detail in Section 5.15.

33
34 Programmatic design features to reduce water runoff and sedimentation would reduce the
35 likelihood of indirect impacts resulting from erosion outside of the SEZ boundary on cultural
36 resources (including along ROWs).

37
38 No new access roads or transmission lines have been assessed for the proposed Pisgah
39 SEZ, assuming existing corridors would be used; impacts on cultural resources related to the
40 creation of new corridors would be evaluated at the project-specific level if new road or
41 transmission construction or line upgrades are to occur.

42
43 Because of the interconnectedness of the landscape in Native American cosmology, a
44 change in one part affects the whole; thus damage to one part of an important cultural landscape
45 would affect all of it. The proposed Pisgah SEZ is close to or within the important Mohave Trail
46 travel corridor. It also includes archaeological evidence of repeated if intermittent use. To date,

1 no culturally important geophysical features have been identified in the area surrounding Pisgah;
2 however, it is possible that features will be identified during continued consultation with the
3 Tribes. Native Americans have expressed concern over the visual impacts of development on
4 segments of trails and features that have religious importance (Halmo 2003). Development that is
5 visible from the trails may be considered intrusive. The Pisgah SEZ is not pristine wilderness; it
6 is crossed by a major interstate highway, a railroad, pipelines, transmission lines, and other
7 roads. However, the construction of an extensive solar energy facility would very likely have
8 more visual impact on the landscape than already exists.

9
10 Native Americans have also expressed concern over other impacts likely to accompany
11 development (Halmo 2003). The presence of an industrial facility and the associated increase in
12 traffic and workers are likely to have a negative impact on the qualities that render a site sacred.
13 An increase in the number of people in the area would increase the potential for damage to
14 panels of rock art and the disturbance of burials and archaeological sites. While the development
15 of the Pisgah SEZ would necessarily increase the number of people coming to and working in
16 the SEZ, this impact should be greatest during the construction and decommissioning phases of a
17 facility. The operation of a solar facility would require fewer personnel (see Section 9.3.19.2.2).

18 19 20 **9.3.17.3 SEZ-Specific Design Features and Design Feature Effectiveness**

21
22 Programmatic design features to mitigate adverse effects on significant cultural
23 resources, such as avoidance of significant sites and features and cultural awareness training for
24 the workforce, are provided in Appendix A, Section A.2.2.

25
26 SEZ-specific design features would be determined in consultation with the California
27 SHPO and affected Tribes. Consultation efforts should include discussions on significant
28 archaeological sites and traditional cultural properties and on sacred sites and trails with views
29 of the proposed SEZ. SEZ-specific design features could include the following:

- 30
31 • Significant historic and prehistoric sites in the vicinity of Troy Lake should be
32 avoided.
- 33
34 • Areas of significant prehistoric remains within the SEZ that are identified
35 through the Calico Solar Power Project (to date an area including a 400-ft
36 [122-m] buffer and in some instances fencing [BLM and CA SHPO 2010])
37 should be avoided.
- 38
39

1 **9.3.18 Native American Concerns**
 2

3 Native Americans share many environmental and socioeconomic concerns with other
 4 ethnic groups. This section focuses on concerns that are specific to Native Americans and to
 5 which Native Americans bring a distinct perspective. For a discussion of issues of possible
 6 Native American concern shared with the population as a whole, several sections in this PEIS
 7 should be consulted. General topics of concern are addressed in Section 4.16. Specifically for
 8 the proposed Pisgah SEZ, Section 9.3.17 discusses archaeological sites, structures, landscapes,
 9 trails, and traditional cultural properties; Section 9.3.8 discusses mineral resources;
 10 Section 9.3.9.1.3 discusses water rights and water use; Section 9.3.10 discusses plant species;
 11 Section 9.3.11 discusses wildlife species, including wildlife migration patterns; Section 9.3.13
 12 discusses air quality; Section 9.3.14 discusses visual resources; and Sections 9.3.19 and 9.3.20
 13 discuss socioeconomics and environmental justice, respectively. Issues of human health and
 14 safety are discussed in Section 5.21.
 15

16 The California Native American Heritage Commission (NAHC) has been consulted to
 17 determine which Tribes have traditional associations with the California SEZs. All federally
 18 recognized Tribes with traditional ties to the Pisgah SEZ have been contacted and given the
 19 opportunity to express their concerns regarding solar energy development. Table 9.3.18-1 lists
 20 the Tribes contacted with traditional ties to the SEZs in southeastern California. Appendix K
 21
 22

TABLE 9.3.18-1 Federally Recognized Tribes with Traditional Ties to the Southeastern California SEZs

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Cabazon Band of Cahuilla Mission Indians	Indio	California
Cahuilla Band of Mission Indians	Anza	California
Campo Kumeyaay Nation	Campo	California
Chemehuevi Indian Tribe	Havasu Lake	California
Cocopah Indian Tribe	Somerton	Arizona
Colorado River Indian Tribes	Parker	Arizona
Ewiiapaayp Band of Kumeyaay Indians	Alpine	California
Fort Mojave Indian Tribe	Needles	California
La Posta Band of Kumeyaay Indians	Boulevard	California
Los Coyotes Band of Cahuilla & Cupeno Indians	Warm Springs	California
Manzanita Band of Kumeyaay Indians	Boulevard	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
Salt River Pima-Maricopa Indian Community	Scottsdale	Arizona
San Manuel Band of Mission Indians	Patton	California
Soboba Band of Luiseño Indians	San Jacinto	California
Sycuan Band of the Kumeyaay Nation	El Cajon	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twenty-Nine Palms Band of Mission Indians	Coachella	California
Viejas Band of Kumeyaay Indians	Alpine	California

1 lists all federally recognized Tribes contacted for this PEIS. The concerns Native Americans
2 have expressed about energy development projects are summarized in the next section. Their
3 comments provide important insights into their concerns over energy development in the area.
4

6 **9.3.18.1 Affected Environment**

7
8 As discussed in Section 9.3.17.1.2, the territorial boundaries of the Tribes that inhabited
9 the Mojave and Colorado Deserts appear to have been fluid over time. At times they overlapped,
10 and where resources were abundant they were shared among the Tribes. The Pisgah SEZ
11 includes the dry Troy Lake and an extensive lava flow. The eastern end of the SEZ is located 6.2
12 mi (10 km) southeast of the Mojave River, which until recently maintained an intermittent
13 surface flow. A major traditional Native American travel corridor, the Mohave Trail, followed
14 the river. Extensive artifact scatters along the eastern shore of Troy Lake and artifacts associated
15 with a rock shelter in the lava flow about 1 mi (1.6 km) west of the SEZ indicate that the area
16 was repeatedly, but intermittently, used by Native Americans. While ethnographic data for the
17 area are scant, the SEZ appears to lie within the traditional use area of the Vanyume branch of
18 the Serrano people (Knack 1980). The Vanyume were encountered along the Mojave River by
19 the earliest Spanish explorers in the area (Kroeber 1925). However, as a major travel corridor it
20 is likely that the area was regularly traversed by neighboring peoples, including the Mohave, the
21 Chemehuevi, and the Kawaiisu. In the 1950s, the Indian Claims Commission found territorial
22 boundaries in the area too difficult to differentiate and judged the area to be the common territory
23 of the “Indians of California;” it is so shown on maps of judicially established Native American
24 land claims (Royster 2008). The Indians of California category was created by Congress to
25 accommodate the claims of California Native Americans who had lost their identity as distinct
26 tribes, bands, or villages due to the arrival and policies of Euro-Americans (Indian Claims
27 Commission 1958).
28

30 **9.3.18.1.1 Territorial Boundaries**

33 **Vanyume—Serrano**

34
35 The Pisgah SEZ lies just north of the area claimed for the Serrano before the Indian
36 Claims Commission in the 1950s. The northern boundary of their claim ran from the Cajon Pass
37 to Ludlow, California, in an irregular line (CSRI 2002). Following Kroeber (1925), most
38 researchers have placed the linguistically related Vanyume bands in the area north of the Serrano
39 (Bean and Smith 1978). The Vanyume were never a large group and had disappeared by the end
40 of the nineteenth century, by which time any remnants of the Tribe had probably been absorbed
41 with Serrano into the remaining “Mission Indian” communities.
42

44 **Mohave**

45
46 The territory claimed by the Mohave before the Indian Claims Commission extends from
47 the Colorado River to the San Gabriel Mountains, and includes all of the Mojave Desert and the

1 Mojave River (CSRI 2002), thus including the SEZ. While the commission granted exclusive
2 claim only to those portions located along Colorado River, the Mohave, known as travelers and
3 traders, made use of the Mohave Trail along the Mojave River and very likely passed through the
4 SEZ. Mohave descendants occupy the Fort Mojave Indian Reservation near Needles, California,
5 and may be found on the reservation of the Colorado River Indian Tribes.
6
7

8 **Chemehuevi**

9

10 The Chemehuevi were eastern neighbors of the Vanyume, with whom they were on
11 friendly terms. Their territorial claims extend as far west as the Bristol Mountains (CSRI 2002).
12 As travelers and friends of the Vanyume, it is likely that they too were familiar with the Mohave
13 Trail and the surrounding mountains and valleys, including the Pisgah SEZ. Chemehuevi
14 descendants occupy the Chemehuevi Reservation and share the Colorado River Indian Tribes
15 Reservation with the Mohave and other Tribes.
16
17

18 **Kawaiisu**

19

20 The Kawaiisu were kin-based bands who spoke a Southern Numic language and
21 inhabited the southern slopes of the Sierra Nevada, with access to both San Joaquin Valley and
22 Mojave Desert resources. Regarded as predominantly peaceful, they are thought to have ranged
23 seasonally as far south as the Mojave River. Kawaiisu culture appears to have disappeared in the
24 1960s. Kawaiisu descendants are few and scattered across southern California (Goss 1966;
25 Zigmund 1986).
26
27

28 **9.3.18.1.2 Plant Resources**

29

30 The plant resources utilized by Native Americans in the Mojave Desert tend to be
31 sparse and widely distributed, making those resources that do exist more valuable. The regions
32 surrounding the SEZ are too dry for unirrigated agriculture but support some of the many desert
33 plants used by the Tribes (Knack 1980).
34

35 The plant communities observed at the Pisgah SEZ are discussed in Section 9.3.10. There
36 are three major plant communities present on the SEZ: North American Warm Desert Playa,
37 North American Warm Desert Volcanic Rockland, and Sonora-Mojave Creosotebush-White
38 Bursage Desert Scrub. There are also smaller areas of North American Warm Desert Bedrock,
39 Cliff, and Outcrop; Sonora-Mojave Mixed Salt Desert Scrub; and North American Warm Desert
40 Active and Stabilized Dune plant communities (NatureServe 2008). The dominant plants across
41 most of the SEZ appear to be creosotebush and bursage, with saltbush in the lakebed.
42

43 Native American populations have traditionally made use of hundreds of native plants.
44 However, the plants that dominate the Mojave Desert, creosotebush, and bursage, are not edible.
45 Creosote was used as medicinal herb and bursage not at all (Knack 1980). Table 9.3.18.1-1 lists
46 plants often mentioned as important by Native Americans that were either observed at the Pisgah

TABLE 9.3.18.1-1 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Pisgah SEZ

Common Name	Scientific Name	Status
Food		
Beavertail Prickly Pear Cactus	<i>Opuntia basilaris</i>	Possible
Boxthorn	<i>Lycium</i> spp.	Possible
Buckwheat	<i>Eriogonum</i> spp.	Possible
Jumping Cholla	<i>Opuntia bigelovii</i>	Possible
Mesquite	<i>Prosopis</i> spp.	Possible
Rice Grass	<i>Orizopsis</i> spp.	Possible
Saltbush	<i>Atriplex</i> spp.	Observed
Medicine		
Creosotebush	<i>Larrea tridentata</i>	Observed
Mormon Tea	<i>Ephedra nevadensis</i>	Possible
Unspecified		
Brittlebush	<i>Encolia farinosa</i> sp.	Observed
Ocotillo	<i>Fouquieria splendens</i>	Possible

Sources: Field visit; Lightfoot and Parrish (2009); NatureServe (2008).

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SEZ or are possible members of the cover-type plant communities identified at the SEZ. In the table, plants are grouped by use category, but an individual plant is not necessarily confined to one category. The plants listed are the dominant species; however, other plants important to Native Americans could occur in the SEZ, depending on local conditions and the season.

Of the food plants, only saltbush was observed at the SEZ. Mesquite, among the most important food plants in the desert, could possibly exist on the stabilized dunes, but the SEZ is not prime mesquite habitat. Other possible food plants for these communities include beavertail cactus, buckwheat, boxthorn, and jumping cholla. Saltbush, rice grass, and buckwheat seeds can be harvested, processed, and eaten; beavertail cactus produces a prickly pear fruit; and the new growth of jumping cholla can be boiled and eaten (Knack 1980; Lightfoot and Parish 2009).

The proposed Pisgah SEZ includes other plants useful to Native Americans. The leaves of the dominant creosotebush are widely made into tea for medicinal purposes, as is a tea made from *Ephedra* spp., or Mormon tea (Lightfoot and Parish 2009). While some of the plant species present at the SEZ were used traditionally by Native Americans, they do not appear to be especially plentiful. Food sources in particular appear to be scant. It is likely that better sources of these plants existed elsewhere. When the Mojave River was flowing, other resources would have been available closer to its bed.

1 **9.3.18.1.3 Other Resources**

2
3 There is some potential for food species in or near the Pisgah SEZ, particularly when
4 water is available in the Mojave River. The largest of these is the bighorn sheep that ranged
5 through the surrounding mountains. Smaller game include black-tailed jackrabbits, desert
6 cottontails, kangaroo rats, and desert wood rats. Gambel’s quail and mourning doves, both
7 snared by Native Americans, are also possible in this habitat (Knack 1980; Lightfoot and
8 Parrish 2009). See Section 9.3.11 for a more detailed discussion of the wildlife present or
9 likely in the SEZ. Table 9.3.18.1-2 provides a representative list of animals important to
10 Native Americans likely to occur within the proposed Pisgah SEZ.

11
12 As long-time desert dwellers, Native Americans have a great appreciation for the
13 importance of water in an arid environment. They have expressed concern over the use and
14 availability of water for solar energy installations (Halmo 2003; Jackson 2009). One of the main
15 concerns regarding past industrial developments planned for the region was the contamination
16 of ground water (CSRI 1987).

17
18
TABLE 9.3.18.1-2 Animal Species used by Native Americans whose Range Includes the Proposed Pisgah SEZ

Common Name	Scientific Name	Status
Mammals		
Bats	Various species	All year
Badger	<i>Taxidea taxus</i>	All year
Bighorn sheep	<i>Ovis Canadensis</i>	All year
Black-tailed jack rabbit	<i>Lepus californicus.</i>	All year
Bobcat	<i>Lynx rufus</i>	All year
Coyote	<i>Canis latrans</i>	All year
Desert cottontail	<i>Silvilagus audubonii</i>	All year
Squirrels	<i>Spermophilus</i> sp. & <i>Ammospermophilus</i> sp.	All year
Woodrats	<i>Neotoma</i> spp.	All year
Birds		
Gambel’s quail	<i>Callipepla gambelii</i>	All year
Greater roadrunner	<i>Geococcyx californiensis</i>	All year
Mourning dove	<i>Zenaida macroura</i>	All year
Turkey vulture	<i>Cathartes aura</i>	Sommer
Reptiles		
Desert tortoise	<i>Gopherus Agassizii</i>	All year
Rattlesnakes	<i>Crotalus</i> spp.	All year

Sources: Lightfoot and Parrish (2009); Fowler (1986); Zigmund (1986).

1 In addition, Native Americans have expressed concern over ecological segmentation, that
2 is, development that fragments animal habitat and does not provide corridors for movement.
3 They would prefer that solar energy development take place on land that has already been
4 disturbed, such as abandoned farmland, rather than on undisturbed ground (Jackson 2009).
5
6

7 **9.3.18.2 Impacts**

8

9 To date, no comments have been received from the Tribes specifically referencing the
10 proposed Pisgah SEZ. However, general concerns regarding solar energy development in the
11 deserts of southeastern California have been expressed. In a response letter, the Quechan Indian
12 Tribe of Fort Yuma stresses the importance of evaluating impacts of development at a landscape
13 scale (Jackson 2009).
14

15 The impacts that would be expected from solar energy development within the Pisgah
16 SEZ on resources important to Native Americans fall into two major categories: impacts on the
17 landscape and impacts on discrete localized resources.
18

19 Landscape-scale impacts are those caused by the presence of an industrial facility within
20 a sacred or culturally important landscape that includes sacred geophysical features tied together
21 by a network of trails. Impacts may be visual—the intrusion of an industrial feature in sacred
22 space; or audible—noise from the construction, operation, or decommissioning of a facility
23 detracting from the culturally important character of the site. As consultation with the Tribes
24 continues and project-specific analyses are undertaken, it is possible that Native Americans will
25 express concerns over potential visual, noise and other effects of solar energy development
26 within the SEZ on a culturally important landscape. To date, no features of this type have been
27 identified for the Pisgah SEZ. The Pisgah SEZ is already the site of modern development. A
28 freeway (I-40), a railroad, energy pipelines, transmission lines, a substation, and other roads all
29 cross the SEZ. The area is not pristine and may be considered already disturbed by the Tribes.
30

31 Localized effects are possible both within the SEZ and in adjacent areas. Within the SEZ
32 these effects would include destroying or degrading important plant resources, destroying the
33 habitat of and impeding the movement of culturally important animal species, and destroying
34 archaeological sites and burials. Any ground-disturbing activity associated with the development
35 within the SEZ has the potential for destruction of localized resources. Tribes consulted as part
36 of environmental and cultural reviews for the planned Calico Solar Power Project, which lies
37 partly within the proposed SEZ, found that significant prehistoric sites would be adversely
38 affected by development of the solar facility. The design of the Calico facility was altered to
39 avoid these resources (BLM and CA SHPO 2010). However, since utility-scale solar energy
40 facilities cover large tracts of ground, it is unlikely that avoidance of all resources would be
41 possible, even taking into account the implementation of programmatic design features.
42 Programmatic design features (see Appendix A, Section A.2.2) assume that the necessary
43 cultural surveys, site evaluations, and Tribal consultations will occur.
44

45 Some plants traditionally used by Native Americans grow within the proposed SEZ and
46 would unavoidably be disturbed by the construction of a utility-scale solar power facility.

1 However, as discussed in Section 9.3.10, impacts on most plant communities are expected to be
 2 small in most cases, since these communities are widespread in the area. The cultural importance
 3 of impacts on specific stands must be determined through consultation with the affected Tribe(s).
 4 As discussed in Section 9.3.11, the affected animal species and habitat are widely distributed in
 5 the area. Impacts on these species are likely to be small as long as programmatic design features
 6 are implemented.

7
 8 Implementation of programmatic design features, as discussed in Appendix A,
 9 Section A.2.2, should eliminate impacts on Tribes’ reserved water rights and the potential for
 10 groundwater contamination issues.

11
 12 Whether there are any issues relative to socioeconomics, environmental justice, or health
 13 and safety relative to Native American populations is yet to be determined.

14
 15
 16 **9.3.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

17
 18 Programmatic design features to mitigate impacts of potential concern to Native
 19 Americans, such as avoidance of sacred sites, water sources, and tribally important plant and
 20 animal species, are provided in Appendix A, Section A.2.2.

21
 22 The development of solar energy facilities in the state of California requires developers
 23 to follow CEC guidelines for interacting with Native Americans, in addition to federal
 24 requirements (CEC 2009a). Developers must obtain information from California’s NAHC on the
 25 presence of Native American sacred sites in the project vicinity and a list of Native Americans
 26 who want to be contacted about proposed projects in the region. Table 9.3.18.3-1 lists the Tribes
 27 recommended for contact by the NAHC.

28
 29 **TABLE 9.3.18.3-1 Federally Recognized Tribes Listed by the NAHC
 to Contact Regarding the Proposed Pisgah SEZ**

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Chemehuevi Indian Tribe	Havasu Lake	California
Colorado River Indian Tribes	Parker	Arizona
Cocopah Indian Tribe	Somerton	Arizona
Fort Mojave Indian Tribe	Needles	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
San Manuel Band of Mission Indians	Patton	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twentynine Palms Band of Mission Indians	Coachella	California

Source: (Singleton 2010).

1 The need for and nature of SEZ-specific design features regarding potential issues of
2 concern would be determined during government-to-government consultation with affected
3 Tribes. The Quechan Tribe has suggested that the clustering of large solar energy facilities be
4 avoided; that priority for development be given to lands that have already been disturbed by
5 agricultural or military use; and that the feasibility of placing solar collectors on existing
6 structures be considered, thus minimizing or avoiding the use of undisturbed land
7 (Jackson 2009).

8
9 Mitigation of impacts on archaeological sites and traditional cultural properties is
10 discussed in Section 9.3.17.3, in addition to the programmatic design features for historic
11 properties discussed in Appendix A, Section A.2.2.

1 **9.3.19 Socioeconomics**

2
3
4 **9.3.19.1 Affected Environment**

5
6 This section describes current socioeconomic conditions and local community services
7 within the ROI surrounding the proposed Pisgah SEZ. The ROI is a single-county area
8 comprising San Bernardino County in California. It encompasses the area in which workers
9 are expected to spend most of their salaries and in which a portion of site purchases and non-
10 payroll expenditures from the construction, operation, and decommissioning phases of the
11 proposed SEZ facility are expected to take place.

12
13
14 **9.3.19.1.1 ROI Employment**

15
16 In 2008, employment in the ROI stood at 806,434 (Table 9.3.19.1-1). Over the period
17 between 1999 and 2008, the annual average employment growth rate in San Bernardino County
18 was 1.2%, slightly higher than the average rate for California (0.9%).

19
20 In 2006, the service sector provided the highest percentage of employment in the
21 ROI at 45.4%, followed by wholesale and retail trade with 21.1% (Table 9.3.19.1-2). Smaller
22 employment shares were held by manufacturing (11.4%) and construction (7.7%).

23
24
25 **9.3.19.1.2 ROI Unemployment**

26
27 Over the period 1999 to 2008, the average unemployment rate in San Bernardino County
28 was 5.6%, slightly lower than the average rate for California (5.8%) (Table 9.3.19.1-3). The
29 unemployment rate for the first 10 months of 2009 (13.1%) contrasts with the rate for 2008 as a
30 whole (8.0%). The average rate for California as a whole (11.6%) was also higher during this
31 period than the corresponding average rate for 2008.

32
33 **TABLE 9.3.19.1-1 ROI Employment in the Proposed Pisgah SEZ**

Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
San Bernardino County	712,624	806,434	1.2
California	15,566,900	17,059,574	0.9

Sources: U.S Department of Labor (2009a,b).

TABLE 9.3.19.1-2 ROI Employment in the Proposed Pisgah SEZ by Sector, 2006^a

Industry	San Bernardino County	% of Total
Agriculture ^a	5,143	0.9
Mining	846	0.1
Construction	45,700	7.7
Manufacturing	67,306	11.4
Transportation and public utilities	49,871	8.5
Wholesale and retail trade	124,321	21.1
Finance, insurance, and real estate	28,760	4.9
Services	267,674	45.4
Other	46	0.0
Total	589,803	

^a Agricultural employment includes 2007 data for hired farmworkers.

Sources: U.S. Bureau of the Census (2009a); USDA (2009).

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TABLE 9.3.19.1-3 ROI Unemployment Rates for the Proposed Pisgah SEZ (%)

Location	1999–2008	2008	2009 ^a
San Bernardino County	5.6	8.0	13.1
California	5.8	7.2	11.6

^a Rates for 2009 are the average for January through November.

Sources: U.S. Department of Labor (2009a–c).

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9.3.19.1.3 ROI Urban Population

The population of San Bernardino County in 2008 was 80% urban, with the majority of urban areas located in the western portion of the county. The largest of these, San Bernardino, had an estimated 2008 population of 198,014; other large cities in the western portion of the county include Fontana (186,869), Ontario (170,947), Rancho Cucamonga (170,057), and Victorville (109,313) (Table 9.3.19.1-4). In addition, there are eight cities in the county with a 2008 population of between 50,000 and 99,999 persons. All these cities are part of the larger urban region that includes Los Angeles, Riverside, and San Bernardino, and most are more than 70 mi (113 km) from the site of the proposed SEZ.

TABLE 9.3.19.1-4 ROI Urban Population and Income for the Proposed Pisgah SEZ

City	Population			Median Household Income (\$ 2008)		
	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	1999	2006–2008	Average Annual Growth Rate, 1999 and 2006–2008 (%) ^a
San Bernardino	185,401	198,014	0.8	40,093	40,764	0.2
Fontana	128,929	186,869	4.7	58,945	62,914	0.7
Ontario	158,007	170,947	1.0	54,658	57,184	0.5
Rancho Cucamonga	127,743	170,057	3.6	78,450	79,455	0.1
Victorville	64,029	109,313	6.9	46,591	52,507	1.3
Rialto	91,873	98,376	0.9	53,115	50,000	-0.7
Hesperia	62,582	85,236	3.9	51,759	48,160	-0.8
Chino	67,168	82,435	2.6	71,330	72,373	0.2
Chino Hills	66,787	73,527	1.2	100,908	103,706	0.3
Upland	68,393	71,760	0.6	62,746	67,803	0.9
Redlands	63,591	69,394	1.1	62,000	65,539	0.6
Highland	44,605	50,870	1.7	53,084	60,963	1.5
Colton	47,662	50,333	0.7	46,063	46,411	0.1
Montclair	33,049	36,231	1.2	52,527	58,094	1.1
Twentynine Palms	28,854	33,354	1.8	40,142	43,447	0.9
Adelanto	18,130	28,330	5.7	40,678	41,875	0.3
Barstow	21,119	24,392	1.8	45,152	48,042	0.7
Loma Linda	18,681	21,515	1.8	49,188	55,091	1.3
Yucca Valley	16,865	20,290	2.3	39,166	45,298	1.6
Grand Terrace	11,626	12,160	0.6	69,074	NA	NA
Big Bear Lake	5,438	6,102	1.5	44,351	NA	NA
Needles	4,830	5,293	1.2	33,614	NA	NA

^a Data are averages for the period 2006–2008.

Source: U.S. Bureau of the Census (2009b-d).

Population growth rates among the larger cities in the county have varied over the period of 2000 to 2008. Victorville grew at an annual rate of 6.9% during this period, with higher than average growth also experienced in Fontana (4.7%), Hesperia (3.9%), and Rancho Cucamonga (3.6%). The cities of Rialto (0.9%), San Bernardino (0.8%), Colton (0.7%), and Upland (0.6%), all experienced growth rates of less than 1% between 2000 and 2008.

Elsewhere in the county, to the east of the San Bernardino area, within 40 mi (64 km) of the site of the proposed SEZ, there are a number of smaller cities. Twentynine Palms (2008 population of 33,354) and Yucca Valley (20,290) are located on the perimeter of the Twentynine Palms Marine Corps base and the Joshua Tree National Monument, and are primarily retail centers, while Barstow (24,392) is a rail and road transportation and retail center.

1 Population growth in these cities between 2000 and 2008 has been low, with annual
2 growth rates of 2.3% in Yucca Valley and 1.8% in Twentynine Palms. The smallest city in the
3 county, Needles (5,293), is located on the Colorado River, more than 100 mi (161 km) from the
4 proposed SEZ location, and also had a relatively low population growth rate (1.2%) between
5 2000 and 2008.

6 7 8 **9.3.19.1.4 ROI Urban Income**

9
10 Median household incomes varied considerably across cities in the county. A number
11 of cities in western San Bernardino County, Chino Hills (\$103,706), Rancho Cucamonga
12 (\$79,455), Chino (\$72,373), Upland (\$67,803) Redlands (\$65,539), and Fontana (\$62,914)
13 had median incomes in 2006 to 2008 that were higher than the average for the state (\$61,154)
14 (Table 9.3.19.1-4). A number of cities in the western portion of the county had relatively low
15 median household incomes, notably San Bernardino (\$40,764), Adelanto (\$41,875), Colton
16 (\$46,411), and Hesperia (\$48,160).

17
18 Among the cities in the western part of the county, median income growth rates between
19 1999 and 2006 to 2008 were highest in Highland (1.5%), Victorville (1.3%), Loma Linda
20 (1.3%), and Montclair (1.1%), with annual growth rates of less than 1% elsewhere. Hesperia
21 (-0.8%) and Rialto (-0.7%) had negative growth rates between 1999 and 2006 to 2008. The
22 average median household income growth rate for the state as a whole over this period was less
23 than 0.1%.

24
25 Elsewhere in the county, Barstow (\$48,042) and Yucca Valley (\$45,298) both had
26 median household incomes less than the state average between 2006 and 2008. Median income
27 in Needles in 2000 was \$33,614. Growth rates in these cities over the period 1999 and 2006 to
28 2008 varied from 1.6% in Yucca Valley to 0.9% in Twentynine Palms.

29 30 31 **9.3.19.1.5 ROI Population**

32
33 Table 9.3.19.1-5 presents recent and projected populations in San Bernardino County and
34 in the state as a whole. Population in the county stood at 2,004,914 in 2008, having grown at an
35 average annual rate of 2.0% since 2000. Population growth in the county was higher than that for
36 California (1.5%) over the same period. The county population is expected to increase to
37 2,619,128 by 2021 and to 2,694,641 by 2023.

38 39 40 **9.3.19.1.6 ROI Income**

41
42 Personal income in San Bernardino County stood at \$58.1 billion in 2007 and has grown
43 at an annual average rate of 2.8% over the period 1998 to 2007 (Table 9.3.19.1-6). Personal
44 income per capita in the county also rose over the same period at a rate of 0.8%, increasing from
45 \$26,797 to \$29,132. The personal income growth rate in the county was higher than the state rate
46 (2.5%), but per capita income growth rate was slightly lower in the county than in California as a
47 whole (1.1%).

TABLE 9.3.19.1-5 ROI Population for the Proposed Pisgah SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
San Bernardino County	1,721,942	2,004,914	2.0	2,619,128	2,694,641
California	33,871,648	38,129,628	1.5	44,646,420	45,667,413

Sources: U.S. Bureau of the Census (2009e-f); California Department of Finance (2010).

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TABLE 9.3.19.1-6 ROI Personal Income for the Proposed Pisgah SEZ

Location	1998	2007	Average Annual Growth Rate, 1998–2007 (%)
San Bernardino County			
Total income ^a	44.1	58.1	2.8
Per capita income	26,797	29,132	0.8
California			
Total income ^a	1,231.7	1,573.6	2.5
Per capita income	37,339	41,821	1.1

^a Unless indicated otherwise, values are reported in \$ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of Census (2009e-f).

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Median household income in San Bernardino County stood at \$56,575 (U.S. Bureau of the Census 2009d).

9.3.19.1.7 ROI Housing

In 2007, more than 679,169 housing units were located in San Bernardino County (Table 9.3.19.1-7). Owner-occupied units compose approximately 65% of the occupied units in the count, with rental housing making up 35% of the total. The vacancy rate in 2007 was 13.3%, and 5.3% of housing units were used for seasonal or recreational purposes. There were 90,111

TABLE 9.3.19.1-7 ROI Housing Characteristics for the Proposed Pisgah SEZ

Parameter	2000	2007 ^a
San Bernardino County		
Owner-occupied	340,933	381,697
Rental	187,661	207,361
Vacant units	72,775	90,111
Seasonal and recreational use	31,657	NA
Total units	601,369	679,169

^a 2007 data for number of owner-occupied, rental, and vacant units for Colorado counties are not available; data are based on 2007 total housing units and 2000 data on housing tenure.

^b NA = data not available.

Sources: U.S. Bureau of the Census (2009h-j).

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vacant housing units in the county in 2007, of which 31,721 are estimated to be rental units that would be available to construction workers. There were 31,657 units in seasonal, recreational, or occasional use at the time of the 2000 Census.

Housing stock in San Bernardino County grew at an annual rate of 1.8% over the period 2000 to 2007, with 77,800 new units added to the existing housing stock in the county (Table 9.3.19.1-7).

The median value of owner-occupied housing in San Bernardino County in 2008 was \$366,600 (U.S. Bureau of the Census 2009g).

9.3.19.1.8 ROI Local Government Organizations

The various local and county government organizations in San Bernardino County are listed in Table 9.3.19.1-8. In addition, there are three tribal governments located in the county; members of other tribal groups are located in the state, but their tribal governments are located in adjacent states.

9.3.19.1.9 ROI Community and Social Services

This section describes educational, health care, law enforcement, and firefighting resources in the ROI.

TABLE 9.3.19.1-8 ROI Local Government Organizations and Social Institutions Associated with the Proposed Pisgah SEZ

Governments

City

City of Adelanto	City of Montclair
Town of Apple Valley	City of Needles
City of Barstow	City of Ontario
City of Big Bear Lake	City of Rancho Cucamonga
City of Chino	City of Redlands
City of Chino Hills	City of Rialto
City of Colton	City of San Bernardino
City of Fontana	City of Twentynine Palms
City of Grand Terrace	City of Upland
City of Hesperia	City of Victorville
City of Highland	Town of Yucca Valley
City of Loma Linda	

County

San Bernardino County

Tribal

Chemehuevi Indian Tribe of the Chemehuevi Reservation, California
 San Manuel Band of Serrano Mission Indians of the San Manuel Reservation, California
 Twentynine Palms Band of Mission Indians of California

Sources: U.S. Bureau of the Census (2009b); U.S. Department of Interior (2010).

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Schools

In 2007, the single-county ROI had a total of 542 public and private elementary, middle, and high schools (NCES 2009). Table 9.3.19.1-9 provides summary statistics for enrollment and educational staffing and two indices of educational quality—student-teacher ratios and levels of service (number of teachers per 1,000 population). The student-teacher ratio in San Bernardino County was 24.3, while the level of service was 8.8.

TABLE 9.3.19.1-9 ROI School District Data for the Proposed Pisgah SEZ, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service ^a
San Bernardino County	427,603	17,568	24.3	8.8

^a Number of teachers per 1,000 population.

Source: NCES (2009).

1 **Health Care**

2
3 There were 4,176 physicians in San Bernardino County in 2007, and the number of
4 doctors per 1,000 population was 2.1 (Table 9.3.19.1-10).

5
6
7 **Public Safety**

8
9 Several state, county, and local police departments provide law enforcement in the ROI
10 (Table 9.3.19.1-11). San Bernardino County has 1,783 officers and would provide law
11 enforcement services to the SEZ. Currently, there are 1,293 professional firefighters in the
12 county (Table 9.3.19.1-11). Levels of service are 0.9 per 1,000 population for police protection
13 and 0.6 for fire services.
14
15

TABLE 9.3.19.1-10 Physicians in the Proposed Pisgah SEZ ROI, 2007

Location	Number of Primary Care Physicians	Level of Service ^a
San Bernardino County	4,176	2.1

^a Number of physicians per 1,000 population.

Source: AMA (2009).

TABLE 9.3.19.1-11 Public Safety Employment in the Proposed Pisgah SEZ ROI

Location	Number of Police Officers ^a	Level of Service ^b	Number of Firefighters ^c	Level of Service
San Bernardino County	1,783	0.9	1,293	0.6

^a 2007 data.

^b Number per 1,000 population.

^c 2008 data; number does not include volunteers.

Sources: U.S. Department of Justice (2008b); Fire Departments Network (2009).

1 **9.3.19.1.10 ROI Social Structure Change**

2
3 Community social structures and other forms of social organization within the ROI are
4 related to various factors, including historical development, major economic activities and
5 sources of employment, income levels, race and ethnicity, and forms of local political
6 organization. Although an analysis of the character of community social structures is beyond the
7 scope of the current programmatic analysis, project-level NEPA analyses would include a
8 description of ROI social structures, contributing factors, their uniqueness, and consequently, the
9 susceptibility of local communities to various forms of social disruption and social change.

10
11 Various energy development studies have suggested that once the annual growth in
12 population is between 5 and 15% in smaller rural communities, alcoholism, depression, suicide,
13 social conflict, divorce, and delinquency will increase, and levels of community satisfaction will
14 decrease (BLM 1980, 1983, 1996). Tables 9.3.19.1-12 and 9.3.19.1-13 present data for a number
15 of indicators of social change, including violent crime and property crime rates, alcoholism and
16 illicit drug use, and mental health and divorce, that might be used to indicate social change.

17
18 Violent crime in San Bernardino County in 2007 stood at 4.6 per 1,000 population
19 (Table 9.3.19.1-12), while the property-related crime rate was 29.6, producing an overall crime
20 rate of 34.2.

21
22 Other measures of social change—alcoholism, illicit drug use, and mental health—are
23 not available at the county level, and thus are presented for the SAMHSA region in which the
24 ROI is located (Table 9.3.19.1-13).

25
26 **TABLE 9.3.19.1-12 County and ROI Crime Rates in the Proposed Pisgah SEZ ROI^a**

	Violent Crime ^b		Property Crime ^c		All Crime	
	Offenses	Rate	Offenses	Rate	Offenses	Rate
San Bernardino County	9,657	4.6	61,713	29.6	71,370	34.2
California	185,173	7.8	1,080,747	45.6	1,265,920	53.4

^a Rates are the number of crimes per 1,000 population.

^b Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

^c Property crime includes burglary, larceny, theft, motor vehicle theft, and arson.

Sources: U.S. Department of Justice (2009a,b).

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TABLE 9.3.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Pisgah SEZ ROI^a

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health ^b	Divorce ^c
California Region 12 (includes San Bernardino County)	7.1	2.6	8.8	- ^d
California	8.1	3.1	8.5	4.3

^a Data for alcoholism and drug use represent % of the population over 12 years of age with dependence on or abuse of alcohol, illicit drugs. Data are averages for 2004 to 2006.

^b Data for mental health represent % of the population over 18 years of age suffering from serious psychological distress. Data are averages for 2002 to 2004.

^c Divorce rates are the number of divorces per 1,000 population. Data are for 1990.

^d A dash indicates data not available.

Sources: SAMHSA (2009); CDC (2009).

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2
3 **9.3.19.1.11 ROI Recreation**
4

5 Various areas in the vicinity of the proposed SEZ are used for recreational purposes, with
6 natural, ecological, and cultural resources in the ROI attracting visitors for a range of activities,
7 including hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback
8 riding, mountain climbing, and sightseeing. These areas are discussed in Section 9.3.5.
9

10 Because the number of visitors using state and federal lands for recreational activities is
11 not available from the various administering agencies, the value of recreational resources in these
12 areas, based solely on the number of recorded visitors, is likely to be an underestimation. In
13 addition to visitation rates, the economic valuation of certain natural resources can also be
14 assessed in terms of the potential recreational destination for current and future users, that is,
15 their nonmarket value (see Section 5.17.1.1.1).
16

17 Another method is to estimate the economic impact of the various recreational activities
18 supported by natural resources on public land in the vicinity of the proposed solar development,
19 by identifying sectors in the economy in which expenditures on recreational activities occur. Not
20 all activities in these sectors are directly related to recreation on state and federal lands, with
21 some activity occurring on private land (e.g., dude ranches, golf courses, bowling alleys, and
22 movie theaters). Expenditures associated with recreational activities form an important part of
23 the economy of the ROI. In 2007, 66,139 people were employed in San Bernardino County in
24 the various sectors identified as recreation, constituting 8.0% of total ROI employment
25 (Table 9.3.19.1-14). Recreation spending also produced almost \$1,503 million in income in the
26 ROI in 2007. The primary sources of recreation-related employment were eating and drinking
27 places.
28

TABLE 9.3.19.1-14 ROI Recreation Sector Activity for the Proposed Pisgah SEZ, 2007

Activity	Employment ^b	Income (\$ million)
Amusement and recreation services	1,934	48.6
Automotive rental	1,554	85.4
Eating and drinking places	50,763	941.6
Hotels and lodging places	2,769	75.5
Museums and historic sites	134	5.5
Recreational vehicle parks and campsites	787	22.8
Scenic tours	4,469	246.5
Sporting goods retailers	3,729	77.4
Total ROI	66,139	1,503

Source: MIG, Inc. (2009).

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9.3.19.2 Impacts

The following analysis begins with a description of the common impacts of solar development, including common impacts on recreation and on social change. These impacts would occur regardless of the solar technology developed in the SEZ. The impacts of developments employing various solar energy technologies are analyzed in detail in subsequent sections.

9.3.19.2.1 Common Impacts

Construction and operation of a solar energy facility at the proposed Pisgah SEZ would produce direct and indirect economic impacts. Direct impacts would occur as a result of expenditures on wages and salaries, procurement of goods and services required for project construction and operation, and the collection of state sales and income taxes. Indirect impacts would occur as project wages and salaries, procurement expenditures, and tax revenues subsequently circulate through the economy of each state, thereby creating additional employment, income, and tax revenues. Facility construction and operation would also require in-migration of workers and their families into the ROI surrounding the site, which would affect population, rental housing, health service employment, and public safety employment. Socioeconomic impacts common to all utility-scale solar energy developments are discussed in detail in Section 5.17. These impacts will be minimized through the implementation of programmatic design features described in Appendix A, Section A.2.2.

1 **Recreation Impacts**
2

3 Estimating the impact of solar facilities on recreation is problematic because it is not
4 clear how solar development in the SEZ would affect recreational visitation and the value of
5 recreational resources for potential or future visits (See Section 5.17.1.2.3). While it is clear that
6 some land in the ROI would no longer be accessible for recreation, the majority of popular
7 recreational locations would be precluded from solar development. It is also possible that solar
8 facilities in the ROI would be visible from popular recreation locations, and that construction
9 workers residing temporarily in the ROI would occupy accommodation otherwise used for
10 recreational visits, thus reducing visitation and consequently affecting the economy of the ROI.
11

12
13 **Social Change**
14

15 Although an extensive literature in sociology documents the most significant components
16 of social change in energy boomtowns, the nature and magnitude of the social impact of energy
17 developments in small rural communities are still unclear (see Section 5.17.1.1.4). While some
18 degree of social disruption is likely to accompany large-scale in-migration during the boom
19 phase, there is insufficient evidence to predict the extent to which specific communities are
20 likely to be affected, which population groups within each community are likely to be most
21 affected, and the extent to which social disruption is likely to persist beyond the end of the boom
22 period (Smith et al. 2001). Accordingly, because of the lack of adequate social baseline data, it
23 has been suggested that social disruption is likely to occur once an arbitrary population growth
24 rate associated with solar energy development projects has been reached, with an annual rate of
25 between 5 and 10% growth in population assumed to result in a breakdown in social structures,
26 with a consequent increase in alcoholism, depression, suicide, social conflict, divorce,
27 delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983, 1996).
28

29 In overall terms, the in-migration of workers and their families into the ROI would
30 represent an increase of less than 0.1% in county population during construction of the trough
31 technology, with smaller increases for the power tower, dish engine, and PV technologies, and
32 during the operation of each technology. While it is possible that some construction and
33 operations workers will choose to locate in communities closer to the SEZ, the insufficient range
34 of housing choices to suit all solar occupations and lack of available housing in smaller rural
35 communities in the ROI to accommodate all in-migrating workers and families, make it likely
36 that many workers will commute to the SEZ from larger communities elsewhere in the ROI,
37 thereby reducing the potential impact of solar development on social change. Regardless of the
38 pace of population growth associated with the commercial development of solar resources, and
39 the likely residential location of in-migrating workers and families in communities some distance
40 from the SEZ itself, the number of new residents from outside the ROI is likely to lead to some
41 demographic and social change in small rural communities in the ROI. Communities hosting
42 solar development are likely to be required to adapt to a different quality of life, with a transition
43 away from a more traditional lifestyle involving ranching and taking place in small, isolated,
44 close-knit, homogenous communities with a strong orientation toward personal and family
45 relationships, toward a more urban lifestyle, with increasing cultural and ethnic diversity, and
46 increasing dependence on formal social relationships within the community.

1 **9.3.19.2.2 Technology-Specific Impacts**
2

3 The economic impacts of solar energy development in the proposed SEZ were measured
4 in terms of employment, income, state tax revenues (sales and income), population in-migration,
5 housing, and community service employment (education, health, and public safety). More
6 information on the data and methods used in the analysis are provided in Appendix M.
7

8 The assessment of the impact of the construction and operation of each technology was
9 based on SEZ acreage, assuming 80% of the area could be developed. To capture a range of
10 possible impacts, solar facility size was estimated on the basis of the land requirements of
11 various solar technologies, assuming that 9 acres/MW (0.04 km²/MW) would be required for
12 power tower, dish engine, and PV technologies, and 5 acres/MW (0.02 km²/MW) for solar
13 trough technologies. Impacts of multiple facilities employing a given technology at each SEZ
14 were assumed to be the same as impacts for a single facility with the same total capacity.
15 Construction impacts were assessed for a representative peak year of construction, assumed to be
16 2021 for each technology. Construction impacts assumed that a maximum of two projects could
17 be constructed within a given year, with a corresponding maximum land disturbance of up to
18 6,000 acres (12 km²). For operations impacts, a representative first year of operations was
19 assumed to be 2023 for each technology. The years of construction and operations were selected
20 as representative of the entire 20-year study period because they are the approximate midpoint;
21 construction and operations could begin earlier.
22

23
24 **Solar Trough**
25

26
27 **Construction.** Total construction employment impacts in the ROI (including direct
28 and indirect impacts) from the use of solar trough technologies would be up to 10,667 jobs
29 (Table 9.3.19.2-2). Construction activities would constitute 1.1% of total ROI employment.
30 A solar development would also produce \$870.6 million in income. Direct sales taxes would
31 be \$27.5 million, with direct income taxes of \$12.6 million.
32

33 Given the scale of construction activities and the likelihood of local worker availability
34 in the required occupational categories, construction of a solar facility would mean that some
35 in-migration of workers and their families from outside the ROI would be required, with
36 1,486 persons in-migrating into the ROI. Although in-migration may potentially affect local
37 housing markets, the relatively small number of in-migrants and the availability of temporary
38 accommodation (hotels, motels, and mobile home parks) would mean that the impact of solar
39 facility construction on the number of vacant rental housing units is not expected to be large,
40 with 743 rental units expected to be occupied in the ROI. This occupancy rate would represent
41 1.8% of the vacant rental units expected to be available in the ROI.
42

43 In addition to the potential impact on housing markets, in-migration would also affect
44 community service employment (education, health, and public safety). An increase in such
45 employment would be required to meet existing levels of service in the ROI. Accordingly,
46 14 new teachers, 3 physicians, and 2 public safety employees (career firefighters and uniformed

1 police officers) would be required in the ROI. These increases would represent 0.1% of total
2 ROI employment expected in these occupations.

3
4
5 **Operations.** Total operations employment impacts in the ROI (including direct and
6 indirect impacts) of a build-out using solar trough technologies would be 1,385 jobs
7 (Table 9.3.19.2-2). Such a solar facility would also produce \$60.6 million in income. Direct
8 sales taxes would be \$0.4 million, with direct income taxes of \$1.3 million. Based on fees
9 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010a), acreage rental
10 payments would be \$3.0 million, and solar generating capacity payments would total at least
11 \$25.2 million.

12
13 Given the likelihood of local worker availability in the required occupational categories,
14 operation of a solar facility would mean that some in-migration of workers and their families
15 from outside the ROI would be required, with 106 persons in-migrating into the ROI. Although
16 in-migration may potentially affect local housing markets, the relatively small number of
17 in-migrants and the availability of temporary accommodation (hotels, motels, and mobile home
18 parks) would mean that the impact of solar facility operation on the number of vacant owner-
19 occupied housing units is not expected to be large, with 96 owner-occupied units expected to be
20 occupied in the ROI.

21
22 In addition to the potential impact on housing markets, in-migration would affect
23 community service (health, education, and public safety) employment. An increase in such
24 employment would be required to meet existing levels of service in the provision of these
25 services in the ROI. Accordingly, one new teacher would be required in the ROI.

26 27 28 **Power Tower**

29
30
31 **Construction.** Total construction employment impacts in the ROI (including direct
32 and indirect impacts) from the use of power tower technologies would be up to 4,249 jobs
33 (Table 9.3.19.2-3). Construction activities would constitute 0.4% of total ROI employment.
34 Such a solar facility would also produce \$346.7 million in income. Direct sales taxes would
35 be \$10.9 million, with direct income taxes of \$5.0 million.

36
37 Given the scale of construction activities and the likelihood of local worker availability
38 in the required occupational categories, construction of a solar facility would mean that some
39 in-migration of workers and their families from outside the ROI would be required, with
40 592 persons in-migrating into the ROI. Although in-migration may potentially affect local
41 housing markets, the relatively small number of in-migrants and the availability of temporary
42 accommodation (hotels, motels, and mobile home parks) would mean that the impact of solar
43 facility construction on the number of vacant rental housing units is not expected to be large,
44 with 296 rental units expected to be occupied in the ROI. This occupancy rate would represent
45 0.7% of the vacant rental units expected to be available in the ROI.

TABLE 9.3.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Pisgah SEZ with Trough Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	3,488	835
Total	10,667	1,385
Income ^b		
Total	870.6	60.6
Direct state taxes ^b		
Sales	27.5	0.4
Income	12.6	1.3
BLM payments (\$ million 2008)		
Rental	NA ^c	3.0
Capacity ^d	NA	25.2
In-migrants (no.)	1,486	106
Vacant housing ^e (no.)	743	96
Local community service employment		
Teachers (no.)	14	1
Physicians (no.)	3	0
Public safety (no.)	2	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,200 MW (corresponding to 6,000 acres [24 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 3,832 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

^d The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010a), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

^e Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

TABLE 9.3.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Pisgah SEZ with Power Tower Facilities^a

Parameter	Construction	Operations
Employment (no.)		
Direct	1,389	431
Total	4,249	601
Income ^b		
Total	346.7	24.6
Direct state taxes ^b		
Sales	10.9	<0.1
Income	5.0	0.7
BLM payments (\$ million 2008)		
Rental	NA ^c	3.0
Capacity ^d	NA	14.0
In-migrants (no.)	592	55
Vacant housing ^e (no.)	296	49
Local community service employment		
Teachers (no.)	6	1
Physicians (no.)	1	0
Public safety (no.)	1	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 667 MW (corresponding to 6,000 acres [24 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 2,129 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

^d The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010a), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

^e Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

1
2

1 In addition to the potential impact on housing markets, in-migration would affect
2 community service (education, health, and public safety) employment. An increase in such
3 employment would be required to meet existing levels of service in the ROI. Accordingly,
4 six new teachers, one physician, and one public safety employee would be required in the ROI.
5 These increases would represent less than 0.1% of total ROI employment expected in these
6 occupations.

7
8
9 **Operations.** Total operations employment impacts in the ROI (including direct and
10 indirect impacts) of a build-out using power tower technologies would be 601 jobs
11 (Table 9.3.19.2-3). Such a solar development would also produce \$24.6 million in income.
12 Direct sales taxes would be less than \$0.1 million, with direct income taxes of \$0.7 million.
13 Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010a),
14 acreage rental payments would be \$3.0 million, and solar generating capacity payments would
15 total at least \$14.0 million.

16
17 Given the likelihood of local worker availability in the required occupational categories,
18 operation of a solar facility would mean that some in-migration of workers and their families
19 from outside the ROI would be required, with 55 persons in-migrating into the ROI. Although
20 in-migration may potentially affect local housing markets, the relatively small number of
21 in-migrants and the availability of temporary accommodation (hotels, motels and mobile home
22 parks) would mean that the impact of solar facility operation on the number of vacant
23 owner-occupied housing units is not expected to be large, with 49 owner-occupied units expected
24 to be required in the ROI.

25
26 In addition to the potential impact on housing markets, in-migration would affect
27 community service (education, health, and public safety) employment. An increase in such
28 employment would be required to meet existing levels of service in the ROI. Accordingly,
29 one new teacher would be required in the ROI.

30 31 32 **Dish Engine**

33
34
35 **Construction.** Total construction employment impacts in the ROI (including direct and
36 indirect impacts) from the use of dish engine technologies would be up to 1,727 jobs
37 (Table 9.3.19.2-4). Construction activities would constitute 0.1% of total ROI employment.
38 Such a solar facility would also produce \$141.0 million in income. Direct sales taxes would be
39 \$4.5 million, with direct income taxes of \$2.0 million.

40
41 Given the scale of construction activities and the likelihood of local worker availability
42 in the required occupational categories, construction of a solar facility would mean that some
43 in-migration of workers and their families from outside the ROI would be required, with
44 241 persons in-migrating into the ROI. Although in-migration may potentially affect local
45 housing markets, the relatively small number of in-migrants and the availability of temporary
46 accommodation (hotels, motels, and mobile home parks) would mean that the impact of solar
47 facility construction on the number of vacant rental housing units is not expected to be large,

TABLE 9.3.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Pisgah SEZ with Dish Engine Facilities^a

Parameter	Construction	Operations
Employment (no.)		
Direct	565	419
Total	1,727	584
Income ^b		
Total	141.0	23.9
Direct state taxes ^b		
Sales	4.5	<0.1
Income	2.0	0.7
BLM payments (\$ million 2008)		
Rental	NA ^c	3.0
Capacity ^d	NA	14.0
In-migrants (no.)	241	53
Vacant housing ^e (no.)	120	48
Local community service employment		
Teachers (no.)	2	1
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 667 MW (corresponding to 6,000 acres [24 km²] of land disturbance) could be built. Operations impacts were based on total development of the site, producing a total output of 2,129 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

^d The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010a), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

^e Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

1
2

1 with 120 rental units expected to be occupied in the ROI. This occupancy rate would represent
2 0.3% of the vacant rental units expected to be available in the ROI.

3
4 In addition to the potential impact on housing markets, in-migration would affect
5 community service (education, health, and public safety) employment. An increase in such
6 employment would be required to meet existing levels of service in the ROI. Accordingly,
7 two new teachers would be required in the ROI. This increase would represent less than 0.1%
8 of total ROI employment expected in this occupation.

9
10
11 **Operations.** Total operations employment impacts in the ROI (including direct
12 and indirect impacts) of a build-out using dish engine technologies would be 584 jobs
13 (Table 9.3.19.2-4). Such a solar development would also produce \$23.9 million in income.
14 Direct sales taxes would be less than \$0.1 million, with direct income taxes of \$0.7 million.
15 Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010a),
16 acreage rental payments would be \$3.0 million, and solar generating capacity payments would
17 total at least \$14.0 million.

18
19 Given the likelihood of local worker availability in the required occupational categories,
20 operation of a dish engine solar facility would mean that some in-migration of workers and their
21 families from outside the ROI would be required, with 53 persons in-migrating into the ROI.
22 Although in-migration may potentially affect local housing markets, the relatively small number
23 of in-migrants and the availability of temporary accommodation (hotels, motels, and mobile
24 home parks) would mean that the impact of solar facility operation on the number of vacant
25 owner-occupied housing units is not expected to be large, with 48 owner-occupied units expected
26 to be required in the ROI.

27
28 In addition to the potential impact on housing markets, in-migration would affect
29 community service employment (education, health, and public safety). An increase in such
30 employment would be required to meet existing levels of service in the ROI. Accordingly,
31 one new teacher would be required in the ROI.

32 33 34 **Photovoltaic**

35
36
37 **Construction.** Total construction employment impacts in the ROI (including direct
38 and indirect impacts) using PV technologies would be up to 806 jobs (Table 9.3.19.2-5).
39 Construction activities would constitute 0.1 % of total ROI employment. Such a solar
40 development would also produce \$65.7 million in income. Direct sales taxes would be
41 \$2.1 million, with direct income taxes of \$1.0 million.

42
43 Given the scale of construction activities and the likelihood of local worker availability
44 in the required occupational categories, construction of a solar facility would mean that some
45 in-migration of workers and their families from outside the ROI would be required, with
46 112 persons in-migrating into the ROI. Although in-migration may potentially affect local
47 housing markets, the relatively small number of in-migrants and the availability of temporary

TABLE 9.3.19.2-5 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Pisgah SEZ with PV Facilities^a

Parameter	Construction	Operations
Employment (no.)		
Direct	263	42
Total	806	58
Income ^b		
Total	65.7	2.4
Direct state taxes ^b		
Sales	2.1	<0.1
Income	1.0	<0.1
BLM payments (\$ million 2008)		
Rental	NA ^c	3.0
Capacity ^d	NA	11.2
In-migrants (no.)	112	5
Vacant housing ^e (no.)	56	5
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 667 MW (corresponding to 6,000 acres [24 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 2,129 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

^d The BLM annual capacity payment was based on a fee of \$5,256 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010a), assuming full build-out of the site.

^e Construction activities would affect vacant rental housing; operations activities would affect owner-occupied housing.

1
2
3

1 accommodation (hotels, motels, and mobile home parks) would mean that the impact of solar
2 facility construction on the number of vacant rental housing units is not expected to be large,
3 with 56 rental units expected to be occupied in the ROI. This occupancy rate would represent
4 0.1% of the vacant rental units expected to be available in the ROI.
5

6 In addition to the potential impact on housing markets, in-migration would affect
7 community service (education, health, and public safety) employment. An increase in such
8 employment would be required to meet existing levels of service in the ROI. Accordingly,
9 1 new teacher would be required in the ROI. This increase would represent less than 0.1% of
10 total ROI employment expected in this occupation.
11

12
13 **Operations.** Total operations employment impacts in the ROI (including direct and
14 indirect impacts) of a build-out using PV technologies would be 58 jobs (Table 9.3.19.2-5). Such
15 a solar development would also produce \$2.4 million in income. Direct sales taxes would be less
16 than \$0.1 million, with direct income taxes of less than \$0.1 million. Based on fees established
17 by the BLM in its Solar Energy Interim Rental Policy (BLM 2010a), acreage rental payments
18 would be \$3.0 million, and solar generating capacity payments would total at least \$11.2 million.
19

20 Given the likelihood of local worker availability in the required occupational categories,
21 operation of a solar facility would mean that some in-migration of workers and their families
22 from outside the ROI would be required, with 5 persons in-migrating into the ROI. Although in-
23 migration may potentially affect local housing markets, the relatively small number of
24 in-migrants and the availability of temporary accommodation (hotels, motels, and mobile home
25 parks) would mean that the impact of solar facility operation on the number of vacant owner-
26 occupied housing units is not expected to be large, with 5 owner-occupied units expected to be
27 required in the ROI.
28

29 No new community service employment would be required to meet existing levels of
30 service in the ROI.
31

32 33 **9.3.19.3 SEZ-Specific Design Features and Design Feature Effectiveness** 34

35 No SEZ-specific design features addressing socioeconomic impacts have been identified
36 for the proposed Pisgah SEZ. Implementing the programmatic design features described in
37 Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would reduce the
38 potential for socioeconomic impacts during all project phases.
39

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1 **9.3.20 Environmental Justice**

2
3
4 **9.3.20.1 Affected Environment**

5
6 E.O. 12898, “Federal Actions to Address Environmental Justice in Minority Populations
7 and Low-Income Populations” (*Federal Register*, Vol. 59, page 7629, Feb. 11, 1994), formally
8 requires federal agencies to incorporate environmental justice as part of their missions.
9 Specifically, it directs them to address, as appropriate, any disproportionately high and adverse
10 human health or environmental effects of their actions, programs, or policies on minority and
11 low-income populations.

12
13 The analysis of the impacts of solar energy projects on environmental justice issues
14 follows guidelines described in the CEQ’s *Environmental Justice Guidance under the National*
15 *Environmental Policy Act* (CEQ 1997). The analysis method has three parts: (1) a description
16 of the geographic distribution of low-income and minority populations in the affected area is
17 undertaken; (2) an assessment is conducted to determine whether the impacts of construction
18 and operation would produce impacts that are high and adverse; and (3) if impacts are high and
19 adverse, a determination is made as to whether these impacts disproportionately affect minority
20 and low-income populations.

21
22 Construction and operation of solar energy projects in the proposed SEZ could affect
23 environmental justice if any adverse health and environmental impacts resulting from either
24 phase of development are significantly high, and if these impacts would disproportionately affect
25 minority and low-income populations. If the analysis determines that health and environmental
26 impacts are not significant, there can be no disproportionate impacts on minority and low-income
27 populations. In the event impacts are significant, disproportionality would be determined by
28 comparing the proximity of any high and adverse impacts with the location of low-income and
29 minority populations.

30
31 The analysis of environmental justice issues associated with the development of solar
32 facilities considered impacts within the SEZ and an associated 50-mi (80-km) radius around the
33 boundary of the SEZ. A description of the geographic distribution of minority and low-income
34 groups in the affected area was based on demographic data from the 2000 Census (U.S. Bureau
35 of the Census 2009k,1). The following definitions were used to define minority and low-income
36 population groups:

- 37
38 • **Minority.** Persons are included in the minority category if they identify
39 themselves as belonging to any of the following racial groups: (1) Hispanic,
40 (2) Black (not of Hispanic origin) or African American, (3) American Indian
41 or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander.

42
43 Beginning with the 2000 Census, where appropriate, the census form allows
44 individuals to designate multiple population group categories to reflect their
45 ethnic or racial origin. In addition, persons who classify themselves as being
46 of multiple racial origins may choose up to six racial groups as the basis of

1 their racial origins. The term minority includes all persons, including those
2 classifying themselves in multiple racial categories, except those who classify
3 themselves as not of Hispanic origin and as White or “Other Race”
4 (U.S. Bureau of the Census 2009k).

5
6 The CEQ guidance proposed that minority populations should be identified
7 where either (1) the minority population of the affected area exceeds 50%, or
8 (2) the minority population percentage of the affected area is meaningfully
9 greater than the minority population percentage in the general population or
10 other appropriate unit of geographic analysis.

11
12 The PEIS applies both criteria in using the Census Bureau data for census
13 block groups, wherein consideration is given to the minority population that is
14 both greater than 50% and 20 percentage points higher than in the state (the
15 reference geographic unit).

- 16
17 • **Low-Income.** Individuals who fall below the poverty line. The poverty line
18 takes into account family size and age of individuals in the family. In 1999,
19 for example, the poverty line for a family of five with three children below
20 the age of 18 was \$19,882. For any given family below the poverty line, all
21 family members are considered as being below the poverty line for the
22 purposes of analysis (U.S. Bureau of the Census 2009I).

23
24 The data in Table 9.3.20.1-1 show the minority and low-income composition of total
25 population located in the proposed SEZ based on 2000 Census data and CEQ Guidelines.
26 Individuals identifying themselves as Hispanic or Latino are included in the table as a separate
27 entry. However, because Hispanics can be of any race, this number also includes individuals
28 identifying themselves as being part of one or more of the population groups listed in the table.

29
30 A large number of minority and low-income individuals are located in the 50-mi (80-km)
31 area around the boundary of the SEZ. Within the 50-mi (80-km) radius, 37.8% of the population
32 is classified as minority, while 16.7% is classified as low-income. However, the number of
33 minority individuals does not exceed 50% of the total population in the area, and the number of
34 minority individuals does not exceed the state average by 20 percentage points or more, meaning
35 that there is no minority population in the SEZ area based on 2000 Census data and CEQ
36 guidelines. The number of low-income individuals does not exceed the state average by
37 20 percentage points or more, and does not exceed 50% of the total population in the area,
38 meaning that there are no low-income populations in the SEZ.

39
40 Figures 9.3.20.1-1 and 9.3.20.1-2 show the locations of the minority and low-income
41 population groups within the 50-mi (80-km) radius around the boundary of the SEZ.

42
43 Within the 50-mi (80-km) radius around the SEZ, more than 50% of the population is
44 classified as minority in block groups located in the City of Barstow and to the northwest of
45 the city, in the city of San Bernardino and vicinity, to the northeast of the SEZ, and to the
46 south of the SEZ associated with the Morongo Indian Reservation. Block groups with minority

TABLE 9.3.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Pisgah SEZ

Parameter	California
Total population	354,336
White, non-Hispanic	220,502
Hispanic or Latino	85,617
Non-Hispanic or Latino minorities	48,217
One race	37,623
Black or African American	25,136
American Indian or Alaskan Native	3,422
Asian	7,276
Native Hawaiian or Other Pacific Islander	1,116
Some other race	673
Two or more races	10,594
Total minority	133,834
Low-income	56,533
Percent minority	37.8
State percent minority	40.5
Percent low-income	16.7
State percent low-income	14.2

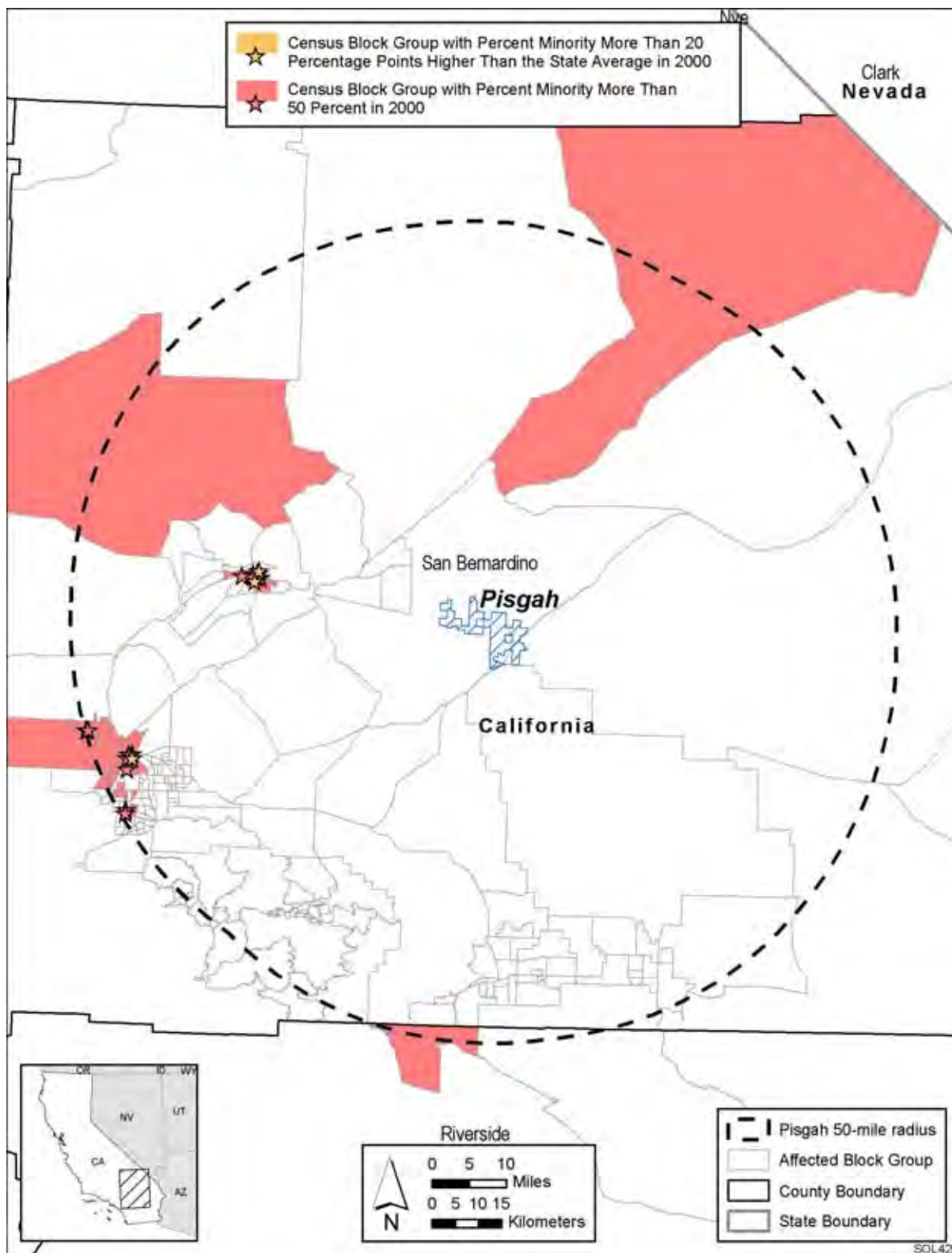
Source: U.S Bureau of the Census (2009k,l).

populations more than 20 percentage points higher than the state average are located in the City of Barstow and in the City of San Bernardino and vicinity.

Census block groups within the 50-mi (80-km) radius where the low-income population is more than 20 percentage points higher than the state average are located in the City of Barstow and in the City of San Bernardino, and in the vicinity of San Bernardino. Additional block groups with low-income populations are located to the southeast, and to the northwest of Barstow, and in the vicinity of Twentynine Palms. Block groups with more than 50% of the population classified as low-income are located in the Cities of Barstow and San Bernardino, and to the southeast of the SEZ, east of the Twentynine Palms military base.

9.3.20.2 Impacts

Environmental justice concerns common to all utility-scale solar energy developments are described in detail in Section 5.18. These impacts will be minimized through the

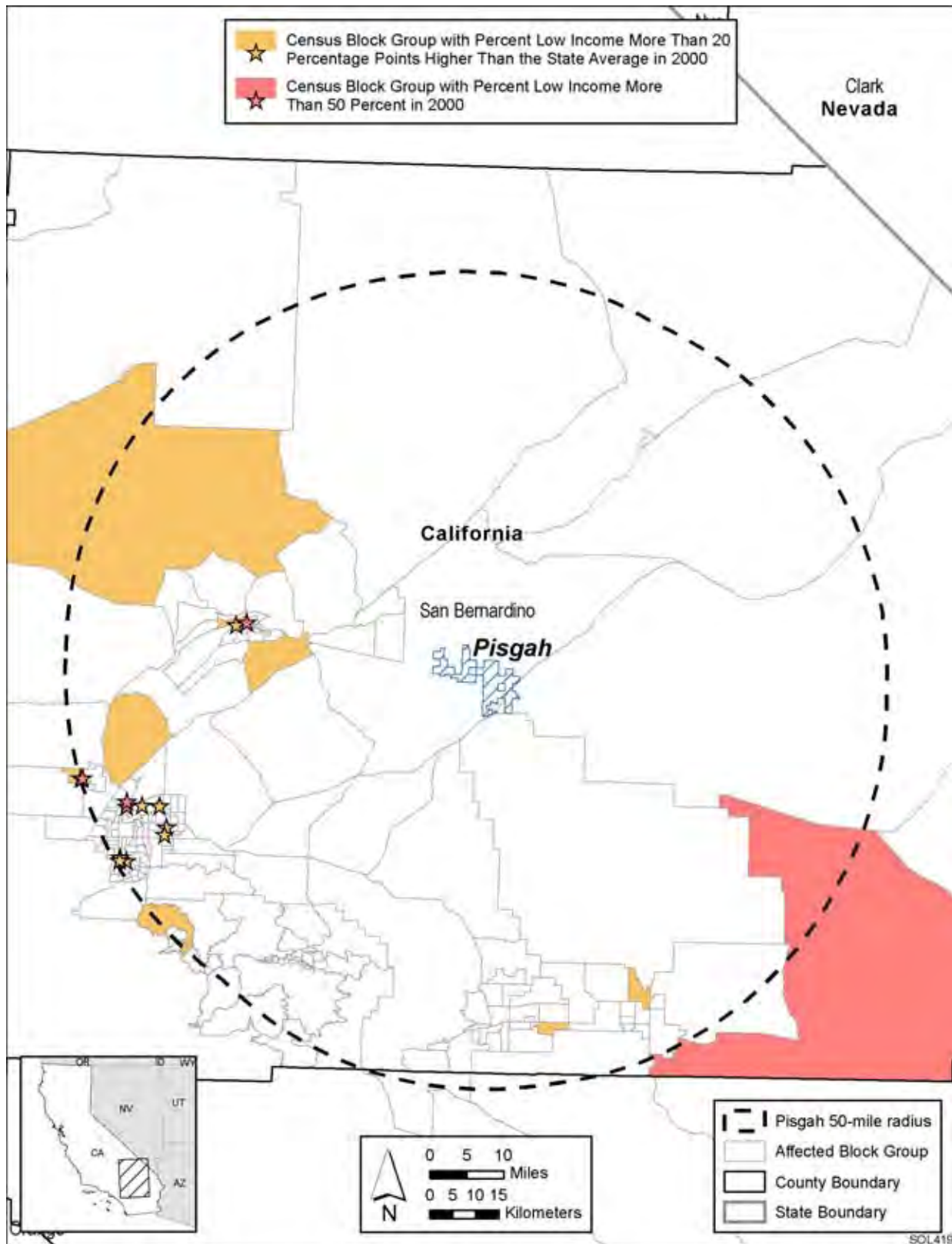


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FIGURE 9.3.20.1-1 Minority Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Pisgah SEZ



1

2 **FIGURE 9.3.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius**
 3 **Surrounding the Proposed Pisgah SEZ**

1 implementation of programmatic design features described in Appendix A, Section A.2.2, which
2 address the underlying environmental impacts contributing to the concerns. The potentially
3 relevant environmental impacts associated with solar development within the proposed Pisgah
4 SEZ include noise and dust during the construction of solar facilities; noise and EMF effects
5 associated with solar project operations; the visual impacts of solar generation and auxiliary
6 facilities, including transmission lines; access to land used for economic, cultural, or religious
7 purposes; and effects on property values as areas of concern that might potentially affect
8 minority and low-income populations. Minority populations have been identified within 50 mi
9 (80 km) of the proposed Pisgah SEZ; low-income populations are also present (Section 9.3.20.1).

10
11 Potential impacts on low-income and minority populations could be incurred as a result
12 of the construction and operation of solar facilities involving each of the four technologies.
13 Although impacts are likely to be small, there are minority populations defined by CEQ
14 guidelines (Section 9.3.20.1) within the 50-mi (80-km) radius around the boundary of the SEZ,
15 meaning that any adverse impacts of solar projects could disproportionately affect minority
16 populations. Because there are also low-income populations within the 50-mi (80-km) radius,
17 according to CEQ guidelines, there could also be impacts on low-income populations.

18 19 20 **9.3.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**

21
22 No SEZ-specific design features addressing environmental justice impacts have been
23 identified for the proposed Pisgah SEZ. Implementing the programmatic design features
24 described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would
25 reduce the potential for environmental justice impacts during all project phases.
26

1 **9.3.21 Transportation**
2

3 The proposed Pisgah SEZ is accessible by road and rail. An interstate highway and a rail
4 line pass through the SEZ. Three small airports are located within 62 mi (100 km) of the SEZ.
5 General transportation considerations and impacts are discussed in Sections 3.4 and 5.19,
6 respectively.
7

8
9 **9.3.21.1 Affected Environment**
10

11 I-40 passes along the southern edge of and then through the Pisgah SEZ, as shown in
12 Figure 9.3.21.1-1. The town of Barstow is located about 25 mi (40 km) to the west of the SEZ
13 along I-40. I-40 terminates in Barstow where it joins I-15, which travels from the southwest to
14 the northeast. From Barstow, the Los Angeles area is about 70 mi (113 km) to the southwest on
15 I-15, and Las Vegas is about 155 mi (249 km) to the northeast. To the east of the SEZ, I-40
16 continues on through Needles, California, approximately 105 mi (169 km) away. Access to the
17 SEZ from I-40 is available from exits at Fort Cady Road (to the west of the SEZ), Hector Road
18 (midway through the SEZ), and Pisgah Crater Road (at the eastern end of the SEZ). The National
19 Trails Highway (historic U.S. 66) also passes through the SEZ as it runs south of and parallel to
20 I-40. Hector Road runs north-south through the middle of the SEZ. North of the I-40 interchange,
21 Hector Road becomes a dirt/gravel road. A number of other local dirt roads cross the SEZ,
22 including those that run parallel to the railroad tracks. The AADT value for I-40 at Hector Road
23 in 2008 was 12,500 (Caltrans 2009a), with approximately 260 vehicles a day exiting onto Hector
24 Road and about 200 vehicles a day entering I-40 from Hector Road (Caltrans 2009b). Annual
25 average traffic volumes along I-15, I-40, and state roads near Barstow for 2008 are provided in
26 Table 9.3.21.1-1. Figure 9.3.21-1 also shows the designated open OHV routes in the proposed
27 Pisgah SEZ. These routes were designated under the CDCA Plan (BLM 1999).
28

29 The BNSF Railway serves the area (BNSF 2005). Local stops are in Newberry, Hector,
30 and Pisgah (BNSF 2010). To the west of the SEZ, the BNSF railroad passes through Barstow
31 where it splits, with one line going north to the San Francisco area and the other branch going
32 south to the Los Angeles area. The UP Railroad is also nearby, with a connection to the BNSF
33 Railroad between Barstow and Newberry at Daggett to the west of the proposed Pisgah SEZ.
34 From that interchange, the UP Railroad travels to the northeast and passes through Yermo on its
35 way Las Vegas (UPR 2009).
36

37 Three small public airports are within a driving distance of approximately 62 mi
38 (100 km) of the Pisgah SEZ. The nearest public airport is the Barstow-Daggett Airport, which is
39 12 mi (19 km) to the west of the Pisgah SEZ along I-40. The airport is owned by the County of
40 San Bernardino and has two asphalt runways that are in good condition; they are 5,123- and
41 6,402-ft (1,561- and 1,951-m) long (FAA 2009). The County of San Bernardino also operates the
42 Apple Valley Airport that is located about 30 mi (48 km) south of Barstow near I-15, a driving
43 distance of approximately 56 mi (90 km) from the Pisgah SEZ. The Apple Valley Airport has
44 two asphalt runways in good condition; they are 4,099- and 6,498-ft (1,249- and 1,981-m) long
45 (FAA 2009). Scheduled commercial passenger service is not available at either the Barstow-
46 Daggett or Apple Valley Airports.

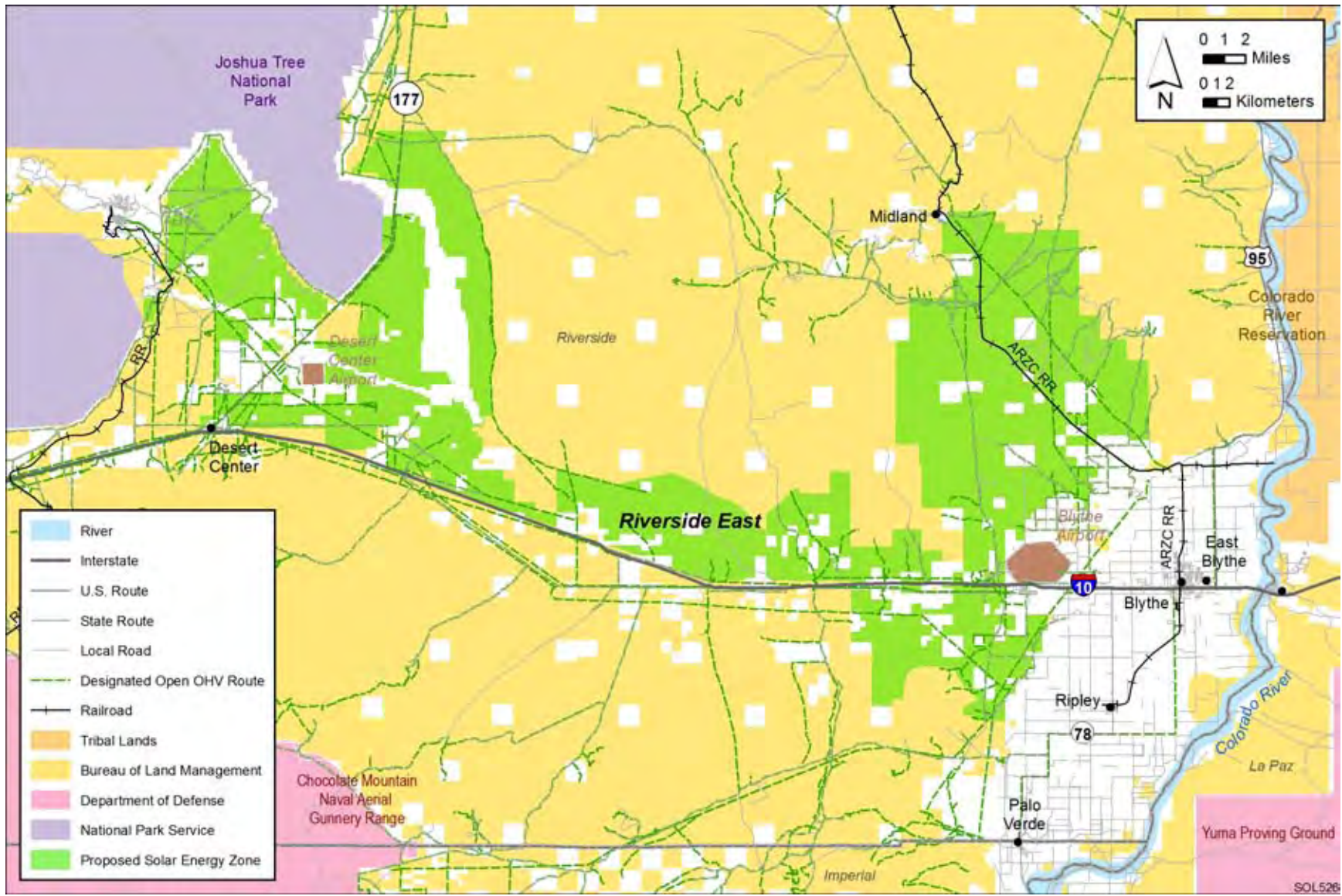


FIGURE 9.3.21.1-1 Local Transportation Network Serving the Proposed Pisgah SEZ

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TABLE 9.3.21.1-1 AADT on Major Roads near the Proposed Pisgah SEZ, 2008

Road	General Direction	Location	AADT (Vehicles)
I-15	Southwest–Northeast	Southwest of junction State Route 58	57,000
		Northeast of junction State Route 58	70,000
		West of junction State Route 247	69,000
		East of junction State Route 247	64,000
		West of Yermo/Calico Road interchange	40,000
		East of Yermo/Calico Road interchange	37,500
I-40	East–West	Junction I-15	18,000
		A Street exit (Daggett)	14,000
		Newberry Road exit	12,600
		Fort Cady Road exit (west of Pisgah SEZ)	12,600
		Hector Road exit (at Pisgah SEZ)	12,500
		Crucero Road exit (east of Pisgah SEZ)	11,900
State Route 58	East–West	Junction I-15	11,500
		West of Lenwood Road	10,600
		East of Lenwood Road	11,000
State Route 247	North–South	Junction I-15	18,700
		North of Stoddard Wells Road	1,800
		South of Stoddard Wells Road	2,200

Source: Caltrans (2009a).

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A third airport, the Southern California Logistics Airport, is located at the site of the former George Air Force Base in Victorville, California, approximately 62 mi (100 km) from the Pisgah SEZ. Redevelopment of the base, now leased from the U.S. Air Force, is being undertaken by the City of Victorville and a private corporation (Global Access 2010). A multimodal transportation hub with associated commercial development is envisaged, and the overall complex is named Global Access. Along with the airport and its two asphalt/concrete runways, which are 9,138- and 15,050-ft (2,785- and 4,587-m) long, Global Access includes service by two railroads (BNSF and UP) and intermodal facilities. In 2008, 10,006 passengers departed and 6,126 arrived at the airport, while 250 lb (113 kg) of freight departed and 354,715 lb (160,870 kg) arrived at the airport (BTS 2009).

9.3.21.2 Impacts

As discussed in Section 5.19, primary transportation impacts are anticipated to be from commuting worker traffic. I-40 and the National Trails Highway provide a regional traffic corridor that would experience small impacts for single projects that may have up to 1,000 daily workers, with an additional 2,000 vehicle trips per day (maximum). Such an increase is approximately 15% of the current traffic on I-40 alone, as summarized in Table 9.3.21.1-1,

1 which provides the available AADT values for routes in the vicinity of the SEZ. However,
2 the exits on I-40 might experience moderate impacts with some congestion. Local road
3 improvements would be necessary in any portion of the SEZ that might be developed near the
4 I-40 exits and along the National Trails Highway so as not to overwhelm the local roads near
5 any site access point(s).

6
7 Solar development within the SEZ would affect public access along OHV routes
8 designated open and available for public use. There are routes designated as open within the
9 proposed SEZ. Such open routes crossing areas granted ROWs for solar facilities would be re-
10 designated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed
11 solar facilities would be treated).

12
13 Should two large projects with approximately 1,000 daily workers each be under
14 development simultaneously, an additional 4,000 vehicle trips per day (maximum) could be
15 added to I-40 in the vicinity of the SEZ, assuming ride-sharing is not implemented. This would
16 be about a 30% increase in the current average daily traffic level on I-40 near the SEZ and could
17 have moderate impacts on traffic flow during peak commuter times. The extent of the problem
18 would depend on the relative locations of the projects within the SEZ, where the worker
19 populations originate, and the work schedules. The affected exits on I-40 would experience
20 moderate impacts with some congestion. The National Trails Highway could also experience
21 moderate congestion impacts dependent on the location of the solar projects in the SEZ and the
22 percentage of commuter traffic using the highway. Local road improvements would be necessary
23 in any portion of the SEZ near I-40 that might be developed so as not to overwhelm the local
24 roads near any site access point(s).

25 26 27 **9.3.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**

28
29 No SEZ-specific design features have been identified related to impacts on transportation
30 systems around the Pisgah SEZ. The programmatic design features discussed in Appendix A,
31 Section A.2.2, including local road improvements, multiple site access locations, staggered work
32 schedules, and ride sharing, would all provide some relief to traffic congestion on local roads
33 leading to the site. Depending on the location of the proposed solar facility within the SEZ, more
34 specific access locations and local road improvements would be implemented.

1 **9.3.22 Cumulative Impacts**
2

3 The analysis presented in this section addresses the potential cumulative impacts in the
4 vicinity of the proposed Pisgah SEZ in San Bernardino County, California. The CEQ guidelines
5 for implementing NEPA define cumulative impacts as environmental impacts resulting from the
6 incremental impacts of an action when added to other past, present, and reasonably foreseeable
7 future actions (40 CFR 1508.7). The impacts of other actions are considered without regard to
8 the agency (federal or nonfederal), organization, or person that undertakes them. The time frame
9 of this cumulative impacts assessment could appropriately include activities that would occur up
10 to 20 years in the future (the general time frame for PEIS analyses), but little or no information is
11 available for projects that could occur more than 5 to 10 years in the future.
12

13 The nearest population center is the small community of Newberry Springs, located near
14 the western boundary of the SEZ. The area around the proposed Pisgah SEZ is mostly open
15 rangeland. The BLM GeoCommunicator Database contained no records of agricultural crop
16 production in the SEZ or adjacent to the SEZ boundary. Some irrigated agricultural land occurs
17 about 10 mi (16 km) west of the SEZ. The southern border of the SEZ abuts the northwest
18 corner of the U.S. Marine Corps Air Ground Combat Center. The Rodman Mountains WA and
19 Newberry Mountains WA are located south of I-40, about 10 mi (16 km) southwest and south of
20 the SEZ. A designated energy corridor (No. 27-41) extends through the SEZ, mostly paralleling
21 I-40 in an east–west direction. Two grazing allotments occur in the area. The Ord Mountain
22 allotment is located about 10 to 20 mi (16 to 32 km) southwest of the SEZ. The southwestern
23 portion of the Cady Mountain allotment overlaps most of the Pisgah SEZ north of I-40. The
24 geographic extent of the cumulative impacts analysis for potentially affected resources near the
25 Pisgah SEZ is identified in Section 9.3.22.1. An overview of ongoing and reasonably foreseeable
26 future actions is presented in Section 9.3.22.2. General trends in population growth, energy
27 demand, water availability, and climate change are discussed in Section 9.3.22.3. Cumulative
28 impacts for each resource area are discussed in Section 9.3.22.4.
29
30

31 **9.3.22.1 Geographic Extent of the Cumulative Impacts Analysis**
32

33 The geographic extent of the cumulative impacts analysis for potentially affected
34 resources evaluated near the Pisgah SEZ is provided in Table 9.3.22.1-1. These geographic areas
35 define the boundaries encompassing potentially affected resources. Their extent may vary on the
36 basis of the nature of the resource being evaluated and the distance at which an impact may
37 occur (thus, for example, the evaluation of air quality may have a greater regional extent of
38 impact than that of visual values). Most of the lands around the SEZ are administered by the
39 BLM, the NPS, or the DoD. The BLM administers approximately 42% of the lands within a
40 50-mi (80-km) radius of the SEZ.
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TABLE 9.3.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Pisgah SEZ

Resource Area	Geographic Extent
Land Use	Western San Bernardino County
Specially Designated Areas and Lands with Wilderness Characteristics	Western San Bernardino County
Rangeland Resources	Western San Bernardino County
Recreation	Western San Bernardino County
Military and Civilian Aviation	Western and central San Bernardino County
Soil Resources	Areas within and adjacent to the Pisgah SEZ
Minerals	Western San Bernardino County
Water Resources	
Surface Water	Mojave River, Troy Lake, Lavic Lake, ephemeral drainages in the Mojave Valley and the Lavic Valley
Groundwater	Lavic Valley Groundwater Basin, Lower Mojave River Valley Groundwater Basin
Air Quality and Climate	A 31-mi (50-km) radius from the center of the Pisgah SEZ within the Mojave Desert Air Basin
Vegetation, Wildlife and Aquatic Biota, Special Status Species	A 50-mi (80-km) radius from the center of the Pisgah SEZ
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Pisgah SEZ
Acoustic Environment (noise)	Areas adjacent to the Pisgah SEZ
Paleontological Resources	Areas within and adjacent to the Pisgah SEZ
Cultural Resources	Areas within and adjacent to the Pisgah SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the Pisgah SEZ for other properties, such as traditional cultural properties
Native American Concerns	Areas within and adjacent to the Pisgah SEZ and viewshed within a 25-mi (40-km) radius of the proposed Pisgah SEZ
Socioeconomics	A 50-mi (80-km) radius from the center of the Pisgah SEZ
Environmental Justice	A 50-mi (80-km) radius from the center of the Pisgah SEZ
Transportation	I-15 and I-40

1 **9.3.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
2

3 The future actions described below are those that are “reasonably foreseeable;” that is,
4 they have already occurred, are ongoing, are funded for future implementation, or are included in
5 firm near-term plans. Types of proposals with firm near-term plans include:

- 6
- 7 • Proposals for which NEPA documents are in preparation or finalized;
 - 8
 - 9 • Proposals in a detailed design phase;
 - 10
 - 11 • Proposals listed in formal NOIs published in the Federal Register or state
12 publications;
 - 13
 - 14 • Proposals for which enabling legislations has been passed; and
 - 15
 - 16 • Proposals that have been submitted to federal, state, or county regulators to
17 begin a permitting process.
 - 18

19 Projects in the bidding or research phase or that have been put on hold were not included in the
20 cumulative impact analysis.

21

22 The reasonably foreseeable future actions described below are grouped into two
23 categories: those that relate to (1) energy production and distribution, including potential solar
24 energy projects under the proposed action (Section 9.3.22.2.1), and (2) other actions, including
25 those related to mining and mineral processing, grazing management, transportation, recreation,
26 water management, and conservation (Section 9.3.22.2.2. Together, these actions have the
27 potential to affect human and environmental receptors within western San Bernardino County
28 over the next 20 years.

29

30

31 ***9.3.22.2.1 Energy Production and Distribution***
32

33 Reasonably foreseeable future actions related to energy production and distribution
34 within 50 mi (80 km) of the center of the Pisgah SEZ are described in the following sections.
35 That area is entirely within San Bernardino County. Future renewable energy facilities are
36 expected to be the main contributors to potential future impacts in this area because of favorable
37 conditions in the area for their development, large acreages required, and potentially large
38 quantities of water used. The area is otherwise largely undeveloped and would be expected to
39 remain so in the absence of renewable energy development. Thus, this analysis focuses on
40 renewable energy facilities and any other foreseeable large energy projects nominally covering
41 500 acres (2 km²) or more or requiring amounts of water on the scale of utility-scale CSP.
42 Figure 9.3.22.2-1 shows the approximate locations of the key projects.
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1 **Renewable Energy Development**
2

3 Several recent executive and legislative actions in California have addressed renewable
4 energy development within the state. In November 2008, Governor Schwarzenegger signed
5 E.O. S-14-08 to streamline California’s renewable energy project approval process and increase
6 the state’s RPS to the most aggressive in the nation—at 33% renewable power by 2020. On
7 September 15, 2009, the governor issued a second E.O., now requiring that 33% of all electrical
8 energy produced in the state be from renewable energy sources by the year 2020. The E.O.
9 directed the CARB to adopt regulations increasing California’s RPS to 33% by 2020.
10

11 In 2009, the California legislature drafted bills that would cause 33% of electrical energy
12 production to come from renewable sources. On October 12, 2009, Governor Schwarzenegger
13 vetoed two bills from the California Legislature on electrical energy generated by renewable
14 sources in favor of an alternative plan that would remove limits on the amount of renewable
15 power utilities could buy from other states (African American Environmentalist Association
16 2009).
17
18

19 **Solar Energy.** Table 9.3.22.2-1 lists three foreseeable solar energy projects on public
20 land, the so-called fast-track projects—SES One (two phases—CACAs 49537 and 49539) and
21 Chevron Energy Solutions (Lucerne) Solar Project (CACA 49561). Fast-track projects are
22 projects on public lands for which the environmental review and public participation process
23 is underway and the ROW applications could be approved by December 2010 (BLM 2010d).
24 The locations of the fast-track projects are shown in Figure 9.3.22.2-1. Other, more numerous,
25 pending regular-track ROW applications shown in the figure are discussed collectively at the end
26 of this section.
27

- 28 • *Solar One Project—SES Solar #3 and SES Solar #6 (CACAs 49537 and*
29 *49539).* The proposed Solar One project would be constructed on an
30 approximate 8,600-acre (35-km²) site in San Bernardino County, California,
31 within the proposed Pisgah SEZ. Construction of the 850-MW project is
32 planned to begin in late 2010 if the project is approved by the CEC and
33 ROW grants are issued by the BLM. Construction would take approximately
34 40 months to complete. The primary equipment for the generating facility
35 would include the 25-kW Stirling solar dish systems (referred to as
36 SunCatchers).
37

38 The facility would be built in two phases and would be expected to operate for
39 approximately 20 years based on the Power Purchase Agreement signed by
40 SES with Southern California Edison (SCE). The first phase would consist of
41 up to 20,000 SunCatchers configured in 334 units and have a net nominal
42 generating capacity of 500 MW on 5,838 acres (24 km²) of federal lands. The
43 second phase would consist of approximately 14,000 SunCatchers configured
44 in 233 units with a net generating capacity of 350 MW on 2,392 acres
45 (9.7 km²) of federal lands (BLM 2010d).
46

TABLE 9.3.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution and Other Major Actions near the Proposed Pisgah SEZ^a

Description	Status	Resources Affected	Primary Impact Location
<i>Fast-Track Solar Energy Projects on BLM-Administered Land</i>			
SES Solar Three, (Calico Solar Project SES One), (CACA-49537); 350 MW CSP dish engine facility; 3,392 total acres (14 km ²)	NOI to prepare an EIS/SA issued on June 8,2009; Draft EIS/SA issued April 19, 2010	Land use, visual, terrestrial habitats, wildlife, groundwater	Within the Pisgah SEZ
SES Solar Six (SES One) (CACA-49539); 500 MW CSP/Dish Engine facility; 5,212 total acres (21 km ²)	Application received March 14, 2007	Land use, visual, terrestrial habitats, wildlife, groundwater	Within the Pisgah SEZ
Chevron Energy Solutions (Lucerne) Solar (CACA 49561); 45 MW PV solar; 516 total acres (2 km ²)	Notice of Availability of Draft EIS/SA issued Feb. 5, 2010	Land use, visual, terrestrial habitats, wildlife, groundwater	About 30 mi (48 km) south of the Pisgah SEZ
<i>Other Reasonably Foreseeable Solar and Hybrid Energy Projects</i>			
Mohave Solar Power Project (CEC licensing case 09-AFC ^b -5); 250 MW parabolic trough facility; 1,765 acres (7 km ²)	Application for Certification filed with CEC Aug. 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	About 40 mi (64 km) west-northwest of the Pisgah SEZ
Victorville 2 Hybrid Power Project; 563 MW; combination of natural-gas fired turbines and parabolic solar-thermal collectors; about 400 acres (1.6 km ²)	Commercial operation planned by summer of 2010	Land use, visual, visual, terrestrial habitats, wildlife, groundwater	40 to 50 mi (72 to 80 km) southwest of the Pisgah SEZ
<i>Wind Energy Projects</i>			
Granite Mountain Wind Energy; (CACA 48254); 73 MW 1,968 acres BLM lands, 670 acres (2.7 km ²) private lands	Draft EIS schedule delayed	Land use, visual, terrestrial habitats, wildlife	6 mi (10 km) east at Apple Valley in Granite Mountains, about 35 to 40 mi (56 to 64 km) southwest of Pisgah SEZ
Daggett Ridge Wind Energy Project (CACA 49575); 82.5 MW; 1,576 acres BLM lands, 380 private lands	Three-month delay requested in Sept. 2010 to study risks to the golden eagle	Land use, visual, terrestrial habitats, wildlife	20 mi (32 km) west of the Pisgah SEZ

TABLE 9.3.22.2-1 (Cont.)

Description	Status	Resources Affected	Primary Impact Location
<i>Other Projects</i>			
CalNev Oil Pipeline Expansion Project; reconstruction of existing oil pipeline to increase pipe to 16-in. (41-cm) diameter	Pending	Disturbed areas, terrestrial habitats along existing pipeline ROW	Extends along 233-mi (375-km) corridor from North Colton terminal in Santa Barbara County through the project area along I-15 from Barstow to Las Vegas

^a Projects in later stages of development.

^b AFC = application for certification.

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Related structures for the project would include the construction of a new 230-kV substation located approximately in the center of the project site. This new substation would be connected to the existing SCE Pisgah Substation adjacent to the project site via approximately 2 mi (3 km) of single-circuit, 230-kV transmission line. In addition, the proposed project would require the SCE to expand and upgrade the existing 230-kV SCE Pisgah Substation to support the increase in voltage to 500 kV, loop the Eldorado-Lugo 500-kV line into the SCE Pisgah Substation, and demolish 65 mi (105 km) of the existing Lugo-Pisgah No. 2 230-kV transmission and replace it with towers and conductor (BLM 2010d).

A draft EIS/SA has been prepared, and the BLM issued a Notice of Availability of the document on April 2, 2010, that started a 90-day public review period (BLM 2010c).

- *Chevron Energy Solutions (Lucerne) Solar Project (CACA 49561)*. Chevron Energy Solutions has requested a 516-acre (2-km²) ROW authorization to construct and operate a 45-MW solar PV project and connect it to an existing Southern California Edison 33-kV transmission line on public lands located approximately 8 mi (13 km) east of Lucerne Valley in San Bernardino County. The proposed project would include a solar array, switchyard, a control and maintenance building, and parking area. A Notice of Availability (NOA) of the Draft EIS was published by the BLM on February 5, 2010 (BLM 2010e). The draft EIS also includes a proposed amendment to the CDCA Plan. The proposed site is located about 30 mi (48 km) south of the Pisgah SEZ.

Pending Solar ROW Applications on BLM-Administered Lands. In addition to the fast-track solar projects described above, there are a number of regular-track applications for

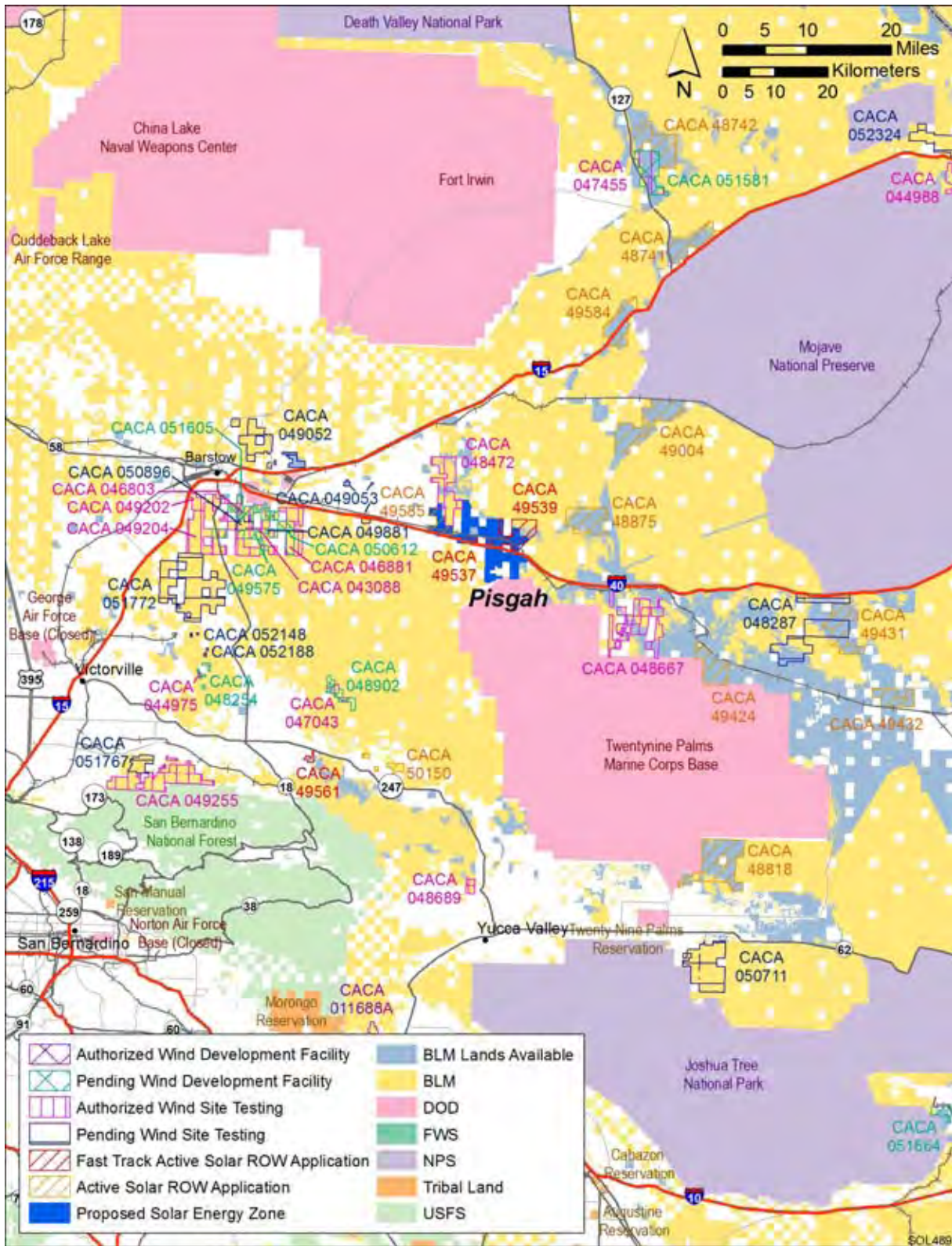


FIGURE 9.3.22.2-1 Locations of Renewable Energy Proposals on Public Land within a 50-mi (80-km) Radius of the Proposed Pisgah SEZ

1 solar project ROWs that have been submitted to the BLM for projects that would be located
2 within 50 mi (80 km) of the SEZ. Table 9.3.22.2-2 provides a list of these other solar projects
3 that had pending applications submitted to the BLM as of March 2010. Figure 9.3.22.2-1 shows
4 the locations of these applications.

5
6 Within 50 mi (80 km) of the proposed Pisgah SEZ, there are 17 active solar applications,
7 including the three fast-track projects described above. Within the boundaries of the Pisgah SEZ,
8 there are two fast-track projects but no other applications. Four of the applications within a 50-mi
9 (80-km) radius of the Pisgah SEZ are administered through the Needles Field Office; the rest are
10 administered through the Barstow Field Office.

11
12 The likelihood of any of the regular-track ROW application projects actually being
13 developed is uncertain, but is generally assumed to be less than that for fast-track applications.
14 The projects are all listed in Table 9.3.22.2-2 for completeness and as an indication of the level
15 of interest in development of solar energy in the region. Some number of these applications
16 would be expected to result in actual projects. Thus, the cumulative impacts of these potential
17 projects are analyzed in their aggregate effects.

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20 **Other Reasonably Foreseeable Solar and Hybrid Energy Projects Not on BLM**
21 **Lands.** The following paragraphs describe other reasonably foreseeable solar and hybrid energy
22 projects in the vicinity of the Pisgah SEZ but not on BLM lands.

- 23
24 • *Mohave Solar Power Project (CEC licensing case 09-AFC-5).* The project is
25 a solar electric generating facility proposed on about 1,765 acres (7.1 km²)
26 in unincorporated San Bernardino County. The site is about 40 mi (64 km)
27 west-northwest of the Pisgah SEZ. The project would use parabolic trough
28 technology and would have a combined nominal electrical output of 250 MW
29 from twin, independently operable solar fields (Abengoa Solar, Inc. 2009).
30 When the Application for Certification (AFC) was filed with the CEC in
31 August 2009, Abengoa Solar planned for the project to commence
32 commercial operation by the winter of 2012.

33
34 The project is proposing interconnection to the Kramer-Cool Water 230-kV
35 transmission line, which is owned by the SCE and located adjacent to the
36 southern border of the project. The project would use wet-cooling towers for
37 power plant cooling. Water for cooling tower makeup, process water makeup,
38 other industrial uses, and potable uses would be supplied from groundwater
39 wells. A packaged water treatment system would be used to treat the water to
40 meet potable standards. A sanitary septic system and on-site leach field would
41 be used to dispose of sanitary wastewater. Project cooling water blowdown
42 would be piped to lined, on-site evaporation ponds for each plant area.

- 43
44 • *Victorville 2 Hybrid Power Project.* In 2007, the City of Victorville submitted
45 an AFC to construct and operate the Victorville 2 Hybrid Power Project
46 (Victorville 2), a hybrid of natural gas-fired combined-cycle generating

TABLE 9.3.22.2-2 Pending Renewable Energy Project ROW Applications on BLM-Administered Land within 50 mi (80 km) of the Pisgah SEZ

Serial No.	Project Name	Application Received	Size (acres ^a)	MW	Technology	Field Office
Solar Applications						
CACA 48741	Solar Investments, LLC	Jan. 18, 2007	8,384	800	CSP	Barstow
CACA 48742	Solar Investments, LLC	Jan. 18, 2007	10,611	1,000	CSP	Barstow
CACA 48818	First Solar (Desert Opal)	Feb. 26, 2007	15,824	1,205	PV	Barstow
CACA 48875	Dpt. Broadwell Lake, LLC	Jan. 24, 2007	8,625	500	CSP	Barstow
CACA 49004	Boulevard Associates, LLC	May 14, 2007	13,528	1,000	CSP	Needles
CACA 49424	Solel, Inc.	July 23, 2007	7,453	600	CSP	Barstow
CACA 49431	Boulevard Associates, LLC	Sept. 21, 2007	10,199	1,000	CSP	Needles
CACA 49432	PG&E	Sept. 24, 2007	5,315	800	Undecided	Needles
CACA 49537	SES Solar Three, LLC (SES One)	March 14, 2007	3,392	350	CSP/Dish engine	Barstow
CACA 49539	SES Solar Six, LLC (SES One)	March 14, 2007	5,212	500	CSP/Dish engine	Barstow
CACA 49561	Chevron Energy Solutions Co. (Lucerne)	Dec. 7, 2007	518	45	PV	Barstow
CACA 49584	Solenergis, LLC	Dec. 18, 2007	7,995	350	PV	Barstow
CACA 49585	Enxco Development, Inc.	Dec. 12, 2007	3,710	1,000	CSP	Barstow
CACA 50150	Solel, Inc. (Johnson Valley)	March 10, 2008	1,800	500	CSP/trough	Barstow
Wind Applications						
Pending Wind Site Testing						
CACA 48287	Renewergy, LLC	July 26, 2006	7,760	– ^c	Wind	Needles
CACA 49052	Atlas Gas REP	May 24, 2007	9,170	–	Wind	Barstow
CACA 49053	Alta Gas REP	May 24, 2007	1,398	–	Wind	Barstow
CACA 49881	AES Wind Generation, Inc.	–	800	–	Wind	Barstow
CACA 50711	Padoma Wind Power, LLC	March 17, 2009	23,829	–	Wind	Barstow
CACA 50896	AES Seawest, Inc.	–	1,643	–	Wind	Barstow
CACA 51767	Del Sur Wind Energy, LLC	March 24, 2010	3,849	–	Wind	Barstow
CACA 51772	Del Sur Wind Energy, LLC	March 24, 2010	21,977	–	Wind	Barstow
CACA 52148	–	–	–	–	Wind	–
CACA 52188	–	–	–	–	Wind	–

TABLE 9.3.22.2-2 (Cont.)

Serial No.	Project Name	Application Received	Size (acres ^a)	MW	Technology	Field Office
Wind Applications (Cont.)						
Authorized Wind Site Testing		Application last authorized				
CACA 43088	AES Seawest, Inc.	Dec. 17, 2004	4,231	–	Wind	Barstow
CACA 44975	Granite Wind, LLC	Sept. 24, 2009	1,968	–	Wind	Barstow
CACA 46803	Horizon Wind Energy	Feb. 9, 2006	4,479	–	Wind	Barstow
CACA 46881	AES Wind Generation, Inc.	Aug. 26, 2005	2,929	–	Wind	Barstow
CACA 47043	West Fry Wind Energy, LLC	Aug. 2, 2005	2,449	–	Wind	Barstow
CACA 47455	Pacific Wind Development LLC, (Iberdrola)	Dec. 29, 2009	6,623	–	Wind	Barstow
CACA 48472	Powers Partners SW (enXco)	Sept. 25, 2009	10,240	–	Wind	Barstow
CACA 48667	Oak Creek Energy	Aug. 11, 2006	25,600	–	Wind	Needles
CACA 48689	Renewergy, LLC, Sierra Renewables, LLC	Jan. 9, 2007	4,046	–	Wind	Barstow
CACA 49202	Verde Resources, Inc (Western Wind)	April 3, 2009	3,295	–	Wind	Barstow
CACA 49204	Horizon Wind Energy	July 19, 2007	24,390	–	Wind	Barstow
CACA 49255	EC&R West, LLC (Airtricity, Inc.)	Jan. 14, 2010	14,080	–	Wind	Barstow
Pending Wind Development Facility						
CACA 48902	West Fry Wind, LLC (FPL Energy)	March 29, 2007	3,248	34	Wind	Barstow
CACA 50612	AES Wind Generation, Inc.	Dec. 29, 2008	4,168	–	Wind	Barstow
CACA 51581	Pacific Wind (Iberdrola)	Dec. 29, 2009	6,630	–	Wind	Barstow
CACA 51605	Horizon Wind Energy	Dec. 29, 2009	150	–	Wind	Barstow

^a Information taken from pending and authorized wind energy projects listed on BLM California Desert District Web site (BLM 2009g) and downloaded from *GeoCommunicator* (BLM and USFS 2010c). Total 14 Solar acres = 102,566 Total Solar MW = 9,650; total wind acres and MW not available.

^b To convert acres to km², multiply by 0.004047.

^c A dash indicates data not available.

1 equipment integrated with solar thermal generating equipment, in the City
2 of Victorville, San Bernardino County (CEC 2009b). The proposed project
3 would have a net electrical output of 563 MW, with construction planned to
4 begin in summer of 2008 and commercial operation planned by summer of
5 2010.

6
7 Primary equipment for the generating facility would include two natural gas–
8 fired combustion turbine-generators (CTGs) rated at 154 MW each, two heat
9 recovery steam generators (HRSGs), one steam turbine-generator (STG) rated
10 at 268 MW, and 250 acres (1 km²) of parabolic solar-thermal collectors with
11 associated heat transfer equipment. The solar-thermal collectors would
12 contribute up to 50 MW of the STG's 268 MW output. Construction of the
13 proposed plant would require three areas totaling 388 acres (1.6 km²) located
14 immediately north of the Southern California Logistics Airport. The project
15 site is about 45 to 50 mi (72 to 80 km) SW of the Pisgah SEZ (CEC 2009b).

16
17 The proposed Victorville 2 facility would connect via a single-circuit, three-
18 phase 230-kV transmission line to the power grid through SCE's existing
19 Victor Substation, located approximately 10 mi (16 km) south-southwest of
20 the proposed project site. Natural gas would be delivered to the project
21 through an existing 24-in (61-cm) diameter natural gas pipeline. About
22 3,150 ac-ft/yr (0.4 million m³/yr) of reclaimed water supplied via a new 1.5-
23 mi (2.4-km) long, 14-in. (35.6-cm) diameter pipeline from a treatment plant
24 southeast of the proposed site would be used for process water. Potable water
25 would be supplied by a new on-site well. Process wastewater would be treated
26 using a zero liquid discharge system. Sanitary waste would be sent to a
27 treatment plant in a new 1.25-mi (2-km) sanitary wastewater line.

28
29
30 **Wind Energy.** The following paragraphs briefly describe two reasonably foreseeable
31 wind energy developments and provide an indication of the number of other pending wind ROW
32 applications for locations within 50 mi (80 km) of the Pisgah SEZ.

- 33
34 • *Granite Mountain Wind Energy Project (CACA 48254).* In September 2009,
35 the BLM announced that it was developing a joint Environmental Impact
36 Statement/Environmental Impact Report (EIS/EIR) and plan amendment with
37 the County of San Bernardino for the development and operation of a wind
38 energy project on 1,968 acres (8 km²) of BLM-administered land and
39 670 acres (2.7 km²) of private lands in the Granite Mountains, about 6 mi
40 (10 km) east of the Apple Valley town limits, in San Bernardino County
41 (BLM 2009e). The proposed site is 35 to 40 mi (56 to 64 km) southwest of the
42 Pisgah SEZ.

43
44 The project would consist of up to 28 Siemens (or similar) 2.3-MW wind
45 turbine generators, a main access road from the east (off Johnson Road), other
46 internal access roads, pad-mounted transformers, an underground electrical

1 collection system, a project substation, overhead transmission line, an
2 interconnection to the existing SCE's Pisgah No. 1 230-kV transmission line,
3 an operations and maintenance building, two meteorological towers, a
4 temporary office, and a temporary staging area. The project would be located
5 on about 1,970 acres (8 km²) of public lands administered by the Barstow
6 Field Office of the BLM and 670 acres (2.7 km²) of privately owned land
7 under county land use jurisdiction (BLM 2009e). The Granite Mountain Wind
8 Energy Project is one of the fast-track projects for review/approval by the
9 BLM and the CEC. On April 2, 2010, a NOA of the Draft EIS was published
10 in the *Federal Register* (BLM 2010f).

- 11
- 12 • *Daggett Ridge Wind Energy Project (CACA 49575)*. The proposed fast-track
13 project would be comprised of 33 GE, or similar, 2.5-MW wind turbine
14 generators, a substation, an overhead transmission line, an interconnection to
15 the existing Southern California Edison 115-kV transmission line, and
16 other structures. Construction of the the project would take 9 to 11 months.
17 The project would be located 11 mi (18 km) southeast of Barstow and 5 mi
18 (8 km) southwest of Daggett in San Bernardino County.
- 19
- 20 • *Other Wind Energy Projects*. The BLM has received numerous applications
21 for right-of-way grants for wind energy projects that, if developed, would be
22 within 50 mi (80 km) of the proposed Pisgah SEZ. These ROW applications
23 include as many as 10 pending authorizations of wind site testing, 12
24 authorized for wind site testing, and 4 pending wind development facilities.
25 Most of the applications are the responsibility of the BLM Barstow Field
26 Office (BLM 2010b). Many of the projects are in the early planning stages
27 and were first submitted to the BLM for review and approval between 2004
28 and 2007. Many of these projects may not be developed because of lack of
29 financing or approval constraints. Eight wind testing projects are pending
30 approval by the BLM Needles Field Office, two of which would be located in
31 the Bristol Mountains about 30 to 35 mi (48 to 56 km) east of the proposed
32 Pisgah SEZ (BLM 2009d).
- 33
- 34

35 ***Transmission and Distribution.*** No new transmission lines are planned that would cross
36 the proposed Pisgah SEZ. Transmission line connections to existing lines or new line upgrades
37 for projects within the geographic extent of effects are included with the specific project
38 descriptions.

1 **9.3.22.2 Other Actions**
2
3

4 **Other Foreseeable Actions**
5
6

7 **CalNev Oil Pipeline Expansion Project.** Calnev Pipe Line, LLC, has applied for a ROW
8 on public lands to expand and reconstruct 233 mi (375 km) of pipeline in California and Nevada.
9 The existing CalNev system delivers petroleum products to the Las Vegas area through
10 two existing pipelines from the North Colton terminal in Colton, California, to Bracken Junction
11 in Las Vegas, Nevada.
12

13 The project would include construction, operation, and maintenance of a new 16-in.
14 (41-cm) diameter pipeline from Colton to Las Vegas; new pumps, an electrical substation, and
15 other ancillary facilities to increase pumping at Colton; a new pump station, electrical substation,
16 and ancillary facilities at Baker; and new or modified connections to existing laterals. Pipeline
17 construction was anticipated to occur over 12 months and was anticipated to begin in late 2009
18 or early 2010.
19

20 The County of San Bernardino is the lead agency for conducting an environmental
21 review of the project. A Notice of Intent to prepare a draft EIS and draft EIR was issued in
22 March 2007 (SBC 2008).
23
24

25 **9.3.22.3 General Trends**
26
27

28 **9.3.22.3.1 Population Growth**
29

30 Table 9.3.22.3-1 presents recent and projected populations in San Bernardino County and
31 in the state as a whole. Population in the county stood at 2,086,465 in 2008, having grown at an
32 average annual rate of 2.4% since 2000. Population growth in the county was higher than that for
33
34

TABLE 9.3.22.3-1 ROI Population for the Proposed Pisgah SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
San Bernardino County	1,721,942	2,086,465	2.4	2,619,128	2,694,641
California	34,105,437	38,129,628	1.4	44,646,420	45,667,413

Sources: U.S. Bureau of the Census (2009c); California Department of Finance (2010).

1 California as a whole (1.4%) over the same period. The county population is expected to increase
2 to 2,619,128 by 2021 and to 2,694,641 by 2023 (California Department of Finance 2010).

3 4 5 **9.3.22.3.2 Energy Demand**

6
7 The growth in energy demand is related to population growth through increases in
8 housing, commercial floorspace, transportation, manufacturing, and services. Given that
9 population growth is expected in Imperial, Riverside, and San Bernardino Counties between
10 2006 and 2016, an increase in energy demand is also expected. However, the EIA projects a
11 decline in per-capita energy use through 2030, mainly because of improvements in energy
12 efficiency and the high cost of oil throughout the projection period. Primary energy consumption
13 in the United States between 2007 and 2030 is expected to grow by about 0.5% each year, with
14 the fastest growth projected for the commercial sector (EIA 2009).

15 16 17 **9.3.22.3.3 Water Availability**

18
19 The proposed Pisgah SEZ is located within the Mojave Desert, which is characterized by
20 extreme daily temperature ranges with low precipitation and humidity (CDWR 2009); annual
21 precipitation is between 4 and 6 in./yr (10 and 15 cm/yr) (MWA 2004; Mathany and Belitz
22 2008).

23 The primary surface-water features within the SEZ are several ephemeral drainages
24 coming off the Cady Mountains and the Lava Bed Mountains that drain toward the Troy Lake
25 area. Troy Lake is a dry lake consisting of playa and dune sediments that covers approximately
26 3,500 acres (14 km²); approximately 1,550 acres (6 km²) of this dry lake is within the boundaries
27 of the SEZ. In addition, the Lavic Lake dry lakebed is located 5 mi (8 km) to the southeast.

28
29 The Mojave River is an intermittent river that flows into the Mojave Desert. The reach of
30 the Mojave River that is closest to the SEZ is located 7 mi (11 km) to the north and is typically
31 dry at the surface except during large rainfall events (Lines 1996). No wetlands have been
32 identified within the SEZ according to the NWI (USFWS 2009a).

33
34 The SEZ is located within two groundwater basins: Lavic Valley and Lower Mojave
35 River Valley. The Pisgah Fault is suspected to act as a groundwater barrier (CDWR 2003) that
36 separates the two groundwater basins. There are two primary aquifers of the Mojave River: the
37 floodplain and regional aquifers. The floodplain aquifer consists of highly permeable deposits of
38 sand and gravel on the order of 200 ft (60 m) in thickness and extends into the SEZ to include
39 Troy Lake. The regional aquifer consists of unconsolidated to partially consolidated sand, silt,
40 and gravel deposits up to 2,000 ft (610 m) in thickness (Stamos et al. 2001; Izbicki 2004).

41
42 Seepage from the Mojave River is the primary recharge source for the floodplain and
43 regional aquifers of the Lower Mojave groundwater basin. Additional recharge comes from
44 direct precipitation, percolation of runoff from surrounding mountains, irrigation returns, and
45 artificial recharge (CDWR 2003). Estimates of recharge vary depending upon the time frame
46 examined, with the average annual recharge to the Lower Mojave Valley groundwater basin

1 estimated to range from 7,400 ac-ft/yr (9 million m³/yr) to 15,914 ac-ft/yr (19.6 million m³/yr)
2 for the analysis periods of 1931 to 1990 and 1937 to 1961, respectively (Stamos et al. 2001).
3 Estimates of recharge for the Lavic Valley groundwater basin are not as well quantified because
4 of the lack of development in this region. The natural recharge is estimated to be approximately
5 300 ac-ft/yr (0.4 million m³/yr) for the Lavic Valley region (CDWR 2003).
6

7 Groundwater discharge by evapotranspiration and underflow is estimated to be
8 approximately 1,000 ac-ft/yr (1.2 million m³/yr) each for the Lower Mojave Valley groundwater
9 basin on the basis of a groundwater model for 1994 conditions (Stamos et al. 2001).
10 Groundwater discharge processes have not been quantified in the Lavic Valley groundwater
11 basin.
12

13 Groundwater withdrawals in the Lower Mojave Valley groundwater basin have been
14 primarily used to support agriculture dating back to the early 1900s. In 1931, groundwater
15 withdrawals were approximately 5,000 ac-ft/yr (6.1 million m³/yr); they quickly rose to around
16 50,000 ac-ft/yr (61.7 million m³/yr) in the mid-1960s and reached a maximum of 60,000 ac-ft/yr
17 (74 million m³/yr) in the mid-1990s (Stamos et al. 2001). Groundwater withdrawals are currently
18 limited to less than 40,000 ac-ft/yr (49 million m³/yr), and this limit is decreasing because of
19 groundwater management by adjudication (MWA 2009; see Section 9.3.9.1.3 for further details).
20

21 Groundwater well yields range from 80 to 140 gpm (303 to 530 L/min) in the Lavic
22 Valley groundwater basin and from 10 to 2,700 gpm (38 to 10,220 L/min), with an average of
23 480 gpm (1817 L/min) in the Lower Mojave groundwater basin (CDWR 2003).
24

25 Evidence of groundwater overdraft with decreasing groundwater elevations has been
26 recognized in the Mojave River region since the mid-1950s (MWA 2004). Groundwater surface
27 elevations have declined at rates ranging from 0.8 to 1.3 ft/yr (0.2 to 0.4 m/yr) over the past
28 decade near Troy Lake and are currently around 60 ft (18 m) below the surface (USGS 2009;
29 well numbers 344956116352901, 345001116381701, 345053116344701, 345104116384002,
30 345109116332401, and 345142116332601). In other portions of the Lower Mojave Valley
31 groundwater basin, groundwater levels currently range between 120 and 160 ft (37 and 49 m)
32 below the surface (MWA 2009).
33

34 In 2005, water withdrawals from surface waters and groundwater in San Bernardino
35 County were 656,900 ac-ft/yr (860 million m³/yr), of which 57% came from surface waters and
36 43% came from groundwater. The largest water use category was municipal and domestic
37 supply, at 427,100 ac-ft/yr (527 million m³/yr). However, the majority of this water is used in the
38 larger cities located in the southwestern portion of San Bernardino County. Agricultural water
39 uses accounted for 167,000 ac-ft/yr (206 million m³/yr), while industrial and thermoelectric
40 water uses accounted for 29,150 and 33,630 ac-ft/yr (36 million and 41 million m³/yr),
41 respectively (Kenny et al. 2009). Consumptive water use in the rural areas near the proposed
42 SEZ totaled 26,400 ac-ft/yr (32.5 million m³/yr) in 2001, with 58% for agricultural use, 24% for
43 industrial use, and 9% each for municipal and recreational uses (MWA 2004; Baja region).
44
45
46

1 **9.3.22.3.4 Climate Change**
2

3 Global warming continues to affect many desert areas in the Southwest with increased
4 temperatures and prolonged drought during the past 20 to 30 years. A report on global climate
5 change in the United States prepared on behalf of the National Science and Technology Council
6 by the U. S. Global Research Program (GCRP 2009) documents current temperature and
7 precipitation conditions and historic trends, and projects impacts during the remainder of GHG
8 emissions. The report summarizes the science of climate change and the recent and future
9 impacts of climate change on the United States. The following excerpts from that report indicate
10 there has been a trend for increasing global temperature and decrease in annual precipitation in
11 desert regions:

- 12 • Average temperature in the U.S. increased more than 2°F (1.1°C) over the
13 period of 1957 to 2007.
- 14 • Southern areas, particularly desert regions of southern Arizona and
15 southeastern California, have experienced longer drought and are projected to
16 have more severe periods of drought during the remainder of the twenty-first
17 century. Much of the Southwest has experienced drought conditions since
18 1999. This period represents the most severe drought in 110 years.
- 19 • The incidence of wildfires in the western United States has increased in recent
20 decades, partly because of increased drought.
- 21 • Temperature increases in the next 20 to 30 years are expected to be strongly
22 correlated with past emissions of heat-trapping gases, such as CO₂ and
23 methane.
- 24 • Many extreme weather events have increased both in frequency and intensity
25 during the last 40 to 50 years. Precipitation and runoff are expected to
26 decrease in the Southwest in spring and summer based on current data and
27 anticipated temperature increases. Water use will increase over the next
28 several decades as the population of southern California grows, resulting in
29 tradeoffs between competing uses.
- 30 • Climate project models also show a 10 to 20% decline in runoff in California
31 and Nevada for the period 2041 to 2060 compared with data from 1901 to
32 1970 used as a baseline.
- 33 • In the Southwest, average temperatures increased about 1.5°F (0.8°C) in 2000
34 compared with a baseline period of 1960 to 1979. By the year 2020,
35 temperatures are projected to rise 2 to 3°F (1.1 to 1.7°C) above the 1960 to
36 1979 baseline.
- 37 • In the Southwest, average temperatures increased about 1.5°F (0.8°C) in 2000
38 compared with a baseline period of 1960 to 1979. By the year 2020,
39 temperatures are projected to rise 2 to 3°F (1.1 to 1.7°C) above the 1960 to
40 1979 baseline.
- 41 • In the Southwest, average temperatures increased about 1.5°F (0.8°C) in 2000
42 compared with a baseline period of 1960 to 1979. By the year 2020,
43 temperatures are projected to rise 2 to 3°F (1.1 to 1.7°C) above the 1960 to
44 1979 baseline.

45 Increased global temperatures from GHG emissions will likely continue to exacerbate
46 drought in the southern California deserts. The State of California has prepared several reports

1 on climate change impact predictions through the remainder of the twenty-first century. Those
2 reports address topics such as economics, ecosystems, water use/availability, impacts on Santa
3 Ana winds, agriculture, timber production, and snowpack. The California climate change portal
4 Web site (<http://www.climatechange.ca.gov/publications/cat/index.html>) lists the Climate Action
5 Team reports that are submitted to the governor and state legislature. These reports are included
6 as final papers of the CEC's Public Interest Energy Research Program.
7
8

9 **9.3.22.4 Cumulative Impacts on Resources**

10
11 This section addresses potential cumulative impacts in the proposed Pisgah SEZ on the
12 basis of the following assumptions: (1) because of the relatively large size of the proposed SEZ
13 (more than 10,000 acres [40.5 km²] but less than 30,000 acres [121 km²]), as many as two
14 projects could be constructed at a time, and (2) maximum total disturbance over 20 years would
15 be about 19,160 acres (345 km²) (80% of the entire proposed SEZ). For analysis, it is
16 also assumed that no more than 3,000 acres (12.1 km²) would be disturbed per project annually
17 and 250 acres (1.01 km²) monthly on the basis of construction schedules planned in current
18 applications. Two existing high-capacity transmission lines (230 and 500 kV) run through the
19 SEZ; therefore, for this analysis, the impacts of construction and operation of new transmission
20 were not assessed. Regarding site access, because I-40 runs from east to west through the SEZ,
21 no major road construction activities outside of the SEZ would be needed for development to
22 occur in the SEZ.
23

24 Cumulative impacts in each resource area that would result from the construction,
25 operation, and decommissioning of solar energy development projects within the proposed SEZ
26 when added to other past, present, and reasonably foreseeable future actions described in the
27 previous section are discussed below. At this stage of development, because of the uncertainties
28 of the future projects in terms of location within the proposed SEZ, size, number, and the types
29 of technology that would be employed, the impacts are discussed qualitatively or semi-
30 quantitatively, with ranges given as appropriate. More detailed analyses of cumulative impacts
31 would be performed in the environmental reviews for the specific projects in relation to all other
32 existing and proposed projects in the geographic areas.
33

34 **9.3.22.4.1 Lands and Realty**

35
36
37 The area covered by the proposed Pisgah SEZ is a rural and largely undeveloped portion
38 of the western Mojave Desert region. The SEZ consists only of BLM-administered public lands
39 that interface private lands in the area. About 380 acres (1.5 km²) of state land border the SEZ.
40 There are numerous existing ROW authorizations in the SEZ (Section 9.3.2.1), including I-40, a
41 railroad line, a fiber optic line, four large transmission lines, an electrical substation, four
42 pipelines, and a county road that provides access to a mine surrounded by the SEZ. A
43 Section 368 designated energy corridor roughly follows the route of I-40 through the SEZ.
44

45 Development of the SEZ would introduce a new and discordant land use into an area that
46 is largely rural. In addition, numerous other renewable energy projects are proposed within a

1 50-mi (80-km) radius of the Pisgah SEZ. As shown in Table 9.3.22.2-2 and Figure 9.3.22.2-1, as
2 many as 14 other solar projects and 26 wind projects have been authorized or have pending
3 applications within this distance. ROW applications totaling more than 9,000 acres (36 km²) are
4 in place for three fast-track solar proposals, two of which lie within the proposed SEZ
5 (Section 9.3.22.2.1). A far larger area could ultimately be developed for renewable energy
6 projects. As a result of the potential and likely development of other renewable energy projects
7 and accompanying transmission lines, roads, and other infrastructure within the geographic
8 extent of effects, the character of a large portion of the California Desert could be dramatically
9 changed. The contribution to cumulative impacts of utility-scale solar projects on public lands on
10 and around the Pisgah SEZ could be significant, particularly if the SEZ is fully developed with
11 solar projects. Development of the public lands for solar energy production may also result in
12 similar development on the state and private lands in the immediate vicinity of the SEZ.
13

14 Construction of utility-scale solar energy facilities within the SEZ would preclude use of
15 those areas occupied by the solar energy facilities for other purposes. The areas that would be
16 occupied by the solar facilities would be fenced, and access to those areas by both the general
17 public and wildlife would be eliminated.
18
19

20 ***9.3.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics***

21

22 The proposed Pisgah SEZ is surrounded by areas of high wilderness and scenic value,
23 including four designated WAs, a WSA, and numerous ACECs with a potential view of the SEZ
24 within 25 mi (40 km) (Section 9.3.3.1). The Pisgah ACEC is located along the eastern boundary
25 of the SEZ, and the Ord-Rodman DWMA is located along the southwestern boundary, while
26 other ACECs lie nearby. Construction of utility-scale solar energy facilities within the SEZ in
27 combination with potential development of other renewable energy projects and associated
28 infrastructure would contribute to the adverse visual impacts on these specially designated areas.
29 Development of the SEZ, especially full development, would be a dominant factor in the
30 viewshed from large portions of these specially designated areas.
31

32 Solar development of the proposed Pisgah SEZ, together with that within the geographic
33 extent of effects, would combine to adversely affect wilderness values in the nearby WAs. The
34 I-40 corridor to the east and west of the Pisgah SEZ, in particular, has a large number of pending
35 wind and solar applications that may result in cumulative effects on sensitive areas in those
36 regions.
37
38

39 ***9.3.22.4.3 Rangeland Resources***

40

41 The SEZ includes only one grazing allotment, which is being relinquished. Since there
42 would be no effect on livestock grazing, solar development of the area would not contribute to
43 any cumulative effects on livestock grazing. Likewise, since the SEZ is not located within or
44 near either an HA or HMA, there would be no contribution to any adverse effects on wild horses
45 or burros.
46
47

1 **9.3.22.4.4 Recreation**

2
3 The proposed Pisgah SEZ is flat and is of a type and quality that generally does not
4 attract recreational users. However, access into the area is easy, and low levels of recreational
5 use would occur, including backcountry driving, rockhounding, and seasonal nature hikes. It is
6 anticipated there would not be a significant loss of recreational use caused by development of the
7 Pisgah SEZ, although some users would be displaced.
8

9 When SEZ development is considered in combination with other potential renewable
10 energy development within the region, the potential would exist for cumulative visual impacts on
11 recreational users of the specially designated areas surrounding the SEZ (Section 9.3.22.4.2) and
12 for users who enjoy backcountry driving. There is substantial potential for loss of wilderness and
13 scenic values throughout the California Desert wherever solar and wind energy development
14 encroaches on wilderness or on other currently undeveloped areas. The overall cumulative
15 impacts on recreational use associated with the loss of wilderness values and general open desert
16 scenery also could be large. While the effects cannot be quantified, desert users might avoid
17 areas dominated by industrial-type solar facilities. This could result in a fundamental change in
18 the way the California Desert has been traditionally used.
19
20

21 **9.3.22.4.5 Military and Civilian Aviation**

22
23 The proposed Pisgah SEZ is completely blanketed under eight MTRs, which are part of a
24 very large, interconnected system of training routes throughout the southwest. The development
25 of any solar energy or transmission facilities that encroach into the airspace of MTRs could
26 create safety issues and could conflict with military training activities. While advance
27 consultation with the DoD is required prior to approval of activities that could adversely affect
28 the use of the MTRs, the military has indicated that solar development on portions of the Pisgah
29 SEZ is compatible with its existing uses regardless of the proposed heights of solar facilities,
30 while other portions should have height limits, and some areas may be incompatible with
31 existing military use. Potential solar development occurring throughout the region, which is
32 currently undeveloped, could result in cumulative effects on the larger system of MTRs. Such
33 effects would be limited by mitigations developed in consultation with the military. With
34 potential solar development occurring throughout the region, not just in SEZs, maintaining a
35 large-picture view of the overall effects on the system of MTRs will be necessary to avoid
36 cumulative effects. Potential effects on military use of military airspace could be limited by
37 mitigation developed in consultation with the military.
38
39

40 **9.3.22.4.6 Soil Resources**

41
42 Ground-disturbing activities (e.g., grading, excavating, and drilling) during the
43 construction phase of a solar project, including any associated transmission lines, would
44 contribute to the soil loss due to erosion. Construction of new roads within the SEZ or
45 improvements to existing roads would also contribute to soil erosion. During construction,
46 operations, and decommissioning of the solar facilities, worker travel and other road use would

1 also contribute to soil loss. These losses would be in addition to losses occurring as a result of
2 disturbance caused by other users in the area, including the potential construction of several
3 other renewable energy facilities, and recreational users, such as off-road vehicle enthusiasts. As
4 discussed in Section 9.3.7.3, programmatic design features would be employed to minimize
5 erosion and loss of soil during the construction, operation, and decommissioning phases of the
6 solar facilities and any associated transmission lines. Landscaping of solar energy facility areas
7 could alter drainage patterns and lead to increased siltation of surface-water streambeds, in
8 addition to that caused by other development activities. Even with the expected design features
9 in place, cumulative impacts from the disturbance of several large sites and connecting linear
10 facilities in the vicinity could be significant.

11 12 13 **9.3.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)**

14
15 Currently, there are 103 mining claims (lode, placer, and millsite) within the proposed
16 Pisgah SEZ, most of which are located in the southern portion of the SEZ south of I-40. There
17 are no oil and gas or geothermal leases within the proposed SEZ, while the area remains open for
18 discretionary mineral leasing.

19
20 Existing mining claims would preclude solar energy development and could prevent solar
21 development in some areas as long as they are in place. Where solar development can proceed,
22 there would be no expected loss of mineral production. The cumulative effects of future
23 renewable energy development on mineral production within the geographic extent of effects is
24 similarly expected to be small, as existing claims would not be affected.

25 26 27 **9.3.22.4.8 Water Resources**

28
29 The water requirements for development and operation of various utility-scale solar
30 energy technologies on the proposed SEZ are described in Sections 9.3.9.2. If the SEZ were fully
31 developed over 80% of its available land area, the amount of water needed during the peak
32 construction year for the various solar technologies evaluated would be 1,745 to 2,566 ac-ft
33 (2,200 to 3,200 thousand m³). The amount of water needed during decommissioning would be
34 similar to or less than the amount used during construction. During operations, the amount of
35 water needed for all solar technologies evaluated would range from 108 to 57,500 ac-ft/yr
36 (0.13 to 71 million m³/yr), with PV representing the lower end of this range. Since the
37 availability of groundwater (the primary water resource available to solar energy facilities in the
38 SEZ) is limited, it would not be feasible to obtain the upper end of the water requirements range.

39
40 The levels of water use needed for build-out with wet cooling are clearly not feasible for
41 the water resources available in the region. In areas of the SEZ that would draw groundwater
42 from the Lavic Valley basin, about 80% of the SEZ, only PV would be sustainable under roughly
43 estimated recharge rates of only about 300 ac-ft/yr (0.37 million m³/yr) (Section 9.3.9.2.2).

44
45 Currently two fast-track applications for development of a solar energy project within the
46 Pisgah SEZ are pending (Table 9.3.22.2-2). Considering technology-specific water use rates

1 (Section 9.3.9) and assuming dish-engine technology, such a facility could require up to
2 60,000 ac-ft/yr (74 million m³/yr) if wet cooled, or 430 ac-ft/yr (0.53 million m³/yr). This use
3 rate could be sustainable even in the Lavic Valley basin, assuming the application of water
4 conservation measures.

5
6 The development of the third fast-track solar project within the geographic extent of
7 effects, CACA 49561, a proposed 45-MW PV facility about 30 mi (48 km²) southwest of the
8 SEZ (Section 9.3.22.2.1), would draw minimal water and not contribute to cumulative impacts.
9 However, the several pending solar energy project proposals for locations on or within a few
10 miles east and southeast of the SEZ (Figure 9.3.22.2-1), if approved, could draw from the Lavic
11 Valley groundwater basin and thus contribute to cumulative impacts within the SEZ. Therefore,
12 cumulative impacts on groundwater basins underlying the Pisgah SEZ from currently foreseeable
13 projects within the geographic extent of effects could be moderate.

14
15 With respect to wastewaters, the small quantities of sanitary wastewater that would be
16 generated during the construction and operation of utility-scale solar energy facilities within the
17 Pisgah SEZ in combination with similarly small volumes from other foreseeable projects would
18 not be expected to strain available sanitary wastewater treatment facilities in the general area of
19 the SEZ. Blowdown water from cooling towers for wet-cooled technologies would be treated
20 within a project site (e.g., in settling ponds) and injected into the ground, released to surface
21 water bodies, or reused, and thus would not contribute cumulative impacts to any nearby
22 treatment systems.

23 24 25 **9.3.22.4.9 Vegetation**

26
27 The proposed Pisgah SEZ is located within the Mojave Basin and Range ecoregion,
28 which primarily supports creosotebush (*Larrea tridentata*) habitats. Annual precipitation in the
29 Mojave Desert occurs primarily in winter and averages only about 4.1 in. (105 mm) in the area
30 of the SEZ. No wetlands occur within the SEZ or within the 5-mi (8-km) area of indirect effects.
31 Troy Lake, a dry lakebed located in the western portion of Pisgah, occasionally holds shallow
32 surface water and is sparsely vegetated. Troy Lake is primarily classified as North American
33 Warm Desert Playa. If utility-scale solar energy projects were to be constructed within the SEZ,
34 all vegetation within the footprints of the facilities would likely be removed during land-clearing
35 and land-grading operations.

36
37 Numerous other renewable energy projects are proposed within a 50-mi (80-km) radius
38 of the proposed Pisgah SEZ. As many as 14 other solar projects and 26 wind projects have
39 authorized or pending applications within this distance. ROW applications totaling more than
40 9,000 acres (36 km²) are in place for three fast-track solar proposals, two of which lie within the
41 proposed SEZ (Section 9.3.22.2.1). Depending on the actual development of renewable energy
42 projects within and outside the SEZ and accompanying transmission lines, roads, and other
43 infrastructure within the geographic extent of effects, cumulative impacts on certain cover types
44 could occur, particularly those that favor the creosote flats, which are suitable for solar facilities.
45 Rare and sensitive cover types present in the SEZ might also be affected cumulatively, including
46 Inter-Mountain Basins Shale Badland and North American Warm Desert Pavement. Other, less

1 common, potentially affected cover types include North American Warm Desert Volcanic
2 Rockland and North American Warm Desert Playa. In addition, groundwater withdrawals near
3 Troy Lake playa could further deplete the Lower Mojave Valley regional groundwater system
4 and affect discharges at springs and seeps along the Mojave River that support riparian habitats,
5 which could cumulatively degrade these habitats.
6

7 In addition, the cumulative effects of fugitive dust generated during the construction of
8 solar facilities along with other activities in the area, such as transportation and recreation, could
9 increase the dust loading in habitats outside a solar project area, which could result in reduced
10 productivity or changes in plant community composition. Programmatic design features would
11 be implemented to reduce the impacts from solar energy projects and thus reduce the overall
12 cumulative impacts on plant communities and habitats.
13

14 **9.3.22.4.10 Wildlife and Aquatic Biota**

15
16 As many as 166 species of wildlife, including amphibians (1 species), reptiles
17 (30 species), birds (100 species), and mammals (35 species), occur in and around the proposed
18 Pisgah SEZ (Section 9.3.11). The construction of utility-scale solar energy projects in the SEZ
19 and of any associated transmission lines and roads in or near the SEZ would have impacts on
20 wildlife through habitat disturbance (i.e., habitat reduction, fragmentation, and alteration),
21 wildlife disturbance, loss of connectivity between natural areas (e.g., habitat fragmentation and
22 blockage of dispersal corridors for bighorn sheep and desert tortoise), and wildlife injury or
23 mortality. In general, affected species that have broad distributions and occur in a variety of
24 habitats would be less affected than species with a narrowly defined habitat within a restricted
25 area. Programmatic design features include pre-disturbance biological surveys to identify key
26 habitat areas used by wildlife, followed by avoidance or minimization of disturbance to those
27 habitats (e.g., avoiding development in Homer Wash).
28

29
30 As many as 14 other solar projects and 26 wind projects have authorized or pending
31 applications within 50 mi (80 km) of the SEZ. ROW applications totaling more than 9,000 acres
32 (36 km²) are in place for three fast-track solar proposals, two of which lie within the proposed
33 SEZ (Section 9.3.22.2.1). Depending on the actual development of renewable energy projects
34 within and outside the SEZ and of accompanying transmission lines, roads, and other
35 infrastructure within the geographic extent of effects, cumulative impacts on some wildlife
36 species could be significant, particularly those with habitats or migratory routes in the basin flats,
37 which are suitable for solar facilities.
38

39 While many of the wildlife species have extensive habitat available within the affected
40 counties, where projects are closely spaced, the cumulative impact on a particular species could
41 be moderate to large. Current applications for solar and wind projects are mainly clustered along
42 the I-40 corridor, where cumulative impacts would be greatest. Programmatic design features
43 would be used to reduce the impacts from solar energy projects and thus reduce the overall
44 cumulative impacts on wildlife. However, even with mitigations in place, cumulative impacts
45 could be moderate within the geographic extent of effects.
46

1 Because no wetlands are present within the proposed SEZ or within a 5-mi (8-km) radius
2 of indirect effects, and Troy Lake is normally dry, no aquatic biota are present within the SEZ.
3 Thus, there would be no cumulative impacts on aquatic biota and habitats resulting from solar
4 development within the SEZ. Increased future demand on groundwater for multiple uses,
5 including solar power development within the SEZ, could affect surface-water levels outside of
6 the SEZ, including the Mojave River, and cumulatively affect aquatic organisms in those water
7 bodies.
8
9

10 **9.3.22.4.11 Special Status Species (Threatened, Endangered, Sensitive, and Rare** 11 **Species)** 12

13 Seven special status species are known to occur within the affected area of the proposed
14 Pisgah SEZ: desert tortoise, which is listed as threatened under the ESA and CESA; white-
15 margined beardtongue, Mojave fringe-toed lizard, Bendire's thrasher, and Nelson's bighorn
16 sheep, which are BLM-designated sensitive species; and Emory's crucifixion-thorn and small-
17 flowered androstephium, which are considered rare species. Numerous additional species
18 occurring on or in the vicinity of the SEZ are listed as threatened or endangered by the State of
19 California or are listed as a sensitive species by the BLM. Programmatic design features that
20 could be used to reduce or eliminate the potential for cumulative effects on these species from
21 the construction and operation of utility-scale solar energy projects within the geographic extent
22 of effects include avoidance of habitat, translocation of individuals, and minimization of erosion,
23 sedimentation, and dust deposition.
24

25 Numerous reasonably foreseeable future actions could occur within the geographic extent
26 of effects of the proposed Pisgah SEZ, including as many as 14 other solar projects and 26 wind
27 projects, which have authorized or pending applications within this distance. Three fast-track
28 solar proposals covering more than 9,000 acres (36 km²) lie with the geographic extent of
29 effects, and two of these lie within the SEZ. Many or all of the special status species found
30 within the proposed Pisgah SEZ are also likely to be present at the locations of other renewable
31 energy projects, particularly solar projects located in creosote flats. However, projects in these
32 and other areas would employ design features to reduce or eliminate the impacts on protected
33 species as required by the ESA and other applicable federal and state laws and regulations.
34

35 Depending on the number and size of other projects that will actually be built in the next
36 20 to 30 years within the geographic extent of effects, there could be cumulative impacts on
37 protected species due to habitat destruction and overall development and fragmentation of the
38 area. Habitats that are particularly at risk are those in basin flats suited for solar development.
39 In particular, the functioning of the Chemehuevi DWMA could be cumulatively affected with
40 respect to connectivity, control of desert tortoise disease, and predation. Together, several new
41 solar facilities and the other associated actions would have a cumulative impact on wildlife.
42 Where projects are closely spaced, particularly along the I-40 corridor, moderate cumulative
43 impact on a particular species could occur.
44
45
46

1 **9.3.22.4.12 Air Quality and Climate**
2

3 While solar energy generates minimal emissions compared with fossil fuel-generated
4 energy, the site preparation and construction activities associated with solar energy facilities
5 would produce some emissions, mainly particulate matter (fugitive dust) and engine exhaust
6 emissions from construction equipment and vehicles. When these emissions are combined with
7 those from other projects near solar energy facilities or when they are added to natural dust
8 generated by winds and wind erosion, the air quality in the general vicinity of the projects could
9 be temporarily degraded. For example, particulate matter (dust) concentration at or near the SEZ
10 boundaries could at times exceed state or federal ambient air quality standards. Generation of
11 dust from construction activities can be partially controlled by implementing aggressive dust
12 control measures, such as increased watering frequency or road paving or treatment, and/or
13 sound practices such as minimizing activities under unfavorable meteorological conditions.
14

15 Numerous other renewable energy projects are proposed or planned within the air basin
16 shared by Pisgah (Section 9.3.22.2.1 and Figure 9.3.22.2-1). Three fast-track solar proposals
17 covering more than 9,000 acres (36 km²) lie with the geographic extent of effects, two within the
18 SEZ, while a total of 14 solar and 26 wind proposals have authorized or pending applications
19 within 50 mi (80 km) of the proposed Pisgah SEZ. The fast-track projects could have
20 overlapping construction schedules, since they would be expected to be constructed roughly in
21 2011 to 2013. These projects, in combination with others with pending applications, could
22 produce periods of elevated particulate matter and engine exhaust emissions in the affected area.
23 Due to predominant westerly winds (more than 70% of the time), potential impacts on residences
24 and communities, which are mainly upwind of the SEZ, would be relatively small.
25

26 Over the long term and across the region, the development of solar energy may have
27 beneficial cumulative impacts on the air quality and atmospheric values in southern California by
28 offsetting the need for energy production with fossil fuels, which result in higher levels of
29 emissions. As discussed in Section 9.3.13, air emissions from operating solar energy facilities are
30 relatively minor, while the displacement of criteria air pollutants, VOCs, TAPs, and GHG
31 emissions currently produced from fossil fuels could be relative large. For example, if the Pisgah
32 SEZ were fully developed (80% of its acreage) with solar facilities, the quantity of pollutants
33 avoided could be as large as 6.3% of all emissions from the current electric power systems in
34 California (Section 9.3.13.2.2).
35

36
37 **9.3.22.4.13 Visual Resources**
38

39 The proposed Pisgah SEZ is located within the east-west trending Mojave Valley, which
40 is relatively flat and is characterized by wide open views. Generally good air quality allows
41 visibility for 50 mi (80 km) or more under favorable atmospheric conditions. The proposed SEZ
42 site is a largely treeless plain, with the northeastern portion sloping upward toward the Cady
43 Mountains; Pisgah Crater is located on the south border of the site. Surrounding mountain ranges
44 generally block views to and from neighboring valleys, while the view is more open to the east
45 of the SEZ. Within the valley, views are afforded of the SEZ, the rest of the valley, and the
46 surrounding mountains. The VRI classes for the SEZ are VRI Class II, indicating high relative

1 visual values, Class III, indicating moderate relative visual values, and Class IV, indicating low
2 relative visual values. The VRI values indicate moderate sensitivity associated with a moderate
3 level of use, largely due to traffic on I-40 and U.S. Route 66, and a moderate level of public
4 interest, due primarily to national interest in U.S. Route 66. Special area sensitivity is ascribed to
5 the SEZ due to its inclusion within the CDCA. The site is also visible from several ACECs and
6 in general is close to several other specially designated areas, indicating moderate visual
7 sensitivity.
8

9 Development of utility-scale solar energy projects within the SEZ would contribute to the
10 cumulative visual impacts in the general vicinity of the SEZ and in the Mohave Valley.
11 However, the exact nature of the visual impacts and the design features that would be appropriate
12 would depend on the specific project locations within the SEZ and on the solar technologies
13 used. Such impacts and potential design features would be considered in visual analyses
14 conducted for specific future projects. In general, large visual impacts on the SEZ would be
15 expected to occur as a result of the construction, operation, and decommissioning of utility-scale
16 solar energy projects. These impacts would be expected to involve major modification of the
17 existing character of the landscape and would likely dominate the views for some nearby
18 viewers. Additional impacts would occur as a result of the construction, operation, and
19 decommissioning of related facilities, such as access roads and electric transmission lines.
20

21 Some lands outside the SEZ would also be subjected to visual impacts related to the
22 construction, operation, and decommissioning of utility-scale solar energy development, due to
23 the large size of such facilities, the large number of pending applications on public lands in the
24 area, and the relatively flat, open nature of the proposed SEZ. Potential impacts would include
25 night sky pollution, including increased skyglow, light spillage, and glare. Some of the affected
26 lands outside the SEZ would include potentially sensitive scenic resource areas, including the
27 four WAs, two WSAs, the Old Spanish National Historic Trail, and the CDCA. These sensitive
28 visual resource areas would be subject to major to minimal visual impacts. Visual impacts
29 resulting from solar energy development within the SEZ would be in addition to impacts caused
30 by other potential projects in the area, such as other solar facilities on private lands, transmission
31 lines, and other renewable energy facilities, including windmills. The presence of new facilities
32 would normally be accompanied by increased numbers of workers in the area, traffic on local
33 roadways, and support facilities, all of which would add to cumulative visual impacts.
34

35 As many as 14 solar and 26 wind projects have authorized or pending applications on
36 public lands within 50 mi (80 km) of the SEZ. While the overall extent of cumulative effects of
37 renewable energy development in the area would depend on the number of projects that are
38 actually built, it may be concluded that the general visual character of the landscape could be
39 transformed from primarily rural desert to more commercial-industrial in nature as a
40 consequence of these developments. Because of the topography of the region, solar facilities,
41 located in flat basins, would be visible at great distances from sensitive viewing locations in the
42 surrounding mountains. Also, the developments would be located near major roads, thus the
43 facilities would be viewable by motorists. However, some portions of major roads where solar
44 energy facilities would be located are currently visually affected by transmission line corridors,
45 towns, and other infrastructure, as well as the road system itself.
46

1 In addition to cumulative visual impacts associated with views of particular future
2 facilities, as additional facilities are added, several projects might become visible from one
3 location or in succession as viewers move through the landscape, for example, as viewers drive
4 on local roads. In general, the new facilities would likely vary in appearance, and depending on
5 the number and type of facilities, the resulting visual disharmony could exceed the visual
6 absorption capability of the landscape and add significantly to the cumulative visual impact.
7 Thus, the overall cumulative visual impacts in the region from solar and wind energy
8 development would be significant.
9

10 **9.3.22.4.14 Acoustic Environment**

11
12
13 The areas around the proposed Pisgah SEZ and in San Bernardino County, in general, are
14 relatively quiet. The existing noise sources include road traffic, railroad traffic, aircraft flyovers,
15 agricultural activities, industrial activities including mining, and activities and events at nearby
16 communities. During construction of solar energy facilities, construction equipment could
17 increase the noise levels over short durations during the day. After the facilities are constructed
18 and begin operating, there would be little or minor noise impacts for any of the technologies,
19 except from solar dish engine facilities and from parabolic trough or power tower facilities using
20 TES. It is possible that residents could be cumulatively affected by more than one solar or other
21 development built in close proximity to the SEZ, particularly at night when noise is more
22 discernable due to relatively low background levels. However, such cumulative impacts are
23 unlikely due to the expected wide separation of facilities and the sparse population of the region.
24
25

26 **9.3.22.4.15 Paleontological Resources**

27
28 The potential for impacts on significant paleontological resources at the Pisgah SEZ in
29 the Mojave Valley is unknown. The specific sites selected for future projects would be surveyed
30 if determined to be necessary by the BLM, and any paleontological resources encountered would
31 be avoided or mitigated to the extent possible. A similar process would be employed at other
32 facilities constructed in the area, and no significant cumulative impacts on paleontological
33 resources are expected.
34
35

36 **9.3.22.4.16 Cultural Resources**

37
38 Direct impacts on significant cultural resources during site preparation and construction
39 activities could occur in the proposed Pisgah SEZ. However, further investigation would be
40 needed, including a cultural resource survey of the entire area of potential effects to identify
41 historic properties (i.e., cultural resources eligible for listing in the NHRP). It is possible that the
42 development of utility-scale solar energy projects in the Pisgah SEZ and other projects likely to
43 occur in the area could contribute cumulatively to cultural resource impacts. However, historic
44 properties would be avoided or mitigated to the extent possible, in accordance with state and
45 federal regulations. Similarly, through ongoing consultation with the California SHPO and
46 appropriate Native American governments, it is likely that many adverse effects on significant

1 resources in the area could be mitigated to some degree, although some visual impacts may not
2 be mitigable to the satisfaction of all interested parties. The increment of adverse effects from
3 solar energy development on the overall cumulative effect on cultural resources would depend
4 on the nature of the resources affected, and could be significant.

5
6
7 **9.3.22.4.17 Native American Concerns**
8

9 Government-to-government consultation has been initiated with federally recognized
10 Tribes whose traditional use areas include the Pisgah SEZ area in order to identify Tribal
11 concerns regarding solar energy development within the SEZ. Among the concerns expressed by
12 the Tribes regarding solar energy development in the California deserts is the impairment of
13 culturally and religiously important landscapes, including adverse impacts on culturally
14 important native plant and game species. It is likely that the development of utility-scale solar
15 energy projects within the SEZ, when added to other potential projects likely to occur in the area,
16 including renewable energy projects outside the SEZ, would contribute cumulatively to visual
17 impacts on their traditional landscape and the destruction of other resources in the valley
18 important to Native Americans. The Pisgah SEZ vicinity has experienced past impacts from
19 highways, transmission lines, and other infrastructure along I-40. Continued government-to-
20 government consultation with the area Tribes is necessary to effectively consider and address the
21 cumulative impacts of solar energy development in the Pisgah SEZ on resources important to the
22 Tribes.

23
24
25 **9.3.22.4.18 Socioeconomics**
26

27 Solar energy development projects in the proposed Pisgah SEZ could cumulatively
28 contribute to socioeconomic effects in the immediate vicinity of the SEZs and in the surrounding
29 multicounty ROI. The effects could be positive (e.g., creation of jobs and generation of extra
30 income, increased revenues to local governmental organizations through additional taxes paid by
31 the developers and workers) or negative (e.g., added strain on social institutions such as schools,
32 law enforcement agencies, and health care facilities). Impacts from solar development would be
33 most intense during facility construction, but of greatest duration during operations. Construction
34 in the Pisgah SEZ and at other new projects in the area, including other renewable energy
35 development, would temporarily increase the number of workers in the area needing housing and
36 services. The number of workers involved in the construction of solar projects in the proposed
37 Pisgah SEZ alone could range from about 260 to 3,500 in the peak construction year, depending
38 on the technology being employed, with solar PV facilities at the low end and solar trough
39 facilities at the high end. The total number of jobs created in the area could range from
40 approximately 800 (solar PV) to as high as 10,700 (solar trough).

41
42 Cumulative socioeconomic effects in the ROI from construction of solar facilities would
43 occur to the extent that multiple construction projects of any type were ongoing simultaneously.
44 It is a reasonable expectation that this condition would occur within a 50-mi (80-km) radius of
45 the SEZ occasionally over the solar development period of 20 years or more. Anticipated
46 projects with advanced proposals, including three fast-track solar projects, could place a modest

1 short-term strain on local resources in this sparsely populated area during the period 2011 to
2 2013, when a number of projects might be constructed.

3
4 Annual impacts during the operation of solar facilities would be less, but could last 20 to
5 30 years and could combine with those from other new projects in the area. The number of
6 workers needed at the solar facilities within the SEZ would be in the range of 40 to 840, with
7 approximately 60 to 1,400 total jobs created in the region, depending on the solar technologies
8 used. Population increases resulting from renewable energy development within 50 mi (80 km)
9 of the proposed Pisgah SEZ would contribute to general population growth experienced in the
10 region in recent years. The overall socioeconomic impacts would be positive, through the
11 creation of additional jobs and income. The negative impacts, including some short-term
12 disruption of rural community quality of life, would not be considered large enough to require
13 SEZ-specific design features.

14 15 16 **9.3.22.4.19 Environmental Justice**

17
18 Solar development within the proposed Pisgah SEZ could have impacts on minority and
19 low-income populations within 50 mi (80 km) of the proposed Pisgah SEZ in California;
20 however, such impacts are expected to be small, mainly from dust emissions during construction
21 and potentially noise from some solar technologies during the operation of solar facilities
22 (Section 9.3.20.2). Such impacts, however, would not be expected to contribute to cumulative
23 impacts on minority and low-income populations, as they are generally of short duration and
24 range.

25 26 27 **9.3.22.4.20 Transportation**

28
29 During construction activities, there could be up to 1,000 workers commuting to a single
30 construction site at the SEZ. I-40 and the National Trails Highway would experience small
31 impacts for single projects that may have up to 1,000 daily workers, with an additional
32 2,000 vehicle trips per day (maximum). Such an increase is approximately 15% of the current
33 traffic on I-40 near the SEZ and could have small cumulative impacts in combination with
34 existing traffic levels and increases from additional future projects in the area. Should two large
35 projects with approximately 1,000 daily workers each be under development simultaneously,
36 cumulative impacts on I-40 and other local roads could be moderate.

37
38 Local road improvements may be necessary near site access points. Any impacts during
39 construction activities would be temporary. The impacts could be mitigated to some degree by
40 having different work hours for projects within the SEZ. Traffic increases during operation
41 would be reduced because of the lower number of workers needed to operate solar facilities and
42 would have a smaller contribution to cumulative impacts.

9.3.23 References

Note to Reader: This list of references identifies Web pages and associated URLs where reference data were obtained for the analyses presented in this PEIS. It is likely that at the time of publication of this PEIS, some of these Web pages may no longer be available or their URL addresses may have changed. The original information has been retained and is available through the Public Information Docket for this PEIS.

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1 **9.4 RIVERSIDE EAST**

2
3
4 **9.4.1 Background and Summary of Impacts**

5
6
7 **9.4.1.1 General Information**

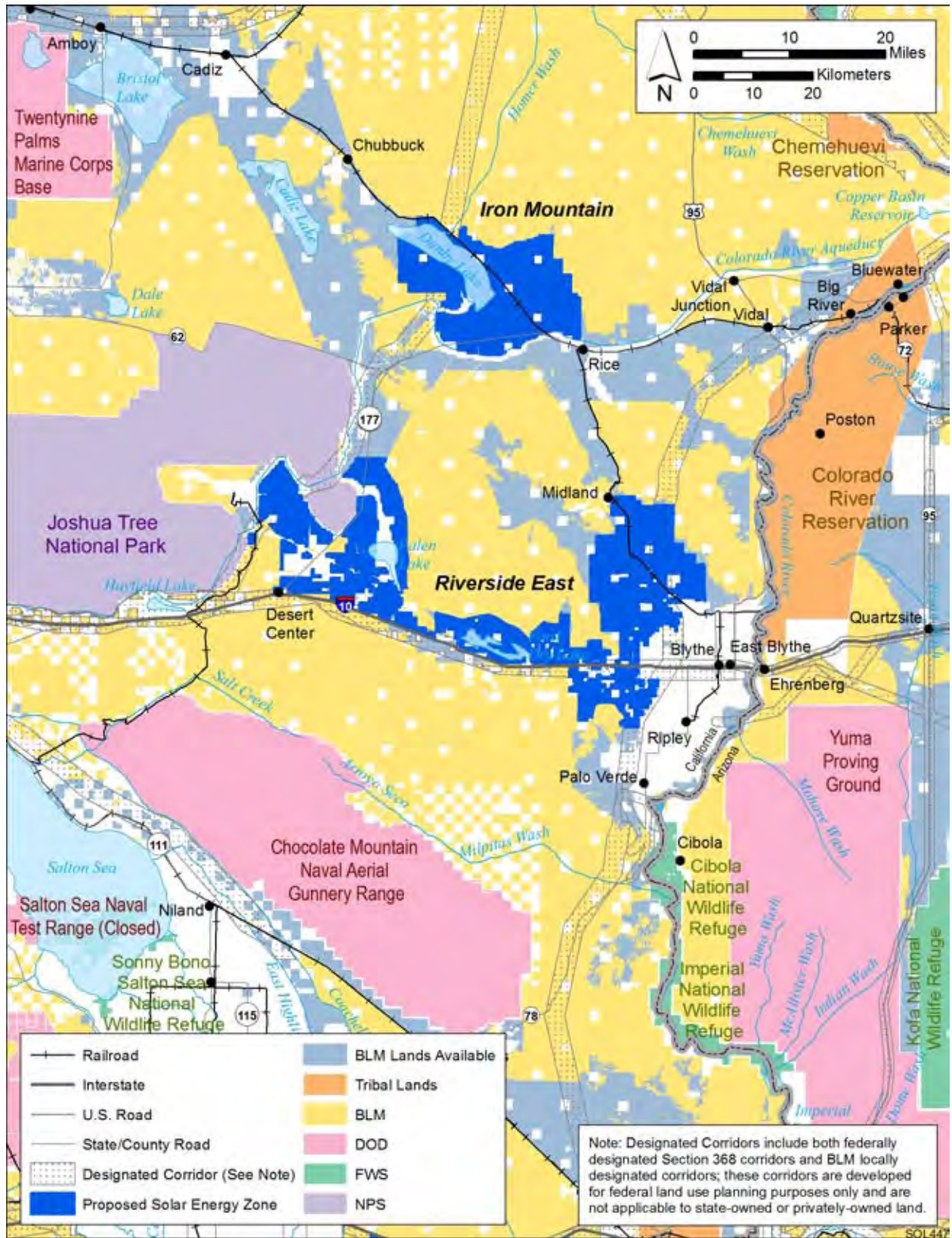
8
9 The proposed Riverside East SEZ is the largest of the proposed SEZs in the six-state
10 study area, with a total area of 202,896 acres (821 km²). The SEZ spans a distance of about
11 45 mi (72 km) between the points farthest west and east, but it has an irregular shape with a large
12 excluded central area (see Figure 9.4.1.1-1). The eastern boundary of the site is about 6 mi
13 (10 km) west of the Arizona border. The western boundary abuts and surrounds a portion of
14 Joshua Tree National Park. The nearest towns with populations greater than 10,000 are Blythe,
15 located about 6 mi (10 km) southeast of the SEZ with a 2008 population of 21,727; and Indio,
16 located about 45 mi (72 km) west of the SEZ on I-10, with a 2008 population of 84,443. The
17 small town of Desert Center (2000 population of 150) is located at the far southwestern edge of
18 the SEZ, along I-10.

19
20 The SEZ is located in Riverside County in southeastern California. In 2008, the county
21 population was 84,443. The closest large cities are Moreno Valley, San Bernardino, and
22 Riverside (all located slightly more than 100 mi [161 km] west of the SEZ on I-10. The Interstate
23 runs east–west along the southern boundary of the SEZ. Other paved roads that cross parts of the
24 Riverside East SEZ include State Route 177, which runs north–south through the western section
25 of the SEZ, and Midland Road, which crosses the northeastern portion of the SEZ. U.S. 95 runs
26 north–south about 3 mi (5 km) from the eastern boundary of the SEZ and through the town of
27 Blythe.

28
29 The nearest operating railroad is the Arizona and California (ARZC) Railroad, which
30 passes through Rice, about 18 mi (29 km) north of the large eastern section of the proposed
31 Riverside East SEZ. The ARZC is a regional short line; the rail stop at Vidal is about a 41 mi
32 (66 km) drive from the SEZ via U.S. 95. Eight small airports open to the public are within a
33 driving distance of approximately 72 mi (116 km) of the SEZ.

34
35 An existing 500-kV transmission line runs east–west along I-10 and parallel to the
36 southern SEZ boundary. It is assumed that the existing 500-kV transmission line could
37 potentially provide access from the SEZ to the transmission grid (see Section 9.4.1.2). In
38 addition, a 230-kV line passes through the far western section of the SEZ, and a 69-kV line
39 passes through the eastern portion of the SEZ, along with other transmission lines (see
40 Section 9.4.2).

41
42 As of February 2010, a total of 15 solar project applications were pending in the SEZ.
43 The combined areas of these applications cover about 132,000 acres (534 km²), about 65% of the
44 SEZ area (see Figure 9.4.1.1-1). Of these active pending applications within the SEZ, three are
45 fast-track applications for parabolic trough facilities and one is a fast-track application for a PV
46 facility. The combined capacity for these four facilities, when built, would be about 2,300 MW.



1

2 **FIGURE 9.4.1.1-1 Proposed Riverside East SEZ**

1 The proposed Riverside East SEZ and other relevant information are shown in
2 Figure 9.4.1.1-1. The criteria used to identify the SEZ as an appropriate location for solar
3 development included proximity to existing transmission lines or designated corridors, proximity
4 to existing roads, a slope of generally less than 2%, and an area of more than 2,500 acres
5 (10 km²). In addition, the area was identified as being free of other types of conflicts, such as
6 USFWS-designated critical habitat for threatened and endangered species, ACECs, SRMAs, and
7 NLCS lands (see Section 2.2.2.2 for the complete list of exclusions). Although these classes of
8 restricted lands were excluded from the proposed Riverside East SEZ, other restrictions might be
9 appropriate. The analyses in the following sections address the affected environment and
10 potential impacts associated with utility-scale solar energy development in the proposed SEZ for
11 important environmental, cultural, and socioeconomic resources.

12
13 As initially announced in the *Federal Register* on June 30, 2009, the proposed Riverside
14 East SEZ encompassed 202,295 acres (819 km²). Subsequent to the study area scoping period,
15 the Riverside East boundaries were altered somewhat to facilitate the BLM's administration of
16 the SEZ area. Borders with irregularly shaped boundaries were adjusted to match the section
17 boundaries of the PLSS (BLM and USFS 2010). Some small higher slope areas at the borders of
18 the site were also added to the SEZ, but these higher slope areas would not likely be utilized for
19 solar facilities. The revised SEZ is approximately 600 acres (2.4 km²) larger than the original
20 SEZ as published in June 2009.

21 22 23 **9.4.1.2 Development Assumptions for the Impact Analysis**

24
25 Maximum development of the proposed Riverside East SEZ was assumed to be 80% of
26 the total SEZ area over a period of 20 years, a maximum of 162,317 acres (657 km²). These
27 values are shown in Table 9.4.1.2-1, along with other development assumptions. Full
28 development of the Riverside East SEZ would allow development of facilities with an estimated
29 total of 18,035 MW of electrical power capacity if power tower, dish engine, or PV technologies
30 were used, assuming 9 acres/MW (0.04 km²/MW) of land required, and an estimated
31 32,463 MW of power if solar trough technologies were used, assuming 5 acres/MW
32 (0.02 km²/MW) of land required.

33
34 Availability of transmission from SEZs to load centers will be an important consideration
35 for future development in SEZs. The nearest existing transmission line is a 500-kV line that runs
36 through the SEZ. It is possible that this existing line could be used to provide access from the
37 SEZ to the transmission grid, but the 500-kV capacity of that line would be inadequate for
38 18,035 to 32,463 MW of new capacity (note that a 500-kV line can accommodate approximately
39 the load of one 700 MW facility). At full build-out capacity, it is clear that substantial new
40 transmission and/or upgrades of existing transmission lines would be required to bring electricity
41 from the proposed Riverside East SEZ to load centers; however, at this time the location and size
42 of such new transmission facilities are unknown. Generic impacts of transmission and associated
43 infrastructure construction and of line upgrades for various resources are discussed in Chapter 5.
44 Project-specific analyses would need to identify the specific impacts of new transmission
45 construction and line upgrades for any projects proposed within the SEZ.
46

TABLE 9.4.1.2-1 Proposed Riverside East Development Acreages, Maximum Solar Megawatt Output, Access Roads, and Transmission Line ROWs

Total Acreage and Assumed Developed Acreage (80% of Total)	Assumed Maximum SEZ Output for Various Solar Technologies	Distance to Nearest State, U.S. or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Transmission Line ROW and Road ROW	Distance to Nearest Designated Transmission Corridor ^d
202,896 acres and 162,317 acres ^a	18,035 MW ^b 32,463 MW ^c	Adjacent (I-10)	Adjacent to SEZ, and 500 kV	0 acres and 0 acres	Adjacent to SEZ ^e

^a To convert acres to km², multiply by 0.004047.

^b Maximum power output if the SEZ were fully developed using power tower, dish engine, or PV technologies, assuming 9 acres/MW (0.04 km²/MW) of land required.

^c Maximum power output if the SEZ were fully developed using solar trough technologies, assuming 5 acres/MW (0.02 km²/MW) of land required.

^d BLM-designated corridors are developed for federal land use planning purposes only and are not applicable to state-owned or privately owned land.

^e A Section 368 federally designated 2-mi (3-km) wide energy corridor runs adjacent to the south boundary of the SEZ.

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For the purposes of analysis in this PEIS, it was assumed that the existing 500-kV transmission line that runs east–west along I-10 and parallel to the southern SEZ boundary could provide access to the transmission grid, and thus no additional acreage disturbance for transmission line access was assessed. In addition, a 230-kV line passes through the far western section of the SEZ, and a 69-kV line passes through the eastern portion of the SEZ. Access to the existing transmission lines was assumed, without additional information on whether these lines would be available for connection of future solar facilities. If a connecting transmission line were constructed in the future to a different off-site grid location from the one assumed here, site developers would need to determine the impacts from construction and operation of that line. Additionally, developers would need to determine the impacts of line upgrades if they are needed.

Existing road access to the proposed Riverside East SEZ should be adequate to support construction and operation of solar facilities, because I-10 passes along the southern edge of the SEZ and there are several exits from I-10 as it passes by and through the SEZ. Because of the site access provided by I-10, no additional road construction outside of the SEZ is assumed to be required to support solar development of the SEZ.

1 **9.4.1.3 Summary of Major Impacts and SEZ-Specific Design Features**
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3 In this section, the impacts and SEZ-specific design features assessed in Sections 9.4.2
4 through 9.4.21 for the proposed Riverside East SEZ are summarized in tabular form.
5 Table 9.4.1.3-1 is comprehensive list of the impacts identified in these sections; the reader may
6 reference the applicable sections for detailed support of the impact assessment. Section 9.4.22
7 discusses potential cumulative impacts from solar energy development in the proposed SEZ.
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9 Only those design features specific to the proposed Riverside East SEZ are included in
10 Sections 9.4.2 through 9.4.21 and in the summary table. The detailed programmatic design
11 features for each resource area to be required under BLM’s proposed Solar Energy Program are
12 presented in Appendix A, Section A.2.2. These programmatic design features would also be
13 required for development in this and the other SEZs.
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TABLE 9.4.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Riverside East SEZ and SEZ-Specific Design Features^a

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the SEZ for utility-scale solar energy production (80% of the total area) could disturb up to 162,317 acres (657 km ²) and would establish a very large and continuous industrial area along the 45-mi (72-km) stretch of I-10 that would exclude many existing and potential uses of the land, perhaps in perpetuity. Since much of the SEZ is undeveloped and rural, utility-scale solar energy development would introduce a new and discordant land use to the area.	None.
	Solar development along the I-10 corridor, State Route 177, and Midland Road would be highly visible to the public traveling these routes. In addition, solar development in the western portion of the SEZ along State Route 177 and County Road 2 would likely create conflict with existing residential use near Desert Center, Lake Tamarisk Resort, and scattered private residences, including those associated with agricultural development.	None.
	It is possible that the 11,640 acres (47 km ²) of private and state lands located within the external boundary of the SEZ eventually would be developed in the same or a complementary manner as the public lands.	None.
	15,683 acres (63 km ²) of the Section 368 energy corridor overlaps with the proposed SEZ. Two other BLM corridors oriented principally north and south designated in the CDCA Plan also overlap the SEZ. Because of technical constraints, solar development could not occur within a transmission ROW. Thus it appears that either the transmission corridors would have to be modified/reduced or solar development would have to be precluded within the transmission corridor.	None.

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Specially Designated Areas and Lands with Wilderness Characteristics	SEZ development would adversely affect wilderness characteristics in the Palen-McCoy, Rice Valley, Big Maria Mountains, Chuckwalla Mountains, and Little Chuckwalla Mountains WAs and in Joshua Tree NP.	Application of SEZ-specific design features for visual resource impacts may reduce the visual impact on wilderness characteristics
	Solar facility development could adversely affect the scenic view from Joshua Tree National Park, the natural soundscape, and the quality of the night sky environment as viewed from the NP and wilderness areas in the region.	None.
	There is potential for adverse impacts on resources within the seven ACECs in and near the SEZ.	Once construction of solar energy facilities begins, the BLM would monitor resource conditions in the seven ACECs to determine whether additional design features would be required to protect the resources in these areas.
Rangeland Resources: Livestock Grazing	None.	None.
Rangeland Resources: Wild Horses and Burros	None.	None.
Recreation	Recreational users would lose the use of any portions of the SEZ developed for solar energy production, but the amount of recreation that is lost is expected to be small. Roads and trails through areas developed for solar power production could be closed or rerouted, although existing county roads would continue to provide general access where they exist.	None.
	The Midland LTVA is located within the SEZ, and solar development could occur very close to the LTVA. The impact of solar energy development on the use of the LTVA by winter visitors is not known, but it is likely the combination of increased traffic and development could discourage some of this use.	A buffer between the Midland LTVA and solar development should be established to preserve the LTVA area. The size of the buffer should be determined based on the site- and visitor-specific criteria.

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Recreation (<i>Cont.</i>)	A large-scale change in the overall character of the SEZ would accompany intensive solar development and would discourage recreational use in areas adjacent to the SEZ, including designated wilderness, undesignated lands, and Joshua Tree NP. The potential loss of recreation use is not known.	None.
Military and Civilian Aviation	<p>The development of any solar energy or transmission facilities that encroach into the airspace of MTRs could conflict with military training activities and could create a safety concern.</p> <p>Two public airports are located within or in near proximity of the SEZ and could be affected by solar energy development.</p>	<p>None.</p> <p>Coordination with the FAA and local airport authorities should be required early in the project planning process to identify and mitigate potential impacts on the local airports.</p> <p>Precautions should be taken for pilots to avoid interference with flight paths or related flight operations, and to avoid reflector glare hazards and thermal plumes.</p>
Geologic Setting and Soil Resources	Impacts on soil resources would occur as a result of ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase. Impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. These may be impacting factors for other resources (e.g., air quality, water quality, and vegetation). Palen and Ford Dry Lakes may not be suitable locations for construction.	None.
Minerals (fluids, solids, and geothermal resources)	None.	None.

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Water Resources	<p>Ground-disturbance activities (affecting 4% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills.</p> <p>Construction activities may require up to 6,813 ac-ft (8.4 million m³) of water during peak construction year.</p> <p>Construction activities could generate up to 222 ac-ft (273,800 m³) of sanitary wastewater.</p> <p>Assuming full development of the SEZ, normal operations would use the following amounts of water:</p> <ul style="list-style-type: none"> • For parabolic trough facilities (32,463-MW capacity), 23,180 to 49,150 ac-ft/yr (28.6 million to 60.6 million m³/yr) for dry-cooled systems (wet cooling not feasible with respect to water requirements); • For power tower facilities (18,035-MW capacity), 12,827 to 27,255 ac-ft/yr (15.8 million to 33.6 million m³/yr) for dry-cooled systems (wet cooling not feasible with respect to water requirements); • For dish engine facilities (18,035-MW capacity), 9,220 ac-ft/yr (11.4 million m³/yr). • For PV facilities (18,035-MW capacity), 922 ac-ft/yr (1.1 million m³/yr). <p>Assuming full development of the SEZ, normal operations would generate up to 455 ac-ft/yr (561,200 m³/yr) of sanitary wastewater and up to 9,222 ac-ft (11.4 million m³/yr) of blowdown water.</p>	<p>Wet-cooling options would not be feasible; other technologies should incorporate water conservation measures.</p> <p>Land disturbance activities should avoid impacts to the extent possible near the regions surrounding Palen Lake, Ford Dry Lake, and McCoy Wash.</p> <p>During site characterization, hydrologic investigations would need to identify 100-year floodplains and potential jurisdictional water bodies subject to Clean Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as within a 100-year floodplain.</p> <p>During site characterization, coordination and permitting with CDFG regarding California's Lake and Streambed Alteration Program would be required for any proposed alterations to surface water features (both perennial and ephemeral).</p> <p>Groundwater withdrawals should comply with rules and regulations set forth by the PVID for the portions of the SEZ located within PVID boundaries.</p> <p>The use of groundwater in the Chuckwalla Valley and Palo Verde Mesa should be planned for and monitored in cooperation with the BOR and the USGS in reference to the Colorado River Accounting Surface and the rules set forth in the Law of the River.</p>

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Water Resources (Cont.)	High TDS values of groundwater could produce water that is non-potable and corrosive to infrastructure.	<p>Groundwater monitoring and production wells should be constructed in accordance with standards set forth by the State of California and Riverside County.</p> <p>Stormwater management plans and BMPs should comply with standards developed by the California Stormwater Quality Association.</p> <p>Water for potable uses would have to meet or be treated to meet water quality standards of the California Safe Drinking Water Act.</p>
Vegetation ^b	<p>Up to 80% (162,317 acres [657 km²]) of the SEZ would be cleared of vegetation. Re-establishment of desert scrub or other communities in temporarily disturbed areas would likely be very difficult because of the arid conditions and might require extended periods of time.</p> <p>Noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation.</p> <p>The deposition of fugitive dust from disturbed soil areas in habitats outside a solar project area could result in reduced productivity or changes in plant community composition.</p> <p>Approximately 3,807 acres (15.4 km²) of wetland habitat occurs within the SEZ and could be adversely affected by project development.</p> <p>Groundwater withdrawals could reduce groundwater discharge along riparian areas, and such reductions at springs and seeps that support riparian habitats could result in degradation of these habitats.</p>	<p>An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration and management, should be approved and implemented to increase the potential for successful restoration of creosotebush-white bursage desert scrub communities and other affected habitats and minimize the potential for the spread of tamarisk, Sahara mustard, cheatgrass, or other invasive species. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides.</p> <p>All wetland, riparian, playa, dry wash (including dry wash microphyll woodland), sand dune and sand transport areas, and chenopod scrub habitats within the SEZ should be avoided to the extent practicable, and any impacts minimized and mitigated. A buffer area should be maintained around wetland, riparian, playa, and dry wash communities to reduce the potential for impacts on these communities on or near the SEZ.</p>

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Vegetation ^b (Cont.)		<p>Appropriate engineering controls should be used to minimize impacts on wetland, riparian, playa, dry wash woodland, and chenopod scrub, including downstream occurrences, resulting from surface-water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.</p> <p>Groundwater withdrawals should be limited to reduce the potential for indirect impacts on riparian habitat associated with groundwater discharge or groundwater-dependent communities, such as mesquite bosque or bush seep-weed communities.</p>
Wildlife: Amphibians and Reptiles ^b	<p>The red-spotted toad and Couch's spadefoot are the main amphibian species expected to occur within the Riverside East SEZ. Several other amphibian species could inhabit the Colorado River Aqueduct west of the SEZ. These species, which include the bullfrog, Colorado River toad, Rio Grande leopard frog, and Woodhouse's toad, would not be expected to occur within the SEZ.</p> <p>Thirty-one reptile species (the desert tortoise, which is a federally and state-listed species, 13 lizards, and 17 snakes) could occur within the SEZ.</p> <p>Direct impacts on these species from SEZ development would be moderate (3.5 to 5.9% of potentially suitable habitats identified for the species in the SEZ region would be lost). With implementation of programmatic design features, indirect impacts would be expected to be negligible.</p>	<p>To the extent practicable, avoid ephemeral drainages, Palen Lake and Ford Dry Lake, and wetlands.</p> <p>The potential for indirect impacts on several amphibian species could be reduced by maximizing the distance between solar energy development and the Colorado River Aqueduct.</p>

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Wildlife: Birds ^b	<p>More than 100 species of birds have a range that encompasses the Riverside East SEZ region. However, habitats for about 40 of these species either do not occur on or are limited within the SEZ (e.g., habitat for waterfowl and wading birds).</p> <p>Direct impacts from habitat disturbance and long-term habitat reduction/fragmentation would be small to moderate (0.3 to 5.5% of potentially suitable habitats identified for the species in the SEZ region would be lost).</p> <p>Other impacts on birds could result from collision with vehicles and facility structures, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.</p> <p>Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of proposed design features.</p>	<p>Pre-disturbance surveys should be conducted within the SEZ for desert bird focal species and bird species listed under the Migratory Bird Treaty Act. Impacts on potential nesting habitat for these species should be avoided during the nesting season.</p> <p>Plant species that positively influence the presence and abundance of the desert bird focal species should be avoided to the extent practicable. These species include Goodding's willow, yucca, Joshua tree, mesquite, honey mesquite, screwbean, desert mistletoe, big saltbush, smoketree, and catclaw acacia.</p> <p>Take of golden eagles and other raptors should be avoided. Mitigation regarding the golden eagle should be developed in consultation with the USFWS and CDFG. A permit may be required under the Bald and Golden Eagle Protection Act.</p> <p>To the extent practicable, ephemeral drainages, Ford Dry Lake and Palen Lake, wetlands, and the CRA should be avoided.</p>
Wildlife: Mammals ^b	<p>Direct impacts on cougar, mule deer, small game, furbearers, and small mammals on the SEZ from habitat disturbance and long-term habitat reduction/fragmentation would be moderate (3.3 to 7.2% of potentially suitable habitats identified for the species in the SEZ region would be lost).</p>	<p>The fencing around the solar energy development should not block the free passage of mule deer between the Colorado River and mountains or foothills.</p>

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Wildlife: Mammals ^b (Cont.)	<p>Although the Riverside East SEZ falls within the overall range of the cougar, desert habitat is not the preferred habitat for the species. It is unlikely that impacts from solar energy development within the SEZ would represent an actual loss of occupied habitat.</p> <p>Mule deer could occur within the desert scrub and desert wash habitats of the SEZ for portions of the year, particularly when standing water occurs in Ford Dry Lake and Palen Lake. Fencing around a large solar development within the SEZ could affect movement of mule deer between the Colorado River and mountains or foothills.</p> <p>Other impacts on mammals could result from collision with vehicles and fences, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.</p> <p>Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of proposed design features.</p>	To the extent practicable, ephemeral drainages, Ford Dry Lake and Palen Lake, wetlands, and the Colorado River Aqueduct should be avoided.
Aquatic Biota ^b	<p>No permanent water bodies or streams are present within the boundaries of the Riverside East SEZ. Within the SEZ and the area of potential indirect effects, aquatic biota, if present in Palen Lake, Ford Dry Lake, and wetlands, could be affected by ground disturbance, contaminants inputs, and soil deposition from runoff and fugitive dust.</p> <p>About 31 mi (50 km) of the Colorado River Aqueduct is present primarily along the western edge of the SEZ. Aquatic organisms present in this feature could be affected by airborne particulate deposition originating from the SEZ especially for ground disturbance occurring along the western boundary of the SEZ.</p>	<p>Ground disturbance near McCoy Wash, Palen Lake, Ford Dry Lake and wetlands should be avoided or minimized to the extent practicable.</p> <p>None.</p>

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Special Status Species ^b	<p>Potentially suitable habitat for 69 special status species occurs in the affected area of the Riverside East SEZ. For most of these special status species, between 1% and 10% of the potentially suitable habitat in the region occurs in the area of direct effects; for several dune-obligate species, up to 32% of the potentially suitable habitat in the region occurs in the area of direct effects.</p>	<p>Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species. Disturbance to occupied habitats for these species should be avoided or minimized to the extent practicable. If avoiding or minimizing impacts to occupied habitats is not possible for some species, translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that used one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies.</p> <p>Disturbance of desert playa and wash habitats within the SEZ should be avoided or minimized to the extent practicable. In particular, development should be avoided in and near Ford Dry Lake, Palen Lake, and McCoy Wash within the SEZ. Avoiding or minimizing disturbance of these habitats could reduce impacts on 9 special status species.</p> <p>Avoiding or minimizing disturbance of sand dunes and sand transport systems, woodlands, rocky cliffs, and outcrops on the SEZ could reduce impacts on 20 special status species.</p> <p>Consultations with the USFWS and the CDFG should be conducted to address the potential for impacts on the desert tortoise a species listed as</p>

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Special Status Species ^b (Cont.)		<p>threatened under the ESA and CESA. Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.</p> <p>Harassment or disturbance of special status species and their habitats in the affected area should be mitigated by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and CDFG.</p>
Air Quality and Climate	<p><i>Construction:</i> Temporary exceedances of AAQS for PM₁₀ and PM_{2.5} at the SEZ boundaries; higher concentrations would be limited to the immediate area surrounding the SEZ boundary and would decrease quickly with distance. For construction occurring in the west-central portion of the SEZ, fugitive dust emissions could result in considerable impacts at the nearest federal Class I area (Joshua Tree NP). (Conservative assumptions e.g., three simultaneous construction projects occurring in close proximity to the Joshua Tree NP resulted in these estimates). Engine exhaust of heavy equipment and vehicles could cause some impacts on air-quality-related values (e.g., visibility and acid deposition) at the nearest federal Class I area. NO_x emissions from engine exhaust would be the primary contributors to potential impacts on AQRVs.</p>	None.

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Air Quality and Climate (Cont.)	<i>Operations:</i> Positive impact due to avoided emission of air pollutants from combustion-related power generation: 30 to 54% of total emissions of SO ₂ , NO _x , Hg, and CO ₂ from electric power systems in the state of California avoided (up to 7,272 tons/yr SO ₂ , 11,944 tons/yr NO _x , 0.11 ton/yr Hg, and 28,258,000 tons/yr CO ₂).	
Visual Resources	<p>Large visual impacts on the SEZ and surrounding lands within the SEZ viewed due to major modification of the character of the existing landscape; potential additional impacts from construction and operation of transmission lines and access roads within the SEZ.</p> <p>Residents, workers, and visitors to the area may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) as they travel area roads. Nearby residents could be subjected to large visual impacts from solar energy development within the SEZ.</p> <p>The SEZ is located within the CDCA. While renewable energy development is allowable within the SEZ under the CDCA management plan, substantial, immitigable visual impacts will occur within the CDCA in the SEZ and surrounding lands.</p> <p>The SEZ is adjacent to Joshua Tree NP and Joshua Tree WA. Because of the open views of the SEZ and/or elevated viewpoints, strong visual contrasts could be observed by NP and WA visitors.</p> <p>The SEZ is adjacent to the Big Maria Mountains WA. Because of the open views of the SEZ and/or elevated viewpoints, strong visual contrasts could be observed by WA visitors.</p> <p>The SEZ is located 1.1 mi (1.8 km) from the Chuckwalla Mountains WA. Because of the open views of the SEZ and elevated viewpoints, weak to strong visual contrasts could be observed by WA visitors.</p>	<p>Within the SEZ, in areas west of the northwest corner of Section 6 of Township 006S Range 017E, and in areas north and west of the northwest corner of Section 30 of Township 005S Range 018E, visual impacts associated with solar energy development in the SEZ should be consistent with VRM Class II management objectives, as determined from KOPs to be selected by the BLM within Joshua Tree NP and the Palen-McCoy WA.</p> <p>Within the SEZ, in areas visible from and within 3 mi (4.8 km) of the Rice Valley or Big Maria Mountains WSAs, visual impacts associated with solar energy project operation should be consistent with VRM Class II management objectives, as experienced from KOPs (to be determined by the BLM) within the WSAs, and in areas visible from between 3 and 5 mi (4.8 and 8.0 km); visual impacts should be consistent with VRM Class III management objectives.</p>

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Visual Resources (Cont.)	<p>The SEZ is located 5 mi (8 km) from the Little Chuckwalla Mountains WA. Because of the open views of the SEZ and elevated viewpoints, moderate to strong visual contrasts could be observed by WA visitors.</p> <p>The SEZ is adjacent to the Palen-McCoy WA. Because of the open views of the SEZ and/or elevated viewpoints, weak to strong visual contrasts could be observed by WA visitors.</p> <p>The SEZ is located 6 mi (10 km) from the Palo Verde Mountains WA. Because of the open views of the SEZ and elevated viewpoints, weak to moderate visual contrasts could be observed by WA visitors.</p> <p>The SEZ is located 0.5 mi (0.8 km) from the Rice Valley WA. Because of the open views of the SEZ and elevated viewpoints, strong visual contrasts could be observed by WA visitors.</p> <p>The SEZ is located 5 mi (8 km) from the Corn Springs Scenic ACEC. Because of the open views of the SEZ and elevated viewpoints, strong visual contrasts could be observed by ACEC visitors.</p> <p>Approximately 23 mi (37.0 km) of the Bradshaw Trail BLM Backcountry Byway is within the SEZ viewshed. Weak to strong visual contrasts could be observed within and near the SEZ by travelers on the Bradshaw Trail. Approximately 79 mi (127 km) of I-10 is within the SEZ viewshed. Six mi (10 km) of I-10 is within or abuts the SEZ. An additional 34 mi (55 m) is within 0.67 mi (1.1 km). Strong visual contrasts could be observed within and near the SEZ by travelers on I-10. Approximately 27 mi (43 m) of State Route 177 is within the SEZ viewshed. Eight mi (13 km) of State Route 177 is within the SEZ. Strong visual contrasts could be observed within and near the SEZ by travelers on State Route 177.</p>	

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Visual Resources (Cont.)	<p>The communities of Blythe, East Blythe, Ehrenberg, Palo Verde, Ripley, Cibola (Arizona), and Desert Center (including the Lake Tamarisk development) are located within the viewshed of the SEZ, although slight variations in topography and vegetation provide some screening. Strong visual contrasts may be observed within Desert Center and Lake Tamarisk. Moderate to strong visual contrasts may be observed within Blythe, East Blythe, and Ripley. Weak to moderate visual contrasts may be observed within Ehrenberg and Palo Verde.</p>	
Acoustic Environment	<p><i>Construction.</i> Estimated noise levels at the nearest residences located just next to the west-central SEZ boundary would be about 74 dBA L_{eq}, which is higher than Riverside County regulation of 45 dBA daytime L_{eq}. For a 10-hour daytime work schedule, 70 dBA L_{dn} at the nearest residences would be well above the EPA guideline of 55 dBA L_{dn} for residential areas.</p> <p><i>Operations.</i> Noise levels at the nearest residences from a CSP solar facility would be 51 dBA L_{eq}, which is higher than the Riverside County standard of 45 dBA daytime L_{eq}. For 12-hour daytime operations, the estimated 49 dBA L_{dn} falls below the EPA guideline of 55 dBA L_{dn} for residential areas. However, for facilities with 6-hour TES, the estimated nighttime sound level at the nearest residences would be 61 dBA L_{eq}, which is higher than the Riverside County standard of 45 dBA daytime L_{eq}. The day-night average level is estimated to be about 63 dBA L_{dn}, which is higher than the EPA guideline of 55 dBA L_{dn} for residential areas.</p> <p>If 80% of the SEZ were developed with dish engine facilities, the estimated noise level of 59 dBA L_{eq} at the nearby residence would be higher than the Riverside County regulation of 45 dBA daytime L_{eq}. For 12-hour daytime operations, the estimated 56 dBA L_{dn} at the nearby residence would be a little higher than the EPA guideline of 55 dBA L_{dn} for residential areas.</p>	<p>Noise levels from cooling systems equipped with TES should be managed so that levels at the nearby residences to the west and to the east of the SEZ are kept within applicable guidelines. This could be accomplished in several ways, for example, through placing the power block approximately 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few hours after sunset, and/or installing fan silencers.</p> <p>Dish engine facilities within the Riverside East SEZ should be located more than 1 to 2 mi (1.6 to 3 km) from the nearby residences to the west and the east of the SEZ (i.e., the facilities should be located in other portions of the proposed SEZ). Direct noise control measures applied to individual dish engine systems could also be used to reduce noise impacts at the nearest residences.</p>

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Paleontological Resources	The potential for impacts on significant paleontological resources at the SEZ is relatively unknown, but could be high in some areas. A more detailed investigation of the local geological deposits of the SEZ and their potential depth is needed; a paleontological survey would likely be required prior to project approval.	The need for and the nature of any SEZ-specific design features would depend on findings of paleontological surveys.
Cultural Resources	<p>Direct impacts on significant cultural resources could occur in the proposed Riverside East SEZ; however, a cultural resource survey of the entire area of potential effect of a proposed project would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would then be needed to determine whether any are eligible for listing in the NRHP.</p> <p>Numerous prehistoric and Native American sites and trails are potentially located within the SEZ and could be affected by solar energy development. Potential impacts on locations in the area that are of cultural or religious significance to Native American Tribes must also be evaluated.</p> <p>Activities associated with the WWII DDTC were also prominent in the valley, and physical remnants of those activities are present within the SEZ and could be affected.</p>	<p>Significant resources clustered in specific areas, such as those in the vicinity of Palen and Ford Dry Lakes, focused DTC/C-AMA activity areas that retain sufficient integrity, and Native American trails evident in the desert pavement should be avoided.</p> <p>Troops in training for World War II often used the same locations that Native Americans did for similar purposes. Any excavation of historic sites should take into consideration the potential for the co-location of prehistoric and ethnohistoric components.</p> <p>Other possible design features specific to the SEZ would be determined through consultation with the California SHPO and affected Tribes.</p>
Native American Concerns	Concerns have been expressed in the past over the Salt Song Trail, which passes down Palen Valley and through the Riverside East SEZ. Solar development within the SEZ is likely to be visible from the trail. Additional trail networks also go through or near the SEZ. Additional features of potential concern include Big Maria, Coxcomb, and Eagle Mountains, Alligator Rock, Black Rock, and McCoy Springs.	The need for and nature of SEZ-specific design features would be determined during government-to-government consultation with the affected Tribes.

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Native American Concerns (<i>Cont.</i>)	As consultations continue, it is possible that other Native American concerns, regarding solar energy development within the SEZ will emerge. The Soboba Band of Luiseno Indians and the Quechan have expressed concerns over highly sensitive areas within their Tribal Traditional Use Areas.	
Socioeconomics	<p><i>Construction:</i> 1,181 to 15,633 total jobs; \$70 million to \$927 million income in ROI.</p> <p><i>Operations:</i> 498 to 11,670 annual total jobs; \$17 million to \$424 million annual income in the ROI.</p>	None.
Environmental Justice	There are both minority populations and low-income populations, as defined by CEQ guidelines, within the 50-mi (80-km) radius around the boundary of the SEZ, meaning that any adverse impacts of solar projects could disproportionately affect minority and low-income populations.	None.
Transportation	<p>The primary transportation impacts would result from commuting worker traffic. I-10 provides a regional traffic corridor that would experience small impacts for single projects that may have up to 1,000 daily workers, with an additional 2,000 vehicle trips per day (maximum). Such an increase is less than 10% of the current traffic on I-10. However, the exits on I-10 might experience moderate impacts with some congestion.</p> <p>Should up to three large projects with approximately 1,000 daily workers each be under development simultaneously, an additional 6,000 vehicle trips per day could be added to I-10 in the vicinity of the SEZ, which is about a 25% increase in the current average daily traffic level on most segments of I-10 near the SEZ.</p>	None.

TABLE 9.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Riverside East SEZ	SEZ-Specific Design Features
Transportation (<i>Cont.</i>)	Because of the proximity of the Blythe and Desert Center Airports, without proper planning, there could be problems with reflector glare from the SEZ interfering with pilot vision during takeoffs and landings.	None.

Abbreviations: AAQS = ambient air quality standards; ACEC = Area of Critical Environmental Concern; BLM = Bureau of Land Management; BMP = best management practice; BOR = U.S. Bureau of Reclamation; CDCA = California Desert Conservation Area; CDFG = California Department of Fish and Game; CEQ = Council on Environmental Quality; CESA = California Endangered Species Act; CO₂ = carbon dioxide; dBA = A-weighted decibel; DoD = U.S. Department of Defense; DTC = Desert Training Center; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; FAA = Federal Aviation Administration; Hg = mercury; KOP = key observation point; L_{dn} = day-night average sound level; L_{eq} = equivalent continuous sound level; LTVA = long term visitor area; MTR = military training route; NO_x = nitrogen oxides; NP = National Park; NRHP = *National Register of Historic Places*; PM_{2.5} = particulate matter with an aerodynamic diameter of 2.5 μm or less; PM₁₀ = particulate matter with an aerodynamic diameter of 10 μm or less; PSD = prevention of significant deterioration;; PVID = Palo Verde Irrigation District; ROI = region of influence; SEZ = solar energy zone; SHPO = State Historic Preservation Office; SO₂ = sulfur dioxide; TDS = total dissolved solids; TES = thermal energy storage; USFWS = U.S. Fish and Wildlife Service; VRM = visual resource management; WA = Wilderness Area; WSA = Wilderness Study Area; WWII = World War II.

- ^a The detailed programmatic design features for each resource area to be required under BLM's proposed Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would be required for development in the proposed Riverside East SEZ.
- ^b The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 9.4.10 through 9.4.12.

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1 **9.4.2 Lands and Realty**

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4 **9.4.2.1 Affected Environment**

5
6 The proposed Riverside East SEZ, at approximately 203,000 acres (821 km²), is by far
7 the largest of the SEZs being considered in this PEIS. It stretches for about 45 mi (72 km) east to
8 west and measures about 25 mi (40 km) north to south. The towns of Blythe and Desert Center
9 mark the approximate eastern and western limits of the SEZ. The western border of the SEZ lies
10 close to much of the eastern border of Joshua Tree NP. The SEZ is located along a critical east-
11 west corridor that contains I-10, numerous pipelines, and transmission lines and surrounds a
12 portion of the Los Angeles Metropolitan Water District (MWD) Colorado River Aqueduct
13 (CRA). Most of the pipelines are south of I-10 and outside of the SEZ, with the exception of the
14 parcel south of I-10 on the eastern side of the SEZ. Five large transmission lines plus one more
15 under construction pass through portions of the SEZ, primarily in the southeast and west (BLM
16 2009c, 2010a). State Route 177 passes through the west side of the SEZ in a northeasterly
17 direction, and the Midland-Rice Road and a railroad pass through the eastern portion of the SEZ
18 in a northwesterly direction.

19
20 In spite of this activity, most of the BLM-administered lands, especially those north of
21 I-10 in the east, those between I-10 and the Palen-McCoy Mountains in the central part of the
22 SEZ, and those on the west side of the Palen-McCoy Mountains and around Palen Lake, retain
23 an undeveloped character. BLM lands in the western portion of the SEZ near I-10 and Desert
24 Center and northwest of State Route 177 are also largely undeveloped, but the presence of
25 developed private land including some residences, the state highway, extensive MWD facilities,
26 a small airport, and the inactive Kaiser Mine and related facilities give the area a more developed
27 setting.

28
29 Although the SEZ contains only BLM-administered land, numerous parcels of private
30 land totaling about 11,000 acres (45 km²) also are scattered throughout the SEZ, with additional
31 private lands in near proximity to its external boundaries. There is also one section of state land
32 surrounded by the SEZ. The city of Blythe, California, on the eastern side of the SEZ, is
33 surrounded by an extensive block of agricultural lands irrigated with water from the Colorado
34 River.

35
36 A Section 368 federally designated, 2-mi (3-km) wide energy corridor on BLM
37 administered lands overlaps the SEZ along I-10. This corridor, which was originally established
38 in the CDCA Plan (BLM 1999), was recently also identified as a Section 368 corridor in the
39 West-wide Corridor PEIS (DOE and DOI 2008) (see also Section 3.2.5). There are also two
40 north-south corridors within the SEZ that were designated as part of the CDCA Plan. One
41 corridor is located in the western portion of the SEZ and one in the eastern portion. Although
42 both corridors have one transmission line in them, these corridors now may not be fully
43 functional since the eastern one crosses designated BLM wilderness (Big Maria Mountains and
44 Rice Valley WAs) and the western one crosses Joshua Tree NP. The portions of the corridors
45 south of the designated wildernesses and the park may still be useful.

1 As of February 2010, there were 15 active solar development applications wholly or
2 partially within the Riverside East SEZ boundaries. Four of these applications are BLM fast-
3 track projects for which environmental reviews have begun.
4

5 6 **9.4.2.2 Impacts**

7 8 9 **9.4.2.2.1 Construction and Operations**

10
11 Development of the proposed Riverside East SEZ for utility-scale solar energy
12 production would establish a large and continuous industrial area along the 45-mi (72-km)
13 stretch of I-10 and in large blocks of public lands north and south of the highway. The SEZ
14 would exclude many existing and potential uses of the land, perhaps in perpetuity. Since much of
15 the SEZ is undeveloped and rural, utility-scale solar energy development would be a new and
16 discordant land use to the area. Development along the I-10 corridor, State Route 177, and
17 Midland Road would be highly visible to the public traveling these routes. In addition, solar
18 development in the western portion of the SEZ along State Route 177 and County Road 2 could
19 create conflict with existing residential use near Desert Center, Lake Tamarisk Resort, and
20 scattered private residences, including those associated with agricultural development. It also is
21 possible that with private land owner and state agreement, the 11,640 acres (47 km²) of private
22 and state lands located within the external boundary of the SEZ eventually could be developed in
23 the same or a complementary manner as the public lands.
24

25 Current ROW authorizations on the SEZ would not be affected by solar energy
26 development, because they are prior rights. Should the area be identified as an SEZ in the ROD
27 for this PEIS, the BLM would still have discretion to authorize additional ROWs in the area until
28 solar energy development was approved, and then future ROWs would be subject to the rights
29 granted for solar energy development.
30

31 The parts of the three designated energy corridors that overlap the proposed SEZ, and
32 solar energy development of the SEZ, are currently in conflict with solar development, because
33 to avoid technical or operational interference with transmission facilities, solar energy facilities
34 cannot be constructed under transmission lines or over pipelines. The designated Section 368
35 transmission corridor along I-10 overlaps 15,700 acres (64 km²) within the SEZ and could limit
36 future solar development in that overlap area. The same constraint also may apply to the
37 remaining two corridors on the east and west sides of the SEZ. Alternatively, designation of the
38 SEZ could limit future use of these existing corridors. Transmission capacity is becoming a more
39 critical factor and reducing the east-west corridor capacity through this SEZ may have future but
40 currently unknown consequences. Near the western end of the SEZ, south of I-10, the existing
41 corridor is limited by designated wilderness to the south and existing pipeline and transmission
42 line development; thus opportunities to place new transmission facilities in this corridor are
43 already constrained. This is an administrative conflict that can be addressed by the BLM in the
44 land use planning process, but there would be implications either for the amount of potential
45 solar energy development or for the amount of transmission capacity that can be accommodated.
46

1 The current public land ownership pattern, along with terrain and drainage features in the
2 SEZ, could lead to the creation of isolated parcels of BLM-administered land scattered among
3 solar facilities that would be both inaccessible to the public and difficult to manage.
4

6 **9.4.2.2.2 Transmission Facilities and Other Off-Site Infrastructure**

7
8 An existing 500-kV transmission line runs east–west along I-10 and parallel to the
9 southern SEZ boundary. In addition, a 230-kV line passes through the far western section of the
10 SEZ and a 69-kV line passes through the eastern portion of the SEZ. Establishing a connection to
11 an existing line would not involve the construction of a new transmission line outside of the
12 SEZ. If a connecting transmission line were constructed in a different location outside of the SEZ
13 in the future, site developers would need to determine the impacts from construction and
14 operation of that line. In addition, developers would need to determine the impacts of line
15 upgrades if they were needed.
16

17 Existing road access to the proposed Riverside East SEZ should be adequate to support
18 construction and operation of solar facilities, because I-10 passes along the southern edge of the
19 SEZ and there are several exits from I-10 as it passes by and through the SEZ. Because of the
20 site access provided by I-10, no additional road construction outside of the SEZ was assumed to
21 be required to support solar development of the SEZ.
22

24 **9.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**

25
26 No SEZ-specific design features were identified. Implementing the programmatic design
27 features described in Appendix A, Section A.2.2, as required under BLM’s proposed Solar
28 Energy Program would provide mitigation for some identified impacts. The exceptions would be
29 impacts related to the exclusion of many existing and potential uses of the public land, perhaps in
30 perpetuity; the visual impact of an industrial-looking solar facility within an otherwise rural area;
31 and induced land use changes on state and private lands.
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9.4.3 Specially Designated Areas and Lands with Wilderness Characteristics

9.4.3.1 Affected Environment

The proposed Riverside East SEZ is located in the CDCA and is surrounded by specially designated areas, including Joshua Tree NP, seven designated WAs (including wilderness in the Joshua Tree NP), and seven ACECs (see Figure 9.4.3.1-1). Corn Springs is the only ACEC within the viewshed of the SEZ that has scenic values as one of its attributes. Alligator Rock, Chuckwalla DWMA, Chuckwalla Valley Dune Thicket, Desert Lily Preserve, Mule Mountains, and Palen Dry Lake ACECs are identified for the protection of plant and animal species and cultural or prehistoric resources. No lands with wilderness characteristics outside of designated WAs and WSAs have been identified within 25 mi (40 km) of the SEZ.

As part of the planning process for the BLM-administered lands in the CDCA, all public lands except for about 300,000 acres (1,214 km²) of scattered parcels were designated geographically into one of four multiple-use classes. The classification was based on the sensitivity of resources and kinds of uses for each geographic area. The four multiple-use classes are as follows (BLM 1999):

- Class C is for lands either designated as wilderness or for wilderness study areas. These lands are managed to protect their wilderness characteristics.
- Class L (Limited Use) protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.
- Class M (Moderate Use) is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources that permitted uses may cause.
- Class I (Intensive use). Its purpose is to provide for concentrated use of lands and resources to meet human needs. Reasonable protection will be provided for sensitive natural and cultural values. Mitigation of impacts on resources and rehabilitation of affected areas will occur insofar as possible.

Lands within the Riverside East SEZ are predominantly Class M with the exception of two parcels around Joshua Tree NP and the Palen McCoy WA, which are Class L. The Multiple-Use Class Guidelines contained in the CDCA Plan indicate that wind, solar, or geothermal electrical generation facilities could be allowed in both of these Classes.

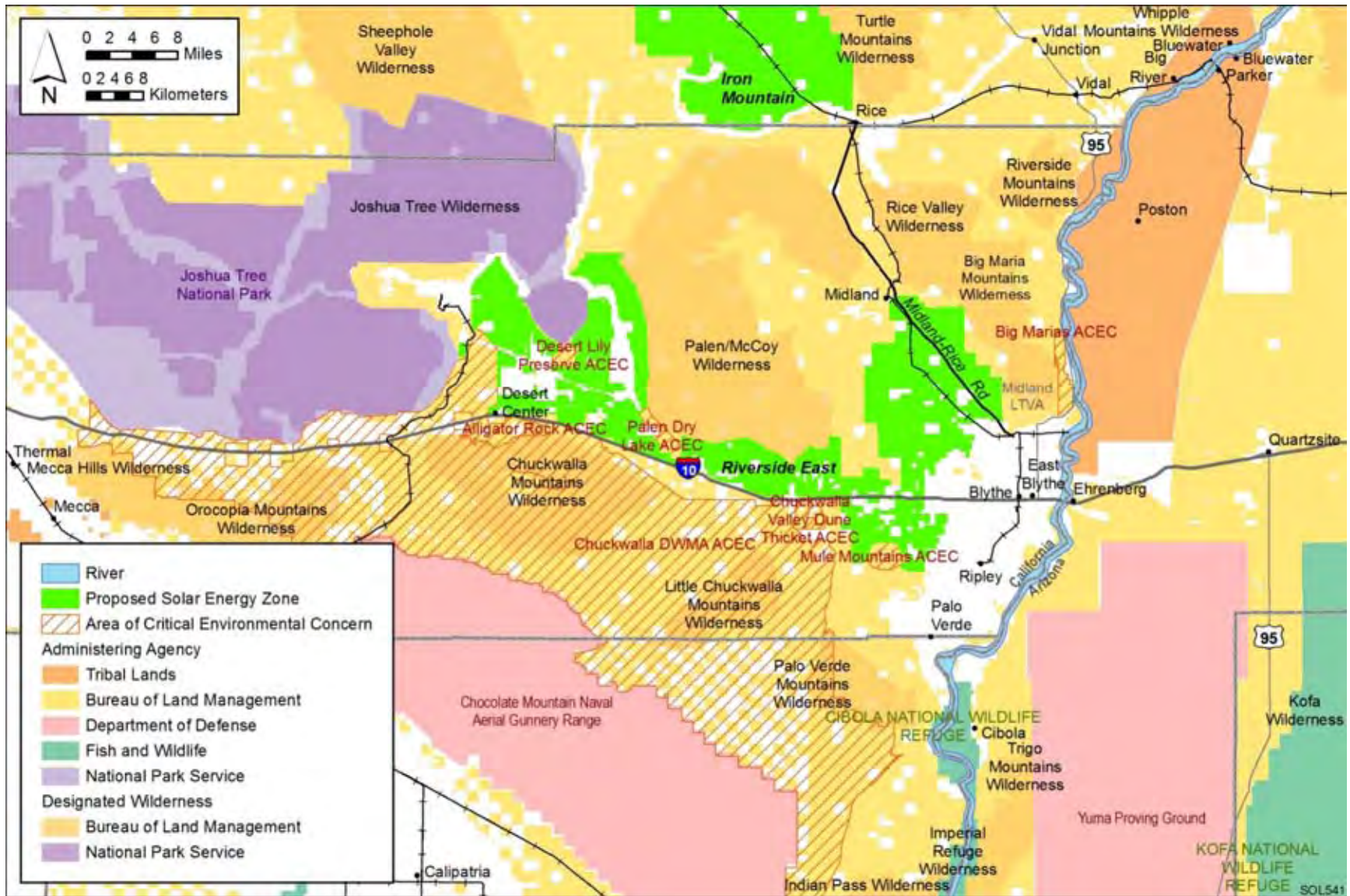


FIGURE 9.4.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Riverside East SEZ

1 **9.4.3.2 Impacts**

2
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4 **9.4.3.2.1 Construction and Operations**

5
6 The potential impact from solar development within the proposed Riverside East SEZ on
7 specially designated areas possessing unique or sensitive visual resources is difficult to quantify
8 and would vary by solar technology employed, the size of the area developed for solar energy
9 facilities, the specific area affected, and the perception of individuals viewing the development.
10 Development of the SEZ, especially full development, would be a dominating factor in the
11 viewshed from large portions of some of these specially designated areas, as summarized in
12 Table 9.4.3.2-1. This table assumes the use of the power tower solar energy technology, which
13 would have the largest potential visual effect because of the height of this type of facility. The
14 potential impacts in terms of acreage of visually sensitive, specially designated areas affected
15 would be somewhat less for smaller solar energy facilities. See Section 9.4.14 for a more
16 complete review of these impacts.

17
18 In general, the closer a viewer is to solar development, the greater the apparent size and
19 level of detail visible, usually resulting in greater perceived impacts on various resources.
20 Although impact levels are usually “banded” based on distance (e.g., 0 to 5 mi, 5 to 15 mi [0 to
21 8 km, 8 to 24 km]), in general, actual perceived impacts decrease gradually as distance increases.
22 Additionally, dense solar facilities and/or large solar facilities may have very large visual
23 impacts, even at longer distances. See Section 9.4.14 for a more thorough discussion of visual
24 impacts associated with solar energy development.

25
26 The viewing height above a solar development area also is important to perceived impact
27 levels, since higher elevation viewpoints show more of the facilities and make the regular, man-
28 made geometry of the solar arrays more apparent. In the case of the Riverside East SEZ, the low
29 elevation of the SEZ in relation to surrounding specially designated areas would tend to highlight
30 the industrial development present in the SEZ.

31
32 An individual viewer’s expectations can also influence perceived impacts. For example,
33 recreationists seeking a wilderness or national park experience would likely be more adversely
34 affected by the sight of intensive solar development than commuting workers traveling along the
35 highway.

36
37 The occurrence of glint and glare at solar facilities could potentially cause large though
38 temporary increases in brightness and visibility of the facilities. The visual contrast levels that
39 were assumed to assess potential impacts on specially designated areas do not account for
40 potential glint and glare effects; however, these effects would be incorporated into a future site-
41 and project-specific assessment that would be conducted for specific proposed utility-scale solar
42 energy projects.

TABLE 9.4.3.2-1 Specially Designated Areas Potentially within the Viewshed of Solar Facilities within the Proposed Riverside East SEZ

Area Name	Total Acres	In 5-mi (8-km) Viewshed		In 15-mi (24-km) Viewshed		In 25-mi (40-km) Viewshed	
		Acres	Percentage	Acres	Percentage	Acres	Percentage
California Desert Conservation Area	25,919,319 ^a	763,254	2.9	1,243,222	4.8	1,494,552	5.8
Joshua Tree NP	793,331	53,426	6.7	111,416	14.0	117,591	14.8
Cibola National Wildlife Refuge	18,398			7,336	39.9	17,121	93.1
Corn Springs ACEC	2,463	352	14.3	1,075	43.6	1,080	43.8
WAs							
Big Maria Mountains	46,056	8,873	19.3	8,829	19.2	8,875	19.3
Chuckwalla Mountains	88,202	31,482	35.7	49,952	56.6	49,913	56.6
Joshua Tree	586,623	40,421	6.9	96,117	16.4	99,460	17.0
Little Chuckwalla Mountains	28,708	76	0.3	16,679	58.1	16,729	58.3
Palen/McCoy	224,414	95,559	42.6	170,666	76.0	170,660	76.0
Palo Verde Mountains	30,403			13,254	43.6	13,252	43.6
Rice Valley	43,412	7,881	18.2	35,773	82.4	35,792	82.4

^a To convert acres to km², multiply by 0.004047.

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1 There are seven ACECs near the SEZ. Potential impacts on these ACECs are indirect and
2 related to the potential impact from additional human use of the areas because of the construction
3 and operation of solar facilities. Four of these ACECs (Chuckwalla DWMA, Desert Lily
4 Preserve, Palen Dry Lake, and Mule Mountains) are immediately adjacent to the boundaries of
5 the SEZ.
6

7 Because the western portion of the SEZ currently contains numerous visible man-made
8 features, impacts on wilderness and scenic values may be somewhat less significant than in areas
9 that are more pristine.
10

11 The lack of development in the immediate region of the SEZ makes the night sky very
12 dark and allows very good opportunities for night sky viewing. The NPS has identified concerns
13 that solar facility development in the region both adjacent to and east of Joshua Tree NP could
14 adversely affect the quality of the night sky environment as viewed from the park. The amount
15 of light that may emanate from Riverside East solar facilities is not known but could affect night
16 sky viewing from the NP and the surrounding wilderness areas.
17

18 *Designated Wilderness* 19

- 20
21 • The border of the Palen-McCoy WA abuts the Riverside East SEZ for about
22 33 mi (53 km) and is surrounded on three sides by the SEZ. Large portions of
23 the viewshed from this wilderness area are not pristine; it includes an array of
24 human-built structures (e.g., highways, roads, housing, railroads) as close as
25 2 mi (3 km) from its boundaries, which already have some effect on
26 wilderness characteristics. However, because of the size and density of solar
27 development, especially at full development, the new visual impacts of solar
28 energy facilities generally would be much more intrusive than those that
29 currently exist.
30

31 Designated wilderness within the 5 mi (8 km) viewshed of the SEZ includes
32 about 96,000 acres (388 km²) (see Table 9.4.3.2-1). Within 15 mi (24 km) of
33 the SEZ, about 171,000 acres (692 km²) of designated wilderness is included
34 within the viewshed of the SEZ. Cumulatively, this amounts to about 76% of
35 the wilderness area. Additionally, the wilderness area would have clear and
36 close views of the Iron Mountain SEZ to the north of the WA that could result
37 in the WA being completely ringed by solar energy development. It is
38 anticipated that wilderness characteristics throughout this wilderness area
39 would be adversely affected by the solar development in the SEZ and in the
40 region.
41

- 42 • The Big Maria Mountains WA is within 0.25 to 2 mi (0.4 to 3 km) of the
43 boundary of the SEZ for about 13 mi (21 km). The viewshed from the
44 wilderness area is not pristine, but the unpaved road and railroad within the
45 viewshed are located far enough to the west of the boundary of the wilderness
46 area to not have a significant impact on the wilderness area. The affected

1 viewshed is restricted to the western slopes of the wilderness area that are
2 within about 5 mi (8 km) of the SEZ and which constitute about 19% of the
3 wilderness area. This area would be adversely affected by SEZ development
4 that could potentially fill the low-lying valley to the west and below the
5 wilderness area. Because the view of the solar development would be so
6 extensive, it is anticipated that the effect on wilderness characteristics in the
7 portions of the wilderness area within the viewshed of the SEZ would be very
8 large. The majority of the area within the wilderness area to the east is outside
9 of the viewshed of the SEZ and would not be affected by development within
10 the SEZ.

11

- 12 • The southern boundary of the Rice Valley WA ranges from 0.5 to 2 mi (1 to
13 3 km) from the boundary of the SEZ for about 6 mi (10 km). The viewshed
14 from the southern boundary of the wilderness area is not pristine and is
15 influenced by the presence of an unpaved road, railroad, and several large
16 mining operations. The portion of the wilderness area that would be in view of
17 development within the SEZ within 5 mi (8 km) is about 7,881 acres (4 km²),
18 or about 18% of the wilderness area. In this area wilderness characteristics
19 would be adversely affected by solar development in the SEZ that could
20 potentially fill the low-lying valley to the south and below the wilderness area.
21 Although the table shows a large acreage of the wilderness area within 15 mi
22 (24 km) of the SEZ, this is actually an anomaly in the viewshed analysis. The
23 large majority of the wilderness area to the north actually is out of the
24 viewshed of development within the SEZ and would not be affected by it (for
25 more information on this, see the description of Rice Valley WA in
26 Section 9.4.14.2.2.1)

27

- 28 • The Chuckwalla Mountains WA is located south of I-10 and the SEZ. The
29 boundary of the wilderness area ranges from 1 to 3 mi (1.6 to 5 km) from the
30 SEZ. The elevation of the wilderness area rises continuously to the south,
31 affording unobstructed views of the SEZ to the north and east. About
32 31,000 acres (125 km²) of the wilderness area is within the 5-mi (8-km)
33 viewshed of the SEZ, and it is expected that wilderness characteristics within
34 this area would be adversely affected. The current viewshed from this
35 wilderness area is not pristine and includes an array of human-built structures
36 (e.g., highways, roads, railroads, power lines, residences, and agricultural
37 development) located from 0.5 to 5 mi (0.8 to 8 km) from the WA boundary.
38 These projects already have some effect on wilderness characteristics;
39 however, because of the size and density of solar development that would be
40 in view from the WA, especially at full development, the new visual impacts
41 of solar energy facilities generally would be much more intrusive than those
42 impacts that currently exist. All of the Chuckwalla WA is within about 12 mi
43 (19 km) of the SEZ, and within this distance about 56% of the WA, about
44 50,000 acres (202 km²) is within the viewshed of the SEZ. At full
45 development, solar facilities could stretch to about 13 mi to the north of the
46 SEZ and more than 20 mi (32 km) east along I-10. Because of this extensive

1 view of solar development, it is anticipated that the cumulative adverse impact
2 on wilderness characteristics within areas of this wilderness area within view
3 of the solar development would be large.

- 4
5 • The Little Chuckwalla and Palo Verde Mountains WAs are 5 and 6 mi (8 and
6 10 km), respectively, from the closest boundary of the SEZ. Both are almost
7 completely contained within the 15-mi (24-km) radius of solar development
8 and about 76% and 82% of the wilderness areas, respectively, would be
9 included in the viewshed of the SEZ. The current viewshed from both
10 wilderness areas is not pristine and includes an array of human-built
11 structures; however, solar development, especially full development, would be
12 very visible from within portions of both of these wilderness areas. Because of
13 the extensive potential view of solar development to the north and east, there
14 would be adverse impacts on wilderness characteristics in the Little
15 Chuckwalla WA.
- 16
17 • For the Palo Verde Mountains WA, because of the alignment of the of the
18 wilderness area relative to the SEZ, while the nearest boundary of the
19 wilderness area is 6-mi (9.6-km) from the SEZ, most of the boundary where
20 there is visibility of the SEZ is from 8 to 10 mi (13 to 16 km) distant.
21 Viewshed analysis indicates that contrast levels caused by solar facilities
22 within the SEZ are not likely to exceed the moderate level. Because of the
23 distance between the SEZ and the wilderness area, the expected level of
24 contrast, partial screening of the area from the SEZ by the Mule Mountains,
25 and the presence of extensive agricultural development within the viewshed of
26 the SEZ, impacts on wilderness characteristics from solar development are
27 anticipated to be minor.

30 *Areas of Critical Environmental Concern*

- 31
32 • The Corn Springs ACEC is designated for many reasons, including scenic
33 resources. The primary scenic portion of the area is in the canyon that runs
34 generally east–west and that is screened from the SEZ and would not be
35 affected by it. Visitors would have clear views of the SEZ as they leave the
36 area and travel down the bajada slopes toward I-10. The cultural resources
37 found in the canyon are sensitive and could be adversely affected if
38 development in the SEZ causes an increase in visitor traffic into the ACEC.
- 39
40 • Chuckwalla DWMA, Desert Lily Preserve, Mule Mountains, and Palen
41 Dry Lake ACECs are located adjacent to the boundary of the SEZ
42 (see Figure 9.4.3.1-1). Alligator Rock, Corn Springs, and Chuckwalla Valley
43 Dune Thicket ACECs are located in close proximity to the SEZ but do not
44 abut it. While these areas would not be directly affected by development of
45 the SEZ, it is possible that additional human traffic could be drawn to the
46 areas because of the solar facilities, and there is potential for unintended

1 impact. The major threat to these areas is uncontrolled vehicle use or
2 vandalism/theft of cultural or prehistoric resources and increased management
3 efforts may be needed to protect the resources of these ACECs. In addition,
4 indirect impacts resulting from edge effects such as non-native species
5 establishment and spread, habitat degradation and fragmentation, and
6 increased predation on desert tortoises by ravens may occur.

7
8
9 *Joshua Tree National Park*

- 10
11 • Portions of Joshua Tree NP are adjacent or in close proximity to the SEZ and
12 would have extensive views of solar energy development in the valley below
13 the park. About 53,000 acres (214 km²) of the park is located within the 5-mi
14 (8-km) viewshed of the SEZ, of which about 31,000 acres (125 km²) is
15 designated as wilderness. A portion of the Coxcomb Mountains in the park is
16 surrounded on three sides by the SEZ. The 15-mi (24-km) viewshed of the
17 SEZ includes about 111,000 acres (449 km²) of the park, including about
18 96,000 acres (388 km²) of wilderness. Although development on private and
19 BLM lands has already reduced wilderness characteristics, the potential
20 development of the SEZ would result in large additional adverse effects on
21 wilderness characteristics in the park.

22
23 The NPS has commented that the combined effects of solar energy
24 development on public lands within and outside the SEZ adjacent to the park
25 have a high potential to directly and negatively impact park resources in the
26 Coxcomb and Eagle Mountains on the eastern boundary of the park. Primary
27 concerns identified include potential for impacts on scenic views from the
28 park, preservation of the desert soundscape, preservation of the night-sky
29 viewing opportunities, and impacts on important wildlife corridors linking
30 NPS- and BLM-managed lands.

31
32 The eastern portion of the Joshua Tree NP affords visitors unimpeded night
33 sky viewing opportunities, while western areas of the park are highly
34 affected by light pollution from the Coachella Valley and Los Angeles areas.
35 Maintaining the high quality of night sky viewing in the eastern portion of the
36 park is a paramount concern of the NPS. The NPS's concerns relate to any
37 artificial light from night time maintenance activity and/or security lighting
38 within 20 mi (32 km) of the park boundaries.

39
40
41 *California Desert Conservation Area*

- 42
43 • The viewshed within 25 mi (40 km) of the Riverside East SEZ includes about
44 1,495,000 acres (6,050 km²), or about 5.8% of the CDCA (Table 9.4.3.2-1).
45 Installation of renewable energy facilities is consistent with the CDCA Plan,
46 but full development of the SEZ would adversely affect wilderness

1 characteristics in six designated wilderness areas including designated
2 wilderness in Joshua Tree NP. Should solar energy development occur,
3 because of the size and visual impact of solar facilities, the current
4 undeveloped character of large portions of the CDCA would be changed.
5
6

7 *Cibola National Wildlife Refuge*
8

- 9 • The Cibola Refuge is about 10 mi (16 km) southeast of the southeastern
10 portion of the SEZ. Although about 7,300 acres (30 km²) of the refuge is
11 within the 15-mi (24 km) viewshed of the SEZ, there are no anticipated
12 impacts on the refuge.
13
14

15 **9.4.3.2.2 Transmission Facilities and Other Off-Site Infrastructure**
16

17 Because of the availability of an existing transmission line and access to I-10, no
18 additional construction of transmission or road facilities was assessed. Should additional
19 transmission lines be required outside of the SEZ, there may be additional impacts to specially
20 designated areas. See Section 9.4.1.2 for the development assumptions underlying this analysis.
21
22

23 **9.4.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**
24

25 Implementing the programmatic design features described in Appendix A, Section A.2.2,
26 as required under BLM's proposed Solar Energy Program, would provide some mitigation for
27 identified impacts. The exceptions would be that SEZ development would adversely affect
28 wilderness characteristics in the Palen-McCoy, Rice Valley, Big Maria Mountains, Chuckwalla
29 Mountains, and Little Chuckwalla Mountains WAs and in Joshua Tree NP. These impacts would
30 not be fully mitigable. The night sky viewing experience in the Joshua Tree NP could also be
31 adversely affected. Required programmatic design features included in Appendix A,
32 Section A.2.2, may reduce visual impacts on wilderness characteristics, scenic resources, and
33 night sky viewing opportunities. It is anticipated that even with the adoption of the design
34 features, adverse impacts on wilderness characteristics would not be completely mitigated and
35 residual impacts would remain.
36

37 A proposed design feature specific to the proposed SEZ is as follows:
38

- 39 • Once construction of solar energy facilities begins, the BLM would monitor
40 whether there are increases in traffic to the seven ACECs in and near the SEZ
41 and determine whether additional design features are required to protect the
42 resources in these areas.
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1 **9.4.4 Rangeland Resources**
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3 Rangeland resources include livestock grazing and wild horses and burros, all of
4 which are managed by the BLM. These resources and possible impacts on them from
5 solar development within the proposed Riverside East SEZ are discussed in Sections 9.4.4.1
6 and 9.4.4.2.
7
8

9 **9.4.4.1 Livestock Grazing**
10

11 **9.4.4.1.1 Affected Environment**
12

13
14 A portion of the SEZ was at one time part of the Ford Dry Lake grazing allotment, but
15 the allotment has been closed to grazing through a land use plan decision (BLM 2009c); no
16 livestock grazing is authorized within the SEZ.
17
18

19 **9.4.4.1.2 Impacts**
20

21 There would be no impacts on livestock grazing.
22
23

24 **9.4.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness**
25

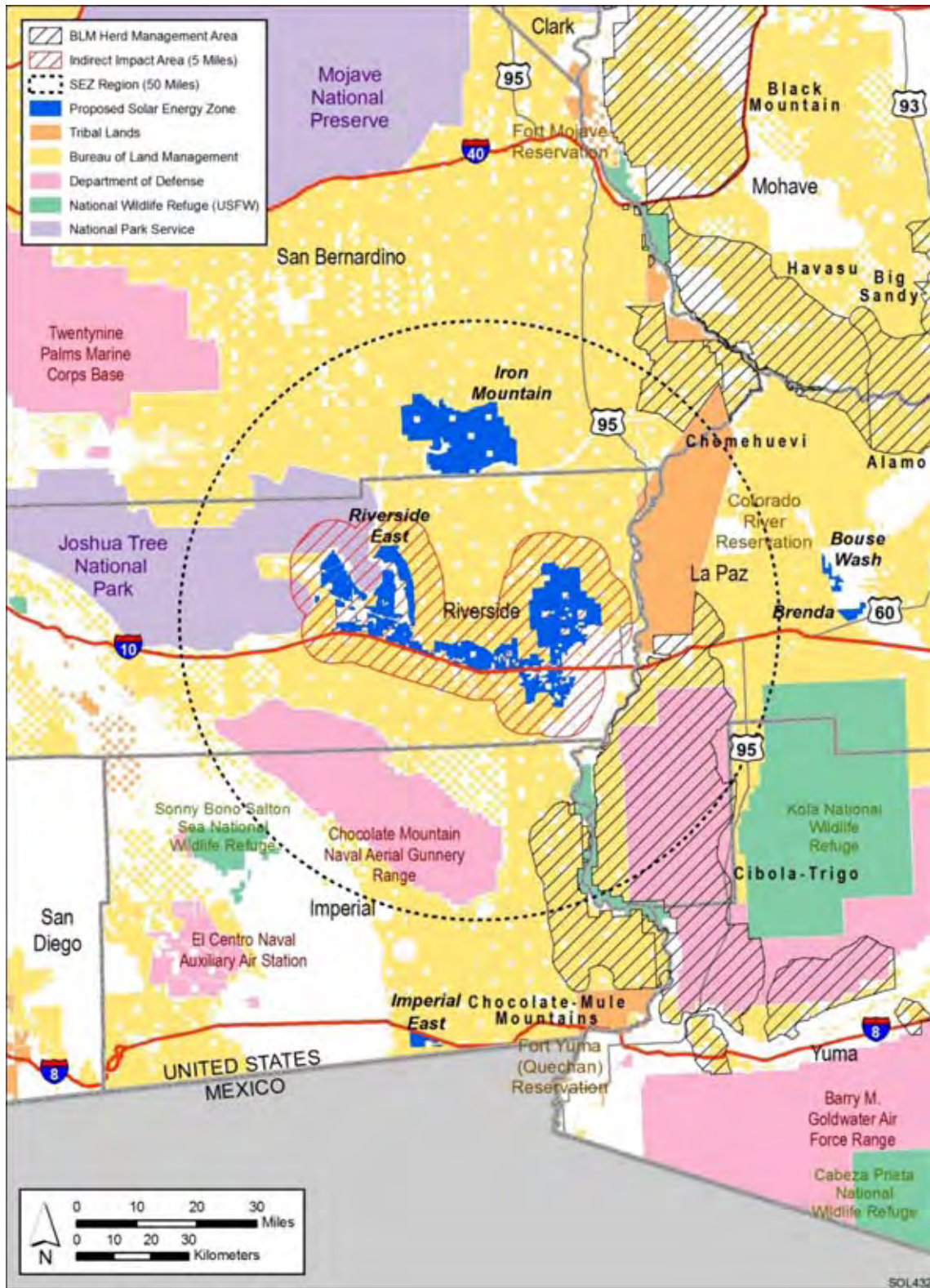
26 No SEZ-specific design features would be necessary to protect or minimize impacts on
27 livestock grazing.
28
29

30 **9.4.4.2 Wild Horses and Burros**
31

32 **9.4.4.2.1 Affected Environment**
33

34
35 Section 4.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) that occur
36 within the six-state study area. Twenty-two BLM wild horse and burro HMAs occur within
37 California. Also, several HMAs in Arizona are located near the Arizona–California border.
38 Portions of three HMAs are located within 50 mi (80 km) of the proposed Riverside East SEZ.
39 The closest is the Cibola-Trigo HMA, located 9 mi (14 km) east of the SEZ (Figure 9.4.4.2-1).
40 The Chemehuevi HMA is located about 27 mi (43 km) northeast of the SEZ, and the Chocolate-
41 Mule Mountains HMA is about 15 m (24 km) south of the SEZ (Figure 9.4.4.2-1). The Cibola-
42 Trigo HMA contains an estimated 285 horses and 393 burros, the Chemehuevi HMA an
43 estimated 201 burros, and the Chocolate-Trigo HMA an estimated 120 burros (BLM 2009b).
44

45 In addition to the HMAs managed by the BLM, the U.S. Forest Service (USFWS) has
46 51 established wild horse and burro territories in Arizona, California, Nevada, New Mexico, and



1

2

3

FIGURE 9.4.4.2-1 BLM Wild Horse and Burro HMAs Located near the Proposed Riverside East SEZ Region (Source: BLM 2009a)

1 Utah, and is the lead management agency that administers 37 of these territories (Giffen 2009;
2 USFS 2007). The territory closest to the proposed Riverside East SEZ is the Big Bear Territory
3 within the San Bernardino National Forest. It is located more than 70 mi (113 km) northwest of
4 the SEZ. This territory is managed for a population of 60 wild burros (USFS 2007).
5
6

7 ***9.4.4.2 Impacts***
8

9 Because the proposed Riverside East SEZ is 9 mi (14 km) or more from any wild horse
10 and burro HMA and more than 70 mi (113 km) from any wild horse and burro territory
11 administered by the USFS, solar energy development within the SEZ would not affect wild
12 horses and burros managed by the BLM or the USFWS.
13
14

15 ***9.4.4.3 SEZ-Specific Design Features and Design Feature Effectiveness***
16

17 The implementation of required programmatic design features described in Appendix A,
18 Section A.2.2, would reduce the potential for effects on wild horses and burros. No SEZ-specific
19 design features would be necessary to protect or minimize impacts on wild horses and burros.
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1 **9.4.5 Recreation**

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4 **9.4.5.1 Affected Environment**

5
6 Although the proposed Riverside East SEZ is very flat, it has diverse vegetation and
7 offers a range of seasonal recreation opportunities. While much of the area is dominated by
8 creosote shrublands or areas with very little vegetation, the eastern portion of the SEZ, especially
9 along McCoy Wash and its tributaries, contains a well-developed ironwood/palo verde
10 community. During the hottest summer months, the SEZ does not provide an environment
11 conducive to non-motorized recreation, but in the cooler months recreation opportunities are
12 abundant. The area has been traditionally used by the residents of Desert Center, Blythe, and
13 urban areas to the west. While no area-wide recreation data are available, the CDCA, like many
14 remote areas of the public lands, attracts individuals and families who are seeking undeveloped
15 recreation opportunities. Opportunities for exploration of old townsites, mining operations, and
16 old roads as well as for wilderness activities, hunting and backcountry camping, hiking, and
17 wildlife and wildflower viewing are important attractions throughout the CDCA. There are areas
18 both in and adjacent to the Riverside East SEZ that provide these kinds of attractions.

19
20 The Midland Long-Term Visitor Area (LTVA) managed by the BLM provides long-term
21 camping opportunities in the winter months and is located along Midland Road in the eastern
22 portion of the SEZ. This area hosted an estimated 605,000 visitor days of use in the 2009 to 2010
23 recreation season and 437,000 visitor days in the 2008 to 2009 season. Many of the visitors
24 likely access areas within the SEZ while they are staying at the LTVA.

25
26 The SEZ area was included in the Northern and Eastern Colorado Desert Coordinated
27 Management Plan approved in 2002 (BLM 2002a,b). In the plan all routes of travel outside of
28 closed and OHV open areas were designated as open, closed, or limited. Numerous routes of
29 travel within the SEZ have been designated as available for use by vehicles. The Palen Pass
30 Road is a popular route; the route leaves State Route 177 in the northwest corner of the SEZ,
31 crosses between units of the Palen-McCoy WA, and travels to the southeast through portions of
32 the eastern side of the SEZ, eventually ending at Blythe. There are many OHV routes designated
33 as open within the proposed Riverside East SEZ; these are discussed in Section 9.4.21 and
34 shown in Figure 9.4.21-1.

35
36
37 **9.4.5.2 Impacts**

38
39
40 **9.4.5.2.1 Construction and Operations**

41
42 Although there are no recreation use data for the SEZ and surrounding lands, it is not
43 anticipated that there would be a significant loss of recreational use caused by development of
44 the Riverside East SEZ. However, some recreation visitors would be displaced from the portions
45 of the SEZ developed for solar energy production, and because of the impact of a large and
46 highly visible industrial-type development in the SEZ, opportunities for undeveloped and

1 primitive recreation experiences in and around the SEZ would be lost or reduced. Roads and
2 trails through areas developed for solar power production could be closed or rerouted, although
3 existing county roads would continue to provide general access where they exist. Because the
4 Midland LTVA is located within the SEZ, solar development could occur very close to it and the
5 impact on winter visitors is not known. The combination of increased traffic and solar
6 development in the areas around the LTVA could discourage some use of this area.
7

8 Open OHV routes crossing areas granted ROWs for solar facilities would be redesignated
9 as closed. However, a programmatic design feature addressing recreational impacts would
10 require consideration of development of alternative routes that would retain a similar level of
11 access across and to public lands as a part of the project proposal (see Section 5.5.1 for more
12 details on how routes coinciding with proposed solar facilities would be treated).
13

14 Based on viewshed analysis, the SEZ would be visible from a wide area. Development of
15 solar facilities in the SEZ would cause the loss of the currently expansive and undeveloped views
16 throughout the SEZ. The viewshed within 25 mi (40 km) of the SEZ alone includes about
17 1,495,000 acres (6,050 km²) within the CDCA (Table 9.4.3.2-1). The viewshed analysis shows
18 the SEZ would be visible from portions of Joshua Tree NP, designated wilderness areas, other
19 specially designated areas outside of the SEZ. Because of the anticipated adverse impact on
20 wilderness characteristics in about 184,000 acres (745 km²) of designated wilderness within the
21 most sensitive 5-mi (8-km) visual zone surrounding the proposed SEZ, losses in opportunities for
22 wilderness recreation use are anticipated. Recreational use of wilderness and other areas in
23 Joshua Tree NP within the viewshed of the SEZ would also be adversely affected.
24
25

26 ***9.4.5.2.2 Transmission Facilities and Other Off-Site Infrastructure***

27

28 Because of the availability of an existing transmission line and access to I-10, no
29 additional construction of transmission or road facilities was assessed. Should additional
30 transmission lines be required outside of the SEZ, there may be additional impacts on specially
31 designated areas. See Section 9.4.1.2 for the development assumptions underlying this analysis.
32
33

34 **9.4.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

35

36 Implementing the programmatic design features described in Appendix A, Section A.2.2,
37 as required under BLM's proposed Solar Energy Program, would provide adequate mitigation
38 for some identified impacts. The exceptions would be that some recreational use would be lost
39 from the area within the SEZ, and this loss would not be mitigated. In addition, adverse impacts
40 on wilderness recreation use in six designated wilderness areas, including within Joshua Tree
41 NP, would also not be completely mitigated.
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A proposed design features specific to the proposed SEZ is as follows:

- A buffer area between the Midland LTVA and solar development should be established to preserve the LTVA area. The size of the buffer should be determined based on the site and visitor specific criteria.

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1 **9.4.6 Military and Civilian Aviation**

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4 **9.4.6.1 Affected Environment**

5
6 With the exception of a large portion of the eastern side of the SEZ, the SEZ is largely
7 covered under eight MTRs that include a mixture of visual and instrument routes. Consequently,
8 the BLM has identified this as an area for which advance consultation with the DoD is required
9 prior to approval of activities that could adversely affect the use of the MTRs.

10
11 The Blythe public airport is located about 2 mi (3 km) southeast of the eastern portion of
12 the SEZ, while the Desert Center public airport is located within the external boundaries of the
13 SEZ on the western side.

14
15
16 **9.4.6.2 Impacts**

17
18 The development of any solar energy or transmission facilities that encroach into the
19 airspace of an MTR could interfere with military training activities and could create a safety
20 concern. While the military has indicated that solar development on portions of the Riverside
21 East SEZ is compatible with its existing uses, it has also commented that other portions should
22 have height limits for facilities, and some areas may be incompatible with existing military use
23 (Brasher 2009).

24
25 The system of military airspace in the Southwest overlaps much of the area of highest
26 interest for solar development, and there is the potential for solar development to result in
27 cumulative effects on the system of MTRs that stretch beyond only one SEZ or solar project.

28
29 Thermal plumes from the air-cooled condensers could be hazardous to low-flying aircraft
30 approaching or departing from either of the airports. In addition, glint and glare from reflective
31 mirrors is a potential source of glare that could cause flash blindness to pilots approaching or
32 departing the airports.

33
34 The proximity of the two public airports to the SEZ would require close coordination
35 with airport authorities and the FAA to ensure solar energy facilities do not interfere with airport
36 operation.

37
38
39 **9.4.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**

40
41 Implementing the programmatic design features described in Appendix A, Section A.2.2,
42 as required under BLM's proposed Solar Energy Program, would provide adequate mitigation
43 for some identified impacts. An exception could be the potential impact on pilots using the two
44 local airports caused by glint and glare from reflective surfaces and from thermal plumes from
45 solar facilities.

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Proposed design features specific to the proposed SEZ include the following:

- Coordination with the FAA and local airport authorities should be required early in the project planning process to identify and mitigate potential impacts on the local airports.

Precautions for pilots should be taken to avoid interference with flight paths or related flight operations and to avoid reflector glare hazards and thermal plumes.

1 **9.4.7 Geologic Setting and Soil Resources**

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4 **9.4.7.1 Affected Environment**

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7 **9.4.7.1.1 Geologic Setting**

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9
10 **Regional Geology**

11
12 The proposed Riverside East SEZ lies within the eastern Mojave Desert region of the
13 Basin and Range physiographic province in southeastern California. The western part of the SEZ
14 covers land north of I-10 along the entire length of the Chuckwalla Valley and the southern part
15 of Palen Valley. The Chuckwalla Valley is a 40-mi (64-km) long, northwest-trending
16 intermontane basin that is bounded on the northwest by the Eagle Mountains and on the
17 southwest by the Chuckwalla Mountains. The north-to-northwest-trending Coxcomb, Palen, and
18 McCoy Mountains are to the north. The SEZ extends northward from Chuckwalla Valley into
19 Palen Valley, a 20-mi (32-km) long, northwest-trending basin bounded on the southwest by the
20 Coxcomb Mountains and on the northeast and east by the Granite and Palen Mountains,
21 respectively (Figure 9.4.7.1-1).

22
23 The eastern portion of the proposed Riverside East SEZ sits on the Palo Verde Mesa,
24 covering land both north and south of I-10. The mesa is bounded on the west-southwest by the
25 McCoy Mountains and on the north and northeast by the Little Maria and Big Maria Mountains.
26 The Palo Verde Valley, a river valley of the Colorado River, lies to the east (Figure 9.4.7.1-1).

27
28 Exposed sediments in the Chuckwalla Valley consist mainly of modern alluvium, playa
29 deposits, and dune sands (Figure 9.4.7.1-2). These sediments are underlain by basin-fill deposits
30 of alluvium and fanglomerate of the Pinto (Pleistocene) and Bouse (Pliocene) Formations.
31 Basin-fill is estimated to be as thick as 1 mi (1.6 km) in the central part of the valley and is the
32 principal water-bearing units in the region (Rotstein et al. 1976; CDWR 2003; CEC 2010b). A
33 good portion of the SEZ is covered by dune sand, especially along the central Chuckwalla
34 Valley. Playa lake sediments, associated with Palen and Ford Dry Lakes, occur in the western
35 and central parts of the SEZ. The surrounding mountains are composed of various igneous and
36 metamorphic rocks of pre-Tertiary age covered by younger residual material.

37
38
39 **Topography**

40
41 The proposed Riverside East SEZ spans the length of the Chuckwalla Valley; its western
42 end covers portions of the northern Chuckwalla and Palen Valleys and its eastern end covers the
43 Palo Verde Mesa. The northern part of the Chuckwalla Valley (between the Eagle and Coxcomb
44 Mountains) slopes to the southeast, with elevations ranging from greater than 820 ft (250 m) on
45 the alluvial fan surfaces flanking the surrounding mountains to less than 660 ft (200 m) in the

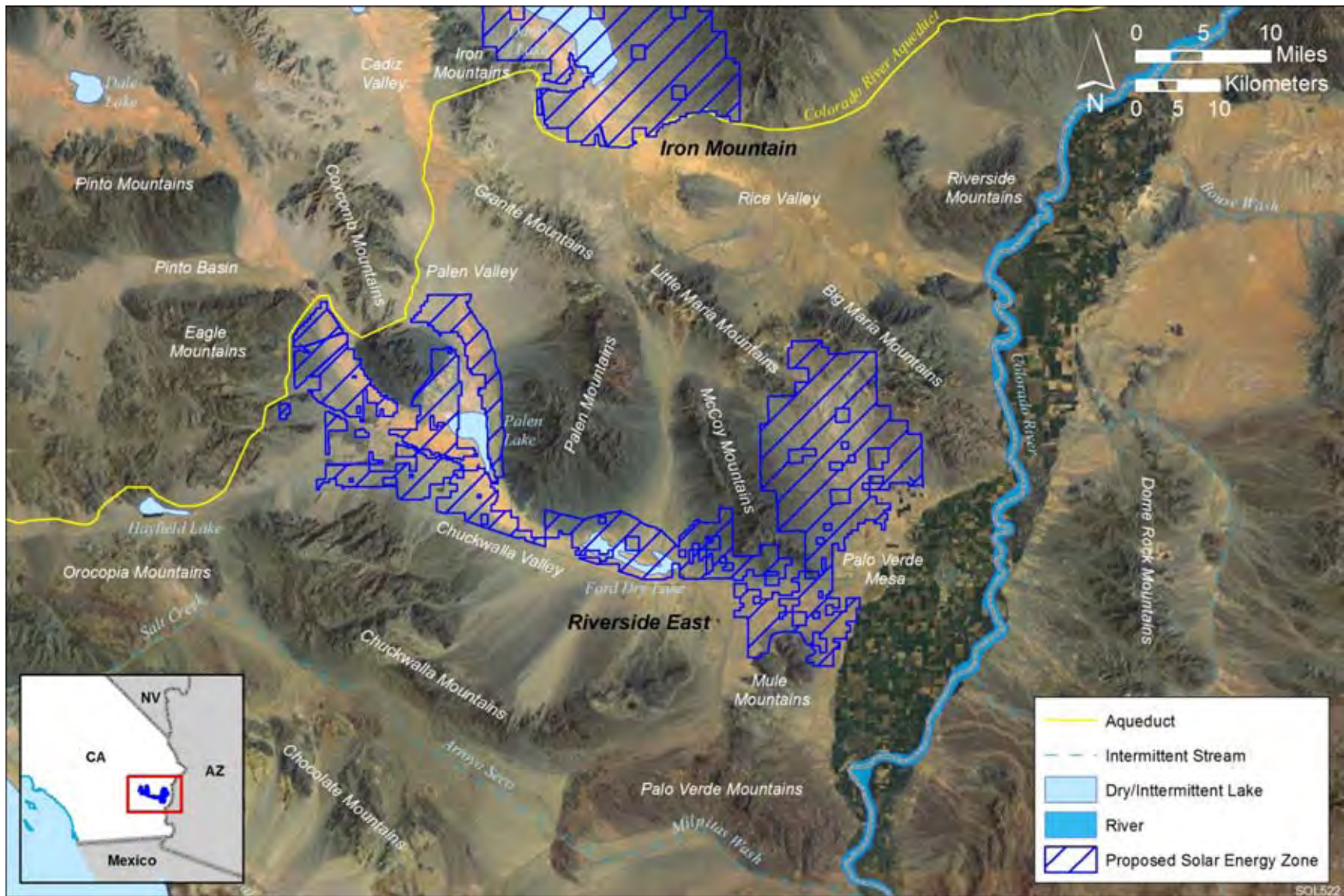


FIGURE 9.4.7.1-1 Physiographic Features in the Proposed Riverside East SEZ Region

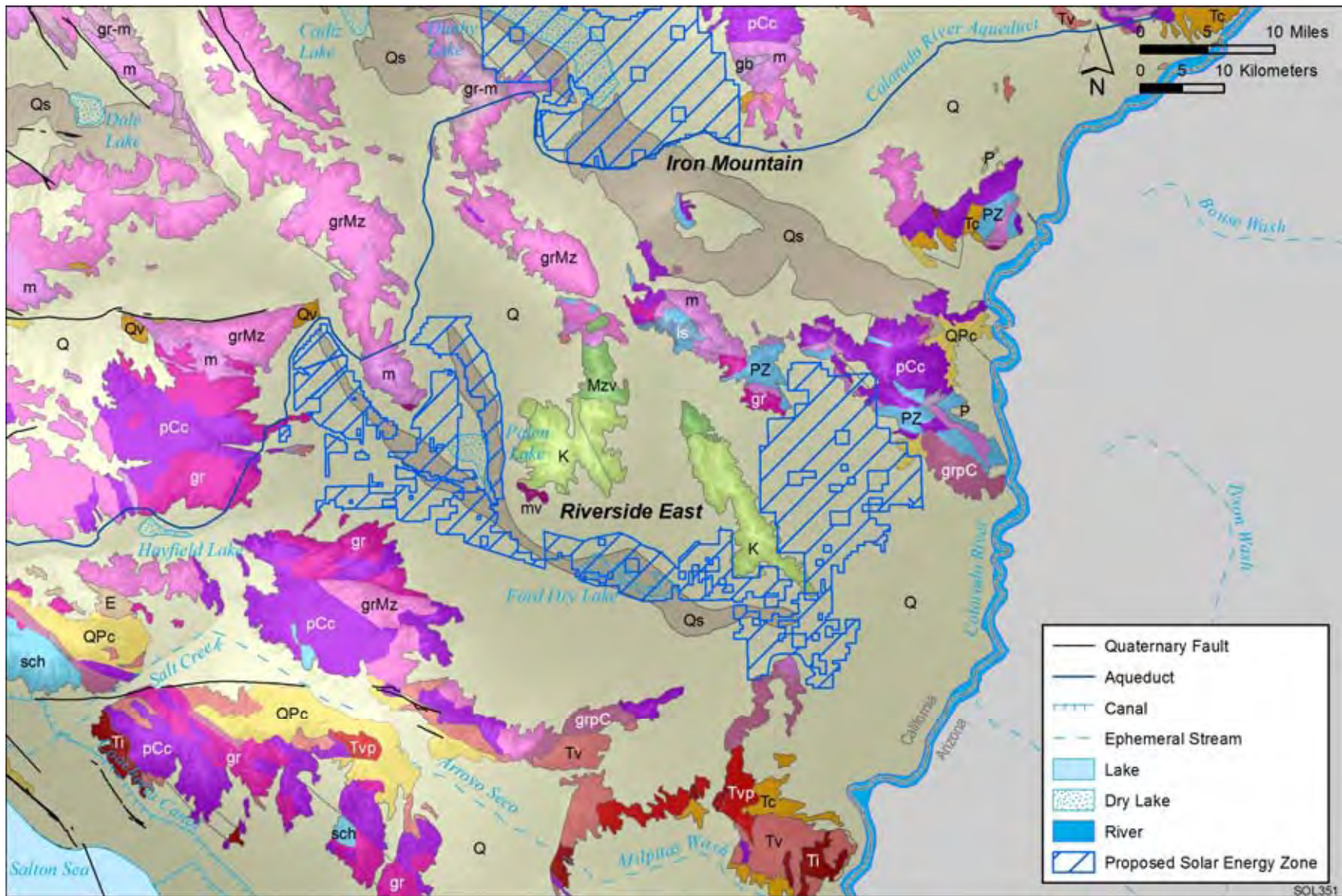


FIGURE 9.4.7.1-2 Geologic Map of the Proposed Riverside East SEZ Region (adapted from Ludington et al. 2007 and Gutierrez et al. 2010)

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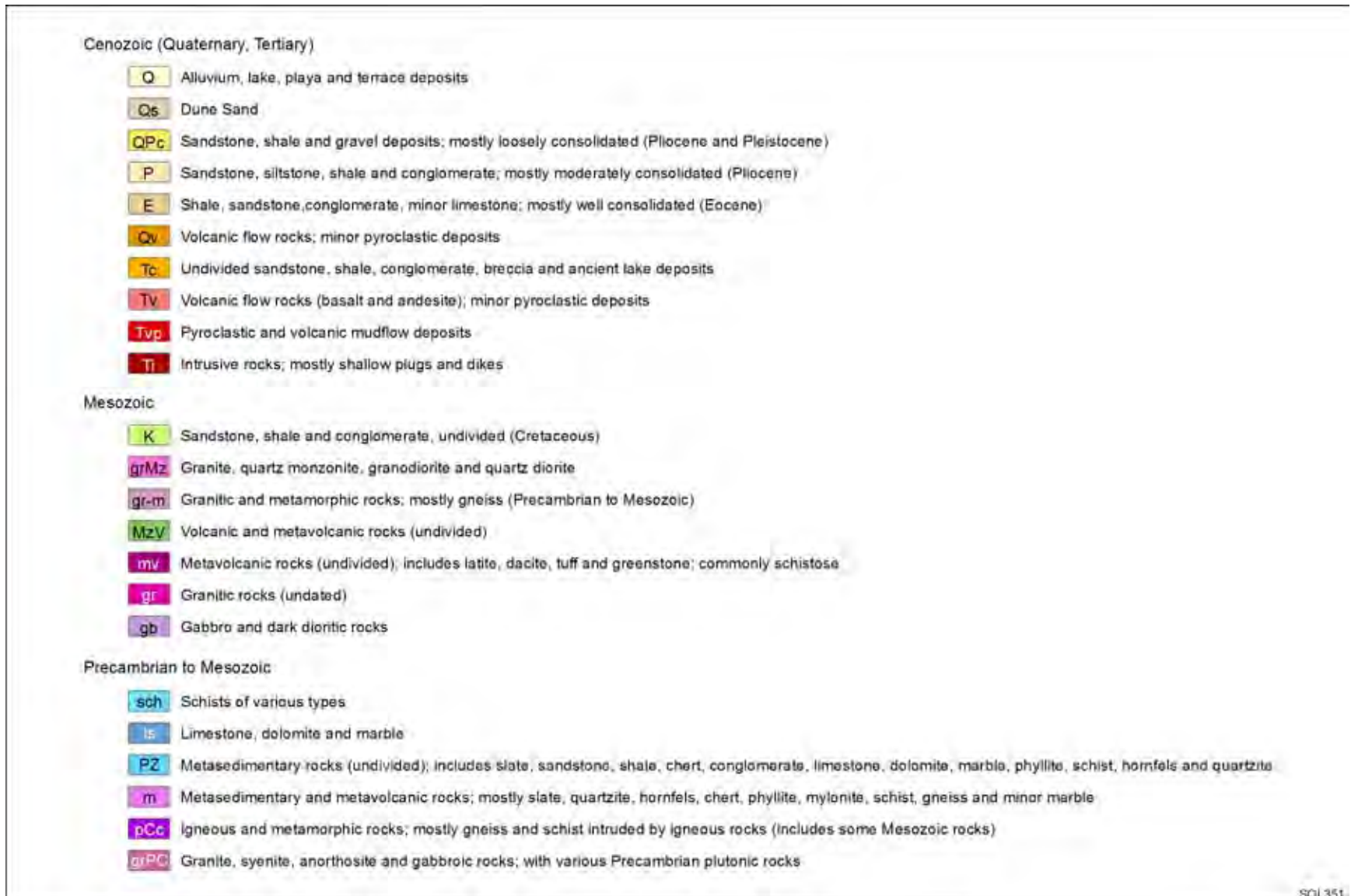


FIGURE 9.4.7.1-2 (Cont.)

1 center of the valley. The Palen Valley slopes to the south-southeast. It is rimmed with alluvial
2 fans that coalesce in the center of the valley. Streams discharging to the valley drain to the lowest
3 elevation (about 430 ft [130 m]) at Palen Lake (Figure 9.4.7.1-3).

4
5 The central part of the Chuckwalla Valley trends to the east-southeast and is nearly flat.
6 The lowest elevations occur within Ford Dry Lake (Figure 9.4.7-3).

7
8 Palo Verde Mesa is situated between the McCoy, Little Maria, and Big Maria Mountains.
9 It slopes to the southeast and ranges in elevation from 820 ft (250 m) along the flanks of the
10 surrounding mountain to less than 330 ft (100 m) along the its southeast-facing edge, which
11 borders the Mesa Verde (Colorado River) Valley. The mesa is drained by the McCoy Wash, a
12 perennial stream that flows to the southeast and discharges to a series of canals in the Mesa
13 Verde Valley (Figure 9.4.7.1-3).

14 15 16 **Geologic Hazards**

17
18 The types of geologic hazards that could potentially affect solar project sites and their
19 mitigation are discussed in Sections 5.7.3 and 5.7.4.2. The following sections provide a
20 preliminary assessment of these hazards at the proposed Riverside East SEZ. Solar project
21 developers may need to conduct a geotechnical investigation to assess geologic hazards locally
22 to better identify facility design criteria and site-specific mitigation measures to minimize their
23 risk.

24
25
26 **Seismicity.** The proposed Riverside East SEZ is located to the southeast of the Eastern
27 California Shear Zone and due east of the San Andreas Fault Zone—both seismically active
28 regions dominated by northwest-trending right-lateral strike slip faulting and categorized as
29 “potentially active” (i.e., having surface displacement within the last 11,000 years [Holocene])
30 under the Alquist-Priolo Earthquake Fault Zoning Act (Figure 9.4.7.1-4). The term “potentially
31 active” generally denotes that a fault has shown evidence of surface displacement during
32 Quaternary time (the last 1.6 million years). However, because there are numerous such faults in
33 California, the State Geologist has introduced new, more discriminating criteria for zoning faults
34 under the Alquist-Priolo Act. Currently, zoned faults include those that are “sufficiently active,”
35 showing evidence of surface displacement within the past 11,000 years along one or more of its
36 segments or branches, and “well-defined,” having a clearly detectable trace at or just below the
37 ground surface (Bryant and Hart 2007).

38
39 The Chuckwalla Valley is about 50 mi (80 km) to the southeast of the Pinto Mountain
40 Fault Zone in Riverside County. The active left-lateral strike-slip fault forms a south-facing
41 escarpment along the south margin of the eastern San Bernardino Mountains and marks the
42 boundary between the Transverse Range and the Mojave Desert. Offsets of late Pleistocene and
43 Holocene sediments place the most recent movement along the fault at less than 15,000 years
44 ago. Slip rate and recurrence interval data for the Pinto Mountain fault have not been reported;
45 however, minor slip occurred along traces of the fault zone during the 7.3 magnitude Landers
46 earthquake (a few miles to the south) on June 27, 1992 (Bryant 2000).

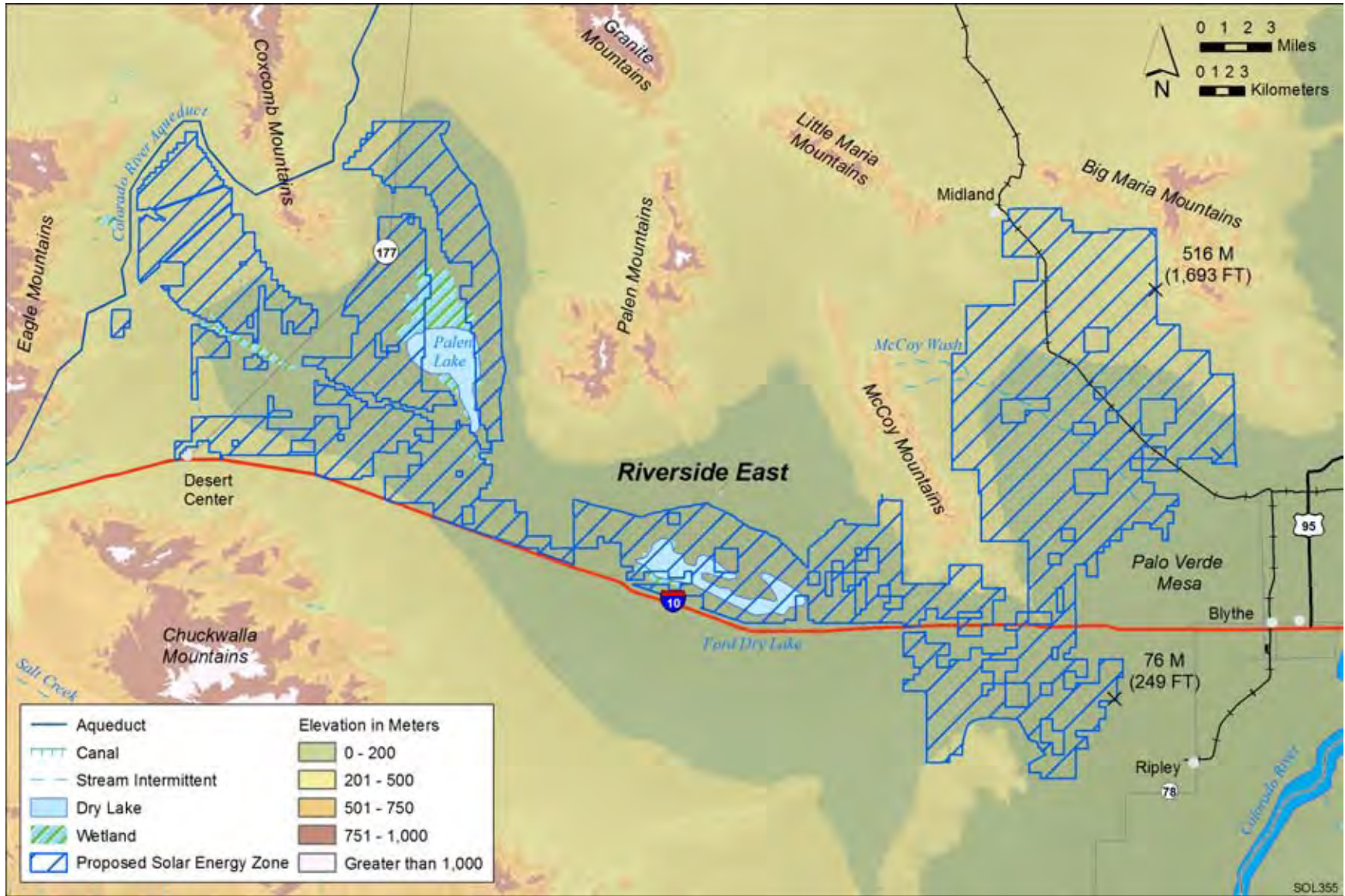


FIGURE 9.4.7.1-3 General Terrain of the Proposed Riverside East SEZ

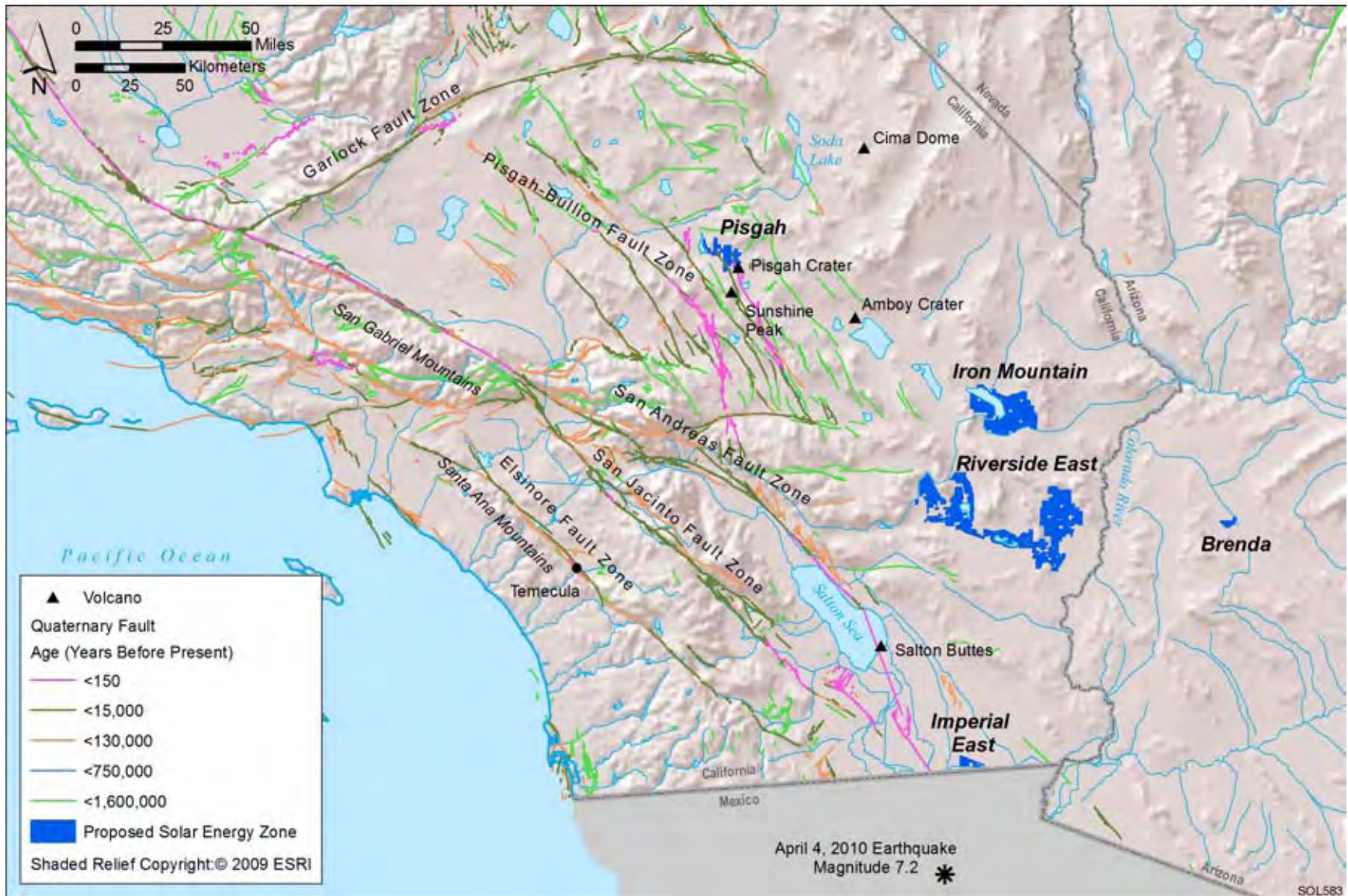


FIGURE 9.4.7.1-4 Quaternary Faults and Volcanoes in Southern California (Sources: USGS and CGS 2009; USGS 2010e)

1

2

1 The Coachella Valley and San Bernardino Mountains sections of the San Andreas Fault
2 Zone are located about 35 mi (56 km) southwest of Chuckwalla Valley. The fault zone is
3 a network of historically active right-lateral strike-slip faults that together compose the transverse
4 boundary between the North American and Pacific plates. It stretches along most of California's
5 coastline southeast to the northern Transverse Range and inland to the Salton Sea
6 (Figure 9.4.7.1-4). Two major historic earthquakes have occurred along the San Andreas Fault:
7 the 1857 Fort Tejon earthquake (magnitude 7.9) and the 1906 San Francisco earthquake
8 (magnitude 7.8). Several smaller surface-rupturing earthquakes have also occurred in historic
9 time. Quaternary to Holocene creep rates ranging from 0.9 to 1.4 in./yr (23 to 35 mm/yr) have
10 been reported for the Coachella Valley and San Bernardino Mountains sections of the fault zone.
11 Average recurrence intervals are estimated to range from 150 to 275 years for the
12 San Bernardino Mountains section and 207 to 233 years for the Coachella Valley section
13 (Bryant and Lundberg 2002a; Matti et al. 1992; USGS 1988). The USGS (1988) estimates that
14 the most recent activity along the Coachella Valley section was about $1,680 \pm 40$ years ago.
15

16 Since 1973, about 835 earthquakes have been recorded within a 61-mi (100-km) radius of
17 the Riverside East SEZ. Three of these earthquakes registered Richter scale magnitudes greater
18 than 6.0: October 16, 1979 (ML¹ 6.1); April 26, 1981 (ML 6.3); and November 24, 1987
19 (ML 6.5). These earthquakes were centered along segments of the San Jacinto Fault Zone and
20 Brawley Seismic Zone located south of the Salton Sea (USGS 2010e).
21
22

23 **Liquefaction.** The proposed Riverside East SEZ lies within an area where the peak
24 horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.06 and
25 0.20 g. Shaking associated with this level of acceleration is generally perceived as weak to light;
26 damage to structures would not be expected (USGS 2008b).
27

28 A regional evaluation for liquefaction hazards was completed for the San Bernardino
29 Valley and vicinity in western San Bernardino county by Matti and Carson (1991); the study did
30 not include the eastern part of San Bernardino county or Riverside county where the proposed
31 Riverside East SEZ is located. San Bernardino Valley is located between the San Andreas and
32 San Jacinto Fault Zones, where the peak horizontal acceleration with a 10% probability of
33 exceedance in 50 years is much higher (between 0.88 and 1.62 g) than that calculated for the
34 Chuckwalla Valley; therefore, only general conclusions from the study are presented here.
35

36 The evaluation considered three aspects of liquefaction: susceptibility, opportunity, and
37 potential. Susceptibility identifies sedimentary materials that are likely to liquefy during a
38 seismic event on the basis of their physical properties, depth to groundwater, expected
39 earthquake magnitude, and strength of ground shaking. Opportunity considers the recurrence
40 intervals for earthquake shaking strong enough to cause liquefaction in susceptible materials.
41 The potential for ground failure due to liquefaction evaluation then combines the results of the

¹ Richter scale magnitude (ML) was the original magnitude defined by Richter and Gutenberg for local earthquakes in 1935. It was based on the maximum amplitude recorded on a Wood-Anderson torsion seismograph but is currently calculated for earthquakes with magnitudes ranging from 2 to 6, using modern instruments with adjustments (USGS 2010f).

1 susceptibility and opportunity evaluations and identifies areas that are most and least likely to
2 experience liquefaction (Matti and Carson 1991).

3
4 Investigators found that the level of liquefaction susceptibility was most dependent on
5 two factors: (1) depth to the groundwater table and (2) the intensity and duration of ground
6 shaking as determined by an earthquake's magnitude and the distance from the causative fault.
7 These factors in combination with penetration-resistance data from various locations within the
8 San Bernardino valley allowed them to conclude that liquefaction susceptibility gradually
9 decreases with increasing depth to groundwater, increasing distance away from the causative
10 fault, and increasing geologic age (and induration) of sedimentary materials. Although the playa
11 sediments at Palen and Ford Dry Lakes could be considered susceptible to liquefaction since
12 groundwater occurs near the surface (Section 9.4.9.1.2), the low intensity of ground shaking
13 estimated for the general area indicates that the potential for liquefaction in the Chuckwalla
14 Valley sediments is also likely to be low.

15
16
17 **Volcanic Hazards.** The nearest volcanoes are in the Amboy Crater and lava field (part of
18 the Lavic Lake volcanic field), about 70 mi (110 km) northwest of the Riverside East SEZ and
19 immediately northwest of Bristol Dry Lake (Figure 9.4.7.1-4). Amboy Crater is a 250-ft (76-m)
20 high complex basaltic cinder cone surrounded by about 24.1 mi² (62 km²) of mafic lava flows.
21 The basalt fields erupted from several vents about 10,000 years ago. Hazards resulting from
22 these eruptions likely would be less severe than those from more silicic sources; they include the
23 formation of cinder cones, small volumes of tephra, and lava flows (Parker 1963; Miller 1989).

24
25 The Pisgah Crater (also part of the Lavic Lake volcanic field), is immediately adjacent to
26 the southeast corner of the Pisgah SEZ, about 105 mi (170 km) northwest of the Riverside East
27 SEZ (Figure 9.4.7.1-4). The 328-ft (100-m) high cinder cone is the youngest vent in the basalt
28 field. Lava flows issuing from vents within the basalt field sit above alluvial fan and playa lake
29 deposits. A similar, lesser known cinder cone and lava field also is present in the Sunshine Peak
30 area, about 6 mi (10 km) south. Researchers date the most recent activity associated with the
31 Pisgah volcano to about 25,000 years ago (Smithsonian 2010; Bassett and Kupfer 1964).
32 Because of the basaltic composition of the Pisgah Crater lava, hazards likely would be similar to
33 those described for the Amboy Crater but would depend on factors such as location, size, and
34 timing (season).

35
36 The Cima dome and volcanic field east of Soda Lake is about 120 mi (190 km) north-
37 northwest of the Riverside East SEZ (Figure 9.4.7.1-4). The volcanic field consists of about
38 40 basaltic cones and more than 60 associated mafic lava flows covering an area of about 58 mi²
39 (150 km²). It has had three periods of activity from the late Miocene through the late Pleistocene,
40 the most recent having occurred about 15,000 years ago (Dohrenwend et al. 1984). Because of its
41 basaltic nature, hazards associated with the Cima volcanic field would like be similar to those
42 described for the Lavic Lake volcanic field, but would depend on factors such as location, size,
43 and timing (season).

1 The nearest active volcano is Mount St. Helens in the Cascade Range (Washington),
2 about 935 mi (1,505 km) north–northwest of the Chuckwalla Valley, which has shown some
3 activity as recently as 2008. The nearest volcano that meets the criterion for an unrest episode is
4 the Long Valley Caldera in east-central California, about 350 mi (565 km) northwest, which has
5 experienced recurrent earthquake swarms, changes in thermal springs and gas emissions, and
6 uplift since 1980 (Diefenbach et al. 2009). The Long Valley Caldera is part of the Mono-Inyo
7 Craters volcanic chain, which extends from Mammoth Mountain (on the caldera rim) northward
8 about 25 mi (40 km) to Mono Lake. Small to moderate eruptions have occurred at various sites
9 along the volcanic chain in the past 5,000 years at intervals ranging from 250 to 700 years.
10 Wind-blown ash from some of these eruptions is known to have drifted as far east as Nebraska.
11 While the probability of an eruption within the volcanic chain in any given year is small (less
12 than 1%), serious hazards could result from a future eruption. Depending on the location, size,
13 timing (season), and type of eruption, hazards could include mudflows and flooding, pyroclastic
14 flows, small to moderate volumes of tephra, and falling ash (Hill et al. 1998, 2000; Miller 1989).

15
16 Earthquake swarms also occurred at Medicine Lake Volcano in northern California
17 (Cascade Range) for a few months in 1988. Medicine Lake is about 650 mi (1,050 km) northwest
18 of the Riverside East SEZ (Diefenbach et al. 2009). The most recent eruption at Medicine Lake
19 was rhyolitic in composition and occurred about 900 years ago (USGS 2010f). Nearby Lassen
20 Peak last erupted between 1914 and 1917; at least two blasts during this period produced
21 mudflows that inundated the valley floors of Hut and Lost Creeks to the east. Tephra from the
22 most violent eruption, occurring on May 22, 1915, was carried by prevailing winds and
23 deposited as far as 310 mi (500 km) to the east (Miller 1989).

24
25
26 ***Slope Stability and Land Subsidence.*** The incidence of rock falls and slope failures can
27 be moderate to high along mountain fronts and can present a hazard to facilities on the relatively
28 flat terrain of valley floors like the northern Chuckwalla and Palen Valleys if they are located at
29 the base of steep slopes. The risk of rock falls and slope failures decreases toward the center of
30 the flat valleys.

31
32 There has been no land subsidence monitoring within the Chuckwalla Valley to date;
33 however, 32- to 64-ft (10- to 20-m) long earth fissures and 3-ft (1-m) wide sinkholes associated
34 with subsidence have been documented in the Temecula area of southwestern Riverside County,
35 about 105 mi (170 km) west–southwest of the proposed Riverside East SEZ (Figure 9.4.7.1-4).
36 The subsidence is the result of groundwater overdrafts in the Temecula-Wolf Valley that have
37 caused differential compaction in the sediments of the underlying aquifer. Land failure caused by
38 sinkholes and fissures has been significant enough to damage buildings, roads, potable water and
39 sewer lines, and other infrastructure (Corwin et al. 1991; Shlemon 1995). Land subsidence has
40 also been documented as far back as the 1970s in southern California’s San Joaquin Valley,
41 where the maximum subsidence due to extensive groundwater withdrawals for irrigation is
42 greater than 28 ft (9 m) (Galloway et al. 1999), and in the Wilmington Oil Field as a result of oil
43 extraction from the Los Angeles basin in southern Los Angeles County (Kovach 1974).

44
45
46 ***Other Hazards.*** Other potential hazards at the proposed Riverside East SEZ include those
47 associated with soil compaction (restricted infiltration and increased runoff), expanding clay

1 soils (destabilization of structures), and hydro-compactable or collapsible soil (settlement).
2 Disturbance of soil crusts and desert varnish (and pavement) on soil surfaces may also increase
3 the likelihood of soil erosion by wind.
4

5 Alluvial fan surfaces, such as those typical of the northern Chuckwalla and Palen
6 Valleys, can be the sites of damaging high-velocity flash floods and debris flows during periods
7 of intense and prolonged rainfall. The nature of the flooding and sedimentation processes
8 (e.g., streamflow versus debris flow) will depend on specific morphology of the fan
9 (National Research Council 1996). Currently, a series of levees rim parts of the northern border
10 of the proposed Riverside East SEZ in the northern Chuckwalla Valley (between the Eagle and
11 Coxcomb Mountains) and Palen Valley (along the eastern flank of the Coxcomb Mountains).
12 The levees channel runoff to the CRA and offer some protection from flash floods and debris
13 flows (see Section 9.4.9.1.1). A series of diversion dikes also border the southern boundary of
14 the SEZ along the central Chuckwalla Valley to channel drainage issuing from the Chuckwalla
15 Mountains to the south.
16
17

18 **9.4.7.1.2 Soil Resources**

19

20 Because soil mapping is not complete for the Colorado Desert area, the map unit
21 composition within the proposed Riverside East SEZ has not been delineated. Therefore, only
22 soil series are shown in Figure 9.4.7.1-5 and described in Table 9.4.7.1-1. Soils within the SEZ
23 are predominantly gravelly loams typical of alluvial fan terraces, which together make up about
24 64% of the site's soil coverage. These soils are gently to strongly sloping and characterized as
25 well to excessively well drained, with low to high runoff, and moderate to moderately rapid
26 permeability. Dune land soils, characterized by very rapid permeability and a high susceptibility
27 for wind erosion, cover about 24% of the SEZ. The poorly drained soils of Ford Dry Lake make
28 up only about 1% of the site's soil coverage. These soils are typical of ancient playa lake
29 deposits, with iron oxide and high salinity precipitates near the surface (Worley-Parsons 2010).
30 Biological soil crusts and desert pavement have not been documented in the SEZ, but may be
31 present.
32
33

34 **9.4.7.2 Impacts**

35

36 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
37 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
38 project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind,
39 soil erosion by water and surface runoff, sedimentation, and soil contamination. Such impacts are
40 common to all utility-scale solar energy facilities in varying degrees and are described in more
41 detail for the four phases of development in Section 5.7.1.
42

43 Because impacts on soil resources result from ground-disturbing activities in the project
44 area, soil impacts would be roughly proportional to the size of a given solar facility, with larger
45 areas of disturbed soil having a greater potential for impacts than smaller areas (Section 5.7.2).
46 The magnitude of impacts would also depend on the types of components built for a given
47 facility since some components would involve greater disturbance and would take place over a
48 longer time frame.

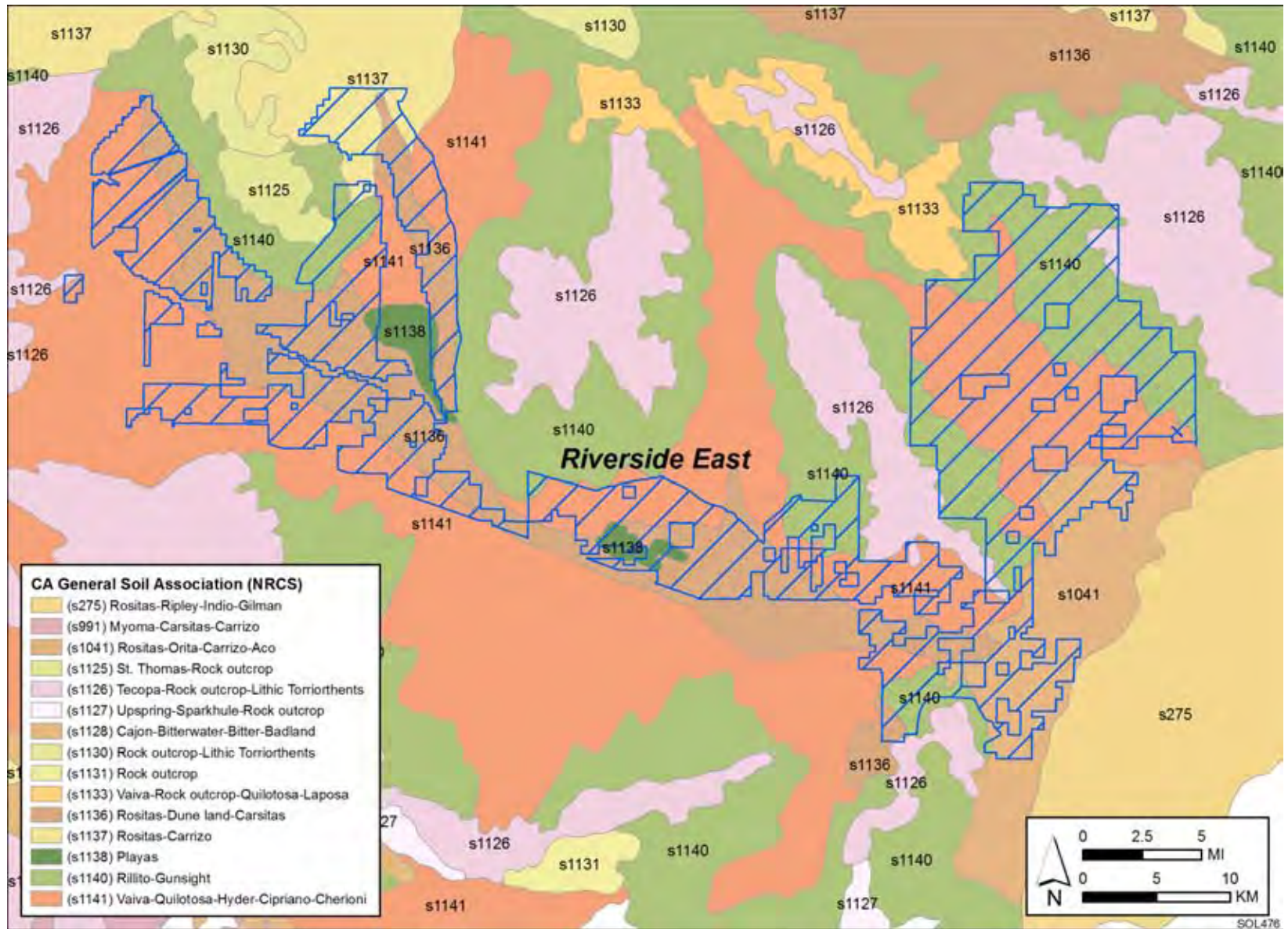


FIGURE 9.4.7.1-5 Soil Map for the Proposed Riverside East SEZ (Source: NRCS 2008)

TABLE 9.4.7.1-1 Summary of Soil Series within the Proposed Riverside East SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential	Wind Erosion Potential	Description	Area in Acres ^b (% of SEZ)
s1136	Rositas-Dune land-Carsitas	– ^a	– ^a	<p><i>Rositas series</i> are gently sloping soils on dunes and sand sheets (gradients of 0 to 30%). Very deep and somewhat excessively drained with low surface runoff potential (high infiltration rate) and rapid permeability. Typically fine sand.</p> <p><i>Dune land</i> soils are constantly shifting medium-grained sand deposited by wind blowing across the valley. Parent material consists of eolian sands. Little or no vegetation; very rapid permeability. <i>Carsitas series</i> are nearly level to strongly sloping soils on alluvial fans, moderately steep valley fills, and dissected alluvial fan remnants. Excessively drained with slow surface runoff (except during torrential events) and rapid permeability. Typically gravelly sand. Used for watershed and recreation; commercial source of sand and gravel.</p>	48,237 (24)
s1141	Rositas-Orita-Carrizo-Aca	–	–	<p><i>Rositas series</i> described above. <i>Orita series</i> are nearly level to gently sloping soils on fan remnants and terraces (gradients of 0 to 2%). Parent material consists of alluvium from mixed sources. Very deep and well-drained soils with very low to medium surface runoff potential and moderate permeability. Well suited for cultivation if irrigated but not as rangeland. <i>Carrizo series</i> are gently sloping soils on floodplains, alluvial fans, fan piedmonts, and bolson floors (gradients of 0 to 15%). Parent material consists of alluvium from mixed sources. Very deep and excessively drained soils with negligible to very low surface runoff potential and rapid to very rapid permeability. Typically extremely gravelly sand. Aridic soil moisture regime.</p>	14,564 (7)

TABLE 9.4.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential	Wind Erosion Potential	Description	Area in Acres ^b (% of SEZ)
s1137	Rositas-Carrizo	–	–	Used mainly as rangeland and wildlife habitat. <i>Aco series</i> are gently sloping soils on terraces above the flood plain (gradients of 0 to 8%). Parent material consists of alluvium from mixed sources. Very deep and well-drained to somewhat excessively drained soils with low to medium surface runoff potential and moderately rapid permeability. Typically sandy loam. Used for cropland if irrigated. <i>Rositas series</i> as described above. <i>Carrizo series</i> are gently sloping soils on floodplains, alluvial fans, fan piedmonts, and bolson floors (gradients of 0 to 15%). They are very deep, excessively drained soils formed in mixed alluvium. Negligible to very low surface runoff potential; rapid to very rapid permeability. Typically extremely gravelly sand. Aridic soil moisture regime. Used mainly as rangeland and wildlife habitat.	5,774 (3)
s1138	Playas	–	–	Very poorly drained soils formed in flats and closed basins; moderately to strongly saline. Medium surface runoff potential and low permeability.	2,741 (1)
s1126	Tecopa-Rock outcrop Lithic torriorthents	–	–	<i>Tecopa series</i> are sloping soils on low hills and low mountain side slopes (gradients of 15 to 75%). Very shallow and well-drained soils formed in residuum and colluvium weathered from metamorphic rocks with medium to rapid surface runoff and moderate permeability. Typically very gravelly sandy loam. Used mainly as desert rangeland. <i>Rock outcrop</i> occurs as low ridges or boulder piles and consists of variable rock types. Rapid surface runoff and barren of vegetation. <i>Lithic Torriorthents</i> are sloping soils on steep hill and mountain side slopes (gradients 15 to 60% or more) with rapid surface runoff. Typically very gravelly sand loam or loam.	2,168 (1)

^a A dash indicates water and wind erosion potential not rated at the Soil Series taxonomic level.

^b To convert acres to km², multiply by 0.004047.

Source: NRCS (2006); CEC (2010).

1 Palen and Ford Dry Lakes may not be suitable locations for construction since lakebed
2 sediments are often saturated with shallow groundwater and likely collapsible. The lakes sit
3 within low elevation areas and serve as sumps for drainage in the Palen and Chuckwalla Valleys.
4

6 **9.4.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**

7

8 No SEZ-specific design features were identified for soil resources at the proposed
9 Riverside East SEZ. Implementing the programmatic design features described in Appendix A,
10 Section A.2.2., as required under BLM's proposed Solar Energy Program, would reduce the
11 potential for soil impacts during all project phases.
12

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1 **9.4.8 Minerals (Fluids, Solids, and Geothermal Resources)**
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3

4 **9.4.8.1 Affected Environment**
5

6 Public land in the Riverside East SEZ was closed to locatable mineral entry in June 2009
7 pending the outcome of this solar energy PEIS. Currently, there are nine mill site claims within
8 the SEZ (BLM and USFS 2010a) located in Township 4 South, Range 21 East, SBM, in
9 Sections 22 and 27. The claims cover the southwest quarter of both sections.
10

11 There are no oil and gas leases within the proposed SEZ, although the area was largely
12 leased at one time (BLM and USFS 2010a). There was also a geothermal lease in the area east of
13 Desert Center, which is now closed (BLM and USFS 2010a) The area is still open for
14 discretionary mineral leasing, including leasing for oil and gas and other leasable and saleable
15 minerals.
16

17
18 **9.4.8.2 Impacts**
19

20 If the BLM identifies the area as an SEZ to be used for utility-scale solar development, it
21 would continue to be closed to all incompatible forms of mineral development with the exception
22 of the areas covered by existing mining claims. The existing claims represent prior existing
23 rights that, if valid, would preclude solar energy development as long as they are in place.
24 Development of solar resources in areas with mining claims could only occur if (1) the claims
25 are abandoned, (2) the claims are demonstrated to not be valid and are vacated by the BLM, or
26 (3) the claims are purchased by a solar developer. The latter two of these approaches could
27 require considerable time, negotiation, and money to accomplish. Although they encumber only
28 a small percentage of the SEZ, the mining claims represent an impediment to moving forward
29 with planning solar development where they are located and are likely to prevent that
30 development in the immediate future.
31

32 Since there are no other mining claims within the SEZ, it is assumed there would be no
33 loss of locatable mineral production.
34

35 Since there are no current oil and gas leases within the SEZ, it is assumed there would be
36 no impacts on these resources if the SEZ were developed for solar energy production. In
37 addition, should any oil and gas resources be found, they could be accessible via directional
38 drilling from outside of the SEZ.
39

40 Solar energy development of the SEZ would preclude future surface use of the site to
41 produce geothermal energy, although geothermal resources, should any be found, might be
42 accessed through directional drilling. Because of this option and the lack of current geothermal
43 leases within the SEZ, solar energy development is anticipated to have no impact on
44 development of geothermal resources.
45

1 If the area is identified as a solar energy development zone, some other mineral uses
2 might be allowed on all or portions of the SEZ. For example, the sale of common minerals, such
3 as sand, gravel, and mineral materials used for road construction, might take place in areas not
4 directly developed for solar energy production.
5

6 **9.4.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**

7
8 No SEZ-specific design features were identified. Implementing the programmatic design
9 features described in Appendix A, Section A.2.2, as required under BLM's proposed Solar
10 Energy Program would provide adequate mitigation for some identified impacts.
11
12
13

1 **9.4.9 Water Resources**

2
3
4 **9.4.9.1 Affected Environment**

5
6 The proposed Riverside East SEZ is located within the Southern Mojave-Salton Sea
7 subbasin of the California hydrologic region (USGS 2010a) and the Basin and Range
8 physiographic province characterized by intermittent mountain ranges and desert valleys
9 (Planert and Williams 1995). The proposed SEZ has surface elevations ranging between
10 450 and 1,000 ft (137 and 305 m) and contains several small alluvial fans between the
11 surrounding mountains generating flow patterns toward Palen Lake and Ford Dry Lake, as well
12 as a general drainage pattern from the northwest to the southeast toward the Colorado River
13 (Figures 9.4.9.1-1 and 9.4.9.1-2). This region is located within the Mojave Desert, which is
14 characterized by extreme daily temperature ranges with low precipitation and humidity
15 (CDWR 2009). Arid conditions exist because of low rainfall (annual precipitation is between
16 4 and 6 in./yr [10 and 15 cm/yr])(CDWR 2003), as well as high pan evaporation rates (130 in./yr
17 [330 cm/yr]) (Cowherd et al. 1988; WRCC 2010a).

18
19
20 **9.4.9.1.1 Surface Waters (Including Drainages, Floodplains, and Wetlands)**

21
22 There are no perennial streams located in the proposed Riverside East SEZ. Palen Lake
23 and Ford Dry Lake are located in the western and central portions of the SEZ, respectively
24 (Figure 9.4.9.1-1). Palen Lake is a wet playa having groundwater located near the surface and
25 covering an area of 4,260 acres (17 km²) with only 750 acres (3 km²) within the boundaries of
26 the SEZ. Ford Dry Lake is a dry lakebed covering 4,400 acres (18 km²), most of which is within
27 the SEZ boundaries. The primary surface water features within the proposed Riverside East SEZ
28 are several ephemeral washes coming off the surrounding mountains. A reach of the CRA is
29 located along the northwestern boundary of the SEZ with several levees along the base of the
30 Eagle Mountains and the Coxcomb Mountains that channel runoff from the mountains to culvert
31 crossings over the CRA and into the boundaries of the SEZ. The McCoy Wash drains the eastern
32 slope of the McCoy Mountains and flows to the southeast across the eastern portion of the SEZ
33 (Figure 9.4.9.1-2). Annual runoff estimates for the McCoy Wash are on the order of 800 ac-ft/yr
34 (987,000 m³/yr) (Metzger et al. 1973).

35
36 Flood hazards have not been identified (Zone D) for the region surrounding the proposed
37 Riverside East SEZ (FEMA 2009). The CDWR awareness floodplain mapping initiative
38 indicates that several areas of the proposed Riverside East SEZ are potentially within 100-year
39 floodplains (CDWR 2010b). These potential floodplain areas are concentrated around the
40 surrounding areas of Ford Dry Lake and Palen Lake, and the ephemeral washes draining the
41 Eagle Mountains and Coxcomb Mountains (Figure 9.4.9.1-1), as well as the ephemeral washes
42 that drain the McCoy Mountains and Little Maria Mountains that feed McCoy Wash
43 (Figure 9.4.9.1-2). Intermittent flooding may occur along the many ephemeral washes within the
44 proposed SEZ with potential for channel incision and sedimentation. Temporary ponding may
45 occur in the low drainage areas near Palen Lake and Ford Dry Lake.

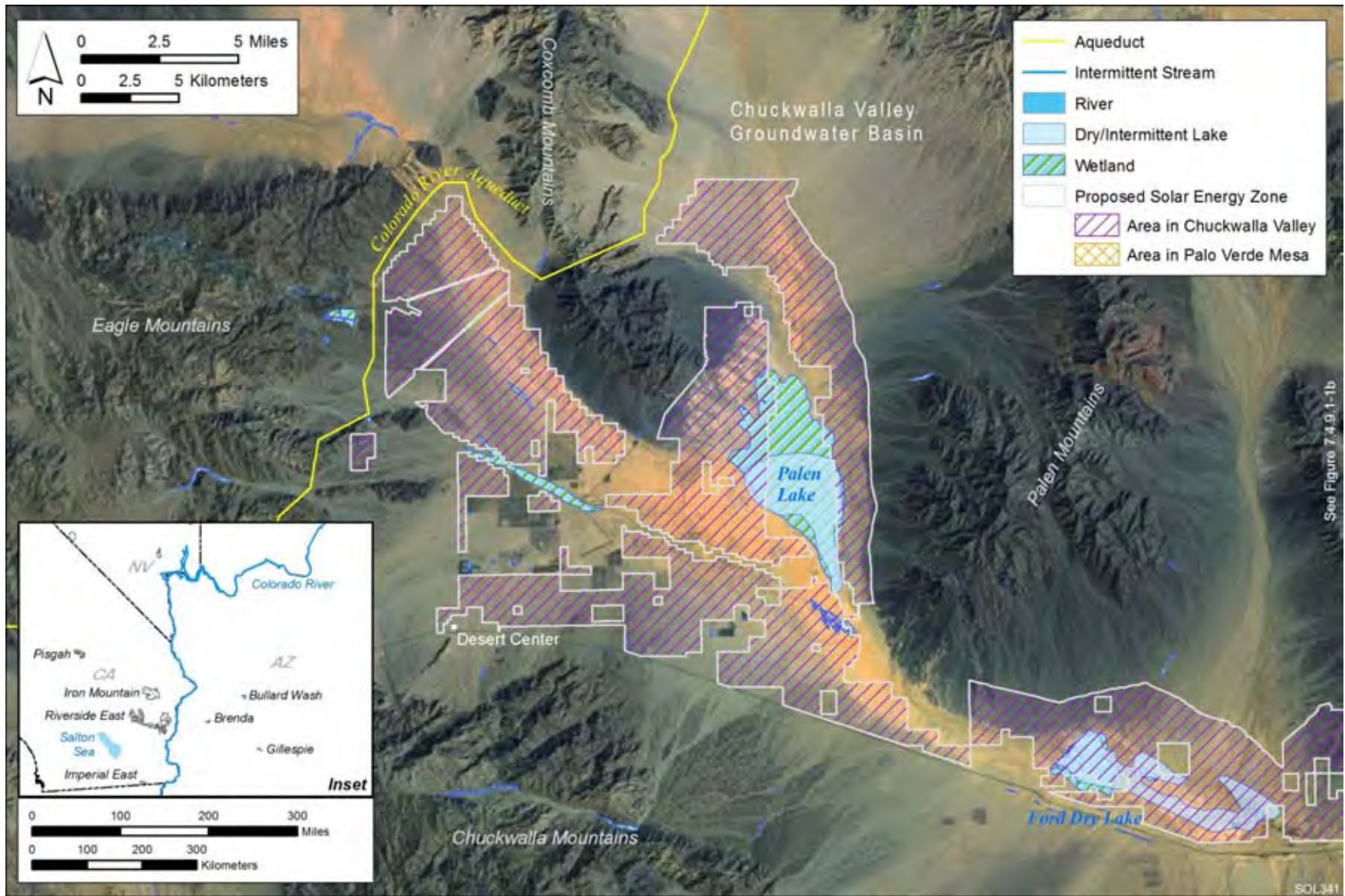


FIGURE 9.4.9.1-1 Surface Water Features near the Western Half of the Proposed Riverside East SEZ

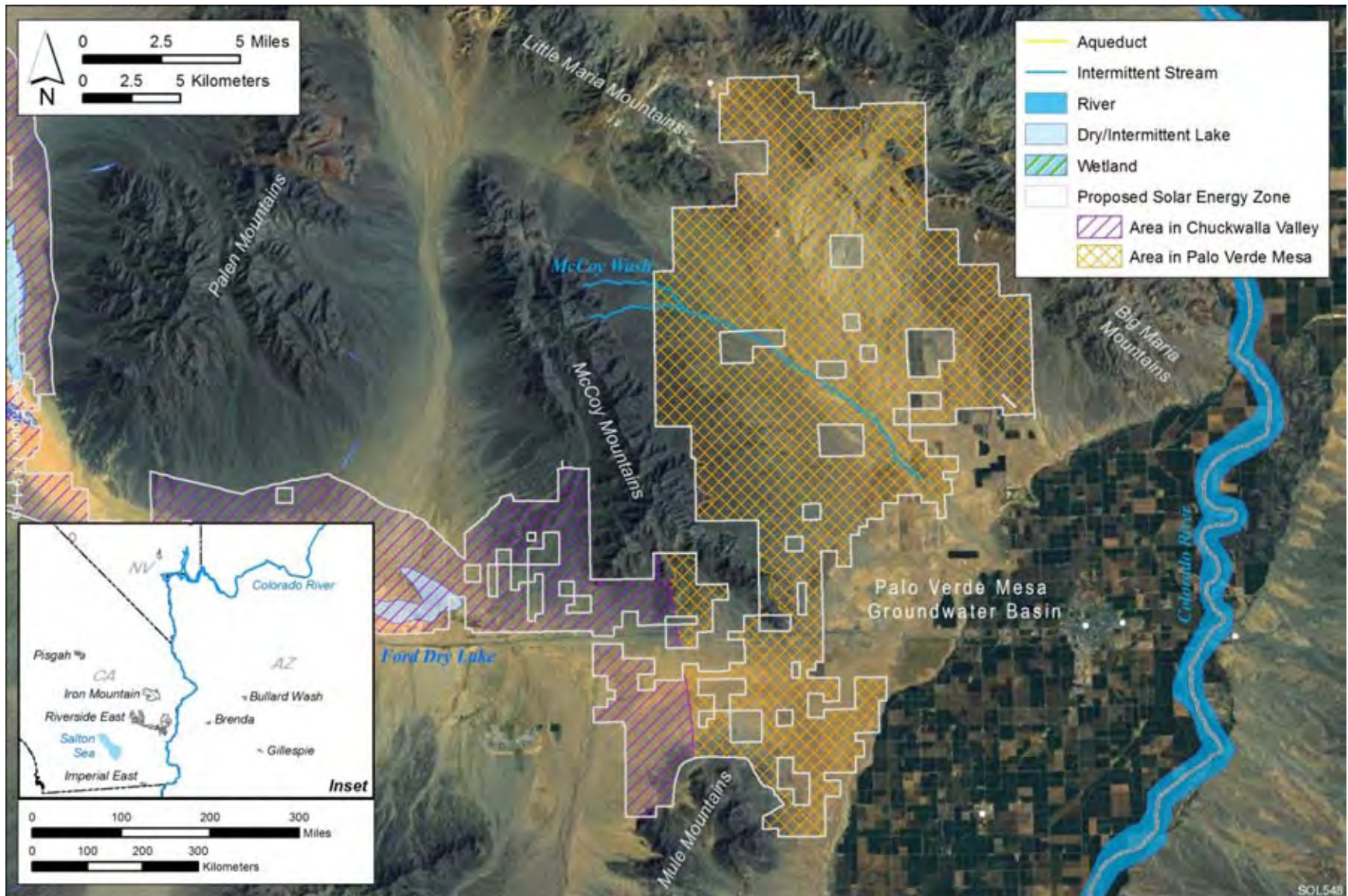


FIGURE 9.4.9.1-2 Surface Water Features near the Eastern Half of the Proposed Riverside East SEZ

1 Several small to large wetlands were identified in the western and central portions of the
2 SEZ, according to the NWI (USFWS 2009). The largest wetland area is the lacustrine wetland
3 that surrounds Palen Lake (Figure 9.4.9.1-1), which is intermittently flooded with unconsolidated
4 shore sediments. Further information regarding the small wetlands near the proposed SEZ is
5 given in Section 9.4.10.1.

6 7 8 **9.4.9.1.2 Groundwater** 9

10 The proposed Riverside East SEZ is located within two groundwater basins: Chuckwalla
11 Valley and Palo Verde Mesa. The divide between these two groundwater basins is a surface
12 drainage divide between the McCoy Mountains and the Mule Mountains, as well as a buried
13 bedrock ridge located below the primary water-bearing aquifer (Wilson and Owen-Joyce 1994;
14 CDWR 2003, groundwater basin numbers 7-5 and 7-39), so there are no restrictive structures
15 between the two groundwater basins. The principal aquifer consists of alluvium and
16 fanglomerate deposits on top of a metamorphic bedrock basement complex (CDWR 2003).
17 The Quaternary age alluvium sediments consist of alluvial fan and river deposits of fine to coarse
18 sands intermixed with layers of gravel, silt, and clay sediments. The late Tertiary age
19 fanglomerate deposits are a part of the Bouse Formation consisting of alluvial fan and marine
20 deposits of limestone interbedded with clays, silt and sand (Wilson and Owen-Joyce 1994). The
21 total thickness of the principal aquifer is on the order of 1,200 ft (366 m) (CDWR 2003), and the
22 alluvium layer thickness is on the order of 100 to 150 ft (30 to 46 m) in the region of the SEZ
23 (Metzger et al. 1973).

24
25 Groundwater recharge in the Chuckwalla Valley is by subsurface underflow and from
26 direct infiltration of precipitation runoff. Subsurface underflow is from the Pinto Valley and
27 Cadiz Valley groundwater basins to the west of the Chuckwalla Valley. The natural groundwater
28 flow pattern is from west to east across the Chuckwalla Valley toward the Colorado River.
29 Estimates of natural recharge have not been quantified in the Chuckwalla Valley. Natural
30 recharge is estimated to be 800 ac-ft/yr (987,000 m³/yr) in the neighboring Palo Verde Mesa and
31 the Cadiz Valley, which have similar climate and precipitation conditions (CDWR 2003).
32 Recharge from precipitation runoff is not suspected to be significant given the limited
33 precipitation in the region (Metzger et al. 1973). Discharge in the Chuckwalla Valley is primarily
34 by evapotranspiration at Palen Lake and subsurface underflow to the Palo Verde Mesa; the
35 evapotranspiration rate at Palen Lake is unknown, and the subsurface underflow is estimated to
36 be 400 ac-ft/yr (493,000 m³/yr) to Palo Verde Mesa (CDWR 2003). Groundwater withdrawal
37 rates were 9,100 ac-ft/yr (11.2 million m³/yr) in 1966 (CDWR 2003), and between 4,400 and
38 5,700 ac-ft/yr (5.4 million and 7.0 million m³/yr) during dry and wet years occurring in the
39 period 1998 to 2001 (CDWR 2005). The majority of groundwater withdrawals in the region of
40 the proposed SEZ are for agricultural and domestic uses.

41
42 Groundwater surface elevations are routinely monitored in the Chuckwalla Valley and
43 Palo Verde Mesa as a part of the methodology used to determine groundwater that is
44 replenished by Colorado River water, as outlined in the 2006 consolidated decree of the
45 U.S. Supreme Court (*Arizona v. California* 2006) (see Section 9.4.9.1.3 for further information).
46 Depth to groundwater ranges between 80 and 270 ft (24 and 82 m) below the surface across

1 the Chuckwalla Valley and into the Palo Verde Mesa (USGS 2010b). Groundwater surface
2 elevations have remained steady for several decades (USGS 2010c, monitoring wells
3 334438115211101, 333939114411501). Groundwater well yields average 1,800 gpm
4 (6,814 L/min) with a maximum of 3,900 gpm (14,760 L/min) in the Chuckwalla Valley.
5 However, the majority of the groundwater extractions are clustered on the western and eastern
6 edges of the valley around Desert Center and the Palo Verde Mesa. It is suspected that further
7 groundwater development in this region may lead to declines in groundwater elevations
8 (Metzger et al. 1973; Steinemann 1989). Transmissivity values for the principal aquifer have
9 been reported to range from 13 to 94,000 ft²/day (1.2 to 8,733 m²/day) (Metzger et al. 1973).

10
11 TDS concentrations range from 274 to 12,300 mg/L in the Chuckwalla Valley and from
12 730 to 4,500 mg/L in the Palo Verde Mesa (CDWR 2003). The best water quality, in terms of
13 low TDS values, comes from the western portion of the Chuckwalla Valley around Desert
14 Center, where the average TDS is 2,100 mg/L; TDS values increase as the groundwater flows
15 eastward towards the Colorado River (Steinemann 1989). In the region of Palen Lake, TDS
16 values range between 2,960 and 4,370 mg/L (CDWR 2003). Additional concerns relating to
17 groundwater quality are high concentrations of arsenic, selenium, fluoride, chloride, boron,
18 sulfate, and TDS, which impair its use for domestic and agricultural applications in certain areas
19 of the Chuckwalla Valley and Palo Verde Mesa (CDWR 2003).

20 21 22 **9.4.9.1.3 Water Use and Water Rights Management**

23
24 In 2005, water withdrawals from surface waters and groundwater in Riverside County
25 were 1.4 million ac-ft/yr (1.7 billion m³/yr), of which 74% came from surface waters and 26%
26 from groundwater. The largest water use category was municipal and domestic supply, at
27 519,000 ac-ft/yr (640 million m³/yr). However, the majority of this water is used in the larger
28 cities located in the western portion of Riverside County. Agricultural water uses accounted for
29 874,000 ac-ft/yr (1.1 billion m³/yr), and industrial water uses on the order of 7,000 ac-ft/yr
30 (8.6 million m³/yr) (Kenny et al. 2009). The primary water use in the eastern portion of
31 Riverside County relevant to the proposed Riverside East SEZ is for agriculture, representing
32 59% to 77% of total groundwater withdrawals during the dry and wet years, respectively, in the
33 period 1998 to 2001 (CDWR 2005).

34
35 To manage water resources, California uses a “plural” system, which consists of a
36 mixture of riparian and prior appropriation doctrines for surface waters, a separate doctrine
37 for groundwater, and pueblo rights (BLM 2001). Several agencies are involved with the
38 management of California’s water resources, including federal, state, local, and water/irrigation
39 districts. For example, water rights and water quality are managed by the State Water Board,
40 while the CDWR manages water conveyance, infrastructure, and flood management
41 (CDWR 2009). Surface water appropriations for nonriparian rights begin with a permit
42 application to the State Water Board and a review process that examines the application’s
43 beneficial use, pollution potential, and water quantity availability; the permitting, review, and
44 licensing procedure should not take more than 6 months to complete unless the application is
45 protested (BLM 2001).

1 Groundwater management in California is primarily implemented at the local level of
2 government through local agencies or ordinances; it can also be subject to court adjudications.
3 State statute provides authority and revenue mechanisms to several types of local agencies to
4 provide water for beneficial uses, as well as to manage withdrawals in order to prevent
5 overdraft² of the aquifers. Local ordinances (typically at the county level) can also be used to
6 manage groundwater resources and have been adopted in 27 counties in California. Many of
7 these local groundwater ordinances are focused on controlling water exports out of the basin
8 through permitting processes. Court adjudications are the strongest form of groundwater
9 management used in California and often result in the creation of a court-appointed
10 “watermaster” agency to manage withdrawals for all users to ensure that the court-determined
11 safe yield³ is maintained (CDWR 2003).

12
13 The most significant water management issue relating to the proposed Riverside East
14 SEZ is the assemblage of compacts, federal laws, court decrees, and contracts that form the “Law
15 of the River,” which pertains to the management of the Colorado River. The key aspects of the
16 Law of the River relevant to the proposed SEZ are as follows (BOR 2008):

- 17
18 • 1922 Colorado River Compact, which defines the Upper and Lower Colorado
19 River Basins and allots to each basin 7.5 million ac-ft/yr (9.3 billion m³/yr)
20 for beneficial use;
- 21
22 • 1928 Boulder Canyon Project Act, which grants California 4.4 million ac-ft/yr
23 (9.3 billion m³/yr) of the lower Colorado River Basin’s allotment;
- 24
25 • 1931 California Seven Party Agreement, which prioritizes California’s
26 allotment among local water management entities; and
- 27
28 • 1964 U.S. Supreme Court decision, along with the Consolidation Decree of
29 2006, which provides a single reference to the 1964 decision (*Arizona v.*
30 *California* 2006).

31
32 In accordance with the Law of the River, the USGS developed a method for identifying
33 groundwater wells outside of the Colorado River’s floodplain, where groundwater is replenished
34 by Colorado River water. This method is known as the Accounting Surface, and it establishes a
35 surface of static groundwater elevations, below which water is accounted for as Colorado River
36 water and above which water is accounted for as local tributary replenished water (Wilson and
37 Owen-Joyce 1994; Wiele et al. 2008). Groundwater below the Accounting Surface is subject to
38 water management by the Law of the River, which is administered by the BOR (Wilson and
39 Owen-Joyce 1994), and water above the Accounting Surface is subject to water management by
40 state and local entities.

² Groundwater overdraft is the condition in which water extractions from an aquifer exceed recharge processes in such excess as to cause substantial and sustained decreases in groundwater flows and groundwater elevations.

³ Safe yield is the amount of groundwater that can be withdrawn from a groundwater basin over a period of time without exceeding the long-term recharge of the basin or unreasonably affecting the basin’s physical and chemical integrity.

1 The Colorado River Accounting Surface is at an elevation between 238 and 240 ft
2 (72.5 and 73 m) for most of the Chuckwalla Valley and Palo Verde Mesa area
3 (Wiele et al. 2008). From west to east across the Chuckwalla Valley and into the Palo Verde
4 Mesa, static groundwater elevations are approximately 488 ft (149 m) near Desert Center, 288 ft
5 (88 m) near Palen Lake, and 245 ft (75 m) near the split between the two groundwater basins
6 (USGS 2010b). Groundwater above the Accounting Surface is subject to State of California
7 laws, because there are no local management entities in this area. Landowners in California may
8 withdraw groundwater for beneficial use without approval from the State Water Board in regions
9 where no local-level management or court adjudication takes precedence, so long as their use
10 does not impair the availability of neighboring water rights (CDWR 2010a).

11
12 Approximately 3% of the proposed SEZ is located in the boundaries of the Palo Verde
13 Irrigation District (PVID) along the very eastern edge of the SEZ. The PVID manages water
14 rights for the Palo Verde Valley and portions of the Palo Verde Mesa. The PVID shares a
15 priority right to develop up to 3.85 million ac-ft/yr (4.75 billion m³/yr) with the Yuma Project
16 and the Imperial Irrigation District according to the California Seven Party Agreement of 1931.
17 The majority of the consumptive use of water in the Palo Verde Valley is irrigation with water
18 supplied by surface water diversions, and any groundwater development on the Palo Verde Mesa
19 in the PVID boundaries would have to make prior arrangements with the PVID. Additionally, the
20 MWD has an indirect stake regarding consumptive water use in the PVID boundaries, because in
21 2004 the MWD and PVID started a 35-year agreement in 2004 for land fallowing within the
22 PVID boundaries in order to supply MWD with Colorado River water (MWD 2007).

23
24 Water management issues pertaining to the CRA are described in Section 9.2.9.1.3.

25 26 27 **9.4.9.2 Impacts**

28
29 Potential impacts on water resources related to utility-scale solar energy development
30 include direct and indirect impacts on surface waters and groundwater. Direct impacts occur at
31 the place of origin and at the time of the proposed activity, while indirect impacts occur away
32 from the place of origin or later in time. Impacts on water resources considered in this analysis
33 are the result of land disturbance activities (construction, final developed site plan, as well as off-
34 site activities such as road and transmission line construction) and water use requirements for
35 solar energy technologies that take place during the four project phases: site characterization,
36 construction, operations, and decommissioning/reclamation. Both land disturbance and
37 consumptive water use activities can affect groundwater and surface water flows, cause
38 drawdown of groundwater surface elevations, modify natural drainage pathways, obstruct natural
39 recharge zones, and alter surface water-wetland-groundwater connectivity. Water quality also
40 can be degraded through the generation of wastewater, chemical spills, increased erosion and
41 sedimentation, and increased salinity (e.g., by the excessive withdrawal from aquifers).

1 **9.4.9.2.1 Land Disturbance Impacts on Water Resources**
2

3 Impacts related to land disturbance activities are common to all utility-scale solar energy
4 facilities and are described in more detail for the four phases of development in Section 5.9.1;
5 these impacts will be minimized through the implementation of programmatic design features
6 described in Appendix A, Section A.2.2. In addition to the hydrologic evaluation (including
7 identifying 100-year floodplains and jurisdictional waters) described in the design features,
8 coordination and permitting with the CDFG would be needed for any proposed alterations of
9 surface water features (both perennial and ephemeral) in accordance with the Lake and
10 Streambed Alteration Program (CDFG 2010a). Siting of solar energy facilities near Palen Lake
11 and Ford Dry Lake (Figure 9.4.9.1-1) could disrupt the natural drainage patterns to these
12 receiving bodies, resulting in erosion and sedimentation issues. Additional concerns of land
13 disturbance in the vicinity of Palen Lake are associated with the surrounding wetland habitat and
14 groundwater recharge/discharge process, which could be adversely affected by alterations to
15 natural drainage patterns. The McCoy Wash represents a significant surface drainage across the
16 eastern portion of the SEZ (Figure 9.4.9.1-2) and a large portion of its watershed is suspected to
17 be within a 100-year floodplain according to CDWR awareness floodplain maps
18 (CDWR 2010b). Several smaller washes feed this incised channel, so land disturbance in the
19 vicinity of McCoy Wash should be minimized in order to prevent further channel incision,
20 erosion, and sedimentation impacts.
21

22
23 **9.4.9.2.2 Water Use Requirements for Solar Energy Technologies**
24

25
26 **Analysis Assumptions**
27

28 A detailed description of the water use assumptions for the four utility-scale solar energy
29 technologies (parabolic trough, power tower, dish engine, and PV systems) is presented in
30 Appendix M. Assumptions regarding water use calculations specific to the proposed Riverside
31 East SEZ are as follows:
32

- 33 • On the basis of a total area of greater than 30,000 acres (121 km²), it is
34 assumed that three solar projects would be constructed during the peak
35 construction year;
- 36 • Water needed for making concrete would come from an off-site source;
- 37 • The maximum land disturbance for an individual solar facility during the peak
38 construction year is assumed to be 3,000 acres (12 km²);
- 39 • Assumptions on individual facility size and land requirements (Appendix M),
40 along with the assumed number of projects and maximum allowable land
41 disturbance, result in the potential to disturb up to 4% of the total area of the
42 proposed SEZ;
43
44
45
46

- Water use requirements for hybrid cooling systems are assumed to be on the same order of magnitude as those using dry cooling (see Section 5.9.2.1); and
- Water from the CRA is assumed to be unavailable to solar energy facilities (see Section 9.2.9.1.3 and Section 9.2.9.2.2 for further details).

Site Characterization

During site characterization, water would be used mainly for controlling fugitive dust and supplying potable water for the workforce. Impacts on water resources during this phase of development are expected to be negligible, because activities would be limited in area, extent, and duration; water needs could be met by trucking water in from an off-site source.

Construction

During construction, water would be used mainly for fugitive dust control and the workforce potable water supply. Because there are no perennial surface water bodies on the proposed Riverside East SEZ, the water requirements for construction activities could be met by either trucking water to the sites or by using on-site groundwater resources. TDS levels in groundwater used for a potable supply must be less than 1,500 mg/L and are recommended to be less than 500 mg/L to meet secondary maximum contaminant levels (California Code Title 22, Article 16, Section 64449). Given the potential for nonpotable TDS values in groundwater of the Chuckwalla Valley and the Palo Verde Mesa, workforce water supplies may have to be brought in from off-site.

Water requirements for dust suppression and potable water supply during construction, shown in Table 9.4.9.2-1, could be as high as 6,813 ac-ft (8.4 million m³). Groundwater wells would have to yield an estimated 2,896 to 4,221 gpm (10,963 to 15,978 L/min) to meet the estimated construction water requirements. These yields are on the order of large municipal and agriculture production wells (Harter 2003), so multiple wells may be needed to obtain the water requirements. In addition, up to 222 ac-ft (273,800 m³) of sanitary wastewater generated would need to be treated either on-site or sent to an off-site facility.

The total water use requirements for the peak construction year, listed in Table 9.4.9.2-1, are on the same order of magnitude as the current groundwater withdrawals in the Chuckwalla Valley, as described in Section 9.4.9.1.2. Under the current conditions of groundwater extractions, groundwater surface elevations have remained steady over time. Groundwater withdrawals for solar energy development during the peak construction year could essentially double the current groundwater withdrawal rate for the region, which would likely cause drawdown of groundwater surface elevations and potentially lead to land subsidence issues. Further characterization of the aquifer properties, including pumping tests, would need to be performed during the site characterization phase to better determine the storage capacity and safe yield of the aquifer.

TABLE 9.4.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Riverside East SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements ^a				
Fugitive dust control (ac-ft) ^{b,c}	4,452	6,678	6,678	6,678
Potable supply for workforce (ac-ft)	222	135	56	28
Total water use requirements (ac-ft)	4,674	6,813	6,734	6,706
Wastewater generated				
Sanitary wastewater (ac-ft)	222	135	56	28

^a Assumptions of water use for fugitive dust control, potable supply for workforce, and wastewater generation are presented in Appendix M.

^b Fugitive dust control estimation assumes a local pan evaporation rate of 130 in./yr (330 cm/yr) (Cowherd et al. 1988; WRCC 2010a).

^c To convert ac-ft to m³, multiply by 1,234.

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Operations

During operations, water would be required for mirror/panel washing, the workforce potable water supply, and cooling (parabolic trough and power tower only) (Table 9.4.9.2-2). Water needs for cooling are a function of the type of cooling used (dry, wet, hybrid). Further refinements to water requirements for cooling would result from the percentage of operational time for the option employed (30% to 60% range assumed) and the power of the system. The differences between the water requirements reported in Table 9.4.9.2-2 for the parabolic trough and power tower technologies are attributable to the assumptions of acreage per megawatt. As a result, the water usage for the more energy-dense parabolic trough technology is estimated to be almost twice as large as that for power tower technology.

At full build-out capacity, water needs for mirror/panel washing are estimated to range from 902 to 16,232 ac-ft/yr (1.1 million to 20.0 million m³/yr) and for the workforce potable water supply, from 20 to 455 ac-ft/yr (24,700 to 561,200 m³/yr). As mentioned previously, TDS values in a potable water supply must be lower than 1,500 mg/L for short durations and less than 500 mg/L for prolonged use to meet California drinking water standards (*California Code*, Title 22, Article 16, Section 64449). Because of the high TDS concentrations that exist near the SEZ, water treatment may be required for the workforce potable water supply. The maximum total water usage during operation at full build-out capacity is estimated to be greatest for those technologies using the wet-cooling option, as high as 487,406 ac-ft/yr (601 million m³/yr). Water usage for dry-cooling systems would be as high as 49,150 ac-ft/yr (60.6 million m³/yr), approximately a factor of 10 times less than that for the wet-cooling option. Noncooled technologies, dish engine and PV systems, require substantially less water at full build-out capacity at 9,220 ac-ft/yr (11.4 million m³/yr) and 922 ac-ft/yr (1.1 million m³/yr), respectively (Table 9.4.9.2-2). Operations would produce up to 455 ac-ft/yr (561,200 m³/yr) of sanitary

TABLE 9.4.9.2-2 Estimated Water Requirements during Operations at Full Build-Out Capacity at the Proposed Riverside East SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW) ^{a,b}	32,463	18,035	18,035	18,035
Water use requirements				
Mirror/panel washing (ac-ft/yr) ^{c,d}	16,232	9,018	9,018	902
Potable supply for workforce (ac-ft/yr)	455	202	202	20
Dry-cooling (ac-ft/yr) ^e	6,493–32,463	3,607–18,035	NA ^f	NA
Wet-cooling (ac-ft/yr) ^e	146,085–470,719	81,158–261,510	NA	NA
Total water use requirements				
Noncooled technologies (ac-ft/yr)	NA	NA	9,220	922
Dry-cooled technologies (ac-ft/yr)	23,180–49,150	12,827–27,255	NA	NA
Wet-cooled technologies (ac-ft/yr)	162,772–487,406	90,378–270,730	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr) ^g	9,222	5,123	NA	NA
Sanitary wastewater (ac-ft/yr)	455	202	202	20

- ^a Land area for parabolic trough was estimated at 5 acres/MW (0.02 km²/MW); land area for power tower, dish engine, and PV technologies was estimated at 9 acres/MW (0.04 km²/MW).
- ^b Water needs are linearly related to power. Water usage for any other size project can be estimated by using multipliers provided in Table M.9-2 (Appendix M).
- ^c Value assumes a usage rate of 0.5 ac-ft/yr/MW for mirror washing for parabolic trough, power tower, and dish engine technologies and a rate of 0.05 ac-ft/yr/MW for panel washing for PV systems.
- ^d To convert ac-ft to m³, multiply by 1,234.
- ^e Dry-cooling value assumes 0.2 to 1.0 ac ft/yr per MW and wet-cooling value assumes 4.5 to 14.5 ac ft/yr per MW (range in these values represents 30 and 60% operating times) (DOE 2009).
- ^f NA = not applicable.
- ^g Value scaled from 250-MW Beacon Solar project with an annual discharge of 44 gpm (167 L/min) (AECOM 2009c). Blowdown estimates are relevant to wet cooling only.

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wastewater. In addition, for wet-cooled technologies, 5,123 to 9,222 ac-ft/yr (6.3 million to 11.4 million m³/yr) of cooling system blowdown water would need to be treated either on- or off-site. Any on-site treatment of wastewater would have to ensure that treatment ponds are effectively lined in order to prevent any groundwater contamination.

Groundwater is the primary water resource available for solar energy development at the proposed Riverside East SEZ. The current estimates of recharge and discharge processes in the Chuckwalla Valley and Palo Verde Mesa groundwater basin suggest that the groundwater aquifer is near a condition of equilibrium, as indicated by steady groundwater surface elevations and little development in the Chuckwalla Valley. The highest groundwater extraction rate in the Chuckwalla Valley was reported to be 9,100 ac-ft/yr (11.2 million m³/yr) in 1966. Based on the

1 limited information on groundwater aquifer characteristics, this groundwater extraction rate
2 serves as an estimate of the maximum groundwater withdrawal rate that would likely not induce
3 drawdown of groundwater surface elevations. However, further characterization of the
4 groundwater resources in the Chuckwalla Valley is needed in order to fully quantify the safe
5 yield of groundwater from this basin. Using the maximum historical groundwater withdrawal as
6 a guide for assessing available water resources, only dish engine and PV systems would be
7 feasible for the full build-out scenario of the proposed Riverside East SEZ. Power tower
8 technologies at the lower operational times (30%) may be feasible as well. Technologies using
9 wet-cooling have water requirement estimates that are a factor of 10 to 80 times greater than the
10 maximum historical groundwater extraction rate for the region. Wet-cooled facilities would most
11 likely cause significant drawdown of the groundwater surface elevations, so the use of wet-
12 cooling technologies is not feasible for the proposed Riverside East SEZ.

13
14 The drawdown of groundwater surface elevations can generate impacts on the natural
15 hydrology, as well as on ecosystem processes. Additional constraints affecting the region of the
16 proposed Riverside East SEZ are the issues relating to the Colorado River Accounting Surface
17 and the laws and management practices associated with the Law of the River, as described in
18 Section 9.4.9.1.3. Current groundwater levels are on the order of 240 ft (73 m) above the
19 Accounting Surface near Desert Center, but these levels above the Accounting Surface quickly
20 drop to about 40 ft (12 m) near Palen Lake and 5 ft (1.5 m) near the Palo Verde Mesa.
21 Groundwater below the Colorado River Accounting Surface is not available for solar energy
22 development, because it is accounted for as Colorado River water, which is fully allocated by the
23 treaties, compacts, and court decisions that make up the Law of the River.

24 25 26 **Decommissioning/Reclamation**

27
28 During decommissioning/reclamation, all surface structures associated with the solar
29 project would be dismantled, and the site reclaimed to its preconstruction state. Activities and
30 water needs during this phase would be similar to those during the construction phase (dust
31 suppression and workforce potable supply) and may also include water to establish vegetation in
32 some areas. However, the total volume of water needed is expected to be less. Because quantities
33 of water needed during the decommissioning/reclamation phase would be less than those for
34 construction, impacts on surface and groundwater resources also would be less.

35 36 37 ***9.4.9.2.3 Off-Site Impacts: Roads and Transmission Lines***

38
39 Impacts associated with the construction of roads and transmission lines primarily deal
40 with water use demands for construction, water quality concerns relating to potential chemical
41 spills, and land disturbance effects on the natural hydrology. The proposed Riverside East SEZ is
42 located adjacent to existing roads and transmission lines, as described in Section 9.4.1.2, so it is
43 assumed that no additional construction outside of the SEZ would be required and there would
44 be no impacts.

1 **9.4.9.2.4 Summary of Impacts on Water Resources**
2

3 The impacts on water resources associated with developing solar energy at the proposed
4 Riverside East SEZ are associated with land disturbance effects on the natural hydrology, water
5 quality concerns, and water use requirements for the various solar energy technologies. Land
6 disturbance activities can cause localized erosion and sedimentation issues, as well as alter
7 groundwater recharge and discharge processes. The impacts of land disturbance are of particular
8 concern in the areas near Palen Lake, Ford Dry Lake, and the McCoy Wash. Palen Lake is a
9 drainage outlet for several washes coming off the Coxcomb Mountains and the Palen Mountains,
10 as well as a significant groundwater discharge point with shallow groundwater levels supporting
11 wetland vegetation. Ford Dry Lake is a drainage outlet for washes coming off the Palen
12 Mountains and the McCoy Mountains. McCoy Wash is a large, incised drainage that conveys
13 significant flows during rainfall events, and much of its watershed is located within a suspected
14 100-year floodplain. Water quality concerns specific to the proposed SEZ deal with
15 contamination of groundwater through surface spills and with potable water supplies meeting
16 California drinking water standards, for which TDS values exceed standards in certain areas of
17 the SEZ.
18

19 Impacts from water use requirements vary depending on the type of solar technology
20 built and, for technologies using cooling systems, the type of cooling (wet, dry, or hybrid) used.
21 Groundwater is the primary water resource available to solar energy facilities in the proposed
22 Riverside East SEZ; however, aquifer characteristics and the region’s safe yield are not fully
23 quantified. The estimates of groundwater recharge, discharge, and underflow from adjacent
24 basins and historical data on groundwater extractions and groundwater surface elevations suggest
25 that there may not be groundwater available to support the water-intensive technologies, such as
26 those using wet cooling. An additional constraint on groundwater development in the proposed
27 Riverside East SEZ is the water rights issue related to the Colorado River Accounting Surface,
28 which defines a groundwater elevation below which the groundwater is accounted for as fully
29 allocated Colorado River water.
30

31 The estimated values of water requirements for the solar energy technologies are a
32 function of the full build-out capacity of the proposed SEZ. Full build-out of the large area of the
33 proposed Riverside East SEZ has the theoretical potential to generate 18,035 to 32,463 MW, but
34 would require very large water supplies for water-intensive technologies (Table 9.4.9.2-2). For
35 the purpose of evaluating a more realistic build-out scenario reflecting the available water
36 supplies, an estimate of the maximum power capacity for each technology was made assuming a
37 value for available groundwater resources in the Chuckwalla Valley. The maximum historical
38 groundwater withdrawal rate was 9,100 ac-ft/yr (11.2 million m³/yr) in 1966, which did not
39 result in significant overdraft conditions. Using this historical withdrawal rate as an estimate of
40 the available groundwater resources, wet-cooling technologies could potentially support 2 to
41 10% of the full build-out power capacity, while dry cooling could potentially support only 19 to
42 71%. This analysis of the potential power production capacity based on limited water resources
43 should serve as an estimate only. Further characterization of the groundwater safe-yield for the
44 Chuckwalla Valley and Palo Verde Mesa basins would be needed prior to the evaluation of
45 impacts associated with project-specific groundwater withdrawals. Additionally, any proposed
46 project-specific groundwater withdrawals will need to be analyzed with respect to drawdown

1 effects and the Colorado River Accounting Surface. While there is limited information on
2 groundwater resources at the proposed Riverside East SEZ, this analysis suggests that wet-
3 cooling technologies would be unfeasible and that substantial water conservation strategies
4 would be needed for dry cooled and dish engine. The relatively small quantities of water
5 estimated to support PV systems for the full build-out scenario suggest that this would be the
6 preferred technology for large-scale solar energy production at the proposed Riverside East SEZ.
7
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9 **9.4.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**

10
11 The program for solar energy development on BLM-administered lands will require the
12 programmatic design features given in Appendix A, Section A.2.2, to be implemented, thus
13 mitigating some impacts on water resources. Programmatic design features would focus on
14 coordinating with federal, state, and local agencies that regulate the use of water resources to
15 meet the requirements of permits and approvals needed to obtain water for development, and
16 conducting hydrological studies to characterize the aquifer from which groundwater would be
17 obtained (including drawdown effects, if a new point of diversion is created). The greatest
18 consideration for mitigating water impacts would be in the selection of solar technologies. The
19 mitigation of impacts would be best achieved by selecting technologies with low water demands.
20

21 Proposed design features specific to the proposed Riverside East SEZ are as follows:

- 22 • Wet-cooling options would not be feasible; other technologies should
23 incorporate water conservation measures.
- 24 • Land disturbance activities should avoid impacts to the extent possible near
25 the regions surrounding Palen Lake, Ford Dry Lake, and McCoy Wash.
- 26 • During site characterization, hydrologic investigations would need to identify
27 100-year floodplains and potential jurisdictional water bodies subject to Clean
28 Water Act Section 404 permitting. Siting of solar facilities and construction
29 activities should avoid areas identified as within a 100-year floodplain.
- 30 • During site characterization, coordination and permitting with CDFG
31 regarding California's Lake and Streambed Alteration Program would be
32 required for any proposed alterations to surface water features (both perennial
33 and ephemeral).
- 34 • Groundwater withdrawals should comply with rules and regulations set forth
35 by the PVID for the portions of the SEZ located within PVID boundaries.
- 36 • The use of groundwater in the Chuckwalla Valley and Palo Verde Mesa
37 should be planned for and monitored in cooperation with the BOR and the
38 USGS in reference to the Colorado River Accounting Surface and the rules set
39 forth in the Law of the River.
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- Groundwater monitoring and production wells should be constructed in accordance with standards set forth by the State of California (CDWR 1991) and Riverside County.
- Stormwater management plans and BMPs should comply with standards developed by the California Stormwater Quality Association (CASQA 2003).
- Water for potable uses would have to meet or be treated to meet water quality standards in the California Safe Drinking Water Act (*California Health and Safety Code*, Chapter 4).

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1 9.4.10 Vegetation

2
3 This section addresses vegetation that could occur or is known to occur within the
4 potentially affected area of the proposed Riverside East SEZ. The affected area considered in this
5 assessment includes the areas of direct and indirect effects. The area of direct effects was defined
6 as the area that would be physically modified during project development (i.e., where ground-
7 disturbing activities would occur) and included only the SEZ. The area of indirect effects was
8 defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities
9 would not occur but that could be indirectly affected by activities in the area of direct effect. No
10 area of direct or indirect effects was assumed for new transmission lines or access roads because
11 they are not expected to be needed for facilities on the proposed Riverside East SEZ due to the
12 proximity of an existing transmission line and state highway.

13
14 Indirect effects considered in the assessment included effects from surface runoff, dust,
15 and accidental spills from the SEZ, but do not include ground-disturbing activities. The potential
16 degree of impacts from indirect effects would decrease with increasing distance from the SEZ.
17 This area of indirect effect was identified on the basis of professional judgment and was
18 considered sufficiently large to bound the area that would potentially be subject to indirect
19 effects. The affected area is the area bounded by the areas of direct and indirect effects. These
20 areas are defined and the impact assessment approach is described in Appendix M.

21 22 23 9.4.10.1 Affected Environment

24
25 The proposed Riverside East SEZ is located in a transitional area that includes many
26 species associated with the Mojave and Sonoran Deserts. Most of the SEZ is located within the
27 Sonoran Basin and Range Level III ecoregion (EPA 2007), which supports creosotebush (*Larrea*
28 *tridentata*)-white bur sage (*Ambrosia dumosa*) plant communities with large areas of palo verde
29 (*Cercidium microphyllum*)-cactus shrub and saguaro cactus (*Carnegiea gigantea*) communities
30 (EPA 2002). The dominant species of the Lower Colorado River Valley subdivision of the
31 Sonoran Desert are primarily creosotebush, white bursage, and all-scale (*Atriplex polycarpa*),
32 with big galleta (*Pleuraphis rigida*), Palmer alkali heath (*Frankenia palmeri*), brittlebush
33 (*Encelia farinosa*), and western honey mesquite (*Prosopis glandulosa* var. *torreyana*) dominant
34 in some areas (Turner and Brown 1994). Larger drainageways and washes support species of
35 small trees and shrubs that may also occur in adjacent areas, such as western honey mesquite,
36 ironwood (*Olneya tesota*), and blue palo verde (*Cercidium floridum*), as well as species such as
37 smoketree (*Psoralea spinosa*), which are mostly restricted to drainageways. Shrub species
38 found in minor drainages include cat-claw acacia (*Acacia greggii*), burrobrush (*Hymenoclea*
39 *salsola* var. *pentalepis*), Anderson thornbush (*Lycium andersonii*), and desert broom (*Baccharis*
40 *sarothroides*). Annual precipitation in the Sonoran Desert occurs in winter and summer
41 (Turner and Brown 1994) and is very low in the area of the SEZ, averaging about 3.5 in.
42 (89.7 mm) at the Blythe Airport (see Section 9.4.13).

43
44 The western portion of the SEZ lies within the Mojave Basin and Range Level III
45 ecoregion, which is characterized by broad basins and scattered mountains. The boundary
46 between the Sonoran and Mojave Deserts represents a transitional area that includes many

1 species associated with both deserts. Communities of sparse, scattered shrubs and grasses
2 including creosotebush, white bursage (*Ambrosia dumosa*), and big galleta grass (*Pleuraphis*
3 *rigida*) occur in basins; Joshua tree (*Yucca brevifolia*), other *Yucca* species, and cacti occur on
4 arid footslopes; woodland and shrubland communities occur on mountain slopes, ridges, and
5 hills (Bryce et al. 2003). Creosote bush, all-scale (*Atriplex polycarpa*), brittlebush (*Encelia*
6 *farinosa*), desert holly (*Atriplex hymenelytra*), white burrobrush (*Hymenoclea salsola*), shadscale
7 (*Atriplex confertifolia*), blackbrush (*Coleogyne ramosissima*), and Joshua tree (*Yucca brevifolia*)
8 are dominant species within the Mojave desertscrub biome (Turner 1994).

9
10 Land cover types described and mapped under CAREGAP (NatureServe 2010) were used
11 to evaluate plant communities in and near the SEZ. Each cover type encompasses a range of
12 similar plant communities. Land cover types that occur within the potentially affected area of the
13 proposed Riverside East SEZ are shown in Figure 9.4.10.1-1. Table 9.4.10.1-1 provides the
14 surface area of each cover type within the potentially affected area.

15
16 Lands within the Riverside East SEZ are classified primarily as Sonora-Mojave
17 Creosotebush-White Bursage Desert Scrub. Additional cover types within the SEZ are given
18 in Table 9.4.10.2-1. Creosotebush was observed to be the dominant species over much of the
19 SEZ in August 2009; associated shrubs included brittlebush, white burrobrush, and desert holly.
20 Western honey mesquite occurs in sand dune areas. Biological soil crusts are present in some
21 areas. Characteristic Sonoran Desert species observed on the SEZ include ironwood, western
22 honey mesquite, smoketree, and blue palo verde. Cacti species observed within the SEZ were
23 barrel cactus (*Ferocactus cylindraceus*) and cholla (*Opuntia* sp.). Community types present on
24 the SEZ that are considered sensitive by the California Resources Agency (BLM 2002a,b)
25 include desert dry wash woodlands, desert chenopod scrub/mixed salt desert scrub, sand dune
26 communities, and playa communities. Plant communities that are dependent on groundwater
27 include mesquite bosque and bush seep-weed (*Suaeda moquinii*) communities (BLM and
28 CEC 2010b), both primarily associated with Palen Lake, located in the western portion of the
29 SEZ, where groundwater is relatively shallow (see Section 9.4.9).

30
31 The area surrounding the SEZ, within 5 mi (8 km), includes 16 cover types, which are
32 listed in Table 9.4.10.1-1. The predominant cover types are Sonora-Mojave Creosotebush-White
33 Bursage Desert Scrub, North American Warm Desert Volcanic Rockland, and North American
34 Warm Desert Bedrock Cliff and Outcrop.

35
36 Wetlands mapped by the NWI that occur within the proposed Riverside East SEZ and
37 within the 5-mi (8-km) area of indirect effects are shown in Figure 9.4.10.1-2 and summarized
38 in Table 9.4.10.1-2. NWI maps are produced from high-altitude imagery and are subject to
39 uncertainties inherent in image interpretation (USFWS 2009). Thirty-seven wetlands are located
40 entirely or in part within the SEZ, primarily in the central and western portions of the SEZ, with
41 a total of 3,807 acres (15.4 km²) occurring within the boundaries of the SEZ. These wetlands are
42 all intermittently flooded, indicating that surface water is usually absent but may be present for
43 variable periods. Six wetlands are classified as lacustrine unconsolidated shore wetlands, with a
44 total of 3,517 acres (14.2 km²) mapped within the SEZ. Unconsolidated shore wetlands have a
45 sparse vegetation cover. The lacustrine wetlands are primarily associated with Palen Lake and

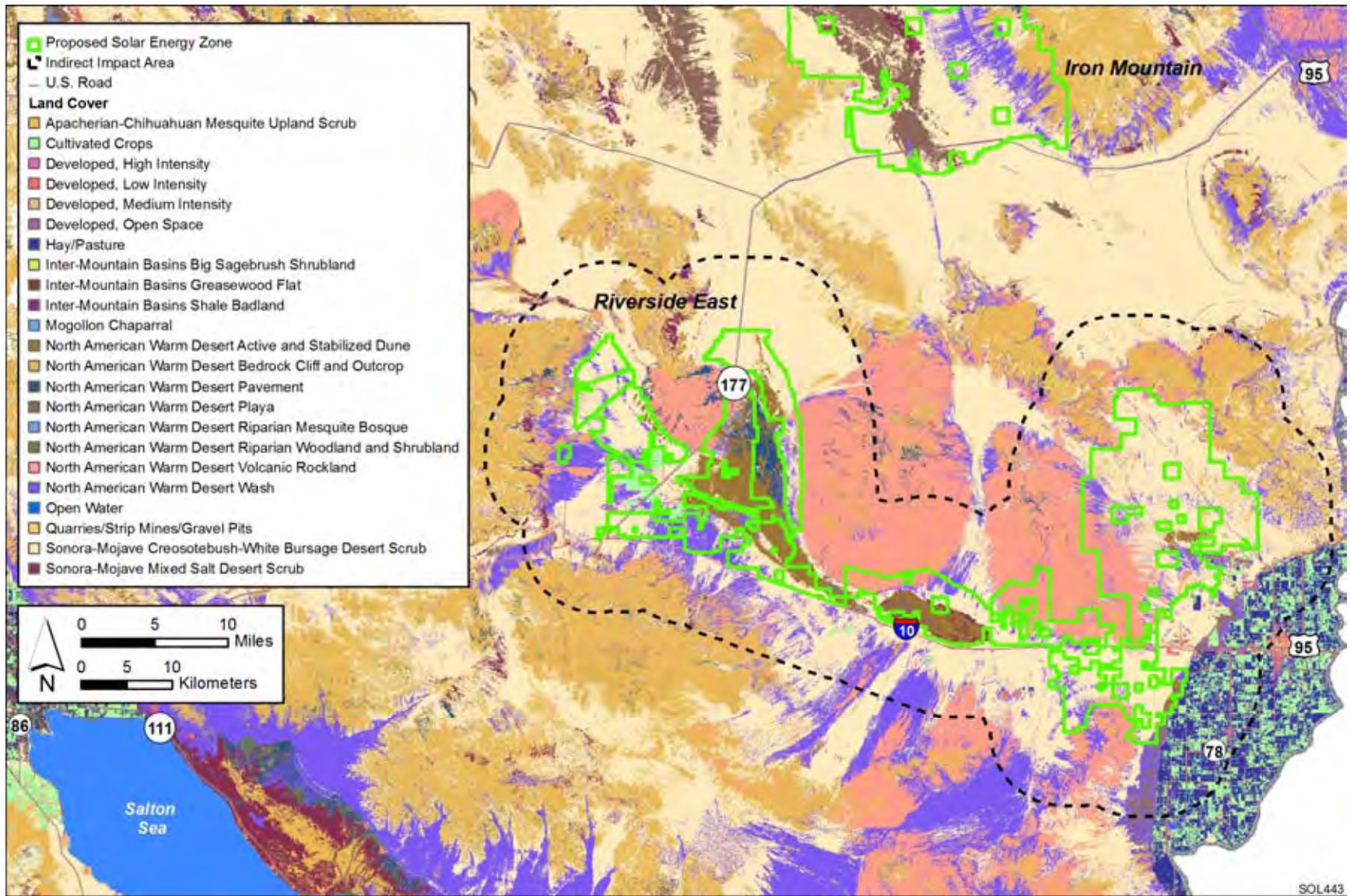


FIGURE 9.4.10.1-1 Land Cover Types within the Proposed Riverside East SEZ (Source: NatureServe 2010)

TABLE 9.4.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Riverside East SEZ and Potential Impacts

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		Overall Impact Magnitude ^e
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	
5264 Sonora-Mojave Creosotebush-White Bursage Desert Scrub: Occurs in broad valleys, lower bajadas, plains, and low hills in the Mojave and Sonoran Deserts. Shrubs form a sparse to moderately dense cover (2–50%), although the ground surface may be mostly barren. The dominant species are typically creosotebush (<i>Larrea tridentata</i>) and white bursage (<i>Ambrosia dumosa</i>). Other shrubs, dwarf-shrubs, and cacti may also be dominant or form sparse understories. Herbaceous species are typically sparse, but may be seasonally abundant.	109,933 acres ^f (5.0%, 8.0%)	229,999 acres (10.4%)	Moderate
3180 North American Warm Desert Volcanic Rockland: Consists of barren and sparsely vegetated (<10% plant cover) areas. Vegetation is variable and typically includes scattered desert shrubs.	29,579 acres (8.5%, 10.4%)	135,364 acres (38.8%)	Moderate
3121 North American Warm Desert Active and Stabilized Dune: Consists of unvegetated to sparsely vegetated (generally <10% plant cover) active dunes and sand sheets. Vegetation includes shrubs, forbs, and grasses. Includes unvegetated “blowouts” and stabilized areas.	26,798 acres (31.8%, 41.6%)	15,987 acres (19.0%)	Large
9151 North American Warm Desert Wash: Consists of intermittently flooded linear or braided strips within desert scrub or grassland landscapes on bajadas, mesas, plains, and basin floors. Although often dry, washes are associated with rapid sheet and gully flow. The vegetation varies from sparse and patchy to moderately dense and typically occurs along the banks, but may occur within the channel. Shrubs and small trees are typically intermittent to open. Common upland shrubs often occur along the edges.	24,976 acres (3.9%, 6.8%)	79,324 acres (12.4%)	Moderate
3120 North American Warm Desert Bedrock Cliff and Outcrop: Occurs on subalpine to foothill steep cliff faces, narrow canyons, rock outcrops, unstable scree, and talus slopes. Consists of barren and sparsely vegetated areas (generally <10% plant cover) with desert species, especially succulents. Lichens are predominant in some areas.	5,640 acres (0.6%, 1.0%)	115,696 acres (12.2%)	Small

TABLE 9.4.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		Overall Impact Magnitude ^e
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	
3143 North American Warm Desert Pavement: Consists of unvegetated to very sparsely vegetated (<2% plant cover) areas, usually in flat basins, with ground surfaces of fine to medium gravel coated with “desert varnish.” Desert scrub species are usually present. Herbaceous species may be abundant in response to seasonal precipitation.	1,588 acres (4.3%, 9.1%)	9,797 acres (26.6%)	Moderate
3161 North American Warm Desert Playa: Consists of barren and sparsely vegetated areas (generally <10% plant cover) that are intermittently flooded; salt crusts are common. Sparse shrubs occur around the margins, and patches of grass may form in depressions. In large playas, vegetation forms rings in response to salinity. Herbaceous species may be periodically abundant.	1,570 acres (2.3%, 2.7%)	828 acres (1.2%)	Moderate
5265 Sonora-Mojave Mixed Salt Desert Scrub: Extensive open-canopied shrublands in the Mojave and Sonoran Deserts, usually occurring around playas and in valley bottoms or basins with saline soils. Vegetation is typically composed of one or more <i>Atriplex</i> species; other salt-tolerant plants are often present or even co-dominant. Grasses occur at varying densities.	1,563 acres (2.8%, 7.2%)	5,103 acres (9.1%)	Moderate
21, 22 Developed, Open Space—Low Intensity: Includes housing, parks, golf courses, and other areas planted in developed settings. Impervious surfaces compose up to 49% of the total land cover.	898 acres (2.5%, 8.6%)	9,243 acres (26.2%)	Moderate
9178 North American Warm Desert Riparian Mesquite Bosque: Occurs along perennial and intermittent streams as relatively dense riparian corridors composed of trees and shrubs. Honey mesquite (<i>Prosopis glandulosa</i>) and velvet mesquite (<i>P. velutina</i>) are the dominant trees. Vegetation is supported by groundwater when surface water is absent.	223 acres (2.5%, 13.3%)	8 acres (0.1%)	Moderate
23, 24 Developed, Medium-High Density: Includes housing and commercial/industrial development. Impervious surfaces compose 50–100% of the total land cover.	67 acres (0.9%, 6.0%)	649 acres (9.1%)	Small
81, 82 Hay/Pasture, Cultivated Crops: Areas where pasture/hay or cultivated crops account for more than 20% of total vegetation cover.	54 acres (<0.1%, 0.6%)	49,248 acres (10.1%)	Small

TABLE 9.4.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b		Overall Impact Magnitude ^e
	Within SEZ ^c (Direct Effects)	Outside SEZ ^d (Indirect Effects)	
3139 Inter-Mountain Basins Shale Badland: Typically occurs on rounded hills and plains. Consists of barren and sparsely vegetated areas (<10% plant cover) with high rate of erosion and deposition. Vegetation consists of sparse dwarf shrubs and herbaceous plants.	23 acres (0.2%, 0.4%)	3,335 acres (22.7%)	Small
9182 North American Warm Desert Riparian Woodland and Shrubland: Occurs along medium to large perennial streams in canyons and desert valleys. Consists of a mix of riparian woodlands and shrublands. Vegetation is dependent upon annual or periodic flooding, along with substrate scouring, and/or a seasonally shallow water table.	0 acres	326 acres (1.2%)	Small
5259 Mojave Mid-Elevation Mixed Desert Scrub: Vegetation composition is quite variable. Dominant species include shrubs forbs, and grasses and may include <i>Yucca</i> spp.	0 acres	248 acres (2.2%)	Small
11 Open Water: Plant or soil cover is generally less than 25%.	0 acres	101 acres (0.4%)	Small

^a Land cover descriptions are from NatureServe (2010). Full descriptions of land cover types, including plant species, can be found in Appendix J.

^b Area in acres, determined from Sanborn Mapping (2008).

^c Includes the area of the cover type within the SEZ, the percentage that area represents of all occurrences of that cover type within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ), and the percentage that area represents of all occurrences of that cover type on BLM lands within the SEZ region. The SEZ region intersects portions of California and Arizona. However, the SEZ and affected area occur only in California.

^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from project facilities. The potential degree of indirect effects would decrease with increasing distance from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.

^e Overall impact magnitude categories were based on professional judgment and include (1) *small*: a relatively small proportion ($\leq 1\%$) of the cover type within the SEZ region would be lost; (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of a cover type would be lost; and (3) *large*: $> 10\%$ of a cover type would be lost.

^f To convert acres to km², multiply by 0.004047.

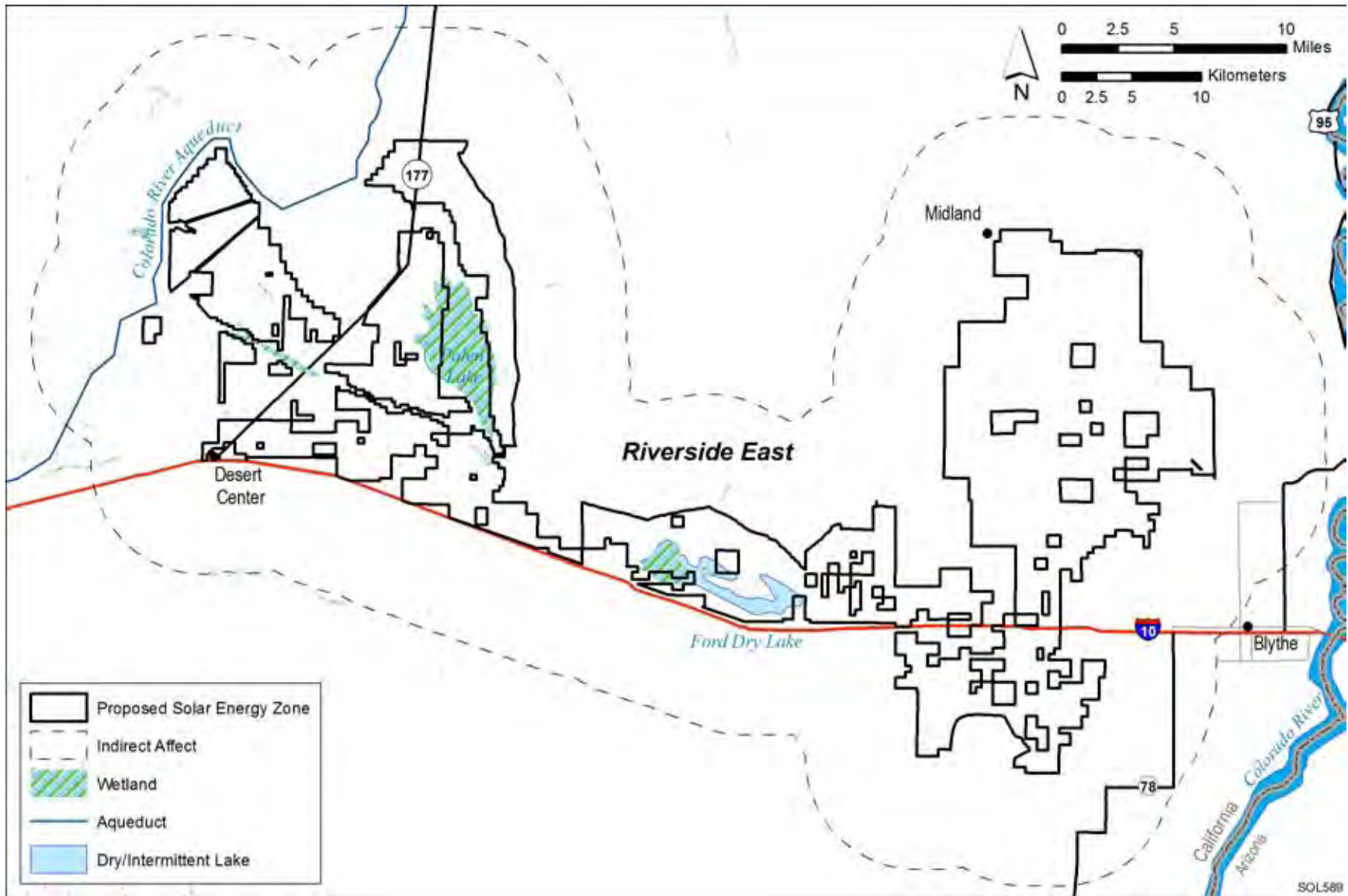


FIGURE 9.4.10.1-2 Wetlands within the Proposed Riverside East SEZ (Source: USFWS 2009)

TABLE 9.4.10.1-2 Wetlands of the Proposed Riverside East SEZ

Wetland Type and Size Range	Area within SEZ	Number/Total Wetland Area/ Area within SEZ
Lacustrine, unconsolidated shore 23–8,178 acres ^a	23–2,214 acres	6/9,860 acres/3,517 acres
Palustrine, emergent 0.2–14 acres	0.2–14 acres (100%)	10/32 acres/32 acres
Palustrine, scrub shrub 1–117 acres	1–117 acres	8/124 acres/124 acres
Palustrine, unconsolidated shore 0.3–10 acres	0.3–10 acres	10/38 acres/38 acres
Riverine, unconsolidated shore 5–717 acres	5–53 acres	3/774 acres/96 acres

^a To convert acres to km², multiply by 0.004047.

Source: USFWS (2009).

1
2
3 Ford Dry Lake, which is located in the central portion of the SEZ. Ten wetlands are classified as
4 palustrine wetlands with emergent plant communities, with a total of 32 acres (0.1 km²) mapped
5 within the SEZ. Emergent plant communities are composed primarily of herbaceous species
6 rooted in shallow water or saturated soil. Eight wetlands are classified as palustrine wetlands
7 with scrub shrub plant communities, with a total of 124 acres (0.5 km²) mapped within the SEZ.
8 Scrub shrub plant communities are composed primarily of short woody species, although
9 herbaceous species may also be present. Ten wetlands are classified as palustrine unconsolidated
10 shore wetlands, with a total of 38 acres (0.2 km²) mapped within the SEZ. Three wetlands are
11 classified as riverine unconsolidated shore wetlands, with a total of 96 acres (0.4 km²) mapped
12 within the SEZ. Desert dry washes in the SEZ support microphyll woodlands that include
13 ironwood, smoketree, and blue palo verde. An ironwood forest, identified by BLM as a Unique
14 Plant Assemblage, occurs in the upper reaches of McCoy Wash. Numerous vegetated and
15 unvegetated ephemeral washes occur within the SEZ, as well as washes and swales that support
16 communities of creosotebush and big galleta grass (*Pleuraphis rigida*) (BLM and CEC 2010a–
17 c). These dry washes typically contain water for short periods during or following precipitation
18 events and include temporarily flooded areas. Ephemeral washes provide surface flows to
19 downstream habitats including playas. One-hundred-thirteen wetlands are located within the
20 indirect impact area. These include lacustrine unconsolidated shore, palustrine emergent,
21 palustrine scrub shrub, palustrine unconsolidated shore, palustrine unconsolidated bottom, and
22 palustrine and riverine unconsolidated shore wetlands.
23

24 The proposed Riverside East SEZ is located within the Low Desert Weed Management
25 Area (LDWMA). Table 9.4.10.1-3 provides a list of weed species of the California Sonoran

TABLE 9.4.10.1-3 Weed Species of the California Sonoran Desert Region

Common Name	Scientific Name
Barbwire Russian thistle	<i>Salsola paulsenii</i>
Bermudagrass	<i>Cynodon dactylon</i>
Camelthorn	<i>Alhagi maurorum</i>
Common Russian thistle	<i>Salsola tragus</i>
Field bindweed	<i>Convolvulus arvensis</i>
Giant reed	<i>Arundo donax</i>
Giant salvinia	<i>Salvinia auriculata</i>
Hydrilla	<i>Hydrilla verticillata</i>
Scarlet wisteria	<i>Sesbania punicea</i>
Tamarisk	<i>Tamarix ramosissima</i>
Tocalote	<i>Centaurea melitensis</i>
White horsenettle	<i>Solanum elaeagnifolium</i>

Source: CDFA (2010).

Desert Region, which includes the LDWMA. Invasive species known to occur within the SEZ include tamarisk, which occurs along wet areas, Sahara mustard (*Brassica tournefortii*), cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola* sp.), Mediterranean grass (*Schismus arabicus*, *S. barbatus*), and red brome (*Bromus madritensis* ssp. *rubens*) (BLM and CEC 2010a–c).

9.4.10.2 Impacts

The construction of solar energy facilities within the Riverside East SEZ would result in direct impacts on plant communities because of the removal of vegetation within the facility footprint during land-clearing and land-grading operations. Approximately 80% of the SEZ (162,345 acres [657 km²]) would be expected to be cleared with full development of the SEZ. The plant communities affected would depend on facility locations and could include any of the communities that occur on the SEZ. Therefore, for the purposes of this analysis, all the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.

Indirect effects (caused, for example, by surface runoff or dust from the SEZ) have the potential to degrade affected plant communities and may reduce biodiversity by promoting the decline or elimination of species sensitive to disturbance. Indirect effects can also cause an increase in disturbance-tolerant species or invasive species. High impact levels could result in the elimination of a community or the replacement of one community type by another. The proper implementation of programmatic design features, however, would reduce indirect effects to a minor or small level of impact.

1 Possible impacts from solar energy facilities on vegetation encountered within the SEZ,
2 as well as general mitigation measures, are described in more detail in Section 5.10.5. Any such
3 impacts will be minimized through the implementation of required programmatic design features
4 described in Appendix A, Section A.2.2, and through additional SEZ-specific design features
5 given in Section 9.4.10.3.
6
7

8 ***9.4.10.2.1 Impacts on Native Species*** 9

10 The impacts of construction, operation, and decommissioning were considered small if
11 the impact affected a relatively small proportion (<1%) of the cover type in the SEZ region
12 (within 50 mi [80 km] of the center of the SEZ); a moderate impact (>1 but <10%) could affect
13 an intermediate proportion of cover type; a large impact could affect greater than 10% of a cover
14 type.
15

16 Solar facility construction and operation would primarily affect communities of the
17 Sonora-Mojave Creosotebush-White Bursage Desert Scrub cover type. Additional cover types
18 within the SEZ that would be affected include North American Warm Desert Volcanic Rockland,
19 North American Warm Desert Active and Stabilized Dune, North American Warm Desert Wash,
20 North American Warm Desert Bedrock Cliff and Outcrop, North American Warm Desert
21 Pavement, North American Warm Desert Playa, Sonora-Mojave Mixed Salt Desert Scrub,
22 North American Warm Desert Riparian Mesquite Bosque, and Inter-Mountain Basins Shale
23 Badland. Although Hay/Pasture, Cultivated Crops, Developed, Open Space—Low Intensity, and
24 Developed, Medium-High Density cover types occur within the SEZ, these areas likely support
25 few native plant communities. Table 9.4.10.1-1 summarizes the potential impacts on native
26 species cover types that would result from solar energy facilities in the proposed Riverside East
27 SEZ. Many of these cover types are relatively common in the SEZ region; however, several are
28 relatively uncommon, representing less than 1% of the land area within the SEZ region: North
29 American Warm Desert Pavement (0.7%), Inter-Mountain Basins Shale Badland (0.3%), and
30 North American Warm Desert Riparian Mesquite Bosque (0.2%).
31

32 The construction, operation, and decommissioning of solar projects within the SEZ
33 would result in large impacts on North American Warm Desert Active and Stabilized Dune and
34 moderate impacts on Sonora-Mojave Creosotebush-White Bursage Desert Scrub, North
35 American Warm Desert Volcanic Rockland, North American Warm Desert Wash, North
36 American Warm Desert Pavement, North American Warm Desert Playa, Sonora-Mojave Mixed
37 Salt Desert Scrub, Developed, Open Space—Low Intensity, and North American Warm Desert
38 Riparian Mesquite Bosque. Most of the playa cover type is associated with Ford Dry Lake. Solar
39 project development within the SEZ would result in small impacts on the remaining cover types
40 in the affected area. Sand dune, playa, desert chenopod scrub/mixed salt desert scrub (primarily
41 associated with Ford Dry Lake), desert ephemeral dry wash communities, and dry wash
42 microphyll woodlands are important sensitive habitats in the region.
43

44 Disturbance of vegetation in dune communities within the SEZ, such as from heavy
45 equipment operation, could result in the loss of substrate stabilization. Re-establishment of dune
46 species could be difficult due to the arid conditions and unstable substrates. Because of the arid

1 conditions, reestablishment of desert scrub or other communities in temporarily disturbed areas
2 would likely be very difficult and might require extended periods of time. In addition, noxious
3 weeds could become established in disturbed areas and colonize adjacent undisturbed habitats,
4 thus reducing restoration success and potentially resulting in widespread habitat degradation.
5 Cryptogamic soil crusts occur in many of the shrubland communities in the region and likely
6 occur on the SEZ. Damage to these crusts, by the operation of heavy equipment or other
7 vehicles, can alter important soil characteristics, such as nutrient cycling and availability, and
8 affect plant community characteristics (Lovich and Bainbridge 1999).

9
10 The deposition of fugitive dust from disturbed soil areas in habitats outside a solar project
11 area could result in reduced productivity or changes in plant community composition. Fugitive
12 dust deposition could affect plant communities of each of the cover types occurring within the
13 indirect impact area identified in Table 9.4.10.1-1.

14
15 Potential impacts on wetlands as a result of solar energy facility development are
16 described in Section 5.6.1. Specific to the affected area of the proposed Riverside East SEZ,
17 approximately 3,807 acres (15.4 km²) of wetland habitat occurs within the SEZ and could be
18 affected by project development.

19
20 Grading could result in direct impacts on the wetlands within the SEZ if fill material is
21 placed within wetland areas. Grading near the wetlands in or near the SEZ could disrupt surface
22 water or groundwater flow characteristics, resulting in changes in the frequency, duration, depth,
23 or extent of inundation or soil saturation, and could potentially alter wetland plant communities
24 and affect wetland function adjacent to or downgradient from solar projects. Increases in surface
25 runoff from a solar energy project site could also affect wetland hydrologic characteristics. The
26 introduction of contaminants into wetlands in or near the SEZ could result from spills of fuels or
27 other materials used on a project site. Soil disturbance could result in sedimentation in wetland
28 areas, which could degrade or eliminate wetland plant communities. Sedimentation effects or
29 hydrologic changes could also extend to wetlands outside of the SEZ. Grading could also affect
30 dry washes within the SEZ, and alteration of surface drainage patterns or hydrology could
31 adversely affect downstream dry wash, playa, or chenopod scrub communities. Vegetation
32 within these communities could be lost by erosion or desiccation. See Section 9.4.9 for further
33 discussion of impacts on washes and playas.

34
35 Although the use of groundwater within the Riverside East SEZ for technologies with
36 high water requirements, such as wet-cooling systems, is considered unlikely, groundwater
37 withdrawals for such systems could reduce groundwater discharge along riparian areas.
38 Reductions in groundwater discharges at springs and seeps that support riparian habitats could
39 result in degradation of these habitats. Communities that depend on accessible groundwater, such
40 as mesquite bosque or bush seep-weed communities, could become degraded or lost as a result of
41 lowered groundwater levels (BLM and CEC 2010b).

1 **9.4.10.2 Impacts from Noxious Weeds and Invasive Plant Species**
2

3 On February 8, 1999, the President signed E.O. 13112, “Invasive Species,” which directs
4 federal agencies to prevent the introduction of invasive species and provide for their control and
5 to minimize the economic, ecological, and human health impacts of invasive species (*Federal*
6 *Register*, Volume 64, page 61836, Feb. 8, 1999). Potential impacts of noxious weeds and
7 invasive plant species resulting from solar energy facilities are described in Section 5.10.1.
8 Despite required programmatic design features to prevent the spread of noxious weeds, project
9 disturbance could potentially increase the prevalence of noxious weeds and invasive species in
10 the affected area of the proposed Riverside East SEZ, such that weeds could be transported into
11 areas that were previously relatively weed-free, which could result in reduced restoration success
12 and possible widespread habitat degradation.

13
14 Invasive species, including tamarisk, Sahara mustard, cheatgrass, Russian thistle,
15 Mediterranean grass, and red brome, occur on the SEZ. Weed species known to occur in the
16 Sonoran Desert Region are given in Table 9.4.10.1-3.

17
18 Past or present land uses may affect the susceptibility of plant communities to the
19 establishment of noxious weeds and invasive species. Small areas of Developed, Open Space—
20 Low Intensity, totaling about 898 acres (3.6 km²), occur within the SEZ, and approximately
21 9,243 acres (37.4 km²) occur in the indirect impact area; about 67 acres (0.3 km²) of Developed,
22 Medium-High Density occur within the SEZ and 649 acres (2.6 km²) occur within the indirect
23 impact area. The developed areas likely support few native plant communities. Because
24 disturbance may promote the establishment and spread of invasive species, developed areas may
25 provide sources of such species. Existing roads, transmission lines, and recreational OHV use
26 within the SEZ area of potential impact also likely contribute to the susceptibility of plant
27 communities to the establishment and spread of noxious weeds and invasive species.

28
29
30 **9.4.10.3 SEZ-Specific Design Features and Design Feature Effectiveness**
31

32 In addition to programmatic design features, SEZ-specific design features would reduce
33 the potential for impacts on plant communities. While some SEZ-specific design features are
34 best established when project details are considered, some design features can be identified at
35 this time, as follows.

- 36
37 • An Integrated Vegetation Management Plan, addressing invasive species
38 control, and an Ecological Resources Mitigation and Monitoring Plan,
39 addressing habitat restoration and management, should be approved and
40 implemented to increase the potential for successful restoration of
41 creosotebush-white bursage desert scrub communities and other affected
42 habitats and minimize the potential for the spread of tamarisk, Sahara
43 mustard, cheatgrass, or other invasive species. Invasive species control should
44 focus on biological and mechanical methods where possible to reduce the use
45 of herbicides.
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- All wetland, riparian, playa, dry wash (including dry wash microphyll woodland), sand dune and sand transport areas, and chenopod scrub habitats within the SEZ should be avoided to the extent practicable, and any impacts minimized and mitigated. A buffer area should be maintained around wetland, riparian, playa, and dry wash communities to reduce the potential for impacts on these communities on or near the SEZ.
- Appropriate engineering controls should be used to minimize impacts on wetland, riparian, playa, dry wash woodland, and chenopod scrub, including downstream occurrences, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.
- Groundwater withdrawals should be limited to reduce the potential for indirect impacts on riparian habitat that is associated with groundwater discharge or groundwater-dependent communities, such as mesquite bosque or bush seep-weed communities.

If these SEZ-specific design features are implemented in addition to programmatic design features, it is anticipated that a high potential for impacts from invasive species and potential impacts on wetland, riparian, playa, dry wash (including dry wash microphyll woodland), sand dune, and chenopod scrub habitats would be reduced to a minimal potential for impact.

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1 **9.4.11 Wildlife and Aquatic Biota**

2
3 This section addresses wildlife (amphibians, reptiles, birds, and mammals) and aquatic
4 biota that could occur within the potentially affected area of the proposed Riverside East SEZ.
5 Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) was determined
6 from the California Wildlife Habitat Relationships System (CDFG 2008). Land cover types
7 suitable for each species were determined from SWReGAP (USGS 2004, 2005, 2007). The
8 amount of aquatic habitat within the SEZ region was determined by estimating the length of
9 linear perennial stream and canal features and the area of standing water body features
10 (i.e., ponds, lakes, and reservoirs) within 50 mi (80 km) of the SEZ with available GIS surface
11 water data sets.

12
13 The affected area considered in this assessment included the areas of direct and indirect
14 effects. The area of direct effects was defined as the area that would be physically modified
15 during project development (i.e., where ground-disturbing activities would occur within the
16 SEZ). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ
17 boundary, where ground-disturbing activities would not occur but that could be indirectly
18 affected by activities in the area of direct effects (e.g., surface runoff, dust, noise, lighting, and
19 accidental spills from the SEZ). The potential degree of indirect effects would decrease with
20 increasing distance from the SEZ. This area of indirect effects was identified on the basis of
21 professional judgment and was considered sufficiently large to bound the area that would
22 potentially be subject to indirect effects.

23
24 The affected area is the area bounded by the areas of direct and indirect effects. These
25 areas are defined and the impact assessment approach is described in Appendix M. No area of
26 direct or indirect effects was assumed for a new transmission line or access road, because of the
27 proximity of existing transmission lines and roads to the SEZ.

28
29 Dominant vegetation in the affected area is desertscrub, and the primary land cover
30 habitat type within the affected area is Sonora-Mojave creosotebush-white bursage desertscrub
31 (see Section 9.4.10). Potentially unique habitats in the affected area in which wildlife species
32 may reside include desert dunes, cliffs and rock outcrops, volcanic rocklands, desert washes, and
33 playa wetland habitats. Playa wetland habitats in the affected area include Ford Dry Lake and
34 Palen Lake as well as the CRA. Palen Lake is located in the western portion of the SEZ; Ford
35 Lake is in the center of the SEZ. The CRA is located along the western border of the SEZ
36 (Figure 9.4.12.1-1). There are also a number of desert washes on the SEZ that may provide
37 habitat for unique plant assemblages.

38 39 **9.4.11.1 Amphibians and Reptiles**

40 41 42 **9.4.11.1.1 Affected Environment**

43
44
45 This section addresses amphibian and reptile species that are known to occur, or for
46 which potentially suitable habitat occurs, on or within the potentially affected area of the

1 proposed Riverside East SEZ. The list of amphibian and reptile species potentially present in the
2 project area was determined from range maps and habitat information available from CWHRs
3 (CDFG 2008). Land cover types suitable for each species were determined from SWReGAP
4 (USGS 2004, 2005, 2007). See Appendix M for additional information on the approach used.
5

6 Based on the range, habitat preferences, and/or presence of potentially suitable land
7 cover for the amphibian species that occur within southeastern California (CDFG 2008;
8 USGS 2004, 2005, 2007), the Couch's spadefoot (*Scaphiopus couchii*) and red-spotted
9 toad (*Bufo punctatus*) would be expected to occur within the proposed Riverside East SEZ. The
10 most likely areas for these species to occur within the SEZ are in the area of Ford Dry Lake (near
11 the center of the SEZ) and Palen Lake (in the western portion of the SEZ). Several other
12 amphibian species could inhabit the CRA along the western boundary of the SEZ. These species
13 include the bullfrog (*Rana catesbeiana*), Colorado River toad (*Bufo alvarius*), Rio Grande
14 leopard frog (*Rana berlandieri*), and Woodhouse's toad (*Bufo woodhousii*). Because these
15 species tend to occur within 300 ft (100 m) of permanent water (USGS 2007), they would not be
16 expected to occur with any regularity in the SEZ.
17

18 Thirty-one reptile species could occur within the Riverside East SEZ (CDFG 2008):
19 one tortoise, 13 lizard, and 17 snake species. The desert tortoise (*Gopherus agassizii*) is a federal
20 and state-listed threatened species. This species is discussed in Section 9.4.12. Among the more
21 common lizard species that could occur within the SEZ are the desert horned lizard (*Phrynosoma*
22 *platyrhinos*), long-nosed leopard lizard (*Gambelia wislizenii*), Mojave fringe-toed lizard (*Uma*
23 *scoparia*), side-blotched lizard (*Uta stansburiana*), western banded gecko (*Coleonyx variegatus*),
24 and zebra-tailed lizard (*Callisaurus draconoides*).
25

26 The most common snake species expected to occur within the Riverside East SEZ are the
27 coachwhip (*Masticophis flagellum*), glossy snake (*Arizona elegans*), gophersnake (*Pituophis*
28 *catenifer*), groundsnake (*Sonora semiannulata*), and long-nosed snake (*Rhinocheilus lecontei*).
29 The Mojave rattlesnake (*Crotalus scutulatus*) and sidewinder (*C. cerastes*) would be the most
30 common poisonous snake species expected to occur on the SEZ.
31

32 Table 9.4.11.1-1 provides habitat information for the amphibian and reptile species that
33 could occur on or in the affected area of the proposed Riverside East SEZ.
34
35

36 **9.4.11.1.2 Impacts** 37

38 The potential for impacts on amphibians and reptiles from utility-scale solar energy
39 development within the proposed Riverside East SEZ is presented in this section. The types of
40 impacts that amphibians and reptiles could incur from construction, operation, and
41 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
42 such impacts would be minimized through the implementation of required programmatic design
43 features described in Appendix A, Section A.2.2, and the application of any additional
44 mitigation. Section 9.4.11.1.3, below, identifies SEZ-specific design features of particular
45 relevance to the Riverside East SEZ.
46

TABLE 9.4.11.1-1 Representative Amphibians and Reptiles That Could Occur on or in the Affected Area of the Proposed Riverside East SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Amphibians				
Couch's spadefoot (<i>Scaphiopus couchii</i>)	Desert washes, desert riparian, palm oasis, desert succulent shrub, and desert scrub habitats. Requires pools or potholes with water that lasts longer than 10 to 12 days for breeding sites. About 2,225,100 acres ^f of potentially suitable habitat occurs in the SEZ region.	110,156 acres of potentially suitable habitat lost (5.0% of available potentially suitable habitat)	230,007 acres of potentially suitable habitat (10.3% of available potentially suitable habitat)	Moderate. Avoid development in Ford Dry Lake and Palen Lake.
Red-spotted toad (<i>Bufo punctatus</i>)	Rocky canyons and gullies in deserts, grasslands, and dry woodlands. When inactive, it occurs under rocks, in rock crevices, or underground. Often found near rocky areas associated with spring seepages, intermittent streams, and cattle tanks. Breeds in shallow water of temporary rain pools, spring-fed pools, and pools along intermittent streams. About 2,522,400 acres of potentially suitable habitat occurs in the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available potentially suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate. Avoid development in Ford Dry Lake and Palen Lake.
Lizards				
Desert horned lizard (<i>Phrynosoma platyrhinos</i>)	Deserts dominated by sagebrush, creosote bush, greasewood, or cactus. Occurs on sandy flats, alluvial fans, washes, and edges of dunes. Burrows in soil during periods of inactivity. Common throughout Mojave and Colorado Deserts. About 4,698,800 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (3.5% of available potentially suitable habitat)	596,015 acres of potentially suitable habitat (12.7% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 9.4.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Lizards (Cont.)				
Long-nosed leopard lizard (<i>Gambelia wislizenii</i>)	Desert and semidesert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows, which it occupies when inactive. Widely distributed in the Mojave, Colorado, and other desert areas in California. About 2,522,500 acres of potentially suitable habitat occurs in the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available potentially suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate
Mojave fringe-toed lizard (<i>Uma scoparia</i>)	Restricted to sparsely vegetated windblown sand of dunes, flats, riverbanks, and washes. Requires fine, loose sand for burrowing. About 2,303,800 acres of potentially suitable habitat occurs in the SEZ region.	136,731 acres of potentially suitable habitat lost (5.9% of available potentially suitable habitat)	245,986 acres of potentially suitable habitat (10.7% of available potentially suitable habitat)	Moderate
Side-blotched lizard (<i>Uta stansburiana</i>)	Arid and semiarid locations with scattered bushes or scrubby trees. Often occurs in sandy washes with scattered rocks and bushes. About 4,053,700 acres of potentially suitable habitat occurs in the SEZ region.	140,549 acres of potentially suitable habitat lost (3.5% of available potentially suitable habitat)	425,267 acres of potentially suitable habitat (10.5% of available potentially suitable habitat)	Moderate
Western banded gecko (<i>Coleonyx variegatus</i>)	Wide variety of habitats including deserts with creosotebush and sagebrush and pinyon-juniper woodlands. Inhabits both rocky areas and barren dunes. Most abundant in sandy flats and desert washes. Uses rocks, burrows, and spaces beneath vegetative debris or trash during periods of inactivity. About 3,265,500 acres (of potentially suitable habitat occurs in the SEZ region.	138,265 acres of potentially suitable habitat lost (4.2% of available potentially suitable habitat)	315,836 acres of potentially suitable habitat (9.7% of available potentially suitable habitat)	Moderate

TABLE 9.4.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Lizards (Cont.)				
Zebra-tailed lizard (<i>Callisaurus draconoides</i>)	Sparsely vegetated deserts on open sandy washes, dunes, floodplains, beaches, or desert pavement. Common and widely distributed throughout Mojave and Colorado Deserts. About 3,734,800 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (4.4% of available potentially suitable habitat)	476,984 acres of potentially suitable habitat (12.8% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Snakes				
Coachwhip (<i>Masticophis flagellum</i>)	Wide variety of open terrain habitats. Most abundant in deserts, grasslands, scrub, chaparral, and pastures. Prefers relatively dry open terrain. It seeks cover in burrows, rocks, or vegetation. About 3,488,700 acres of potentially suitable habitat occurs in the SEZ region.	142,371 acres of potentially suitable habitat lost (4.1% of available potentially suitable habitat)	361,682 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate
Glossy snake (<i>Arizona elegans</i>)	Variety of habitats including barren to sparsely shrubby deserts, sagebrush flats, grasslands, and sandhills. Prefers sandy areas with scattered brush, but also occurs in rocky areas. Shelters and lays eggs underground. Common throughout southern California, particularly the desert regions. About 3,186,500 acres of potentially suitable habitat occurs in the SEZ region.	161,930 acres of potentially suitable habitat lost (5.1% of available potentially suitable habitat)	325,318 acres of potentially suitable habitat (10.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 9.4.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Snakes (Cont.)				
Gophersnake (<i>Pituophis catenifer</i>)	Wide variety of habitats including deserts, prairies, shrublands, woodlands, and farmlands. May dig its burrow or occupy mammal burrows. Eggs are laid in burrows or under large rocks or logs. Most widespread and common snake in California. About 3,483,600 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (4.7% of available potentially suitable habitat)	341,715 acres of potentially suitable habitat (9.8% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Groundsnake (<i>Sonora semiannulata</i>)	Arid and semiarid areas including desert flats, sand hummocks, and rocky hillsides with pockets of loose soil. Ranges from prairie and desert lowlands to pinyon-juniper and oak-pine zone. About 2,502,900 acres of potentially suitable habitat occurs in the SEZ region.	110,156 acres of potentially suitable habitat lost (4.4% of available potentially suitable habitat)	230,581 acres of potentially suitable habitat (9.2% of available potentially suitable habitat)	Moderate
Long-nosed snake (<i>Rhinocheilus lecontei</i>)	Typically inhabits deserts, dry prairies, and river valleys. Occurs by day and lays eggs underground or under rocks. Burrows rapidly in loose soil. Common in desert regions. About 997,700 acres of potentially suitable habitat occurs in the SEZ region.	51,997 acres of potentially suitable habitat lost (5.2% of available potentially suitable habitat)	95,645 acres of potentially suitable habitat (9.6% of available potentially suitable habitat)	Moderate
Mojave rattlesnake (<i>Crotalus scutulatus</i>)	Mostly upland desert and lower mountain slopes including barren desert, grasslands, open woodland, and scrubland. Generally avoids broken rocky terrain or densely vegetated areas. Takes refuge in animal burrows or spaces under or among rocks. Widely distributed throughout the Mojave and extreme northern Colorado Deserts. About 2,502,800 acres of potentially suitable habitat occurs in the SEZ region.	110,156 acres of potentially suitable habitat lost (4.4% of available potentially suitable habitat)	239,581 acres of potentially suitable habitat (9.2% of available potentially suitable habitat)	Moderate

TABLE 9.4.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Snakes (Cont.)				
Sidewinder (<i>Crotalus</i> <i>cerastes</i>)	Open desert terrain with fine windblown sand, desert flats with sandy washes, or sparsely vegetated sand dunes. Concentrates near washes and areas of relatively dense vegetation where mammal burrows are common. During periods of inactivity, uses underground burrows, occurs under bushes, or almost completely snuggles under sand. Widely distributed and locally abundant in the Mojave and Colorado Deserts. About 2,577,500 acres of potentially suitable habitat occurs in the SEZ region.	136,731 acres of potentially suitable habitat lost (5.3% of available potentially suitable habitat)	246,560 acres of potentially suitable habitat (9.6% of available potentially suitable habitat)	Moderate

^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 162,473 acres would be developed in the SEZ.

^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ boundary.

^d Overall impact magnitude categories were based on professional judgment and were (1) *small*: ≤1% of potentially suitable habitat for the species would be lost and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but ≤10% of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: >10% of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.

Footnotes continued on next page.

TABLE 9.4.11.1-1 (Cont.)

^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.

^f To convert acres to km², multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 The assessment of impacts on amphibians and reptile species is based on available
2 information on the presence of species in the affected area as presented in Section 9.4.11.1.1,
3 following the analysis approach described in Appendix M. Additional NEPA assessments and
4 coordination with state natural resource agencies may be needed to address project-specific
5 impacts more thoroughly. These assessments and consultations could result in additional
6 required actions to avoid or mitigate impacts on amphibians and reptiles (see Section 9.4.11.1.3).

7
8 In general, impacts on amphibians and reptiles would result from habitat disturbance
9 (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality
10 to individual amphibians and reptiles. Table 9.4.11.1-1 summarizes the potential impacts on
11 representative amphibian and reptile species resulting from solar energy development that could
12 occur on or in the affected area in the proposed Riverside East SEZ. Direct impacts on
13 representative amphibian and reptile species would be moderate, because 3.5 to 5.9% of
14 potentially suitable habitats for the species in the SEZ region would be lost (Table 9.4.11.1-1).
15 Larger areas of potentially suitable habitats for the amphibian and reptile species occur within
16 the area of potential indirect effects (e.g., up to 12.8% of available habitat for the zebra-tailed
17 lizard). Other impacts on amphibians and reptiles could result from surface water and sediment
18 runoff from disturbed areas, fugitive dust generated by project activities, accidental spills,
19 collection, and harassment. These indirect impacts are expected to be negligible with
20 implementation of programmatic design features.

21
22 Decommissioning of facilities and reclamation of disturbed areas after operations cease
23 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
24 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
25 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
26 reclamation on wildlife. Of particular importance for amphibian and reptile species would be the
27 restoration of original ground surface contours, soils, and native plant communities associated
28 with semiarid shrublands.

31 ***9.4.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

32
33 The implementation of required programmatic design features described in Appendix A,
34 Section A.2.2, would reduce the potential for effects on amphibians and reptiles, especially for
35 species using habitat types that can be avoided (e.g., the ephemeral drainages, playa, dry lake,
36 wetlands, and the CRA). Indirect impacts could be reduced to negligible levels by implementing
37 programmatic design features, especially those engineering controls that would reduce runoff,
38 sedimentation, spills, and fugitive dust. While SEZ-specific design features are best established
39 when project details are considered, design features that can be identified at this time include the
40 following:

- 41
42 • The potential for indirect impacts on several amphibian species could be
43 reduced by maximizing the distance between solar energy development and
44 the CRA.
- 45
46 • To the extent practicable, avoid ephemeral drainages, Palen Lake and Ford
47 Dry Lake, and wetlands.

1 If these SEZ-specific design features are implemented in addition to other programmatic
2 design features, impacts on amphibian and reptile species could be reduced. However, because
3 potentially suitable habitats for a number of the amphibian and reptile species occur throughout
4 much of the SEZ, additional species-specific mitigation of direct effects for those species would
5 be difficult or infeasible.

6 7 8 **9.4.11.2 Birds**

9 10 11 **9.4.11.2.1 Affected Environment**

12
13 This section addresses bird species that are known to occur, or for which potentially
14 suitable habitat occurs, on or within the potentially affected area of the proposed Riverside East
15 SEZ. The list of bird species potentially present in the project area was determined from range
16 maps and habitat information available from the California Wildlife Habitat Relationships
17 System (CDFG 2008). Land cover types suitable for each species were determined from
18 SWReGAP (USGS 2004, 2005, 2007). See Appendix M for additional information on the
19 approach used.

20
21 More than 100 species of birds have a range that encompasses the proposed Riverside
22 East SEZ region. However, habitats for about 40 of these species either do not occur on or are
23 limited within the SEZ (e.g., habitat for waterfowl and wading birds). In addition, the SEZ region
24 is only within the winter or summer range for some of the bird species. Eleven bird species that
25 could occur on or in the affected area of the SEZ are considered focal species for the California
26 Partners in Flight's *Desert Bird Conservation Plan* (CalPIF 2009): ash-throated flycatcher
27 (*Myiarchus cinerascens*), black-tailed gnatcatcher (*Polioptila melanura*), black-throated sparrow
28 (*Amphispiza bilineata*), burrowing owl (*Athene*
29 *cunicularia*), common raven (*Corvus corax*),
30 Costa's hummingbird (*Calypte costae*), crissal
31 thrasher (*Toxostoma crissale*), ladder-backed
32 woodpecker (*Picoides scalaris*), Le Conte's
33 thrasher (*Toxostoma lecontei*), phainopepla
34 (*Phainopepla nitens*), and verdin (*Auriparus*
35 *flaviceps*). Habitats for most of these species
36 are described in Table 9.4.11.2-1. The ash-
37 throated flycatcher would be a summer resident within the SEZ, while the other desert focal bird
38 species could occur year-round (CalPIF 2009).

Desert Focal Bird Species

Bird species whose requirements define spatial attributes, habitat characteristics, and management regimes representative of a healthy desert system (Chase and Geupel 2005).

39 40 41 **Waterfowl, Wading Birds, and Shorebirds**

42
43 As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds
44 (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and terns) are
45 among the most abundant groups of birds in the six-state study area. About 20 species of
46 waterfowl, wading birds, and shorebirds occur within the SEZ region for the proposed Riverside

TABLE 9.4.11.2-1 Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Riverside East SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Shorebirds				
Killdeer (<i>Charadrius vociferus</i>)	Widespread throughout California. Open areas such as fields, meadows, lawns, mudflats, and shores. Nests on ground in open dry or gravelly locations. About 231,000 acres ^f of potentially suitable habitat occurs in the SEZ region. Year-round.	2,535 acres of potentially suitable habitat lost (1.1% of available potentially suitable habitat)	10,821 acres of potentially suitable habitat (4.7% of available potentially suitable habitat)	Moderate. Avoid development in Ford Dry Lake and Palen Lake. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Least sandpiper (<i>Calidris minutilla</i>)	Wet meadows, mudflats, flooded fields, lake shores, edge of salt marshes, and river sandbars. About 64,700 acres of potentially suitable habitat occurs in the SEZ region. Common to abundant in winter.	223 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	435 acres of potentially suitable habitat (0.7% of available potentially suitable habitat)	Small. Avoid development in Ford Dry Lake and Palen Lake. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants</i>				
Ash-throated flycatcher (<i>Myiarchus cinerascens</i>)	Common in scrub and woodland habitats including desert riparian and desert washes. Requires hole/cavity for nesting. Uses shrubs or small trees for foraging perches. About 3,196,900 acres of potentially suitable habitat occurs in the SEZ region. Summer.	136,695 acres of potentially suitable habitat lost (4.3% of available potentially suitable habitat)	315,008 acres of potentially suitable habitat (9.9% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Black-tailed gnatcatcher (<i>Poliophtila melanura</i>)	Nests in bushes mainly in wooded desert washes with dense mesquite, palo verde, ironwood, and acacia. Also occurs in desert scrub habitat. About 3,199,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	161,930 acres of potentially suitable habitat lost (5.1% of available potentially suitable habitat)	325,318 acres of potentially suitable habitat (10.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
Black-throated sparrow (<i>Amphispiza bilineata</i>)	Chaparral and desert scrub habitats with sparse to open stands of shrubs. Often in areas with scattered Joshua trees. Nests in thorny shrubs or cactus. About 2,960,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	162,473 acres of potentially suitable habitat lost (5.5% of available potentially suitable habitat)	394,738 acres of potentially suitable habitat (13.3% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is wide-spread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Brewer's sparrow (<i>Spizella breweri</i>)	Common in Mojave and Colorado Deserts during winter. Occupies open desert scrub and cropland habitats. About 2,305,900 acres of potentially suitable habitat occurs in the SEZ region.	111,544 acres of potentially suitable habitat lost (4.8% of available potentially suitable habitat)	243,705 acres of potentially suitable habitat (10.6% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Cactus wren (<i>Campylorhynchus brunneicapillus</i>)	Desert (especially areas with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and trees in towns in arid regions. Nests in <i>Opuntia</i> spp.; twiggy, thorny trees and shrubs; and sometimes in buildings. Nests may be used as winter roost. Locally common in the Mojave and Colorado Deserts. About 1,865,100 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	30,616 acres of potentially suitable habitat lost (1.6% of available potentially suitable habitat)	195,594 acres of potentially suitable habitat (10.5% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Common poorwill (<i>Phalaenoptilus nuttallii</i>)	Scrubby and brushy areas, prairie, desert, rocky canyons, open woodlands, and broken forests. Mostly in arid and semiarid habitats. Nests in open areas on a bare site. About 4,125,500 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	142,112 acres of potentially suitable habitat lost (3.4% of available potentially suitable habitat)	430,448 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Common raven (<i>Corvus corax</i>)	Occurs in most habitats. Trees and cliffs provide cover. Roosts primarily in trees. Nests on cliffs, bluffs, tall trees, or human-made structures. Forages in sparse, open terrain. About 2,692,700 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	112,684 acres of potentially suitable habitat lost (4.2% of available potentially suitable habitat)	245,576 acres of potentially suitable habitat (9.1% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
Costa's hummingbird (<i>Calypte costae</i>)	Desert and semidesert areas, arid brushy foothills, and chaparral. Main habitats are desert washes, edges of desert riparian and valley foothill riparian areas, coastal shrub, desert scrub, desert succulent shrub, low-elevation chaparral, and palm oasis. Also in mountains, meadows, and gardens during migration and winter. Most common in canyons and washes when nesting. Nests are located in trees, shrubs, vines, or cacti. About 3,196,700 acres of potentially suitable habitat occurs in the SEZ region. Common in summer and uncommon in winter in California.	136,473 acres of potentially suitable habitat lost (4.3% of available potentially suitable habitat)	315,008 acres of potentially suitable habitat (9.8% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Greater roadrunner (<i>Geococcyx californianus</i>)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Requires thickets, large bushes, or small trees for shade, refuge, and roosting. Usually nests low in trees, shrubs, or clumps of cactus. Rarely nests on ground. About 4,413,300 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	162,473 acres of potentially suitable habitat lost (3.7% of available potentially suitable habitat)	459,771 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
Horned lark (<i>Eremophila alpestris</i>)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semidesert shrublands, and alpine tundra. During migration and winter, inhabits the same habitats other than tundra, and also occurs in agricultural areas. Usually occurs where plant density is low and there are exposed soils. About 2,378,200 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	111,496 acres of potentially suitable habitat lost (4.7% of available potentially suitable habitat)	235,350 acres of potentially suitable habitat (9.9% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
House finch (<i>Carpodacus mexicanus</i>)	Variety of areas including arid scrub and brush, desert riparian areas, open woodlands, cultivated lands, and savannas. Usually forages in areas with elevated escape perches (e.g., trees, tall shrubs, transmission lines, and buildings). Roosts and nests in sheltered sites in trees; tall, dense shrubs; man-made structures; cliff crevices; or earthen banks. About 142,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	1,188 acres of potentially suitable habitat lost (0.8% of available potentially suitable habitat)	9,900 acres of potentially suitable habitat (6.9% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Ladder-backed woodpecker (<i>Picoides scalaris</i>)	Fairly common in Mojave and Colorado Deserts. Variety of habitats including deserts, arid scrub, riparian woodlands, mesquite, scrub oak, pinyon-juniper woodlands. Digs nest hole in rotted stub or dead or dying branches of various trees. Also nests in saguaro, agave, yucca, fence posts, and utility poles. Nests on ledges; branches of trees, shrubs, and cactus; and holes in trees or walls. About 3,196,800 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	136,695 acres of potentially suitable habitat lost (4.3% of available potentially suitable habitat)	315,008 acres of potentially suitable habitat (9.9% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
Le Conte's thrasher (<i>Toxostoma leconteii</i>)	Open desert wash, alkali desert scrub, and desert succulent shrub habitats. Prefers to nest and forage in arroyos and washes lined with dense stands of creosotebush and salt bush. About 3,197,700 acres of potentially suitable habitat occurs in the SEZ region. Year-round, but uncommon to rare.	161,930 acres of potentially suitable habitat lost (5.1% of available potentially suitable habitat)	325,566 acres of potentially suitable habitat (10.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
Lesser nighthawk (<i>Chordeiles acutipennis</i>)	Open country, desert regions, scrub, savanna, and cultivated areas. Usually near water including open marshes, salt ponds, large rivers, rice paddies, and beaches. Roosts on low perches or the ground. Nests in the open on bare sites. About 4,603,400 acres of potentially suitable habitat occurs in the SEZ region. Uncommon summer resident.	162,473 acres of potentially suitable habitat lost (3.5% of available potentially suitable habitat)	594,861 acres of potentially suitable habitat (12.9% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Open country with scattered trees and shrubs, savanna, desert scrub, desert riparian, Joshua tree, and occasionally, open woodland habitats. Perches on poles, wires, or fence posts (suitable hunting perches are important aspect of habitat). Nests in shrubs and small trees. About 3,336,200 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	137,593 acres of potentially suitable habitat lost (4.1% of available potentially suitable habitat)	324,251 acres of potentially suitable habitat (9.7% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Neotropical Migrants (Cont.)</i>				
Phainopepla (<i>Phainopepla nitens</i>)	Common in Mojave and Colorado Deserts. Desert scrub, mesquite, juniper and oak woodlands, tall brush, washes, riparian woodlands, and orchards. Nests in dense foliage of large shrubs or trees, sometimes in a clump of mistletoe. About 1,113,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round, but many move to more western and northern portions of California during summer.	51,997 acres of potentially suitable habitat lost (4.7% of available potentially suitable habitat)	95,893 acres of potentially suitable habitat (8.6% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Say's phoebe (<i>Sayornis saya</i>)	Arid open country, deserts, sagebrush plains, dry barren foothills, canyons, cliffs, ranches, and rural homes. Nests in cliff crevices, holes in banks, sheltered ledges, tree cavities, under bridges and roofs, and in mines. About 3,359,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	118,034 acres of potentially suitable habitat lost (3.5% of available potentially suitable habitat)	360,289 acres of potentially suitable habitat (10.7% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Verdin (<i>Auriparus flaviceps</i>)	Common to abundant in Colorado Desert, less common in Mojave Desert. Desert riparian, desert wash, desert scrub, and alkali desert scrub areas with large shrubs and small trees. Nests in shrubs, small trees, or cactus. About 3,232,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	135,132 acres of potentially suitable habitat lost (4.2% of available potentially suitable habitat)	309,905 acres of potentially suitable habitat (9.6% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Neotropical Migrants (Cont.)				
White-throated swift (<i>Aeronautes saxatalis</i>)	Mountainous country near cliffs and canyons where breeding occurs. Forages over forest and open situations. Nests in rock crevices and canyons, sometimes in buildings. Ranges widely over most terrain and habitats, usually high in the air. About 1,027,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	6,828 acres of potentially suitable habitat lost (0.7% of available potentially suitable habitat)	125,922 acres of potentially suitable habitat (12.3% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Birds of Prey				
American kestrel (<i>Falco sparverius</i>)	Occurs in most open habitats, in various shrub and early successional forest habitats, forest openings, and various ecotones. Perches on trees, snags, rocks, utility poles and wires, and fence posts. Uses cavities in trees, snags, rock areas, banks, and buildings for nesting and cover. About 1,774,600 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	37,970 acres of potentially suitable habitat lost (2.1% of available potentially suitable habitat)	266,637 acres of potentially suitable habitat (15.0% of available potentially suitable habitat)	Moderate

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Birds of Prey (cont.)				
Golden eagle (<i>Aquila chrysaetos</i>)	Grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. Occasionally in most other habitats, especially during migration and winter. Nests on cliffs and sometimes trees in rugged areas, with breeding birds ranging widely over surrounding areas. About 4,645,700 acres of potentially suitable habitat occurs in the SEZ region. Winter.	162,473 acres of potentially suitable habitat lost (3.5% of available potentially suitable habitat)	566,888 acres of potentially suitable habitat (12.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Bald and Golden Eagle Protection Act.
Prairie falcon (<i>Falco mexicanus</i>)	Associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. Nests in potholes or well-sheltered ledges on rocky cliffs or steep earth embankments. May also nest in man-made excavations on otherwise unsuitable cliffs and old nests of ravens, hawks, and eagles. Forages in large patch areas with low vegetation. May forage over irrigated croplands in winter. About 4,161,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	140,549 acres of potentially suitable habitat lost (3.4% of available potentially suitable habitat)	425,345 acres of potentially suitable habitat (10.2% of available potentially suitable habitat)	Moderate

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Birds of Prey</i> (Cont.)				
Red-tailed hawk (<i>Buteo jamaicensis</i>)	Wide variety of habitats from deserts, mountains, and populated valleys. Open areas with scattered, elevated perch sites such as scrub desert, plains and montane grassland, agricultural fields, pastures, urban parklands, broken coniferous forests, and deciduous woodland. Nests on cliff ledges or in tall trees. About 433,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	2,461 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	14,594 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small
Turkey vulture (<i>Cathartes aura</i>)	Occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting. Migrates and forages over most open habitats. Will roost communally in trees, exposed boulders, and occasionally transmission line support towers. About 3,372,500 acres of potentially suitable habitat occurs in the SEZ region. Summer.	117,359 acres of potentially suitable habitat lost (3.5% of available potentially suitable habitat)	351,380 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate
<i>Upland Game Birds</i>				
Gambel's quail (<i>Callipepla gambelii</i>)	Deserts, especially in areas with brushy or thorny growth, and adjacent cultivated areas. Usually occurs near water. Nests on the ground under cover of small trees, shrubs, and grass tufts. About 4,158,700 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	142,335 acres of potentially suitable habitat lost (3.4% of available potentially suitable habitat)	430,704 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate

TABLE 9.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Upland Game Birds</i> (Cont.)				
Mourning dove (<i>Zenaida macroura</i>)	Habitat generalist, occurring in grasslands, shrublands, croplands, lowland and foothill riparian forests, ponderosa pine forests, deserts, and urban and suburban areas. Rarely in aspen and other forests, coniferous woodlands, and alpine tundra. Nests on ground or in trees. Winters mostly in lowland riparian forests adjacent to cropland. About 3,426,600 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	139,253 acres of potentially suitable habitat lost (4.1% of available potentially suitable habitat)	329,063 acres of potentially suitable habitat (9.6% of available potentially suitable habitat)	Moderate
White-winged dove (<i>Zenaida asiatica</i>)	Desert riparian, wash, succulent shrub, scrub, and Joshua tree habitats; orchards and vineyards, croplands, and pastures. About 3,266,300 acres of potentially suitable habitat occurs in the SEZ region. Summer.	162,473 acres of potentially suitable habitat lost (5.0% of available potentially suitable habitat)	330,669 acres of potentially suitable habitat (10.1% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 162,473 acres would be developed in the SEZ.

Footnotes continued on next page.

TABLE 9.4.11.2-1 (Cont.)

-
- ^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc. from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ boundary.
- ^d Overall impact magnitude categories were based on professional judgment and were (1) *small*: $\leq 1\%$ of potentially suitable habitat for the species would be lost and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>10\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.
- ^f To convert acres to km^2 , multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 East SEZ. Within the SEZ, waterfowl, wading birds, and shorebirds are uncommon because of
2 the lack of aquatic habitat, but occur within the area of the CRA just northwest of the SEZ. The
3 killdeer (*Charadrius vociferus*) and least sandpiper (*Calidris minutilla*) (shorebird species)
4 would be expected to occur on the SEZ, especially when Ford Dry Lake and Palen Lake contain
5 standing water. The Colorado River, located more than 5 mi (8 km) east of the SEZ, and the
6 Salton Sea, located more than 31 mi (50 km) southwest of the SEZ, would provide more
7 productive habitat for this group of birds.
8
9

10 **Neotropical Migrants**

11
12 As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse
13 category of birds within the six-state study area. Neotropical migrants expected to occur on or in
14 the affected area of the proposed Riverside East SEZ throughout the year include the black-tailed
15 gnatcatcher, black-throated sparrow, cactus wren (*Campylorhynchus brunneicapillus*), common
16 poorwill (*Phalaenoptilus nuttallii*), common raven, Costa's hummingbird, crissal thrasher,
17 greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), house finch
18 (*Carpodacus mexicanus*), ladder-backed woodpecker, Le Conte's thrasher, loggerhead shrike
19 (*Lanius ludovicianus*), phainopepla, Say's phoebe (*Sayornis saya*), verdin, and white-throated
20 swift (*Aeronautes saxatalis*). The winter range for the Brewer's sparrow (*Spizella breweri*),
21 green-tailed towhee (*Pipilo chlorurus*), and sage sparrow (*Amphispiza belli*) encompasses the
22 SEZ, while the summer range for the ash-throated flycatcher (*Myiarchus cinerascens*) and lesser
23 nighthawk (*Chordeiles acutipennis*) encompasses the SEZ (CDFG 2008).
24
25

26 **Birds of Prey**

27
28 Section 4.10.2.2.4 provides an overview of the birds of prey (raptors, owls, and vultures)
29 within the six-state study area. Seventeen bird of prey species have ranges that encompass the
30 proposed Riverside East SEZ (CDFG 2008). Raptor species expected to occur within the SEZ
31 include the American kestrel (*Falco sparverius*, year-round), burrowing owl (year-round),
32 ferruginous hawk (*Buteo regalis*, winter), golden eagle (*Aquila chrysaetos*, winter), prairie falcon
33 (*Falco mexicanus*, year-round), red-tailed hawk (*Buteo jamaicensis*, year-round), and turkey
34 vulture (*Cathartes aura*, summer) (CDFG 2008). However, the American kestrel, golden eagle,
35 prairie falcon, and red-tailed hawk make only infrequent use of the desert regions within which
36 the Riverside East SEZ occurs. The golden eagle is a Fully Protected species by the State of
37 California (CDFG 2010b).
38
39

40 **Upland Game Birds**

41
42 Section 4.10.2.2.5 provides an overview of the upland game birds (primarily pheasants,
43 grouse, quail, and doves) that occur within the six-state study area. Upland game species that
44 could occur year-round within the proposed Riverside East SEZ are Gambel's quail (*Callipepla*
45 *gambelii*) and mourning dove (*Zenaida macroura*), while the white-winged dove (*Zenaida*
46 *asiatica*) would occur during the summer (CDFG 2008). Gambel's quail is common within the

1 Colorado and Mojave Desert areas of California. It prefers riparian areas and also occurs near
2 streams, springs, and water holes. While it feeds in open habitats, trees or tall shrubs are required
3 for escape cover. It also requires a nearby source of water, particularly during hot summer
4 months (CDFG 2008). Up to 400,000 Gambel's quail are harvested annually in California
5 (CDFG 2008). The mourning dove is common throughout California and can be found in a wide
6 variety of habitats. Regardless of habitat occupied, it requires a nearby water source
7 (CDFG 2008). The white-winged dove occurs in the southeastern corner of California. It inhabits
8 desert riparian, wash, succulent shrub, scrub, alkali scrub, and Joshua tree habitats. It also occurs
9 in orchards, vineyards, cropland, and pastures (CDFG 2008).

10
11 Table 9.4.11.2-1 provides habitat information for the representative bird species that
12 could occur on the affected area of the proposed Riverside East SEZ. Because of their special
13 status standing, the burrowing owl, crissal thrasher, ferruginous hawk, and short-eared owl are
14 discussed in Section 9.4.12.1.

15 16 17 **9.4.11.2.2 Impacts**

18
19 The types of impacts that birds could incur from construction, operation, and
20 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.2. Any
21 such impacts would be minimized through the implementation of required programmatic design
22 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
23 Section 9.4.11.2.3, below, identifies design features of particular relevance to the proposed
24 Riverside East SEZ.

25
26 The assessment of impacts on bird species is based on available information on the
27 presence of species in the affected area as presented in Section 9.4.11.2.1, following the analysis
28 approach described in Appendix M. Additional NEPA assessments and coordination with state
29 natural resource agencies may be needed to address project-specific impacts more thoroughly.
30 These assessments and consultations could result in additional required actions to avoid or
31 mitigate impacts on birds (see Section 9.4.11.2.3).

32
33 In general, impacts on birds would result from habitat disturbance (i.e., habitat reduction,
34 fragmentation, and alteration) and from disturbance, injury, or mortality to individual birds.
35 Table 9.4.11.2-1 summarizes the potential impacts on representative bird species resulting from
36 solar energy development that could occur on or in the affected area in the proposed Riverside
37 East SEZ. Direct impacts on representative bird species would be small for the least sandpiper,
38 house finch, white-throated sparrow, and red-tailed hawk, because 0.3 to 0.8% of habitats
39 potentially suitable for the species would be lost (Table 9.4.11.2-1). Moderate direct impacts on
40 the other representative bird species would occur, with loss of potentially suitable habitats
41 ranging from 1.1 to 5.5% (Table 9.4.11.2-1). Larger areas of potentially suitable habitat for the
42 birds occur within the area of potential indirect effects (e.g., up to 15.0% of potentially suitable
43 habitat for the American kestrel). Other impacts on birds could result from collision with
44 vehicles and structures, surface water and sediment runoff from disturbed areas, fugitive dust
45 generated by project activities, noise, lighting, spread of invasive species, accidental spills, and
46 harassment. Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation,

1 erosion, and sedimentation) are expected to be negligible with implementation of programmatic
2 design features.

3
4 Decommissioning of facilities and reclamation of disturbed areas after operations cease
5 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
6 but long-term benefits would accrue if suitable habitats in previously disturbed areas were
7 restored. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
8 reclamation on wildlife. Of particular importance for reptile species would be the restoration of
9 original ground surface contours, soils, and native plant communities associated with semiarid
10 shrublands.

11 12 13 ***9.4.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 14

15 The successful implementation of programmatic design features presented in
16 Appendix A, Section A.2.2, would reduce the potential for effects on birds, especially for those
17 species that depend on habitat types that can be avoided (e.g., ephemeral drainages, Ford Dry
18 Lake and Palen Lake, wetlands, and the CRA). Indirect impacts could be reduced to negligible
19 levels by implementing programmatic design features, especially those engineering controls that
20 would reduce runoff, sedimentation, spills, and fugitive dust. While SEZ-specific design features
21 important to reducing impacts on birds are best established when project details are considered,
22 some design features can be identified at this time, as follows:

- 23
24 • Pre-disturbance surveys should be conducted within the SEZ for bird species
25 listed under the Migratory Bird Treaty Act, including those species considered
26 to be desert bird focal species. Nesting habitat for bird species listed under the
27 Migratory Bird Treaty Act should be avoided during the nesting season.
- 28
29 • Plant species that positively influence the presence and abundance of the
30 desert bird focal species should be avoided to the extent practicable. These
31 species include Goodding's willow, yucca, Joshua tree, mesquite, honey
32 mesquite, screwbean, desert mistletoe, big saltbush, smoketree, and catclaw
33 acacia (CalPIF 2009).
- 34
35 • Take of golden eagles and other raptors should be avoided. Mitigation
36 regarding the golden eagle should be developed in consultation with the
37 USFWS and CDFG. A permit may be required under the Bald and Golden
38 Eagle Protection Act.
- 39
40 • To the extent practicable, avoid ephemeral drainages, Ford Dry Lake and
41 Palen Lake, wetlands, and the CRA.

42
43 If these SEZ-specific design features are implemented in addition to programmatic
44 project design features, impacts on bird species could be reduced. Any residual impacts on birds
45

1 are anticipated to be small given the relative abundance of suitable habitats in the SEZ region.
2 However, as potentially suitable habitats for a number of the bird species occur throughout much
3 of the SEZ, additional species-specific mitigation of direct effects for those species would be
4 difficult or infeasible. The potential for indirect impacts on several bird species (particularly
5 waterfowl, wading birds, and shorebirds) could be reduced by maximizing the distance between
6 solar energy facilities and the CRA.
7
8

9 **9.4.11.3 Mammals**

10 **9.4.11.3.1 Affected Environment**

11
12
13
14 This section addresses mammal species that are known to occur, or for which suitable
15 habitat occurs, on or within the potentially affected area of the Riverside East SEZ. The list of
16 mammal species potentially present in the project area was determined from range maps and
17 habitat information available from the California Wildlife Habitat Relationships System (CDFG
18 2008). Land cover types suitable for each species were determined from SWReGAP (USGS
19 2004, 2005, 2007). See Appendix M for additional information on the approach used. Based on
20 species distributions and habitat preferences, more than 40 mammal species could occur within
21 the SEZ (CDFG 2008). The following discussion emphasizes big game and other mammal
22 species that (1) have key habitats within or near the Riverside East SEZ, (2) are important to
23 humans (e.g., big game, small game, and furbearer species), and/or (3) are representative of other
24 species that share similar habitats.
25
26

27 **Big Game**

28
29 The cougar (*Puma concolor*)⁴, desert bighorn sheep (*Ovis canadensis nelsoni*), and mule
30 deer (*Odocoileus hemionus*) are the big game species whose ranges encompass the area of the
31 proposed Riverside East SEZ. The cougar inhabits cliffs, forests, woodlands, shrublands,
32 chaparral, and deserts. It generally occurs in mountainous or remote undisturbed areas. However,
33 it also occurs in a variety of other habitats, including swamps, riparian woodlands, and broken
34 country with brush or woodland cover. Habitat areas of more than 500,000 acres (2,000 km²) are
35 needed for long-term population survival, and protection of immigration corridors is also
36 desirable (NatureServe 2010). The cougar is generally absent from desert areas that do not
37 support mule deer. Its seasonal movements are generally in response to following migrating deer
38 herds. There are possibly more than 5,000 cougar in California with the numbers apparently
39 increasing (CDFG 2008).
40
41

⁴ Although cougar hunting does not occur in California, it is included with big game for the sake of continuity with the SEZ wildlife sections for the other five states.

1 Because it is a BLM sensitive species, the desert bighorn sheep is discussed in
2 Section 9.4.12.

3
4 The mule deer is common to abundant throughout California, except in deserts and
5 intensely farmed areas (CDFG 2008). It prefers a mosaic of vegetation that has herbaceous
6 openings, dense brush or tree thickets, riparian areas, and abundant edges. Mule deer are
7 browsers and grazers, feeding on shrubs, forbs, and a few grasses. Brush is important for
8 escape cover and for thermal regulation in winter and summer (CDFG 2008). The burro deer
9 (*Odocoileus hemionus eremicus*), a subspecies of mule deer, occurs in the Colorado Desert. It
10 occurs primarily along the Colorado River, especially during hot summers, and in desert wash
11 woodland communities when away from the river (generally when late summer thunderstorms
12 and cooler temperatures allow the deer to move up the larger washes into the mountains or wash
13 complexes in the foothills) (BLM and CDFG 2002). Burro deer consume foliage from riparian
14 and woodland trees (e.g., willow, palo verde, and ironwood) and various shrubs. Major threats to
15 the burro deer include habitat loss from agricultural development and urbanization and
16 infestation of tamarisk along the Colorado River (BLM and CDFG 2002).

17 18 19 **Other Mammals**

20
21 A number of small game and furbearer species occur within the area of the proposed
22 Riverside East SEZ: the American badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus*
23 *californicus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus*
24 *audubonii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), and white-tailed antelope
25 squirrel (*Ammospermophilus leucurus*) (CDFG 2008).

26
27 Nongame (small) mammal species, such as bats, mice, kangaroo rats, and shrews, also
28 occur within the area of the Riverside East SEZ: the cactus mouse (*Peromyscus eremicus*),
29 canyon deer mouse (*P. crinitus*), desert kangaroo rat (*Dipodomys deserti*), desert shrew
30 (*Notiosorex crawfordi*), desert woodrat (*Neotoma lepida*), little pocket mouse (*Perognathus*
31 *longimembris*), long-tailed pocket mouse (*Chaetodipus formosus*), Merriam's kangaroo rat
32 (*Dipodomys merriami*), and southern grasshopper mouse (*Onychomys torridus*) (CDFG 2008).
33 The ranges of nine bat species encompass the SEZ: big brown bat (*Eptesicus fuscus*), Brazilian
34 free-tailed bat (*Tadarida brasiliensis*), Californian leaf-nosed bat (*Macrotus californicus*),
35 California mastiff bat (*Eumops perotis californicus*), California myotis (*Myotis californicus*),
36 pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), Townsend's big-eared bat
37 (*Corynorhinus townsendii*), and western pipistrelle (*Parastrellus hesperus*). Most bat species
38 would utilize the SEZ only during foraging. Roost sites for the species (e.g., caves, hollow trees,
39 rock crevices, or buildings) are absent to scarce on or in the affected area of the SEZ.

1 Table 9.4.11.3-1 provides habitat information for the representative mammal species that
2 could occur on or in the affected area of the Riverside East SEZ. Because of their special status
3 standing, the California mastiff bat, Californian leaf-nose bat, pallid bat, and Townsend's big-
4 eared bat are discussed in Section 9.4.12.

5
6
7 **9.4.11.3.2 Impacts**
8

9 The types of impacts that mammals could incur from construction, operation, and
10 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.3. Any
11 such impacts would be minimized through the implementation of required programmatic design
12 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
13 Section 9.4.11.3.3, below, identifies design features of particular relevance to the proposed
14 Riverside East SEZ.

15
16 The assessment of impacts on mammal species is based on available information on the
17 presence of species in the affected area as presented in Section 9.4.11.3.1, following the analysis
18 approach described in Appendix M. Additional NEPA assessments and coordination with state
19 natural resource agencies may be needed to address project-specific impacts more thoroughly.
20 These assessments and consultations could result in additional required actions to avoid or
21 mitigate impacts on mammals (see Section 9.4.11.3.3).

22
23 Table 9.4.11.3-1 summarizes the potential impacts on representative mammal species
24 resulting from solar energy development (with the implementation of required programmatic
25 design features) in the proposed Riverside East SEZ.

26
27 Although the Riverside East SEZ falls within the overall range of the cougar, desert
28 habitat is not the preferred habitat for the species. It is unlikely that impacts from solar energy
29 development within the SEZ would represent an actual loss of occupied habitat, although direct
30 impacts could occur to 117,359 acres (474.9 km²), about 3.3%, of potentially suitable habitat
31 within the SEZ region (Table 9.4.11.3-1).

32
33 Mule deer would occur near the Colorado River most of the year, particularly during the
34 hot summer months. However, the species could occur within the desert scrub and desert wash
35 habitats of the SEZ for portions of the year, particularly when standing water occurs in Ford Dry
36 Lake and Palen Lake. Almost 162,500 acres (658 km²) of potentially suitable mule deer habitat
37 could be directly affected by solar energy development on the proposed Riverside East SEZ
38 (Table 9.4.11.3-1). Fencing around a large solar development within the SEZ could affect
39 movement of mule deer between the Colorado River and mountains or foothills.
40
41

TABLE 9.4.11.3-1 Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Riverside East SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
Big Game				
Cougar (<i>Puma concolor</i>)	Widespread, uncommon permanent resident in California. Most common in rough, broken foothills and canyon country, often in association with montane forests, shrublands/chaparral, and pinyon-juniper woodlands. Also occurs in deserts, swamps, and riparian area. Seeks cover in caves, other natural cavities, and thickets in brush and timber. About 3,508,100 acres ^f of potentially suitable habitat occurs in the SEZ region.	117,359 acres of potentially suitable habitat lost (3.3% of available potentially suitable habitat)	351,380 acres of potentially suitable habitat (10.0% of available potentially suitable habitat)	Moderate
Mule deer (<i>Odocoileus hemionus</i>)	Occurs in early to intermediate successional stages of most forest, woodland, and brush habitats. About 3,433,200 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (4.7% of available potentially suitable habitat)	335,963 acres of potentially suitable habitat (9.8% of available potentially suitable habitat)	Moderate. Ensure that fencing does not block the free passage of mule deer between the Colorado River and mountains or foothills.
Small Game and Furbearers				
American badger (<i>Taxidea taxus</i>)	Open grasslands and deserts, meadows in subalpine and montane forests, alpine tundra. Dig burrows in friable soils. Most common in areas with abundant populations of ground squirrels, prairie dogs, and pocket gophers. Relatively uncommon throughout California. About 2,502,700 acres of potentially suitable habitat occurs in the SEZ region.	110,156 acres of potentially suitable habitat lost (4.4% of available potentially suitable habitat)	230,581 acres of potentially suitable habitat (9.2% of available potentially suitable habitat)	Moderate

TABLE 9.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers (Cont.)</i>				
Black-tailed jackrabbit (<i>Lepus californicus</i>)	Open plains, fields, and deserts with scattered thickets or patches of shrubs. Also open, early stages of forests and chaparral habitats. Rests during the day in shallow depressions, and uses shrubs for cover. About 4,065,600 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (4.0% of available potentially suitable habitat)	450,831 acres of potentially suitable habitat (11.1% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Bobcat (<i>Lynx rufus</i>)	Occurs in nearly all habitats and successional stages. Optimal habitats include mixed woodlands and forest edges, hardwood forests, swamps, forested river bottoms, brushlands, deserts, mountains, and other area with thick undergrowth. Availability of water may limit its distribution in xeric regions. Uses rocky clefts, caves, hollow logs, spaces under fallen trees, and so forth when inactive; usually changes shelter areas daily. About 2,951,800 acres of potentially suitable habitat occurs in the SEZ region.	136,053 acres of potentially suitable habitat lost (4.6% of available potentially suitable habitat)	322,483 acres of potentially suitable habitat (10.9% of available potentially suitable habitat)	Moderate
Coyote (<i>Canis latrans</i>)	Suitable habitat characterized by interspersions of brush and open areas with free water. Least common in dense coniferous forest. Where human control efforts occur, it is restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 4,822,200 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (3.4% of available potentially suitable habitat)	605,581 acres of potentially suitable habitat (12.6% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 9.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Small Game and Furbearers (Cont.)</i>				
Desert cottontail (<i>Sylvilagus audubonii</i>)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Thickets and patches of shrubs, vines, and brush also used as cover. About 3,233,000 acres of potentially suitable habitat occurs in the SEZ region.	136,030 acres of potentially suitable habitat lost (4.2% of available potentially suitable habitat)	318,574 acres of potentially suitable habitat (9.9% of available potentially suitable habitat)	Moderate
Round-tailed ground squirrel (<i>Spermophilus tereticaudus</i>)	Optimum habitat includes desert succulent shrub, desert wash, desert scrub, alkali desert scrub, and levees in cropland habitat. Also occurs in urban habitats. Burrows usually at base of shrubs. About 2,558,600 acres of potentially suitable habitat occurs in the SEZ region.	111,719 acres of potentially suitable habitat lost (4.4% of available potentially suitable habitat)	235,684 acres of potentially suitable habitat (9.2% of available potentially suitable habitat)	Moderate
White-tailed antelope squirrel (<i>Ammospermophilus leucurus</i>)	Common to abundant in California deserts. Optimal habitats are desert scrub, sagebrush, alkali desert scrub, Joshua tree, bitterbrush, and pinyon-juniper. Fairly common in desert riparian, desert succulent shrub, and desert wash habitats. Also occurs in mixed chaparral and annual grassland habitats. Requires friable soil for burrowing. Burrows may be under shrubs or in open, often uses abandoned kangaroo rat burrows. About 4,053,800 acres of potentially suitable habitat occurs in the SEZ region.	140,549 acres of potentially suitable habitat lost (3.5% of available potentially suitable habitat)	425,267 acres of potentially suitable habitat (10.5% of available potentially suitable habitat)	Moderate

TABLE 9.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (Small)</i>				
<i>Mammals</i>				
Big brown bat (<i>Eptesicus fuscus</i>)	Deserts, forests and woodlands, old fields, shrublands, and urban/suburban areas. Uncommon in hot desert habitats. Summer roosts are in buildings, hollow trees, rock crevices, tunnels, and cliff swallow nests. Maternity colonies occur in attics, barns, tree cavities, rock crevices, and caves. Caves, mines, and man-made structures used for hibernation sites. About 3,578,200 acres of potentially suitable habitat occurs in the SEZ region.	116,538 acres of potentially suitable habitat lost (3.3% of available potentially suitable habitat)	355,936 acres of potentially suitable habitat (9.4% of available potentially suitable habitat)	Moderate
Brazilian free-tailed bat (<i>Tadarida brasiliensis</i>)	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, and suburban/urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 4,291,600 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (3.8% of available potentially suitable habitat)	451,224 acres of potentially suitable habitat (10.5% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Cactus mouse (<i>Peromyscus eremicus</i>)	Deserts, shrublands, chaparral, and coniferous woodlands. Occurs on rocky areas and areas with sandy substrates and loamy soils. Nests in rock heaps, stone walls, burrows, brush fences, and woodrat houses. About 3,209,200 acres of potentially suitable habitat occurs in the SEZ region.	136,695 acres of potentially suitable habitat lost (4.3% of available potentially suitable habitat)	315,008 acres of potentially suitable habitat (9.8% of available potentially suitable habitat)	Moderate

TABLE 9.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (Small Mammals (Cont.))</i>				
Californian myotis (<i>Myotis californicus</i>)	Cliffs, deserts, forests, woodlands, grasslands, savannas, shrublands, and savannas. Often uses man-made structures for night roosts. Uses crevices for summer day roosts. May roost on small desert shrubs or on the ground. Hibernates in caves, mines, tunnels, or buildings. Maternity colonies in rock crevices, under bark, or under eaves of buildings. Common to abundant below 6,000 ft. About 4,078,900 acres of potentially suitable habitat occurs in the SEZ region.	140,772 acres of potentially suitable habitat lost (3.5% of available potentially suitable habitat)	425,353 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate
Canyon deer mouse (<i>Peromyscus crinitus</i>)	Found in most desert and chaparral habitats. Gravelly desert pavement, talus, boulders, cliffs, and slickrock—rocky areas with virtually any type of plant cover. About 2,898,300 acres of potentially suitable habitat occurs in the SEZ region.	141,075 acres of potentially suitable habitat lost (4.9% of available potentially suitable habitat)	371,040 acres of potentially suitable habitat (12.8% of available potentially suitable habitat)	Moderate
Desert kangaroo rat (<i>Dipodomys deserti</i>)	Low deserts, deep wind-drifted sandy soil with sparse vegetation, alkali sinks, and shadscale or creosote bush scrub. Nests in burrows dug in mounds, usually under vegetation. About 722,200 acres of potentially suitable habitat occurs in the SEZ region.	51,774 acres of potentially suitable habitat lost (7.2% of available potentially suitable habitat)	95,311 acres of potentially suitable habitat (13.2% of available potentially suitable habitat)	Moderate

TABLE 9.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (Small)</i>				
<i>Mammals (Cont.)</i>				
Desert shrew (<i>Notiosorex crawfordi</i>)	Generally found in arid areas with adequate cover for nesting and resting. Deserts, semiarid grasslands with scattered cactus and yucca, chaparral slopes, alluvial fans, sagebrush, gullies, juniper woodlands, riparian areas, and dumps. About 4,334,000 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (3.7% of available potentially suitable habitat)	446,691 acres of potentially suitable habitat (10.3% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Desert woodrat (<i>Neotoma lepida</i>)	Sagebrush scrub; chaparral; deserts and rocky slopes with scattered cactus, yucca, pine-juniper, or other low vegetation; creosotebush desert; Joshua tree woodlands; scrub oak woodlands, pinyon-juniper woodlands; and riparian zones. Most abundant in rocky areas with Joshua trees. Dens built of debris on ground, among cacti or yucca, along cliffs, among rocks, or occasionally in trees. About 4,546,200 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (3.6% of available potentially suitable habitat)	579,200 acres of potentially suitable habitat (12.7% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 9.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (Small Mammals (Cont.))</i>				
Little pocket mouse (<i>Perognathus longimembris</i>)	Common to abundant in southern California deserts. Preferred habitat includes desert riparian, desert scrub, desert wash, and sagebrush. Nests in an underground burrow. Sandy soil preferred for burrowing, but also commonly burrows on gravel washes and on stony soils. About 3,244,600 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (5.0% of available potentially suitable habitat)	330,661 acres of potentially suitable habitat (10.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Merriam's kangaroo rat (<i>Dipodomys merriami</i>)	Most widespread kangaroo rat in California. In southern California, it occurs in desert scrub and alkali desert scrub, sagebrush, Joshua tree, and pinyon-juniper habitats. Uses desert flats or slopes with sparse to moderate canopy coverage and sandy to gravelly substrates. Uses underground burrows that are often located at the base of a shrub. About 3,290,800 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (4.9% of available potentially suitable habitat)	340,466 acres of potentially suitable habitat (10.3% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Southern grasshopper mouse (<i>Onychomys torridus</i>)	Hot, arid valleys and scrub deserts with sparse and scattered vegetation such as mesquite, creosotebush, cholla, yucca, and short grasses. Frequents scrub habitats with friable soils for digging. Also uses abandoned underground burrows. About 3,284,300 acres of potentially suitable habitat occurs in the SEZ region.	162,473 acres of potentially suitable habitat lost (4.9% of available potentially suitable habitat)	330,987 acres of potentially suitable habitat (10.1% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 9.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected ^a		Overall Impact Magnitude ^d and Species-Specific Mitigation ^e
		Within SEZ (Direct Effects) ^b	Outside SEZ (Indirect Effects) ^c	
<i>Nongame (Small)</i>				
<i>Mammals (Cont.)</i>				
Spotted bat (<i>Euderma maculatum</i>)	Mostly found in the foothills, mountains, and desert regions of southern California. Roosts in caves and cracks or crevices in cliffs and canyons. About 3,863,400 acres of potentially suitable habitat occurs in the SEZ region.	140,772 acres of potentially suitable habitat lost (3.6% of available potentially suitable habitat)	425,601 acres of potentially suitable habitat (11.0% of available potentially suitable habitat)	Moderate
Western pipistrelle (<i>Parastrellus hesperus</i>)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 3,450,700 acres of potentially suitable habitat occurs in the SEZ region.	116,538 acres of potentially suitable habitat lost (3.4% of available potentially suitable habitat)	355,587 acres of potentially suitable habitat (10.3% of available potentially suitable habitat)	Moderate

^a Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

^b Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 162,473 acres would be developed in the SEZ.

^c The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ boundary.

Footnotes continued on next page.

TABLE 9.4.11.3-1 (Cont.)

- ^d Overall impact magnitude categories were based on professional judgment and were (1) *small*: $\leq 1\%$ of potentially suitable habitat for the species would be lost and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: $>10\%$ of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects, because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^e Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.
- ^f To convert acres to km^2 , multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

1 Direct impacts on small game, furbearers, and nongame (small) mammal species would
2 be moderate, ranging from 3.3 to 7.2% of potentially suitable habitats lost for the representative
3 species listed in Table 9.4.11.3-1. Larger areas of suitable habitat for mammal species occur
4 within the area of potential indirect effects (e.g., ranging from 9.2% for the American badger and
5 round-tailed ground squirrel to 19.3% for the desert bighorn sheep). Other impacts on mammals
6 could result from collision with fences and vehicles, surface water and sediment runoff from
7 disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive
8 species, accidental spills, and harassment. These indirect impacts are expected to be negligible
9 with implementation of programmatic design features.

10
11 Decommissioning of facilities and reclamation of disturbed areas after operations cease
12 could result in short-term negative impacts on individuals and habitats adjacent to project areas,
13 but long-term benefits would accrue if suitable habitats were restored in previously disturbed
14 areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and
15 reclamation on wildlife. Of particular importance for mammal species would be the restoration
16 of original ground surface contours, soils, and native plant communities associated with semiarid
17 shrublands.

20 ***9.4.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness***

21
22 The implementation of required programmatic design features described in Appendix A,
23 Section A.2.2, would reduce the potential for effects on mammals. While some SEZ-specific
24 design features are best established when project details are considered, design features that can
25 be identified at this time include the following:

- 26
27 • The fencing around the solar energy development should not block the free
28 passage of mule deer between the Colorado River and mountains or foothills.
- 29
30 • To the extent practicable, ephemeral drainages, Ford Dry Lake and Palen
31 Lake, wetlands, and the CRA should be avoided.

32
33 If these SEZ-specific design features are implemented in addition to programmatic design
34 features, impacts on mammal species could be reduced. However, because potentially suitable
35 habitats for a number of the mammal species occur throughout much of the SEZ, additional
36 species-specific mitigation of direct effects for those species would be difficult or infeasible.

39 **9.4.11.4 Aquatic Biota**

42 ***9.4.11.4.1 Affected Environment***

43
44 This section addresses aquatic habitats and biota known to occur on the proposed
45 Riverside East SEZ itself or within an area that could be affected, either directly or indirectly, by
46 activities associated with solar energy development within the SEZ. There are no perennial

1 streams within the proposed Riverside East SEZ, but the intermittent McCoy Wash is present.
2 McCoy Wash carries substantial flow, but there is little information on aquatic communities, if
3 present. Palen Lake and Ford Dry Lake are the only water bodies within the SEZ, with
4 approximately 745 acres (3 km²) of Palen Lake located on the western side of the SEZ, and
5 3,945 acres (16 km²) of Ford Dry Lake located in the center of the SEZ. Both Palen Lake and
6 Ford Dry Lake are intermittent and rarely have standing water, but temporary ponding may occur
7 especially in Palen Lake, which has groundwater located near the surface. As described in
8 Section 9.4.9.1.1, there are also 3,807 acres (15 km²) of wetland within the SEZ. However,
9 wetlands near dry lakes rarely have water (USFS 1998), and the NWI classifies these wetlands as
10 intermittently flooded, indicating that surface water is usually absent but may be present for
11 variable periods. Although site-specific data are not available, Palen Lake, Ford Dry Lake, and
12 wetlands may contain aquatic biota adapted to desiccating conditions (Graham 2001). On the
13 basis of information from ephemeral pools in the American Southwest, ostracods (seed shrimp)
14 and small planktonic crustaceans (e.g., copepods or cladocerans) are expected to be present, and
15 larger branchiopod crustaceans such as fairy shrimp could occur (Graham 2001). Various types
16 of insects that have aquatic larval stages, such as dragonflies and a variety of midges and other
17 fly larvae, may also occur depending on pool longevity, distance to permanent water features,
18 and the abundance of other invertebrates for prey (Graham 2001). However, more site-specific
19 data are needed to fully evaluate the extent to which aquatic biota are present.
20

21 There are no natural perennial stream features within the area of indirect effects.
22 However, 31 mi (50 km) of the CRA is present, primarily along the western edge of the SEZ.
23 The aqueduct diverts water west from the Colorado River at Lake Havasu, located approximately
24 44 mi (71 km) from the Riverside East SEZ. The aqueduct may support populations of non-
25 native fish common to the lower Colorado River, including striped bass (*Morone saxatilis*),
26 largemouth bass (*Micropterus salmoides*), carp (*Cyprinus carpio*), flathead catfish (*Pylodictis*
27 *olivaris*), channel catfish (*Ictalurus punctatus*), sunfish (*Lepomis* spp.), and tilapia (*Tilapia* spp.;
28 Mueller and Marsh 2002). Native fish are relatively rare in the lower Colorado River because of
29 overfishing, predation by non-native species, and human alteration of streams and rivers
30 (Mueller and Marsh 2002), and endangered species native to the Colorado River are not expected
31 to occur (see Section 9.4.12). Although aquatic organisms may be present in the CRA, periodic
32 chlorination and draining used to control the population of the invasive quagga mussel
33 (*Dreissena rostriformis bugensis*) (USGS 2008a) makes the aqueduct unsuitable for aquatic
34 organisms. Palen Lake and Ford Dry Lake are the only water bodies present in the area of
35 indirect effects. A total of approximately 3,516 acres (14 km²) and 460 acres (2 km²) of Palen
36 Lake and Ford Dry Lake, respectively, are located within the area of potential indirect effects.
37 Approximately 7,757 acres (31 km²) of wetlands is also located in the area of potential indirect
38 effects. As described above, Ford Dry Lake, Palen Lake, and associated wetlands are typically
39 dry but may support aquatic communities when water is present.
40

41 Outside of the potential indirect effects area, but within 50 mi (80 km) of the SEZ, there
42 are several lake and reservoir habitats totaling approximately 62,143 acres (251 km²). Of this
43 total, 15,998 acres (65 km²) is permanent lake (Salton Sea), 10,160 acres (41 km²) is intermittent
44 lake, and 35,984 (146 km²) is dry lake. Dammed portions of the Colorado River are also present
45 and total 51,004 acres (206 km²). There are also several stream features including 124 mi
46 (200 km) of the CRA, 74 mi (119 km) of canals, and 168 mi (270 km) of intermittent streams.

1 Within the SEZ and the area of potential indirect effects, intermittent lakes are the only surface
2 water features present, representing approximately 46% of the amount of intermittent lake
3 available within the overall analysis area.
4
5

6 **9.4.11.4.2 Impacts** 7

8 The types of impacts that could occur on aquatic habitats and biota from development
9 of utility-scale solar energy facilities are discussed in Section 5.10.2.4. Effects particularly
10 relevant to aquatic habitats and communities are water withdrawal and changes in water,
11 sediment, and contaminant inputs associated with runoff.
12

13 No permanent water bodies or streams are present within the boundaries of the Riverside
14 East SEZ. Therefore, no direct impacts on these features are expected. The intermittent streams,
15 wetlands, and dry lakes present within the SEZ could be affected by ground disturbance and
16 runoff of water and sediment from the SEZ, especially if ground disturbance occurred near Palen
17 Lake and Ford Dry Lake (see Section 9.4.9). The intermittent streams, dry lakes, and associated
18 wetlands present in the SEZ are typically dry but may support aquatic communities on a seasonal
19 basis. More detailed site surveys of ephemeral and intermittent surface waters would be needed
20 to determine whether solar energy development activities would result in direct or indirect
21 impacts on aquatic biota. See Section 5.10.3 for a detailed description of potential impacts to
22 aquatic biota resulting from solar energy development activities. Avoiding intermittent surface
23 water features within the SEZ as well as the implementation of commonly used engineering
24 practices to control water runoff and sediment deposition into surface water features would
25 minimize the potential for impacts on aquatic organisms.
26

27 The man-made CRA is within 5 mi (8 km) of the SEZ and could be indirectly affected by
28 development and operation of solar energy facilities. Aquatic organisms present in these habitat
29 features could be affected by airborne particulate deposition originating from the SEZ, especially
30 if ground disturbance occurred along the SEZ's western boundary (Section 5.10.2.4). Runoff
31 from the SEZ into the CRA would not occur, because the aqueduct is leveed, and natural
32 drainage patterns would carry surface water away from the aqueduct.
33

34 As identified in Section 5.9, water quality in aquatic habitats could be affected by the
35 introduction of contaminants such as fuels, lubricants, or pesticides/herbicides during site
36 characterization, construction, operation, or decommissioning for a solar energy facility. There is
37 the potential for contaminants from solar energy development activities within the SEZ to enter
38 McCoy Wash, Palen Lake, Ford Dry Lake, and wetlands within the SEZ, especially if heavy
39 machinery is used in or near these features. The aqueduct runs along the western border of the
40 Riverside East SEZ, but contamination from solar development activities in the SEZ would not
41 occur, because it is leveed and natural drainage patterns would carry runoff away from the CRA.
42

43 In arid environments, reductions in the quantity of water in aquatic habitats are of
44 particular concern. Water quantity in aquatic habitats could also be affected if significant
45 amounts of surface water or groundwater were utilized for power plant cooling water, for
46 washing mirrors, or for other needs. The greatest need for water would occur if technologies

1 employing wet cooling, such as parabolic trough or power tower, were developed at the site; the
2 associated impacts would ultimately depend on the water source used (including groundwater
3 from aquifers at various depths). As identified in Section 9.4.9.1.3, it seems unlikely that
4 approval could be obtained to withdraw water from the CRA. Nevertheless, the aqueduct itself is
5 poor habitat and supports no important aquatic species. Obtaining cooling water from other
6 perennial surface water features in the region could affect water levels and, as a consequence,
7 aquatic organisms in those water bodies. Additional details regarding the volume of water
8 required and the types of organisms present in potentially affected water bodies would be
9 required in order to further evaluate the potential for impacts from water withdrawals.

10 11 12 ***9.4.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness***

13
14 The implementation of required programmatic design features described in Appendix A,
15 Section A.2.2, could greatly reduce or eliminate the potential for effects on aquatic biota and
16 aquatic habitats from development and operation of solar energy facilities. While some SEZ-
17 specific design features are best established when project details are being considered, a design
18 feature that can be identified at this time is as follows:

- 19
20 • Ground disturbance near McCoy Wash, Palen Lake, Ford Dry Lake and
21 wetlands should be avoided or minimized to the extent practicable.

22
23 If this design feature is implemented in addition to programmatic project design features
24 and if the utilization of water from groundwater or surface water sources is adequately controlled
25 to maintain sufficient water levels in nearby aquatic habitats, the potential impacts on aquatic
26 biota and habitats from solar energy development at the Riverside East SEZ would be negligible.

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9.4.12 Special Status Species (Threatened, Endangered, Sensitive, and Rare Species)

This section addresses special status species that are known to occur, or for which suitable habitat occurs, on or within the potentially affected area of the proposed Riverside East SEZ. Special status species include the following types of species:⁵

- Species listed as threatened or endangered under the ESA;
- Species that are proposed for listing, under review, or are candidates for listing under the ESA;
- Species that are listed as threatened or endangered by the State of California under the CESA, or that are identified as fully protected by the state⁶;
- Species that are listed by the BLM as sensitive; and
- Species that have been ranked by the states of California or Arizona as S1 or S2, or species of concern by the State of California or the USFWS; hereafter referred to as “rare” species. Arizona does not maintain a separate list of species of concern.

Special status species known to occur within 50 mi (80 km) of the Riverside East SEZ center (i.e., the SEZ region) were determined from natural heritage records available through NatureServe Explorer (NatureServe 2010), information provided by the CDFG (2010c), CNDDDB (CDFG 2010b), CAREGAP (Davis et al. 1998, USGS 2010d), and SWReGAP (USGS 2004, 2005, 2007). Information reviewed consisted of county-level occurrences as determined from NatureServe, point and polygon element occurrences as determined from CNDDDB, and modeled land cover types and predicted suitable habitats for the species within the 50-mi (80-km) region as determined from CAREGAP and SWReGAP. The 50-mi (80-km) SEZ region intersects Imperial, Riverside, and San Bernardino Counties, California, and La Paz and Yuma Counties, Arizona. However, the SEZ and affected area occur only in eastern Riverside County, California. See Appendix M for additional information on the approach used to identify species that could be affected by development within the SEZ.

9.4.12.1 Affected Environment

The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur). For the

⁵ See Section 4.6.4 for definitions of these species categories. Note that some of the categories of species included here do not fit BLM’s definition of special status species as defined in BLM Manual 6840 (BLM 2008c). These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

⁶ State-listed species are those listed as threatened or endangered under the CESA; California fully protected species are species that receive the strictest take provisions as identified by the CDFG.

1 Riverside East SEZ, the area of direct effect was limited to the SEZ itself. Because of the
2 proximity of existing infrastructure, the impacts of construction and operation of transmission
3 lines outside the SEZ are not assessed, assuming that the existing transmission infrastructure
4 might be used to connect some new solar facilities to load centers, and that additional project-
5 specific analysis would be conducted for new transmission construction or line upgrades.
6 Similarly, the impacts of construction of or upgrades to access roads were not assessed for this
7 SEZ because of the proximity of State Route 62 (see Section 9.4.1.2 for a discussion of
8 development assumptions for this SEZ). The area of indirect effects was defined as the area
9 within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur but
10 that could be indirectly affected by activities in the area of direct effect. Indirect effects
11 considered in the assessment included effects from surface runoff, dust, noise, lighting, and
12 accidental spills from the SEZ, but do not include ground-disturbing activities. The potential
13 magnitude of indirect effects would decrease with increasing distance away from the SEZ. This
14 area of indirect effect was identified on the basis of professional judgment and was considered
15 sufficiently large to bound the area that would potentially be subject to indirect effects. The
16 affected area includes both the direct and indirect effects areas.

17
18 The primary habitat type within the affected area is Sonora-Mojave creosotebush-white
19 bursage desert scrub (see Section 9.4.10). Potentially unique habitats in the affected area in
20 which special status species may reside include desert dunes, cliffs and rock outcrops, desert
21 washes, playa habitats, and other aquatic habitats such as the CRA. Dry lake playas in the
22 affected area include Ford Dry Lake and Palen Lake. Palen Lake is located in the western portion
23 of the SEZ; Ford Lake is in the center of the SEZ. The CRA is located along the western border
24 of the SEZ (Figure 9.4.12.1-1). There are a number of desert washes on the SEZ that may
25 provide habitat for unique plant assemblages as identified in the Northern and Eastern Colorado
26 (NECO) Management Plan (BLM and CDFG 2002).

27
28 All special status species that are known to occur within the Riverside East SEZ region
29 (i.e., within 50 mi [80 km] of the center of the SEZ) are listed, with their status, nearest recorded
30 occurrence, and habitats, in Appendix J. Of these species, there are 69 that could be affected by
31 solar energy development within the SEZ, based on recorded occurrences or the presence of
32 potentially suitable habitat in the area. These species, their status, and their habitats are presented
33 in Table 9.4.12.1-1. For many of the species listed in the table, their predicted potential
34 occurrence in the affected area is based only on a general correspondence between mapped
35 CAREGAP land cover types and descriptions of species habitat preferences. This overall
36 approach to identifying species in the affected area probably overestimates the number of species
37 that actually occur in the affected area. For many of the species identified as having potentially
38 suitable habitat in the affected area, the nearest known occurrence is over 20 mi (32 m) away
39 from the SEZ.

40
41 Based on CNDDDB records and information provided by the CDFG and USFWS, there are
42 29 special status species known to occur within the affected area of the Riverside East SEZ:
43 Abrams' spurge, bitter hymenoxys, California ditaxis, California satintail, desert spike-moss,
44 dwarf germander, Emory's crucifixion thorn, glandular ditaxis, Harwood's milkvetch, jackass-
45 clover, Orocopia sage, pink fairy-duster, spear-leaf matelea, Wiggins' cholla, California McCoy
46 snail, Bradley's cuckoo wasp, Riverside cuckoo wasp, desert tortoise, Bendire's thrasher, crissal

1 thrasher, western burrowing owl, Arizona myotis, California leaf-nosed bat, cave myotis,
2 Colorado Valley woodrat, Nelson’s bighorn sheep, pallid bat, Townsend’s big-eared bat, and
3 western mastiff bat. Of these species, the desert tortoise is listed as threatened under the ESA.
4 Nine of these species are listed as BLM-designated sensitive; the remaining 19 species are
5 considered rare. Designated critical habitat for the desert tortoise occurs within the affected area
6 in the Chuckwalla DWMA adjacent to the southern boundary of the SEZ. There are no
7 groundwater-dependent species in the vicinity of the SEZ based upon CNDDDB records,
8 comments provided by the USFWS (Stout 2009), and the evaluation of groundwater resources in
9 the Riverside East SEZ region (Section 9.4.9).

10
11
12 ***9.4.12.1.1 Species Listed under the Endangered Species Act That Could Occur***
13 ***in the Affected Area***
14

15 There is one species listed under the ESA that may occur in the affected area of the
16 Riverside East SEZ: the desert tortoise. The Mojave population of the desert tortoise, which
17 includes all populations in California, is listed as a threatened species under the ESA. The desert
18 tortoise is also listed as a threatened species under the CESA. This species is discussed below;
19 additional basic information on life history, habitat needs, and threats to populations of this
20 species is provided in Appendix J. CNDDDB records indicate disjunct occurrences of the
21 Coachella Valley milkvetch in the Chuckwalla Valley within the affected area of the SEZ. The
22 Coachella Valley milkvetch is listed as endangered under the ESA. However, the USFWS has
23 confirmed that those occurrences do not belong to the Coachella Valley milkvetch; the nearest
24 known occurrences of this species are from the Coachella Valley, approximately 45 mi (72 km)
25 west of the SEZ. It is unlikely for the Coachella Valley milkvetch to occur in the affected area of
26 the Riverside East SEZ.

27
28 In scoping comments on the Riverside East SEZ, the USFWS expressed concern for
29 impacts of solar facilities within the SEZ on the desert tortoise (Stout 2009). This species has the
30 potential to occur within the SEZ based on observed occurrences on and near the SEZ, the
31 presence of designated critical habitat within the area of indirect effects, and the presence of
32 potentially suitable habitat in the SEZ (Figure 9.4.12.1-1; Table 9.4.12.1-1).

33
34 The desert tortoise occurs in Joshua Tree NP and the Chuckwalla DWMA, which are
35 adjacent to the western and southern boundary of the proposed Riverside East SEZ. In 2007,
36 surveys for desert tortoises conducted by the USFWS Desert Tortoise Recovery Office indicated
37 a desert tortoise density of about 3.5 and 5.0 individuals/km² within Joshua Tree NP and the
38 Chuckwalla DWMA, respectively (Stout 2009). Because the SEZ exists at lower elevations,
39 desert tortoise densities within the SEZ are likely lower than those within the surrounding
40 DWMA. The SEZ also shares greater connectivity with the Pinto Basin near the Joshua Tree
41 NP. For these reasons, the USFWS used the lower density estimate from the Joshua Tree NP
42 (3.5 individuals/km²) to estimate that the SEZ may support up to 2,865 desert tortoises.

43
44 CNDDDB records desert tortoises located within the eastern and western portions of the
45 SEZ (Figure 9.4.12.1-1). According to the CAREGAP habitat suitability model, potentially
46 suitable habitat for the species occurs throughout the majority of the SEZ and the area of indirect

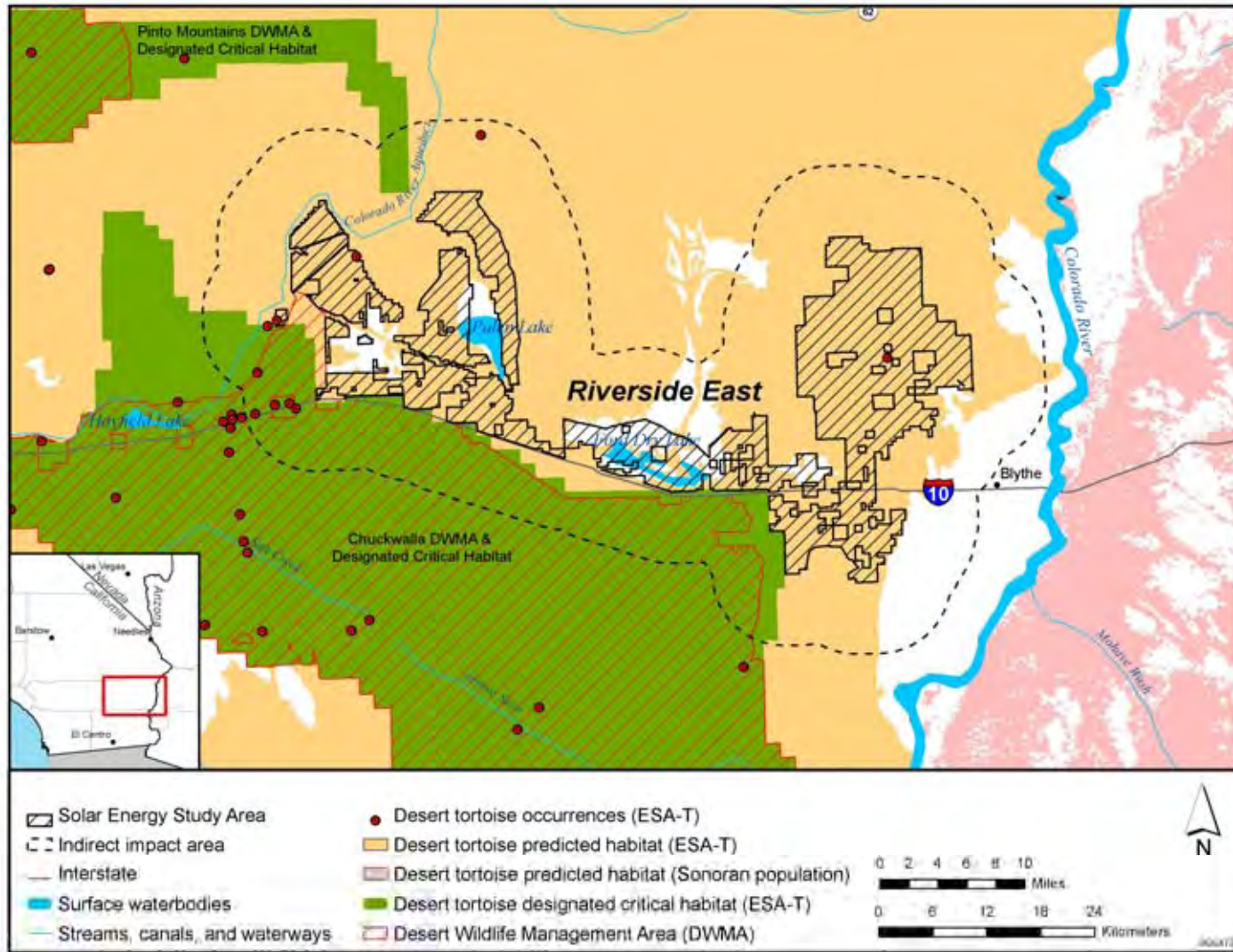


FIGURE 9.4.12.1-1 Known or Potential Occurrences of Species Listed as Endangered or Threatened under the ESA That May Occur in the Proposed Riverside East SEZ Affected Area (Sources: CDFG 2010b; Davis et al. 1998, 2007)

TABLE 9.4.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Riverside East SEZ

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants</i>						
Abrams' spurge	<i>Chamaesyce abramsiana</i>	CA-S1	Sandy substrates within creosotebush scrub communities in the Mojave and Sonoran Deserts at elevations below 3,000 ft. ^h Known to occur in the affected area. Nearest recorded occurrence is from the Chuckwalla DWMA, about 1 mi south of the SEZ. About 2,215,155 acres ⁱ of potentially suitable habitat occurs within the SEZ region.	109,933 acres of potentially suitable habitat lost (5.0% of available suitable habitat)	229,999 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ; translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Note that these potential mitigations apply to all special status plants.
Alkali mariposa-lily	<i>Calochortus striatus</i>	BLM-S; CA-S2; FWS-SC	Alkaline seeps, springs, and meadows at elevations between 2,600 and 4,600 ft. Nearest recorded occurrences are 40 mi west of the SEZ. About 68,658 acres of potentially suitable habitat occurs within the SEZ region.	1,570 acres of potentially suitable habitat lost (2.3% of available suitable habitat)	828 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to desert playa habitat on the SEZ could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Bitter hymenoxys^j	<i>Hymenoxys odorata</i>	CA-S2	Sandy substrates within riparian and Sonoran Desert scrub communities, also within open flats, mesquite flats, ditches and drainage areas, and along roads and streams. Elevation ranges between 150 and 500 ft. Known to occur in the affected area. Nearest recorded occurrences are 5 mi east of the SEZ. About 2,657,966 acres of potentially suitable habitat occurs within the SEZ region.	138,283 acres of potentially suitable habitat lost (5.2% of available suitable habitat)	324,557 acres of potentially suitable habitat (12.2% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
California ditaxis	<i>Ditaxis serrata</i> var. <i>californica</i>	CA-S2	Sonoran Desert scrub and creosotebush scrub communities at elevations between 100 and 3,300 ft. Known to occur in the affected area. Nearest recorded occurrence is near the CRA, approximately 2 mi west of the SEZ. About 2,514,766 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,102 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
California satintail	<i>Imperata brevifolia</i>	CA-S2	Chaparral, coastal sage scrub, creosotebush, desert scrub, mesic riparian scrub, and alkaline meadow and seep communities. Elevation ranges between 0 and 1,650 ft. Known to occur in the affected area. Nearest recorded occurrences are 5 mi east of the SEZ. About 2,526,349 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
California saw-grass	<i>Cladium californicum</i>	CA-S2	Alkaline, freshwater, and riparian habitats including meadows, marshes, swamps, and seeps. Elevation ranges between 200 and 2,000 ft. Nearest recorded occurrence is from the vicinity of the Salton Sea, approximately 30 mi southwest of the SEZ. About 117,240 acres of potentially suitable habitat occurs within the SEZ region.	1,793 acres of potentially suitable habitat lost (1.5% of available suitable habitat)	1,162 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to desert playa and wash habitats on the SEZ could reduce impacts. See Abrams' surge for a list of potential mitigations applicable to all special status plant species.
Chaparral sand-verbena	<i>Abronia villosa</i> var. <i>aurita</i>	BLM-S; CA-S2	Endemic to southern California. Inhabits chaparral desert sand dunes at elevations between 350 and 5,250 ft. Historically occurred on and in the vicinity of the SEZ; the species has not been recorded in the project area since 1964. Most recent recorded occurrences are 23 mi from the SEZ. About 84,357 acres of potentially suitable habitat occurs within the SEZ region.	26,798 acres of potentially suitable habitat lost (31.8% of available suitable habitat)	15,987 acres of potentially suitable habitat (19.0% of available potentially suitable habitat)	Large overall impact. Avoiding or minimizing disturbance to desert dunes and sand transport systems on the SEZ could reduce impacts. See Abrams' surge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Coves' cassia	<i>Senna covesii</i>	CA-S2	Sonoran Desert dry washes and slopes with sandy substrates within desert scrub and creosotebush scrub communities. Elevation ranges between 1,000 and 3,500 ft. Nearest recorded occurrence is 15 mi from the SEZ. About 3,164,051 acres of potentially suitable habitat occurs within the SEZ region.	136,472 acres of potentially suitable habitat lost (4.3% of available suitable habitat)	314,674 acres of potentially suitable habitat (9.9% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to desert wash habitats to the SEZ could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Creamy blazing star	<i>Mentzelia tridentata</i>	BLM-S; CA-S2	Mojave desert creosotebush scrub communities on rocky and sandy substrates at elevations below 3,900 ft. Nearest recorded occurrences are 45 mi west of the SEZ. About 2,215,155 acres of potentially suitable habitat occurs within the SEZ region.	109,933 acres of potentially suitable habitat lost (5.0% of available suitable habitat)	229,999 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Desert pincushion	<i>Coryphantha chlorantha</i>	CA-S1	Gravelly bajadas, limestone, or dolomite rocky slopes associated with desert scrub communities within pinyon-juniper woodlands and Joshua tree woodlands. Elevation ranges between 148 and 7,875 ft. Nearest recorded occurrence is 30 mi from the SEZ. About 2,526,161 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Desert spike-moss	<i>Selaginella eremophila</i>	CA-S2	Gravelly or rocky slopes within creosotebush scrub and Sonoran desert scrub communities. Elevation ranges between 650 and 2,950 ft. Known to occur in the affected area. Nearest recorded occurrence is 5 mi south of the SEZ. About 2,514,766 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,102 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Dwarf germander	<i>Teucrium cubense ssp. depressum</i>	CA-S2	Desert dunes, playas, riparian, creosotebush scrub, and desert scrub communities. Elevation ranges between 150 and 1,300 ft. Known to occur in the affected area. Nearest recorded occurrence is from the Chuckwalla DWMA, about 1 mi south of the SEZ. About 2,727,570 acres of potentially suitable habitat occurs within the SEZ region.	140,087 acres of potentially suitable habitat lost (5.1% of available suitable habitat)	252,499 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to playas and desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Emory's crucifixion-thorn	<i>Castela emoryi</i>	CA-S2	Slightly wet alluvial bottomlands associated with basalt flows within Mojave Desert scrub, non-saline playas, creosotebush scrub, and Sonoran Desert scrub communities. Elevation ranges between 295 and 2,200 ft. Known to occur in the affected area. Nearest recorded occurrence is about 1 mi from the western portion of the SEZ. About 2,594,668 acres of potentially suitable habitat occurs within the SEZ region.	113,066 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	236,178 acres of potentially suitable habitat (9.1% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to playas could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Giant spanish-needle	<i>Palafoxia arida</i> var. <i>gigantea</i>	BLM-S; CA-S1	Desert sand dune habitats at elevations below 330 ft. Nearest recorded occurrences are 40 mi south of the SEZ. Suitable habitat may exist on the site. About 84,168 acres of potentially suitable habitat occurs within the SEZ region.	26,798 acres of potentially suitable habitat lost (31.8% of available suitable habitat)	15,987 acres of potentially suitable habitat (19.0% of available potentially suitable habitat)	Large overall impact. Avoiding or minimizing disturbance to desert dunes and sand transport systems on the SEZ could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Glandular ditaxis	<i>Ditaxis claryana</i>	CA-S1	Sandy substrates within desert scrub communities at elevations below 1,525 ft. Known to occur in the affected area. Nearest recorded occurrence is from the Chuckwalla DWMA, approximately 2 mi south of the SEZ. About 2,526,160 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Harwood's eriastrum	<i>Eriastrum harwoodii</i>	BLM-S; CA-S2	Known from fewer than 20 occurrences in southern California on desert dunes and other sandy habitats at elevations between 650 and 3,000 ft. Nearest recorded occurrence is 15 mi northwest of the SEZ in the Pinto Mountains DWMA. About 84,168 acres of potentially suitable habitat occurs within the SEZ region.	26,798 acres of potentially suitable habitat lost (31.8% of available suitable habitat)	15,987 acres of potentially suitable habitat (19.0% of available potentially suitable habitat)	Large overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Harwood's milkvetch	<i>Astragalus insularis</i> var. <i>harwoodii</i>	CA-S2	Sonoran Desert of Arizona and California on sandy or gravelly substrates of desert dunes within desert scrub communities. Elevation ranges between 0 and 2,325 ft. Known to occur on the SEZ and in other portions of the affected area. About 2,610,178 acres of potentially suitable habitat occurs within the SEZ region.	138,294 acres of potentially suitable habitat lost (5.3% of available suitable habitat)	251,337 acres of potentially suitable habitat (9.6% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Jackass-clover	<i>Wislizenia refracta</i> ssp. <i>refracta</i>	CA-S1	Mojave and northern Sonoran Deserts in dunes, sandy washes, roadsides, and playas within creosotebush scrub, alkali sink, or desert scrub communities. Elevation ranges between 2,000 and 2,600 ft. Known to occur in wash habitats in the western portion of the SEZ near Palen Lake. About 813,288 acres of potentially suitable habitat occurs within the SEZ region.	53,991 acres of potentially suitable habitat lost (6.6% of available suitable habitat)	99,483 acres of potentially suitable habitat (12.2% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems, playas, or washes could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Latimer's woodland-gilia	<i>Saltugilia latimeri</i>	BLM-S; CA-S2	Mojave Desert scrub communities, pinyon-juniper woodlands, and washes on rocky or sandy substrates at elevations between 1,300 and 6,500 ft. Nearest recorded occurrence is 30 mi west of the SEZ. About 2,920,277 acres of potentially suitable habitat occurs within the SEZ region.	136,472 acres of potentially suitable habitat lost (4.7% of available suitable habitat)	314,674 acres of potentially suitable habitat (10.8% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Little San Bernardino Mountains linanthus	<i>Linanthus maculatus</i>	BLM-S; CA-S1	Known from fewer than 20 occurrences in southern California near Joshua Tree National Park in desert dunes and sandy flats with creosotebush scrub and Joshua tree woodland communities at elevations less than 6,900 ft. Nearest recorded occurrences are 30 mi west of the SEZ. About 84,168 acres of potentially suitable habitat occurs within the SEZ region.	26,798 acres of potentially suitable habitat lost (31.8% of available suitable habitat)	15,987 acres of potentially suitable habitat (19.0% of available potentially suitable habitat)	Large overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems on the SEZ could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Lobed ground-cherry	<i>Physalis lobata</i>	CA-S1	Known from the northeastern Sonoran and southeastern Mojave Deserts in decomposed granitic substrates within creosotebush scrub, alkali sink, desert scrub, and playas communities. Elevation ranges between 1,650 and 2,600 ft. Nearest recorded occurrences are 20 mi northwest of the SEZ. About 2,594,668 acres of potentially suitable habitat occurs within the SEZ region.	113,066 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	236,178 acres of potentially suitable habitat (9.1% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Munz's cholla	<i>Opuntia munzii</i>	BLM-S; CA-S1	Gravelly or sandy to rocky soils, often on lower bajadas, washes, flats, hills and canyon sides in Sonoran Desert creosotebush shrub communities at elevations below 3,280 ft. Nearest recorded occurrences are from the Chuckwalla DWMA, approximately 20 mi south of the SEZ. About 4,187,934 acres of potentially suitable habitat occurs within the SEZ region.	171,716 acres of potentially suitable habitat lost (4.1% of available suitable habitat)	570,180 acres of potentially suitable habitat (13.6% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Plants (Cont.)						
Narrow-leaved psorothamnus	<i>Psorothamnus fremontii</i> var. <i>attenuatus</i>	CA-S2	Volcanic substrates of slopes, flats, and canyons within Sonoran Desert scrub communities at elevations between 1,100 and 3,000 ft. Nearest recorded occurrences are from the vicinity of the Whipple Mountains, approximately 32 mi northeast of the SEZ. About 2,863,434 acres of potentially suitable habitat occurs within the SEZ region.	141,075 acres of potentially suitable habitat lost (4.9% of available suitable habitat)	370,466 acres of potentially suitable habitat (12.9% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Orocopia sage	<i>Salvia greatae</i>	BLM-S; CA-S2	Creosotebush scrub communities and dry washes at elevations less than 2,600 ft. Known to occur in the affected area. Nearest occurrences are from the Chuckwalla DWMA about 2 mi south of the SEZ. About 2,853,196 acres of potentially suitable habitat occurs within the SEZ region.	134,909 acres of potentially suitable habitat lost (4.7% of available suitable habitat)	309,323 acres of potentially suitable habitat (10.8% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Parish's club-cholla	<i>Grusonia parishii</i>	CA-S2	Silty, sandy, or gravelly flats, dunelets, and hills within Joshua tree woodlands, creosotebush scrub, and desert scrub communities. Elevation ranges between 100 and 5,000 ft. Nearest recorded occurrences are 10 mi west of the SEZ. About 2,995,669 acres of potentially suitable habitat occurs within the SEZ region.	169,461 acres of potentially suitable habitat lost (5.7% of available suitable habitat)	396,498 acres of potentially suitable habitat (13.2% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Pink fairy-duster	<i>Calliandra eriophylla</i>	CA-S2	Sandy or rocky substrates in creosote and desert scrub communities. Elevation ranges between 390 and 4,900 ft. Known to occur in the affected area. The species is known to occur in habitats along I-10 about 0.5 mi south of the SEZ. About 2,526,160 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Purple-nerve cymopterus	<i>Cymopterus multinervatus</i>	CA-S2	Sandy or gravelly slopes within desert scrub, Joshua tree woodland, and pinyon-juniper woodland communities. Elevation ranges between 2,600 and 5,900 ft. Nearest recorded occurrences are from San Bernardino County, California, approximately 40 mi northwest of the SEZ. About 2,526,160 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Saguaro cactus	<i>Carnegiea gigantea</i>	CA-S1	Endemic to the Sonoran Desert along the Colorado River from the Whipple Mountains to Laguna Dam. Rocky substrates within Sonoran desert scrub and creosotescrub communities at elevations between 160 and 4,900 ft. Nearest recorded occurrence is from the Palo Verde Mountains WA, approximately 10 mi south of the SEZ. About 2,863,434 acres of potentially suitable habitat occurs within the SEZ region.	141,075 acres of potentially suitable habitat lost (4.9% of available suitable habitat)	370,466 acres of potentially suitable habitat (12.9% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Salt Spring checkerbloom	<i>Sidalcea neomexicana</i>	CA-S2	Alkaline or mesic substrates within riparian wetlands, marshes, springs, chaparral, coastal scrub, coniferous forest, desert scrub, and playas habitats. Elevation ranges between 50 and 5,000 ft. Nearest recorded occurrences are approximately 40 mi northwest of the SEZ. About 2,643,589 acres of potentially suitable habitat occurs within the SEZ region.	113,289 acres of potentially suitable habitat lost (4.3% of available suitable habitat)	236,512 acres of potentially suitable habitat (8.9% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to desert playa and wash habitats on the SEZ could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Sand evening-primrose	<i>Camissonia arenaria</i>	CA-S2	Sandy washes and rocky slopes within Sonoran desert scrub communities at elevations below 3,000 ft. Nearest recorded occurrence is 13 mi south of the SEZ in the Chuckwalla DWMA. About 3,501,475 acres of potentially suitable habitat occurs within the SEZ region.	166,051 acres of potentially suitable habitat lost (4.7% of available suitable habitat)	449,790 acres of potentially suitable habitat (12.8% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to desert wash habitats on the SEZ could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Slender cottonheads	<i>Nemacaulis denudata</i> var. <i>gracilis</i>	CA-S2	Southern California within the Mojave and Sonoran Deserts on sandy soils within coastal dunes, desert dunes, creosotebush scrub, and desert scrub communities at elevations below 1,300 ft. Nearest recorded occurrences are 40 mi west of the SEZ. About 1,786,349 acres of potentially suitable habitat occurs within the SEZ region.	138,294 acres of potentially suitable habitat lost (7.7% of available suitable habitat)	251,337 acres of potentially suitable habitat (14.1% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Small-flowered androstephium	<i>Androstephium breviflorum</i>	CA-S1	Dry sandy to rocky soil substrates in desert dunes within creosotebush scrub and Mojavean desert scrub at elevations between 720 and 2,100 ft. Nearest occurrences are approximately 10 mi north of the SEZ. About 2,715,222 acres of potentially suitable habitat occurs within the SEZ region.	167,873 acres of potentially suitable habitat lost (6.2% of available suitable habitat)	386,701 acres of potentially suitable habitat (14.2% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Spear-leaf matelea	<i>Matelea parvifolia</i>	CA-S2	Endemic to southeastern California on rocky substrates within creosotebush and desert scrub communities at elevations between 1,450 and 3,600 ft. Known to occur in the affected area. Nearest recorded occurrences are 5 mi south of the SEZ in the Chuckwalla DWMA. About 2,526,160 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Thorny milkwort	<i>Polygala acanthoclada</i>	CA-S2	Loose, sandy or gravelly slopes within shadscale scrub, chenopod scrub, Joshua tree woodland, and pinyon-juniper woodland communities at elevations between 2,500 and 7,500 ft. Nearest recorded occurrences are 25 mi west of the SEZ. About 2,526,161 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Three-awned grama	<i>Bouteloua trifida</i>	CA-S2	Eastern Mojave Desert mountains on dry, rocky, often calcareous slopes within desert scrub communities. Elevation ranges between 2,300 and 6,500 ft. Nearest recorded occurrence is 40 mi north of the SEZ. About 2,282,236 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.9% of available suitable habitat)	235,350 acres of potentially suitable habitat (10.3% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
White-margined beardtongue	<i>Penstemon albomarginatus</i>	BLM-S; CA-S1; FWS-SC	Desert sand dune habitats and Mojave Desert scrub communities at elevations below 3,600 ft. Nearest recorded occurrences are 50 mi north of the SEZ. About 2,366,404 acres of potentially suitable habitat occurs within the SEZ region.	138,294 acres of potentially suitable habitat lost (5.8% of available suitable habitat)	251,337 acres of potentially suitable habitat (10.6% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Plants (Cont.)</i>						
Wiggins' cholla	<i>Opuntia wigginsii</i>	CA-S1	Sandy substrates of small washes and flats within creosotebush scrub and Sonoran Desert scrub communities. Elevation ranges between 100 and 2,900 ft. Known to occur in the affected area. Nearest recorded occurrences are approximately 5 mi south of the SEZ. About 2,909,226 acres of potentially suitable habitat occurs within the SEZ region.	136,472 acres of potentially suitable habitat lost (4.7% of available suitable habitat)	314,426 acres of potentially suitable habitat (10.8% of available potentially suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
<i>Mollusks</i>						
California McCoy snail	<i>Eremarionta rowelli mccoiana</i>	CA-S1	Known only from Riverside County, California within an area less than 40 mi ² near the southern Palen/McCoy Wilderness. Lives terrestrially among rocks on talus slopes. Known to occur in the affected area. Nearest occurrences are from the Palen/McCoy Mountains within 1 mi north of the SEZ. About 949,247 acres of potentially suitable habitat occurs within the SEZ region.	5,640 acres of potentially suitable habitat lost (0.6% of available suitable habitat)	115,696 acres of potentially suitable habitat (12.2% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Arthropods</i> Bradley's cuckoo wasp	<i>Ceratochrysis bradleyi</i>	CA-S1	Endemic to California where it is known only from eastern Riverside County in Sonoran Desert scrub, creosote-scrub, yucca and cholla cactus, saltbush, and desert dune communities. Known to occur in the affected area. Nearest recorded occurrence is 2 mi east of the SEZ. About 2,610,178 acres of potentially suitable habitat occurs within the SEZ region.	138,294 acres of potentially suitable habitat lost (5.3% of available suitable habitat)	251,337 acres of potentially suitable habitat (9.6% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Cheeseweed owlfly	<i>Oliarces clara</i>	CA-S1; FWS-SC	Colorado River drainage of southwestern Arizona and southern California within creosote-scrub communities on or near bajadas at elevations below 330 ft. Nearest recorded occurrence is 10 mi north of the SEZ. About 2,215,155 acres of potentially suitable habitat occurs within the SEZ region.	109,933 acres of potentially suitable habitat lost (5.0% of available suitable habitat)	229,999 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Arthropods (Cont.)</i>						
Riverside cuckoo wasp	<i>Hedychridium argenteum</i>	CA-S1	Endemic to California where it is known only from eastern Riverside County in Sonoran Desert scrub, creosotebush scrub, yucca and cholla cactus, saltbush, and desert dune communities. The only known CNDDDB occurrence for this species is within the SEZ near the southern border of the SEZ. About 2,610,178 acres of potentially suitable habitat occurs within the SEZ region.	138,294 acres of potentially suitable habitat lost (5.3% of available suitable habitat)	251,337 acres of potentially suitable habitat (9.6% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Roberts' rhopalolemma bee	<i>Rhopalolemma robertsi</i>	CA-S1	Endemic to southern California from desert wash habitats in southern San Bernardino County. Nearest recorded occurrences are 35 mi west of the SEZ. About 637,257 acres of potentially suitable habitat occurs within the SEZ region.	24,976 acres of potentially suitable habitat lost (3.9% of available suitable habitat)	79,324 acres of potentially suitable habitat (12.4% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Amphibians						
Couch's spadefoot	<i>Scaphiopus couchii</i>	CA-S2; CA-SC	Scattered populations east of the Algodones Mountains north along the Colorado River in wetland habitats that include temporary pools, ponds, and puddles. Often occurs in arid and semiarid shrublands, shortgrass plains, mesquite savanna, creosotebush, thorn forest, and cultivated areas. Elevation ranges between 690 and 1,120 ft. Nearest recorded occurrences are 6 mi southeast of the SEZ. About 424,690 acres of potentially suitable habitat occurs within the SEZ region.	20,880 acres of potentially suitable habitat lost (4.9% of available suitable habitat)	62,922 acres of potentially suitable habitat (14.8% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Reptiles						
Desert tortoise	<i>Gopherus agassizii</i>	ESA-T; CA-T; CA-S2;	Mojave and Sonoran Deserts in desert creosote bush communities on firm soils for digging burrows, along riverbanks, washes, canyon bottoms, creosote flats, and desert oases. Known to occur on the SEZ (western and northeastern portions) and in the affected area. About 4,205,025 acres of potentially suitable habitat occurs within the SEZ region.	185,274 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	542,622 acres of potentially suitable habitat (12.9% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ, translocation of individuals from areas of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts. The potential for impact and need for mitigation should be determined in consultation with the USFWS and CDFG.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Reptiles (Cont.)						
Mojave fringe-toed lizard	<i>Uma scoparia</i>	BLM-S; CA-SC	Sandy habitats in the Mojave Desert from Death Valley south to the Colorado River near Blythe, California and extreme western Arizona. Sparsely-vegetated desert areas with fine wind-blown sand, including dunes, flats, and washes at elevations below 3,000 ft. Nearest recorded occurrences are 25 mi north of the SEZ. About 1,840,628 acres of potentially suitable habitat occurs within the SEZ region.	140,506 acres of potentially suitable habitat lost (7.6% of available suitable habitat)	380,038 acres of potentially suitable habitat (20.6% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems or washes could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects could reduce impacts.
Rosy boa	<i>Charina trivirgata</i>	BLM-S; FWS-SC	Southeastern California and western Arizona in scrublands, rocky deserts, and canyons with permanent or intermittent streams. Nearest recorded occurrences are from Joshua Tree NP, approximately 25 mi west of the SEZ. About 4,171,153 acres of potentially suitable habitat occurs within the SEZ region.	185,274 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	544,126 acres of potentially suitable habitat (13.0% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ, translocation of individuals from areas of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Birds</i>						
Bendire's thrasher	<i>Toxostoma bendirei</i>	BLM-S; CA-SC	Summer resident in the SEZ region in a variety of desert habitats with fairly large shrubs or cacti and open ground, or open woodland with scattered shrubs and trees, between 0 and 550 m elevation. Nearest recorded occurrence is 2 mi south of the SEZ in the Chuckwalla DWMA. About 2,526,161 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	235,350 acres of potentially suitable habitat (9.3% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats, especially nesting habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Crissal thrasher	<i>Toxostoma crissale</i>	CA-SC; FWS-SC	Year-round resident in SEZ region in dense thickets of scrubs or low trees in desert riparian and desert wash habitats, and in washes within pinyon-juniper habitats. Nearest recorded occurrence is approximately 1 mi south of the SEZ. About 295,943 acres of potentially suitable habitat occurs within the SEZ region.	635 acres of potentially suitable habitat lost (0.2% of available suitable habitat)	13,309 acres of potentially suitable habitat (4.5% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats, especially nesting habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds (Cont.)						
Ferruginous hawk	<i>Buteo regalis</i>	BLM-S; FWS-SC	Winter resident and migrant in the SEZ region at lower elevations in open grasslands, shrublands, sagebrush flats, desert scrub, desert valleys, and fringes of pinyon-juniper habitats. Occurs in Riverside County, California in the SEZ region. About 1,978,858 acres of potentially suitable habitat occurs within the SEZ region.	112,197 acres of potentially suitable foraging habitat lost (5.7% of available suitable habitat)	287,942 acres of potentially suitable habitat (14.6% of available potentially suitable habitat)	Moderate overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effects.
Gila woodpecker	<i>Melanerpes uropygialis</i>	CA-E; CA-S1	Year-round resident in the SEZ region along the Colorado River in desert riparian and desert wash habitats, orchards, vineyards, and urban habitats. Nearest recorded occurrence is from the Colorado River, approximately 6 mi east of the SEZ. About 297,582 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	300 acres of potentially suitable habitat (0.1% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is needed.
Hepatic tanager	<i>Piranga flava</i>	CA-S1	Summer resident in SEZ region in open coniferous forests, montane pine-oak forests, riparian woodlands, and pine savanna. Nests high in coniferous or deciduous trees. Nearest recorded occurrences are 17 mi from the SEZ. About 3,283 acres of potentially suitable habitat occurs within the SEZ region.	223 acres of potentially suitable habitat lost (6.8% of available suitable habitat)	8 acres of potentially suitable habitat (0.2% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats, especially nesting habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Birds (Cont.)</i>						
Loggerhead shrike	<i>Lanius ludovicianus</i>	CA-SC; FWS-SC	Breeds in SEZ region in open woodlands with moderate grass cover interspersed with areas of bare ground. Nearest recorded occurrences are approximately 10 mi south of the SEZ. About 3,635,415 acres of potentially suitable habitat occurs within the SEZ region.	202,050 acres of potentially suitable habitat lost (5.6% of available suitable habitat)	574,386 acres of potentially suitable habitat (15.8% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance of all woodland habitat on the SEZ would reduce or eliminate impacts. Alternatively, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats, especially nesting habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Birds (Cont.)</i>						
Lucy's warbler	<i>Vermivora luciae</i>	CA-S2; CA-SC	Riparian, chaparral, and hardwood woodlands having standing snags or hollow trees. Nonbreeding habitat includes dry washes and riparian forests. Nearest recorded occurrences are from the Colorado River, approximately 20 mi southeast of the SEZ. About 376,331 acres of potentially suitable habitat occurs within the SEZ region.	636 acres of potentially suitable habitat lost (0.2% of available suitable habitat)	15,966 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of all woodland and riparian habitat on the SEZ would reduce or eliminate impacts. Alternatively, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats, especially nesting habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	BLM-S; CA-S2; CA-SC; FWS-SC	Year-round resident in the SEZ region. Open areas with short, sparse vegetation, including grasslands, agricultural fields, and disturbed areas. Nests in burrows created by mammals or tortoises. Known to occur in the affected area. Nearest occurrences are within 1 mi east of the SEZ. About 4,653,092 acres of potentially suitable habitat occurs within the SEZ region.	202,844 acres of potentially suitable habitat lost (4.4% of available suitable habitat)	652,982 acres of potentially suitable habitat (14.0% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied burrows and habitats in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds (Cont.)						
Arizona myotis	<i>Myotis occultus</i>	CA-S2; CA-SC; FWS-SC	Ponderosa pine and oak-pine woodlands in close proximity to water, and riparian forests within along the Colorado River. Known to occur in the affected area. Nearest recorded occurrences are 4 mi east of the SEZ. About 802,324 acres of potentially suitable habitat occurs within the SEZ region.	25,199 acres of potentially suitable habitat lost (3.1% of available suitable habitat)	79,658 acres of potentially suitable habitat (9.9% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
California leaf-nosed bat	<i>Macrotus californicus</i>	BLM-S; CA-S2; CA-SC; FWS-SC	Year-round resident in SEZ region in desert riparian, desert wash, desert scrub, and palm oasis habitats at elevations below 2,000 ft. Roosts in mines, caves, and buildings. Known to occur in the affected area. Nearest recorded occurrences are from the Palen/McCoy Wilderness within 2 mi of the SEZ. About 3,973,317 acres of potentially suitable habitat occurs within the SEZ region.	142,335 acres of potentially suitable habitat lost (3.6% of available suitable habitat)	430,378 acres of potentially suitable habitat (10.8% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
Cave myotis	<i>Myotis velifer</i>	BLM-S; CA-S1; CA-SC; FWS-SC	Year-round resident in SEZ region in desert scrub, shrublands, washes, and riparian habitats. Roosts in colonies in caves. Known to occur in the affected area. Nearest recorded occurrence is from the Mule Mountains ACEC about 2 mi south of the SEZ. About 4,136,719 acres of potentially suitable habitat occurs within the SEZ region.	142,335 acres of potentially suitable habitat lost (3.4% of available suitable habitat)	430,704 acres of potentially suitable habitat (10.4% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds (Cont.)						
Colorado Valley woodrat	<i>Neotoma albigula venusta</i>	CA-S1	Low-lying desert, creosote-mesquite, and pinyon-juniper habitats. Distribution is strongly influenced by the availability of den-building materials, including litter of cholla, prickly pear, mesquite, and catclaw, as well as its low tolerance for cold temperatures. Known to occur in the affected area. Nearest recorded occurrences are on BLM lands about 1 mi southeast of the SEZ. About 3,066,791 acres of potentially suitable habitat occurs within the SEZ region.	167,910 acres of potentially suitable habitat lost (5.5% of available suitable habitat)	425,558 acres of potentially suitable habitat (13.9% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Nelson's bighorn sheep	<i>Ovis canadensis nelsoni</i>	BLM-S; FWS-SC	Open, steep rocky terrain in mountainous habitats of the eastern Mojave and Sonoran Deserts in California. Rarely uses desert lowlands, except as corridors for travel between mountain ranges. Known to occur in the affected area. Nearest recorded occurrences are from the Joshua Tree Wilderness and the Chuckwalla DWMA, about 2 mi north, west, and south of the SEZ. About 1,896,141 acres of potentially suitable habitat occurs within the SEZ region.	42,020 acres of potentially suitable habitat lost (2.2% of available suitable habitat)	223,604 acres of potentially suitable habitat (11.8% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats within the SEZ other habitats that serve as movement corridors could further reduce impacts.
Pallid bat	<i>Antrozous pallidus</i>	BLM-S; CA-SC; FWS-SC	Year-round resident in SEZ region in low-elevation desert communities, including grasslands, shrublands, and woodlands. Roosts in caves, crevices, and mines. Known to occur in the affected area. Nearest recorded occurrence is from the Chuckwalla Mountains Wilderness approximately 5 mi south of the SEZ. About 3,668,119 acres of potentially suitable habitat occurs within the SEZ region.	117,359 acres of potentially suitable habitat lost (3.2% of available suitable habitat)	351,380 acres of potentially suitable habitat (9.6% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds (Cont.)						
Palm Springs pocket mouse	<i>Perognathus longimembris bangsi</i>	BLM-S; CA-S2; CA-SC	Creosote scrub, desert scrub, and grasslands on loose or sandy soils. Nearest recorded occurrence is from the Chuckwalla DWMA, approximately 25 mi west of the SEZ. About 3,749,649 acres of potentially suitable habitat occurs within the SEZ region.	198,472 acres of potentially suitable habitat lost (5.3% of available suitable habitat)	512,782 acres of potentially suitable habitat (13.7% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Pocketed free-tailed bat	<i>Nyctinomops femorosaccus</i>	CA-S2; CA-SC; FWS-SC	Year-round resident in SEZ region lowland areas including creosotebush and chaparral habitats in association with very large boulders, high cliffs, rugged rock outcroppings, and rocky canyons. Nearest recorded occurrences are 37 mi south of the SEZ. About 1,964,239 acres of potentially suitable habitat occurs within the SEZ region.	111,496 acres of potentially suitable habitat lost (5.7% of available suitable habitat)	235,350 acres of potentially suitable habitat (12.0% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
Spotted bat	<i>Euderma maculatum</i>	BLM-S; CA-S2	Year-round resident in SEZ region in deserts, grasslands, and mixed coniferous forests at elevations below 10,000 ft. Roosts in caves, rock crevices, and buildings. Nearest recorded occurrence is 40 mi west of the SEZ. Suitable habitat exists on the site. About 2,363,936 acres of potentially suitable habitat occurs within the SEZ region.	111,719 acres of potentially suitable habitat lost (4.7% of available suitable habitat)	235,684 acres of potentially suitable habitat (10.0% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
Birds (Cont.)						
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM-S; CA-S2; CA-SC; FWS-SC	Year-round resident in SEZ region in all habitats but subalpine and alpine habitats, and at any season. Roosts in caves, mines, tunnels, buildings, or other human-made structures. Known to occur in the affected area. Nearest recorded occurrences are approximately 4 mi southeast of the SEZ. About 5,065,765 acres of potentially suitable habitat occurs within the SEZ region.	202,912 acres of potentially suitable habitat lost (4.0% of available suitable habitat)	655,256 acres of potentially suitable habitat (12.9% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
Western mastiff bat	<i>Eumops perotis californicus</i>	BLM-S; CA-SC; FWS-SC	Year-round resident in SEZ region in open semiarid habitats, including conifer and deciduous woodlands, shrublands, grasslands, chaparral, and urban areas. Roosts in crevices in cliff faces, buildings, and tall trees. Known to occur in the affected area. Nearest recorded occurrence is 5 mi south of the SEZ. About 4,069,881 acres of potentially suitable habitat occurs within the SEZ region.	202,912 acres of potentially suitable habitat lost (5.0% of available suitable habitat)	655,256 acres of potentially suitable habitat (16.1% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
Western small-footed myotis	<i>Myotis ciliolabrum</i>	BLM-S; CA-S2	Year-round resident in SEZ region in woodland and riparian habitats at elevations below 9,000 ft. Roosts in caves, buildings, mines, and crevices of cliff faces. Nearest recorded occurrence is from the Chocolate Mountains, approximately 30 mi south of the SEZ. About 661,873 acres of potentially suitable habitat occurs within the SEZ region.	25,199 acres of potentially suitable habitat lost (3.8% of available suitable habitat)	79,658 acres of potentially suitable habitat (12.0% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Birds (Cont.)</i>						
Western yellow bat	<i>Lasiurus xanthinus</i>	BLM-S; AZ-WSC; AZ-S2; CA-SC	Year-round resident in SEZ region in desert riparian, desert wash, and palm oasis habitats at elevations below 2,000 ft. Roosts in trees. Nearest recorded occurrence is from Blythe, California, approximately 6 mi east of the SEZ. About 1,340,978 acres of potentially suitable habitat occurs within the SEZ region.	25,199 acres of potentially suitable habitat lost (1.9% of available suitable habitat)	79,658 acres of potentially suitable habitat (5.9% of available potentially suitable habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
Yuma hispid cotton rat	<i>Sigmodon hispidus eremicus</i>	AZ-S2; CA-S2; CA-SC; FWS-SC	Dense stands of vegetation near wetlands, herbaceous grasslands, and hardwood woodland communities especially dense grassy areas such as fields, marshes, and roadside edges, brushy areas along streams or ponds, irrigated fields, and desert scrub. Nearest recorded occurrences are 50 mi south of the SEZ. About 176,434 acres of potentially suitable habitat occurs within the SEZ region.	76 acres of potentially suitable habitat lost (<0.1% of available suitable habitat)	53,096 acres of potentially suitable habitat (30.1% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c		Overall Potential Impact Magnitude ^f and Species-Specific Mitigation ^g
				Within SEZ (Direct Effects) ^d	Outside SEZ (Indirect Effects) ^e	
<i>Birds (Cont.)</i>						
Yuma mountain lion	<i>Puma concolor browni</i>	CA-S1; CA-SC	Riparian bottomlands, cottonwood-willow forests, mesquite bosques, adjacent desert foothills, low rocky mountains, and canyons within desert, chaparral shrubland, and mixed woodland communities especially sites with dense vegetation, caves or other natural cavities, rocky outcrops ranging, and tree/brush edges. Elevation ranges between 1,000 and 3,500 ft. Nearest recorded occurrences are 25 mi south of the SEZ. About 2,833,446 acres of potentially suitable habitat occurs within the SEZ region.	185,274 acres of potentially suitable habitat lost (6.5% of available suitable habitat)	542,622 acres of potentially suitable habitat (19.2% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of habitats within the SEZ that serve as movement corridors could further reduce impacts.

^a BLM-S = listed as a sensitive species by the BLM; CA-E = listed as endangered by the State of California; CA-S1 = ranked as S1 in the State of California; CA-S2 = ranked as S2 in the State of California; CA-T = listed as threatened by the State of California; ESA-T = listed as threatened under the ESA; ESA-UR = under review for listing under the ESA; FWS-SC = USFWS species of concern. An asterisk denotes that the listing status applies to populations only within the State of Arizona.

^b For plant and invertebrate species, potentially suitable habitat was determined using CAREGAP and SWReGAP land cover types. For reptile, bird, and mammal species, potentially suitable habitat was determined using CAREGAP and SWReGAP habitat suitability models as well as CAREGAP and SWReGAP land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, defined as the area within 50 mi (80 km) of the SEZ center.

^c Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined using CAREGAP or SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. Impacts of access road and transmission line construction, upgrade, or operation are not assessed in this evaluation because of the proximity of existing infrastructure to the SEZ.

^d Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations.

^e Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.

Footnotes continued on next page.

TABLE 9.4.12.1-1 (Cont.)

-
- ^f Overall impact magnitude categories were based on professional judgment and include (1) *small*: $\leq 1\%$ of the population or its habitat would be lost, and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat, would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; and (3) *large*: $>10\%$ of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^g Species-specific mitigations are suggested here but final mitigations should be developed in consultation with state and federal agencies, and should be based on pre-disturbance surveys.
- ^h Elevations in the areas of direct and indirect effect range from about 230 ft (70 m) to 3,800 ft (1,160 m).
- ⁱ To convert acres to km^2 , multiply by 0.004047.
- ^j Species in bold text have been recorded or have designated critical habitat in the affected area.

1 effects (Figure 9.4.12.1-1; Table 9.4.12.1-1). The USGS desert tortoise model
2 (Nussear et al. 2009) indicates that the majority of the SEZ is composed of less suitable habitat
3 than the surrounding landscape (modeled suitability value ≤ 0.5 out of 1.0).
4

5 Designated critical habitat for this species does not occur on the SEZ, but adjacent critical
6 habitat occurs south of the SEZ in the area of indirect effects within the Chuckwalla DWMA.
7 Designated critical habitat for the desert tortoise also occurs within the area of indirect effects
8 northwest of the SEZ within the Pinto Mountains DWMA. The Riverside East SEZ is situated
9 between the two DWMA's (Figure 9.4.12.1-1), and provides connectivity between them and other
10 Wildlife Habitat Management Areas (WHMA's) defined in the BLM NECO Plan (BLM and
11 CDFG 2002) to facilitate the movement of desert tortoises and increase genetic diversity
12 (Stout 2009).
13
14

15 **9.4.12.1.2 BLM-Designated Sensitive Species**

16
17 There are 25 BLM-designated sensitive species that may occur in the affected area of the
18 Riverside East SEZ (Table 9.4.12.1-1). These BLM-designated sensitive species include the
19 following (1) plants: alkali mariposa-lily, chaparral sand-verbena, creamy blazing star, giant
20 Spanish-needle, Harwood's eriastrum, Latimer's woodland-gilia, Little San Bernardino
21 Mountains linanthus, Munz's cholla, Orocopia sage, and white-margined beardtongue;
22 (2) reptiles: Mojave fringe-toed lizard and rosy boa; (3) birds: Bendire's thrasher, ferruginous
23 hawk, and western burrowing owl; and (4) mammals: California leaf-nosed bat, cave myotis,
24 Nelson's bighorn sheep, pallid bat, Palm Springs pocket mouse, spotted bat, Townsend's big-
25 eared bat, western mastiff bat, western small-footed bat, and western yellow bat. Of these
26 species, the Orocopia sage, Bendire's thrasher, western burrowing owl, California leaf-nosed bat,
27 cave myotis, Nelson's bighorn sheep, pallid bat, Townsend's big-eared bat, and western mastiff
28 bat have been recorded in the affected area. Habitats in which these species are found, the
29 amount of potentially suitable habitat in the affected area, and known locations of the species
30 relative to the SEZ are discussed below and presented in Table 9.4.12.1-1. Additional life history
31 information for these species is provided in Appendix J.
32
33

34 **Alkali Mariposa-Lily**

35
36 The alkali mariposa-lily is a perennial forb in the lily family that is known only from
37 wetlands in the western Mojave Desert region of southern California. It inhabits alkaline seeps,
38 springs, and meadows. The species is not known to occur on the SEZ, but potentially suitable
39 habitat does occur there and in other portions of the affected area (Table 9.4.12.1-1). The nearest
40 known occurrence of the species is about 40 mi (64 km) west of the Riverside East SEZ.
41
42

43 **Chaparral Sand-Verbena**

44
45 The chaparral sand-verbena is a flowering for that is endemic to southern California. It
46 historically occurred in the vicinity of the Riverside East SEZ and within the area of indirect

1 effects. The most recent recorded occurrences for this species are 23 mi (37 km) west of the
2 SEZ. Although the species has not been recently recorded near the SEZ, potentially suitable sand
3 dune habitat does occur there and in other portions of the affected area (Table 9.4.12.1-1).
4
5

6 **Creamy Blazing-Star**

7

8 The creamy blazing-star is an annual forb in the aster family that is endemic to the
9 Mojave Desert in southern California. It inhabits desert creosotebush scrub communities on
10 rocky and sandy substrates. The species is not known to occur on the SEZ, but potentially
11 suitable habitat does occur there and in other portions of the affected area (Table 9.4.12.1-1).
12 The nearest known occurrence of the species is about 45 mi (72 km) west of the Riverside East
13 SEZ.
14

15 **Giant Spanish-Needle**

16

17
18 The giant Spanish-needle is a flowering forb endemic to sand dune habitats in the
19 Sonoran Desert of southern California and southwestern Arizona. Populations are known to
20 occur as near as 40 mi (64 km) south of the SEZ. Populations are not known to occur on the
21 Riverside East SEZ, but suitable desert dune habitats may occur on the SEZ and in other portions
22 of the affected area (Table 9.4.12.1-1).
23

24 **Harwood's Eriastrum**

25

26
27 The Harwood's eriastrum is an annual forb that is known only from the Mojave Desert
28 in southern California where it inhabits desert dunes. The species is not known to occur on the
29 SEZ, but potentially suitable habitat does occur there and in other portions of the affected area
30 (Table 9.4.12.1-1). The nearest known occurrence of the species is about 15 mi (24 km)
31 northwest of the Riverside East SEZ in the Pinto Mountains DWMA.
32

33 **Latimer's Woodland-Gilia**

34

35
36 The Latimer's woodland-gilia is an annual forb in the phlox family that is endemic to
37 southern California from San Bernardino and Riverside Counties. It inhabits desert scrub,
38 washes, and pinyon-juniper woodland communities on rocky or sandy substrates. The species is
39 not known to occur on the SEZ, but potentially suitable habitat does occur there and in other
40 portions of the affected area (Table 9.4.12.1-1). The nearest known occurrence of the species is
41 about 30 mi (48 km) west of the Riverside East SEZ.
42
43
44

1 **Little San Bernardino Mountains Linanthus**

2
3 The Little San Bernardino Mountains linanthus is an annual forb in the phlox family that
4 is endemic to southern California in Riverside and San Bernardino Counties. It inhabits desert
5 dunes and sandy flats within creosotebush and Joshua tree woodland communities. The species is
6 not known to occur on the SEZ, but potentially suitable habitat does occur there and in other
7 portions of the affected area (Table 9.4.12.1-1). The nearest known occurrence of the species is
8 about 30 mi (48 km) west of the Riverside East SEZ.

9
10
11 **Munz's Cholla**

12
13 The Munz's cholla is a tree-like cactus endemic to southern California where it is known
14 only from the Chocolate Mountains in Imperial and Riverside Counties as near as 20 mi (32 km)
15 south of the SEZ. The species inhabits Sonoran Desert creosotebush scrub communities. The
16 species is not known to occur on the Riverside East SEZ, but potentially suitable habitat occurs
17 on the SEZ and in other portions of the affected area (Table 9.4.12.1-1).

18
19
20 **Orocopia Sage**

21
22 The Orocopia sage is a flowering evergreen shrub that is endemic to southern California
23 in dry desert washes and floodplains. The species is known to occur as near as 2 mi (3 km) south
24 of the Riverside East SEZ within the area of indirect effects. Potentially suitable habitat for the
25 species occurs on the SEZ and in other portions of the affected area (Table 9.4.12.1-1).

26
27
28 **White-Margined Beardtongue**

29
30 The white-margined beardtongue is a perennial forb in the figwort family that occurs
31 in the deserts of Arizona, California, and Nevada. In California, it is known from fewer than
32 20 locations. It inhabits desert dunes and desert scrub communities of the Mojave Desert. The
33 nearest known occurrence of the species is about 50 mi (80 km) north of the Riverside East SEZ;
34 potentially suitable habitat exists on the SEZ and in other portions of the affected area
35 (Table 9.4.12.1-1).

36
37
38 **Mojave Fringe-Toed Lizard**

39
40 The Mojave fringe-toed lizard is a fairly small, smooth-skinned lizard that inhabits
41 desert sand dune habitats the Mojave Desert of southern California. The species occurs in
42 scattered populations in dunes composed of fine, loose, windblown sand deposits. The
43 nearest known occurrence of the species is about 25 mi (40 km) north of the Riverside East SEZ;
44 potentially suitable dune habitats are known to occur on the SEZ and in other portions of the
45 affected area (Table 9.4.12.1-1).

1 **Rosy Boa**

2
3 The rosy boa is a heavy-bodied snake that inhabits desert scrublands, rocky deserts, and
4 canyons in southern California south of the Death Valley region. The nearest known occurrence
5 is from Joshua Tree NP, approximately 25 mi (40 km) west of the Riverside East SEZ.
6 Potentially suitable habitat occurs on the SEZ and in other portions of the affected area
7 (Table 9.4.12.1-1).
8
9

10 **Bendire’s Thrasher**

11
12 The Bendire’s thrasher is a small neotropical migrant bird that is a summer breeding
13 resident in southern California. This species inhabits desert succulent shrub and Joshua tree
14 habitats in the Mojave Desert where it is associated with sagebrush, pinyon-juniper woodlands,
15 cholla cactus, Joshua tree, palo verde, mesquite, and agave species. The species is known to
16 occur as near as the Chuckwalla DWMA, 2 mi (3 km) south of the Riverside East SEZ in the
17 area of indirect effects. Potentially suitable scrub and wash habitats may occur in the SEZ and
18 other portions of the affected area (Table 9.4.12.1-1).
19
20

21 **Ferruginous Hawk**

22
23 The ferruginous hawk is a winter resident and migrant in the Riverside East SEZ region.
24 The species inhabits open grasslands, sagebrush flats, desert scrub, and the edges of pinyon-
25 juniper woodlands. It is known to occur in Riverside County, and potentially suitable foraging
26 habitat occurs on the Riverside East SEZ and in other portions of the affected area
27 (Table 9.4.12.1-1).
28
29

30 **Western Burrowing Owl**

31
32 The western burrowing owl is a year-round resident of open, dry grasslands and desert
33 habitats in southern California and Arizona. The species occurs locally in open areas with sparse
34 vegetation. The species is known to occur as near as 1 mi (1.6 km) east of the Riverside East
35 SEZ in the area of indirect effects. Potentially suitable foraging and nesting habitat may occur in
36 the SEZ and other portions of the affected area (Table 9.4.12.1-1). The availability of nest sites
37 (burrows) within the affected area has not been determined; shrubland habitat that may be
38 suitable for either foraging or nesting occurs throughout the affected area.
39
40

41 **California Leaf-Nosed Bat**

42
43 The California leaf-nosed bat is a large-eared bat with a leaflike flap of protective skin on
44 the tip of its nose. It primarily occurs along the Colorado River, from southern Nevada, through
45 Arizona and California, to Baja California and Sinaloa Mexico. The species forages in a variety
46 of desert habitats, including desert riparian, desert wash, desert scrub, and palm oasis. It roosts

1 in caves, crevices, and mines. The nearest recorded occurrences are from the Palen/McCoy
2 Wilderness within 2 mi (3 km) of the SEZ in the area of indirect effects. Potentially suitable
3 habitat may occur on the Riverside East SEZ and in other portions of the affected area
4 (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ and in the area of indirect effects
5 could include foraging and roosting habitat. On the basis of an evaluation of land cover types,
6 approximately 5,600 acres (23 km²) and 115,700 acres (468 km²) of rocky cliffs and outcrops on
7 the SEZ and in the area of direct effects, respectively, could be potentially suitable roosting
8 habitat for this species.

11 **Cave Myotis**

13 The cave myotis is known to occur in the lower Colorado River Basin in southern
14 California and Arizona. It inhabits desert scrublands, washes, and riparian habitats. This species
15 roosts in colonies in caves. The nearest recorded occurrences are from the Mule Mountains
16 ACEC about 2 mi (3 km) south of the Riverside East SEZ. Potentially suitable habitat may occur
17 on the SEZ and in other portions of the affected area (Table 9.4.12.1-1). The potentially suitable
18 habitat on the SEZ and in the area of indirect effects could include foraging and roosting habitat.
19 On the basis of an evaluation of land cover types, approximately 5,600 acres (23 km²) and
20 115,700 acres (468 km²) of rocky cliffs and outcrops on the SEZ and in the area of direct effects,
21 respectively, could be potentially suitable roosting habitat for this species.

24 **Nelson's Bighorn Sheep**

26 The Nelson's bighorn sheep is one of several subspecies of bighorn sheep known to occur
27 in the southwestern United States. This species occurs in desert mountain ranges in Arizona,
28 California, Nevada, Oregon, and Utah. The Nelson's bighorn sheep uses primarily montane
29 shrubland, forest, and grassland habitats and may utilize desert valleys as corridors for travel
30 between range habitats. In California, the species is known from the desert mountain ranges from
31 the White Mountains, south to the San Bernardino Mountains, and southeastward to the Mexican
32 border. The Nelson's bighorn sheep uses primarily montane shrubland, forest, and grassland
33 habitats, and may utilize desert valleys as corridors for travel between range habitats. The nearest
34 recorded occurrences are from the Joshua Tree Wilderness and the Chuckwalla DWMA, about
35 2 mi (3 km) north, west, and south of the SEZ. The SEZ and other portions of the affected area
36 may provide important habitat for sheep travelling between ranges (Table 9.4.12.1-1).

39 **Pallid Bat**

41 The pallid bat is a large, pale bat with large ears that is locally common in desert
42 grasslands and shrublands in the southwestern United States. It roosts in caves, crevices, and
43 mines. The species is a year-round resident throughout southern California. The nearest recorded
44 occurrence is from the Chuckwalla Mountains Wilderness, approximately 5 mi (8 km) south of
45 the Riverside East SEZ. Potentially suitable habitat may occur on the SEZ and in other portions
46 of the affected area (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ and in the area

1 of indirect effects could include foraging and roosting habitat. On the basis of an evaluation of
2 land cover types, approximately 5,600 acres (23 km²) and 115,700 acres (468 km²) of rocky
3 cliffs and outcrops on the SEZ and in the area of direct effects, respectively, could be potentially
4 suitable roosting habitat for this species.
5
6

7 **Palm Springs Pocket Mouse**

8
9 The Palm Springs pocket mouse is a pocket mouse subspecies known only to occur in
10 Riverside County within the Coachella Valley. This species inhabits desert scrub and grassland
11 communities on sandy soils. The nearest recorded occurrences are 25 mi (40 km) west of the
12 SEZ. Potentially suitable habitat occurs on the Riverside East SEZ and in other portions of the
13 affected area (Table 9.4.12.1-1).
14

15 **Spotted Bat**

16
17
18 The spotted bat is considered a rare year-round resident of southern California where it
19 forages in mountain foothills, desert shrublands, grasslands, washes, riparian areas, and mixed
20 conifer forests. The species roosts in rock crevices along cliffs. The nearest recorded occurrences
21 are approximately 40 mi (64 km) west of the Riverside East SEZ. Potentially suitable habitat
22 may occur on the SEZ and in other portions of the affected area (Table 9.4.12.1-1). The
23 potentially suitable habitat on the SEZ and in the area of indirect effects could include foraging
24 and roosting habitat. On the basis of an evaluation of land cover types, approximately
25 5,600 acres (23 km²) and 115,700 acres (468 km²) of rocky cliffs and outcrops on the SEZ and
26 in the area of direct effects, respectively, could be potentially suitable roosting habitat for this
27 species.
28
29

30 **Townsend's Big-Eared Bat**

31
32 The Townsend's big-eared bat is widely distributed throughout the western United States.
33 In California, the species forages year-round in a wide variety of desert and non-desert habitats.
34 The species roosts in caves, mines, tunnels, buildings, and other man-made structures. The
35 nearest recorded occurrences are approximately 4 mi (6 km) southeast of the Riverside East SEZ.
36 Potentially suitable habitat may occur on the SEZ and in other portions of the affected
37 area (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ and in the area of indirect
38 effects could include foraging and roosting habitat. On the basis of an evaluation of land cover
39 types, approximately 5,600 acres (23 km²) and 115,700 acres (468 km²) of rocky cliffs and
40 outcrops on the SEZ and in the area of direct effects, respectively, could be potentially suitable
41 roosting habitat for this species.
42
43
44

1 **Western Mastiff Bat**

2
3 The western mastiff bat is a large uncommon resident of southern California and western
4 Arizona. The species forages in many open semiarid habitats, including conifer and deciduous
5 woodlands, shrublands, grassland, and urban areas. It roosts in crevices, trees, and buildings. The
6 nearest recorded occurrences are 5 mi (8 km) west of the Riverside East SEZ. Potentially suitable
7 habitat may occur on the SEZ and in other portions of the affected area (Table 9.4.12.1-1). The
8 potentially suitable habitat on the SEZ and in the area of indirect effects could include foraging
9 and roosting habitat. On the basis of an evaluation of land cover types, approximately
10 5,600 acres (23 km²) and 115,700 acres (468 km²) of rocky cliffs and outcrops on the SEZ and
11 in the area of direct effects, respectively, could be potentially suitable roosting habitat for this
12 species.
13

14
15 **Western Small-Footed Myotis**

16
17 The western small-footed myotis is a common year-round resident in desert habitats of
18 southern California. It occurs in a variety of desert woodland and riparian habitats. This species
19 roosts in caves, buildings, mines, and rock crevices. The nearest recorded occurrences are from
20 the Chocolate Mountains, approximately 30 mi (48 km) south of the Riverside East SEZ.
21 Potentially suitable habitat may occur on the SEZ and in other portions of the affected area
22 (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ and in the area of indirect effects
23 could include foraging and roosting habitat. On the basis of an evaluation of land cover types,
24 approximately 5,600 acres (23 km²) and 115,700 acres (468 km²) of rocky cliffs and outcrops on
25 the SEZ and in the area of direct effects, respectively, could be potentially suitable roosting
26 habitat for this species.
27

28
29 **Western Yellow Bat**

30
31 The western yellow bat is an uncommon year-round resident in the foothill and desert
32 regions of southern California and southwestern Arizona. It occurs in a variety of desert wash,
33 riparian, and palm oasis habitats. This species roosts in trees. The nearest recorded occurrences
34 are from the vicinity of Blythe, California, approximately 6 mi (10 km) east of the Riverside East
35 SEZ. Potentially suitable habitat may occur on the SEZ and in other portions of the affected area
36 (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ and in the area of indirect effects
37 could include foraging and roosting habitat. On the basis of an evaluation of land cover types,
38 approximately 223 acres (1 km²) and 335 acres (1.5 km²) of riparian woodlands on the SEZ and
39 in the area of direct effects, respectively, could be potentially suitable roosting habitat for this
40 species.
41

42
43 **9.4.12.1.3 State-Listed Species**

44
45 There are two species listed by the State of California that may occur in the Riverside
46 East SEZ affected area—the desert tortoise and Gila woodpecker (Table 9.4.12.1-1). The desert

1 tortoise is listed as threatened under the CESA; this species is discussed in Section 9.4.12.1.1
2 because of its status under the ESA.

3
4 The Gila woodpecker is listed as an endangered species under the CESA. It is a fairly
5 uncommon resident in southern California and southwestern Arizona, where it occurs in desert
6 riparian and wash habitats along the lower Colorado River Basin. Additional life history
7 information for this species is provided in Appendix J. The nearest recorded occurrence for this
8 species is from the Colorado River, approximately 6 mi (10 km) east of the Riverside East SEZ.
9 According to the CAREGAP habitat suitability model, potentially suitable habitat for this species
10 does not occur on the SEZ; however, potentially suitable foraging and nesting habitat may occur
11 in portions of the area of indirect effects (Table 9.4.12.1-1).

12 13 14 **9.4.12.1.4 Rare Species**

15
16 There are 68 rare species (i.e., state rank of S1 or S2 in California or a species of
17 concern by the State of California or USFWS) that may occur in the affected area of the
18 Riverside East SEZ (Table 9.4.12.1-1). Of these species, there are 42 that have not been
19 discussed as ESA-listed (Section 9.4.12.1.1), BLM-designated sensitive (Section 9.4.12.1.2),
20 or state-listed (Section 9.4.12.1.3).

21 22 23 **9.4.12.2 Impacts**

24
25 This section discusses the potential for impacts on special status species from utility-scale
26 solar energy development within the proposed Riverside East SEZ. The types of impacts that
27 special status species could incur from construction and operation of utility-scale solar energy
28 facilities are discussed in Section 5.10.4.

29
30 The assessment of impacts on special status species is based on available information on
31 the presence of species in the affected area, as presented in Section 9.4.12.1, following the
32 analysis approach described in Appendix M. It is assumed that, prior to development, surveys
33 would be conducted to determine the presence of special status species and their habitats in and
34 near areas where ground-disturbing activities would occur. Additional NEPA assessments, ESA
35 consultations, and coordination with state natural resource agencies may be needed to address
36 project-specific impacts more thoroughly. These assessments and consultations could result in
37 additional required actions to avoid, minimize, or mitigate impacts on special status species
38 (see Section 9.4.12.3).

39
40 Solar energy development within the Riverside East SEZ could affect a variety of
41 habitats (see Section 9.4.10). These impacts on habitats could in turn affect special status species
42 that are dependent on those habitats. Based on CNDDDB records and information provided by the
43 USFWS, there are 29 special status species known to occur in the affected area of the Riverside
44 East SEZ (Section 9.4.12.1). These species are listed in bold in Table 9.4.12.1-1. No other
45 special status species have been recorded in the affected area (CDFG 2010b). Other special
46 status species may occur on the SEZ or within the affected area based on the presence of

1 potentially suitable habitat. As discussed in Section 9.4.12.1, this approach to identifying the
2 species that could occur in the affected area probably overestimates the number of species that
3 actually occur in the affected area, and may therefore overestimate impacts on some special
4 status species.

5
6 Potential direct and indirect impacts on special status species within the SEZ and in the
7 area of indirect effect outside the SEZ are presented in Table 9.4.12.1-1. In addition, the overall
8 potential magnitude of impacts on each species (assuming programmatic design features are in
9 place) is presented along with any potential species-specific mitigation measures that could
10 further reduce impacts.

11
12 Impacts on special status species could occur during all phases of development
13 (construction, operation, and decommissioning and reclamation) of a utility-scale solar energy
14 project within the SEZ. Construction and operation activities could result in short- or long-term
15 impacts on individuals and their habitats, especially if these activities are sited in areas where
16 special status species are known to or could occur. As presented in Section 9.4.1.2, impacts of
17 access road and transmission line construction, upgrade, or operation are not assessed in this
18 evaluation because of the proximity of existing infrastructure to the SEZ.

19
20 Direct impacts would result from habitat destruction or modification. It is assumed that
21 direct impacts would occur only within the SEZ where ground-disturbing activities are expected
22 to occur. Indirect impacts could result from surface water and sediment runoff from disturbed
23 areas, fugitive dust generated by project activities, accidental spills, harassment, and lighting. No
24 ground-disturbing activities associated with project facilities are anticipated to occur within the
25 area of indirect effects. Decommissioning of facilities and reclamation of disturbed areas after
26 operations cease could result in short-term negative impacts to individuals and habitats adjacent
27 to project areas, but long-term benefits would accrue if original land contours and native plant
28 communities were restored in previously disturbed areas.

29
30 The successful implementation of programmatic design features (discussed in
31 Appendix A, Section A.2.2) would reduce direct impacts on some special status species,
32 especially those that depend on habitat types that can be easily avoided (e.g., dunes and sand
33 transport systems, playa and desert wash habitats). Indirect impacts on special status species
34 could be reduced to negligible levels by implementing programmatic design features, especially
35 those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust.

36 37 38 ***9.4.12.2.1 Impacts on Species Listed under the ESA***

39
40
41 The desert tortoise is the only ESA-listed species that has the potential to occur in the
42 affected area of the Riverside East SEZ and is the only ESA-listed species the USFWS identified
43 as potentially affected by solar energy development on the SEZ (Stout 2009). The desert tortoise
44 is known to occur in the Chuckwalla DWMA adjacent to the southern boundary of the SEZ in
45 the area of indirect effects; populations are also known to occur in Joshua Tree NP and Pinto
46 Mountains DWMA, adjacent to the western and northwestern border of the SEZ
47 (Figure 9.4.12.1-1). According to the CAREGAP habitat suitability model, approximately

1 185,274 acres (750 km²) of potentially suitable habitat on the SEZ could be directly affected by
2 construction and operations of solar energy development on the SEZ (Table 9.4.12.1-1). This
3 direct effects area represents about 4.4% of available suitable habitat of the desert tortoise in the
4 region. The USGS desert tortoise model (Nussear et al. 2009) indicates that the majority of the
5 SEZ is composed of less suitable habitat than the surrounding landscape (modeled suitability
6 value ≤ 0.5 out of 1.0). About 542,622 acres (2,200 km²) of suitable habitat occurs in the area of
7 potential indirect effects; this area represents about 12.9% of the available suitable habitat in the
8 region (Table 9.4.12.1-1).

9
10 On the basis of desert tortoise surveys conducted in Joshua Tree NP, adjacent to the
11 western border of the SEZ, the USFWS estimated that full-scale solar energy development on the
12 SEZ may directly affect up to 2,865 desert tortoises on the SEZ (Stout 2009). In addition to
13 direct impacts, development on the SEZ could indirectly affect desert tortoises by fragmenting
14 and degrading adjacent habitat (refer to Section 5.10.4 for a discussion of possible indirect
15 impacts). Fragmentation would be exacerbated by the installation of exclusionary fencing at the
16 perimeter of the SEZ or individual project areas. The SEZ is situated between the Chuckwalla
17 and Pinto Mountains DWMA (these DWMA also contain USFWS-designated critical habitat),
18 and WHMA within the SEZ may provide important connectivity for desert tortoise movements
19 between the DWMA (BLM and CDFG 2002; Stout 2009). Therefore, development on the SEZ
20 may disrupt desert tortoise population dynamics in nearby DWMA and designated critical
21 habitat.

22
23 The overall impact on the desert tortoise from construction, operation, and
24 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
25 considered moderate because the amount of potentially suitable habitat for this species in the
26 area of direct effects represents between 1% and 10% of potentially suitable habitat in the region
27 and the implementation of programmatic design features alone is unlikely to substantially reduce
28 these impacts. Avoidance of all potentially suitable habitats for this species is not a feasible
29 means of mitigating impacts because these habitats (desert scrub) are widespread throughout the
30 area of direct effects.

31
32 Development of actions to reduce impacts (e.g., reasonable and prudent alternatives,
33 reasonable and prudent measures, and terms and conditions) for the desert tortoise, including
34 development of a survey protocol, avoidance measures, minimization measures, and, potentially,
35 translocation actions and compensatory mitigation, would require formal consultation with the
36 USFWS under Section 7 of the ESA. These consultations may be used to authorize incidental
37 take statements per Section 10 of the ESA (if necessary). In addition, the CESA provides
38 authority to the CDFG to regulate potential impacts on the desert tortoise and other species listed
39 under the CESA. Therefore, formal consultation with the CDFG would also be required to permit
40 the incidental take of desert tortoises in the SEZ.

41
42 There are inherent dangers to tortoises associated with their capture, handling, and
43 translocation from the SEZ. These actions, if done improperly, can result in injury or death.
44 To minimize these risks, and as stated above, the desert tortoise translocation plan should be
45 developed in consultation with the USFWS and CDGF, and follow the *Guidelines for Handling*
46 *Desert Tortoises During Construction Projects* (Desert Tortoise Council 1994) and other current

1 translocation guidance provided by the USFWS and CDFG. Consultation will identify
2 potentially suitable recipient locations, density thresholds for tortoise populations in recipient
3 locations, procedures for pre-disturbance clearance surveys and tortoise handling, as well as
4 disease testing and post-translocation monitoring and reporting requirements. Despite some risk
5 of mortality or decreased fitness, translocation is widely accepted as a useful strategy for the
6 conservation of the desert tortoise (Field et al. 2007).

7
8 To offset impacts of solar development on the SEZ, compensatory mitigation may be
9 needed to balance the acreage of habitat lost with acquisition of lands that would be improved
10 and protected for desert tortoise populations (USFWS 1994). Compensation can be accomplished
11 by improving the carrying capacity for the desert tortoise on the acquired lands. Other mitigation
12 actions may include funding for the enhancement of desert tortoise habitat on existing federal
13 lands. Consultations with the USFWS and CDGF would be necessary to determine the
14 appropriate mitigation ratio to acquire, enhance, and preserve desert tortoise compensation lands.

15 16 17 **9.4.12.2.2 Impacts on BLM-Designated Sensitive Species**

18
19 Impacts on the 25 BLM-designated sensitive species that have potentially suitable habitat
20 within the affected area of the Riverside East SEZ are discussed below.

21 22 23 **Alkali Mariposa-Lily**

24
25 The alkali mariposa-lily is not known to occur in the affected area of the Riverside East
26 SEZ; however, approximately 1,570 acres (6 km²) of potentially suitable desert playa habitat on
27 the SEZ could be directly affected by construction and operations (Table 9.4.12.1-1). This direct
28 impact area represents about 2.3% of available suitable habitat in the region. About 828 acres
29 (3 km²) of potentially suitable habitat occurs in the area of potential indirect effect; this area
30 represents about 1.2% of the available suitable habitat in the region (Table 9.4.12.1-1).

31
32 The overall impact on the alkali mariposa-lily from construction, operation, and
33 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
34 considered moderate because the amount of potentially suitable habitat for this species in the
35 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
36 in the region. The implementation of programmatic design features may be sufficient to reduce
37 indirect impacts to negligible levels.

38
39 Potentially suitable habitat for the alkali mariposa-lily occurs in a limited portion of the
40 SEZ (primarily associated with Ford Dry Lake and Palen Lake) and could be completely avoided
41 during the development of facilities and protected from indirect effects. Alternatively, avoiding
42 or minimizing disturbance to occupied habitats also would reduce impacts on this species. If
43 avoidance or minimization is not a feasible option, plants could be translocated from the area of
44 direct effects to protected areas that would not be affected directly or indirectly by future
45 development. Alternatively, or in combination with translocation, a compensatory mitigation
46 plan could be developed and implemented to mitigate direct effects on occupied habitats. The

1 protection and enhancement of existing occupied or suitable habitats could compensate for
2 habitats lost to development. A comprehensive mitigation strategy that uses one or more of these
3 options could be designed to completely offset the impacts of development. The need for
4 mitigation, other than programmatic design features, should be determined by conducting pre-
5 disturbance surveys for the species and its habitat on the SEZ.
6
7

8 **Chaparral Sand-Verbena**

9

10 The chaparral sand-verbena historically occurred on the SEZ, but it is currently only
11 known to occur outside of the area of indirect effects approximately 23 mi (37 km) from the
12 SEZ. Approximately 26,798 acres (108 km²) of potentially suitable desert sand dune habitat
13 within the SEZ may be directly affected by project construction and operations
14 (Table 9.4.12.1-1). This direct impact area represents 31.8% of available suitable habitat in the
15 region. About 15,987 acres (65 km²) of potentially suitable habitat occurs within the area of
16 indirect effects; this area represents about 19.0% of the available suitable habitat in the region
17 (Table 9.4.12.1-1).
18

19 The overall impact on the chaparral sand-verbena from construction, operation, and
20 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
21 considered large because the amount of potentially suitable habitat for this species in the area of
22 direct effects represents 10% or more of potentially suitable habitat in the region. The
23 implementation of programmatic design features would reduce indirect impacts to negligible
24 levels.
25

26 Chaparral sand-verbena habitat (desert sand dunes) occupies portions of the SEZ that
27 could be avoided during the development of facilities and protected from indirect effects. In
28 conjunction with the implementation of programmatic design features, avoiding or minimizing
29 disturbance to occupied habitats and desert dunes and sand transport systems and applying the
30 mitigation measures described previously for the alkali mariposa-lily could further reduce
31 impacts on this species. The need for mitigation should first be determined by conducting pre-
32 disturbance surveys for the species and its habitat on the SEZ.
33
34

35 **Creamy Blazing-Star**

36

37 The creamy blazing-star is not known to occur in the affected area of the Riverside East
38 SEZ; however, approximately 109,933 acres (445 km²) of potentially suitable desert scrub
39 habitat on the SEZ could be directly affected by construction and operations (Table 9.4.12.1-1).
40 This direct impact area represents about 5.0% of available suitable habitat in the region. About
41 229,999 acres (931 km²) of potentially suitable habitat occurs in the area of potential indirect
42 effect; this area represents about 10.4% of the available suitable habitat in the region
43 (Table 9.4.12.1-1).
44

45 The overall impact on the creamy blazing-star from construction, operation, and
46 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is

1 considered moderate because the amount of potentially suitable habitat for this species in the
2 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
3 in the region. The implementation of programmatic design features alone is unlikely to
4 substantially reduce impacts.
5

6 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
7 creamy blazing-star because some of these habitats (desert scrub) are widespread throughout the
8 area of direct effect. However, impacts could be reduced to negligible levels with the
9 implementation of programmatic design features and the mitigation options described previously
10 for the alkali mariposa-lily. The need for mitigation should first be determined by conducting
11 pre-disturbance surveys for the species and its habitat on the SEZ.
12
13

14 **Giant Spanish-Needle**

15
16 The giant Spanish-needle is not known to occur in the affected area of the Riverside East
17 SEZ; however, approximately 26,798 acres (108 km²) of potentially suitable desert dune habitat
18 on the SEZ could be directly affected by construction and operations (Table 9.4.12.1-1). This
19 direct impact area represents 31.8% of available suitable habitat in the SEZ region. About
20 15,987 acres (65 km²) of potentially suitable habitat occurs in the area of potential indirect
21 effect; this area represents about 19.0% of the available suitable habitat in the SEZ region
22 (Table 9.4.12.1-1).
23

24 The overall impact on the giant Spanish-needle from construction, operation, and
25 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
26 considered large because the amount of potentially suitable habitat for this species in the area of
27 direct effects represents 10% or more of potentially suitable habitat in the SEZ region. The
28 implementation of programmatic design features would reduce indirect impacts to negligible
29 levels.
30

31 Giant Spanish-needle habitat (desert dunes) occupies portions of the SEZ that could be
32 avoided during the development of solar facilities and protected from indirect effects. In
33 conjunction with the implementation of programmatic design features, avoiding or minimizing
34 disturbance to occupied habitats and desert dunes and sand transport systems and applying the
35 mitigation measures described previously for the alkali mariposa-lily could further reduce
36 impacts on this species. The need for mitigation should first be determined by conducting pre-
37 disturbance surveys for the species and its habitat on the SEZ.
38
39

40 **Harwood's Eriastrum**

41
42 The Harwood's eriastrum is not known to occur in the affected area of the Riverside East
43 SEZ; however, approximately 26,798 acres (108 km²) of potentially suitable desert dune habitat
44 on the SEZ could be directly affected by construction and operations (Table 9.4.12.1-1). This
45 direct impact area represents about 31.8% of available suitable habitat in the region. About
46 15,987 acres (65 km²) of potentially suitable habitat occurs in the area of potential indirect

1 effect; this area represents about 19.0% of the available suitable habitat in the SEZ region
2 (Table 9.4.12.1-1).

3
4 The overall impact on the Harwood's eriastrum from construction, operation, and
5 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
6 considered large because the amount of potentially suitable habitat for this species in the area
7 of direct effects represents 10% or more of potentially suitable habitat in the SEZ region. The
8 implementation of programmatic design features would reduce indirect impacts to negligible
9 levels.

10
11 Harwood's eriastrum habitat (desert dunes) occupies portions of the SEZ that could be
12 avoided during the development of solar facilities and protected from indirect effects. In
13 conjunction with the implementation of programmatic design features, avoiding or minimizing
14 disturbance to occupied habitats and desert dunes and sand transport systems and applying the
15 mitigation measures described previously for the alkali mariposa-lily could further reduce
16 impacts on this species. The need for mitigation should first be determined by conducting pre-
17 disturbance surveys for the species and its habitat on the SEZ.

18 19 20 **Latimer's Woodland-Gilia**

21
22 The Latimer's woodland-gilia is not known to occur in the affected area of the
23 Riverside East SEZ; however, approximately 136,472 acres (552 km²) of potentially suitable
24 desert scrub and wash habitat on the SEZ could be directly affected by construction and
25 operations (Table 9.4.12.1-1). This direct impact area represents about 4.7% of available suitable
26 habitat in the SEZ region. About 314,674 acres (1,273 km²) of potentially suitable habitat occurs
27 in the area of potential indirect effect; this area represents about 10.8% of the available suitable
28 habitat in the region (Table 9.4.12.1-1).

29
30 The overall impact on the Latimer's woodland gilia from construction, operation, and
31 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
32 considered moderate because the amount of potentially suitable habitat for this species in the
33 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
34 in the region. The implementation of programmatic design features alone is unlikely to
35 substantially reduce impacts.

36
37 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
38 Latimer's woodland gilia because some of these habitats (desert scrub) are widespread
39 throughout the area of direct effect. However, impacts could be reduced to negligible levels with
40 the implementation of mitigation options described previously for the alkali mariposa-lily. The
41 need for mitigation should first be determined by conducting pre-disturbance surveys for the
42 species and its habitat on the SEZ.

1 **Little San Bernardino Mountains Linanthus**
2

3 The Little San Bernardino Mountains linanthus is not known to occur in the affected area
4 of the Riverside East SEZ; however, approximately 26,798 acres (108 km²) of potentially
5 suitable desert dune habitat on the SEZ could be directly affected by construction and operations
6 (Table 9.4.12.1-1). This direct impact area represents about 31.8% of available suitable habitat
7 in the region. About 15,987 acres (65 km²) of potentially suitable habitat occurs in the area of
8 potential indirect effect; this area represents about 19.0% of the available suitable habitat in the
9 SEZ region (Table 9.4.12.1-1).

10
11 The overall impact on the Little San Bernardino Mountains linanthus from construction,
12 operation, and decommissioning of utility-scale solar energy facilities within the Riverside East
13 SEZ is considered large because the amount of potentially suitable habitat for this species in the
14 area of direct effects represents 10% or more of potentially suitable habitat in the SEZ region.
15 The implementation of programmatic design features would reduce indirect impacts to negligible
16 levels.

17
18 Little San Bernardino Mountains linanthus habitat (desert dunes) occupies portions of the
19 SEZ that could be avoided during the development of solar facilities and protected from indirect
20 effects. In conjunction with the implementation of programmatic design features, avoiding or
21 minimizing disturbance to occupied habitats and desert dunes and sand transport systems and
22 applying the mitigation measures described previously for the alkali mariposa-lily could further
23 reduce impacts on this species. The need for mitigation should first be determined by conducting
24 pre-disturbance surveys for the species and its habitat on the SEZ.

25
26
27 **Munz's Cholla**
28

29 The Munz's cholla is not known to occur in the affected area of the Riverside East SEZ;
30 however, approximately 171,716 acres (695 km²) of potentially suitable desert scrub and wash
31 habitats on the SEZ could be directly affected by construction and operations (Table 9.4.12.1-1).
32 This direct impact area represents about 4.1% of available suitable habitat in the SEZ region.
33 About 570,180 acres (2,307 km²) of potentially suitable habitat occurs in the area of potential
34 indirect effect; this area represents about 13.6% of the available suitable habitat in the SEZ
35 region (Table 9.4.12.1-1).

36
37 The overall impact on the Munz's cholla from construction, operation, and
38 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
39 considered moderate because the amount of potentially suitable habitat for this species in the
40 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
41 in the SEZ region. The implementation of programmatic design features alone is unlikely to
42 substantially reduce impacts.

43
44 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on
45 the Munz's cholla because these habitats (mostly desert scrub) are widespread throughout the
46 area of direct effect. However, impacts could be reduced to negligible levels with the

1 implementation of programmatic design features and the mitigation options described previously
2 for the alkali mariposa-lily. The need for mitigation should first be determined by conducting
3 pre-disturbance surveys for the species and its habitat on the SEZ.
4
5

6 **Orocopia Sage**

7

8 The Orocopia sage is known from the Chuckwalla DWMA within the Riverside East
9 SEZ area of indirect effects. Approximately 134,909 acres (546 km²) of potentially suitable
10 desert scrub and wash habitats on the SEZ could be directly affected by construction and
11 operations (Table 9.4.12.1-1). This direct impact area represents about 4.7% of available suitable
12 habitat in the SEZ region. About 309,323 acres (1,252 km²) of potentially suitable habitat occurs
13 in the area of potential indirect effect; this area represents about 10.8% of the available suitable
14 habitat in the region (Table 9.4.12.1-1).
15

16 The overall impact on the Orocopia sage from construction, operation, and
17 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
18 considered moderate because the amount of potentially suitable habitat for this species in the
19 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
20 in the SEZ region. The implementation of programmatic design features alone is unlikely to
21 substantially reduce impacts.
22

23 Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on
24 the Orocopia sage because potentially suitable desert scrub habitats are widespread throughout
25 the area of direct effect. However, impacts could be reduced to negligible levels with the
26 implementation of programmatic design features and the mitigation options described previously
27 for the alkali mariposa-lily. The need for mitigation should first be determined by conducting
28 pre-disturbance surveys for the species and its habitat on the SEZ.
29
30

31 **White-Margined Beardtongue**

32

33 The white-margined beardtongue is not known to occur on the Riverside East SEZ;
34 however, approximately 138,294 acres (560 km²) of potentially suitable desert scrub and dune
35 habitat on the SEZ could be directly affected by construction and operations (Table 9.4.12.1-1).
36 This direct impact area represents about 5.8% of available suitable habitat in the SEZ region.
37 About 251,337 acres (1,017 km²) of potentially suitable habitat occurs in the area of potential
38 indirect effect; this area represents about 10.6% of the available suitable habitat in the SEZ
39 region (Table 9.4.12.1-1).
40

41 The overall impact on the white-margined beardtongue from construction, operation, and
42 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
43 considered moderate because the amount of potentially suitable habitat for this species in the
44 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
45 in the SEZ region. The implementation of programmatic design features alone is unlikely to
46 substantially reduce impacts.

1 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
2 white-margined beardtongue because some of these habitats (desert scrub) are widespread
3 throughout the area of direct effect. However, impacts could be reduced to negligible levels with
4 the implementation of programmatic design features and the mitigation options described
5 previously for the alkali mariposa-lily. The need for mitigation should first be determined by
6 conducting pre-disturbance surveys for the species and its habitat on the SEZ.
7
8

9 **Mojave Fringe-Toed Lizard**

10
11 The Mojave fringe-toed lizard is not known to occur on the Riverside East SEZ;
12 however, according to the CAREGAP habitat suitability model, approximately 140,506 acres
13 (569 km²) of potentially suitable habitat on the SEZ could be directly affected by construction
14 and operations (Table 9.4.12.1-1). This direct impact area represents about 7.6% of available
15 suitable habitat in the SEZ region. About 380,038 acres (1,538 km²) of potentially suitable
16 foraging habitat occurs in the area of potential indirect effect; this area represents about 20.6% of
17 the available suitable habitat in the region (Table 9.4.12.1-1).
18

19 The overall impact on the Mojave fringe-toed lizard from construction, operation, and
20 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
21 considered moderate because the amount of potentially suitable habitat for this species in the
22 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
23 in the SEZ region. The implementation of programmatic design features would reduce indirect
24 impacts to negligible levels.
25

26 Avoidance of all potentially suitable habitats is not a feasible option for mitigating
27 impacts on the Mojave fringe-toed lizard because, according to the CAREGAP habitat suitability
28 model, these habitats are widespread throughout the area of direct effects. However, avoiding or
29 minimizing disturbance to occupied habitats, dune and sand transport systems, and desert wash
30 habitats would reduce impacts on this species. If avoidance or minimization is not feasible,
31 impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing
32 impacts on occupied habitats on the SEZ. If avoidance or minimization is not a feasible option, a
33 compensatory mitigation plan could be developed and implemented to mitigate direct effects on
34 occupied habitats. The protection and enhancement of existing occupied or suitable habitats
35 could compensate for habitats lost to development. A comprehensive mitigation strategy that
36 uses one or both of these options could be designed to completely offset the impacts of
37 development. The need for mitigation should first be determined by conducting pre-disturbance
38 surveys for the species and its habitat on the SEZ.
39
40

41 **Rosy Boa**

42
43 The rosy boa is not known to occur on the Riverside East SEZ; however, according to
44 the CAREGAP habitat suitability model, approximately 185,274 acres (750 km²) of potentially
45 suitable habitat on the SEZ could be directly affected by construction and operations
46 (Table 9.4.12.1-1). This direct impact area represents about 4.4% of available habitat in the

1 SEZ region. About 544,126 acres (2,200 km²) of potentially suitable habitat occurs in the area
2 of potential indirect effect; this area represents about 13.0% of the available suitable habitat in
3 the region (Table 9.4.12.1-1).
4

5 The overall impact on the rosy boa from construction, operation, and decommissioning of
6 utility-scale solar energy facilities within the Riverside East SEZ is considered moderate because
7 the amount of potentially suitable habitat for this species in the area of direct effects represents
8 greater than 1% but less than 10% of potentially suitable habitat in the SEZ region. The
9 implementation of programmatic design features is expected to reduce indirect impacts to
10 negligible levels.
11

12 Avoidance of all potentially suitable habitats is not a feasible option for mitigating
13 impacts on the rosy boa because potentially suitable desertscrub habitats are widespread
14 throughout the area of direct effects. Impacts could be reduced to negligible levels through
15 implementing programmatic design features and avoiding or minimizing disturbance to occupied
16 habitats on the SEZ. If avoidance or minimization is not a feasible option, a compensatory
17 mitigation plan could be developed and implemented to mitigate direct effects on occupied
18 habitats. The protection and enhancement of existing occupied or suitable habitats could
19 compensate for habitats lost to development. A comprehensive mitigation strategy that uses one
20 or both of these options could be designed to completely offset the impacts of development. The
21 need for mitigation should first be determined by conducting pre-disturbance surveys for the
22 species and its habitat on the SEZ.
23
24

25 **Bendire's Thrasher**

26
27 The Bendire's thrasher is a summer resident in southern California and is known to occur
28 in the Chuckwalla DWMA within the area of indirect effects. According to the CAREGAP land
29 cover model, approximately 111,496 acres (451 km²) of potentially suitable habitat on the SEZ
30 could be directly affected by construction and operations of solar energy development on the
31 SEZ (Table 9.4.12.1-1). This direct effects area represents about 4.4% of available suitable
32 habitat in the region. About 235,350 acres (952 km²) of suitable habitat occurs in the area of
33 potential indirect effects; this area represents about 9.3% of the available suitable habitat in the
34 region (Table 9.4.12.2-2).
35

36 The overall impact on the Bendire's thrasher from construction, operation, and
37 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
38 considered moderate because the amount of potentially suitable habitat for this species in the
39 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
40 in the SEZ region. The implementation of programmatic design features is expected to reduce
41 indirect impacts to negligible levels.
42

43 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
44 Bendire's thrasher, because potentially suitable foraging habitats (desert scrub) are widespread
45 throughout the area of direct effect. Impacts could be reduced to small or negligible levels
46 through the implementation of programmatic design features and by avoiding or minimizing

1 disturbance to occupied nesting habitats on the SEZ, such as those that may occur in ironwood
2 communities in desert wash habitats. If avoidance or minimization is not a feasible option, a
3 compensatory mitigation plan could be developed and implemented to mitigate direct effects on
4 occupied habitats. Compensation could involve the protection and enhancement of existing
5 occupied or suitable nesting habitats to compensate for habitats lost to development. A
6 comprehensive mitigation strategy that used one or both of these options could be designed to
7 completely offset the impacts of development. The need for mitigation should first be determined
8 by conducting pre-disturbance surveys for the species and its habitat on the SEZ.
9

10 **Ferruginous Hawk**

11
12
13 The ferruginous hawk is a winter resident in the Riverside East SEZ region. According to
14 the CAREGAP land cover model, approximately 112,197 acres (454 km²) of potentially suitable
15 foraging habitat on the SEZ could be directly affected by construction and operations
16 (Table 9.4.12.1-1). This direct impact area represents about 5.7% of available suitable habitat in
17 the region. About 287,942 acres (1,165 km²) of potentially suitable habitat occurs in the area of
18 potential indirect effect; this area represents about 14.6% of the available suitable habitat in the
19 region (Table 9.4.12.1-1).
20

21 The overall impact on the ferruginous hawk from construction, operation, and
22 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
23 considered moderate because direct effects would occur only on potentially suitable foraging
24 habitat, and the amount of this habitat in the area of direct effects represents between 1 and 10%
25 of potentially suitable habitat in the SEZ region. The implementation of programmatic design
26 features is expected to reduce indirect impacts to negligible levels. Avoidance of direct impacts
27 on all potentially suitable foraging habitat is not a feasible option for mitigating impacts on the
28 ferruginous hawk because potentially suitable shrubland is widespread throughout the area of
29 direct effects and readily available in other portions of the affected area.
30

31 **Western Burrowing Owl**

32
33
34 The western burrowing owl is known to occur in the SEZ area of indirect effects
35 within 1 mi (1.6 km) east of the SEZ. According to the CAREGAP habitat suitability model,
36 approximately 202,844 acres (821 km²) of potentially suitable habitat on the SEZ could be
37 directly affected by construction and operations (Table 9.4.12.1-1). This direct impact area
38 represents 4.4% of available suitable habitat in the region. About 652,982 acres (2,642 km²) of
39 potentially suitable habitat occurs in the area of potential indirect effect; this area represents
40 about 14.0% of the available suitable habitat in the region (Table 9.4.12.1-1). Most of this area
41 could serve as foraging and nesting habitat (shrublands). The abundance of burrows suitable for
42 nesting on the SEZ and in the area of indirect effects has not been determined.
43

44 The overall impact on the western burrowing owl from construction, operation, and
45 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
46 considered moderate because the amount of potentially suitable habitat for this species in the

1 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
2 in the SEZ region. The implementation of programmatic design features is expected to be
3 sufficient to reduce indirect impacts on this species to negligible levels.
4

5 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
6 western burrowing owl because potentially suitable desert scrub habitats are widespread
7 throughout the area of direct effect. However, impacts on the western burrowing owl could be
8 reduced by avoiding or minimizing disturbance to occupied burrows and habitat in the area of
9 direct effects. If avoidance or minimization of disturbance to all occupied habitat is not a feasible
10 option, a compensatory mitigation plan could be developed and implemented to mitigate direct
11 effects. The protection and enhancement of existing occupied or suitable habitats could
12 compensate for habitats lost to development. A comprehensive mitigation strategy that used one
13 or both of these options could be designed to completely offset the impacts of development. The
14 need for mitigation should first be determined by conducting pre-disturbance surveys for the
15 species and its habitat on the SEZ.
16
17

18 **California Leaf-Nosed bat**

19

20 The California leaf-nosed bat is a year-round resident in southern California within the
21 Riverside East SEZ region. Approximately 142,335 acres (576 km²) of potentially suitable
22 foraging habitat on the SEZ could be directly affected by construction and operations
23 (Table 9.4.12.1-1). This direct impact area represents about 3.6% of available suitable habitat in
24 the region. About 430,378 acres (1,742 km²) of potentially suitable habitat occurs in the area of
25 potential indirect effect; this area represents about 10.8% of the available suitable habitat in the
26 region (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging
27 habitat (desert shrubland). However, on the basis of an evaluation of land cover types,
28 approximately 5,600 acres (23 km²) of rocky cliffs and outcrops that may be potentially suitable
29 roosting habitat occurs on the SEZ. An additional 115,700 acres (468 km²) of rocky cliffs and
30 outcrops occurs in the area of direct effects.
31

32 The overall impact on the California leaf-nosed bat from construction, operation, and
33 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
34 considered moderate because the amount of potentially suitable habitat for this species in the
35 area of direct effects represents greater than 1% but less than 10% of potentially suitable
36 foraging habitat in the SEZ region. The implementation of programmatic design features is
37 expected to reduce indirect impacts to negligible levels.
38

39 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
40 suitable foraging habitat (shrublands) is widespread in the area of direct effect and readily
41 available in other portions of the affected area. However, avoiding or minimizing disturbance of
42 all potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and
43 could reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting
44 habitat is not a feasible option, a compensatory mitigation plan could be developed and
45 implemented to mitigate direct effects. The protection and enhancement of existing occupied or
46 suitable habitats could compensate for habitats lost to development. A comprehensive mitigation

1 strategy that uses one or both of these options could be designed to completely offset the impacts
2 of development. The need for mitigation, other than programmatic design features, should be
3 determined by conducting pre-disturbance surveys for the species and its habitat within the area
4 of direct effects.

7 **Cave Myotis**

9 The cave myotis is a year-round resident in the lower Colorado River Basin within the
10 Riverside East SEZ region. Approximately 142,335 acres (576 km²) of potentially suitable
11 foraging habitat on the SEZ could be directly affected by construction and operations
12 (Table 9.4.12.1-1). This direct impact area represents about 3.4% of available suitable habitat in
13 the region. About 430,704 acres (1,742 km²) of potentially suitable habitat occurs in the area of
14 potential indirect effect; this area represents about 10.4% of the available suitable habitat in the
15 region (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging
16 habitat (desert shrubland). However, on the basis of an evaluation of land cover types,
17 approximately 5,600 acres (23 km²) of rocky cliffs and outcrops that may be potentially suitable
18 roosting habitat occurs on the SEZ. An additional 115,700 acres (468 km²) of rocky cliffs and
19 outcrops occurs in the area of direct effects.

21 The overall impact on the cave myotis from construction, operation, and
22 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
23 considered moderate because the amount of potentially suitable habitat for this species in the
24 area of direct effects represents greater than 1% but less than 10% of potentially suitable
25 foraging habitat in the SEZ region. The implementation of programmatic design features is
26 expected to reduce indirect impacts to negligible levels.

28 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
29 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
30 available in other portions of the affected area. However, avoiding or minimizing disturbance of
31 all potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and
32 could reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting
33 habitat is not a feasible option, a compensatory mitigation plan could be developed and
34 implemented to mitigate direct effects. The protection and enhancement of existing occupied or
35 suitable habitats could compensate for habitats lost to development. A comprehensive mitigation
36 strategy that uses one or both of these options could be designed to completely offset the impacts
37 of development. The need for mitigation, other than programmatic design features, should be
38 determined by conducting pre-disturbance surveys for the species and its habitat within the area
39 of direct effects.

42 **Nelson's Bighorn Sheep**

44 The Nelson's bighorn sheep (also called the desert bighorn sheep) is known to occur in
45 the affected area from the Joshua Tree Wilderness and Chuckwalla DWMA within 2 mi (3 km)
46 north, west, and south of the Riverside East SEZ. Sheep may utilize habitats within the SEZ as

1 migration corridors between these ranges. According to the CAREGAP habitat suitability model,
2 approximately 42,020 acres (170 km²) of potentially suitable habitat on the SEZ could be
3 directly affected by construction and operations (Table 9.4.12.1-1). This direct impact area
4 represents about 2.2% of available suitable habitat in the SEZ region. About 223,604 acres
5 (905 km²) of potentially suitable habitat occurs in the area of potential indirect effect; this area
6 represents about 11.8% of the available suitable habitat in the SEZ region (Table 9.4.12.1-1).

7
8 The overall impact on the Nelson's bighorn sheep from construction, operation, and
9 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
10 considered moderate because the amount of potentially suitable habitat for this species in the
11 area of direct effects represents greater than 1% but less than 10% of potentially suitable habitat
12 in the region. The implementation of programmatic design features alone is unlikely to
13 substantially reduce impacts.

14
15 Impacts on the Nelson's bighorn sheep could be reduced to small or negligible levels by
16 conducting pre-construction surveys and avoiding or minimizing disturbance to occupied
17 habitats and important movement corridors on the SEZ. If avoidance or minimization is not a
18 feasible option, a compensatory mitigation plan could be developed and implemented to mitigate
19 direct effects on occupied habitats. Compensation could involve the protection and enhancement
20 of existing occupied or suitable habitats to compensate for habitats lost to development. A
21 comprehensive mitigation strategy that used one or both of these options could be designed to
22 completely offset the impacts of development. The need for mitigation should first be determined
23 by conducting pre-construction surveys for the species and its habitat on the SEZ.

24 25 26 **Pallid Bat**

27
28 The pallid bat is a year-round resident in southern California within the Riverside East
29 SEZ region. According to the CAREGAP land cover model, approximately 117,359 acres
30 (475 km²) of potentially suitable foraging habitat on the SEZ could be directly affected by
31 construction and operations (Table 9.4.12.1-1). This direct impact area represents about 3.2% of
32 available suitable habitat in the region. About 351,380 acres (1,421 km²) of potentially suitable
33 habitat occurs in the area of potential indirect effect; this area represents about 9.6% of the
34 available suitable habitat in the region (Table 9.4.12.1-1). The potentially suitable habitat on the
35 SEZ is primarily foraging habitat (desert shrubland). However, on the basis of an evaluation of
36 land cover types, approximately 5,600 acres (23 km²) of rocky cliffs and outcrops that may be
37 potentially suitable roosting habitat occurs on the SEZ. An additional 115,700 acres (468 km²) of
38 rocky cliffs and outcrops occurs in the area of direct effects.

39
40 The overall impact on the pallid bat from construction, operation, and decommissioning
41 of utility-scale solar energy facilities within the Riverside East SEZ is considered moderate
42 because the amount of potentially suitable habitat for this species in the area of direct effects
43 represents greater than 1% but less than 10% of potentially suitable foraging habitat in the SEZ
44 region. The implementation of programmatic design features is expected to reduce indirect
45 impacts to negligible levels.

1 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
2 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
3 available in other portions of the affected area. However, avoiding or minimizing disturbance of
4 all potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and
5 could reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting
6 habitat is not a feasible option, a compensatory mitigation plan could be developed and
7 implemented to mitigate direct effects. The protection and enhancement of existing occupied or
8 suitable habitats could compensate for habitats lost to development. A comprehensive mitigation
9 strategy that uses one or both of these options could be designed to completely offset the impacts
10 of development. The need for mitigation, other than programmatic design features, should be
11 determined by conducting pre-disturbance surveys for the species and its habitat within the area
12 of direct effects.
13
14

15 **Palm Springs Pocket Mouse**

16
17 The Palm Springs pocket mouse is not known to occur in the Riverside East SEZ
18 affected area; however, according to the CAREGAP habitat suitability model, approximately
19 198,472 acres (803 km²) of potentially suitable habitat on the SEZ could be directly affected by
20 construction and operations (Table 9.4.12.1-1). This direct impact area represents about 5.3% of
21 available suitable habitat in the SEZ region. About 512,782 acres (2,075 km²) of potentially
22 suitable habitat occurs in the area of potential indirect effect; this area represents about 13.7% of
23 the available suitable foraging habitat in the SEZ region (Table 9.4.12.1-1).
24

25 The overall impact on the Palm Springs pocket mouse from construction, operation, and
26 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
27 considered moderate because the amount of potentially suitable habitat for this species in the
28 area of direct effects represents greater than 1% but less than 10% of potentially suitable
29 foraging habitat in the SEZ region. The implementation of programmatic design features alone is
30 unlikely to substantially reduce impacts.
31

32 Avoidance of all potentially suitable habitats is not a feasible option for mitigating
33 impacts on the Palm Springs pocket mouse because potentially suitable desertscrub habitats are
34 widespread throughout the area of direct effects. Impacts could be reduced to negligible levels
35 through the implementation of programmatic design features and avoidance or minimization of
36 disturbance to occupied habitats on the SEZ. If avoidance or minimization is not a feasible
37 option, a compensatory mitigation plan could be developed and implemented to mitigate direct
38 effects on occupied habitats. The protection and enhancement of existing occupied or suitable
39 habitats could compensate for habitats lost to development. A comprehensive mitigation strategy
40 that uses one or both of these options could be designed to completely offset the impacts of
41 development. The need for mitigation should first be determined by conducting preconstruction
42 surveys for the species and its habitat on the SEZ.
43
44
45

1 **Spotted Bat**

2
3 The spotted bat is considered to be a rare year-round resident in the Riverside East SEZ
4 region. According to the CAREGAP land cover model, approximately 111,719 acres (452 km²)
5 of potentially suitable habitat on the SEZ could be directly affected by construction and
6 operations (Table 9.4.12.1-1). This direct impact area represents about 4.7% of available suitable
7 foraging habitat in the SEZ region. About 235,684 acres (954 km²) of potentially suitable habitat
8 occurs in the area of potential indirect effect; this area represents about 10.0% of the available
9 suitable habitat in the SEZ region (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ
10 is primarily foraging habitat (desert shrubland); however, suitable roosting habitat may occur on
11 the SEZ. On the basis of an evaluation of land cover types, approximately 5,600 acres (23 km²)
12 of rocky cliffs and outcrops that may be potentially suitable roosting habitat occurs on the SEZ.
13 An additional 115,700 acres (468 km²) of rocky cliffs and outcrops occurs in the area of direct
14 effects.

15
16 The overall impact on the spotted bat from construction, operation, and decommissioning
17 of utility-scale solar energy facilities within the Riverside East SEZ is considered moderate
18 because the amount of potentially suitable habitat for this species in the area of direct effects
19 represents greater than 1% but less than 10% of potentially suitable foraging habitat in the SEZ
20 region. The implementation of programmatic design features is expected to reduce indirect
21 impacts to negligible levels.

22
23 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
24 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
25 available in other portions of the affected area. However, avoiding or minimizing disturbance of
26 all potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and
27 could reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting
28 habitat is not feasible, a compensatory mitigation plan could be developed and implemented to
29 mitigate direct effects. The protection and enhancement of existing occupied or suitable habitats
30 could compensate for habitats lost to development. A comprehensive mitigation strategy that
31 uses one or both of these options could be designed to completely offset the impacts of
32 development. The need for mitigation, other than programmatic design features, should be
33 determined by conducting pre-disturbance surveys for the species and its habitat within the area
34 of direct effects.

35
36
37 **Townsend's Big-Eared Bat**

38
39 The Townsend's big-eared bat is a year-round resident in the Riverside East SEZ region.
40 According to the CAREGAP land cover model, approximately 202,912 acres (821 km²) of
41 potentially suitable foraging habitat on the SEZ could be directly affected by construction and
42 operations (Table 9.4.12.1-1). This direct impact area represents about 4.0% of available suitable
43 habitat in the SEZ region. About 655,256 acres (2,651 km²) of potentially suitable habitat occurs
44 in the area of potential indirect effect; this area represents about 12.9% of the available suitable
45 habitat in the SEZ region (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ is
46 primarily foraging habitat (desert shrubland). However, on the basis of an evaluation of land

1 cover types, approximately 1,500 acres (6 km²) of rocky cliffs and outcrops that may be
2 potentially suitable roosting habitat occurs on the SEZ. An additional 41,000 acres (166 km²) of
3 rocky cliffs and outcrops occurs in the area of direct effects.
4

5 The overall impact on the Townsend's big-eared bat from construction, operation, and
6 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
7 considered moderate because the amount of potentially suitable habitat for this species in the
8 area of direct effects represents greater than 1% but less than 10% of potentially suitable
9 foraging habitat in the SEZ region. The implementation of programmatic design features is
10 expected to reduce indirect impacts to negligible levels.
11

12 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
13 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
14 available in other portions of the affected area. However, avoiding or minimizing disturbance of
15 all potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and
16 could reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting
17 habitat is not feasible, a compensatory mitigation plan could be developed and implemented to
18 mitigate direct effects. The protection and enhancement of existing occupied or suitable habitats
19 could compensate for habitats lost to development. A comprehensive mitigation strategy that
20 uses one or both of these options could be designed to completely offset the impacts of
21 development. The need for mitigation, other than programmatic design features, should be
22 determined by conducting pre-disturbance surveys for the species and its habitat within the area
23 of direct effects.
24
25

26 **Western Mastiff Bat**

27

28 The western mastiff bat is a year-round resident in the Riverside East SEZ region.
29 According to the CAREGAP land cover model, approximately 202,912 acres (821 km²) of
30 potentially suitable foraging habitat on the SEZ could be directly affected by construction and
31 operations (Table 9.4.12.1-1). This direct impact area represents about 5.0% of available suitable
32 habitat in the SEZ region. About 655,256 acres (2,651 km²) of potentially suitable habitat occurs
33 in the area of potential indirect effect; this area represents about 16.1% of the available suitable
34 habitat in the SEZ region (Table 9.4.12.1-1). The potentially suitable habitat on the SEZ is
35 primarily foraging habitat (desert shrubland). However, on the basis of an evaluation of land
36 cover types, approximately 5,600 acres (23 km²) of rocky cliffs and outcrops that may be
37 potentially suitable roosting habitat occurs on the SEZ. An additional 115,700 acres (468 km²) of
38 rocky cliffs and outcrops occurs in the area of direct effects.
39

40 The overall impact on the western mastiff bat from construction, operation, and
41 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
42 considered moderate because the amount of potentially suitable habitat for this species in the
43 area of direct effects represents greater than 1% but less than 10% of potentially suitable
44 foraging habitat in the SEZ region. The implementation of programmatic design features is
45 expected to reduce indirect impacts to negligible levels.
46

1 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
2 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
3 available in other portions of the affected area. However, avoiding or minimizing disturbance of
4 all potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and
5 could reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting
6 habitat is not feasible, a compensatory mitigation plan could be developed and implemented to
7 mitigate direct effects. The protection and enhancement of existing occupied or suitable habitats
8 to compensate for habitats lost to development. A comprehensive mitigation strategy that uses
9 one or both of these options could be designed to completely offset the impacts of development.
10 The need for mitigation, other than programmatic design features, should be determined by
11 conducting pre-disturbance surveys for the species and its habitat within the area of direct
12 effects.
13
14

15 **Western Small-Footed Myotis**

16
17 The western small-footed myotis is a year-round resident in the Riverside East SEZ
18 region. According to the CAREGAP land cover model, approximately 25,199 acres (102 km²) of
19 potentially suitable foraging habitat on the SEZ could be directly affected by construction and
20 operations (Table 9.4.12.1-1). This direct impact area represents about 3.8% of available suitable
21 foraging habitat in the SEZ region. About 79,658 acres (322 km²) of potentially suitable foraging
22 habitat occurs in the area of potential indirect effect; this area represents about 12.0% of the
23 available suitable foraging habitat in the SEZ region (Table 9.4.12.1-1). The potentially suitable
24 habitat on the SEZ is primarily foraging habitat (desert shrubland). However, on the basis of an
25 evaluation of land cover types, approximately 5,600 acres (23 km²) of rocky cliffs and outcrops
26 that may be potentially suitable roosting habitat occurs on the SEZ. An additional 115,700 acres
27 (468 km²) of rocky cliffs and outcrops occurs in the area of direct effects.
28

29 The overall impact on the western small-footed myotis from construction, operation, and
30 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
31 considered moderate because the amount of potentially suitable habitat for this species in the
32 area of direct effects represents greater than 1% but less than 10% of potentially suitable
33 foraging habitat in the SEZ region. The implementation of programmatic design features is
34 expected to reduce indirect impacts to negligible levels.
35

36 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
37 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
38 available in other portions of the affected area. However, avoiding or minimizing disturbance of
39 all potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and
40 could reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting
41 habitat is not feasible, a compensatory mitigation plan could be developed and implemented to
42 mitigate direct effects. The protection and enhancement of existing occupied or suitable habitats
43 could compensate for habitats lost to development. A comprehensive mitigation strategy that
44 uses one or both of these options could be designed to completely offset the impacts of
45 development. The need for mitigation, other than programmatic design features, should be

1 determined by conducting pre-disturbance surveys for the species and its habitat within the area
2 of direct effects.

3 4 5 **Western Yellow Bat**

6
7 The western yellow bat is a year-round resident in the Riverside East SEZ region.
8 According to the CAREGAP land cover model, approximately 25,199 acres (102 km²) of
9 potentially suitable foraging habitat on the SEZ could be directly affected by construction and
10 operations (Table 9.4.12.1-1). This direct impact area represents about 1.9% of available suitable
11 foraging habitat in the SEZ region. About 79,658 acres (322 km²) of potentially suitable foraging
12 habitat occurs in the area of potential indirect effect; this area represents about 5.9% of the
13 available suitable foraging habitat in the SEZ region (Table 9.4.12.1-1). The potentially suitable
14 habitat on the SEZ is primarily foraging habitat (desert shrubland). However, on the basis of an
15 evaluation of land cover types, approximately 223 acres (1 km²) of riparian woodlands that may
16 be potentially suitable roosting habitat occurs on the SEZ. An additional 335 acres (1.5 km²) of
17 riparian woodlands occurs in the area of direct effects.

18
19 The overall impact on the western yellow bat from construction, operation, and
20 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
21 considered moderate because the amount of potentially suitable habitat for this species in the
22 area of direct effects represents greater than 1% but less than 10% of potentially suitable
23 foraging habitat in the SEZ region. The implementation of programmatic design features is
24 expected to reduce indirect impacts to negligible levels.

25
26 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
27 suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily
28 available in other portions of the affected area. However, avoiding or minimizing disturbance of
29 all potentially suitable roosting habitat (riparian woodlands) on the SEZ is feasible and could
30 reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting habitat
31 is not feasible, a compensatory mitigation plan could be developed and implemented to mitigate
32 direct effects. The protection and enhancement of existing occupied or suitable habitats could
33 compensate for habitats lost to development. A comprehensive mitigation strategy that uses one
34 or both of these options could be designed to completely offset the impacts of development. The
35 need for mitigation, other than programmatic design features, should be determined by
36 conducting pre-disturbance surveys for the species and its habitat within the area of direct
37 effects.

38 39 **9.4.12.2.3 Impacts on State-Listed Species**

40
41
42 There are two species listed by the State of California that could occur in the affected
43 area of the Riverside East SEZ (Section 9.4.12.1.3; Table 9.4.12.1-1)—desert tortoise and Gila
44 woodpecker. Impacts on the desert tortoise are discussed in Section 9.4.12.2.1 because of the
45 status of this species under the ESA; impacts on the Gila woodpecker are discussed below.

1 The Gila woodpecker is not known to occur in the affected area of the Riverside East
2 SEZ. However, the species is known to occur along the Colorado River about 6 mi (10 km) east
3 of the SEZ. According to the CAREGAP habitat suitability model, there is no suitable habitat for
4 this species on the SEZ (Table 9.4.12.1-1). However, about 300 acres (1 km²) of potentially
5 suitable habitat occurs in the area of potential indirect effect; this area represents about 0.1% of
6 the available suitable habitat in the SEZ region (Table 9.4.12.1-1).

7
8 The overall impact on the Gila woodpecker from construction, operation, and
9 decommissioning of utility-scale solar energy facilities within the Riverside East SEZ is
10 considered small because no suitable habitat occurs on the SEZ and only indirect effects are
11 possible. The implementation of programmatic design features would reduce indirect impacts to
12 negligible levels. No species-specific mitigation for the Gila woodpecker is feasible or
13 warranted.

14 15 16 **9.4.12.2.4 Impacts on Rare Species**

17
18 There are 69 species with a state rank of S1 or S2 in California or considered a species of
19 concern by the State of California or USFWS that may occur in the affected area of the Riverside
20 East SEZ. Impacts have been previously discussed for 27 of these species that are also listed
21 under the ESA (Section 9.4.12.2.1), BLM-designated sensitive (Section 9.4.12.2.2), or state-
22 listed (Section 9.4.12.2.3). Impacts on the remaining 42 rare species that do not have any other
23 special status designation are presented in Table 9.4.12.1-1.

24 25 26 **9.4.12.3 SEZ-Specific Design Features and Design Feature Effectiveness**

27
28 The implementation of required programmatic design features described in Appendix A,
29 Section A.2.2, would greatly reduce or eliminate the potential for effects of utility-scale solar
30 energy development on special status species. While some SEZ-specific design features are best
31 established when project details are being considered, some design features can be identified at
32 this time, including the following:

- 33
34 • Pre-disturbance surveys should be conducted within the SEZ to determine the
35 presence and abundance of special status species, including those identified in
36 Table 9.4.12.1-1; disturbance to occupied habitats for these species should be
37 avoided or minimized to the extent practicable. If avoiding or minimizing
38 impacts to occupied habitats is not possible, translocation of individuals from
39 areas of direct effects, or compensatory mitigation of direct effects on
40 occupied habitats could reduce impacts. A comprehensive mitigation strategy
41 for special status species that uses one or more of these options to offset the
42 impacts of development should be developed in coordination with the
43 appropriate federal and state agencies.
- 44
45 • Disturbance of desert playa and wash habitats within the SEZ should be
46 avoided or minimized to the extent practicable. In particular, development

1 should be avoided in and near Ford Dry Lake, Palen Lake, and McCoy Wash
2 within the SEZ. Adverse impacts on the following species could be reduced
3 with the avoidance of these playas and desert wash habitats on the SEZ: alkali
4 mariposa-lily, California saw-grass, Coves' cassia, Emory's crucifixion-thorn,
5 jackass-clover, Salt Spring checkerbloom, sand evening-primrose, Roberts'
6 rhopalolemma bee, and crissal thrasher.

- 7
- 8 • Avoidance or minimization of disturbance to sand dune habitats and sand
9 transport systems on the SEZ could reduce impacts on several special status
10 species, including the chaparral sand-verbena, dwarf germander, giant
11 Spanish-needle, Harwood's eriastrum, jackass-clover, little San Bernardino
12 Mountains linanthus, and Mojave fringe-toed lizard.
- 13
- 14 • Consultations with the USFWS and the CDFG should be conducted to address
15 the potential for impacts on the desert tortoise, a species listed as threatened
16 under the ESA and CESA. Consultation would identify an appropriate survey
17 protocol, avoidance measures, and, if appropriate, reasonable and prudent
18 alternatives, reasonable and prudent measures, and terms and conditions for
19 incidental take statements.
- 20
- 21 • Harassment or disturbance of special status species and their habitats in the
22 affected area should be mitigated. This can be accomplished by identifying
23 any additional sensitive areas and implementing necessary protection
24 measures based upon consultation with the USFWS and CDFG.
- 25

26 If these SEZ-specific design features are implemented in addition to required
27 programmatic design features, impacts on the special status and rare species would be reduced.
28

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1 **9.4.13 Air Quality and Climate**

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4 **9.4.13.1 Affected Environment**

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6
7 **9.4.13.1.1 Climate**

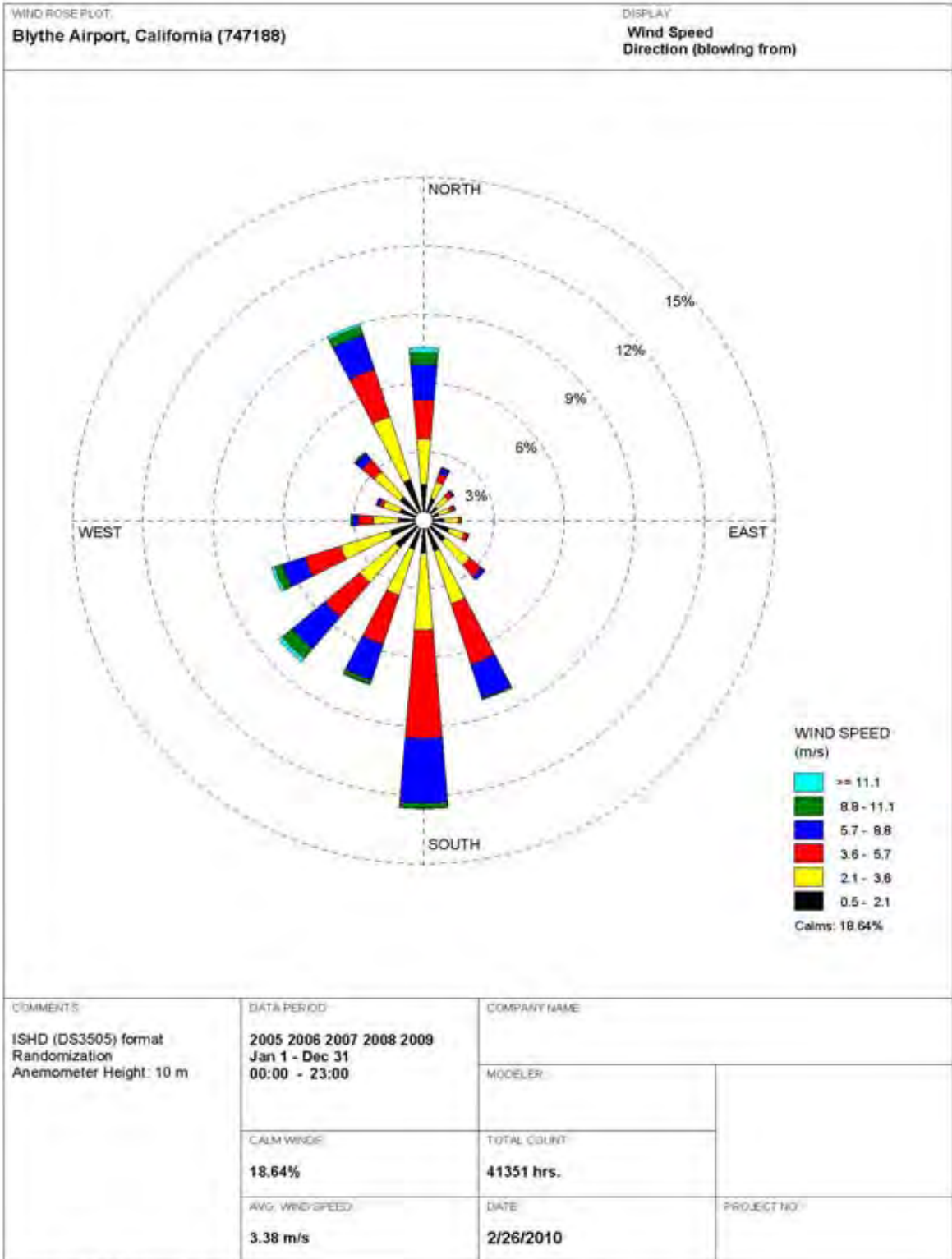
8
9 The proposed Riverside East SEZ is located in the eastern portion of Riverside County in
10 southeastern California. The SEZ, with an average elevation of 580 ft (177 m), straddles the
11 southernmost portion of the Mojave Desert and northernmost portion of the Sonoran Desert,
12 which has an extremely arid climate—mild winters and hot summers, large daily temperature
13 swings, scant precipitation, high evaporation rates, low relative humidity, and abundant sunshine.
14 Meteorological data collected at the Blythe Airport,⁷ which is about 1.5 mi (2.4 km) east of the
15 eastern boundary of the Riverside East SEZ, are summarized below.

16
17 A wind rose from the Blythe Airport in Blythe, California, for the 5-year period 2005 to
18 2009 and taken at a level of 33 ft (10 m) is presented in Figure 9.4.13.1-1 (NCDC 2010a).⁸
19 During this period, the annual average wind speed at the airport was about 7.6 mph (3.4 m/s),
20 with a prevailing wind direction from the south (about 13% of the time) and secondarily from the
21 north–northwest (about 9% of the time), parallel to nearby mountain ranges. Wind directions
22 alternated between north–northwest (March, May, August, and October) and south (the rest of
23 the months) throughout the year. In California, wind flow is generally from the west or northwest
24 throughout the year, but the prevailing wind direction for a given site is influenced by local
25 terrain (NCDC 2010b). Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s]) occurred
26 frequently (almost one-fifth of the time) because of the stable conditions caused by strong
27 radiative cooling from late night to sunrise. Average wind speeds were relatively uniform by
28 season; the highest was in summer and fall, at 7.8 mph (3.5 m/s); lower in winter, at 7.4 mph
29 (3.3 m/s), respectively; and lowest in spring, at 7.2 mph (3.2 m/s).

30
31 For the period 1948 to 2009, the annual average temperature at the Blythe Airport was
32 73.7°F (23.2°C) (WRCC 2010b). December was the coldest month with an average minimum
33 temperature of 41.2°F (5.1°C), and July was the warmest month with an average maximum of
34 108.4°F (42.4°C). On most days in summer, daytime maximum temperatures were in the 100s,
35 and minimums were in the low 70s or higher. The minimum temperatures recorded were below
36 freezing ($\leq 32^\circ\text{F}$ [0°C]) on about 2 to 3 days of the colder months (December and January), but
37 subzero temperatures were never recorded. During the same period, the highest temperature,
38 123°F (50.6°C), was reached in June 1994, and the lowest, 20°F (-6.7°C), in January 1971.

⁷ Eagle Mountain station is located about 0.6 mi (1.0 km) from the western edge of the SEZ at an elevation of about 970 ft (296 m), which is higher than the elevation of Blythe Airport, at about 390 ft (119 m). The station also has collected temperature and precipitation data since 1933. Temperatures are a little lower and precipitation is a little higher at the Eagle Mountain station than at the Blythe Airport.

⁸ Note that the Riverside East SEZ is spread over a wide area, about 50 mi (80 km) east–west and 25 mi (40 km) north–south and is in complex terrains. Accordingly, wind patterns at a location of interest might vary depending on elevation, orientation, and proximity to nearby mountains.



1

2

3

FIGURE 9.4.13.1-1 Wind Rose at 33-ft (10-m) Height at Blythe Airport, Blythe, California, 2005–2009 (Source: NCDC 2010a)

1 In a typical year, about 176 days had a maximum temperature of $\geq 90^{\circ}\text{F}$ (32.2°C), while more
2 than 5 days had a minimum temperature at or below freezing.
3

4 Pacific air masses lose most of their moisture on the windward side of mountain ranges
5 parallel to the California coastline. Thus, leeward areas like the Riverside East SEZ experience
6 a lack of precipitation. For the period 1948 to 2009, annual precipitation at the Blythe Airport
7 averaged about 3.53 in. (9.0 cm) (WRCC 2010b). There is an average of 17 days annually with
8 measurable precipitation (0.01 in. [0.025 cm] or higher). About 37% of the annual precipitation
9 occurs during winter months, and 15% in spring, and the rest in summer and fall in almost equal
10 amounts. No measurable snowfall was recorded at the Blythe Airport
11

12 Because the area surrounding the proposed Riverside East SEZ is far from major water
13 bodies (more than 120 mi [193 km]) and because surrounding mountain ranges block air masses
14 from penetrating into the area, severe weather events, such as hurricanes and tornadoes, are rare.
15

16 Since 1993, 137 floods (about 70% of which were flash floods), with peaks in July and
17 August, have been reported in Riverside County (NCDC 2010c) and caused 6 deaths, 14 injuries,
18 and considerable property and crop damage in total.
19

20 In Riverside County, 25 hail storms in total have been reported since 1960 and caused
21 2 injuries and minor property and crop damage. Hail measuring 2.75 in. (7.0 cm) in diameter was
22 reported in 1960. In Riverside County, 112 high-wind events, peaking in winter months, have
23 been reported since 1996 and caused 8 deaths, 68 injuries, and significant property and crop
24 damage (NCDC 2010c). A high-wind event with a maximum wind speed of 120 mph (53.5 m/s)
25 occurred in 1999. Since 1973, 87 thunderstorm wind events, peaking in summer months, have
26 been reported and caused some property damage and minor crop damage. Many thunderstorms
27 in California are accompanied by little to no precipitation, and lightning strikes sometimes cause
28 forest fires (NCDC 2010b).
29

30 Since 1998, 15 dust storms have been reported in Riverside County (NCDC 2010c). The
31 ground surface of the SEZ is covered predominantly with gravelly loams of alluvial fan terraces,
32 which have relatively moderate dust storm potential. High winds can trigger large amounts of
33 blowing dust in areas of Riverside County that have dry and loose soils with sparse vegetation.
34 Dust storms can deteriorate air quality and visibility and have adverse effects on health..
35

36 Hurricanes and tropical storms formed off the coast of Central America and Mexico
37 weaken over the cold waters off the California coast. Accordingly, hurricanes rarely hit
38 California. Historically, four tropical storms/depressions have passed within 100 mi (160 km) of
39 the proposed Riverside East SEZ (CSC 2010). Tornadoes in Riverside County, which
40 encompasses the proposed Riverside East SEZ, occur infrequently. In the period 1950 to
41 June 2010, a total of 19 tornadoes (0.3 per year) were reported in Riverside County
42 (NCDC 2010c). However, most tornadoes occurring in Riverside County were relatively weak
43 (i.e., 1 was unclassified, 16 were weak F0 or F1, and 2 were strong F2 or F3 on the Fujita
44 tornado scale). Several of these tornadoes caused two injuries and some property damage in total.
45 Most tornadoes in Riverside County were reported far from the proposed Riverside East SEZ,

1 except one F3 and one F0 tornadoes, which hit the area about 4 mi (6 km) east and 1 mi (1.6 km)
 2 south of the SEZ.

3
 4
 5 **9.4.13.1.2 Existing Air Emissions**

6
 7 Riverside County has many industrial emission sources,
 8 which are mainly concentrated over the Valley Region near the
 9 City of Riverside. More than ten point source emissions are
 10 located around the proposed SEZ, mostly to the east in Blythe,
 11 and their annual emissions are relatively minor, except for a
 12 major source, the Southern California Gas Company
 13 compressor station in Blythe. Mobile source emissions are
 14 substantial, because the county is crossed by several interstate
 15 highways, including I-10, I-15, and I-215. Data on annual
 16 emissions of criteria pollutants and VOCs in Riverside County
 17 are presented in Table 9.4.13.1-1 for 2002 (WRAP 2009).
 18 Emission data are classified into six source categories: point,
 19 area, onroad mobile, nonroad mobile, biogenic, and fire
 20 (wildfires, prescribed fires, agricultural fires, structural fires). In
 21 2002, nonroad sources were major contributors to total SO₂
 22 emissions (about 47%) and secondary contributors to total NO_x
 23 emissions (about 27%). Onroad sources were major contributors
 24 to NO_x and CO emissions (about 61% and 64%, respectively)
 25 and secondary contributors to SO₂ emissions (about 31%).
 26 Biogenic sources (i.e., vegetation—including trees, plants, and
 27 crops—and soils) that release naturally occurring emissions
 28 accounted for most VOC emissions (about 87%). Area sources
 29 were primary contributors to PM emissions, which accounted
 30 for about 88% of PM₁₀ and 67% of PM_{2.5}. Point and fire
 31 sources are minor contributors to criteria pollutants and VOCs
 32 in Riverside County.

33
 34 In 2006, California produced about 483.9 MMt of
 35 gross⁹ carbon dioxide equivalent (CO₂e)¹⁰ emissions (CARB
 36 2010a). Gross greenhouse gas (GHG) emissions in California
 37 increased by about 12% from 1990 to 2006, which was three-fourths of the increase in the
 38 national rate (about 16%). In 2006, transportation (38%) and electricity use (22%) were the
 39 primary contributors to gross GHG emission sources in California. Fossil fuel use in the

TABLE 9.4.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Riverside County, California, Encompassing the Proposed Riverside East SEZ, 2002^a

Pollutant ^b	Emissions (tons/yr)
SO ₂	785
NO _x	55,220
CO	240,193
VOCs	267,693
PM ₁₀	22,651
PM _{2.5}	6,934

^a Includes point, area, onroad and nonroad mobile, biogenic, and fire emissions.

^b Notation: CO = carbon monoxide; NO_x = nitrogen oxides; PM_{2.5} = particulate matter with a diameter of ≤2.5 μm; PM₁₀ = particulate matter with a diameter of ≤10 μm; SO₂ = sulfur dioxide; and VOCs = volatile organic compounds.

Source: WRAP (2009).

⁹ Excluding GHG emissions removed as a result of forestry and other land uses and excluding GHG emissions associated with exported electricity.

¹⁰ A measure used to compare the emissions from various GHGs on the basis of their global warming potential, defined as the cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas, CO₂. The CO₂e for a gas is derived by multiplying the mass of the gas by the associated global warming potential.

1 residential, commercial, and industrial sectors combined accounted for about 29% of total state
2 emissions. California's *net* emissions were about 479.8 MMt CO_{2e}, considering carbon sinks
3 from forestry activities and agricultural soils throughout the state. The U.S. Environmental
4 Protection Agency (EPA 2009a) also estimated 2005 emissions in California. Its estimate of CO₂
5 emissions from fossil fuel combustion was 390.6 MMt, which was comparable to the state's
6 estimate. The transportation and residential, commercial, and industrial sectors accounted for
7 about 59% and 30% of the CO₂ emissions total, respectively, while electric power generation
8 accounted for the remainder (about 11%).
9

10 **9.4.13.1.3 Air Quality**

11 CAAQS address the same six criteria pollutants as the NAAQS (CARB 2010b;
12 EPA 2010a): SO₂, NO₂, CO, O₃, PM₁₀, PM_{2.5}, and Pb. CAAQS are more stringent than
13 NAAQS for most criteria pollutants. In addition, California has set standards for some pollutants
14 not addressed by NAAQS—visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl
15 chloride. The NAAQS and CAAQS for criteria pollutants are presented in Table 9.4.13.1-2.
16
17
18

19 Most of Riverside County is located administratively within the Southeast Desert
20 Intrastate AQCR (Title 40, Part 81, Section 167 of the *Code of Federal Regulations*
21 [40 CFR 81.167]), along with parts of Kern, Los Angeles, and San Bernardino Counties, and all
22 of Imperial County. In addition, the Riverside East SEZ is located within the Mojave Desert Air
23 Basin, one of 15 geographic air basins designated for the purpose of managing air resources in
24 California, which also includes the desert portions of Kern, Los Angeles, Riverside, and San
25 Bernardino Counties. Currently, the area surrounding the proposed SEZ is designated as being in
26 unclassifiable/attainment of NAAQS for all criteria pollutants (40 CFR 81.305). However, the
27 area is designated as a nonattainment area for O₃ and PM₁₀ based on CAAQS (CARB 2010c).
28

29 With a low population density, the Mojave Desert area has no significant emission
30 sources of its own, except mobile emissions along interstate highways. Air quality in the Mojave
31 Desert area primarily depends on upwind emissions transported from the South Coast Air Basin,
32 including Los Angeles. As a result of upwind emission controls, air quality of the Mojave Desert
33 area has improved, but concentrations of ozone are still relatively high.
34

35 There are no ambient air-monitoring stations in Riverside County near the proposed
36 Riverside East SEZ, except an ozone-monitoring station in Joshua Tree NP and Blythe. To
37 characterize ambient air quality around the SEZ, two monitoring stations in the Coachella Valley
38 of Riverside County were chosen: Indio, about 44 mi (71 km), and Palm Springs, about 62 mi
39 (100 km) west of the SEZ. These monitoring stations, which are not in the Mojave Desert area
40 but upwind of the SEZ along I-10, are considered representative of the proposed SEZ, although
41 the Coachella Valley is designated as a nonattainment area for PM₁₀. Ambient concentrations of
42 O₃, PM₁₀, and PM_{2.5} are recorded at Indio, while those of NO₂, CO, O₃, PM₁₀, and PM_{2.5} are
43 recorded at Palm Springs. No SO₂ and Pb measurements are made either in the Mojave Desert
44 area or in the Coachella Valley, so their measurements from Rubidoux are presented to
45 demonstrate that these pollutants are not a concern in Riverside County. The background
46 concentrations of criteria pollutants at these stations for the period 2004 to 2008 are presented in

TABLE 9.4.13.1-2 NAAQS, CAAQS, and Background Concentration Levels Representative of the Proposed Riverside East SEZ in Riverside County, California, 2004–2008

Pollutant ^a	Averaging Time	NAAQS	CAAQS	Background Concentration Level	
				Concentration ^{b,c}	Measurement Location, Year
SO ₂	1-hour	0.075 ppm ^d	0.25 ppm	0.019 ppm (NA; 7.6%)	Rubidoux, 2005
	3-hour	0.5 ppm	NA ^e	0.015 ppm (3.0%; NA)	Rubidoux, 2004
	24-hour	0.14 ppm	0.04 ppm	0.015 ppm (11%; 38%)	Rubidoux, 2004
	Annual	0.030 ppm	NA	0.004 ppm (13%; NA)	Rubidoux, 2005
NO ₂	1-hour	0.100 ppm ^f	0.18 ppm	0.085 ppm (NA; 47%)	Palm Springs, 2006
	Annual	0.053 ppm	0.030 ppm	0.013 ppm (25%; 43%)	Palm Springs, 2004
CO	1-hour	35 ppm	20 ppm	2.0 ppm (5.7%; 10%)	Palm Springs, 2005
	8-hour	9 ppm	9.0 ppm	0.8 ppm (8.9%; 8.9%)	Palm Springs, 2006
O ₃	1-hour	0.12 ppm ^g	0.09 ppm	0.098 ppm (NA; 109%)	Joshua Tree NP, 2008
	8-hour	0.075 ppm	0.070 ppm	0.084 ppm (112%; 120%)	Joshua Tree NP, 2008
PM ₁₀	24-hour	150 µg/m ³	50 µg/m ³	157 µg/m ³ (105%; 314%)	Indio, 2007
	Annual	NA ^h	20 µg/m ³	56 µg/m ³ (NA; 280%)	Indio, 2007
PM _{2.5}	24-hour	35 µg/m ³	NA	26.8 µg/m ³ (77%; NA)	Indio, 2004
	Annual	15.0 µg/m ³	12 µg/m ³	10.8 µg/m ³ (72%; 90%)	Indio, 2004
Pb	30-day	NA	1.5 µg/m ³	NA	NA
	Calendar quarter	1.5 µg/m ³	NA	0.02 µg/m ³ (1.3%; NA)	Rubidoux, 2005
	Rolling 3-month	0.15 µg/m ³ ⁱ	NA	NA	NA

^a Notation: CO = carbon monoxide; NO₂ = nitrogen dioxide; O₃ = ozone; Pb = lead; PM_{2.5} = particulate matter with a diameter of ≤2.5 µm; PM₁₀ = particulate matter with a diameter of ≤10 µm; and SO₂ = sulfur dioxide.

^b Monitored concentrations are the highest for calendar-quarter Pb; second-highest for all averaging times less than or equal to 24-hour averages, except fourth-highest daily maximum for 8-hour O₃ and the 98th percentile for 24-hour PM_{2.5}; and arithmetic mean for annual SO₂, NO₂, PM₁₀, and PM_{2.5}.

^c Values in parentheses are background concentration levels as a percentage of NAAQS and CAAQS, respectively. Calculation of 1-hour SO₂, 1-hour NO₂, and rolling 3-month Pb to NAAQS was not made, because no measurement data based on new NAAQS are available.

^d Effective August 23, 2010.

^e NA = not applicable or not available.

^f Effective April 12, 2010.

^g The EPA revoked the 1-hour O₃ standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).

^h Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of 50 µg/m³.

ⁱ Effective January 12, 2009.

Sources: CARB (2010b); EPA (2010a,b).

1 Table 9.4.13.1-2 (EPA 2010b). Monitored SO₂, NO₂, CO, and Pb levels were lower than their
2 respective standards (up to 47%). Monitored O₃ and PM₁₀ concentrations exceeded both
3 NAAQS and CAAQS. Monitored PM_{2.5} levels were lower than NAAQS and CAAQS but
4 approaching CAAQS.
5

6 The PSD regulations (see 40 CFR 52.21), which are designed to limit the growth of air
7 pollution in clean areas, apply to a major new source or modification of an existing major source
8 within an attainment or unclassified area (see Section 4.11.2.3). As a matter of policy, the EPA
9 recommends that the permitting authority notify Federal Land Managers when a proposed PSD
10 source would locate within 62 mi (100 km) of a sensitive Class I area. There are several Class I
11 areas around the Riverside East SEZ, only one of which is situated within 62 mi (100 km). The
12 nearest Class I area is the Joshua Tree NP (40 CFR 81.405), adjacent to the Riverside East SEZ.
13 The eastern portion of this Class I area is located downwind of prevailing winds at the Riverside
14 East SEZ (Figure 9.4.13.1-1) and thus would be affected by activities at the proposed SEZ. The
15 next nearest Class I areas are located beyond 62 mi (100 km), the San Jacinto WA and the San
16 Gorgonio WA, which are about 66 mi (106 km) west and 73 mi (117 km) west-northwest of the
17 Riverside East SEZ, respectively.
18
19

20 **9.4.13.2 Impacts**

21
22 Potential impacts on ambient air quality associated with a solar project would be of
23 most concern during the construction phase. Impacts on ambient air quality from fugitive dust
24 emissions resulting from soil disturbances are anticipated, but they would be of short duration.
25 During the operations phase, only a few sources with generally low-level emissions would exist
26 for any of the four types of solar technologies evaluated. A solar facility would either not burn
27 fossil fuels or burn only small amounts during operation. (For facilities using heat transfer fluids
28 [HTFs], fuel could be used to maintain the temperature of the HTFs for more efficient daily
29 start-up.) Conversely, solar facilities would displace air emissions that would otherwise be
30 released from fossil fuel-fired power plants.
31

32 Air quality impacts shared by all solar technologies are discussed in detail in
33 Section 5.11.1, and technology-specific impacts are discussed in Section 5.11.2. Impacts
34 specific to the proposed Riverside East SEZ are presented in the following sections. Any such
35 impacts would be minimized through the implementation of required programmatic design
36 features described in Appendix A, Section A.2.2, and through the application of any additional
37 mitigation. Section 9.4.13.3, below, identifies SEZ-specific design features of particular
38 relevance to the Riverside East SEZ.
39
40

41 **9.4.13.2.1 Construction**

42
43 The Riverside East SEZ has a relatively flat terrain; thus only a minimum number of site
44 preparation activities, perhaps with no large-scale earthmoving operations, would be required.
45 However, fugitive dust emissions from soil disturbances during the entire construction phase
46 would be a major concern because of the large areas that would be disturbed in a region that

1 experiences windblown dust problems. Fugitive dusts, which are released near ground level,
2 typically have more localized impacts than similar emissions from an elevated stack, which has
3 additional plume rise induced by buoyancy and momentum effects.
4
5

6 **Methods and Assumptions**

7

8 Air quality modeling for PM₁₀ and PM_{2.5} emissions associated with construction
9 activities was performed by using the EPA-recommended AERMOD model (EPA 2009b).
10 Details for emissions estimation, the description of AERMOD, input data processing procedures,
11 and modeling assumption are described in Appendix M, Section M.13. Estimated air
12 concentrations were compared with the applicable NAAQS/CAAQS levels at the site boundaries
13 and nearby communities and with PSD increment levels at nearby Class I areas.¹¹ For the
14 Riverside East SEZ, the modeling was conducted based on the following assumptions and input:
15

- 16 • Uniformly distributed emissions over the 3,000 acres (12.1 km²) each and
17 9,000 acres (36.4 km²) in total, and in the west-central portion of the SEZ,
18 adjacent to the nearest Class I area (Joshua Tree NP) and north of many
19 scattered residences, including Lake Tamarisk and Desert Center;
20
- 21 • Surface hourly meteorological data from the Blythe Airport and upper air
22 sounding data from Desert Rock/Mercury, Nevada, for the 2005 to 2009
23 period;
24
- 25 • A regularly spaced receptor grid over a modeling domain of 62 × 62 mi
26 (100 km × 100 km) centered on the proposed SEZ; and
27
- 28 • Additional discrete receptors at the SEZ boundaries and at the nearest Class I
29 area—Joshua Tree NP—adjacent to the northwestern portion of the SEZ.
30
31

32 **Results**

33

34 The modeling results for both PM₁₀ and PM_{2.5} concentration increments and total
35 concentrations (modeled plus background concentrations) that would result from construction-
36 related fugitive emissions are summarized in Table 9.4.13.2-1. Maximum 24-hour PM₁₀
37 concentration increments modeled to occur at the site boundaries would be an estimated
38 627 µg/m³, which far exceeds the relevant NAAQS level of 150 µg/m³ or the CAAQS level of
39 50 µg/m³. Total 24-hour PM₁₀ concentrations of 784 µg/m³ would also exceed the NAAQS and
40 CAAQS levels at the SEZ boundary. However, high PM₁₀ concentrations would be limited to

¹¹ To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS/CAAQS levels and the PSD Class I increment levels. Although the Clean Air Act exempts construction activities from PSD requirements, a comparison with the Class I increment levels was used to quantify potential impacts. Only monitored data can be used to determine the attainment status. Modeled data are used to assess potential problems and as a consideration in the permitting process.

TABLE 9.4.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Riverside East SEZ

Pollutant ^a	Averaging Time	Rank ^b	Concentration ($\mu\text{g}/\text{m}^3$)			Percentage of NAAQS/CAAQS ^e		
			Maximum Increment ^b	Background ^c	Total	NAAQS/CAAQS ^d	Increment	Total
PM ₁₀	24-hour	H6H	627	157	784	150/50	418/1,255	523/1,569
	Annual	NA ^f	94.1	56.0	150	NA/20	NA/471	NA/751
PM _{2.5}	24-hour	H8H	44.2	26.8	71.0	35/NA	126/NA	203/NA
	Annual	NA	9.4	10.8	20.2	15.0/12	63/78	135/168

- ^a PM_{2.5} = particulate matter with a diameter of $\leq 2.5 \mu\text{m}$; PM₁₀ = particulate matter with a diameter of $\leq 10 \mu\text{m}$.
- ^b Concentrations for attainment demonstration are presented. H6H = highest of the sixth-highest concentrations at each receptor over the 5-year period. H8H = highest of the multiyear average of the eighth-highest concentrations at each receptor over the five-year period. For the annual average, multiyear averages of annual means over the five-year period are presented. Maximum concentrations are predicted to occur at the site boundaries.
- ^c See Table 9.4.13.1-2.
- ^d First and second values are NAAQS and CAAQS, respectively.
- ^e First and second values are concentration levels as a percentage of NAAQS and CAAQS, respectively.
- ^f NA = not applicable.

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2
3 the immediate area surrounding the SEZ boundary and would decrease quickly with distance.
4 Predicted maximum 24-hour PM₁₀ concentration increments would be about 90 to 150 $\mu\text{g}/\text{m}^3$ at
5 the nearest residences, scattered over the north of Lake Tamarisk; about 80 $\mu\text{g}/\text{m}^3$ at Lake
6 Tamarisk; 40 $\mu\text{g}/\text{m}^3$ at Desert Center; 20 $\mu\text{g}/\text{m}^3$ at Eagle Mountain Pumping Station; and
7 10 $\mu\text{g}/\text{m}^3$ or less at residences around the eastern SEZ near Blythe. Concentration contours
8 indicate that higher concentrations are limited to the boundary of Joshua Tree NP and from
9 around the foot of higher elevations. Concentrations at higher elevations are relatively low (a
10 maximum of about 20 $\mu\text{g}/\text{m}^3$). Annual average modeled PM₁₀ concentration increments and
11 total concentrations (increment plus background) at the SEZ boundary would be about
12 94.1 $\mu\text{g}/\text{m}^3$ and 150 $\mu\text{g}/\text{m}^3$, respectively, which are much higher than the CAAQS level of
13 20 $\mu\text{g}/\text{m}^3$. Annual PM₁₀ increments would be much lower for the mentioned residences, about
14 2 to 10 $\mu\text{g}/\text{m}^3$ at the nearest residences, scattered over the north of Lake Tamarisk; about
15 2 $\mu\text{g}/\text{m}^3$ at Lake Tamarisk; and about 1 $\mu\text{g}/\text{m}^3$ at Desert Center and Eagle Mountain Pumping
16 Station. Total 24-hour PM_{2.5} concentrations would be 71 $\mu\text{g}/\text{m}^3$ at the SEZ boundary, which is
17 much higher than the NAAQS level of 35 $\mu\text{g}/\text{m}^3$; the modeled increment contributes about twice
18 as much as background concentrations to this total. The total annual average PM_{2.5} concentration
19 would be 20.2 $\mu\text{g}/\text{m}^3$, which is above the NAAQS and CAAQS levels of 15.0 and 12 $\mu\text{g}/\text{m}^3$,
20 respectively. At the nearby residences, predicted maximum 24-hour and annual PM_{2.5}
21 concentration increments would be about 7.6 and 0.7 $\mu\text{g}/\text{m}^3$, respectively.

1 Predicted 24-hour and annual PM₁₀ concentration increments at the nearest Class I Area,
2 Joshua Tree NP, would be about 417 and 29.8 µg/m³, or 5,200% and 746% of the PSD
3 increments for Class I Areas, respectively.
4

5 In conclusion, predicted 24-hour and annual PM₁₀ and PM_{2.5} concentration levels could
6 exceed NAAQS and CAAQS levels at the SEZ boundaries and in immediate surrounding areas
7 during the construction of solar facilities. To reduce potential impacts on ambient air quality and
8 to comply with BLM design features, aggressive dust control measures would be used. Potential
9 air quality impacts on nearby residences and cities would be lower. Modeling indicates that
10 construction activities could result in concentrations far above Class I PSD PM₁₀ increments at
11 the nearest federal Class I area (Joshua Tree NP). Construction activities are not subject to the
12 PSD program and the comparison provides only a screen for gauging the size of the impact.
13 Additionally, the assumed scenario—in which three construction projects would occur
14 simultaneously near the western central portion of the SEZ—is quite conservative. If locations of
15 construction were spread across the SEZ or the projects occurred at different times, potential
16 impacts would be anticipated to be much lower than the aforementioned values. Accordingly,
17 impacts of construction activities on ambient air quality would be expected to be moderate and
18 temporary.
19

20 Construction emissions from the engine exhaust from heavy equipment and vehicles
21 could cause impacts on AQRVs (e.g., visibility and acid deposition) at the adjacent federal
22 Class I area, Joshua Tree NP, which is located downwind of prevailing winds, if construction
23 were to occur in the western portion of the SEZ. SO_x emissions from engine exhaust would be
24 very low, because BLM design features would require that ultra-low-sulfur fuel with a sulfur
25 content of 15 ppm be used. NO_x emissions from engine exhaust would be primary contributors
26 to potential impacts on AQRVs. Construction-related emissions are temporary in nature and thus
27 would cause some unavoidable but short-term impacts.
28

29 For this analysis, the impacts of construction and operation of transmission lines outside
30 of the SEZ were not assessed, assuming that one or more of the existing transmission lines
31 (ranging from 69 kV to 500 kV) located within the SEZ might be used to connect some new
32 solar facilities to load centers, and that additional project-specific analysis would be done for
33 new transmission construction or line upgrades. However, some construction of transmission
34 lines could occur within the SEZ. Potential impacts on ambient air quality would be a minor
35 component of construction impacts in comparison with solar facility construction and would be
36 temporary in nature.
37
38

39 ***9.4.13.2.2 Operations***

40
41 Emission sources associated with the operation of a solar facility would include auxiliary
42 boilers; vehicle (commuter, visitor, support, and delivery) traffic; maintenance (e.g., mirror
43 cleaning and repair and replacement of damaged mirrors); and drift from cooling towers for the
44 parabolic trough or power tower technologies if wet cooling was implemented (drift consists of
45 low-level PM emissions).
46

1 The type of emission sources caused by and offset by operation of a solar facility are
 2 discussed in Appendix M, Section M.13.4.

3
 4 Estimates of potential air emissions displaced by the solar project development at the
 5 Riverside East SEZ are presented in Table 9.4.13.2-2. Total power generation capacity ranging
 6 from 18,035 to 32,463 MW is estimated for the Riverside East SEZ for various solar
 7 technologies (see Section 9.4.2). The estimated amount of emissions avoided for the solar
 8 technologies evaluated depends only on the megawatts of conventional fossil fuel-generated
 9 power displaced, because a composite emission factor per megawatt-hour of power by
 10 conventional technologies is assumed (EPA 2009c). If the Riverside East SEZ were fully
 11 developed, emissions avoided would be expected to be substantial. Development of solar power
 12 in the SEZ would result in avoided air emissions ranging from 30% to 54% of total emissions of
 13 SO₂, NO_x, Hg, and CO₂ from electric power systems in the state of California (EPA 2009c).
 14
 15

TABLE 9.4.13.2-2 Annual Emissions from Combustion-Related Power Generation Displaced by Full Solar Development of the Proposed Riverside East SEZ

Area Size (acres)	Capacity (MW) ^a	Power Generation (GWh/yr) ^b	Emissions Displaced (tons/yr; 10 ³ tons/yr for CO ₂) ^c			
			SO ₂	NO _x	Hg	CO ₂
202,896	18,035–32,463	31,598–56,876	4,040–7,272 (23,867–42,961)	6,636–11,944 (35,174–63,313)	0.06–0.11 (0.28–0.50)	15,699–28,258 (24,932–44,878)
Percentage of total emissions from electric power systems in California ^d			30–54%	30–54%	30–54%	30–54%
Percentage of total emissions from all source categories in California ^e			5.7–10%	0.55–1.0%	NA ^f	3.6–6.6%
Percentage of total emissions from electric power systems in the six-state study area ^d			1.6–2.9% (9.5–17%)	1.8–3.2% (9.5–17%)	2.0–3.6 (9.5–17%)	6.0–11% (9.5–17%)
Percentage of total emissions from all source categories in the six-state study area ^e			0.86–1.5% (5.1–9.1%)	0.25–0.44% (1.3–2.3%)	NA (NA)	1.9–3.4% (3.0–5.4%)

^a It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km²) per MW (for parabolic trough technology) to 9 acres (0.036 km²) per MW (power tower, dish engine, and PV technologies) would be required.

^b Assumed a capacity factor of 20%.

^c Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 0.26, 0.42, 3.7 × 10⁻⁶, and 994 lb/MWh, respectively, were used for the state of California. Values in parentheses are estimated based on composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 1.51, 2.23, 1.8 × 10⁻⁵, and 1,578 lb/MWh, respectively, averaged over six southwestern states.

^d Emission data for all air pollutants are for 2005.

^e Emission data for SO₂ and NO_x are for 2002, while those for CO₂ are for 2005.

^f NA = not estimated.

Sources: EPA (2009a,c); WRAP (2009).

1 Avoided emissions would be up to 11% of total emissions from electric power systems in the
2 six-state study area. When compared with all source categories, power production from the same
3 solar facilities would displace up to 10% of SO₂, 1.0% of NO_x, and 6.6% of CO₂ emissions in
4 the state of California (EPA 2009a; WRAP 2009). These emissions would be up to 3.4% of total
5 emissions from all source categories in the six-state study area. Power generation from fossil
6 fuel-fired power plants accounts for only 53% of the total electric power generation in
7 California, most of which is from natural gas combustion. Thus, solar facilities to be built in the
8 Riverside East SEZ could considerably reduce fuel combustion-related emissions in California
9 but relatively less so than those built in other states with higher fossil use rates.

10
11 About one-quarter of electricity consumed in California is generated out of state, with
12 about three-quarters of this amount coming from the southwestern states. Thus, it is possible that
13 a solar facility in California would replace power from fossil fuel-fired power plants outside of
14 California but within the six-state study area. It is also possible that electric power transfer
15 between the states will increase in the future. To assess potential region-wide emissions benefit,
16 emissions being displaced were also estimated based on composite emission factors averaged
17 over the six-state study area. For SO₂, NO_x, and Hg, composite emission factors for the six-state
18 study area would be about 5 to 6 times higher than those for California alone. For CO₂, the
19 six-state emission factor is about 60% higher than the California-only emission factor. If
20 the Riverside East SEZ were fully developed, emissions avoided would be considerable.
21 Development of solar power in the SEZ would result in avoided air emissions ranging from
22 9.5% to 17% of total emissions of SO₂, NO_x, Hg, and CO₂ from electric power systems in the
23 six southwestern states. These emissions would be up to 9.1% of total emissions from all source
24 categories in the six-state study area.

25
26 As discussed in Section 5.11.1.5, the operation of associated transmission lines would
27 generate some air pollutants from activities such as periodic site inspections and maintenance.
28 However, these activities would occur infrequently, and the amount of emissions would be
29 small. In addition, transmission lines could produce minute amounts of O₃ and its precursor
30 NO_x associated with corona discharge (i.e., the breakdown of air near high-voltage conductors),
31 which is most noticeable for higher-voltage lines during rain or very humid conditions. Since
32 the Riverside East SEZ is located in an arid desert environment, these emissions would be small,
33 and potential impacts on ambient air quality would be negligible, considering the infrequent
34 occurrences and small amount of emissions from corona discharges.

35 36 37 **9.4.13.2.3 Decommissioning/Reclamation**

38
39 As discussed in Section 5.11.1.4, decommissioning/reclamation activities are similar to
40 construction activities but on a more limited scale and of shorter duration. Potential impacts on
41 ambient air quality would be correspondingly less than those from construction activities.
42 Decommissioning activities would last for a short period, and their potential impacts would be
43 moderate and temporary. The same mitigation measures adopted during the construction phase
44 would be implemented during the decommissioning phase (Section 5.11.3).

1 **9.4.13.3 SEZ-Specific Mitigation Measures and Mitigation Effectiveness**
2

3 No SEZ-specific design features are required. Limiting dust generation during
4 construction and operations at the proposed Riverside East SEZ (such as increased watering
5 frequency or road paving or treatment) is a required design feature under BLM’s proposed Solar
6 Energy Program. These extensive fugitive dust control measures would keep off-site PM levels
7 as low as possible during construction.
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1 **9.4.14 Visual Resources**

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4 **9.4.14.1 Affected Environment**

5
6 The proposed Riverside East SEZ is located in the Chuckwalla Valley and the southern
7 portion of the Palen Valley approximately 6.7 mi (10.9 km) west of the California–Arizona
8 border within the CDCA in Riverside County in southern California. The SEZ lies within the
9 Mojave basin and range physiographic province, typified by small, rocky mountain ranges with
10 jagged peaks alternating with talus slopes and desert floor. Flat basins form broad flat expanses
11 of barren plains, generally with low scrub vegetation and expansive views. Dark browns and
12 garnets are the dominant mountain hues, although blues and purples prevail as viewing distance
13 increases. In contrast, lighter brown and tan soils dominate the desert floor, sparsely dotted
14 with the grey-green of Sonoran creosotebush and golden bursage scrub vegetation (BLM and
15 CEC 2010a).

16
17 The SEZ includes portions of both the Sonoran Basin and Range ecoregion and the
18 western portion of the Mojave Basin and Range ecoregion (EPA 2007) and is located within two
19 of the USFS’s ecological subsections: Chuckwalla Valley and Palo Verde Valley and Mesa. Both
20 are characterized by very gently to moderately sloping alluvial fans, with nearly level basin
21 floors (USFS 1997).

22
23 Within the Chuckwalla Valley, elevations range from 350 ft (106.7 m) at Ford Dry Lake
24 to about 800 ft (243.8 m). The small surrounding mountain ranges rise 3,000 to 5,000 ft (914.4 to
25 1,524 m) above mean sea level. Visually prominent mountain ranges around the valley include
26 the Big Maria Mountains to the east; the Little Maria, Palen, and McCoy ranges to the north; the
27 Coxcomb Mountains within Joshua Tree NP to the northwest; the Eagle Mountains to the west,
28 the majority of which are within Joshua Tree NP; the Chuckwalla and Little Chuckwalla
29 Mountains to the south; and the Mule and Palo Verde Mountains to the southeast. The SEZ and
30 surrounding mountain ranges are shown in Figure 9.4.14.1-1.

31
32 The Riverside East SEZ (202,896 acres [821 km²]) occupies an area approximately 46 mi
33 (74 km) east to west (at greatest extent) and 27 mi (43 km) north to south (at greatest extent), and
34 is located approximately 8.4 mi (13.5 km) (at closest approach) west of the town of Blythe and
35 47 mi (76 km) east of the community of Indio. The community of Desert Center is located
36 adjacent to the southwest corner of the SEZ. I-10 runs through the eastern portion of the SEZ and
37 then along most of its southern border. There are a number of exits to local roads off I-10 as it
38 passes by and through the SEZ. State Route 177 passes through the west side of the SEZ in a
39 northeasterly direction, and the Midland-Rice Road and a railroad pass through the eastern
40 portion of the SEZ in a northwesterly direction.

41
42 The SEZ is located within the flat plains of the Chuckwalla and Palen Valley floors, and
43 the strong horizon line and the above-mentioned mountain ranges surrounding the valley are the
44 dominant visual features. Elevation within the SEZ ranges from a low of 250 ft (76 m) on the
45 southeastern border of the SEZ near Blythe to a high of 1,690 ft (516 m) on the northeastern
46 border of the SEZ in the Big Maria Mountains; however, the valley floor ranges from

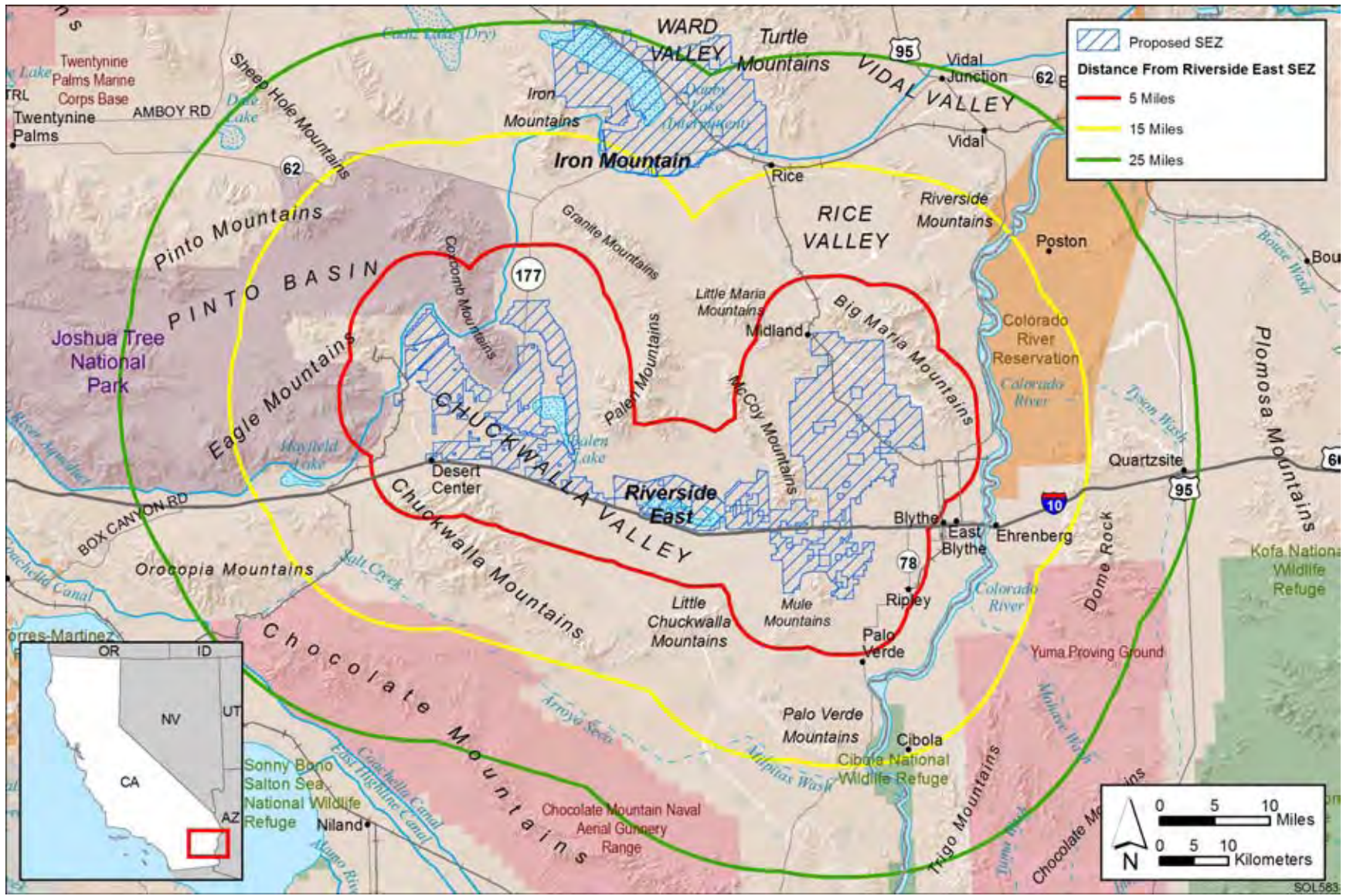


FIGURE 9.4.14.1-1 Proposed Riverside East SEZ and Surrounding Lands

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1 approximately 360 to 750 ft (110 to 230 m). The western portion generally slopes gently
2 southward to a low point at Ford Dry Lake, while the eastern portion of the SEZ slopes
3 southeastward toward the Colorado River. The flatness of the valley and general absence of
4 screening vegetation afford panoramic views of the vast valley floor and the surrounding
5 mountain ranges that form a visual backdrop.
6

7 The Chuckwalla Valley is located within the ecotone between the Mojave and Sonoran
8 Deserts; thus the SEZ, although very flat, is vegetatively diverse. While much of the area is
9 dominated by creosote shrublands or areas with very little vegetation, the eastern portion of the
10 SEZ, especially along McCoy Wash and its tributaries, contains a well-developed ironwood/palo
11 verde community.
12

13 Much of the SEZ consists of flats with widely spaced, olive green creosote bushes and
14 other low shrubs of various green and brown hues, but there are also dry lake beds, sandy areas,
15 and dry washes with ironwood and other trees. The diverse landscape types result in somewhat
16 varied colors and textures, although foreground textures are generally coarse. Soils are generally
17 very light tan and visually prominent over most of SEZ due to the sparse vegetation. Other
18 portions of the SEZ contain generally light gray gravel flats. Some areas are devoid or nearly
19 devoid of vegetation.
20

21 No permanent water features are present on the SEZ. This landscape type is common
22 within the region.
23

24 Although the SEZ itself is generally natural appearing, cultural modifications within the
25 SEZ detract somewhat from the SEZ's scenic quality. In addition to I-10, State Route 177, and
26 Midland Road, several gravel and dirt roads of various sizes cross the SEZ. Transmission lines
27 also cross the SEZ. An apparently abandoned railroad runs through the eastern portion of the
28 SEZ. The Midland Long Term Visitor Area is also located on the east side of the SEZ. An
29 existing 500-kV transmission line runs east-west along I-10 and parallel to the southern SEZ
30 boundary. In addition, a 230-kV line passes through the far western section of the SEZ, and a
31 69-kV line passes through the eastern portion of the SEZ, along with other transmission lines
32 (see Section 9.4.2).
33

34 Off-site views are dominated by the surrounding mountain ranges, which, in some cases,
35 for example, the Coxcomb, McCoy, Big Maria, Little Maria, and Mule Mountains, rise from the
36 valley floor immediately adjacent to the SEZ. Other ranges, such as the Eagle, Chuckwalla, Little
37 Chuckwalla, and Palen Mountains, are separated from the SEZs by one to several miles of
38 bajadas or valley floor. The mountain slopes and peaks around the SEZ are, in general, visually
39 pristine, as they are largely within congressionally designated WAs.
40

41 The general lack of topographic relief, water, and variety results in low scenic quality on
42 the valley floor; however, because of the flatness of the landscape, the lack of trees, and the
43 breadth of the Chuckwalla Valley, the SEZ presents a vast panoramic landscape with sweeping
44 views of the surrounding mountains that add significantly to the scenic quality of the SEZ. In
45 general, the mountains appear to be devoid of vegetation, and their generally jagged, irregular
46 form and brown/garnet colors provide dramatic visual contrasts to the strong horizontal line,

1 green vegetation, and light-colored soils of the valley floor, particularly when viewed from
2 nearby locations within the SEZ. Panoramic views of the SEZ are shown in Figures 9.4.14.1-2,
3 9.4.14.1-3, and 9.4.14.1-4.

4
5 Off-site cultural modifications near the SEZ detract somewhat from the SEZ's scenic
6 quality. The abandoned Eagle Mountain Mine is prominently visible in the Eagle Mountains
7 from the far northwest portion of the SEZ. Near the western boundary of the SEZ are several
8 small, private lots and homes, including a housing development at Lake Tamarisk, immediately
9 adjacent to the farthest southwest portion of the SEZ. Ironwood State Prison is visible from
10 nearby locations within the far southeastern portion of the SEZ. Traffic on I-10 adjacent to or
11 near the SEZ is visible from the southern portions of the SEZ.

12
13 While the lands to the north and west of the SEZ are generally undeveloped mountains,
14 the lands to the southeast are agricultural, and there is development visible along I-10 just south
15 of the SEZ, though areas south of the SEZ beyond I-10 are generally undeveloped. Aside from
16 agriculture and development in the I-10 corridor, off-site views from the SEZ include isolated
17 ranches, homes, and associated structures located on private lands near the SEZ, as well as local
18 roads and airstrips. Scattered tanks and other structures associated with ranching and farming are
19 also visible.

20
21 While these cultural modifications within and around the SEZ generally detract from the
22 scenic quality of the SEZ, the SEZ is so large that from many locations within it, these features
23 are either not visible or so distant as to have minimal effect on views. In addition, most of the
24 cultural disturbances are found in or near the southern and far western portions of the SEZ. From
25 most locations within the SEZ, particularly in the northern and eastern portions of the SEZ, the
26 landscape is generally natural in appearance, with little disturbance apparent.

27
28 The BLM conducted a Visual Resource Inventory (VRI) for the SEZ and surrounding
29 lands in 2010 (BLM 2010e). The VRI evaluates BLM-administered lands based on *scenic*
30 *quality*; *sensitivity level*, in terms of public concern for preservation of scenic values in the
31 evaluated lands; and *distance* from travel routes or key observation points. Based on these three
32 factors, BLM-administered lands are placed into one of four Visual Resource Inventory Classes,
33 which represent the relative value of the visual resources. Class I and II are the most valued;
34 Class III represents a moderate value; and Class IV represents the least value. Class I is reserved
35 for specially designated areas, such as national wildernesses and other congressionally and
36 administratively designated areas where decisions have been made to preserve a natural
37 landscape. Class II is the highest rating for lands without special designation. More information
38 about VRI methodology is available in Section 5.7 and in *Visual Resource Inventory*, BLM
39 Manual Handbook 8410-1 (BLM 1986a).

40
41 The VRI map for the SEZ and surrounding lands is shown in Figure 9.4.14.1-5. The VRI
42 classes for the SEZ are VRI Class II, indicating high relative visual values; Class III, indicating
43 moderate relative visual values; and Class IV, indicating low relative visual values. Within the
44 SEZ, VRI Class II areas include lands within 5 mi (8 km) of Joshua Tree NP in the northwestern
45 portion of the SEZ, and lands in the southeastern portion of the SEZ between the Palen
46 Mountains and the Little Chuckwalla Mountains. The inventory indicates moderate scenic

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FIGURE 9.4.14.1-2 Approximately 120° Panoramic View of Western Portion of the Proposed Riverside East SEZ from Desert Center Facing Northeast, Including Lake Tamarisk (foreground) and Coxcomb Mountains in Joshua Tree NP (background center)

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FIGURE 9.4.14.1-3 Approximately 180° Panoramic View of the Proposed Riverside East SEZ from I-10 near Ford Dry Lake Facing North, Including Chuckwalla Mountains (far left), Palen Mountains (background center), and McCoy Mountains (right)

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FIGURE 9.4.14.1-4 Approximately 120° Panoramic View of the Northeastern Portion of the Proposed Riverside East SEZ from McCoy Wash Facing Northeast, Including Big Maria Mountains

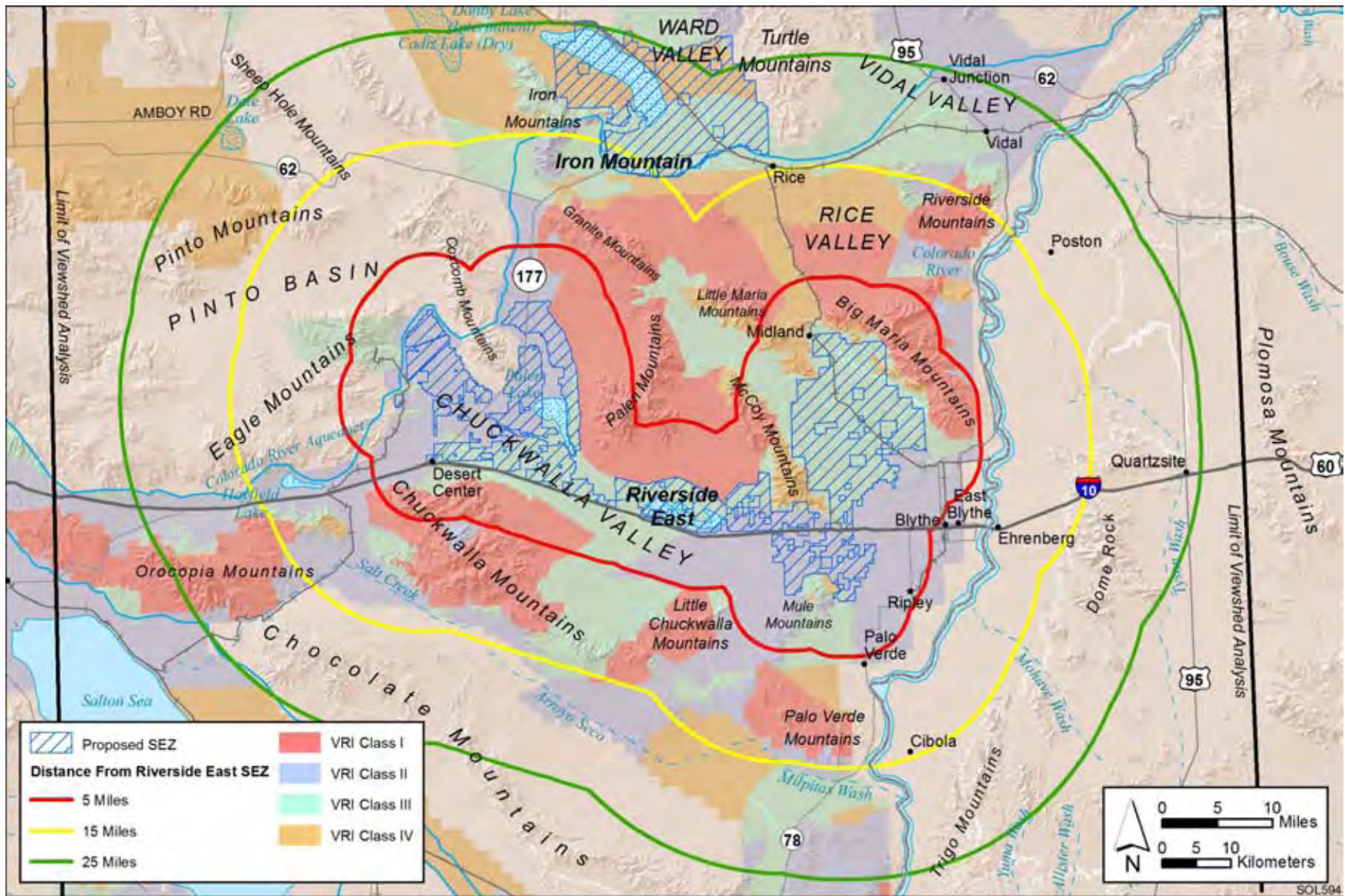


FIGURE 9.4.14.1-5 Visual Resource Inventory Values for the Proposed Riverside East SEZ and Surrounding Lands

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1 quality for the Chuckwalla Valley. The scenic quality rating includes a high score for attractive
2 off-site views and low scores for landform variety and the presence of water. The inventory
3 indicates high sensitivity for the SEZ lands near Joshua Tree NP, noting a high level of public
4 concern for the heavily visited NP. The inventory indicates high sensitivity for the Class II area
5 in the southeastern portion of the SEZ, based on heavy recreational use, the presence of a BLM
6 Backcountry Byway (the Bradshaw Trail) and historic trails, and close proximity to
7 congressionally designated wilderness and ACECs. Both areas were designated as foreground–
8 middleground distance zones, based on proximity to major or secondary travel routes.
9

10 VRI Class III lands include the central portion of the Chuckwalla Valley within the west–
11 central, southern, and northeastern parts of the SEZ. These lands received lower sensitivity
12 ratings than the Class II areas, primarily because they are farther from Joshua Tree NP and
13 other high-value scenic resource areas. They received moderate scores for sensitivity, in part
14 because of high visibility from I-10, their inclusion in the CDCA, and their proximity to the NP
15 and other WAs. VRI Class IV lands include very small areas on the edges of the northeastern
16 part of the SEZ, corresponding to areas where mining damage in the McCoy and Big Maria
17 Mountains is visible.
18

19 In the Barstow, El Centro, Needles, and Palm Springs-South Coast FOs, lands within the
20 25-mi (40-km), 650-ft (198-m) viewshed of the SEZ contain 318,419 acres (1,288.60 km²) of
21 VRI Class I areas in Palen-McCoy WA and other special designation lands; 390,052 acres
22 (1,578.48 km²) of VRI Class II areas, primarily west, southwest, and southeast of the SEZ;
23 429,146 acres (1,736.69 km²) of Class III areas, primarily in the Chuckwalla Valley north and
24 south of the SEZ; and 176,428 acres (713.98 km²) of VRI Class IV areas, concentrated primarily
25 in heavily mined mountain ranges and the floors of valleys adjacent to Chuckwalla Valley,
26 including Rice and Ward Valleys.
27

28 BLM has not assigned VRM classes to the SEZ and surrounding lands. More information
29 about the BLM VRM program is available in Section 5.12 and in *Visual Resource Management*,
30 BLM Manual Handbook 8400 (BLM 1984).
31
32

33 **9.4.14.2 Impacts** 34

35 The potential for impacts from utility-scale solar energy facilities on visual resources
36 within the proposed Riverside East SEZ and surrounding lands, as well as the impacts of related
37 projects (e.g., access roads and transmission lines) outside of the SEZ, is presented in this
38 section.
39

40 Site-specific impact assessment is needed to systematically and thoroughly assess visual
41 impact levels for a particular project. Without precise information about the location of a project
42 and a relatively complete and accurate description of its major components and their layout, it is
43 not possible to assess precisely the visual impacts associated with the facility. However, if the
44 general nature and location of a facility are known, a more generalized assessment of potential
45 visual impacts can be made by describing the range of expected visual changes and discussing
46 contrasts typically associated with these changes. In addition, a general analysis can be used to

1 identify sensitive resources that may be at risk if a future project is sited in a particular area.
2 Detailed information about the methodology employed for the visual impact assessment for this
3 PEIS, including assumptions and limitations, is presented in Appendix M.
4

5 *Potential Glint and Glare Impacts.* Similarly, the nature and magnitude of potential glint-
6 and glare-related visual impacts for a given solar facility are highly dependent on viewer
7 position, sun angle, the nature of the reflective surface and its orientation relative to the sun and
8 the viewer, atmospheric conditions, and other variables. The determination of potential impacts
9 from glint and glare from solar facilities within a given proposed SEZ would require precise
10 knowledge of these variables and is not possible given the scope of this PEIS. Therefore, the
11 following analysis does not describe or suggest potential contrast levels arising from glint and
12 glare for facilities that might be developed within the SEZ; however, it should be assumed that
13 glint and glare are possible visual impacts from *any* utility-scale solar facility, regardless of size,
14 landscape setting, or technology type. The occurrence of glint and glare at solar facilities could
15 potentially cause large though temporary increases in brightness and visibility of the facilities.
16 The visual contrast levels projected for sensitive visual resource areas discussed in the following
17 analysis do not account for potential glint and glare effects; however, these effects would be
18 incorporated into a future site- and project-specific assessment that would be conducted for
19 specific proposed utility-scale solar energy projects. For more information about potential glint
20 and glare impacts associated with utility-scale solar energy facilities, see Section 5.12 of this
21 PEIS.
22
23

24 ***9.4.14.2.1 Impacts on the Proposed Riverside East SEZ***

25

26 Some or all of the SEZ could be developed for one or more utility-scale solar energy
27 projects, utilizing one or more of the solar energy technologies described in Appendix F.
28 Because of the industrial nature and large size of utility-scale solar energy facilities, large visual
29 impacts on the SEZ would occur as a result of the construction, operation, and decommissioning
30 of solar energy projects. In addition, large impacts could occur at solar facilities utilizing highly
31 reflective surfaces or major light-emitting facility components (solar dish, parabolic trough, and
32 power tower technologies), with lesser impacts associated with reflective surfaces expected from
33 PV facilities. These impacts would be expected to involve major modification of the existing
34 character of the landscape and would likely dominate the views from nearby locations.
35 Additional, and potentially large impacts would occur as a result of the construction, operation,
36 and decommissioning of related facilities, such as access roads and electric transmission lines
37 within the SEZ (however, no new transmission line construction outside of the proposed SEZ
38 was assessed; see Section 9.4.1.2). While the primary visual impacts associated with solar energy
39 development within the SEZ would occur during daylight hours, lighting required for utility-
40 scale solar energy facilities would be a potential source of visual impacts at night, both within
41 the SEZ and on surrounding lands.
42

43 Common and technology-specific visual impacts from utility-scale solar energy
44 development, as well as impacts associated with electric transmission lines, are discussed in
45 Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and
46 decommissioning, and some impacts could continue after project decommissioning. Visual

1 impacts resulting from solar energy development in the SEZ would be in addition to impacts
2 from solar energy development and other development that may occur on other public or private
3 lands within the SEZ viewshed and are subject to cumulative effects. For discussion of
4 cumulative impacts, see Section 9.4.22.4.13 of the PEIS.
5

6 The changes described above would be expected to be consistent with BLM VRM
7 objectives for VRM Class IV, as seen from nearby KOPs. The BLM has not assigned VRM
8 classes to the SEZ and surrounding lands. More information about impact determination using
9 the BLM VRM program is available in Section 5.12 and in *Visual Resource Contrast Rating*,
10 BLM Manual Handbook 8431-1 (BLM 1986b).
11

12 Implementation of the programmatic design features intended to reduce visual impacts
13 (described in Appendix A, Section A.2.2) would be expected to reduce visual impacts associated
14 with utility-scale solar energy development within the SEZ; however, the degree of effectiveness
15 of these design features could be assessed only at the site- and project-specific level. Given the
16 large scale, reflective surfaces, and strong regular geometry of utility-scale solar energy facilities
17 and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities
18 away from sensitive visual resource areas and other sensitive viewing areas would be the primary
19 means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures
20 would generally be limited, but would be important to reduce visual contrasts to the greatest
21 extent possible.
22
23

24 ***9.4.14.2.2 Impacts on Lands Surrounding the Proposed Riverside East SEZ***

25
26

27 **Impacts on Selected Sensitive Visual Resource Areas**

28

29 Because of the large size of utility-scale solar energy facilities and the generally flat,
30 open nature of the proposed SEZ, lands outside the SEZ would be subjected to visual impacts
31 related to construction, operation, and decommissioning of utility-scale solar energy facilities.
32 The affected areas and extent of impacts would depend on a number of visibility factors and
33 viewer distance (for a detailed discussion of visibility and related factors, see Section 5.12).
34 A key component in determining impact levels is the intervisibility between the project and
35 potentially affected lands; if topography, vegetation, or structures screen the project from viewer
36 locations, there is no impact.
37

38 Preliminary viewshed analyses were conducted to identify which lands surrounding the
39 proposed SEZ could have views of solar facilities in at least some portion of the SEZ
40 (see Appendix M for important information on assumptions and limitations of the methods used).
41 Four viewshed analyses were run, assuming four different heights representative of project
42 elements associated with potential solar energy technologies: 24.6 ft (7.5 m) for PV and
43 parabolic trough arrays; 38 ft (11.6 m) for solar dishes and power blocks for CSP technologies;
44 150 ft (45.7 m) for transmission towers and short solar power towers; and 650 ft (198.1 m) for
45 tall solar power towers. Viewshed maps for the SEZ for all four solar technology heights are
46 available in Appendix N.
47

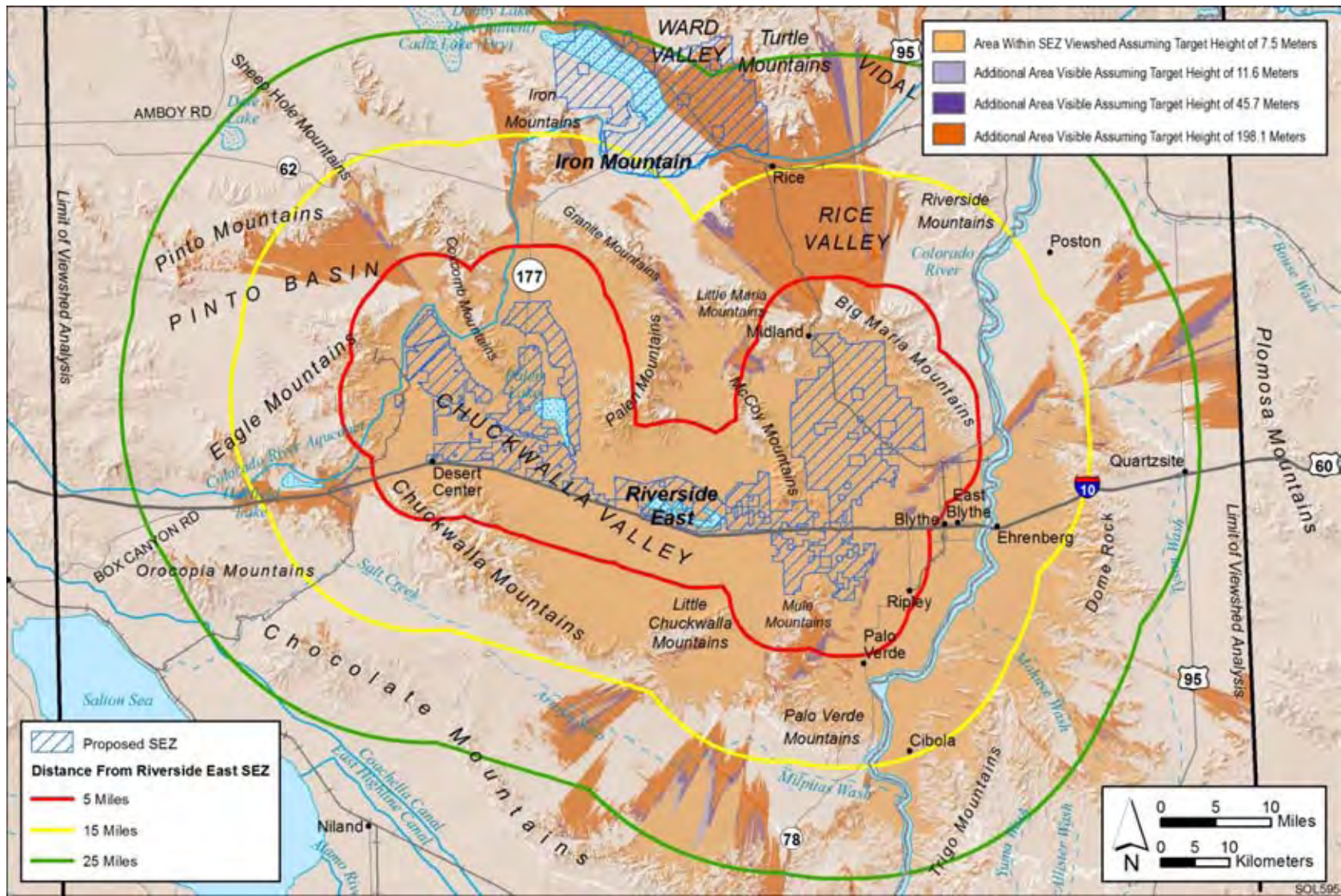
1 Because of the large size of the SEZ, the area's topography, and the general lack of
2 screening vegetation, the viewshed of the SEZ is enormous. Within 25 mi (41 km) of the SEZ,
3 650-ft (198-m) power towers within the SEZ could theoretically be visible within an area of
4 more than 2,100,000 acres (8,500 km²), which is more than twice the land area of the state of
5 Rhode Island. The viewshed includes large portions of the mountain ranges surrounding the
6 Chuckwalla Valley and some neighboring valleys, including Ward and Rice Valleys, and the
7 Pinto Basin. Because the lands surrounding the SEZ contain a number of sensitive visual
8 resource areas, these areas could be subject to visual impacts associated with solar energy
9 development within the SEZ.

10
11 Figure 9.4.14.2-1 shows the combined results of the viewshed analyses for all four solar
12 technologies. The colored portions indicate areas with clear lines of sight to one or more areas
13 within the SEZ and from which solar facilities within these areas of the SEZ would be expected
14 to be visible, assuming the absence of screening vegetation or structures and adequate lighting
15 and other atmospheric conditions. The light brown areas are locations from which PV and
16 parabolic trough arrays located in the SEZ could be visible. Solar dishes and power blocks
17 for CSP technologies would be visible from the areas shaded in light brown and the additional
18 areas shaded in light purple. Transmission towers and short solar power towers would be visible
19 from the areas shaded light brown, light purple, and the additional areas shaded in dark purple.
20 Power tower facilities located in the SEZ could be visible from areas shaded light brown, light
21 purple, dark purple, and at least the upper portions of power tower receivers could be visible
22 from the additional areas shaded in medium brown.

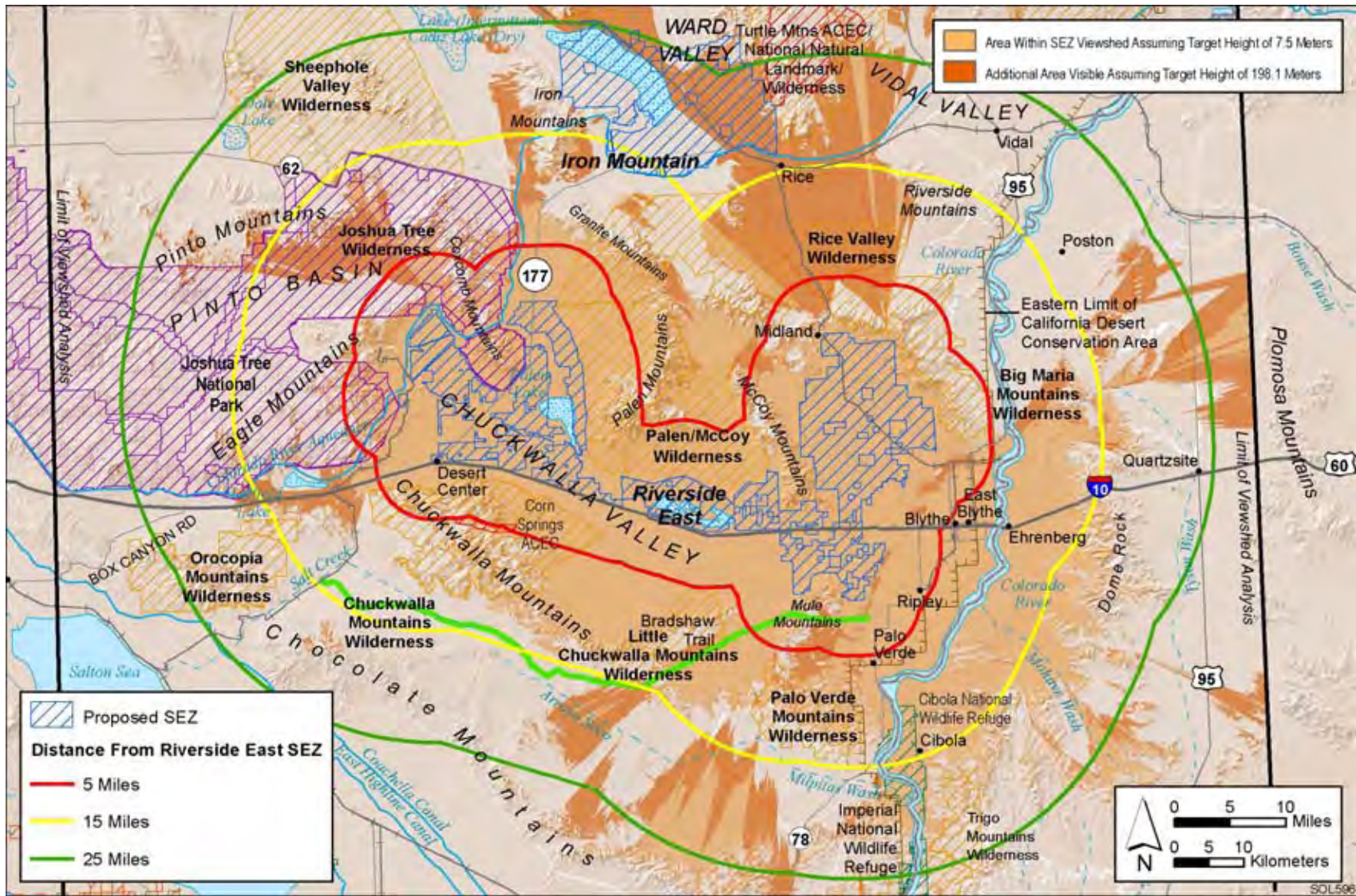
23
24 For the following visual impact discussion, the tall solar power tower (650 ft [198.1 m])
25 and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds are shown in figures and
26 discussed in the text. These heights represent the maximum and minimum landscape visibility
27 for solar energy technologies analyzed in this PEIS. Viewsheds for solar dish and CSP
28 technology power blocks (38 ft [11.6 m]) and for transmission towers and short solar power
29 towers (150 ft [45.7 m]) are presented in Appendix N. The visibility of these facilities would fall
30 between that for tall power towers and PV and parabolic trough arrays.

31 32 33 **Impacts on Selected Federal-, State-, and BLM-Designated Sensitive Visual** 34 **Resource Areas**

35
36 Figure 9.4.14.2-2 shows the results of a GIS analysis that overlays selected federal-,
37 state-, and BLM-designated sensitive visual resource areas onto the combined tall solar power
38 tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds, in order
39 to illustrate which of these sensitive visual resource areas could have views of solar facilities
40 within the SEZ and therefore potentially would be subject to visual impacts from those facilities.
41 Distance zones that correspond with BLM's VRM system-specified foreground–middleground
42 distance (5 mi [8 km]), background distance (15 mi [24.1 km]), and a 25-mi (40.2-km) distance
43 zone are shown as well, in order to indicate the effect of distance from the SEZ on impact levels,
44 which are highly dependent on distance.



1
2 **FIGURE 9.4.14.2-1 Viewshed Analyses for the Proposed Riverside East SEZ and Surrounding Lands, Assuming Solar Technology**
3 **Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar**
4 **development within the SEZ could be visible)**



1
2 **FIGURE 9.4.14.2-2** Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds
3 for the Proposed Riverside East SEZ

1 The scenic resources included in the analysis were as follows:
2

- 3 • National Parks, National Monuments, National Recreation Areas, National
4 Preserves, National Wildlife Refuges, National Reserves, National
5 Conservation Areas, National Historic Sites;
6
- 7 • Congressionally authorized Wilderness Areas;
8
- 9 • Wilderness Study Areas;
10
- 11 • National Wild and Scenic Rivers;
12
- 13 • Congressionally authorized Wild and Scenic Study Rivers;
14
- 15 • National Scenic Trails and National Historic Trails;
16
- 17 • National Historic Landmarks and National Natural Landmarks;
18
- 19 • All-American Roads, National Scenic Byways, State Scenic highways, and
20 BLM- and USFS-designated scenic highways/byways; BLM-designated
21 Special Recreation Management Areas; and
22
- 23 • ACECs designated because of outstanding scenic qualities.
24

25 Potential impacts on specific sensitive resource areas visible from and within 25 mi
26 (40 km) of the proposed Riverside East SEZ are discussed below. The results of this analysis are
27 also summarized in Table 9.4.14.2-1. Further discussion of impacts on these areas is available in
28 Sections 9.4.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and
29 9.4.17 (Cultural Resources) of this PEIS.
30

31 The following visual impact analysis describes *visual contrast levels* rather than *visual*
32 *impact levels*. *Visual contrasts* are changes in the landscape as seen by viewers, including
33 changes in the forms, lines, colors, and textures of objects seen in the landscape. A measure of
34 *visual impact* includes potential human reactions to the visual contrasts arising from a
35 development activity, based on viewer characteristics, including attitudes and values,
36 expectations, and other characteristics that are viewer- and situation-specific. Accurate
37 assessment of visual impacts requires knowledge of the potential types and numbers of viewers
38 for a given development and their characteristics and expectations; specific locations where the
39 project might be viewed from; and other variables that were not available or not feasible to
40 incorporate in this PEIS analysis. These variables would be incorporated into a future site- and
41 project-specific assessment that would be conducted for specific proposed utility-scale solar
42 energy projects. For more discussion of visual contrasts and impacts, see Section 5.12 of the
43 PEIS.
44
45

TABLE 9.4.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40.2-km) Viewshed of the Proposed Riverside East SEZ, Assuming a Viewshed Analysis Target Height of 650 ft (198.1 m)

Feature Type	Feature Name (Total Acreage)	Feature Area or Linear Distance ^a		
		Visible within 5 mi	Visible between	
			5 and 15 mi	15 and 25 mi
National Conservation Area	California Desert (25,919,319 acres)	763,254 acres (3%) ^b	479,968 acres (2%)	251,330 acres (1%)
NPs	Joshua Tree (793,331 acres)	53,426 acres (7%)	57,990 acres (7%)	6,175 acres (0.8%)
Scenic Highway	Bradshaw Trail	9 mi (15 km)	14 mi (23 km)	0 acres
WAs	Big Maria Mountains (46,056 acres)	8,873 acres (19%)	0 acres	0 acres
	Chuckwalla Mountains (88,202 acres)	31,482 acres (36%)	18,470 acres (21%)	0 acres
	Imperial Refuge (15,714 acres)	0 acres	0 acres	560 acres (4%)
	Joshua Tree (586,623 acres)	40,421 acres (7%)	55,696 acres (9%)	3,343 acres (0.5%)
	Little Chuckwalla Mountains (28,708 acres)	76 (0.3%)	16,603 acres (58%)	0 acres
	Orocopia Mountains (54,709 acres)	0 acres	143 acres (0.3%)	2,108 acres (4%)
	Palen-McCoy (224,414 acres)	95,559 acres (43%)	75,107 acres (33%)	0 acres
	Palo Verde Mountains (30,403 acres)	0 acres	13,254 acres (44%)	0 acres
	Rice Valley (43,412 acres)	7,881 acres (18%)	27,892 acres (64%)	0 acres

TABLE 9.4.14.2-1 (Cont.)

Feature Type	Feature Name (Total Acreage)	Feature Area or Linear Distance ^a		
		Visible within 5 mi	Visible between	
			5 and 15 mi	15 and 25 mi
WAs (Cont.)	Sheephole Valley (195,002 acres)	0 acres	357 acres (0.2%)	2,376 acres (1%)
	Trigo Mountains (30,046 acres)	0 acres	0 acres	3,512 acres (12%)
	Turtle Mountains (182,610 acres)	0 acres	0 acres	13,827 acres (8%)
NWRs	Cibola (18,398 acres)	0 acres	7,336 acres (40%)	9,785 acres (53%)
	Imperial (31,465 acres)	0 acres	0 acres	1,749 acres (6%)
National Natural Landmarks	Turtle Mountains (50,057 acres)	0 acres	0 acres	2,355 acres (5%)
ACECs designated for outstanding scenic values	Corn Springs (2,463 acres)	352 acres (14%)	723 acres (29%)	0 acres
	Turtle Mountains (50,057 acres)	0 acres	0 acres	2,355 acres (5%)

^a To convert acres to km², multiply by 0.004047; to convert mi to km, multiply by 1.609.

^b Percentage of total feature area for areal features.

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National Conservation Areas

- *California Desert Conservation Area*—The CDCA is a 26-million-acre (105,000-km²) parcel of land in southern California designated by Congress in 1976 through the Federal Land Policy and Management Act. About 10 million acres (40,000 km²) of the CDCA is administered by the BLM. The proposed Riverside East SEZ is located within the CDCA.
- The CDCA management plan notes the “superb variety of scenic values” in the CDCA (BLM 1980), and lists scenic resources as needing management to preserve their value for future generations. The CDCA management plan

GOOGLE EARTH™ VISUALIZATIONS

The visual impact analysis discussion in this section utilizes three-dimensional Google Earth™ perspective visualizations of hypothetical solar facilities placed within the SEZ. The visualizations include simplified wireframe models of a hypothetical solar power tower facility. The models were placed at various locations within the SEZ as visual aids for assessing the approximate size and viewing angle of utility-scale solar facilities. The visualizations are intended to show the apparent size, distance, and configuration of the SEZ, as well as the apparent size of a typical utility-scale solar power tower project and its relationship to the surrounding landscape, as viewed from potentially sensitive visual resource areas within the viewshed of the SEZ.

The visualizations are not intended to be realistic simulations of the actual appearance of the landscape or of proposed utility-scale solar energy projects. The placement of models within the SEZ did not reflect any actual planned or proposed projects within the SEZ and did not take into account engineering or other constraints that would affect the siting or choice of facilities for this particular SEZ. The number of facility models placed in the SEZ does not reflect the 80% development scenario analyzed in this PEIS, but the discussion of expected visual contrast levels does account for the 80% development scenario. A solar power tower was chosen for the models because the unique height characteristics of power tower facilities make their visual impact potential extend beyond other solar technology types.

1
2
3 divides CDCA lands into multiple-use classes based on management
4 objectives. The class designations govern the type and degree of land use
5 actions allowed within the areas defined by class boundaries. All land use
6 actions and resource-management activities on public lands within a multiple-
7 use class delineation must meet the guidelines given for that class.
8

9 The proposed SEZ is within areas classified as multiple use classes “L” and
10 “M.” The area of the SEZ around Joshua Tree NP and east of Palen-McCoy
11 WA is designated as Class “L.” Class “L” protects sensitive, natural, scenic,
12 ecological, and cultural resource values. Class “L” management provides for
13 generally lower intensity, carefully controlled multiple use of resources, while
14 ensuring that sensitive values are not significantly diminished. Multiple-Use
15 Class “M” (Moderate Use) is based upon a controlled balance between higher
16 intensity use and protection of public lands. This class provides for a wide
17 variety of present and future uses such as mining, livestock grazing,
18 recreation, energy, and utility development. Class “M” management is also
19 designed to conserve desert resources and to mitigate damage to those
20 resources caused by permitted uses.
21

- 22 • Utility-scale solar development within the SEZ would be an allowable use
23 under the CDCA management plan, assuming mitigation measures were used
24 to minimize visual impacts; however, construction and operation of solar
25 facilities under the PEIS development scenario would result in substantial
26 visual impacts on the SEZ and some surrounding lands within the SEZ
27 viewshed that could not be completely mitigated.
28

- 29 • Portions of the CDCA within the 650-ft (198.1-m) viewshed for the Riverside
30 East SEZ include approximately 1,494,552 acres (6,048 km²), or 6% of the

1 total CDCA acreage. Portions of the CDCA within the 24.6-ft (7.5-m)
2 viewshed encompass approximately 1,048,201 acres (4,242 km²), or 4% of
3 the total CDCA acreage.
4

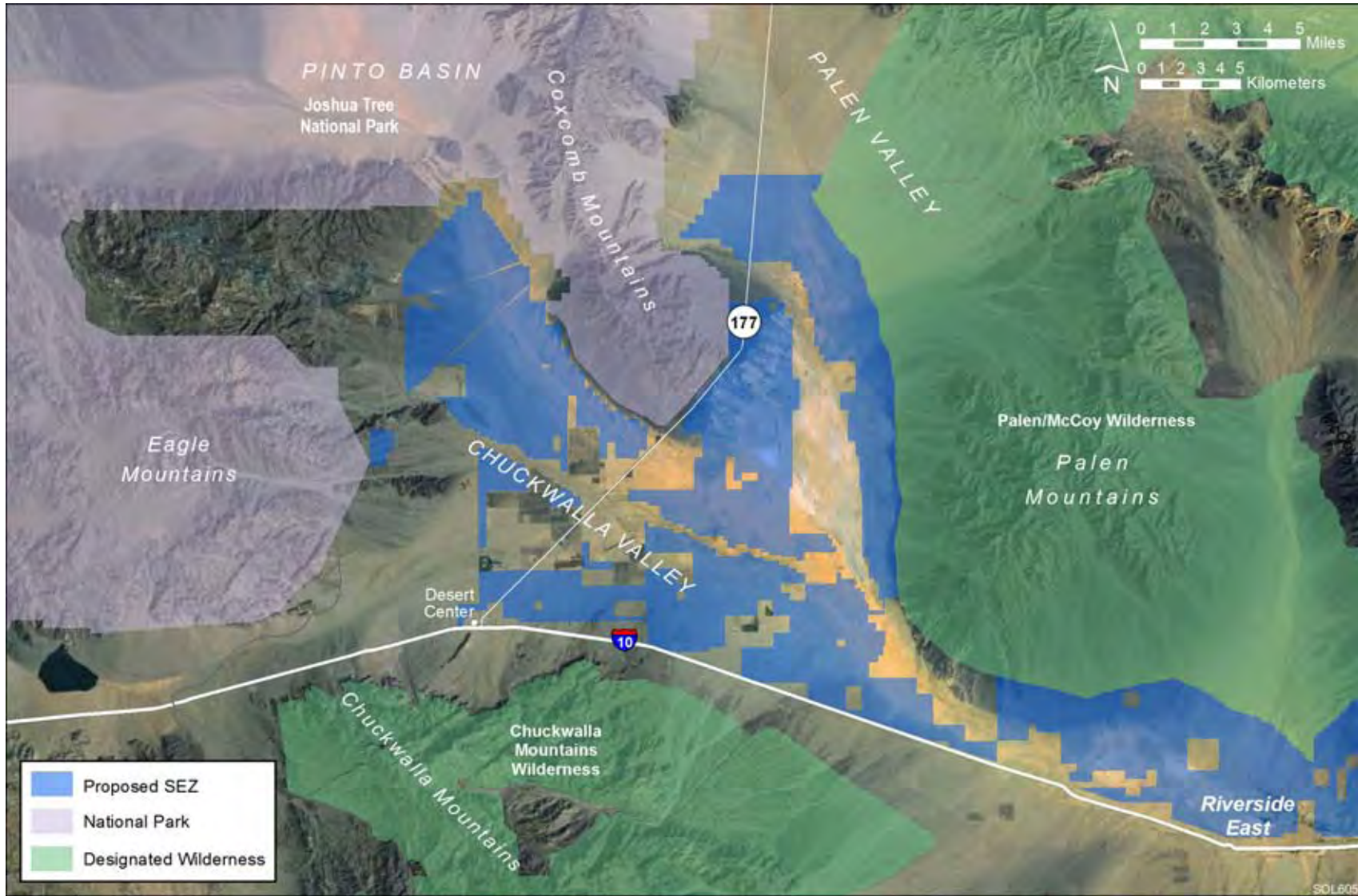
5 6 *National Parks*

- 7
8 • *Joshua Tree NP*—A portion of the eastern boundary of Joshua Tree NP is
9 adjacent to the SEZ’s northwestern boundary, and other portions of the NP are
10 located between 0.2 and 2.5 mi (0.3 to 4 km) of the SEZ. The park contains
11 paved roads popular for scenic driving, several miles of hiking trails, and four-
12 wheel drive roads. There are campgrounds; backcountry camping and hiking
13 are allowed; and the park is a popular winter climbing area. Stargazing is
14 popular year-round, as is bird watching. Most of the park’s services and
15 facilities are in the western portion of the park, as is most recreational use;
16 however, the undeveloped wilderness portions of the park, including those
17 areas near the SEZ, are visited by persons seeking solitude and wilderness
18 experiences or engaging in other activities appropriate to the relatively
19 undisturbed environment.
20

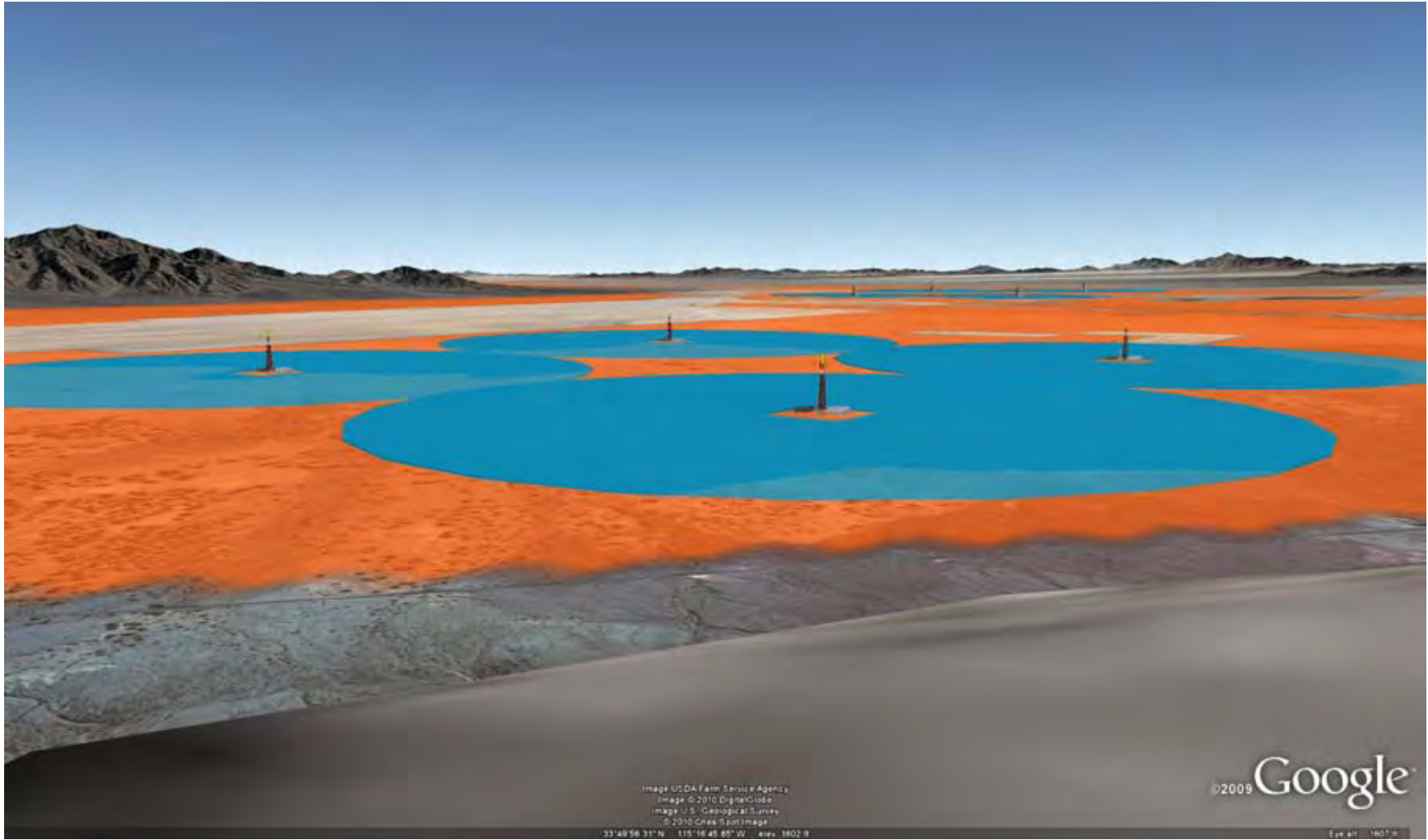
21 As shown in Figure 9.4.14.2-3, the northwest-southeast trending Coxcomb
22 Mountains within the national park project into the northwestern portion of
23 the SEZ. Portions of the SEZ are located both northeast and southwest of the
24 projection, in essence “wrapping around” the Coxcomb Mountains on all sides
25 except the northwest, where the Coxcomb Mountain portion of the national
26 park connects to the main portion of the park. The park is separated from the
27 SEZ by State Route 177 (about 0.05 mi [0.09 km] in width) for about 4 mi
28 (6.4 km), and approximately another 44 mi (71 km) of the park boundary is
29 within 5 mi (8 km, the BLM VRM foreground–middleground distance) of the
30 SEZ.
31

32 The area of the national park within the 650-ft (198.1-m) viewshed of the
33 SEZ includes 117,591 acres (476 km²), or 15% of the total park acreage. The
34 area within the 24.6-ft (7.5-m) viewshed of the SEZ includes 68,860 acres
35 (279 km²), or 9% of the total park acreage. The 650-ft (198.1-m) SEZ
36 viewshed extends approximately 14.2 mi (22.9 km) into the national park
37 from the northwestern boundary of the SEZ.
38

39 Figure 9.4.14.2-4 is a Google Earth visualization of the SEZ as seen from an
40 unnamed ridge in the northeastern portion of the national park, near the
41 southeast end of the Coxcomb Mountains. The visualization includes
42 simplified wireframe models of a hypothetical solar power tower facility. The
43 models were placed at various locations within the SEZ, as a visual aid for
44 assessing the approximate size and viewing angle of utility-scale solar



1
2 **FIGURE 9.4.14.2-3 Photomap of the Proposed Riverside East SEZ (shown in blue tint) and Surrounding Lands in the Vicinity of**
3 **Joshua Tree NP**



1

FIGURE 9.4.14.2-4 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint in Southeast Coxcomb Mountains within Joshua Tree NP

2

3

4

5

1 facilities. The receiver towers depicted in the visualization are properly scaled
2 models of a 459-ft (139.9-m) power tower with an 867-acre (3.5-km²) field of
3 12-ft (3.7-m) heliostats, each representing approximately 100 MW of electric
4 generating capacity. Eleven groups of four models and two groups of two
5 models were placed in the SEZ for this and other visualizations shown in this
6 section of this PEIS. In the visualization, the SEZ area is depicted in orange,
7 the heliostat fields in blue.
8

9 The viewpoint in the visualization is from a highpoint on the first ridge in
10 the Coxcomb Mountains within the NP west of the SEZ, and approximately
11 0.8 mi (1.3 km) from the SEZ boundary. The viewpoint elevation is
12 approximately 1,600 ft (490 m) above mean sea level, and the viewpoint is
13 elevated roughly 1,100 ft (340 m) above the valley floor at the closest point
14 within the SEZ.

15 The upper slopes and peaks of the Coxcomb Mountains are barren with little
16 opportunity for screening. The visualization suggests that from this elevated
17 viewpoint and very short distance to the SEZ, the SEZ would be too large to
18 be encompassed in one view, and viewers would need to turn their heads to
19 scan across the whole SEZ. The view direction shown in the visualization
20 (south-southeast) is near the middle of an approximately 180-degree
21 horizontal arc in which portions of the SEZ and associated solar facilities
22 would be visible from this location before nearby mountains screened the
23 view of the SEZ.
24

25 Two clusters of four power tower facility models are visible; the closest tower
26 of the model cluster in the immediate foreground is approximately 1.8 mi
27 (2.8 km) from the viewpoint, and the closest tower of the model cluster in the
28 background is approximately 9.0 mi (14.5 km) from the viewpoint. The
29 potential visual contrast expected for this viewpoint would vary depending on
30 project locations, technologies, and site designs; however, if facilities were
31 located at these distances, the following might be observed: The tops of solar
32 collector/reflector arrays in the closest parts of the SEZ would be visible.
33 Details of array components (mirrors, panels, dishes, heliostats, and so on)
34 would likely be visible and could be a source of reflections. At short
35 distances, the effects of atmospheric haze would be reduced, so that any bright
36 colors on facilities and shadow contrasts might be easily seen. Worker activity
37 would likely be visible as well.
38

39 Taller ancillary facilities, such as buildings, transmission structures, and
40 cooling towers, and plumes (if present) likely would be visible projecting
41 above the collector/reflector arrays, and their structural details could be
42 evident at least for nearby facilities. The ancillary facilities could create form
43 and line contrasts with the strongly horizontal, regular, and repeating forms
44 and lines of the collector/reflector arrays. Color and texture contrasts would

1 also be likely, but their extent would depend on the materials and surface
2 treatments utilized in the facilities.

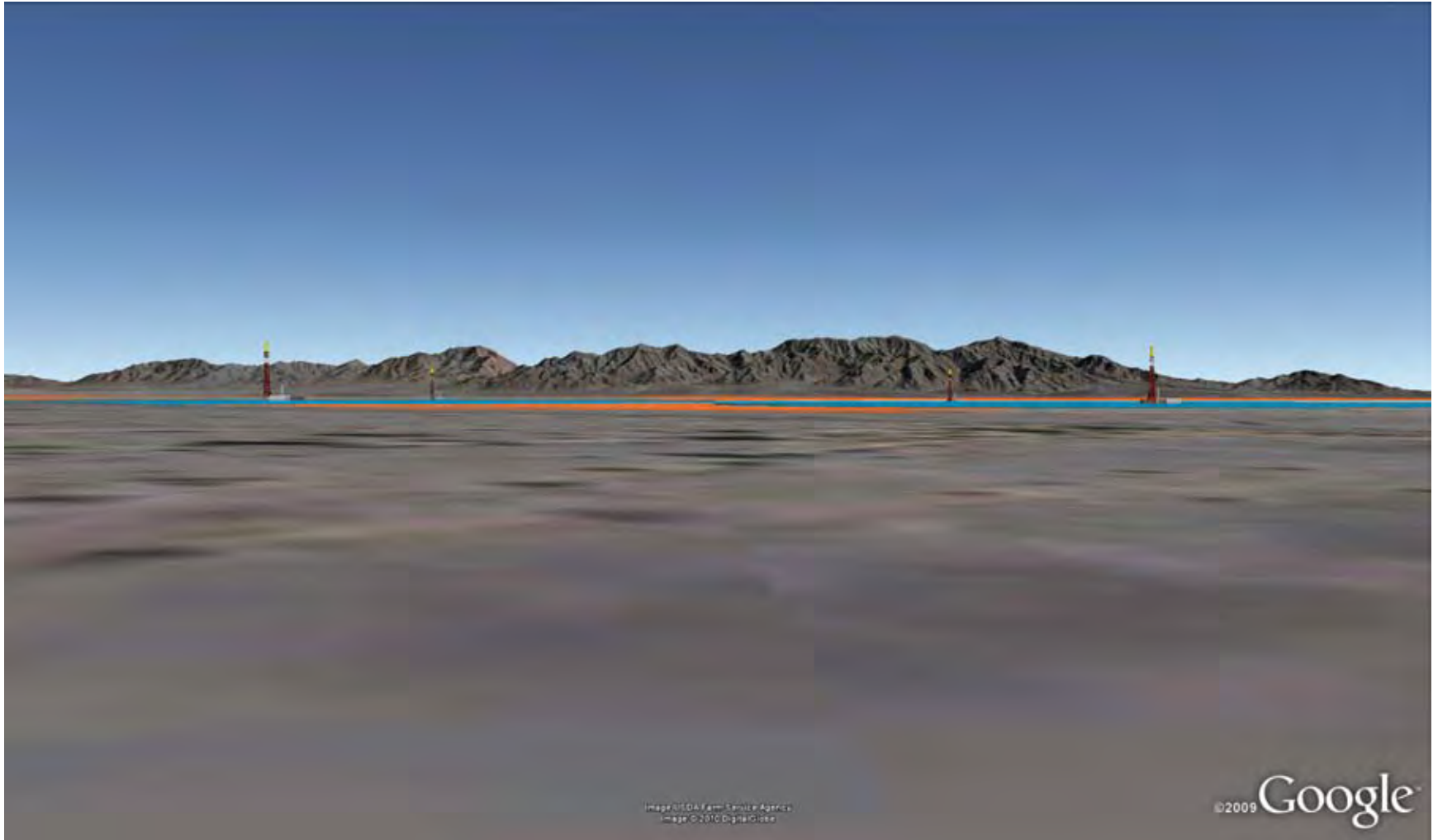
3
4 If power towers were present within the SEZ, when operating, receivers at
5 distances of a few miles or less would likely appear as brilliant nonpoint
6 (i.e., having visible cylindrical or rectangular surfaces) light sources atop
7 clearly discernable tower structures against the backdrop of the valley floor
8 and could potentially cause discomfort when looked at directly. Also, during
9 certain times of the day from certain angles, sunlight on dust particles in the
10 air might result in the appearance of light streaming down from the tower(s).
11 The power towers likely would strongly attract visual attention, as seen from
12 this viewpoint.

13
14 At night, if sufficiently tall, the power towers could have red or white flashing
15 hazard navigation lights that would likely be visible from the national park
16 and could be very conspicuous from this viewpoint, given the dark night skies
17 in the vicinity of the SEZ. Other lighting associated with solar facilities in the
18 SEZ could potentially be visible as well, at least for facilities in the closest
19 portions of the SEZ.

20
21 Facilities at greater distances from the viewpoint would be seen at a lower
22 viewing angle, and because the facilities would be seen more edge-on, the
23 visible area of the facilities would be much smaller. Facilities sufficiently far
24 away would appear as lines or thin bands that would tend to repeat the line of
25 the horizon, reducing visual contrast. Atmospheric haze would tend to reduce
26 color contrast and the sharpness of shadows and strong geometric outlines of
27 facility components and, when combined with the low viewing angle, could
28 make distant facilities harder to discern from the background textures, colors,
29 and forms.

30
31 Because the viewpoint in this visualization is elevated and very close to the
32 SEZ, the SEZ would occupy most of the field of view, and under the 80%
33 development scenario analyzed in this PEIS, solar facilities within the SEZ
34 would likely dominate the view from this location. Because there could be
35 numerous solar facilities within the SEZ, a variety of technologies employed,
36 and a range of supporting facilities that would contribute to visual impacts, a
37 visually complex, man-made appearing industrial landscape could result. This
38 essentially industrial-appearing landscape would contrast greatly with the
39 surrounding natural-appearing lands and would be expected to create strong
40 visual contrasts as viewed from this location within the NP.

41
42 Figure 9.4.14.2-5 is a Google Earth visualization of the SEZ as seen from
43 within the national park on the Chuckwalla Valley floor, near State Route 177,
44 beyond the southern end of the Coxcomb Mountains. The viewpoint is at the
45 same elevation as the valley floor at the closest point within the SEZ and is
46 located approximately 0.4 mi (0.7 km) from the nearest point on the northern



1

2 **FIGURE 9.4.14.2-5 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with**
3 **Power Tower Wireframe Models, as Seen from Viewpoint near State Route 177 within Joshua Tree NP**
4

1 boundary of the SEZ. The viewpoint is less than 0.1 mi (0.2 km) northwest of
2 State Route 177, and the views from this location are very similar to what
3 would be seen by travelers on State Route 177. The view direction shown in
4 the visualization (east–southeast) is near the middle of an approximately
5 260-degree horizontal arc in which portions of the SEZ and associated solar
6 facilities would be visible from this location before nearby mountains
7 screened the view of the SEZ.
8

9 The visualization suggests that from this very short distance to the SEZ, the
10 SEZ would be too large to be encompassed in one view, and viewers would
11 need to turn their heads to scan across the whole SEZ. One cluster of four
12 power tower facility models is visible; the two closest towers are nearly
13 equidistant from the viewpoint at approximately 2 mi (3.2 km).
14

15 The visualization suggests that despite the very short distance to the power
16 towers and associated collector/reflector arrays, because the viewpoint is at
17 the same elevation as the facility, the collector/reflector arrays would be
18 viewed nearly edge-on, greatly reducing the visible area for each facility, and
19 presenting a banded appearance that would repeat the line of the horizon,
20 tending to reduce visual contrast. If nearby facilities used PV systems and
21 low-profile ancillary facilities, the visual impacts would be minimized, but for
22 facilities utilizing STGs, there would be taller structures visible projecting
23 above the collector/reflector arrays, and in some conditions steam plumes
24 could be present that would add significantly to visual contrasts. These taller
25 elements would add vertical line and form contrasts, and likely color contrasts
26 as well; steam plumes would add color, and possibly line or form contrasts,
27 depending on conditions. Depending on height, these ancillary facilities could
28 add significantly to visual contrasts for some facilities. The tops of solar
29 collector/reflector arrays in the closest parts of the SEZ likely would not be
30 visible.
31

32 If power towers were present within the SEZ, when operating, nearby
33 receivers likely would appear as brilliant nonpoint (i.e., having visible
34 cylindrical or rectangular surfaces) light sources atop clearly discernable
35 tower structures against the backdrop of the sky above the Palen Mountains or
36 against the mountain slopes, and could potentially cause discomfort when
37 looked at directly. Also, during certain times of the day from certain angles,
38 sunlight on dust particles in the air might result in the appearance of light
39 streaming down from the tower(s). The power towers likely would strongly
40 attract visual attention, as seen from this viewpoint. More distant receivers
41 likely would appear as distant points of light against the sky, against the
42 backdrop of the valley floor, or against the bajadas and slopes of the Palen
43 Mountains.
44

45 At night, if sufficiently tall, the power towers could have red or white flashing
46 hazard navigation lights that would likely be visible from the national park

1 and could be very conspicuous from this viewpoint, given the dark night skies
2 in the vicinity of the SEZ. Other lighting associated with solar facilities in the
3 SEZ could potentially be visible as well, at least for facilities in the closest
4 portions of the SEZ.
5

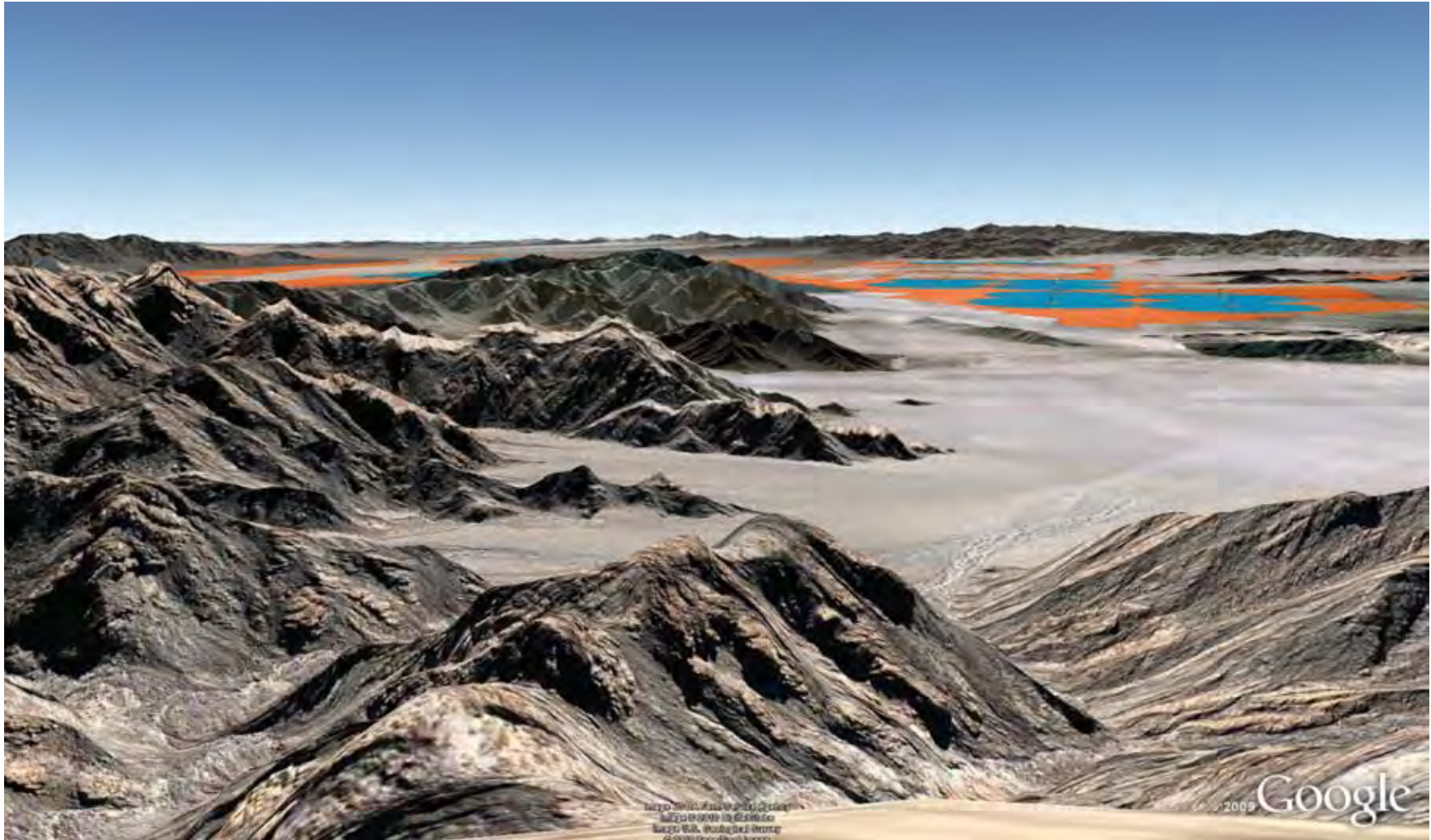
6 The nature of the visual contrasts from solar facilities in the SEZ as observed
7 from this location would depend on the numbers, types, sizes, and locations of
8 solar facilities in the SEZ and on other project- and site-specific factors, but
9 because the viewpoint is very close to the SEZ, the SEZ would occupy the
10 entire horizontal field of view, and under the 80% development scenario
11 analyzed in this PEIS, solar facilities within the SEZ would likely dominate
12 the view from this location. Because there could be numerous solar facilities
13 within the SEZ, with a variety of technologies employed, and a range of
14 supporting facilities that would contribute to visual impacts, a visually
15 complex, man-made appearing industrial landscape could result. This
16 essentially industrial-appearing landscape would contrast greatly with the
17 surrounding natural-appearing lands and would be expected to create strong to
18 very strong visual contrasts as viewed from this location within the NP.
19

20 Figure 9.4.14.2-6 is a Google Earth visualization of the SEZ as seen from a
21 mountain peak north of the Pinto Basin, at the northwestern end of the
22 Coxcomb Mountains within the NP. The viewpoint elevation is approximately
23 4,300 ft (1,300 m), about 3,400 ft (1,040 m) above the valley floor at the
24 closest point within the SEZ. The viewpoint is located approximately 8 mi
25 (13 km) from the nearest point on the northern boundary of the SEZ. The view
26 direction shown in the visualization is southeast.
27

28 The visualization suggests that from this longer distance deeper into the NP,
29 the SEZ can be encompassed in one view. Five clusters of four power tower
30 facility models are visible; the two closest towers are nearly equidistant from
31 the viewpoint at approximately 10 mi (16 km). The farthest tower visible in
32 the image (visible just beyond the end of the Coxcomb Mountains) is
33 approximately 26 mi (42 km) from the viewpoint.
34

35 The visualization shows that while facilities in the SEZ would be viewed at
36 relatively long distances, from this viewpoint height the tops of solar
37 collector/reflector arrays could be seen, increasing the apparent size of the
38 facility, changing its apparent shape, and increasing potential for glinting and
39 glare. The visualization also shows that the SEZ is large enough that even at
40 relatively long distances, it can occupy a substantial portion of the field of
41 view.
42

43 The potential visual contrast expected for this viewpoint would depend on the
44 numbers, types, sizes, and locations of solar facilities in the SEZ and on other
45 project- and site-specific factors, but while the viewpoint is 8 mi (13 km) from
46 the SEZ, the SEZ would occupy nearly the entire horizontal field of view.



1

2 **FIGURE 9.4.14.2-6 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with**
3 **Power Tower Wireframe Models, as Seen from Viewpoint in Northwest Coxcomb Mountains within Joshua Tree NP**

4

5

1 Under the 80% development scenario analyzed in this PEIS, solar facilities
2 within the SEZ would attract visual attention, and would be expected to create
3 strong visual contrasts as viewed from this location within the NP.
4

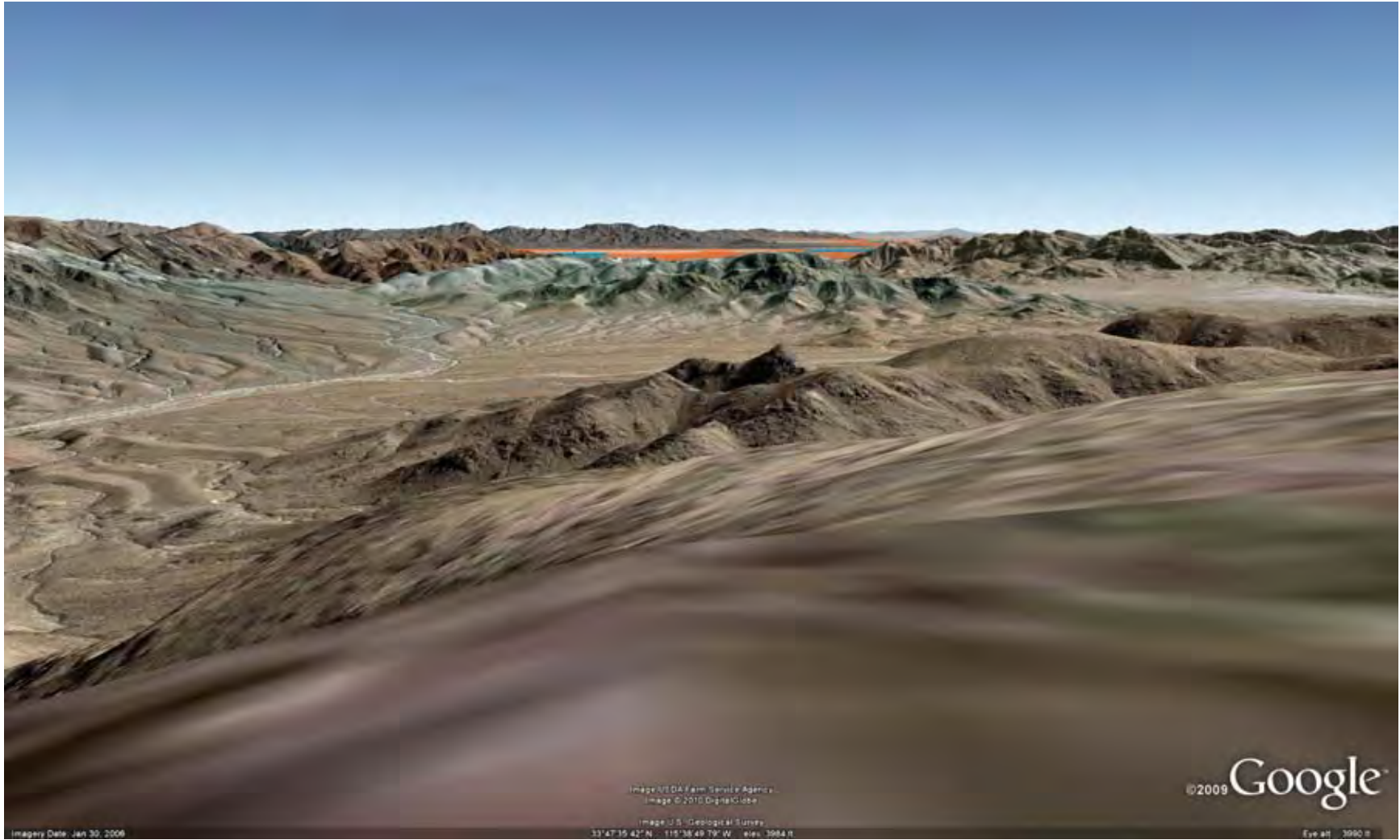
5 Figure 9.4.14.2-7 is a Google Earth visualization of the SEZ as seen from a
6 peak within the Eagle Mountains. The viewpoint elevation is approximately
7 4,000 ft (1,300 m), about 3,200 ft (580 m) above the valley floor at the closest
8 visible point within the SEZ. The viewpoint is located approximately 11 mi
9 (18 km) from the nearest point on the far western boundary of the SEZ. The
10 view direction shown in the visualization is east. Two clusters of four power
11 tower facility models are partially visible; the closest towers are
12 approximately 15 mi (24 km) from the viewpoint.
13

14 The visualization shows a more typical view of the SEZ from the interior of
15 the national park. The mountainous portions of the park are quite rugged, and
16 many views out of the park toward the SEZ would be partially or fully
17 screened by intervening terrain. In this case, much of the view of the distant
18 SEZ is screened by mountains along the eastern edge of the Eagle Mountains.
19 A portion of the SEZ is visible, but solar facilities in the visible area would be
20 distant and seen edge-on. The SEZ occupies too small a portion of the field of
21 view to be visually dominant.
22

23 Power tower receivers visible within the SEZ would likely appear as points of
24 light near the eastern horizon; lower height facilities might be difficult to
25 distinguish at the long distances involved, at least in many lighting conditions.
26 At night, if sufficiently tall, the power towers could have red or white flashing
27 hazard navigation lights that likely would be visible from this viewpoint,
28 given the dark night skies in the vicinity of the SEZ.
29

30 The potential visual contrast expected for this viewpoint would depend on the
31 numbers, types, sizes and locations of solar facilities in the SEZ and on other
32 project- and site-specific factors. Under the 80% development scenario
33 analyzed in this PEIS, solar facilities within the SEZ would be expected to
34 create weak visual contrasts as viewed from this location within the park.
35

36 In summary, Joshua Tree NP borders or is very close to the border of the SEZ,
37 and the southeastern part of the Coxcomb Mountains is essentially surrounded
38 by the SEZ in all directions except looking northwest into the main part of the
39 park. Many of the higher elevations in the Coxcomb Mountains have
40 unobstructed, panoramic views of the SEZ from relatively short distances and
41 elevated viewpoints, a situation conducive to strong levels of visual contrast,
42 especially given the large size of the SEZ and the number, size, and variety of
43 solar facilities that might be visible under the 80% development scenario
44 analyzed in this PEIS. These viewpoints and similar viewpoints would likely
45 be subject to strong levels of visual contrast resulting from solar development
46 within the SEZ under the 80% development scenario. Lower elevation



1

FIGURE 9.4.14.2-7 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint in Eagle Mountains within Joshua Tree NP

2

3

4

1 viewpoints are more likely to be screened by nearby topography, and there are
2 many locations in the park, for example, in valleys, where views of the SEZ
3 are completely screened. Lower elevation viewpoints with clear views of the
4 SEZ will have lower viewing angles, which would be expected to reduce
5 contrasts, but many viewpoints could still be subject to strong visual contrasts.
6 Farther to the west, in the interior of the park, contrasts would be reduced as
7 screening increased and distance to the SEZ increased. Solar facilities within
8 the SEZ might be visible, but they would be either too far or too small in
9 apparent size to cause substantial visual contrasts.

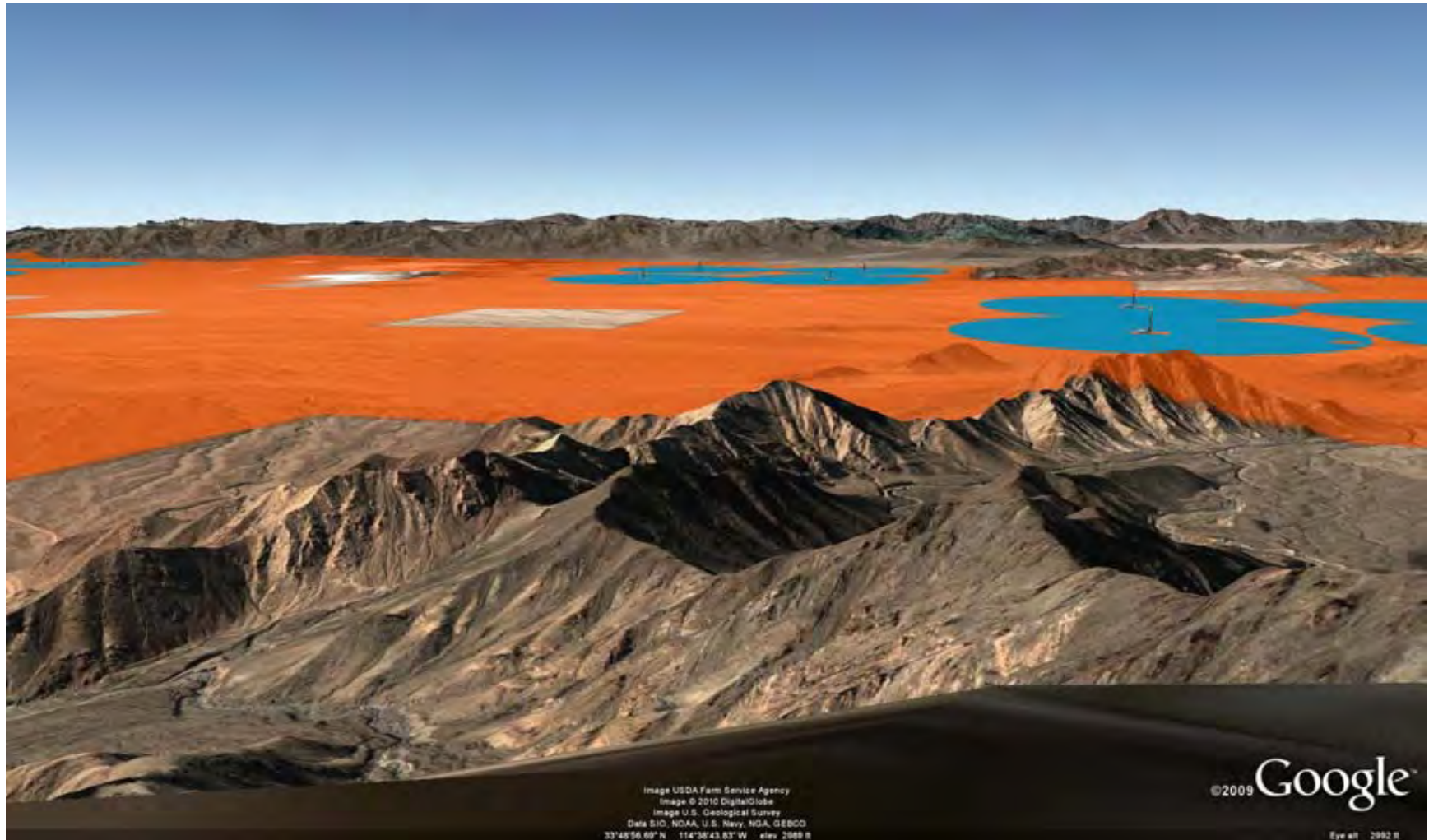
10
11 Note that some locations within the Coxcomb Mountains and within the main
12 portion of the park also have partial views of the much more distant proposed
13 Iron Mountain SEZ. Overall, under the 80% development scenario analyzed in
14 this PEIS, solar energy development in the Iron Mountain SEZ would be
15 expected to result in much weaker visual impacts on Joshua Tree NP than
16 expected from development within the Riverside East SEZ, but where views
17 of both SEZs existed, additional impacts to those described here would occur.

18 19 20 *Wilderness Areas*

- 21
22 • *Big Maria Mountains WA*—The 46,056-acre (186-km²) Big Maria Mountains
23 is a congressionally designated wilderness area located adjacent to the
24 northeast corner of the SEZ. It then runs parallel to the northeastern boundary
25 and is 0.3 mi (0.5 km) at the point of closest approach east of the SEZ. The
26 Big Maria Mountains contain gently sloping bajadas and rough, craggy peaks
27 separated by steep canyons. Camping, hunting, hiking, backpacking,
28 horseback riding, and wildlife viewing are recreational activities in the
29 wilderness area. There are no trails, but there are abandoned jeep tracks that
30 are used for hiking.

31
32 As shown in Figure 9.4.14.2-2, much of the eastern portion of the SEZ is
33 visible from the south- and southwest-facing slopes of the Big Maria
34 Mountains within the wilderness area. Portions of the wilderness area within
35 the 650-ft (198.1-m) SEZ viewshed (approximately 8,875 acres [36 km²], or
36 19% of the total WA acreage), extend from the point of closest approach at
37 the northeast corner of the SEZ to approximately 0.9 mi (1.5 km) from the
38 SEZ. Portions of the WA within the 24.6-ft (7.5-m) SEZ viewshed encompass
39 approximately 7,420 acres (30.0 km²), or 16% of the total WA acreage.

40
41 Figure 9.4.14.2-8 is a Google Earth visualization of the SEZ (highlighted in
42 orange) as seen from an unnamed peak in the Big Maria Mountains, elevated
43 roughly 3,100 ft (940 m) above the bajada at the closest point within the SEZ,
44 and 3,600 ft (1,100 m) above the lowest point in the SEZ. The viewpoint is
45 approximately 2.0 mi (3.2 km) from the nearest point on the northeastern
46 boundary of the SEZ.



1

2 **FIGURE 9.4.14.2-8 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with**
3 **Power Tower Wireframe Models, as Seen from a Peak in Big Maria Mountains WA**

1 The visualization suggests that from this elevated viewpoint and very short
2 distance to the SEZ, the SEZ would be too large to be encompassed in one
3 view, and viewers would need to turn their heads to scan across the whole
4 SEZ. Three clusters of power tower facility models are visible; the right-most
5 model cluster is approximately 5 mi (8 km) from the viewpoint, and the right
6 center model cluster is 9 mi (15 km) from the viewpoint (both distances to
7 center points of model clusters). The tops of solar collector/reflector arrays in
8 the closest parts of the SEZ would be visible, and the angle of view is high
9 enough that these closer facilities would not repeat the horizontal line of the
10 valley plain. Because of the oblique angle of view, the facilities would appear
11 larger in areal extent than they would from less elevated viewpoints at the
12 same distance, and the strong regular geometry of the collector/reflector
13 arrays would be apparent. These factors would increase visual contrast
14 relative to lower angle views. collector/reflector arrays

15
16 Taller ancillary facilities, such as buildings, transmission structures, and
17 cooling towers, and plumes (if present) would likely be visible projecting
18 above the collector/reflector arrays, and their structural details could be
19 evident, at least for nearby facilities. The ancillary facilities could create form
20 and line contrasts with the strongly horizontal, regular, and repeating forms
21 and lines of the collector/reflector arrays. Color and texture contrasts would
22 also be likely, but their extent would depend on the materials and surface
23 treatments utilized in the facilities.

24
25 If power towers were present within the SEZ, when operating, the receivers at
26 short distances would likely appear as brilliant white nonpoint (i.e., having
27 visible cylindrical or rectangular shapes) atop clearly discernable tower
28 structures against the backdrop of the valley floor, while power tower
29 receivers at the longer distances shown here would appear as points of light
30 against the backdrop of the valley floor or the bajadas of the McCoy
31 Mountains. During certain times of the day from certain angles, sunlight on
32 dust particles in the air might result in the appearance of light streaming down
33 from nearby power tower(s).

34
35 At night, if sufficiently tall, the power towers could have red or white flashing
36 hazard navigation lights that likely would be visible from the wilderness area,
37 and could be very conspicuous from this viewpoint, given the dark night skies
38 in the vicinity of the SEZ. Other lighting associated with solar facilities in the
39 SEZ could potentially be visible as well, at least for facilities in the closest
40 portions of the SEZ.

41
42 The potential visual contrast expected for this viewpoint would depend on the
43 numbers, types, sizes and locations of solar facilities in the SEZ and on other
44 project- and site-specific factors, but because the viewpoint is elevated and
45 very close to the SEZ, the SEZ would occupy most of the field of view,
46 stretching across the Chuckwalla Valley floor to the bajadas of the McCoy

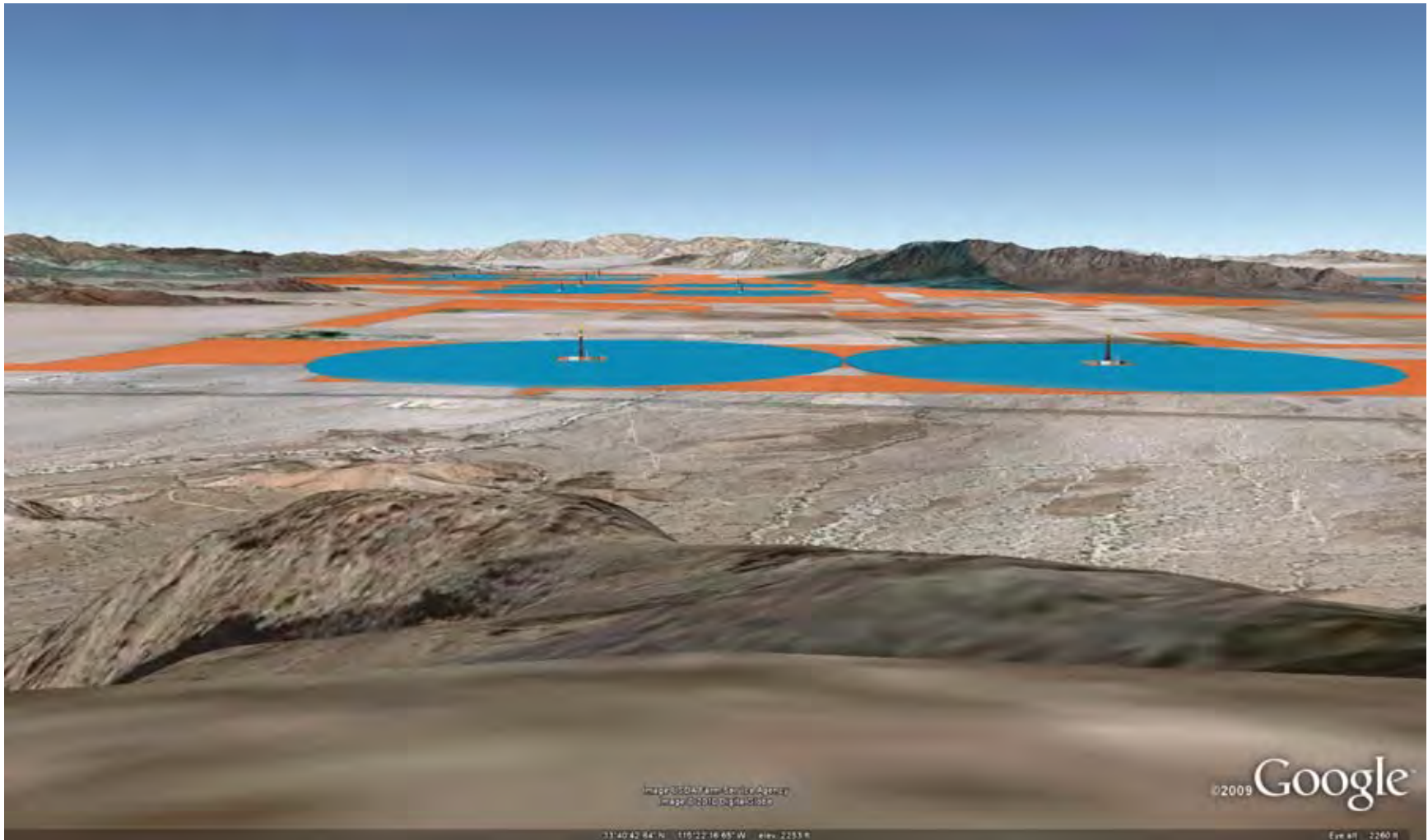
1 Mountains. Under the 80% development scenario analyzed in this PEIS, there
2 could be numerous solar facilities within the SEZ, a variety of technologies
3 employed, and a range of supporting facilities that would contribute to visual
4 impacts, such as transmission towers and lines, substations, power block
5 components, and roads. The resulting visually complex landscape would be
6 essentially industrial in appearance and would contrast greatly with the
7 surrounding mostly natural-appearing landscape. Solar facilities within the
8 SEZ would likely dominate the view from this location and would be expected
9 to create very strong visual contrasts as viewed from this location within the
10 wilderness area.

11
12 Most southwest-facing slopes of the Big Maria Mountains within the WA
13 have views similar to that shown in Figure 9.4.14.2-8. At lower elevations, the
14 angle of view is lower, so facilities appear more edge-on, but even at the
15 lowest elevations within the WA, where there is a view of the SEZ, it occupies
16 so much of the field of view that strong visual contrasts from solar
17 development within the SEZ would be likely. Lower levels of visual contrast
18 would be expected for viewpoints farther northeast in the WA, where
19 intervening mountains would be likely to screen views of the SEZ partially.

- 20
21 • *Chuckwalla Mountains WA*—The 88,202-acre (357-km²) Chuckwalla
22 Mountains is a congressionally designated wilderness area located 1.1 mi
23 (1.8 km) at the point of closest approach south of the western portion of the
24 SEZ. Rough, boulder-strewn hillsides and washes, thick with vegetation,
25 allow opportunities for visitors to enjoy seclusion. Elevation varies widely
26 from the low-lying bajada at 800 ft (244 m) to the area’s highest peak, Black
27 Butte, reaching up to 4,450 ft (1,356 m).

28
29 The southern and western portions of the SEZ are visible from the bajada and
30 northern slopes and peaks of the wilderness area, but numerous areas in the
31 mountains farther south in the WA also have views of the SEZ. Portions of the
32 wilderness area within the 650-ft (198.1-m) SEZ viewshed (approximately
33 49,913 acres [202 km²], or 57% of the total wilderness area acreage) extend
34 from the point of closest approach at the southern boundary of the SEZ to
35 approximately 5.9 mi (9.5 km) from the SEZ. Portions of the wilderness area
36 within the 24.6-ft (7.5-m) viewshed encompass approximately 47,186 acres
37 (191 km²), or 54% of the total wilderness area acreage.

38
39 Figure 9.4.14.2-9 is a Google Earth visualization of the SEZ as seen from an
40 unnamed peak in the far northern Chuckwalla Mountains within the
41 wilderness area, south of the western end of the SEZ and approximately 3 mi
42 (5 km) southeast of Desert Center. The viewpoint is elevated roughly 1,400 ft
43 (430 m) above the valley floor at the closest point within the SEZ. The
44 viewpoint is approximately 2.4 mi (3.8 km) from the nearest point on the
45 southern boundary of the SEZ. The view direction is north.



1

2 **FIGURE 9.4.14.2-9 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with**
3 **Power Tower Wireframe Models, as Seen from a Peak in Western Portion of Chuckwalla Mountains WA**

4

5

1 The visualization suggests that from this elevated viewpoint and very short
2 distance to the SEZ, the SEZ would be too large to be encompassed in one
3 view, and viewers would need to turn their heads to the right to scan across
4 the whole SEZ, which would extend almost 90 degrees to the right. Four
5 clusters of power tower facility models are visible; the closest tower is
6 approximately 3 mi (5 km) from the viewpoint, and the center of the next
7 model cluster is nearly 10 mi (16 km) from the viewpoint. From this vantage
8 point, the tops of solar collector/reflector arrays in the closest parts of the SEZ
9 would be visible, and the angle of view is high enough that these closer
10 facilities would not repeat the horizontal line of the valley plain. Because of
11 the oblique angle of view, the facilities would appear larger in areal extent
12 than they would from less elevated viewpoints at the same distance.

13
14 Taller ancillary facilities, such as buildings, transmission structures, and
15 cooling towers, and plumes (if present) likely would be visible projecting
16 above the collector/reflector arrays, and their structural details could be
17 evident at least for nearby facilities. The ancillary facilities could create form
18 and line contrasts with the strongly horizontal, regular, and repeating forms
19 and lines of the collector/reflector arrays. Color and texture contrasts would
20 also be likely, but their extent would depend on the materials and surface
21 treatments utilized in the facilities.

22
23 If power towers were present within the SEZ at the distance corresponding to
24 the closest tower in the model, the receivers would likely appear as brilliant
25 nonpoint (i.e., having visible cylindrical or rectangular surfaces) light sources
26 atop clearly discernable tower structures against the backdrop of the valley
27 floor, while power tower receivers at the longer distances shown here would
28 appear as points of light against the backdrop of the distant valley floor. For
29 nearby power towers, during certain times of the day from certain angles,
30 sunlight on dust particles in the air might result in the appearance of light
31 streaming down from the tower(s). Details of solar array components and
32 ancillary facilities might be visible in the closest parts of the SEZ.

33
34 At night, if sufficiently tall, the power towers could have red or white flashing
35 hazard navigation lights that likely would be visible from the wilderness area
36 and could be very conspicuous from this viewpoint, given the dark night skies
37 in the vicinity of the SEZ; however, views would be across I-10, and lights
38 from traffic likely would be visible. Other lighting associated with solar
39 facilities in the SEZ could potentially be visible as well, at least for facilities
40 in the closest portions of the SEZ.

41
42 The potential visual contrast expected for this viewpoint would depend on the
43 numbers, types, sizes and locations of solar facilities in the SEZ and on other
44 project- and site-specific factors, but because the viewpoint is elevated and
45 very close to the SEZ, the SEZ would occupy most of the field of view,
46 stretching across the Chuckwalla Valley floor almost to the bajadas of the

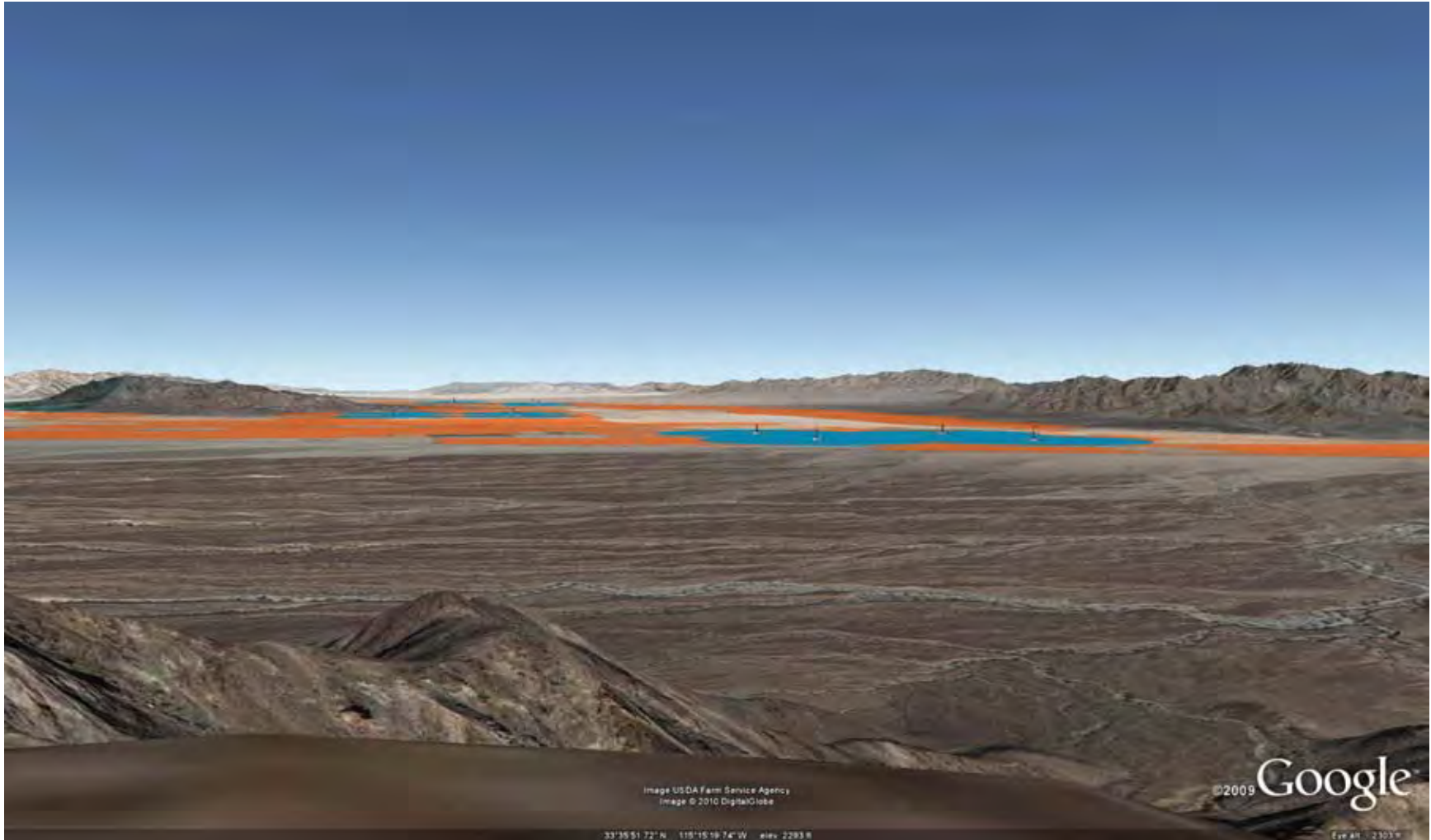
1 distant Palen Mountains. Under the 80% development scenario analyzed in
2 this PEIS, there could be numerous solar facilities within the SEZ, a variety of
3 technologies employed, and a range of supporting facilities that would
4 contribute to visual impacts, such as transmission towers and lines,
5 substations, power block components, and roads. The resulting visually
6 complex landscape would be essentially industrial in appearance and would
7 contrast greatly with the surrounding mostly natural-appearing landscape.
8 Under the 80% development scenario, solar facilities within the SEZ would
9 likely dominate the view from this location and would be expected to create
10 strong visual contrasts as viewed from this location within the wilderness area.

11
12 Figure 9.4.14.2-10 is a Google Earth visualization of the SEZ as seen from an
13 unnamed peak in the far eastern Chuckwalla Mountains within the wilderness
14 area, south of the southeastern end of the Coxcomb Mountains. The viewpoint
15 is elevated roughly 1,600 ft (430 m) above the valley floor at the closest point
16 within the SEZ. The viewpoint is approximately 5.8 mi (9.3 km) from the
17 nearest point on the southern boundary of the SEZ. The view direction is
18 north.

19
20 The visualization suggests that from this elevated viewpoint because of the
21 breadth of the SEZ east-to-west, the SEZ would be too large to be
22 encompassed in one view, and viewers would need to turn their heads to scan
23 across the whole SEZ, which would extend over much of the northern
24 horizon. Four clusters of power tower facility models are visible; the closest
25 tower is approximately 8 mi (13 km) from the viewpoint, and the center of the
26 next model cluster is 14 mi (23 km) from the viewpoint. From this vantage
27 point, the tops of solar collector/reflector arrays in the closest parts of the SEZ
28 would be visible, but the angle of view is low enough that these closer
29 facilities might repeat the horizontal line of the valley plain, depending on the
30 facility layout. The low angle of view would reduce the apparent areal extent
31 of the facilities.

32
33 Taller ancillary facilities, such as buildings, transmission structures, and
34 cooling towers, and plumes (if present) likely would be visible projecting
35 above the collector/reflector arrays, and their structural details could be
36 evident, at least for nearby facilities. The ancillary facilities could create form
37 and line contrasts with the strongly horizontal, regular, and repeating forms
38 and lines of the collector/reflector arrays. Color and texture contrasts would be
39 possible for nearby facilities, but their extent would depend on the materials
40 and surface treatments utilized in the facilities.

41
42 If power towers were present within the SEZ at the distance corresponding to
43 the closest tower in the model, the receivers would likely appear as bright
44 light sources atop discernable tower structures against the backdrop of the
45 valley floor, while power tower receivers at the longer distances shown here



1

FIGURE 9.4.14.2-10 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in Eastern Portion of Chuckwalla Mountains WA

1 would appear as distant points of light against the backdrop of the distant
2 valley floor.

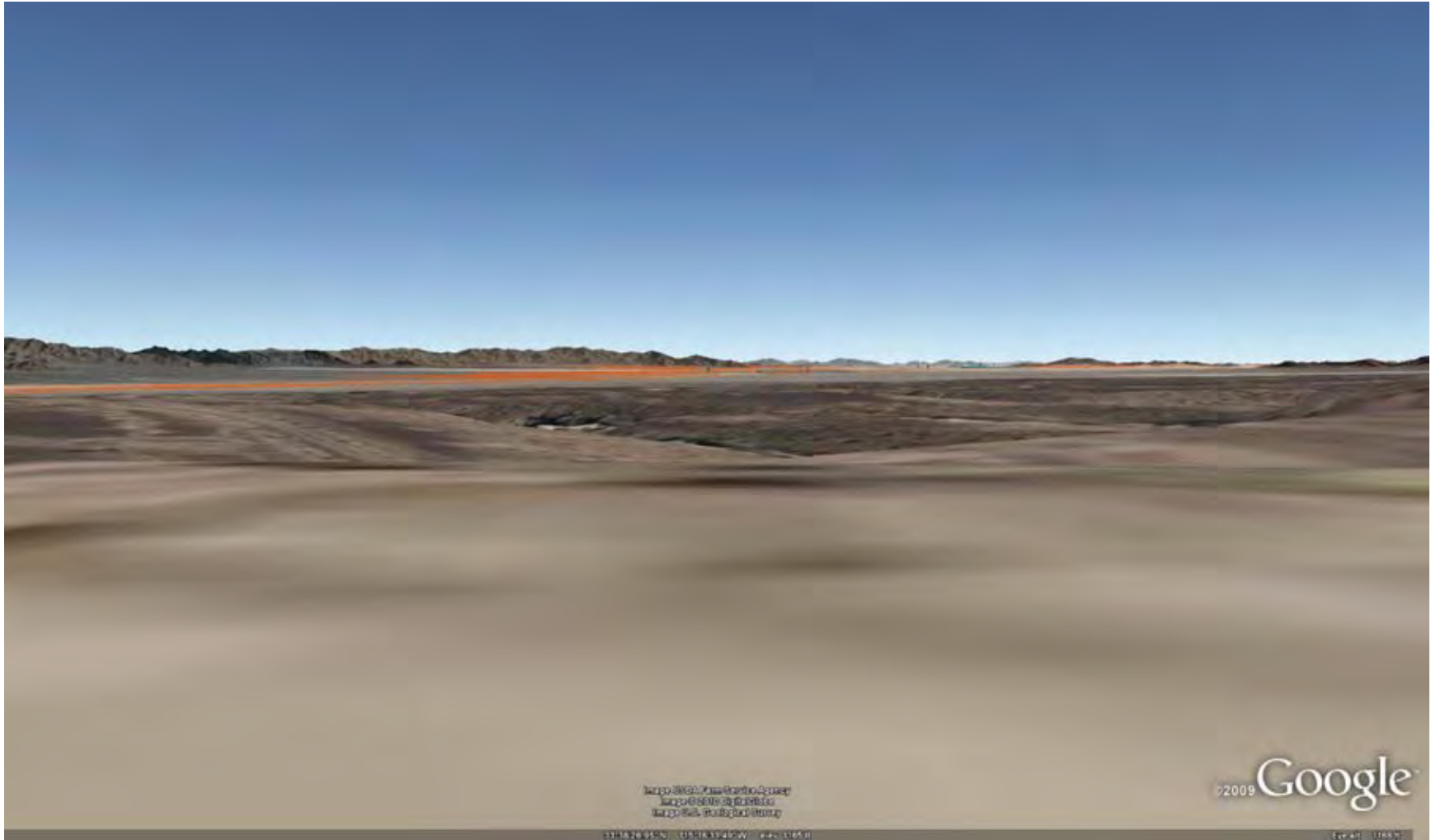
3
4 At night, if sufficiently tall, the power towers could have red or white flashing
5 hazard navigation lights that could be conspicuous from this viewpoint, given
6 the dark night skies in the vicinity of the SEZ. Other lighting associated with
7 solar facilities in the SEZ could potentially be visible as well, at least for
8 facilities in the closest portions of the SEZ.

9
10 The potential visual contrast expected for this viewpoint would depend on the
11 numbers, types, sizes and locations of solar facilities in the SEZ and on other
12 project- and site-specific factors, but because the viewpoint is elevated and the
13 SEZ so large, the SEZ would appear to stretch across the Chuckwalla Valley
14 floor roughly 25 mi (40 km) to the east. Under the 80% development scenario
15 analyzed in this PEIS, there could be numerous solar facilities within the SEZ,
16 a variety of technologies employed, and a range of supporting facilities that
17 would contribute to visual impacts, such as transmission towers and lines,
18 substations, power block components, and roads. The resulting visually
19 complex landscape would be essentially industrial in appearance and would
20 contrast greatly with the surrounding mostly natural-appearing landscape.
21 Under the 80% development scenario, solar facilities within the SEZ would
22 attract attention, might dominate the view from this location, and would be
23 expected to create strong visual contrasts as viewed from this location within
24 the WA.

25
26 Figure 9.4.14.2-11 is a Google Earth visualization of the SEZ as seen from
27 Corn Springs Road on the bajada in the far northeastern portion of the WA.
28 The viewpoint is elevated about 200 ft (60 m) above the valley floor at the
29 closest point within the SEZ, and is approximately 3.3 mi (5.4 km) from the
30 nearest point on the boundary of the SEZ. The view looks east down I-10 to
31 the eastern portion of the SEZ.

32
33 The SEZ in the vicinity of this viewpoint is only a few miles across, north to
34 south, and because the elevation of the viewpoint is only minimally elevated
35 relative to the SEZ, the SEZ and very distant heliostat arrays depicted in the
36 power tower model cluster appear edge-on, as a very narrow band parallel to,
37 and repeating, the strong horizon line and thus greatly reducing their visible
38 area and associated visual contrast. The closest model is approximately 17 mi
39 (27 km) from the viewpoint. The visualization also shows that from this
40 viewpoint, the SEZ would be too large to be encompassed in one view, and
41 viewers would need to turn their heads to scan across the whole SEZ, which
42 would span much of the northern and eastern horizons.

43
44 Transmission towers could be visible above the solar collector/reflector
45 arrays. If power towers were present within the SEZ, at the distance shown
46 here, the receivers could appear as distant point light sources against the



1

FIGURE 9.4.14.2-11 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Corn Springs Road on Bajada in Chuckwalla Mountains WA

2

3

4

5

1 backdrop of the McCoy Mountains. At night, if sufficiently tall, the power
2 towers could have red or white flashing hazard navigation lights that could be
3 seen from this viewpoint, given the dark night skies in the vicinity of the SEZ.
4

5 The potential visual contrast expected for this viewpoint would depend on the
6 numbers, types, sizes and locations of solar facilities in the SEZ and on other
7 project- and site-specific factors. Under the 80% development scenario, solar
8 facilities within the SEZ would be expected to create weak to moderate visual
9 contrasts as viewed from this location within the wilderness area.
10

11 In summary, higher elevations in the Chuckwalla WA have extended open
12 views of the SEZ and could be subject to high levels of visual contrast
13 associated with solar energy development within the wilderness area.
14 Viewpoints on the bajada would still have expansive views of the SEZ but,
15 primarily because of the lower viewing angle, would be expected to be
16 subjected to substantially lower levels of visual contrast.
17

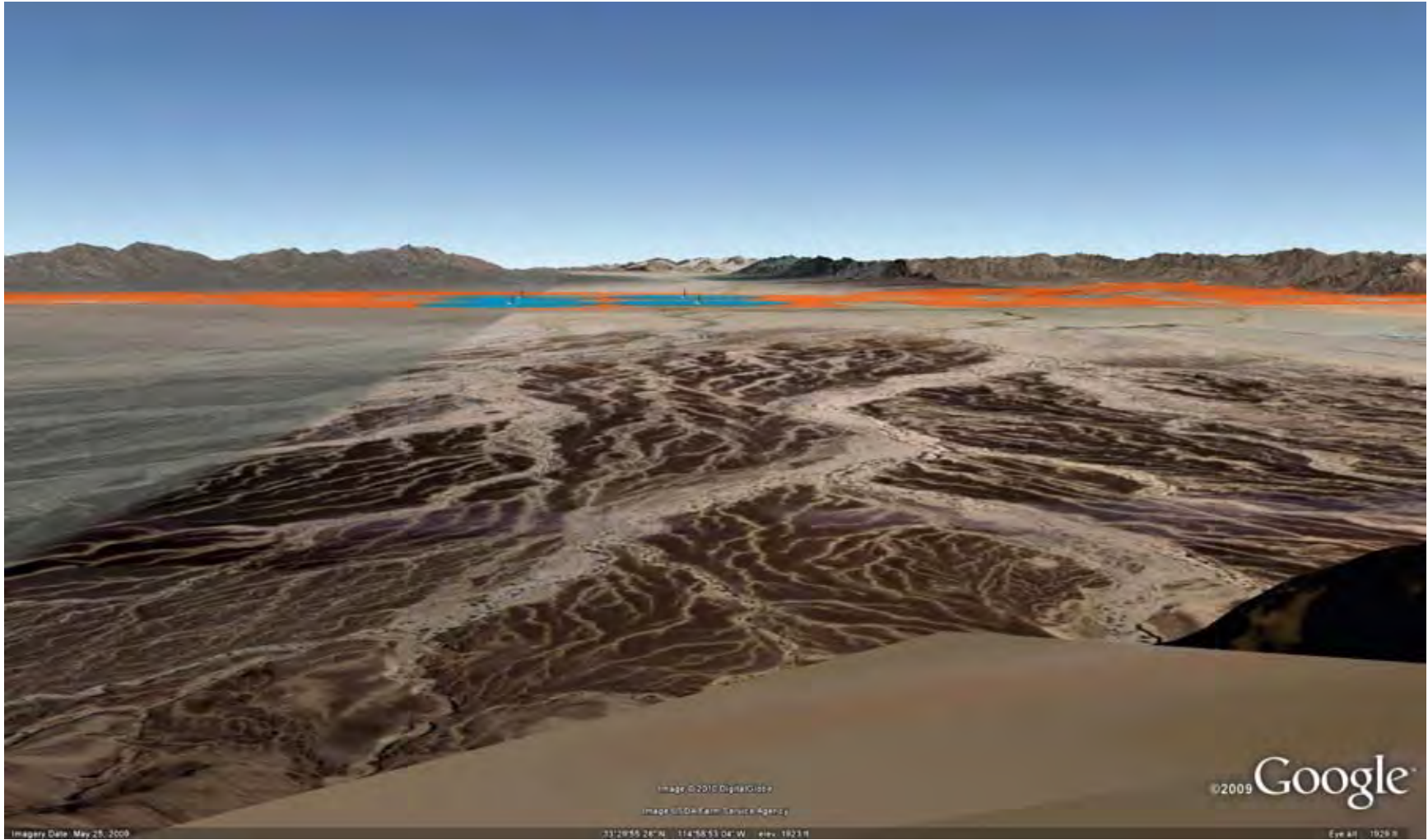
- 18 • *Imperial Refuge WA*—The 15,714-acre (64-km²) Imperial Refuge is a
19 congressionally designated wilderness area managed by the USFWS located
20 22 mi (36 km) at the point of closest approach south of the SEZ. The
21 wilderness area includes low, heavily vegetated land along the Colorado River
22 as well as higher areas with less vegetation on both sides of the river. Portions
23 of the wilderness area within the 650-ft (198.1-m) SEZ viewshed
24 (approximately 560 acres [2 km²], or 4% of the total wilderness area acreage)
25 extend from the point of closest approach at the southern boundary of the SEZ
26 to beyond 25 mi (41 km) from the SEZ. Portions of the wilderness area within
27 the 24.6-ft (7.5-m) viewshed encompass approximately 468 acres (2 km²), or
28 3% of the total wilderness area acreage.
29

30 The far southeastern corner of the SEZ is visible from some areas within the
31 northern portion of the wilderness area. Within 25 mi (41 km) of the SEZ,
32 where vegetative screening is absent, solar facilities located in the far
33 southeastern portions of the SEZ might be visible from the highest points
34 within the wilderness area. Because of the very long distance to the SEZ and
35 screening by the Palo Verde Mountains, visible portions of the SEZ would
36 occupy a very small portion of the field of view. The wilderness area is at a
37 slightly lower elevation than the SEZ. Any visible solar facilities within the
38 SEZ would be viewed at very low angles. Solar collector/reflector arrays
39 would be viewed edge-on and, at distance approaching 25 mi (41 km), are
40 unlikely to be distinguishable. If power towers were visible, they would likely
41 appear as distant point light sources on the northern horizon. At night, if
42 sufficiently tall, the power towers could have red or white flashing hazard
43 navigation lights that could be visible from the wilderness area. Visual
44 impacts on the Imperial Refuge WA from solar development within the SEZ
45 would be expected to be minimal.

- 1 • *Joshua Tree WA*—Joshua Tree is a 586,623-acre (2,374-km²) congressionally
2 designated wilderness area managed by the NPS and located entirely within
3 Joshua Tree NP. A section of the WA divides the western portion of the SEZ
4 and is located adjacent to its boundaries. This section is almost entirely within
5 the viewshed. Portions of the wilderness area within the 650-ft (198.1-m) SEZ
6 viewshed (approximately 99,460 acres [403 km²], or 17% of the total
7 wilderness area acreage) extend from the point of closest approach at the
8 northwestern boundary of the SEZ to approximately 13.6 mi (21.9 km)
9 northwest from the SEZ. Portions of the wilderness area within the 24.6-ft
10 (7.5-m) viewshed encompass approximately 55,203 acres (224 km²), or 9% of
11 the total wilderness area acreage. Expected visual contrast levels for the
12 wilderness area are the same as those expected for the national park (see
13 above).
14
- 15 • *Little Chuckwalla Mountains WA*—The 28,708-acre (116-km²) Little
16 Chuckwalla Mountains is a congressionally designated wilderness area
17 located 5.0 mi (8.1 km) at the point of closest approach south of the SEZ. The
18 wilderness area contains rugged mountains surrounded by a large, gently
19 sloping bajada with a network of washes.
20

21 Within the wilderness area, the SEZ is visible from the north- and northwest-
22 facing slopes and the peaks of the Little Chuckwalla Mountains, as well as all
23 of the north-facing bajada and the southern portions of the south-facing
24 bajada. Portions of the wilderness area within the 650-ft (198.1-m) SEZ
25 viewshed (approximately 16,729 acres [68 km²], or 58% of the total
26 wilderness area acreage) extend from the point of closest approach at the
27 southern boundary of the SEZ to approximately 14.0 mi (23 km) from the
28 SEZ. Portions of the wilderness area within the 24.6-ft (7.5-m) viewshed
29 encompass approximately 14,319 acres (58 km²), or 50% of the total
30 wilderness area acreage.
31

32 Figure 9.4.14.2-12 is a Google Earth visualization of the SEZ as seen from a
33 high, unnamed peak in the Little Chuckwalla Mountains, in the far eastern
34 portion of the wilderness area, approximately 8 mi (13 km) from the SEZ,
35 south of the Palen Dunes Drive interchange on I-10. At approximately 1,900 ft
36 (530 m), the viewpoint elevation is about 1,700 ft (520 m) above the elevation
37 of the valley floor. The visualization suggests that from this elevated
38 viewpoint, the SEZ would be too large to be encompassed in one view, and
39 viewers would need to turn their heads to scan across the whole SEZ;
40 however, the angle of view is low enough that the valley floor would appear
41 as a band across the base of the mountains. Because solar facilities in the
42 valley would be viewed from a low oblique angle, the visible surface area of
43 the facilities would be reduced, the strong regular geometry of the
44 collector/reflector arrays would be less apparent, and associated visual
45 impacts would be reduced in proportion.
46



1

2 **FIGURE 9.4.14.2-12 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands,**
3 **with Power Tower Wireframe Models, as Seen from a Peak in Eastern Portion of Little Chuckwalla Mountains WA**
4

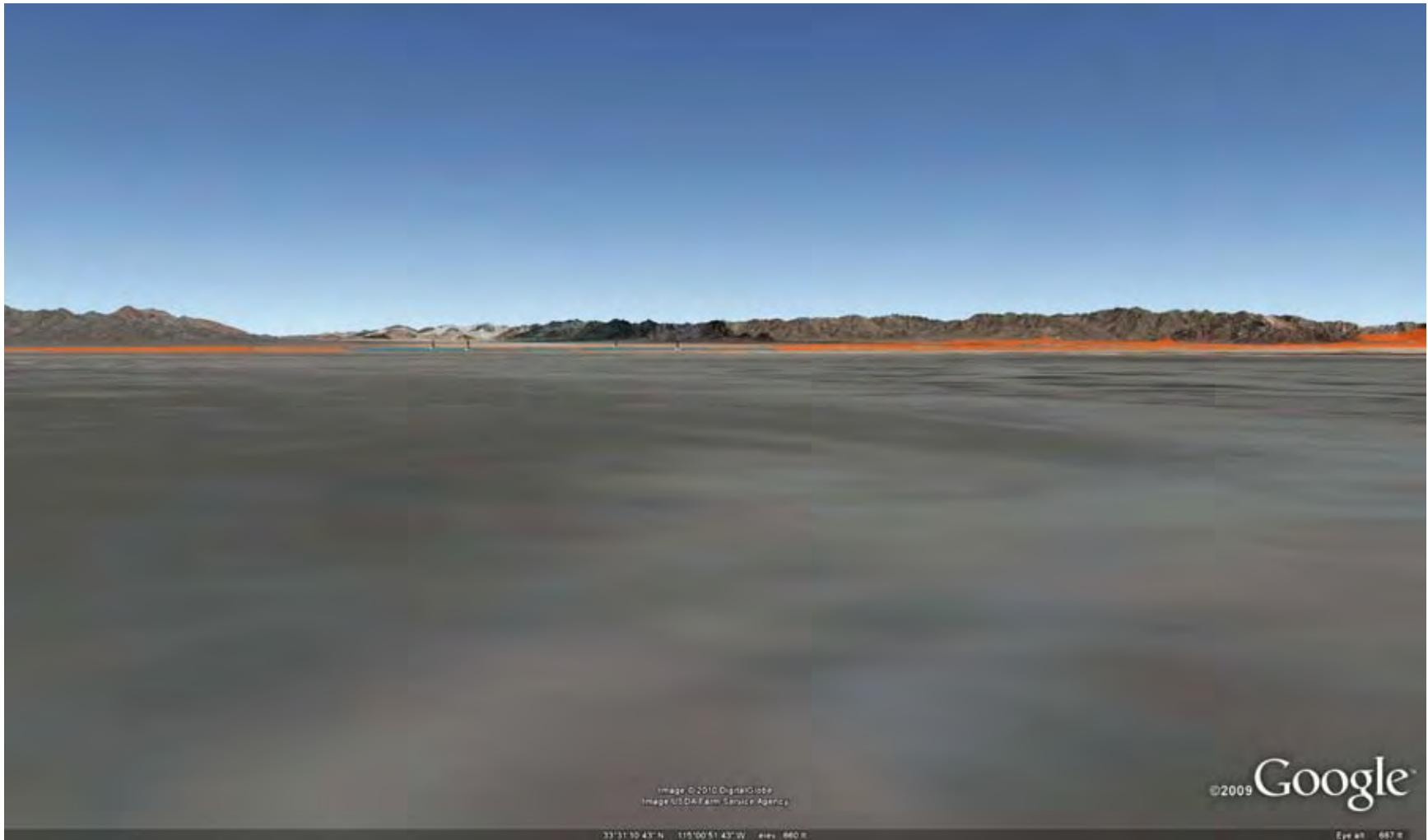
1 At the 80% development scenario analyzed in this PEIS, a large portion of the
2 Chuckwalla Valley north of I-10 visible from this location would be occupied
3 by a variety of solar facilities with associated transmission facilities and roads,
4 stretching across the valley floor to the base of the bajada of the Palen
5 Mountains and to the other mountain ranges north of the SEZ. While the tops
6 of solar collector/reflector arrays located within the SEZ nearest to this
7 viewpoint might be visible, solar collector/reflector arrays within most of the
8 SEZ visible from this viewpoint would be seen nearly edge-on, reducing their
9 apparent size and repeating the line of the horizon, which would tend to
10 reduce visual contrast.

11
12 Taller ancillary facilities, such as buildings, transmission structures, and
13 cooling towers, and plumes (if present) could potentially be visible projecting
14 above the collector/reflector arrays. The ancillary facilities could create form
15 and line contrasts with the strongly horizontal, regular, and repeating forms
16 and lines of the collector/reflector arrays.

17
18 Power tower receivers within the SEZ could be visible as dim to bright points
19 of light across almost the entire northern horizon, against the backdrop of the
20 Palen Mountains and the other ranges north of the SEZ. At night, if
21 sufficiently tall, the power towers could have red or white flashing hazard
22 navigation lights that would likely be visible from the WA, and could be seen
23 from this viewpoint.

24
25 Despite the low angle of view and considerable distance from many portions
26 of the SEZ, the SEZ occupies such a large area within the view from this
27 location that solar development within the SEZ under the 80% development
28 scenario would be likely to create strong visual contrasts with the surrounding
29 landscape that could dominate the views from this location, especially toward
30 the northeast, where a larger portion of the SEZ is visible at a relatively
31 shorter distance.

32
33 Figure 9.4.14.2-13 is a Google Earth visualization of the SEZ as seen from a
34 two-track road on the bajada at the base of the northern slopes of the Little
35 Chuckwalla Mountains in the northeastern portion of the wilderness area,
36 approximately 6.4 mi (10.3 km) from the SEZ, southwest of the Palen Dunes
37 Drive interchange on I-10. The viewpoint elevation is approximately 660 ft
38 (200 m), about 300 ft (90 m) above the valley floor. In this case, the
39 viewpoint is somewhat closer to the SEZ than that for the view shown in
40 Figure 9.4.14.2-12, but the elevation is much lower, significantly decreasing
41 the angle of view. The visualization suggests that from this viewpoint, the
42 SEZ would be too large to be encompassed in one view, and viewers would
43 need to turn their heads to scan across the whole SEZ; however, the angle of
44 view is low enough that solar facilities in the valley would be viewed nearly
45 edge-on, so the visible surface area of the facilities would be reduced, the
46



1

FIGURE 9.4.14.2-13 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Road on the Bajada in Little Chuckwalla Mountains WA

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1 strong regular geometry of the collector/reflector arrays would be less
2 apparent, and associated visual impacts would be reduced in proportion.

3
4 From this relatively low viewpoint, the tops of solar collector/reflector arrays
5 located within the SEZ would not likely be visible, but power block facilities,
6 transmission towers, steam plumes, and other tall facility components would
7 likely project above collector/reflector arrays, adding short vertical lines to the
8 strongly horizontal landscape, and adding some visual contrast. Power tower
9 receivers within the SEZ could be visible as dim to bright points of light
10 across almost the entire northern horizon, against the backdrop of the Palen
11 Mountains and the other ranges north of the SEZ.

12
13 Visual contrasts observed from this low-elevation location would be expected
14 to be lower than those from more elevated viewpoints at the same or
15 somewhat longer distances from the SEZ. At the 80% development scenario
16 analyzed in this PEIS, a variety of solar facilities with associated transmission
17 and roads would appear to stretch across the valley floor across nearly the
18 entire northern horizon and to the base of the bajada of the Palen Mountains
19 and to the other mountain ranges north of the SEZ. Resulting visual contrasts
20 would likely be strong.

21
22 Because of the southwest-to-northeast orientation of the wilderness area,
23 viewpoints in the southwestern portion of the wilderness area are 10 to 14 mi
24 (16 to 23 km) from the SEZ. From some locations in the southwest portion of
25 the wilderness area, particularly at lower elevations, nearby mountain ridges
26 screen portions of the SEZ to the extent that expected visual contrasts
27 associated with solar facilities visible within the SEZ would be moderate.

- 28
29 • *Orocopia Mountains WA*—The 54,709-acre (221-km²) Orocopia Mountains is
30 a congressionally designated wilderness area located 13 mi (21 km) at the
31 point of closest approach southwest of the SEZ. The wilderness area provides
32 dramatic scenery, with open valleys, ridges, and highly colorful and
33 dramatically eroded canyons.

34
35 The SEZ is visible from both the low mountains in the far northeast portion of
36 the wilderness area and the higher mountains closer to the center of the
37 wilderness area. Portions of the wilderness area within the 650-ft (198.1-m)
38 SEZ viewshed (approximately 2,251 acres [9 km²], or 4% of the total WA
39 acreage) extend from the point of closest approach to approximately 15.7 mi
40 (25.3 km) from the SEZ. Portions of the wilderness area within the 24.6-ft
41 (7.5-m) viewshed encompass approximately 1,409 acres (6 km²), or 3% of the
42 total wilderness area acreage.

43
44 From the far northeastern section of the WA, the SEZ is visible beyond I-10
45 through the western end of the Chuckwalla Valley. The distance to the SEZ
46 exceeds 13 mi (21 km), so the angle of view is low. Parts of the SEZ are

1 screened by the Eagle Mountains and the Chuckwalla Mountains, so the
2 SEZ occupies a small portion of the horizontal field of view. Solar
3 collector/reflector arrays within the SEZ that were visible from the wilderness
4 area would be seen edge-on, reducing their apparent size, concealing their
5 strong regular geometry, and repeating the line of the horizon, which would
6 tend to reduce visual contrast. Power towers within the SEZ could be visible
7 as distant points of light on the northeast horizon, against the backdrop of the
8 Chuckwalla Valley floor or the mountain ranges northeast of the valley. At
9 night, if sufficiently tall, the power towers could have red or white flashing
10 hazard navigation lights that would likely be visible from the wilderness area.

11
12 The mountains closer to the center of the wilderness area, while higher, are
13 more than 20 mi (36 km) distant from the SEZ, and in some areas, uplands in
14 the northeast portion of the Orocopia Mountains themselves provide
15 additional screening of the SEZ. Because of the additional distance to the SEZ
16 and (in some areas) the additional screening, the SEZ occupies an even
17 smaller portion of the field of view, with weaker visual contrasts expected as a
18 result.

19
20 Visual contrasts associated with solar energy development within the SEZ
21 would depend on viewer location within the wilderness area; the numbers,
22 types, sizes and locations of solar facilities in the SEZ and on other project-
23 and site-specific factors. Where there was a clear view of the SEZ, under the
24 80% development scenario analyzed in this PEIS, weak levels of visual
25 contrast would be expected. The highest contrast levels would be expected for
26 locations in the far northeastern part of the wilderness area, with lower
27 contrasts expected for locations in the more central mountains in the
28 wilderness area.

- 29
30 • *Palen-McCoy WA*—Palen-McCoy is a 224,414-acre (908-km²)
31 congressionally designated wilderness area located adjacent to both the
32 northern boundary and eastern boundary of the western portion of the SEZ.
33 The wilderness area contains five separate mountain ranges separated by wide
34 bajadas and encompasses several landscape types, from desert pavement,
35 bajadas, interior valleys, and canyons to dense ironwood forests, steep
36 canyons, and rugged peaks. Unlike most other wilderness areas around the
37 proposed SEZs, in some areas the Palen-McCoy WA extends well beyond the
38 mountains down the bajada and as much as 7 mi (12 km) or more out onto the
39 Chuckwalla Valley floor. Camping, hiking, backpacking, horseback riding,
40 hunting, and wildlife viewing are recreational activities in the wilderness area.

41
42 Much of the SEZ is visible from the various portions of this large wilderness
43 area. The SEZ essentially surrounds the wilderness area on all sides except
44 north (the north side of the wilderness area faces the Iron Mountain SEZ).
45 Portions of the wilderness area within the 650-ft (198.1-m) SEZ viewshed
46 (approximately 170,660 acres [691 km²], or 76% of the total wilderness area

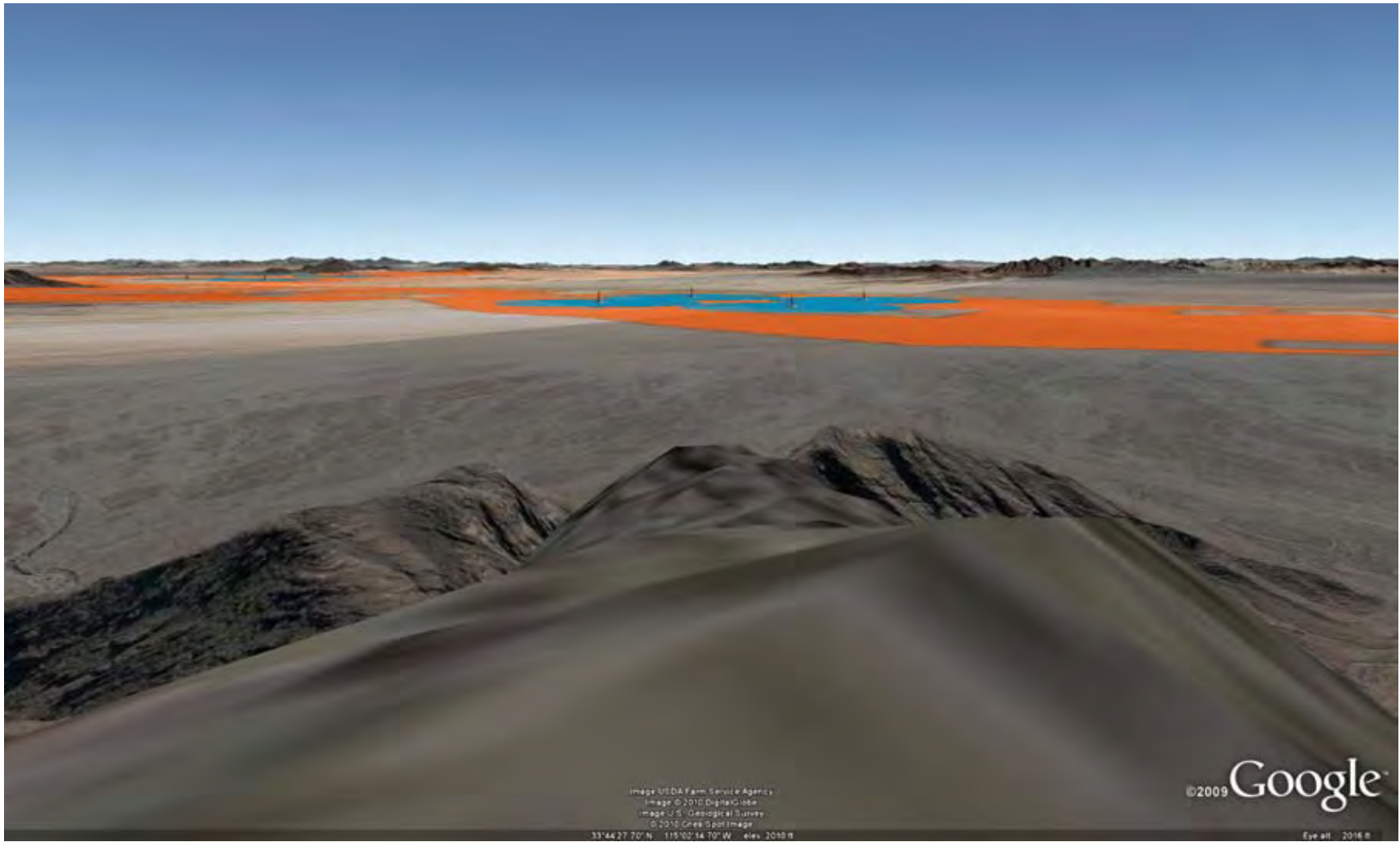
1 acreage) extend from adjacent to the SEZ at the northeast corner of the
2 western portion to approximately 7.6 mi (12.2 km) from the SEZ. Portions of
3 the wilderness area within the 24.6-ft (7.5-m) viewshed encompass
4 approximately 151,549 acres (613 km²), or 68% of the total wilderness area
5 acreage.
6

7 Figure 9.4.14.2-14 is a Google Earth visualization of the SEZ as seen from an
8 unnamed peak at the far southern end of the Palen Mountains, elevated
9 roughly 1,900 ft (580 m) above the valley floor at the closest point within the
10 SEZ and approximately 4.0 mi (6.5 km) from the nearest point on the
11 boundary of the SEZ, about 5 mi (8 km) north of I-10. The view direction is
12 south–southeast.
13

14 The visualization shows that because the wilderness area extends several
15 miles down the bajada to the south, the SEZ boundary is substantially farther
16 away from the mountains than would be the case for many other wilderness
17 areas, where the wilderness area boundaries typically are located at the base of
18 the mountain slopes. The additional distance to the SEZ means that solar
19 facilities within the SEZ would also be several miles farther from the
20 wilderness area than they might otherwise be, substantially reducing visual
21 contrast levels.
22

23 The visualization also shows that from this elevated viewpoint and relatively
24 short distance to the SEZ, the SEZ would be too large to be encompassed in
25 one view, and viewers would need to turn their heads to scan across the whole
26 SEZ. Two clusters of power tower facility models are visible; the left-most
27 model cluster is approximately 15 mi (24 km) from the viewpoint, and the
28 right-most model cluster is 8 mi (13 km) from the viewpoint (both distances to
29 center points of model clusters). The tops of solar collector/reflector arrays in
30 the closest parts of the SEZ likely would be visible, but the angle of view is
31 low enough that most solar collector/reflector arrays visible in the SEZ from
32 this location would be viewed nearly edge-on, reducing their apparent size and
33 repeating the horizontal line of the valley plain. If power towers were present
34 within the SEZ, at the shorter distances shown here, the receivers could appear
35 as very bright point or nonpoint (i.e., having visible cylindrical or rectangular
36 surfaces) light sources atop discernable tower structures against the backdrop
37 of the valley floor. Power tower receivers located at the farther distances
38 depicted here would likely appear as distant points of light against the
39 backdrop of the valley floor or the bajadas of the mountains on the eastern
40 side of the SEZ.
41

42 At night, if sufficiently tall, the power towers could have red or white flashing
43 hazard navigation lights that likely would be visible from the WA and could
44 be very conspicuous from this viewpoint, given the dark night skies in the
45 vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ



1

FIGURE 9.4.14.2-14 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in Southern Palen-McCoy WA

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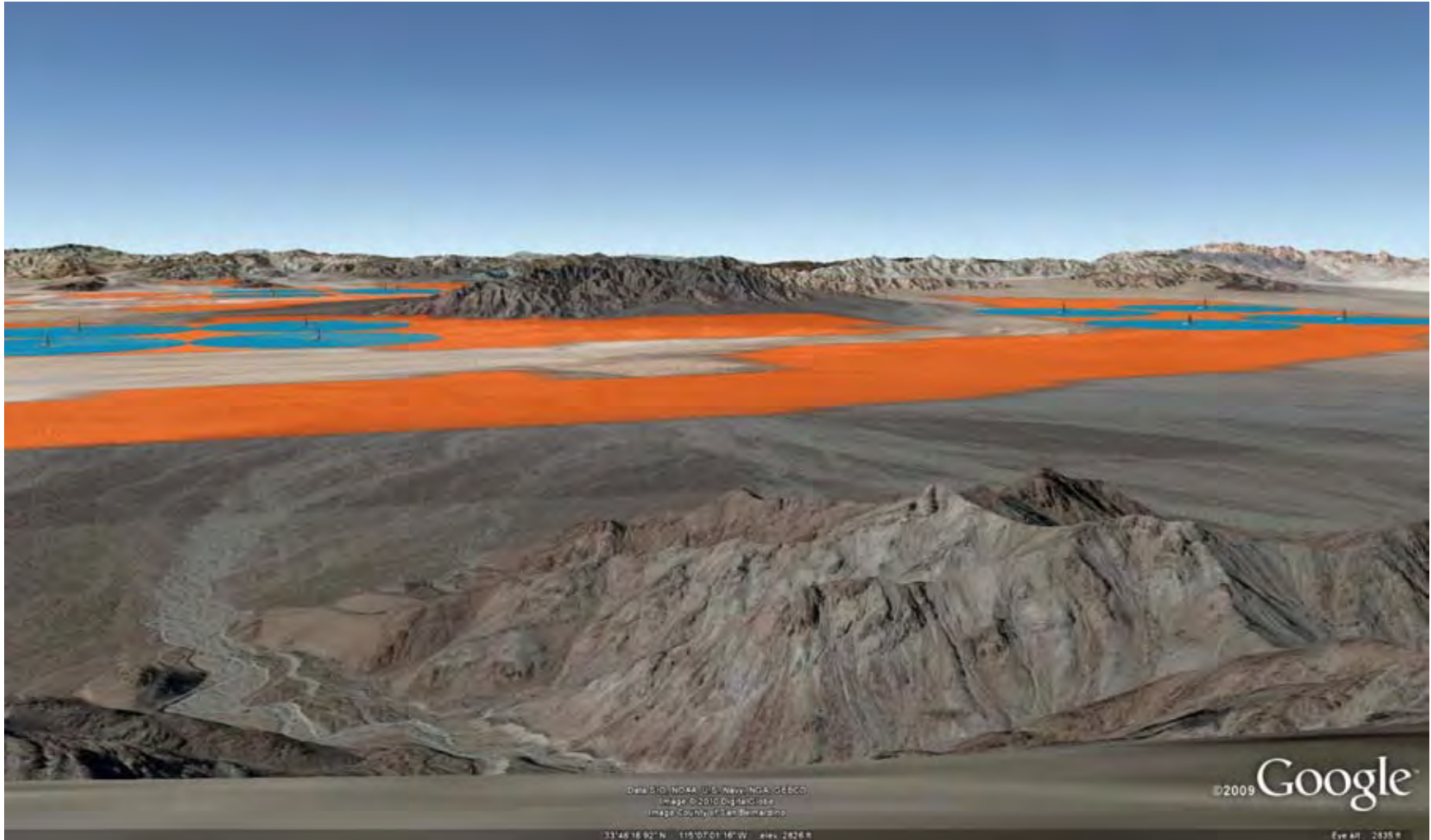
1 could potentially be visible as well, at least for facilities in the closest portions
2 of the SEZ. The potential visual contrast expected for this viewpoint would
3 depend on the numbers, types, sizes and locations of solar facilities in the SEZ
4 and on other project- and site-specific factors, but because the viewpoint is
5 elevated and relatively close to the SEZ, the SEZ would occupy much of the
6 field of view. Under the 80% development scenario analyzed in this PEIS,
7 there could be numerous solar facilities within the SEZ, a variety of
8 technologies employed, and a range of supporting facilities that would
9 contribute to visual impacts, such as transmission towers and lines,
10 substations, power block components, and roads. The resulting visually
11 complex landscape could potentially dominate the view from this location.
12 Under the 80% development scenario, solar facilities within the SEZ would be
13 expected to create strong visual contrasts as viewed from this location within
14 the WA.

15
16 Figure 9.4.14.2-15 is a Google Earth visualization of the SEZ as seen from an
17 unnamed peak on the western side of the Palen Mountains across from the
18 Coxcomb Mountains, elevated roughly 2,300 ft (700 m) above the valley floor
19 at the closest point within the SEZ, and approximately 3 mi (5 km) from the
20 nearest point on the boundary of the SEZ. The view looks west to the Eagle
21 and Coxcomb Mountains in Joshua Tree NP.

22
23 The visualization shows that the wilderness area extends approximately 1.5 mi
24 (2.4 km) down the bajada to the west. The visualization also shows that from
25 this elevated viewpoint and relatively short distance to the SEZ, the SEZ
26 would be too large to be encompassed in one view, and viewers would need to
27 turn their heads to scan across the whole SEZ. Two clusters of power tower
28 facility models are visible; the left-most model cluster is approximately 8 mi
29 (13 km) from the viewpoint, and the right-most model cluster is 9.5 mi
30 (15 km) from the viewpoint (both distances to center points of model
31 clusters). The tops of solar collector/reflector arrays in the closest parts of the
32 SEZ would likely be visible, but the angle of view is low enough that solar
33 collector/reflector arrays visible in the farthest part of the SEZ visible from
34 this location would be viewed nearly edge-on, reducing their apparent size,
35 tending to conceal their strong regular geometry, and repeating the horizontal
36 line of the valley plain.

37
38 Taller ancillary facilities, such as buildings, transmission structures, and
39 cooling towers, and plumes (if present) likely would be visible projecting
40 above the collector/reflector arrays, and their structural details could be
41 evident, at least for nearby facilities. The ancillary facilities could create form
42 and line contrasts with the strongly horizontal, regular, and repeating forms
43 and lines of the collector/reflector arrays. Color and texture contrasts would
44 also be likely, but their extent would depend on the materials and surface
45 treatments utilized in the facilities.

46



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FIGURE 9.4.14.2-15 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in Western Palen-McCoy WA

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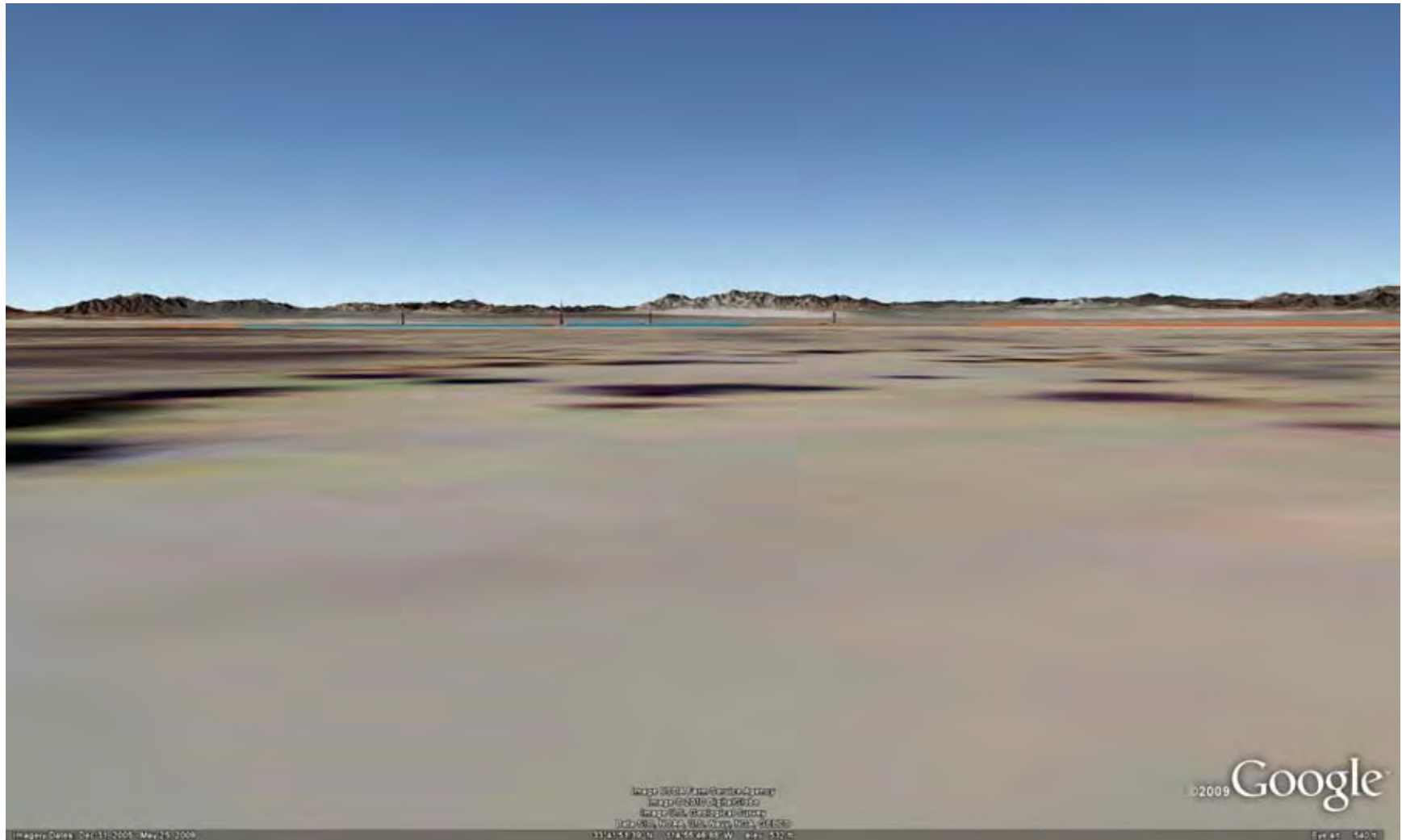
1 If power towers were present within the SEZ, at the shorter distances shown
2 here, the receivers could appear as very bright white light sources atop clearly
3 discernable tower structures against the backdrop of the valley floor. Power
4 tower receivers located at the farther distances depicted here would likely
5 appear as distant points of light against the backdrop of the valley floor or the
6 bajadas of the Eagle Mountains.
7

8 At night, if sufficiently tall, the power towers could have red or white flashing
9 hazard navigation lights that could be conspicuous from this viewpoint, given
10 the dark night skies in the vicinity of the SEZ. Other lighting associated with
11 solar facilities in the SEZ could potentially be visible as well, at least for
12 facilities in the closest portions of the SEZ.
13

14 The potential visual contrast expected for this viewpoint would depend on the
15 numbers, types, sizes, and locations of solar facilities in the SEZ and on other
16 project- and site-specific factors, but because the viewpoint is elevated and
17 relatively close to the SEZ, the SEZ would occupy much of the field of view.
18 Under the 80% development scenario analyzed in this PEIS, there could be
19 numerous solar facilities within the SEZ, a variety of technologies employed,
20 and a range of supporting facilities that would contribute to visual impacts,
21 such as transmission towers and lines, substations, power block components,
22 and roads. The resulting visually complex landscape could potentially
23 dominate the view from this location. Under the 80% development scenario,
24 solar facilities within the SEZ would be expected to create strong visual
25 contrasts as viewed from this location within the wilderness area.
26

27 Figure 9.4.14.2-16 is a Google Earth visualization of the SEZ as seen from an
28 unpaved road on the bajada in the far southeastern portion of the wilderness
29 area. The viewpoint is elevated about 130 ft (40 m) above the valley floor at
30 the closest point within the SEZ, and is approximately 3 mi (5 km) from the
31 nearest point on the boundary of the SEZ. The view looks southwest to the
32 Little Chuckwalla Mountains beyond I-10.
33

34 The SEZ in the vicinity of this viewpoint is only 3.5 (5.6 km) across, northeast
35 to southwest, and because the elevation of the viewpoint is only minimally
36 elevated relative to the SEZ, the SEZ and heliostat arrays depicted in the
37 power tower model cluster appear edge-on, as a very narrow band parallel to,
38 and repeating, the strong horizon line and thus greatly reducing their visible
39 area and associated visual contrast. The model is approximately 5 mi (8 km)
40 from the viewpoint. The visualization also shows that from this elevated
41 viewpoint and relatively short distance to the SEZ, the SEZ would be too large
42 to be encompassed in one view, and viewers would need to turn their heads to
43 scan across the whole SEZ, which would span the entire southern horizon. If
44 power towers were present within the SEZ, at the distance shown here, the
45 receivers could appear as very bright point light sources atop clearly
46



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FIGURE 9.4.14.2-16 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Road on the Bajada in Palen-McCoy WA

1 discernable tower structures against the backdrop of the Little Chuckwalla
2 Mountains. Transmission towers would be visible above the solar
3 collector/reflector arrays. Plumes from CSP plants could be visible above the
4 collector/reflector arrays, depending on lighting and atmospheric conditions,
5 as could be the tops of ancillary buildings. Glare and glinting might be
6 possible from the sides of collector/reflector arrays.
7

8 The potential visual contrast expected for this viewpoint would vary
9 depending on project locations, technologies, and site designs. Under the 80%
10 development scenario, solar facilities within the SEZ would be expected to
11 create weak to moderate visual contrasts as viewed from this location within
12 the wilderness area.
13

14 In summary, the Palen-McCoy WA is very large and, unlike most wilderness
15 areas, includes much gently sloping low-elevation land beyond the mountains;
16 this would have the effect of keeping solar facilities within the SEZ away
17 from many of the higher elevation viewpoints in the wilderness area.
18 Nonetheless, virtually the entire SEZ is visible from the various portions of
19 the wilderness area, and while perceived contrast levels would depend on
20 viewer location within the wilderness area, and on the numbers, types, sizes,
21 and locations of solar facilities in the SEZ, as well as on other project- and
22 site-specific factors, many higher elevation viewpoints within the wilderness
23 area could be subject to strong visual contrasts from solar energy development
24 within the SEZ under the 80% development scenario.
25

26 Note that some locations within the wilderness area also have partial views of
27 the proposed Iron Mountain SEZ, in the Ward Valley north of the wilderness
28 area. Where views of both SEZs exist, additional impacts to those described
29 here would occur.
30

- 31 • *Palo Verde Mountains WA*—The 30,403-acre (123-km²) Palo Verde
32 Mountains WA is a congressionally designated wilderness area located 6.2 mi
33 (10.0 km) at the point of closest approach south of the SEZ. The wilderness
34 area includes twin buttes known as the Flat Tops, which stand out as a
35 landmark against a range of jagged peaks. Palo Verde Peak is the high point
36 of the range, rising to 1,800 ft (550 m).
37

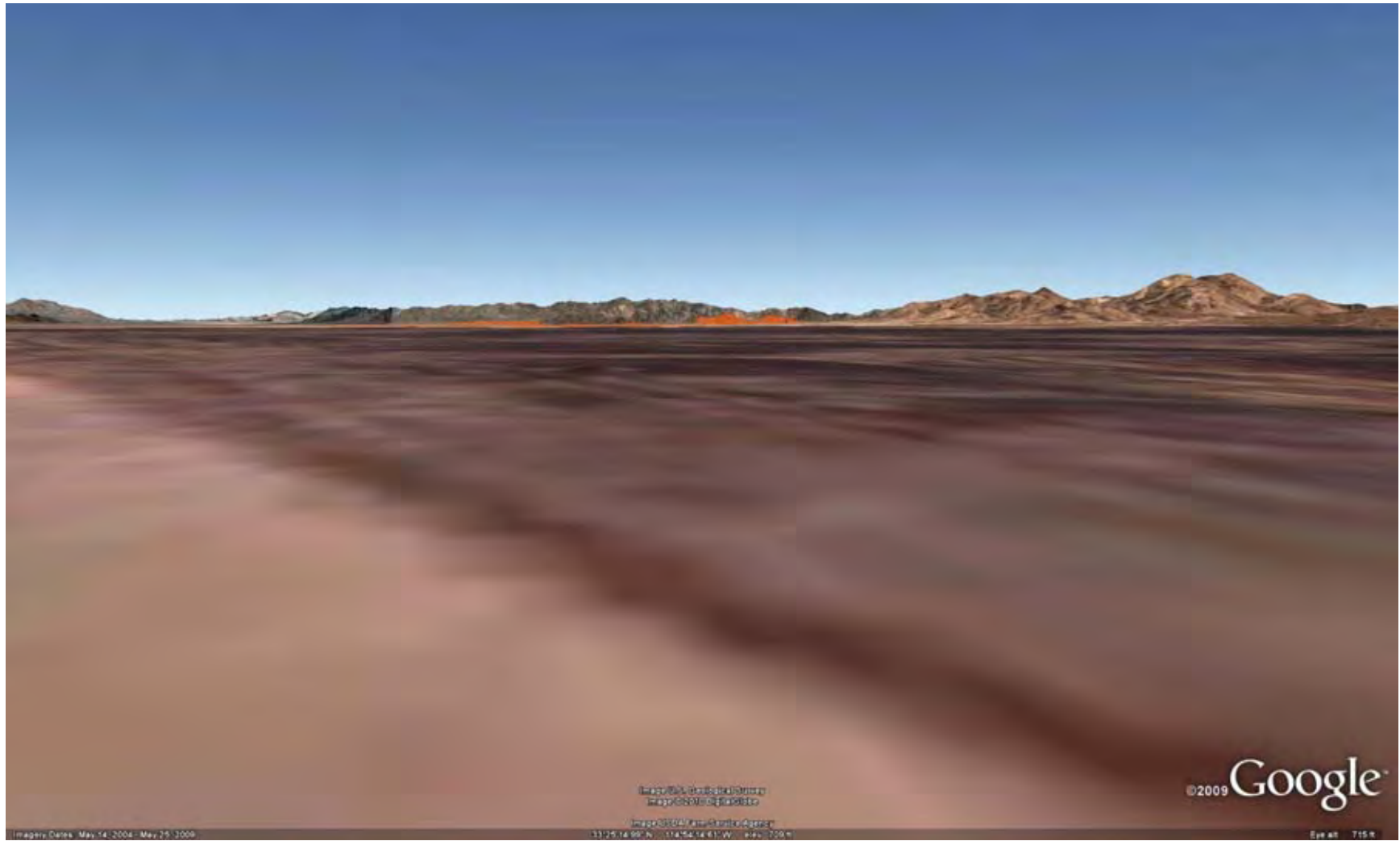
38 The southeastern portion of the SEZ is visible from higher elevations
39 throughout all but the southwestern portion of the wilderness area. Portions of
40 the wilderness area within the 650-ft (198.1-m) SEZ viewshed (approximately
41 13,252 acres [54 km²], or 43.6% of the total wilderness area acreage) extend
42 from the point of closest approach to approximately 14.3 mi (23.0 km) from
43 the SEZ. Portions of the wilderness area within the 24.6-ft (7.5-m) viewshed
44 encompass approximately 8,715 acres (35 km²), or 29% of the total
45 wilderness area acreage.
46

1 Figure 9.4.14.2-17 is a Google Earth visualization of the SEZ as seen from
2 Milpitas Wash Road, along the border of the northwestern portion of the
3 wilderness area, approximately 8 mi (13 km) from the closest point in the
4 SEZ, just west of the Mule Mountains. The viewpoint elevation is about 30 ft
5 (10 m) above the elevation of the closest point in the SEZ. The visualization
6 suggests that minor undulations in elevation between the viewpoint and the
7 SEZ would screen portions of the SEZ from view and that the Mule
8 Mountains would also partially screen views of the SEZ. The SEZ occupies a
9 substantial portion of the horizontal field of view, but the angle of view is
10 very low. Solar collector/reflector arrays within the SEZ visible from the
11 wilderness area would be seen edge-on, reducing their apparent size and
12 repeating the line of the horizon, which would tend to reduce visual contrast.
13

14 Taller ancillary facilities, such as buildings, transmission structures, and
15 cooling towers, and plumes (if present) could potentially be visible projecting
16 above the collector/reflector arrays, at least for nearby facilities. The ancillary
17 facilities could create form and line contrasts with the strongly horizontal,
18 regular, and repeating forms and lines of the collector/reflector arrays.
19

20 Power towers within the SEZ could be visible as points of light on the
21 northeast horizon, against the backdrop of the Big Maria Mountains. At night,
22 if sufficiently tall, the power towers could have red or white flashing hazard
23 navigation lights that likely would be visible from the wilderness area and
24 could be conspicuous from this viewpoint, given the dark night skies in the
25 vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ
26 could potentially be visible as well, at least for facilities in the closest portions
27 of the SEZ.
28

29 Figure 9.4.14.2-18 is a Google Earth visualization of the SEZ as seen from
30 Palo Verde Peak, in the far southeastern portion of the wilderness area,
31 approximately 13 mi (21 km) from the far southeastern corner of the SEZ, just
32 east of the Mule Mountains. At 1,800 ft (550 m), the viewpoint elevation is
33 about 1,400 ft (430 m) above the elevation of the closest point in the SEZ. The
34 visualization suggests that while the Mule and Little Chuckwalla Mountains
35 would partially screen views of the SEZ, because of its vast size the SEZ
36 would stretch across most of the horizontal field of view. Despite the height of
37 the viewpoint, the angle of view is very low, because the distance to the SEZ
38 exceeds 13 mi (21 km). Solar collector/reflector arrays within the SEZ visible
39 from this viewpoint would be seen edge-on, reducing their apparent size and
40 repeating the line of the horizon, which would tend to reduce visual contrast.
41 Power towers within the SEZ could be visible as distant points of light on the
42 northern and northwestern horizon, against the backdrop of the Big Maria
43 Mountains and the other ranges north of the SEZ. At night, if sufficiently tall,
44 the power towers could have red or white flashing hazard navigation lights
45 that could be visible from this viewpoint.
46

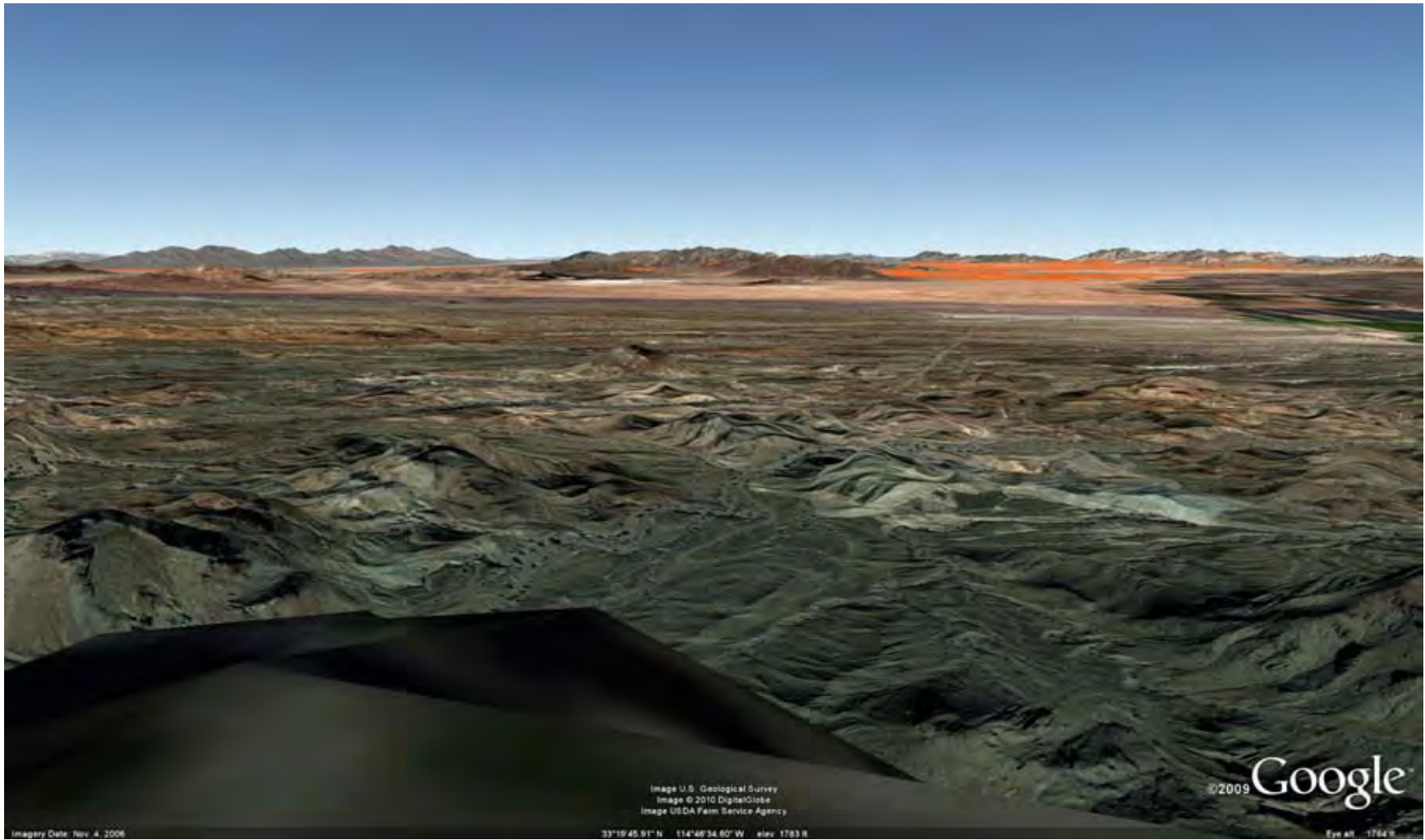


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FIGURE 9.4.14.2-17 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Milpitas Wash Road in the Palo Verde Mountains WA



1

2 **FIGURE 9.4.14.2-18 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands,**
3 **with Power Tower Wireframe Models, as Seen from Palo Verde Peak in the Palo Verde Mountains WA**

4

1 Visual contrasts associated with solar energy development within the SEZ
2 would depend on viewer location within the wilderness area; on the numbers,
3 types, sizes and locations of solar facilities in the SEZ; and on other project-
4 and site-specific factors. At lower elevations, where there is a clear view of
5 the SEZ, under the 80% development scenario analyzed in this PEIS, weak
6 levels of visual contrast would be expected. Moderate levels of visual contrast
7 might be observed from the highest elevations within the WA, such as Thumb
8 Peak, the Flat Tops, and Palo Verde Peak.

- 9
- 10 • *Rice Valley WA*—The 43,412-acre (176-km²) Rice Valley is a congressionally
11 designated wilderness area located 0.5 mi (0.8 km) at the point of closest
12 approach north of the SEZ. The WA includes a portion of the broad, flat
13 plains of Rice Valley, the northwestern tip of the Big Maria Mountains, and a
14 system of small dunes rising 30 to 40 feet above the valley floor. The valley is
15 part of a massive sand sheet that extends from Cadiz Valley through Ward
16 Valley. Camping, hiking, backpacking, hunting, and wildlife viewing are
17 recreational activities in the wilderness area. According to BLM's 1990
18 Wilderness Report, the wilderness area provides expansive vistas, imparting
19 to the visitor a sense of vastness and desolation. The flatness of most of the
20 area provides miles of unrestricted views in all directions (BLM 1990).

21

22 Portions of the wilderness area within the 650-ft (198.1-m) SEZ viewshed
23 (approximately 35,792 acres [145 km²], or 82% of the total wilderness area
24 acreage) extend from the point of closest approach to approximately 9.9 mi
25 (15.9 km) from the SEZ. Portions of the wilderness area within the 24.6-ft
26 (7.5-m) viewshed encompass approximately 871 acres (4 km²), or 2% of the
27 total wilderness area acreage. As noted above, the wilderness area includes a
28 portion of the Big Maria Mountains, and the range forms the southern
29 boundary of the wilderness area. The large difference in visible area within
30 the wilderness area between the 650-ft (198.1-m) and the 24.6-ft (7.5-m)
31 viewsheds is due to inclusion in the SEZ of two hills located in the far
32 northeastern portion of the SEZ south of the wilderness area and the Big
33 Maria Mountains. If 650-ft (198.1-m) power towers were located at the peaks
34 of these hills, the upper portions of the power tower would project above the
35 bottoms of two gaps in the Big Maria Mountains such that they would be
36 visible from much of the Rice Valley WA. However, due to the steep slope of
37 the hills, it is extremely unlikely that power towers would ever be erected on
38 the peaks of these hills. If power towers were located away from the peaks of
39 these hills, they would not be visible from points in the wilderness area north
40 of the Big Maria Mountains. The rest of the analysis assumes that visibility of
41 solar facilities within the SEZ is limited to the southern slopes of the Big
42 Maria Mountains within the wilderness area.

43

44 With this assumption, solar energy facilities within the SEZ could potentially
45 be visible from a small area in the far southern portion of the wilderness area,

1 including peaks and south-facing slopes of certain mountains in the Big Maria
2 range.

3
4 Figure 9.4.14.2-19 is a Google Earth visualization of the SEZ (highlighted in
5 orange) as seen from a peak in the Big Maria Mountains in the far southern
6 portion of the wilderness area. The viewpoint is approximately 1.4 mi
7 (2.3 km) from the northern border of the SEZ and elevated approximately
8 1,750 ft (533 m) above the valley floor at the closest point in the SEZ. The
9 view looks southward down the length of the eastern portion of the SEZ
10 toward the distant McCoy and Mule Mountains.

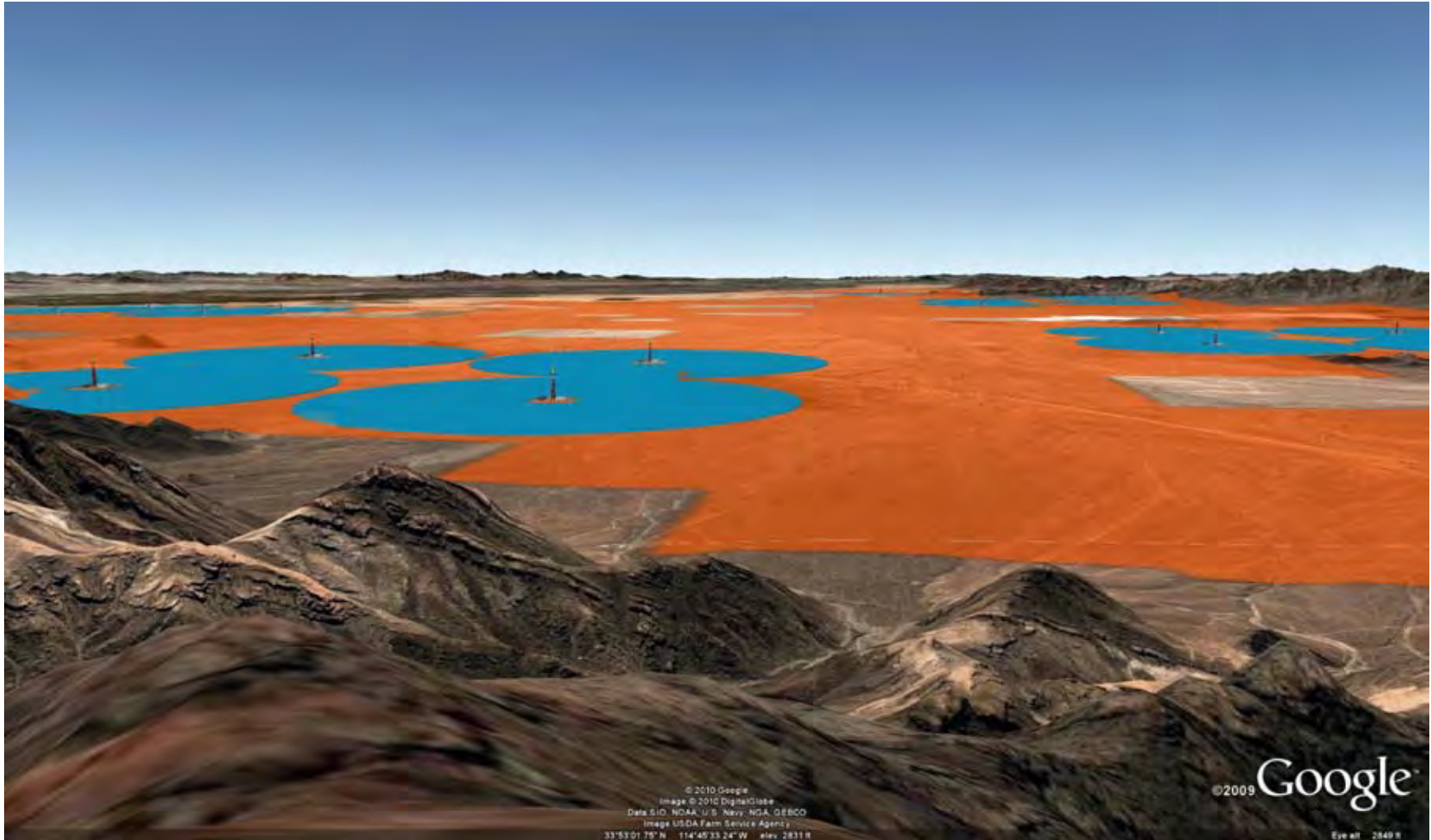
11
12 The visualization suggests that from this elevated viewpoint and relatively
13 short distance to the SEZ, the SEZ would be too large to be encompassed in
14 one view, and viewers would need to turn their heads to scan across the whole
15 visible portion of the SEZ. Four clusters of power tower facility models are
16 visible; the closest model cluster is 4.2mi (6.8 km) from the viewpoint, and
17 the farthest model cluster is 14 mi (23 km) from the viewpoint (both distances
18 to center points of model clusters). The tops of solar collector/reflector arrays
19 in the closest parts of the SEZ would be visible, but the angle of view is low
20 enough that farther facilities would likely repeat the horizontal line of the
21 valley plain.

22
23 Taller ancillary facilities, such as buildings, transmission structures, and
24 cooling towers, and plumes (if present) would likely be visible projecting
25 above the collector/reflector arrays, and their structural details could be
26 evident, at least for nearby facilities. The ancillary facilities could create form
27 and line contrasts with the strongly horizontal, regular, and repeating forms
28 and lines of the collector/reflector arrays. Color and texture contrasts would
29 also be likely, but their extent would depend on the materials and surface
30 treatments utilized in the facilities.

31
32 If power towers were present within the SEZ, at short distances the receivers
33 would likely appear as very bright nonpoint sources of light atop clearly
34 discernable tower structures against the backdrop of the valley floor, while at
35 the longest distances visible here they would likely appear as distant points of
36 light below the southern horizon against the backdrop of the valley floor.

37
38 At night, if sufficiently tall, the power towers could have red or white flashing
39 hazard navigation lights that would likely be visible from the WA, and could
40 be very conspicuous from this viewpoint, given the dark night skies in the
41 vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ
42 could potentially be visible as well, at least for facilities in the closest portions
43 of the SEZ.

44
45 The potential visual contrast expected for this viewpoint would depend on the
46 numbers, types, sizes, and locations of solar facilities in the SEZ and on other



1

FIGURE 9.4.14.2-19 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Viewpoint in the Big Maria Mountains within the Rice Valley WA

2

3

4

5

1 project- and site-specific factors, but because the viewpoint is elevated and
2 relatively close to the SEZ, the SEZ would fill up much of the field of view.
3 While one or a few solar facilities within the SEZ might only give rise to
4 moderate levels of visual contrast, under the 80% development scenario
5 analyzed in this PEIS, there could be numerous solar facilities within the SEZ,
6 a variety of technologies employed, and a range of supporting facilities that
7 would contribute to visual impacts, such as transmission towers and lines,
8 substations, power block components, and roads. The lack of uniformity in
9 facility components could result in a visually complex landscape, vast in
10 scope but with low visual unity. This essentially industrial-appearing
11 landscape would contrast greatly with the surrounding natural-appearing lands
12 and would likely dominate the view from this location. Under the 80%
13 development scenario, solar facilities within the SEZ would be expected to
14 create strong visual contrasts as viewed from this and similar locations on the
15 slopes or peaks of the Big Maria Mountains within the wilderness area.

16
17 Note that some locations within the Big Maria Mountains and within the
18 wilderness area also have partial views of the more distant proposed Iron
19 Mountain SEZ. Overall, under the 80% development scenario analyzed in this
20 PEIS, solar energy development in the Iron Mountain SEZ would be expected
21 to result in much weaker visual impacts on the wilderness area than those
22 expected from development in the Riverside East SEZ, but where views of
23 both SEZs existed, additional impacts to those described here would occur.

- 24
25 • *Sheephole Valley WA*—The 195,002-acre (789-km²) Sheephole Valley is a
26 congressionally designated wilderness area located 12.3 mi (19.8 km) at the
27 point of closest approach northwest of the SEZ. The wilderness area includes
28 the Sheephole Mountains, the Calumet Mountains, and the Sheephole Valley. The
29 Sheepholes are a steep, boulder-strewn mountain range; the Calumets are similar
30 but much lower. Camping, hiking, backpacking, hunting, and wildlife viewing
31 are recreational activities in the wilderness area.

32
33 The SEZ is visible from higher elevations in both the Sheephole and Calumet
34 Mountains. Portions of the wilderness area within the 650-ft (198.1-m) SEZ
35 viewshed (approximately 2,733 acres [11 km²], or 1.4% of the total
36 wilderness area acreage) extend from 14.4 mi (23.2 km) to approximately
37 22.6 mi (36.4 km) from the SEZ. Portions of the wilderness area within the
38 24.6-ft (7.5-m) viewshed encompass approximately 625 acres (3 km²) or 0.3%
39 of the total wilderness area acreage.

40
41 From the Sheephole Mountains, the far northwest portion of the SEZ is visible
42 beyond the Pinto Basin to the west of the Coxcomb Mountains. The Coxcomb
43 Mountains partially screen the view of the SEZ from the Sheephole
44 Mountains, and because the distance to the SEZ exceeds 15 mi (24 km), the
45 angle of view is low, so that the visible portion of the SEZ occupies a very
46 small portion of the field of view. Solar collector/reflector arrays within the

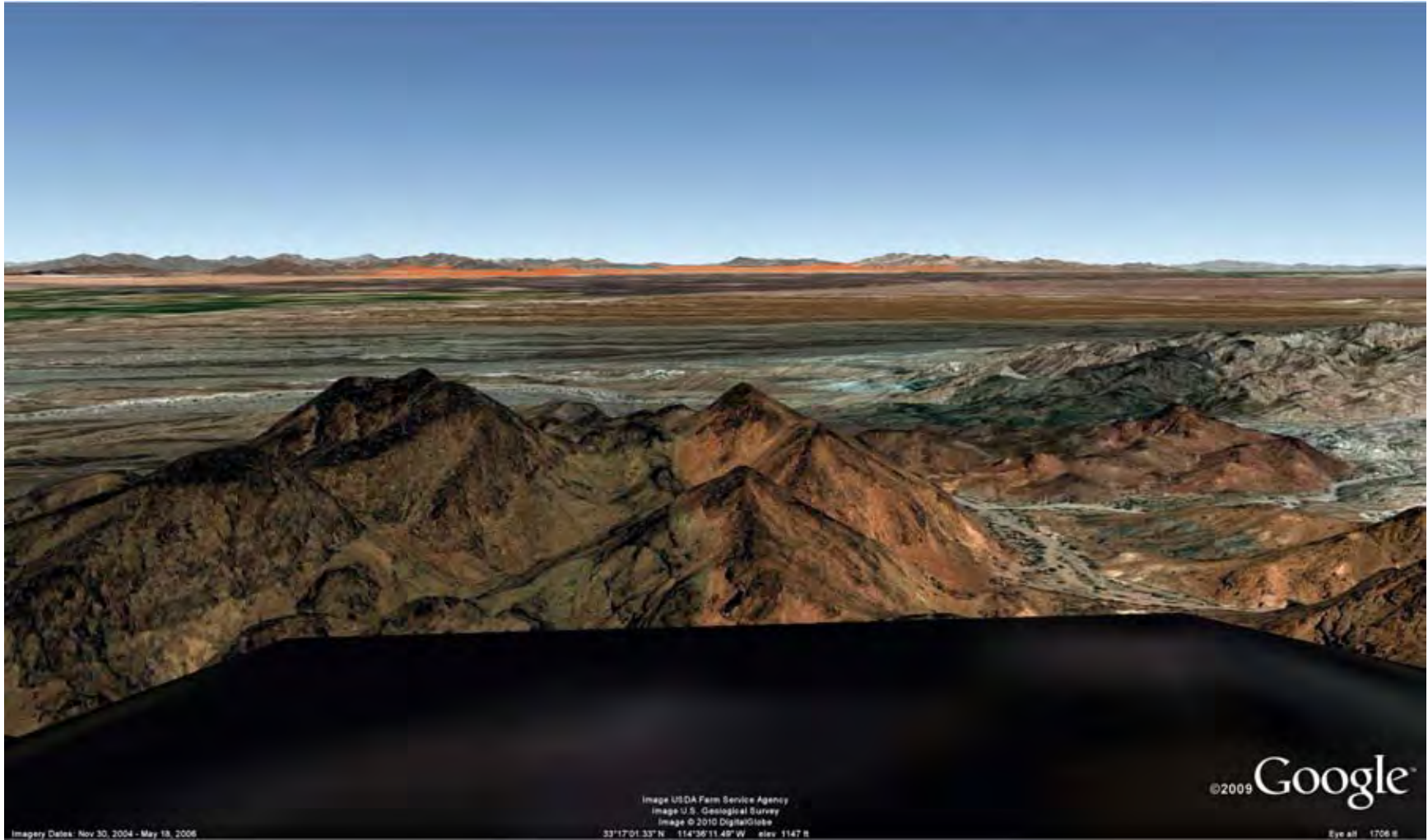
1 SEZ visible from the Sheephole Mountains within the wilderness area would
2 be seen edge-on, reducing their apparent size and repeating the line of the
3 horizon, which would tend to reduce visual contrast. Power towers within the
4 SEZ could be visible as distant points of light on the southeast horizon,
5 against the backdrop of the Chuckwalla Valley floor. At night, if sufficiently
6 tall, the power towers could have red or white flashing hazard navigation
7 lights that could potentially be visible from this location. Expected visual
8 contrasts would be weak.

9
10 From the Calumet Mountains, sufficiently tall power towers in the northwest
11 portion of the SEZ east of the Coxcomb Mountains might just be visible over
12 the bajada of the Coxcomb Mountains. The mountains screen the view of the
13 SEZ from the Calumet Mountains, and because the distance to the SEZ
14 exceeds 19 mi (31 km), the angle of view is very low, so only the upper
15 portions of tall power towers might be seen. Power towers within the SEZ
16 could be visible as distant points of light on the southeast horizon, appearing
17 just above the bajada east of the Coxcomb Mountains. Expected visual
18 contrasts would be minimal.

- 19
20 • *Trigo Mountains WA*—The 30,046-acre (122-km²) Trigo Mountains is a
21 congressionally designated wilderness area located in Arizona, 17.4 mi
22 (28.0 km) at the point of closest approach southeast of the SEZ. The
23 wilderness is characterized by sawtooth ridges and steep-sided canyons and is
24 heavily dissected by washes. Recreation such as extended horseback riding
25 and backpacking trips, sightseeing, hiking, and rock climbing are enhanced by
26 the topographic diversity, scenic character, as well as botanical, wildlife, and
27 cultural values (BLM 2010a).

28
29 The Riverside East SEZ is visible from higher elevations throughout the Trigo
30 wilderness area. Although the closest points in the wilderness area are farther
31 than 17 mi (27 km) from the SEZ, there are no intervening mountains to
32 screen views. Portions of the wilderness area within the 650-ft (198.1-m) SEZ
33 viewshed (approximately 3,512 acres [14.2 km²], or 12% of the total
34 wilderness area acreage) extend from the point of nearest approach to beyond
35 25 mi (41 km) from the SEZ. Portions of the wilderness area within the 24.6-ft
36 (7.5-m) viewshed encompass approximately 2,517 acres (10 km²), or 8% of
37 the total wilderness area acreage.

38
39 Figure 9.4.14.2-20 is a Google Earth visualization of the SEZ as seen from an
40 unnamed peak in the northwestern portion of the wilderness area,
41 approximately 19 mi (31 km) from the far southeastern portion of the SEZ.
42 The visualization illustrates that despite the relatively long distance to the SEZ
43 from the Trigo Mountains WA, because of the open view and its large size,
44 the SEZ occupies a substantial portion of the horizontal field of view. Because
45 of the long distance, however, the angle of view is very low. Solar
46 collector/reflector arrays within the SEZ visible from the wilderness area



1

2 **FIGURE 9.4.14.2-20 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands,**
3 **with Power Tower Wireframe Models, as Seen from a Viewpoint in the Trigo Mountains within the Trigo Mountains WA**
4

1 would be seen edge-on, reducing their apparent size and repeating the line of
2 the horizon, which would tend to reduce visual contrast. Power towers within
3 the SEZ could be visible as distant points of light on the northwest horizon,
4 against the backdrop of the Chuckwalla Valley floor or the mountain ranges
5 north of the valley. At night, if sufficiently tall, the power towers could have
6 red or white flashing hazard navigation lights that could be visible from the
7 WA.
8

9 Visual contrasts associated with solar energy development within the SEZ
10 would depend on the numbers, types, sizes and locations of solar facilities in
11 the SEZ, and other project- and site-specific factors.. Where there was a clear
12 view of the SEZ, under the 80% development scenario analyzed in this PEIS,
13 weak levels of visual contrast would be expected. The highest contrast levels
14 would be expected for peaks in the northern part of the WA, with lower
15 contrasts expected for lower elevations and viewpoints in the southern part of
16 the WA.
17

- 18 • *Turtle Mountains WA*—The 182,610-acre (739-km²) Turtle Mountains is a
19 congressionally designated wilderness area located 17.0 mi (27.4 km) at the
20 point of closest approach north of the SEZ. Above broad, open bajadas, the
21 wilderness area's eroded volcanic peaks, spires, and cliffs in a range of colors
22 constitute a diverse, scenic landscape, which includes the Turtle Mountains
23 scenic ACEC and the Turtle Mountains National Natural Landmark. The
24 wilderness area contains numerous trails. The wilderness area contains the
25 Mopah Peaks, which are rhyodactic or volcanic plugs, and the northernmost
26 peak in the wilderness area is a landmark known as Mexican Hat. Hiking,
27 horseback riding, hunting, camping, rock hounding, photography, and
28 backpacking are popular recreation activities in the wilderness area. Coffin,
29 Mopah, and Mohawk Springs are popular hiking destinations. The Turtle
30 Mountains WA includes most of the Turtle Mountains range, and a large
31 portion of the Ward Valley floor to the northwest of the Turtle Mountains.
32

33 Small areas of the northeast section of the SEZ are visible from the south-
34 facing slopes and peaks in the southern portion of the wilderness area beyond
35 Rice Valley through two gaps, one in the Big Maria Mountains and one
36 between the Big Maria and Little Maria Mountains. Portions of the wilderness
37 area within the 650-ft (198.1-m) viewshed (approximately 13,827 acres
38 [56 km²], or 8% of the total wilderness area acreage) extend from the point of
39 nearest approach to beyond 25 mi (41 km) from the SEZ. Portions of the
40 wilderness area within the 24.6-ft (7.5-m) viewshed encompass approximately
41 1,375 acres (6 km²), or 0.8% of the total wilderness area acreage.
42

43 The gaps through which the SEZ is visible from the wilderness area are
44 relatively narrow, so the visible portions of the SEZ are very small, especially
45 the eastern-most gap in the Big Maria Mountains. The distance from the SEZ
46 to visible areas within the wilderness area exceeds 17 mi (27 km), so solar

1 collector/reflector arrays within the SEZ visible from the wilderness area
2 would be seen edge-on, reducing their apparent size and repeating the line of
3 the horizon, which would tend to reduce visual contrast. Power towers within
4 the SEZ could be visible as distant points of light within the gaps. At night, if
5 sufficiently tall, the power towers could have red or white flashing hazard
6 navigation lights that could be visible from the wilderness area.

7
8 Visual contrasts associated with solar energy development within the SEZ
9 would depend on viewer location within the WA; solar facility type, size, and
10 location within the SEZ; and other visibility factors. Where there was a clear
11 view of the SEZ, under the 80% development scenario analyzed in this PEIS,
12 weak levels of visual contrast would be expected.

13 14 *National Wildlife Refuges*

- 15 • *Cibola NWR*—The 18,398-acre (75-km²) Cibola NWR is 9.8 mi (15.8 km)
16 south of the SEZ at the closest point of approach, in the floodplain of the
17 lower Colorado River. The refuge is located immediately north of Imperial
18 NWR (see below). The refuge includes backwaters, seasonally flooded
19 croplands, two historic river meanders, and two small lakes. The refuge
20 includes low desert ridges and washes away from the river.
21
22

23
24 The southeastern portion of the SEZ is visible from most of the refuge.
25 Approximately 17,121 acres (69 km²), or 93% of the refuge, is within the
26 650-ft (198.1-m) viewshed of the SEZ, and 16,386 acres (66 km²), or 89%, is
27 within the 24.6-ft (7.5-m) viewshed. The portions of the refuge within the
28 viewshed extend from the point of nearest approach at the northern boundary
29 to the southern boundary of the refuge, approximately 22.1 mi (35.6 km) from
30 the SEZ.

31
32 The refuge is very flat, with relief in most of the refuge varying less than 20 ft
33 (6 m), except the far southern portions. Most of the refuge is lower in
34 elevation than the SEZ by 100 ft (30 m) or more, and the highest points in the
35 refuge are lower than the southeastern portion of the SEZ; hence the angle of
36 view between the refuge and the SEZ is very low. Some of the SEZ is
37 screened from view by the Palo Verde Mountains. In addition, much of the
38 refuge is heavily vegetated, and in some areas of the refuge, views of the SEZ
39 are likely screened by vegetation.

40
41 Any solar facilities within the SEZ visible from the refuge would be viewed at
42 very low angles. Solar collector/reflector arrays would be viewed edge-on,
43 tending to reduce apparent size and visual contrast. If power towers were
44 visible, they would likely appear as point light sources on the northern
45 horizon. At night, if sufficiently tall, the power towers could have red or white
46 flashing hazard navigation lights that could be visible from the refuge.

1 Visual contrasts associated with solar energy development within the SEZ
2 would depend on viewer location within the NWR; solar facility type, size,
3 and location within the SEZ; and other visibility factors. From the northern
4 portions of the NWR, where there was a clear view of the SEZ, under the 80%
5 development scenario analyzed in this PEIS, weak levels of visual contrast
6 would be expected. Contrast would be weaker from viewpoints in the southern
7 portions of the NWR, because the distance to the SEZ is greater.
8

- 9 • *Imperial NWR*—The 31,465-acre (127-km²) Imperial NWR is approximately
10 22.1 mi (35.6 km) at the closest point of approach south of the SEZ. The
11 refuge protects wildlife habitat along 30 mi (48.3 km) of the lower Colorado
12 River in Arizona and California, including the last unchannelized section
13 before the river enters Mexico. The refuge includes low, heavily vegetated
14 land along the Colorado River as well as higher areas with less vegetation on
15 both sides of the river.
16

17 The far southeastern corner of the SEZ is visible from some areas within the
18 northern portion of the refuge. Approximately 1,749 acres (7 km²), or 6% of
19 Imperial NWR's total acreage, is contained within the 650-ft (198.1-m)
20 viewshed of the SEZ, and 1,381 acres (6 km²), or 4% of the refuge's total
21 acreage, is within the 24.6-ft (7.5-m) viewshed. The portions of the refuge
22 within the viewshed extend from the point of nearest approach at the northern
23 boundary of the refuge to beyond 25 mi (41 km) from the SEZ.
24

25 Within 25 mi (41 km) of the SEZ, where vegetative screening is absent, solar
26 facilities located in the far southeastern portions of the SEZ might be visible
27 from the highest points within the refuge. Because of the very long distance to
28 the SEZ and screening by the Palo Verde Mountains, visible portions of the
29 SEZ would occupy a very small portion of the field of view. The refuge is at a
30 slightly lower elevation than the SEZ. Any visible solar facilities within the
31 SEZ would be viewed at very low angles. Solar collector/reflector arrays
32 would be viewed edge-on and, at distance exceeding 22 mi (35 km), are
33 unlikely to be distinguishable. If power towers were visible, they would likely
34 appear as distant point light sources on the northern horizon. At night, if
35 sufficiently tall, the power towers could have red or white flashing hazard
36 navigation lights that could potentially be visible from the refuge. Visual
37 impacts on the Imperial NWR from solar development within the SEZ would
38 be expected to be minimal.
39

40 *National Natural Landmarks*

- 41 • *Turtle Mountains NNL*—The Turtle Mountains NNL comprises 50,057 acres
42 (202.57 km²) designated for outstanding scenic values, located almost entirely
43 within the Turtle Mountains WA (see above). The Turtle Mountains NNL
44 encompasses the same lands as the Turtle Mountain Scenic ACEC.
45
46

1 Visual impacts on the Turtle Mountains NNL associated with utility-scale
2 solar energy development in the proposed Riverside East SEZ would be
3 similar to those described for the Turtle Mountains WA (see above).
4
5

6 *ACECs Designated for Outstanding Scenic Qualities* 7

- 8 • *Corn Springs ACEC*—The Corn Springs ACEC is a 2,463-acre (10-km²)
9 BLM-designated ACEC located 4.8 mi (7.7 km) south of the SEZ at the point
10 of closest approach. The ACEC contains land in and around a canyon in the
11 Chuckwalla Mountains Wilderness. The ACEC was designated for its
12 prehistoric/historic values, outstanding scenery, wildlife habitat, and
13 vegetation, and the ACEC also contains petroglyphs. Corn Springs is also a
14 Cahuilla Indian sacred site. The Corn Springs Campground is located in the
15 canyon, situated by a stand of native California fan palms.
16

17 Much of the SEZ is visible from the eastern portion of the SEZ outside Corn
18 Springs Canyon, and a very small portion of the SEZ is visible from within
19 the canyon. The area of the ACEC within the viewshed of the SEZ
20 encompasses 1,080 acres (4 km²) in the 650-ft (198.1-m) viewshed, or 44%
21 of the total ACEC acreage. Portions of the ACEC within the 24.6-ft (7.5-m)
22 viewshed include approximately 941 acres (4 km²), or 38% of the total ACEC
23 acreage. The portions of the ACEC within the viewshed extend from the point
24 of nearest approach to approximately 5.9 mi (9.5 km) from the SEZ.
25

26 The SEZ is largely screened from view within the canyon itself, although
27 there is a very limited view of the SEZ almost straight east from Corn Springs
28 Road as it crosses a slightly elevated bench in the western part of the canyon.
29 The view of the SEZ from this location is limited by screening from the
30 canyon walls to a very small area in the far southeastern portion of the SEZ,
31 more than 29 mi (47 km) distant, and at such a low angle of view that visual
32 impacts from any solar facilities visible from that location would be expected
33 to be minimal.
34

35 Within the ACEC, near the eastern mouth of the canyon where the canyon
36 outwash turns northward toward the Chuckwalla Valley, views of the SEZ
37 open up to the north and east. As Corn Springs Road crosses east of the wash,
38 views open up even more as the Chuckwalla Mountains no longer screen
39 views of the western portion of the SEZ.
40

41 Figure 9.4.14.2-21 is a Google Earth visualization of the SEZ as seen from
42 Corn Springs Road approximately 0.2 mi (0.4 km) north of the southern
43 boundary of the ACEC and 0.4 mi (0.7 km) from the eastern boundary of the
44 ACEC. The viewpoint is approximately 5 mi (8 km) south of the SEZ and is
45 elevated about 600 ft (180 m) over the closest portion of the SEZ and about
46 850 ft (260 m) over the valley floor. The visualization suggests that from this



1

FIGURE 9.4.14.2-21 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Viewpoint on Corn Springs Road within the Corn Springs ACEC

2

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1 elevated viewpoint, the SEZ would be too large to be encompassed in one
2 view, and viewers would need to turn their heads to scan across the whole
3 SEZ. The entire Chuckwalla Valley visible from this location would present a
4 variety of solar facilities with associated transmission facilities and roads,
5 stretching across the valley floor to the base of the bajada of the Palen
6 Mountains and to the other mountain ranges north of the SEZ. The angle of
7 view is low enough, however, that the valley itself appears as a band across
8 the base of the mountains, so most of the development in the valley would be
9 viewed from a low oblique angle that would reduce the visible surface area
10 and associated visual impacts.

11
12 The tops of solar collector/reflector arrays in the closest parts of the SEZ
13 would likely be visible, but the angle of view is low enough that most
14 facilities would appear close to edge-on, appearing as a thin band that would
15 tend to repeat the line of the horizon.

16
17 Taller ancillary facilities, such as buildings, transmission structures, and
18 cooling towers, and plumes (if present) would likely be visible projecting
19 above the collector/reflector arrays, at least for nearby facilities, and their
20 structural details could be evident. The ancillary facilities could create form
21 and line contrasts with the strongly horizontal, regular, and repeating forms
22 and lines of the collector/reflector arrays. Color and texture contrasts would
23 also be likely, but their extent would depend on the materials and surface
24 treatments utilized in the facilities.

25
26 If power towers were present within the SEZ, closer receivers would likely
27 appear as bright points of light atop discernable tower structures against the
28 backdrop of the valley floor or the bajada of the Palen Mountains. The tower
29 structures and power block facilities would likely be visible for projects close
30 to the viewpoint, but receiver lights would be dimmer and ancillary facilities
31 more difficult to discern for projects farther from the viewpoint, as the
32 distance increased and the viewing angle decreased.

33
34 At night, if sufficiently tall, the power towers could have red or white flashing
35 hazard navigation lights that likely would be visible from this location in the
36 ACEC and could be very conspicuous, given the dark night skies in the
37 vicinity of the SEZ, although there would be lighting from I-10 and other
38 sources visible as well. Other lighting associated with solar facilities in the
39 SEZ could potentially be visible as well, at least for facilities in the closest
40 portions of the SEZ.

41
42 The potential visual contrast expected for this viewpoint would vary
43 depending on the numbers, types, sizes, and locations of solar facilities in the
44 SEZ and on other project- and site-specific factors, but under the 80%
45 development scenario analyzed in this PEIS, solar facilities within the SEZ

1 would be expected to create strong visual contrasts as viewed from this
2 location within the ACEC.

3
4 In summary, visual contrasts associated with solar energy development within
5 the SEZ would depend on viewer location within the ACEC; on solar facility
6 type, size, and location within the SEZ; and on other visibility factors. Inside
7 Corn Spring Canyon, visibility of solar facilities in the SEZ would be very
8 limited; views would be at very long distances; and expected contrast levels
9 would be minimal. Outside of the canyon at points on or along Corn Springs
10 Road, with a clear view of the SEZ, under the 80% development scenario
11 analyzed in this PEIS, strong levels of visual contrast would be expected.

- 12
13 • *Turtle Mountain ACEC*—The Turtle Mountains ACEC is a 50,057-acre
14 (203-km²) BLM-designated ACEC located approximately 20.8 mi (33.5 km)
15 north of the SEZ at the point of closest approach. The ACEC encompasses the
16 Turtle Mountains NNL. The ACEC was designated for its scenic values.

17
18 The area of the ACEC within the 650-ft (198.1-m) viewshed of the SEZ
19 includes 2,355 acres (10 km²), or 5% of the total ACEC acreage. The area
20 within the 24.6-ft (7.5-m) viewshed of the SEZ includes 856 acres (4 km²), or
21 2% of the total ACEC acreage. The visible portions of the ACEC extend from
22 the point of closest approach to beyond 25 mi (41 km) from the SEZ.

- 23
24 • Visual impacts on the Turtle Mountains ACEC associated with utility-scale
25 solar energy development in the proposed Riverside East SEZ would be
26 similar to those described for the Turtle Mountains WA (see above).

27
28
29 ***Scenic Highways/Byways***

- 30
31 • *Bradshaw Trail*—The Bradshaw Trail is a BLM Backcountry Byway that runs
32 parallel to the southern boundary of the SEZ. The trail traverses mostly public
33 land between the Chuckwalla Mountains and the Chocolate Mountain Aerial
34 Gunnery Range, with spectacular views of the Chuckwalla Bench, Orocopia
35 Mountains, Chuckwalla Mountains and the Palo Verde Valley. It is currently
36 unpaved, and is accessible with four-wheel drive vehicles.

37
38 Approximately 23 mi (37.0 km) of the trail is within the calculated 650-ft
39 (198.1-m) viewshed of the SEZ. Near the southeastern corner of the SEZ, the
40 Bradshaw Trail passes within 1.7 mi (2.8 km) of the SEZ and parallels the
41 SEZ at roughly that distance for a little more than 6 mi (10 km); however,
42 views of the SEZ from the trail would be screened by the Mule Mountains for
43 most of that distance. As the trail heads west, it veers slightly south to pass to
44 the south of the Little Chuckwalla Mountains and after about 15 additional mi
45 (24 km) passes out of the SEZ 650-ft (198.1-m) viewshed.

1 The trail climbs steadily as it runs west, from an elevation of about 240 ft
2 (73.2 m) above mean seal level near the southeast corner of the SEZ to about
3 1,240 ft (378 m) above mean sea level at the point it passes out of the SEZ
4 viewshed. For that portion of the trail closest to the SEZ, the trail is at a
5 slightly lower elevation, which would ensure a very low angle of view to the
6 SEZ.
7

8 Figure 9.4.14.2-22 is a Google Earth perspective visualization of the SEZ as
9 seen from the Bradshaw Trail 1.7 mi (2.8 km) south of the southeast corner of
10 the SEZ. The viewpoint is roughly 20 ft (6 m) lower in elevation than the SEZ
11 in the vicinity. The view direction is north.
12

13 In the visualization, the SEZ and very distant heliostat arrays depicted in the
14 power tower model cluster appear edge-on, as a very narrow band parallel to,
15 and repeating, the strong horizon line. The very low angle of view would
16 greatly reduce the visible area of solar collector/reflector arrays, conceal their
17 strong regular geometry, and thus reduces associated visual contrast. The
18 model cluster at center right is approximately 18 mi (29 km) from the
19 viewpoint; however, if solar facilities were closer to the viewpoint, they
20 would cause greater levels of visual contrast, and if they were close to the
21 southeastern corner of the SEZ, they could potentially give rise to moderate to
22 strong visual contrasts.
23

24 If power towers were present within the SEZ, at the distance shown here, the
25 receivers could appear as distant point light sources against the backdrop of
26 the Big Maria Mountains. Transmission towers could be visible above the
27 solar collector/reflector arrays. Receivers on closer power towers could be
28 much brighter.
29

30 At night, if sufficiently tall, the power towers could have red or white flashing
31 hazard navigation lights that would likely be visible from the Trail and could
32 be very conspicuous from this viewpoint, given the dark night skies in the
33 vicinity of the SEZ and the short distance to the SEZ. Other lighting
34 associated with solar facilities in the SEZ could potentially be visible as well,
35 at least for facilities in the closest portions of the SEZ.
36

37 The potential visual contrast expected for this viewpoint would depend on the
38 numbers, types, sizes, and locations of solar facilities in the SEZ and on other
39 project- and site-specific factors. Under the 80% development scenario, solar
40 facilities within the SEZ would be expected to create weak to moderate visual
41 contrasts as viewed from this location on the trail.
42

43 On average, eastbound travelers on the Bradshaw Trail would be more likely
44 to experience visual impacts from solar energy development in the SEZ than



1

2 **FIGURE 9.4.14.2-22 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands,**
3 **with Power Tower Wireframe Models, as Seen from the Bradshaw Trail near the Southeast Corner of the SEZ**

4

5

1 westbound travelers. As eastbound travelers approached the SEZ, they would
2 be at a higher elevation than the SEZ and so would see more of the SEZ and
3 solar facilities within it, but they would also have more extended views of the
4 SEZ as they descended the trail. Westbound travelers would be facing away
5 from the SEZ as they climbed the trail behind the Little Chuckwalla
6 Mountains.

7
8 Figure 9.4.14.2-23 is a Google Earth perspective visualization of the SEZ as it
9 would be seen by eastbound travelers on the Bradshaw Trail 5.7 mi (9.2 km)
10 southwest of the SEZ at the western edge of the Mule Mountains. The
11 viewpoint is roughly 240 ft (73 m) higher in elevation than the SEZ is in the
12 direction of travel. The view direction is northeast.

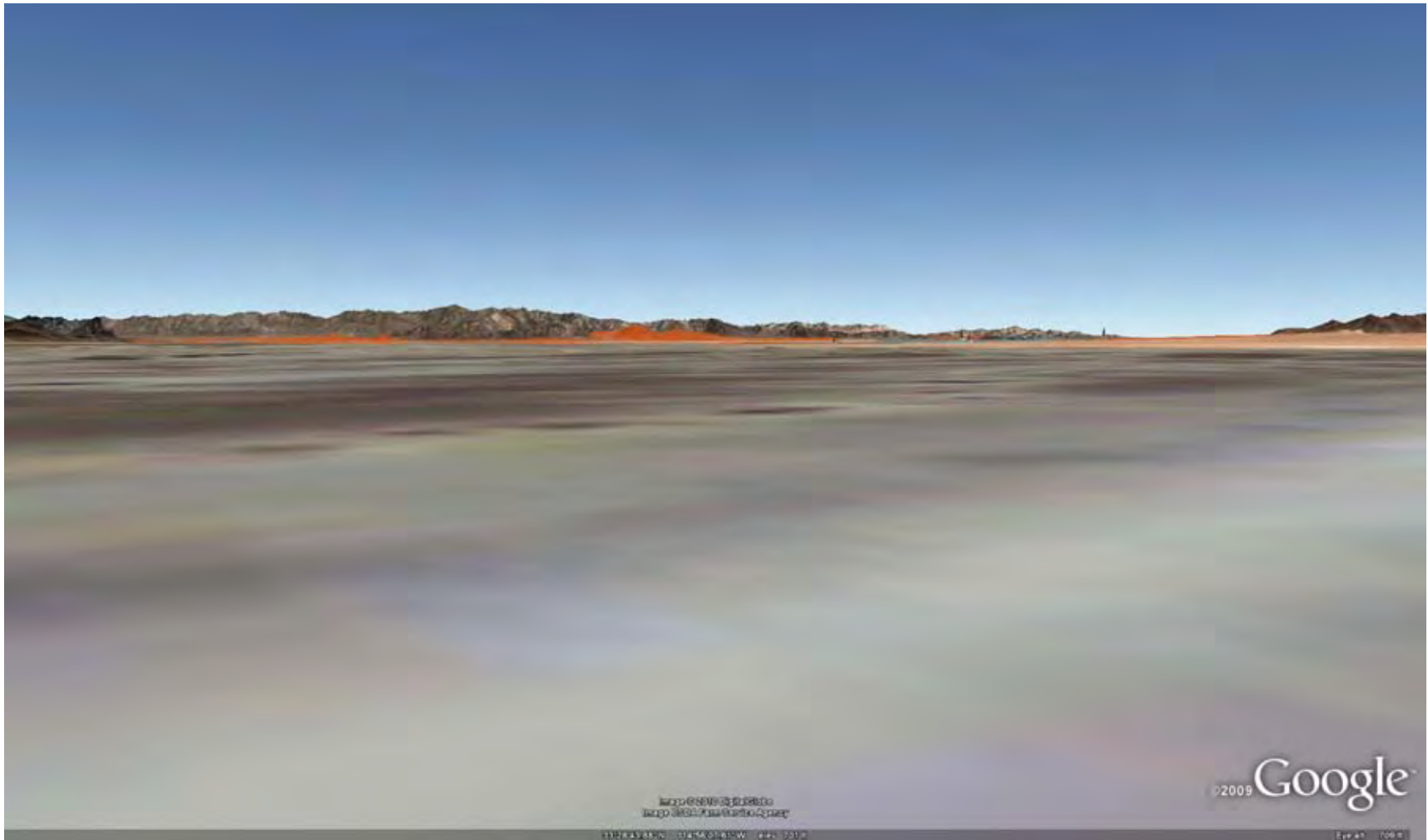
13
14 In the visualization, the SEZ and very distant heliostat arrays depicted in the
15 power tower model cluster appear edge-on, as a very narrow band parallel to,
16 and repeating, the strong horizon line and thus greatly reducing their visible
17 area and associated visual contrast. The model cluster at center right is
18 approximately 9 mi (14 km) from the viewpoint.

19
20 If power towers were present within the SEZ, at the distance shown here, the
21 receivers could appear as bright point light sources atop discernable tower
22 structures against the backdrop of the Big Maria Mountains or the sky.
23 Transmission towers could be visible above the solar collector/reflector
24 arrays.

25
26 At night, if sufficiently tall, the power towers could have red or white flashing
27 hazard navigation lights that could be visible from this location. Other lighting
28 associated with solar facilities in the SEZ could potentially be visible as well,
29 at least for facilities in the closest portions of the SEZ.

30
31 The potential visual contrast expected for this viewpoint would depend on the
32 numbers, types, sizes and locations of solar facilities in the SEZ, and other
33 project- and site-specific factors. Under the 80% development scenario, solar
34 facilities within the SEZ would be expected to create moderate visual
35 contrasts as viewed from this location on the trail.

36
37 In summary, visual contrasts associated with solar energy development within
38 the SEZ would depend on viewer location on the Bradshaw Trail; on solar
39 facility type, size, and location within the SEZ; and on other visibility factors.
40 On much of the trail, visibility of solar facilities in the SEZ would be very
41 limited; views would be at long distances; and expected contrast levels would
42 be minimal. However, under the 80% development scenario analyzed in this
43 PEIS, moderate or strong levels of visual contrast would be expected for some
44 locations with elevated viewpoints or low-elevation viewpoints very close to
45 the SEZ. In general, because of view direction and duration, eastbound
46



1

FIGURE 9.4.14.2-23 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Bradshaw Trail near the Mule Mountains

2

3

4

1 travelers on the trail would be subject to higher contrast levels than westbound
2 travelers.
3

4 Additional scenic resources exist at the national, state, and local levels, and impacts may
5 occur on both federal and nonfederal lands, including sensitive traditional cultural properties
6 important to Tribes. Note that in addition to the resource types and specific resources analyzed in
7 this PEIS, future site-specific NEPA analyses would include state and local parks, recreation
8 areas, other sensitive visual resources, and communities close enough to the proposed project to
9 be affected by visual impacts. Selected other lands and resources are included in the discussion
10 below.
11

12 In addition to impacts associated with the solar energy facilities themselves, sensitive
13 visual resources could be affected by facilities that would be built and operated in conjunction
14 with the solar facilities. With respect to visual impacts, the most important associated facilities
15 would be access roads and transmission lines, the precise location of which cannot be
16 determined until a specific solar energy project is proposed. Currently, a 500-kV, a 230-kV, and
17 a 69-kV transmission line are within the proposed SEZ. For this analysis, the impacts of
18 construction and operation of transmission lines outside of the SEZ were not assessed, assuming
19 that the existing transmission lines might be used to connect some new solar facilities to load
20 centers and that additional project-specific analysis would be performed for new transmission
21 construction or line upgrades. Note that depending on project- and site-specific conditions, visual
22 impacts associated with access roads, and particularly transmission lines, could be large.
23 Detailed information about visual impacts associated with transmission lines is presented in
24 Section 5.12.1. 5. A detailed site-specific NEPA analysis would be required to determine
25 visibility and associated impacts precisely for any future solar projects, based on more precise
26 knowledge of facility location and characteristics.
27
28

29 **Impacts on Selected Other Lands and Resources**

30
31

32 **Interstate 10.** I-10 passes through the SEZ for a distance of approximately 4.0 mi
33 (6.4 km), abuts the southern boundary of the SEZ for an additional 1.7 mi (2.7 km), and is within
34 0.67 mi (1.1 km) of the SEZ for an additional 34 mi (55 km). As shown in Figure 9.4.14.2-2,
35 approximately 79 mi (127 km) of I-10 is within the 650-ft (198.1-m) viewshed of the Riverside
36 East SEZ. I-40 intersects the SEZ in five separate areas, ranging in length from approximately
37 0.04 to 3 mi (0.06 to 4.8 km). Undulations in topography as well as buildings screen views of
38 portions of the SEZ from some locations along I-10; however, there are generally open views
39 of the SEZ from I-10 throughout the viewshed.
40

41 For westbound travelers on I-10, solar facilities within the SEZ would likely come into
42 view just past a pass in the Dome Rock Mountains, about 8.5 mi (13.6 km) east of Ehrenberg,
43 about 34 mi (55 km) from the eastern boundary of the SEZ. At that distance, the SEZ would
44 occupy a substantial portion of the horizontal field of view directly from the Interstate; however,
45 because of the distance, visual contrasts would likely be weak. As travelers descend the foothills
46 of the Dome Rock Mountains, the road passes through several dips that might partially conceal

1 some facilities within the SEZ briefly, but some part of the SEZ would be in nearly continuous
2 view, with visual contrasts due to solar facilities within the SEZ gradually increasing as the
3 distance to the SEZ decreased and the apparent height and width of the solar facilities increased.
4 In about 15 to 20 minutes after first coming into view, the SEZ would occupy much of the
5 northwestern horizon north of I-10. The viewing angle would be low and would decrease as
6 travelers approach the Colorado River Valley, so that the SEZ and associated solar development
7 would appear as a thin band just under the Chuckwalla and McCoy Mountains.
8

9 As travelers pass through the Palo Verde Valley, their elevation would drop below that
10 of the SEZ, and eventually, the western slope of the valley that climbs to the Palo Verde Mesa
11 would gradually cut off views of the SEZ and associated solar facilities. By the time travelers
12 reach State Route 78, except for a view of the far northeast corner of the SEZ straight north, the
13 SEZ would be cut off entirely from view. Less than 1 mi (1.6 km) west of State Route 78, the
14 elevation climbs again rapidly, and the SEZ would again become visible, but much closer, with
15 stronger contrast levels. At Blythe Airport, another ridge would cut off views of the SEZ, and
16 after travelers cross this ridge to the Palo Verde Mesa, the SEZ would again come back into
17 view, at this point filling the view to the west and north and likely dominating the view at 1 mi
18 (1.6 km) from the eastern boundary of the SEZ. At night, if there were hazard navigation lights
19 on sufficiently tall power towers, depending on their location within the SEZ, they could be
20 visible to travelers on I-10 approaching the SEZ, gradually increasing in brightness and height
21 above the horizon, and potentially becoming very conspicuous in the night sky as travelers
22 approached the SEZ closely.
23

24 Figure 9.4.14.2-24 is a Google Earth perspective visualization of the SEZ as seen from
25 I-10, approximately 7.4 mi (11.9 km) east of the intersection of I-10 and the SEZ, just west of
26 Blythe and facing west toward the SEZ. The visualization suggests that from this location, the
27 SEZ would occupy much of the horizontal field of view, but because the viewing angle is very
28 low, small undulations in topography might screen views of lower height solar facilities away
29 from the roadways, and visible facilities would be seen edge-on, which would tend to reduce
30 visual contrasts. If power tower facilities were present within the SEZ, the receivers of power
31 towers in the far eastern portion of the SEZ could appear as very bright points of light atop
32 visible tower structures on the western horizon, against a sky or mountain backdrop. These
33 bright light sources could potentially interfere with views of the distant mountains.
34

35 Figure 9.4.14.2-25 is a Google Earth perspective visualization of the SEZ as seen from
36 I-10, approximately 0.7 mi (1 km) east of the intersection of the highway and the SEZ, facing
37 southwest toward two power tower models just south of I-10. The closest tower is approximately
38 1.6 mi (2.5 km) from the viewpoint. The visualization suggests that from this location, solar
39 facilities within the SEZ would be in full view. The SEZ would occupy more than the entire field
40 of view, so travelers would have to turn their heads to scan across the full SEZ. Facilities located
41 within the far eastern portion of the SEZ could strongly attract the eye and likely dominate views
42 from I-10.
43

44 Taller ancillary facilities, such as buildings, transmission structures, and cooling towers,
45 and plumes (if present) would likely be visible projecting above the collector/reflector arrays,
46 and their structural details could be evident, at least for nearby facilities. The ancillary facilities



1

FIGURE 9.4.14.2-24 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from I-10 Approximately 7.4 mi (11.9 km) East of the SEZ

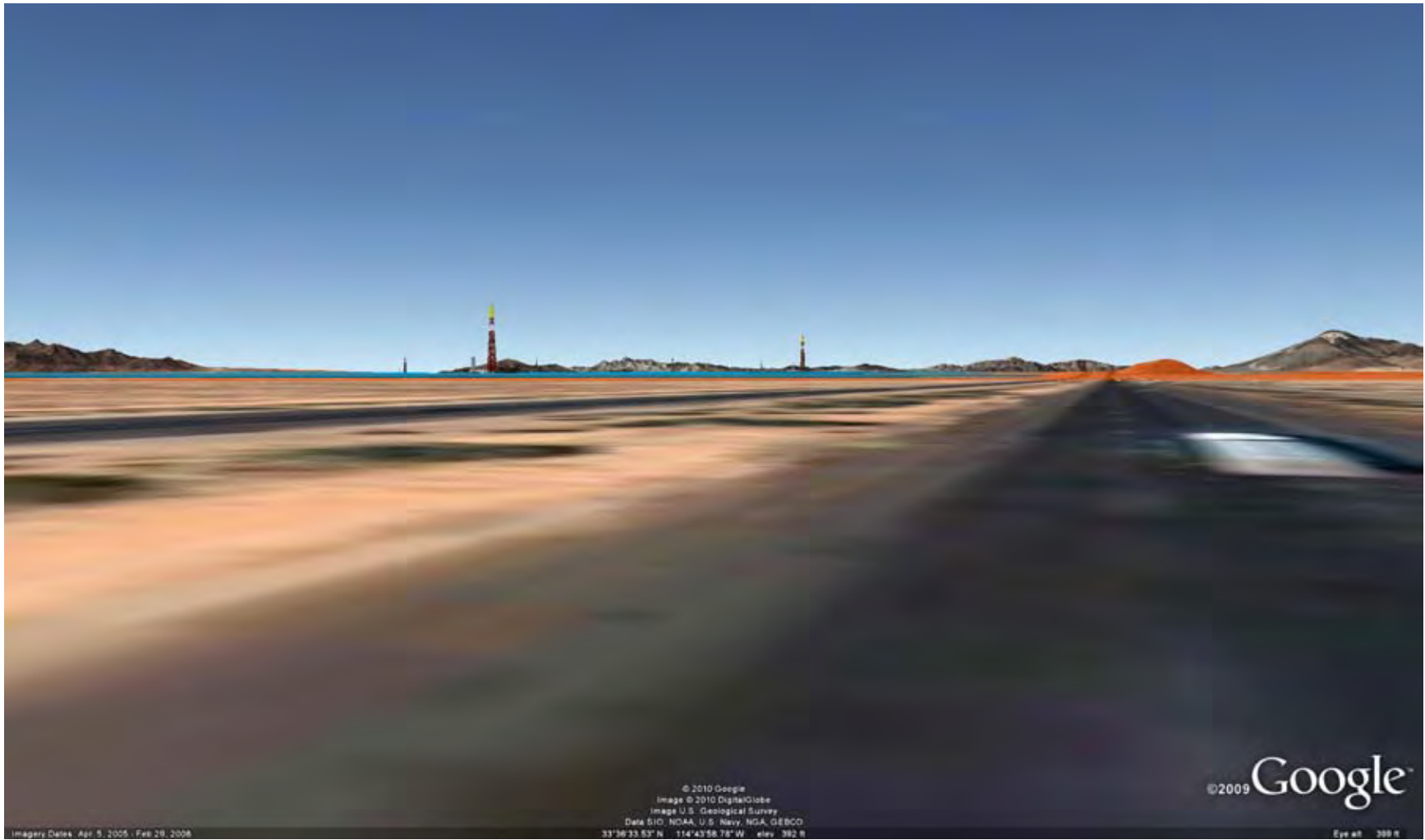
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6



1

FIGURE 9.4.14.2-25 Google Earth Visualization of the Proposed Riverside East SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from I-10 Approximately 0.7 mi (1 km) East of the SEZ

2

3

4

1 could create form and line contrasts with the strongly horizontal, regular, and repeating forms
2 and lines of the collector/reflector arrays. Color and texture contrasts also would be likely, but
3 their extent would depend on the materials and surface treatments utilized in the facilities. Steam
4 plumes, transmission towers, and other tall facility components likely would project above the
5 mountains. From this viewpoint, solar collector/reflector arrays would be seen nearly edge-on
6 and would repeat the horizontal line of the plain in which the SEZ is situated; this would reduce
7 their apparent size and conceal the strong regular geometry of the arrays, tending to reduce visual
8 contrast, but as the viewer approached the SEZ, the collector/reflector arrays could increase in
9 apparent size until their individual forms became plainly visible, and they no longer appeared as
10 horizontal lines against the natural-appearing backdrop.

11
12 Views of the Chuckwalla Valley and the mountain ranges on either side of the valley
13 could be partially screened by solar facilities, depending on the layout of solar facilities within
14 the SEZ. Because of the potentially very short distance of solar facilities from I-10, strong visual
15 contrasts likely would result, depending on solar project characteristics and location within the
16 SEZ.

17
18 Visual contrast would increase further after travelers on I-10 entered the SEZ. If power
19 tower facilities were located in the SEZ, the receivers could appear as brilliant light sources on
20 either side of the highway and would likely strongly attract views. For nearby power towers,
21 during certain times of the day from certain angles, sunlight on dust particles in the air might
22 result in the appearance of light streaming down from the tower(s). At night, if sufficiently tall,
23 the power towers could have red or white flashing hazard navigation lights that would likely be
24 very conspicuous from I-10. Other lighting associated with solar facilities in the SEZ could
25 potentially be visible as well, at least for facilities in the closest portions of the SEZ. Ahead,
26 down the roadway, if solar facilities were located on both the north and south sides of I-10, the
27 banks of solar collectors/reflectors on both sides could form a visual “tunnel,” which travelers
28 would pass through briefly. If solar facilities were located close to the roadway, given the 80%
29 development scenario analyzed in this PEIS, they would be expected to dominate views from
30 I-10 and would create strong visual contrasts. After travelers pass through the section of SEZ, the
31 SEZ would still be very close to I-10 on one or the other side of the highway. Impact levels
32 would be dependent on the presence of solar facilities in areas near the roadway and on solar
33 facility characteristics.

34
35 Travelers heading east on I-10 would in general be subjected to the same types of visual
36 contrasts, but the order would be reversed, and this could change the perceived impact levels.
37 Because of differences in topography between the eastern and western approaches to the SEZ,
38 more of the SEZ would be visible for longer distances for eastbound travelers. Solar facilities
39 within the SEZ could be visible as far as Chiriaco Summit (18 mi [29 km] west of the SEZ), with
40 power tower receivers appearing as distant lights on the eastern horizon at that distance.

41
42 From Chiriaco Summit eastward, except for brief periods, travelers would have
43 continuous visibility of solar facilities within some part of the SEZ as they approach it. Solar
44 facilities within the SEZ would gradually increase in apparent size, with the view opening up
45 substantially (and visual contrast levels rising accordingly) as travelers approach Desert Center.

1 Visual dominance of the solar facilities within the SEZ would increase steadily until peaking
2 when travelers entered and passed through the SEZ.
3

4 In summary, visual contrasts associated with solar energy development within the SEZ
5 would depend on viewer location on I-10; on solar facility type, size, and location within the
6 SEZ; and on other visibility factors. The SEZ would be visible at long distances on I-10 for both
7 eastbound and westbound travelers, although westbound travelers would have intermittent
8 visibility of the SEZ because of periodic screening. However, under the 80% development
9 scenario analyzed in this PEIS, strong levels of visual contrast would be expected as travelers in
10 both directions approached and passed through the SEZ.
11
12

13 **State Route 177.** State Route 177 passes through or is immediately adjacent to the SEZ
14 for a distance of approximately 8.4 mi (13.5 km). As shown in Figure 9.4.14.2-2, approximately
15 27 mi (43 km) of State Route 177 is within the 650-ft (198.1-m) viewshed of the Riverside East
16 SEZ. State Route 177 intersects the SEZ in two separate areas in lengths of approximately 3 mi
17 (4.8 km) and 5.4 mi (8.7 km). Undulations in topography as well as buildings may screen views
18 of portions of the SEZ from some locations along the route; however, there are generally open
19 views of the SEZ from State Route 177 throughout the viewshed.
20

21 Moving northward on State Route 177 from Desert Center, travelers would immediately
22 enter the SEZ, after having experienced in some degree the impacts described above for I-10.
23 Under the 80% development scenario analyzed in this PEIS, visual contrasts from solar energy
24 development within the SEZ could potentially cause strong visual contrasts for travelers on State
25 Route 177 and would likely dominate the view from some locations on State Route 177.
26

27 Between Desert Center and the northern boundary of the SEZ, where State Route 177 is
28 not actually within the SEZ itself, it is not more than 1 mi (1.6 km) from the SEZ. In these areas,
29 visual contrasts might be somewhat lower than those experienced within the SEZ itself, but
30 because the distance to the SEZ is so short, visual contrasts could still be strong and solar
31 development within the SEZ could dominate views from State Route 177.
32

33 Both within and near the SEZ, for travelers on State Route 177, solar collector/reflector
34 arrays for solar facilities within the SEZ would be seen nearly edge-on. This would reduce their
35 apparent size, conceal their strong regular geometry, and cause them to repeat the horizontal line
36 of the plain in which the SEZ is situated; this would tend to reduce visual contrast. However, as
37 the viewer passes through the SEZ, the collector/reflector arrays could increase in apparent size
38 until they no longer appear as horizontal lines against the natural-appearing backdrop.
39

40 Taller ancillary facilities, such as buildings, transmission structures, and cooling towers,
41 and plumes (if present) likely would be visible projecting above the collector/reflector arrays,
42 and their structural details could be evident, at least for nearby facilities. The ancillary facilities
43 could create form and line contrasts with the strongly horizontal, regular, and repeating forms
44 and lines of the collector/reflector arrays. Color and texture contrasts would also be likely, but
45 their extent would depend on the materials and surface treatments utilized in the facilities.
46

1 If power tower facilities were located in the SEZ, the receivers could appear as brilliant
2 light sources on either side of the highway. They could project above nearby mountains, be
3 visible against a sky backdrop, and likely strongly attract views. For nearby power towers,
4 during certain times of the day from certain angles, sunlight on dust particles in the air might
5 result in the appearance of light streaming down from the tower(s). Steam plumes, transmission
6 towers, and other tall facility components could also project above the mountains.
7

8 At night, if sufficiently tall, the power towers could have red or white flashing hazard
9 navigation lights that likely would be very conspicuous from I-10. Other lighting associated with
10 solar facilities in the SEZ could potentially be visible as well, at least for facilities in the closest
11 portions of the SEZ.
12

13 State Route 177 travelers heading south from the Palen Valley would in general be
14 subjected to the same types of visual contrasts, but the order would be reversed, and this could
15 change the perceived impact levels. The SEZ would come into view about 9 mi (14 km) north of
16 the SEZ, shortly after crossing Granite Pass, and the SEZ (and solar development within the
17 SEZ) would be visible for approximate 7 to 9 minutes, gradually increasing in size, until
18 travelers enter the SEZ itself.
19
20

21 ***Communities of Blythe, East Blythe, Palo Verde, Ripley, Cibola (Arizona) and Desert***
22 ***Center.*** The viewshed analyses indicate visibility of the SEZ from the communities of Blythe
23 (approximately 8.3 mi [13.4 km] east of the SEZ); East Blythe (approximately 9.6 mi [15.5 km]
24 east of the SEZ); Ehrenberg (approximately 13 mi [21 km] east of the SEZ); Palo Verde
25 (approximately 5.8 mi [9.3 km] south of the SEZ); Ripley (approximately 4.5 mi [7.2 km] east of
26 the SEZ); Cibola, located in Arizona (approximately 15 mi [24 km] southwest of the SEZ); and
27 Desert Center (adjacent to the southwest boundary of the SEZ).
28

29 Blythe, East Blythe, Ehrenberg, Palo Verde, Ripley, and Cibola are all communities in
30 or very close to the Palo Verde Valley east of the SEZ. The elevations in Blythe, East Blythe,
31 Ehrenberg, Palo Verde, Ripley, and Cibola range from 233 to 276 ft (71 to 84 m), and all these
32 communities are more than 100 ft (30 m) lower in elevation than the eastern border the SEZ.
33 Thus, there is a low angle of view between these communities and the SEZ; this would tend to
34 reduce the visibility of solar facilities within the SEZ and would therefore reduce associated
35 impacts. Desert Center is located at the far southwestern corner of the SEZ off I-10. Desert
36 Center (approximate elevation 905 ft [276 m] above mean sea level) is at a slightly higher
37 elevation than most portions of the SEZ immediately adjacent to it, and is several hundred feet
38 higher than the lowest points nearby in the SEZ.
39

40 Screening by small undulations in topography, vegetation, buildings, or other structures
41 would likely restrict or eliminate visibility of the SEZ and associated solar facilities within these
42 communities, but a detailed future site-specific NEPA analysis is required to determine visibility
43 precisely. However, note that even with existing screening, solar power towers, cooling towers,
44 plumes, transmission lines and towers, or other tall structures associated with the development
45 could potentially be tall enough to exceed the height of screening in some areas and could
46 therefore cause visual impacts on these communities.

1 The western-most portions of Blythe are slightly less than 5 mi (8 km) from the closest
2 point on the eastern boundary of the SEZ. In general, absent screening by nearby structures or
3 vegetation, Blythe and East Blythe have unobstructed views of the SEZ, which would occupy
4 much of the western horizon visible from these communities. However, the angle of view is low,
5 so that if solar facilities were visible within the SEZ, they would be viewed edge-on and would
6 repeat the line of the horizon, tending to reduce visual contrast. The light from power tower
7 receivers within the eastern-most portions of the SEZ would likely appear as very bright
8 nonpoint (i.e., having a visible cylindrical or rectangular surface) sources of light atop
9 discernable tower structures on the western horizon.

10
11 At night, if sufficiently tall, the power towers could have red or white flashing hazard
12 navigation lights that likely would be visible from these communities and could be conspicuous
13 from some location, given the dark night skies in the vicinity of the SEZ. Other lighting
14 associated with solar facilities in the SEZ could potentially be visible from some locations as
15 well, at least for facilities in the closest portions of the SEZ.

16
17 Visual contrasts associated with solar facilities within the SEZ would vary greatly,
18 depending on the presence of screening by nearby structures and vegetation and on project
19 locations, technologies, and site designs within the SEZ, but where there were unobstructed
20 views, these contrasts would be expected to be moderate to strong. In general, contrasts would be
21 expected to be greatest for locations on the western side of Blythe, with lesser contrast levels in
22 eastern Blythe and the community of East Blythe.

23
24 The community of Ehrenberg is located approximately 4 mi (6 km) east of Blythe, at the
25 same elevation as Blythe. Ehrenberg would have essentially the same view of solar development
26 within the SEZ as Blythe, but lower visual contrast levels would be expected in Ehrenberg
27 because of the increased distance to the SEZ. Where there were unobstructed views, contrast
28 levels would be expected to be weak to moderate.

29
30 The community of Ripley is located approximately 7 mi (11 km) southwest of Blythe,
31 and between 4 to 5 mi (6 to 8 km) from the far southeastern boundary of the SEZ. In general,
32 absent screening by nearby structures or vegetation, Ripley has unobstructed views of the SEZ,
33 which would occupy much of the northwestern horizon visible from Ripley. However, the angle
34 of view is low, so that if solar facilities were visible within the SEZ, they would be viewed edge-
35 on and would repeat the line of the horizon, tending to reduce visual contrast. The light from
36 power tower receivers within the far southeastern portion of the SEZ would likely appear as very
37 bright nonpoint sources of light to the northwest and could appear silhouetted against the sky
38 looking west down the Chuckwalla Valley. At night, if sufficiently tall, the power towers could
39 have red or white flashing hazard navigation lights that likely would be visible from Ripley and
40 could be conspicuous. Other lighting associated with solar facilities in the SEZ could potentially
41 be visible from some locations as well, at least for facilities in the closest portions of the SEZ.

42
43 Visual contrasts associated with solar facilities within the SEZ would vary greatly
44 depending on the presence of screening by nearby structures and vegetation and on project
45 locations, technologies, and site designs within the SEZ, but where there were unobstructed
46 views, contrasts would be expected to be moderate to strong.

1 The community of Palo Verde is approximately 6 mi (10 km) south of the far
2 southeastern corner of the SEZ. The Mule and Little Chuckwalla Mountains screen views of
3 most of the western parts of the SEZ from Palo Verde; however, much of the southeastern
4 portion of the SEZ would be visible on the northern horizon. The angle of view is low, so that if
5 solar facilities were visible within the SEZ, they would be viewed edge-on and would repeat the
6 line of the horizon, tending to reduce visual contrast. The light from power tower receivers
7 within the far southeastern portions of the SEZ could appear as bright point or nonpoint sources
8 of light on the northern horizon. Power towers with hazard lighting could be visible at night and
9 could be conspicuous depending on project location and other visibility factors. Visual contrasts
10 associated with solar facilities within the SEZ would vary greatly depending on the numbers,
11 types, sizes, and locations of solar facilities in the SEZ and on other project- and site-specific
12 factors, but where there were unobstructed views, contrasts would be expected to be weak to
13 moderate.

14
15 The community of Cibola in Arizona is approximately 21 mi (34 km) south of Blythe and
16 approximately 15 mi (24 km) from the far southeastern corner of the SEZ. The Mule and Little
17 Chuckwalla Mountains screen views of most of the western parts of the SEZ from Cibola;
18 however, portions of the southeastern portion of the SEZ would be visible on the northern
19 horizon. The angle of view is low, so that if solar facilities were visible within the SEZ, they
20 would be viewed edge-on and would repeat the line of the horizon, tending to reduce visual
21 contrast. The light from power tower receivers within the far southeastern portion of the SEZ
22 would likely appear as very distant point sources of light on the northern horizon. Visual
23 contrasts associated with solar facilities within the SEZ would depend on the numbers, types,
24 sizes, and locations of solar facilities in the SEZ and on other project- and site-specific factors,
25 but where there were unobstructed views, contrasts would be expected to be weak.

26
27 The community of Desert Center and the Lake Tamarisk housing development are
28 located immediately adjacent to the far southwest corner of the SEZ. Desert Center is located at
29 the Rice Rd (State Route 177) interchange on I-10, and Lake Tamarisk is less than 2 mi (3 km)
30 north of Desert Center. In general, absent screening by nearby structures or vegetation, Desert
31 Center and Lake Tamarisk have unobstructed views of the SEZ, which in the case of Desert
32 Center would surround the community in all directions except south (across I-10) and in the case
33 of Lake Tamarisk would surround the community in all directions except west.

34
35 From Desert Center and Lake Tamarisk, the SEZ could not be encompassed in one view,
36 and viewers would need to turn their heads to scan across the whole SEZ. Solar facility
37 collector/reflector arrays would be viewed nearly edge-on, reducing the visible area for each
38 facility and presenting a banded appearance that would repeat the line of the horizon, tending to
39 reduce visual contrast. If nearby facilities used PV systems and low-profile ancillary facilities,
40 the visual impacts would be lessened, but for facilities utilizing STGs, taller structures projecting
41 above the collector/reflector arrays would be visible, and in some conditions steam plumes could
42 be present that would add significantly to visual contrasts. These taller elements would add
43 vertical line and form contrasts, and likely color contrasts as well; steam plumes would add color
44 and possibly line or form contrasts, depending on conditions. Depending on height, these
45 ancillary facilities could add significantly to visual contrasts for some facilities. For all projects,
46 transmission towers, lines, and substations might be visible, which could add substantially to

1 form and line contrasts. Structural details of collectors and ancillary facilities (buildings, STGs,
2 substations, and so on) could be visible within nearby facilities. The tops of solar
3 collector/reflector arrays in the closest parts of the SEZ would not likely be visible, but because
4 the ground slopes downward to the east and north of Desert Center and Lake Tamarisk, the tops
5 of collector/reflector arrays could be visible for facilities farther way, and this would increase
6 chances of reflections from collector/reflector arrays, thermal tubes, and other facilities,
7 depending on facility design, location, distance, and other visibility factors. If power towers were
8 present within the SEZ, nearby receivers would likely appear as brilliant nonpoint (i.e., having
9 visible cylindrical or rectangular surfaces) light sources atop clearly discernable tower structures
10 against the backdrop of the sky above the surrounding mountains or against the mountain slopes,
11 which could potentially cause discomfort when looked at directly. More distant receivers would
12 likely appear as points of light against the sky, against the backdrop of the valley floor, or against
13 the bajadas and slopes of the nearby mountains.

14
15 At night, if sufficiently tall, the power towers could have red or white flashing hazard
16 navigation lights that would likely be visible from Desert Center and Lake Tamarisk and could
17 be very conspicuous from these communities, given the dark night skies in the vicinity of the
18 SEZ, although other lights would be visible in the vicinity. Other lighting associated with solar
19 facilities in the SEZ could potentially be visible as well, at least for facilities in the closest
20 portions of the SEZ.

21
22 The potential visual contrast expected for these communities would depend on the
23 numbers, types, sizes, and locations of solar facilities in the SEZ and on other project- and site-
24 specific factors, but because Desert Center and Lake Tamarisk are adjacent to the SEZ, the SEZ
25 would be seen in close proximity in most directions, and under the 80% development scenario
26 analyzed in this PEIS, solar facilities within the SEZ would likely dominate views from these
27 communities. Because there could be numerous solar facilities within the SEZ, a variety of
28 technologies employed, and a range of supporting facilities that would contribute to visual
29 impacts, a visually complex, man-made appearing industrial landscape could result. This
30 essentially industrial-appearing landscape would contrast greatly with the surrounding natural-
31 appearing lands and would be expected to create strong visual contrasts as viewed from Desert
32 Center and Lake Tamarisk.

33
34 Regardless of visibility from within these communities, residents, workers, and visitors to
35 the area would be likely to experience visual impacts from solar energy facilities located within
36 the SEZ (as well as any associated access roads and transmission lines) as they travel area roads,
37 including I-10 and State Route 177.

38
39
40 **Nearby Residents.** As noted above, there are scattered ranches and other residences on
41 private lands immediately adjacent or close to the SEZ and elsewhere within the SEZ viewshed.
42 Depending on technology- and project-specific factors, because of the proximity and large size
43 of likely facilities, these residents could be subjected to large visual impacts from solar energy
44 development within the SEZ. These impacts would be determined in the course of a site-specific
45 environmental impact analysis.

1 **9.4.14.2.3 Summary of Visual Resource Impacts for the Proposed Riverside East SEZ**
2

3 Because there could be numerous solar facilities within the SEZ, a variety of technologies
4 employed, and a range of supporting facilities that would contribute to visual impacts, a visually
5 complex, man-made appearing industrial landscape could result. This essentially industrial-
6 appearing landscape would contrast greatly with the surrounding generally natural-appearing
7 lands. Large visual impacts on the SEZ and surrounding lands within the SEZ viewshed would
8 be associated with solar energy development due to major modification of the character of the
9 existing landscape. There is the potential for additional impacts from construction and operation
10 of transmission lines and access roads within the SEZ.
11

12 Residents, workers, and visitors to the area may experience visual impacts from solar
13 energy facilities located within the SEZ (as well as any associated access roads and transmission
14 lines) as they travel area roads. Nearby residents could be subjected to strong visual contrasts
15 from solar energy development within the SEZ. The communities of Blythe, East Blythe,
16 Ehrenberg, Palo Verde, Ripley, Cibola (Arizona), and Desert Center (including the Lake
17 Tamarisk development) are located within the viewshed of the SEZ, although slight variations in
18 topography and vegetation provide some screening. Strong visual contrasts may be observed
19 within Desert Center and Lake Tamarisk. Moderate to strong visual contrasts may be observed
20 within Blythe, East Blythe, and Ripley. Weak to moderate visual contrasts may be observed
21 within Ehrenberg and Palo Verde.
22

23 Utility-scale solar energy development within the proposed Riverside East SEZ is likely
24 to cause moderate to strong visual impacts on highly sensitive visual resource areas, including
25 Joshua Tree NP and WA, the Big Maria Mountains WA, Chuckwalla Mountains WA, Little
26 Chuckwalla Mountains WA, Palen-McCoy WA, Palo Verde Mountains WA, Rice Valley WA,
27 Corn Springs Scenic ACEC, and the Bradshaw Trail BLM Backcountry Byway.
28
29

30 **9.4.14.3 SEZ-Specific Design Features and Design Feature Effectiveness**
31

32 As noted in Section 5.12, the presence and operation of large-scale solar energy facilities
33 and equipment would introduce major visual changes into non-industrialized landscapes and
34 could create strong visual contrasts in line, form, color, and texture that could not easily be
35 mitigated substantially. Implementation of the programmatic design features presented in
36 Appendix A, Section A.2.2, would be expected to reduce the magnitude of visual impacts
37 experienced: however, the degree of effectiveness of these design features could be assessed only
38 at the site- and project-specific level. Given the large scale, reflective surfaces, and strong
39 regular geometry of utility-scale solar energy facilities, and the typical lack of screening
40 vegetation and landforms within the SEZ viewsheds, siting the facilities away from sensitive
41 visual resource areas and other sensitive viewing areas is the primary means of mitigating visual
42 impacts. The effectiveness of other visual impact mitigation measures would generally be
43 limited.
44

45 While the applicability and appropriateness of some mitigation measures would depend
46 on site- and project- specific information that would be available only after a specific solar

1 energy project had been proposed, the following SEZ-specific design features can be identified
2 for the Riverside East SEZ at this time:

- 3
4 • Within the SEZ, in areas west of the northwest corner of Section 6
5 of Township 006S Range 017E and in areas north and west of the northwest
6 corner of Section 30 of Township 005S Range 018E, visual impacts
7 associated with solar energy development in the SEZ should be consistent
8 with VRM Class II management objectives (see Table 9.4.14.3-1), as
9 experienced from KOPs (to be determined by the BLM) within Joshua
10 Tree NP and the Palen-McCoy WA. The VRM Class II impact level
11 consistency mitigation would affect approximately 67,704 acres (273.99 km²)
12 within the western portion of the SEZ.
- 13
14 • Within the SEZ, in areas visible from and within 3 mi (4.8 km) of the Rice
15 Valley or Big Maria Mountains WAs, visual impacts associated with solar
16 energy project operation should be consistent with VRM Class II management
17 objectives, as experienced from KOPs (to be determined by BLM) within the
18 WAs, and in areas visible from between 3 and 5 mi (4.8 and 8.0 km), visual
19 impacts should be consistent with VRM Class III management objectives. The
20 VRM Class II impact level consistency mitigation would affect approximately
21 11,926 acres (48.263 km²) within the northeastern portion of the SEZ. The
22 VRM Class III impact level consistency mitigation would affect
23 approximately 19,676 additional acres (79.626 km²).

24
25 Areas within the SEZ affected by these design features are shown in Figure 9.4.14.3-1.

26
27 Application of the SEZ-specific design features above would substantially reduce visual
28 impacts associated with solar energy development within the SEZ.

29
30 Application of the distance-based mitigation to restrict allowable visual impacts
31 associated with solar energy project in areas west of the northwest corner of Section 6 of
32 Township 006S Range 017E and in areas north and west of the northwest corner of Section 30 of
33 Township 005S Range 018E would substantially reduce potential visual impacts on Joshua Tree
34 NP, the Palen-McCoy WA, the Chuckwalla Mountains WA, Corn Springs Scenic ACEC, I-10,
35 State Route 177, and the communities of Desert Center and Lake Tamarisk, by limiting impacts
36 within the BLM-defined and foreground–middleground distance of the viewsheds of these areas,
37 where potential visual impacts would be greatest.

38
39 Application of the distance-based mitigation to restrict allowable visual impacts
40 associated with solar energy project operations within 5 mi (8 km) of the Rice Valley and
41 Big Maria Mountains WAs would substantially reduce potential visual impacts on the WAs by
42 limiting impacts within the BLM-defined foreground of the viewshed of these areas, where
43 potential visual impacts would be greatest. Impacts would also be reduced on I-10 and the
44 communities within the Palo Verde Valley.

TABLE 9.4.14.3-1 VRM Management Class Objectives

VRM Management Class Objectives	
Class I Objective	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective	The objective to this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Source: BLM 1986b.

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4

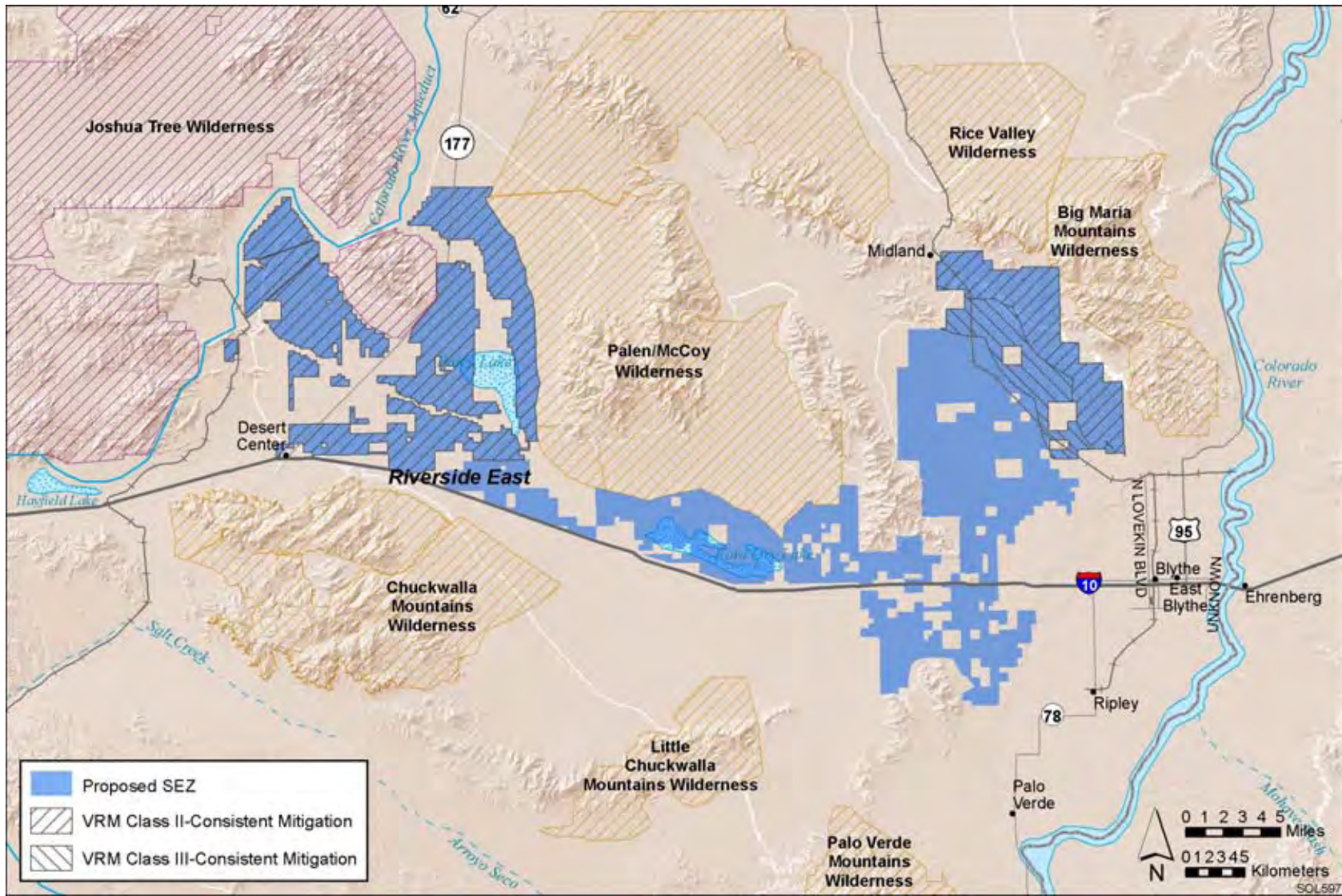


FIGURE 9.4.14.3-1 Areas within the Proposed Riverside East SEZ Affected by SEZ-Specific Distance-Based Visual Impact Design Features

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1 **9.4.15 Acoustic Environment**

2
3
4 **9.4.15.1 Affected Environment**

5
6 The proposed Riverside East SEZ is in the eastern portion of Riverside County in
7 southeastern California. Riverside County has established noise standards based on affected land
8 use and time of day (County of Riverside 2010). Noise standards applicable to solar energy
9 development in the Riverside East SEZ are those established for rural environments: 45 dBA L_{eq}
10 for both daytime and nighttime. In Riverside County, construction noise sources located within
11 0.25 mi (0.4 km) from an inhabited dwelling are exempt if construction does not occur between
12 6 p.m. and 6 a.m. from June through September and between 6 p.m. and 7 a.m. from October
13 through May.
14

15 I-10 runs east-west along the southern edge of the western and central portions of the
16 SEZ and passes through the eastern portion of the SEZ, while State Route 177 passes southwest-
17 northeast through the western portion of the SEZ. The Arizona and California Railroad passes
18 north-south through the eastern portion of the SEZ and another railroad runs north-south to the
19 west of the western SEZ boundary. That railroad starts from the now-defunct Eagle Mountain
20 iron mine and connects to the UP Railroad near the Salton Sea. There are three airports around
21 the SEZ: Desert Center Airport, surrounded by the western parcels of the SEZ; Blythe Airport,
22 located about 1.5 mi (2.4 km) east of the easternmost SEZ boundary; and the privately owned
23 W R Byron Airport (about 6 mi [10 km] northeast of Blythe Airport), located about 1.5 mi
24 (2.4 km) east of the easternmost SEZ boundary. Because tourism is a major industry in the area,
25 other industrial activities are relatively minimal. Irrigated agricultural activities are scattered over
26 the western portion of the SEZ, and high-density/large-scale agricultural activities exist to the
27 east in Blythe. Many sensitive receptors are located within a short distance of the proposed
28 Riverside East SEZ. Sensitive receptors such as schools or churches exist around the
29 southwestern SEZ in Lake Tamarisk, and a hospital is located within 2 mi (3 km) east of the
30 easternmost SEZ boundary. Many residences (mostly farms) are scattered along the western and
31 eastern SEZ boundary. A cluster of employee residences at Eagle Mountain Pumping Station is
32 located about 0.6 mi [1 km] west of the western SEZ boundary, and residences in Lake Tamarisk
33 are adjacent to the southwestern SEZ boundary. Population centers with schools include Desert
34 Center, which is located at the southwestern edge of the SEZ, and Blythe, located about 5 mi
35 (8 km) east of the eastern SEZ boundary. Therefore, noise sources around the SEZ include road
36 traffic, railroad traffic, aircraft flyover, agricultural activities, and activities and events at nearby
37 residences. Background noise levels would be relatively high along I-10 and State Route 177 and
38 around airports, while noise levels are similar to wilderness natural background levels at portions
39 of the SEZ far from roads, airports, and agricultural activities, mostly the northern portions of the
40 SEZ. To date, no environmental noise survey has been conducted around the Riverside East
41 SEZ. On the basis of the population density, the day-night average sound level (L_{dn} or DNL) is
42 estimated to be 45 dBA for Riverside County, which is on the high end for a rural area¹²
43 (Eldred 1982; Miller 2002).
44

¹² Rural and undeveloped areas have sound levels in the range of 33 to 47 dBA L_{dn} (Eldred 1982). Typically, the nighttime level is 10 dBA lower than the daytime level, and it can be interpreted as 33 to 47 dBA (mean 40 dBA) during daytime hours and 23 to 37 dBA (mean 30 dBA) during nighttime hours.

1 **9.4.15.2 Impacts**
2

3 Potential noise impacts associated with solar projects in the Riverside East SEZ would
4 occur during all phases of the projects. During the construction phase, potential noise impacts
5 associated with operation of heavy equipment and vehicular traffic on several nearby residences
6 (adjacent to the western SEZ boundary) would be anticipated, albeit of short duration. During the
7 operations phase, potential impacts on nearby residences would be anticipated, depending on the
8 solar technologies employed. Noise impacts shared by all solar technologies are discussed in
9 detail in Section 5.13.1, and technology-specific impacts are presented in Section 5.13.2. Impacts
10 specific to the Riverside East SEZ are presented in this section. Any such impacts would be
11 minimized through the implementation of required programmatic design features described in
12 Appendix A, Section A.2.2, and through the application of any additional SEZ-specific design
13 features (see Section 9.4.15.3 below). This section primarily addresses potential noise impacts on
14 humans, although potential impacts on wildlife at nearby sensitive areas are discussed.
15 Additional discussion on potential noise impacts on wildlife is presented in Section 5.10.2.
16

17
18 **9.4.15.2.1 Construction**
19

20 The proposed Riverside East SEZ has a relatively flat terrain; thus, minimal site
21 preparation activities would be required, and associated noise levels would be lower than those
22 during general construction (e.g., erecting building structures and installing equipment, piping,
23 and electrical). Solar array construction would also generate noise, but it would be spread over a
24 wide area.
25

26 For the parabolic trough and power tower technologies, the highest construction noise
27 levels would occur at the power block area; a maximum of 95 dBA at a distance of 50 ft (15 m)
28 is assumed, if impact equipment such as pile drivers or rock drills is not being used. Typically,
29 the power block area is located in the center of the solar facility, at a distance of more than
30 0.5 mi (0.8 km) to the facility boundary. Noise levels from construction of the solar array
31 would be lower than 95 dBA. When geometric spreading and ground effects are considered, as
32 explained in Section 4.13.1, noise levels would attenuate to about 40 dBA at a distance of
33 1.2 mi (1.9 km) from the power block area. This noise level is typical of daytime mean rural
34 background level. In addition, mid- and high-frequency noise from construction activities is
35 significantly attenuated by atmospheric absorption under the low-humidity conditions typical of
36 an arid desert environment and by temperature lapse conditions typical of daytime hours; thus
37 noise attenuation to background levels would occur at distances somewhat shorter than 1.2 mi
38 (1.9 km). If a 10-hour daytime work schedule is considered, the EPA guideline level of 55 dBA
39 L_{dn} for residential areas (EPA 1974) would occur at about 1,200 ft (370 m) from the power block
40 area, which would be well within the facility boundary. For construction activities occurring near
41 the residences adjacent to western SEZ boundary, estimated noise levels at the nearest residences
42 would be about 74 dBA,¹³ which is well above the Riverside County standard of 45 dBA

¹³ Typically, the heavy equipment operators would not allow public access any closer than 330 ft (100 m) for safety reasons. In other words, construction and solar facility would not occur within this distance from the nearest residence.

1 daytime L_{eq} for rural environments. In addition, an estimated 70 dBA L_{dn} ¹⁴ at this receptor is
2 well above the EPA guideline of 55 dBA for residential areas.
3

4 It is assumed that a maximum of three projects at any one time would be developed for
5 SEZs larger than 30,000 acres (121.4 km²) such as the Riverside East SEZ. If all three projects
6 were to be built within the SEZ near the residences in the western SEZ boundary, noise levels
7 would be only a little higher than the above-mentioned values, because the second and third
8 construction sites would be far from the first construction site due to the irregular shape of the
9 SEZ. Under this construction scenario assumption, combined noise levels would be less than a
10 noticeable increase of about 3 dBA over those for a single project.
11

12 In addition, noise levels were estimated at the specially designated areas within 5-mi
13 (8-km) from the Riverside East SEZ, which is the farthest distance that noise except extremely
14 loud noise can be discernable. There are several specially designated areas within the range
15 where noise might be an issue: Joshua Tree WA, Palen/McCoy WA, Rice Valley WA, Big Maria
16 Mountains WA, Mule Mountains ACEC, Chuckwalla DWMA, and Alligator Rock ACEC.
17 These areas abut the Riverside East SEZ, except Rice Valley WA and Alligator Rock ACEC,
18 which are located about 0.5 mi (0.8 km) north of the eastern SEZ and 500 ft (150 m) south of the
19 western SEZ, respectively. For construction activities occurring near these specially designated
20 areas, noise levels are estimated to be about 74 dBA at the locations abutting the SEZ, higher
21 than the typical daytime mean rural background level of 40 dBA. Thus, if construction would
22 occur near the specially designated areas, portions of those areas close to the SEZ (within
23 approximately 1 mi [1.6 km]) could be disturbed by construction noise from the SEZ. However,
24 sound levels above 90 dB are likely to adversely affect wildlife (Manci et al. 1988). Thus,
25 construction noise from the SEZ is not likely to adversely affect wildlife in nearby specially
26 designated areas, except in areas directly adjacent to the construction site.
27

28 Depending on soil conditions, pile driving might be required for installation of solar dish
29 engines. However, the pile drivers used would be relatively small and quiet, such as vibratory or
30 sonic drivers, rather than the impulsive impact pile drivers frequently seen at large-scale
31 construction sites. Potential impacts on neighboring residences (just next to the western SEZ
32 boundary) would be anticipated to be minor, except when pile driving occurs near the residences.
33

34 It is assumed that most construction activities would occur during the day, when noise is
35 better tolerated, than at night, because of the masking effects of background noise. In addition,
36 construction activities for a utility-scale facility are temporary in nature (typically a few years).
37 Construction would cause some unavoidable but localized short-term noise impacts on
38 neighboring communities, particularly for activities occurring near the western and eastern
39 proposed SEZ boundary, close to the nearby residences.
40

41 Construction activities could result in various degrees of ground vibration, depending
42 on the equipment used and construction methods employed. All construction equipment causes
43 ground vibration to some degree, but activities that typically generate the most severe vibrations

¹⁴ For this analysis, background levels of 40 and 30 dBA for daytime and nighttime hours, respectively, are assumed, which result in a day-night average noise level (L_{dn}) of 40 dBA.

1 are high-explosive detonations and impact pile driving. As is the case for noise, vibration would
2 diminish in strength with distance. For example, vibration levels at receptors beyond 140 ft
3 (43 m) from a large bulldozer (87 VdB at 25 ft [7.6 m]) would diminish below the threshold of
4 perception for humans, which is about 65 VdB (Hanson et al. 2006). During the construction
5 phase, no major construction equipment that can cause ground vibration would be used, and no
6 residences or sensitive structures are located in close proximity. Therefore, no adverse vibration
7 impacts are anticipated from construction activities, including from pile driving for dish engines.
8

9 For this analysis, the impacts of construction and operation of transmission lines outside
10 of the SEZ were not assessed, assuming that the one or more of the existing transmission lines
11 (ranging from 115 kV to 500 kV) located within the SEZ might be used to connect new solar
12 facilities to the regional grid and that additional project-specific analysis would be conducted for
13 new transmission construction or line upgrades. However, some construction of transmission
14 lines could occur within the SEZ. Potential noise impacts on nearby residences would be a minor
15 component of construction impacts in comparison with solar facility construction and would be
16 temporary in nature.
17

18 19 **9.4.15.2.2 Operations** 20

21 Noise sources common to all or most types of solar technologies include equipment
22 motion from solar tracking; maintenance and repair activities (e.g., washing mirrors or replacing
23 broken mirrors) at the solar array area; commuter/visitor/support/delivery traffic within and
24 around the solar facility; and control/administrative buildings, warehouses, and other auxiliary
25 buildings/structures. Diesel-fired emergency power generators and fire water pump engines
26 would be additional sources of noise, but their operations would be limited to several hours per
27 month (for preventive maintenance testing).
28

29 With respect to the main solar energy technologies, noise-generating activities in the
30 PV solar array area would be minimal, related mainly to solar tracking, if used. Dish engine
31 technology, which employs collector and converter devices in a single unit, on the other hand,
32 generally has the strongest noise sources.
33

34 For the parabolic trough and power tower technologies, most noise sources during
35 operations would be in the power block area, including the turbine generator (typically in an
36 enclosure), pumps, boilers, and dry- or wet-cooling systems. The power block is typically
37 located in the center of the facility. On the basis of a 250-MW parabolic trough facility with a
38 cooling tower (Beacon Solar, LLC 2008), simple noise modeling indicates that noise levels
39 would be more than 85 dBA around the power block, but about 51 dBA at the facility boundary,
40 about 0.5 mi (0.8 km) from the power block area. For a facility located near the southwestern
41 corner of the SEZ (in Lake Tamarisk), the predicted noise level would be about 51 dBA at the
42 nearest residence just next to the SEZ boundary, which is higher than the Riverside County
43 standard of 45 dBA daytime L_{eq} . If thermal energy storage (TES) were not used (i.e., if the
44 operation were limited to daytime, 12 hours only¹⁵), the EPA guideline level of 55 dBA (as L_{dn}

15 Maximum possible operating hours at the summer solstice, but limited to 7 to 8 hours at the winter solstice.

1 for residential areas) would occur at about 1,370 ft (420 m) from the power block area and thus
2 would not be exceeded outside of the proposed SEZ boundary. At the nearest residences, noise
3 levels of about 49 dBA L_{dn} would be estimated, which is below the EPA guideline. As for
4 construction, if three parabolic trough and/or power tower facilities were operating around the
5 residences in the western portion of the SEZ, combined noise levels would be a little higher than
6 the above-mentioned values, below a just-noticeable increase of about 3 dBA over a single
7 facility. However, day-night average sound levels higher than those estimated above by using the
8 simple noise modeling would be anticipated if TES were used during nighttime hours, as
9 explained below and in Section 4.13.1.

10
11 On a calm, clear night typical of the proposed Riverside East SEZ setting, the
12 air temperature would likely increase with height (temperature inversion) because of strong
13 radiative cooling. Such a temperature profile tends to focus noise downward toward the ground.
14 There would be little, if any, shadow zone¹⁶ within 1 or 2 mi (2 or 3 km) of the noise source in
15 the presence of a strong temperature inversion (Beranek 1988). In particular, such conditions
16 add to the effect of noise being more discernable during nighttime hours, when the background
17 levels are the lowest. To estimate day-night average sound levels (L_{dn}), 6-hour nighttime
18 generation with TES is assumed after 12-hour daytime generation. For nighttime hours under
19 temperature inversion, 10 dBA is added to sound levels estimated from the uniform atmosphere
20 (see Section 4.13.1). On the basis of these assumptions, the estimated nighttime noise level at the
21 nearest residences (about 0.5 mi [0.8 km]) from the power block area for a solar facility located
22 near the southwestern SEZ boundary) would be 61 dBA L_{eq} , which is much higher than
23 Riverside County regulation of 45 dBA nighttime L_{eq} . The day-night average noise level is
24 estimated to be about 63 dBA L_{dn} , which is higher than the EPA guideline of 55 dBA for
25 residential areas. The assumptions are conservative in terms of operating hours, and no credit
26 was given to other attenuation mechanisms, so it is likely that sound levels would be lower than
27 63 dBA at the nearby residences in Lake Tamarisk, even if TES is used at a solar facility. If three
28 parabolic trough and/or power tower facilities are operating around the nearby residences in the
29 southwestern portion of the SEZ, combined noise levels would be a little higher than these
30 values, as explained above, but lower than a just-noticeable increase of about 3 dBA over a
31 single facility. Consequently, operating parabolic trough or power tower facilities with TES and
32 located near the southwestern SEZ boundary could result in sound levels above the noise
33 standard or guideline, and adverse noise impacts could occur at the nearest residences. In the
34 permitting process, refined noise propagation modeling would be warranted along with
35 measurement of background sound levels.

36
37 Associated with operation of a parabolic trough or power tower solar facility occurring
38 near the specially designated areas, the estimated daytime level of 51 dBA at the boundary of
39 these areas is higher than the typical daytime mean rural background level of 40 dBA, while the
40 estimated nighttime level of 61 dBA is much higher than the typical nighttime mean rural
41 background level of 30 dBA. However, operation noise from a parabolic trough or power tower
42 solar facility with TES is not likely to adversely affect wildlife at the nearby specially designated
43 areas (Manci et al. 1988).

16 A shadow zone is defined as the region in which direct sound does not penetrate because of upward diffraction.

1 The solar dish engine is unique among concentrating solar power (CSP) technologies,
2 because it generates electricity directly and does not require a power block. A single, large
3 solar dish engine has relatively low noise levels, but a solar facility might employ tens of
4 thousands of dish engines, which would cause high noise levels around such a facility. For
5 example, the proposed 750-MW SES Solar Two dish engine facility in California would employ
6 as many as 30,000 dish engines (SES Solar Two, LLC 2008). At the Riverside East SEZ, on the
7 basis of the assumption of dish engine facilities of up to 18,035-MW total capacity (covering
8 80% of the total area, or 162,317 acres [657 km²]), up to 721,400 25-kW dish engines could be
9 employed. Also for a large dish engine facility, several thousand step-up transformers would be
10 embedded in the dish engine solar field, along with several substations; however, the noise from
11 these sources would be masked by dish engine noise.

12
13 The composite noise level of a single dish engine would be about 89 dBA at a distance of
14 3 ft (0.9 m) (SES Solar Two, LLC 2008). This noise level would be attenuated to about 40 dBA
15 (typical of the mean rural daytime environment) within 340 ft (105 m). However, the combined
16 noise level from hundreds of thousands of dish engines operating simultaneously would be high
17 in the immediate vicinity of the facility, for example, about 54 dBA at 1.0 mi (1.6 km) and
18 51 dBA at 2 mi (3 km) from the boundary of the square-shaped dish engine solar field, both
19 of which are higher than the Riverside County standard of 45 dBA daytime L_{eq} for rural
20 environments. However, these levels would occur at somewhat shorter distances than the
21 aforementioned distances, considering noise attenuation by atmospheric absorption and
22 temperature lapse during daytime hours. To estimate noise levels at nearby residences, it was
23 assumed dish engines were placed all over the Riverside East SEZ at intervals of 98 ft (30 m).
24 On the basis of this assumption, the estimated noise levels at all nearby receptors within a 2-mi
25 (3-km) distance of the SEZ boundary would be higher than the Riverside County standard of
26 45 dBA daytime L_{eq} for rural environments. The noise level would decrease to the level of the
27 Riverside County standard of 45 dBA daytime L_{eq} for rural environments at about 3 mi (5 km)
28 from the SEZ boundary. The highest noise levels of about 59 dBA L_{eq} would be estimated for a
29 receptor near the east central SEZ boundary. On the basis of 12-hr daytime operation, the
30 estimated 56 dBA L_{dn} for this receptor is a little higher than the EPA guideline of 55 dBA L_{dn}
31 for residential areas. At other receptors, 55 dBA or less L_{dn} was estimated. While this upper-
32 limit estimate for operation of dish engines over the entire Riverside East SEZ is highly unlikely
33 to be attained, noise levels from, for example, a single 1,000-MW facility located at the SEZ
34 boundary would not be much lower, only about several decibels lower, because contributions to
35 levels from dish engines at further distances would be minor. A dish engine facility near the
36 western or eastern SEZ boundary close to the nearby residences could result in noise levels
37 above Riverside County standard and EPA guideline levels, and could have corresponding
38 adverse noise impacts on residents there. Noise from dish engines might be masked by
39 background noise if a receptor is located near noisy background sources, such as highways or
40 airports. However, noise from dish engines would have considerable impacts on receptors with
41 low background noise levels.

42
43 For dish engines placed throughout the SEZ, the estimated highest noise level at the SEZ
44 boundary would be about 62 dBA, which is higher than the typical daytime mean rural
45 background level of 40 dBA. However, dish engine noise from the SEZ is not likely to adversely
46 affect the nearby specially designated areas (Manci et al. 1988).

1 Consideration of minimizing noise impacts is very important during siting for dish engine
2 facilities. Direct mitigation of dish engine noise through noise control engineering could also be
3 considered.

4
5 During operations, no major ground-vibrating equipment would be used. In addition,
6 no sensitive structures are located close enough to the Riverside East SEZ to experience
7 physical damage. Therefore, potential vibration impacts on surrounding communities and
8 vibration-sensitive structures during operation of any solar facility would be minimal.

9
10 Transformer-generated humming noise and switchyard impulsive noises would be
11 generated during the operation of solar facilities. These noise sources would be located near the
12 power block area, typically near the center of a solar facility. Noise from these sources would
13 generally be limited to within the facility boundary and rarely be heard at nearby residences,
14 assuming a 0.5-mi (0.8-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and to the
15 nearby residences). Accordingly, potential impacts of these noise sources on nearby residences
16 would be minimal.

17
18 For impacts from transmission line corona discharge noise during rainfall events
19 (Section 5.13.1.5), the noise level at 50 ft (15 m) and 300 ft (91 m) from the center of a 230-kV
20 transmission line tower would be about 39 and 31 dBA (Lee et al. 1996), respectively, typical of
21 daytime and nighttime mean background noise levels in rural environments. The noise levels at
22 65 ft (20 m) and 300 ft (91 m) from the center of 500-kV transmission line towers would be
23 about 49 and 42 dBA, typical of high-end and mean daytime background noise levels,
24 respectively, in rural environments. Corona noise includes high-frequency components, which
25 may be judged to be more annoying than other environmental noises. However, corona noise
26 likely would not cause impacts, unless a residence was located close to the source (e.g., within
27 500 ft [152 m] of a 230-kV transmission line and 0.5 mi [0.8 km] of a 500-kV transmission line).
28 The proposed Riverside East SEZ is located in an arid desert environment, and incidents of
29 corona discharge would be infrequent. Therefore, potential impacts on nearby residents along the
30 transmission line ROW would be negligible.

31 32 33 **9.4.15.2.3 Decommissioning/Reclamation**

34
35 Decommissioning/reclamation requires many of the same procedures and equipment used
36 in traditional construction. Decommissioning/reclamation would include dismantling of solar
37 facilities and support facilities such as buildings/structures and mechanical/electrical
38 installations; disposal of debris; grading; and revegetation as needed. Activities for
39 decommissioning would be similar to those used for construction but on a more limited scale.
40 Potential noise impacts on surrounding communities would be correspondingly lower than those
41 for construction activities. Decommissioning activities would be of short duration, and their
42 potential impacts would be moderate and temporary in nature. The same mitigation measures
43 adopted during the construction phase could also be implemented during the decommissioning
44 phase.

1 Similarly, potential vibration impacts on surrounding communities and vibration-
2 sensitive structures during decommissioning of any solar facility would be lower than those
3 during construction and thus minimal.
4

6 **9.4.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**

7

8 The implementation of required programmatic design features described in Appendix A,
9 Section A.2.2, would greatly reduce or eliminate the potential for noise impacts from
10 development and operation of solar energy facilities. While some SEZ-specific design features
11 are best established when project details are being considered, measures that can be identified at
12 this time include the following:
13

- 14 • Noise levels from cooling systems equipped with TES should be managed so
15 that levels at the nearby residences to the west and to the east of the SEZ are
16 kept within applicable guidelines. This could be accomplished in several
17 ways, for example, through placing the power block approximately 1 to 2 mi
18 (1.6 to 3 km) or more from residences, limiting operations to a few hours after
19 sunset, and/or installing fan silencers.
20
- 21 • Dish engine facilities within the Riverside East SEZ should be located more
22 than 1 to 2 mi (2 to 3 km) from the nearby residences to the west and the east
23 of the SEZ (i.e., the facilities should be located in other portions of the
24 proposed SEZ). Direct noise control measures applied to individual dish
25 engine systems also could be used to reduce noise impacts at the nearest
26 residences.
27

1 **9.4.16 Paleontological Resources**

2
3
4 **9.4.16.1 Affected Environment**

5
6 The proposed Riverside East SEZ is covered predominantly by Quaternary/Tertiary
7 deposits of varying types. The eastern half and southwestern portions are mostly composed of
8 thick alluvial deposits (more than 100 ft [30.5 m] thick), ranging in age from the Holocene to the
9 Pliocene. The total acreage of the alluvial deposits within the SEZ is 147,295 acres (596 km²), or
10 about 73% of the SEZ. The northwest and central sections are mostly composed of eolian (dune
11 sand) and playa sediments. The total area of eolian sediments within the SEZ is 50,927 acres
12 (206 km²), or 25% of the SEZ, and the total area of playa sediments is 3,081 acres (12 km²), or
13 2% of the SEZ. Peripheral sections of the SEZ are composed of residual materials developed in
14 igneous and metamorphic rocks, sedimentary rocks, or carbonate rocks. These discontinuous
15 residual deposits account for 1,788 acres (7.2 km²), or less than 1% of the SEZ. In the absence of
16 a PFYC map for the California Desert District, a preliminary classification of PFYC Class 3b is
17 assumed for the alluvial, eolian, playa, and residual deposits. Class 3b indicates that the potential
18 for the occurrence of significant fossil materials is unknown and needs to be investigated further
19 (see Section 4.8 for a discussion of the PFYC system). On the basis of some paleontological
20 survey work conducted within the SEZ for existing solar applications, several areas within the
21 SEZ could be classified as PFYC Class 1. Other areas could be classified as PFYC Class 4/5,
22 such as near Quaternary lake bed deposits. The Bouse Formation is likely to be present within
23 the SEZ and has the potential to contain marine, brackish, and freshwater fossils, including a
24 species of barnacle, a foraminifer, mollusks, gastropods, ostracodes, and charophytes. Well tests
25 within the Riverside East SEZ hit the Bouse Formation at a depth of about 60 ft (18 m).

26
27 Pedestrian surveys to look for surface fossils and exposures of potential fossil-bearing
28 geologic units were conducted for the Palen and Blythe Solar Power Projects in 2009. Five
29 nonsignificant fossil occurrences or points were recorded for the Palen project, predominantly
30 consisting of petrified wood and one possible mammal jaw fragment from the surface of
31 Quaternary deposits. In addition to the field reconnaissance, a records search indicated that the
32 potential for subsurface deposits of paleontological material ranged from low to high, increasing
33 with depth. A portion of the Palen project was identified as having a high sensitivity for
34 containing significant paleontological resources in areas of Quaternary lakebed deposits. The
35 recommendation of the report is to monitor ground disturbances in Quaternary lakebed deposits,
36 due to their sensitivity, on a full-time basis and to prepare a Paleontological Resource
37 Monitoring and Mitigation Plan for the project.

38
39 For the Blythe project, 37 nonsignificant fossil occurrences of petrified wood were
40 recorded, in addition to 64 nonsignificant fossil points of turtle shell fragments, vertebrate
41 fragments, and invertebrate specimens. Several portions of the Blythe project area, including
42 areas of alluvial deposits in the McCoy Wash and Palo Verde Mesa areas and older alluvial fan
43 and alluvial valley deposits, have been identified as having high sensitivity for containing
44 possible significant subsurface paleontological resources. Quaternary alluvium deposits of
45 modern washes range in sensitivity from low to high, increasing sensitivity with depth. The
46 recommendation of the report is to prepare a Paleontological Resource Monitoring and

1 Mitigation Plan for the project and monitor ground disturbance in all areas of high sensitivity,
2 including areas of low to high sensitivity when ground disturbances equal or exceed 5 ft (1.5 m)
3 in depth.
4
5

6 **9.4.16.2 Impacts**

7

8 The potential for impacts on significant paleontological resources at the Riverside East
9 SEZ is relatively unknown, but the potential is high in some areas. A more detailed investigation
10 of the local geological deposits of the SEZ and their potential depth is needed prior to project
11 approval. Once a project area has been chosen, a paleontological survey will likely be needed
12 following consultation with the BLM. The appropriate course of action would be determined as
13 established in BLM IM2008-009 and IM2009-011 (BLM 2007b, 2008a). Section 5.14 discusses
14 the types of impacts that could occur on any significant paleontological resources found to be
15 present within the Riverside East SEZ. Impacts will be minimized by implementing applicable
16 general mitigation measures from Section 5.14, such as paleontological monitoring and
17 development of a management/mitigation plan, and required programmatic design features
18 described in Appendix A, Section A.2.2.
19

20 Indirect impacts on paleontological resources outside of the SEZ, such as through looting
21 or vandalism, are unknown but unlikely because any such resources would be below the surface
22 and not readily accessed. Programmatic design features for controlling water runoff and
23 sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.
24

25 No new roads or transmission lines have been assessed for the proposed Riverside East
26 SEZ, assuming existing corridors would be used; impacts on paleontological resources related to
27 the creation of new corridors would be evaluated at the project-specific level if new road or
28 transmission construction or line upgrades are to occur.
29

30 A programmatic design feature requiring a stop work order in the event of an inadvertent
31 discovery of paleontological resources would reduce impacts by preserving some information
32 and allowing possible excavation of the resource, if warranted. Depending on the significance of
33 the find, it could also result in some modification to the project footprint. Since the SEZ is
34 located in an area preliminarily classified as PFYC Class 3b or greater, a stipulation would be
35 included in permitting documents to alert solar energy developers of the possibility of a delay if
36 paleontological resources were uncovered during surface-disturbing activities.
37
38

39 **9.4.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**

40

41 Impacts would be minimized through the implementation of required programmatic
42 design features, including a stop-work stipulation in the event that paleontological resources are
43 encountered during construction, as described in Appendix A, Section A.2.2. The need for and
44 the nature of any SEZ-specific design features would depend on findings of paleontological
45 surveys.

1 **9.4.17 Cultural Resources**

2
3
4 **9.4.17.1 Affected Environment**

5
6
7 **9.4.17.1.1 Prehistory**

8
9 The proposed Riverside East SEZ is located in a transitional area between the Colorado
10 Desert to the south and the Mojave Desert to the north. The earliest human use of the Colorado
11 and Mojave Deserts was likely during the Paleoindian Period, sometime between 12,000 and
12 10,000 B.P. Although no Paleoindian sites have been documented in the Colorado Desert,
13 several sites have been documented in the Mojave Desert, and in coastal sites to the west. These
14 known sites are predominantly located near inland pluvial lakes (now mostly dry), and on desert
15 terraces, suggesting that subsistence during this time period focused on mega-fauna and on the
16 local lake and marsh habitats. This hunting-intensive period came to an end around 7,000 to
17 8,000 B.P., when the mega-fauna became extinct, likely due to intensive hunting and a warming
18 climate; this warming climate consequently led to the shrinking of ancient pluvial lakes. These
19 early sites are characterized by the Clovis complex of fluted points, and later the San Dieguito
20 complex, characterized by core and flaked-based tools, crescents, choppers, planes and scrapers,
21 and some leaf-projectile points (Rogers 1939; Jones and Klar 2007).

22
23 The Archaic Period in the Colorado Desert lasted from approximately 8,000 to
24 1,500 B.P., defined mainly by the Pinto Cultural Complex. The paucity of evidence during the
25 Archaic time period in the Colorado Desert makes it difficult to establish secure chronological
26 sequences, making the Archaic period of the Colorado Desert an important source for regional
27 research questions. The sites during this time period are generally identified by the material
28 culture, distinctive projectile points, and ground stone tools used for processing plant resources.
29 However, some of the Late Archaic sites in the region, mainly found on the margins of the
30 Colorado Desert or around ancient Lake Cahuilla to the southeast of the SEZ, have been
31 identified by buried midden deposits with clay-lined features, cremations, thermal features
32 (such as fire-affected rock and hearths), and perishable items such as basketry, nets, traps, and
33 split-twig figurines (Love and Dahdul 2002; Jones and Klar 2007).

34
35 The Late Prehistoric/Protohistoric Period began about 1500 B.P. and extended until
36 contact with European explorers and colonization of the area. The archaeological
37 Patayan complex is thought to be ancestral to the later Yuman cultural groups discussed in
38 Section 9.4.17.1.2. The Late Prehistoric period likely saw a change in subsistence patterns from
39 the preceding Archaic period as Lake Cahuilla recessed, forcing groups to rely on floodplain
40 agriculture and the seasonal flooding of the Colorado River. While agriculture played a large role
41 in their diet, these groups likely maintained some of their hunting and gathering subsistence
42 practices, practicing a mix of horticultural and hunter-gatherer subsistence strategies. The Late
43 Prehistoric period also saw the introduction of pottery, buff and brown ware ceramics, and
44 paddle and anvil pottery, likely introduced from Mexico. Archaeological assemblages of the
45 period are also characterized by bow-and-arrow technology, evidenced by smaller Cottonwood
46 and Desert side-notched points; a shift in burial practices from inhumation to cremation

1 techniques; rock art and intaglios; bedrock milling features; and an extensive system of trails,
2 along which “pot-drops,” lithic debitage, and shrines are found.
3
4

5 **9.4.17.1.2 Ethnohistory** 6

7 Although of diverse linguistic stock, the Native Americans that inhabited the southeastern
8 California deserts when Euro-Americans first arrived shared similar ways of life and broadly
9 similar beliefs, norms, and values (Halmo 2003). The mountains and valleys of their shared
10 environment provided a variety of seasonally available resources. Native American groups
11 harvested these resources following a regular seasonal pattern. They lived in kin-based groups,
12 or lineages, that would join together or split apart depending on the type and the abundance of
13 the resources available. A pattern of seasonal camps combined with permanent villages emerged.
14 Lineages tended to consider specific highly productive areas, such as dense stands of mesquite,
15 as their own, while the areas between were shared not only with other lineages, but also with
16 other Tribes (Lightfoot and Parish 2009). Even when they grew wild, plant resources were often
17 managed; stands of plant resources might be pruned, watered, or burned to encourage growth.
18 The pattern of seasonal migration to exploit particular resources allowed the groups to adapt to
19 changes in their subsistence base with the arrival of new cultural impulses and populations.
20 Floodplain horticulture, adopted from the Southwest, allowed for the establishment of
21 permanent, often multi-ethnic villages along the Colorado River (Halmo 2003). These became
22 part of the migratory pattern which continued to take some ethnic groups into the highlands to
23 harvest resources available there. Similarly, with the discovery of gold in the 19th century and
24 the influx of Euro-American populations in the 20th century, Native Americans added wage
25 labor in mines and on large irrigated farms to their seasonal rounds (Bean et al. 1978).
26

27 The various Native American ethnic groups that inhabited the southeastern California
28 deserts each had an area that they considered their homeland, but the boundaries between these
29 areas were not sharply drawn. Travel to hunt, trade, or just visit neighboring groups was common
30 (Kelly and Fowler 1986). The territorial claims of the different ethnic groups who occupied the
31 Mojave and Colorado Deserts overlap each other. The boundaries between ethnic groups appear
32 to have changed from one time period to another, and groups would sometimes share territory, or
33 a group would invite its neighbors to share an abundant resource (CSRI 2002). In addition, many
34 of the ethnic groups that inhabited the Colorado Desert shared a considerable amount of ritual
35 and worldview, including an important religious song cycle sung in the language of the Mohave.
36 This song cycle was associated with a network of trails, the most important of which are the
37 *Xam Kwatcan* Trail (Johnson 2003) and the Salt Song Trail (Halmo 2003). These trails are both
38 physical and spiritual paths, connecting sacred natural features thought to be imbued with power.
39 Following the trails physically or in spirit was particularly important as part of a mortuary ritual
40 to aid the departed in their journey to the afterlife. Points along the trail are often marked with
41 cairns, sometimes covering burials, cleared sleeping circles, panels of petroglyphs, and in some
42 areas geoglyphs or intaglios. Campsites along the trails are most often associated with springs
43 (CSRI 1987). Other trails were of secular importance, reflecting a web of social and trade links
44 that stretched from the Pacific coast to the Great Plains. As discussed in Section 9.4.18.1, the
45 Native Americans living in southeastern California tend to view the landscape they inhabit

1 holistically, each part intrinsically and inextricably connected to the whole. In some sense, the
2 network of trails tied the landscape together.

3
4 The proposed Riverside East SEZ lies in an area of intermittent joint use. It provided
5 seasonal resources to surrounding groups and included important trails that connected them
6 (Knack 1981). The Takic-speaking Serrano were centered in the mountains to the west; the
7 closely related Cahuilla in the Coachella Valley; the Yuman-speaking Quechan at the confluence
8 of the Colorado River and the Gila; their allies, the Mohave, along the river from Blythe to Black
9 Canyon; and the Numic-speaking Chemhuevi in the Chemehuevi Valley and parts of the Mojave
10 Desert. Before the early 19th century, the Halchidhoma lived along the river around what is now
11 Blythe.

12 13 14 **Serrano**

15
16 The precise sociopolitical boundaries of the Serrano are difficult to define (Kroeber 1925;
17 Strong 1929). Their name is derived from a Spanish term meaning “highlander” or
18 “mountaineer.” Most researchers place the Serrano homeland in the San Bernardino Mountains
19 east of the Cajon Pass, and in the Mojave River drainage north of Victorville. They themselves
20 place their traditional center of origin at Twentynine Palms (CSRI 2002).

21
22 The Serrano were a collection of localized lineages speaking the same language and
23 sharing the same culture, but with little or no overarching political structure. They had cultural
24 ties to the Vanyume on the north and Cahuilla on the south. The Serrano appear to have been
25 primarily gatherers, supplementing their plant-based diet with hunting and fishing. There is
26 considerable variation in altitude within their traditional range, and as with neighboring groups,
27 resources were collected from a number of environments. Most villages were found in the
28 foothills, but some occurred on the desert floor in locations where good water was available. At
29 higher elevations they gathered piñon nuts and acorns, and at lower elevations mesquite pods and
30 yucca heads. The harvests were stored, and excess traded. Where the resource was abundant,
31 lineages might gather to harvest or to communally hunt rabbits or deer (Bean and Smith 1978).

32
33 Limited by water supply, villages were small, consisting of clusters of tule-thatched,
34 domed, circular huts. Most often they also included a larger ceremonial structure where the
35 lineage leader lived. Their material culture included decorated baskets, pottery, hide blankets,
36 stone pipes, yucca fiber cordage, and an assortment of musical instruments of wood, bone, and
37 shell, similar to the material culture of the Cahuilla (Farmer et al 2009).

38
39 The Serrano had little contact with the Spanish until 1819 when an *asistencia*, or mission
40 outpost, was established near Redlands. Thereafter, native ways of life rapidly faded as the
41 majority of the population was moved to the missions. By the latter part of the 20th century,
42 most Serrano lived on the Morongo and San Manuel reservations, where they mixed with the
43 Cahuilla and other ethnic groups (Bean and Smith 1978).

1 **Cahuilla**
2

3 Closely related to and associated with the Serrano, the Cahuilla occupied the Coachella
4 Valley. Like the Serrano, their society was composed of lineage-based groups with hereditary
5 leaders, but with no overarching sociopolitical organization. They are believed to have entered
6 the Colorado Desert from the Great Basin sometime between 500 BC and AD 500. They were
7 hunters and gatherers who lived in permanent villages near reliable water. They appear to have
8 first settled on the shores of Lake Cahuilla,¹⁷ and then moved to the mountains as the lake dried.
9 The Cahuilla tended toward larger groups that consisted of multiple lineages (Lightfoot and
10 Parish 2009). Preferred settlement sites were near mesquite stands or palm oases. They
11 considered the latter to be sacred (Bean et al 1978). While villages were occupied year-round,
12 small groups would move seasonally to temporary camps to collect localized plant resources or
13 to hunt. Larger groups would travel to the mountains together with mountain allies to harvest
14 piñon nuts and acorns. These would be brought to the permanent villages for storage. Species
15 important to the Cahuilla are discussed in Section 9.4.18.
16

17 The Cahuilla were long-distance traders. The routes westward through San Gorgonio
18 Pass to the coast lay within their traditional use area, and the Cahuilla maintained trading
19 relationships east of the Colorado River with the Maricopa. Like the Chemehuevi, they were part
20 of a network that stretched as far east as the Great Plains (Bean et al 1978). A major east–west
21 trade route referred to as the “Cocomaricopa” or “Halchidhoma Trail” connected the San
22 Gorgonio Pass with the Gila River area and crossed the Colorado River near present-day Blythe.
23 I-10 roughly follows the northern branch of the trail from Blythe westward to Desert Center
24 (Cleland and Apple 2003). The Cahuilla would have been familiar with the southern portions of
25 the proposed Riverside East SEZ.
26

27
28 **Quechan**
29

30 Sometimes referred to as the Yuma, the Quechan (Kwatsan) are a Yuman-speaking group
31 closely allied with the Mohave, traditionally centered at the confluence of the Gila and Colorado
32 Rivers. It is not clear when they arrived at the confluence. They were there by the 1770s, but
33 were not mentioned by Francisco Vasquez de Coronado, who passed through the area in 1540.
34 Quechan tradition relates that the Tribe migrated south from the sacred mountain *Avikwaame*, in
35 the Newberry Mountains near Laughlin, Nevada. They are thought to have arrived at the
36 confluence sometime between the thirteenth and the eighteenth centuries. Traditionally, the
37 Quechan practiced floodplain horticulture, depending on the annual floods of the Colorado River
38 to replenish their fields with fresh silt. The fertility of the soil allowed multiple plantings and
39 harvests, which the Quechan supplemented by gathering plants from the desert and by fishing.
40 During the growing season they dispersed along the floodplains of the Colorado and the Gila
41 Rivers, moving to the upper terraces during the winter. The Quechan prospered using simple

¹⁷ Lake Cahuilla formed when the Colorado River shifted course to the west and flowed into the Salton Sea Basin, then dried when the river reverted to its former course. The process of formation and desiccation was cyclical before the construction of dams on the Colorado, with cycles lasting about 150 years (Redlands Institute 2002).

1 technology. Their bows were simple and unbacked. Arrows often had no stone points. Digging
2 sticks served for planting maize, and clothing was minimal (Bee 1983).

3
4 While their settlements were more dispersed and independent than those of the Serrano
5 or the Cahuilla, the Quechan had a sense that they were a Tribe, a nation occupying a specific
6 territory. They acted together in warfare; acting together with their allies, the Mohave, they were
7 often at odds with the Halchidhoma, the Maricopa, and the Cocopah.

8
9 The confluence of the Gila and Colorado Rivers was an important crossing along the
10 Yuma-San Diego Trail, which led to the coast. Important to the Spanish, and later the
11 Americans, the Spanish established a mission there in 1779 only to have it destroyed by the
12 Quechan and Cahuilla 2 years later. The Hispanic connection remained important to the
13 Quechan, who desired Spanish trade goods, for which they exchanged slaves captured during
14 raids on their enemies (Knack 1981). Between 1826 and 1829 the Quechan joined the Mohave in
15 driving out the Halchidhoma, who controlled another important river crossing. For a time, some
16 Quechan moved into the Blythe area, but they had returned south by the second half of the
17 nineteenth century (Bee 1983). After the defeat of Mexico in 1848, the United States established
18 at fort at Yuma to control the crossing, which had become an important wagon road. A
19 reservation was established for the Quechan in 1884.

20
21 Like that of their northern neighbors, Quechan cosmology included ritually important
22 trails. The most important of these remains the *Xam Kwatcan* Trail. It follows the Colorado
23 River, connecting Pilot Knob (*Avikwalali*) with Spirit Mountain (*Avikwaame*), connecting a
24 series of ritually important places of power. One of these is Palo Verde Peak, located about
25 12 mi (19 km) south of the SEZ (Johnson 2003).

26 27 28 **Mohave**

29
30 The Mohave were primarily at home along the Colorado River, from time to time
31 occupying its banks as far south as Blythe. They appear to have entered the Mojave Valley
32 sometime around AD 1150. They resided chiefly along the eastern bank of the Colorado River,
33 but travelled widely, for trade, to harvest seasonally available resources, and out of curiosity.
34 They are likely to have been familiar with Chuckwalla Valley and lands included in the proposed
35 Riverside East SEZ. They lived in sprawling settlements, rather than villages, with houses
36 situated on low hills above the flood plain. They did not engage in irrigation agriculture, but
37 relied on seasonal inundation to water and refresh their fields. Unlike most other Colorado
38 Desert Tribes, families owned individual fields and individual mesquite trees (Stewart 1983).
39 Most of the year the Mohave lived on terraces above the Colorado River, moving to the flood
40 plain in the spring to plant crops after seasonal floods receded (Kroeber 1925).

41
42 The Mohave have traditionally thought of themselves as a nation inhabiting a territory
43 under a hereditary great chief of the Malika clan. Divided into patrilineal clans, they came
44 together for warfare and other purposes. War leaders and shamans had great influence, and
45 power was gained by dreaming, often in sacred locations. Their territorial claims are extensive,
46 reflecting their propensity to travel. They claim as their territory a much larger range than other

1 California Tribes, including all of the Mojave Desert and as far south as the Turtle, Granite, and
2 Eagle Mountains (CSRI 2002), adjacent to, but not including the SEZ. This larger range was
3 where they hunted and gathered to supplement their planted crops and the fish they took from the
4 river. They are likely to have traded, hunted, and gathered in the Riverside East SEZ area. They
5 were less reliant on hunting and gathering than the Chemehuevi, who hunted and gathered in
6 much of the same area (Farmer et al. 2009).

7
8 Besides being used for travel for trade, war, and recreation, trails often had religious
9 significance. The Salt Song Trail, which passes through the SEZ, seems to have originated with
10 the Mohave. The Mohave revere other trails, such as the Keruk Trail of Dreams. The song cycles
11 that are associated with the trails tied specific songs to specific places. Many of these were
12 considered places of power, where individuals sought enlightenment, skills, and status through
13 dreaming. These trails are considered sacred, and offerings continue to be left at sacred points
14 along them (Halmo 2003).

15 16 17 **Halchidhoma**

18
19 The Halchidhoma were a Yuman-speaking group who were once located south of the
20 Mohave along the Colorado River. Like the Mohave, they were floodplain cultivators and active
21 traders. Culturally, they were similar to the Mohave and the Quechan, but politically they were
22 their enemies. Their ties were with the Maricopa and Cocopah, also Yuman speakers. Like the
23 Mohave, they were great travelers and traders, establishing the Cocomaricopa or Halchidhoma
24 Trail, and an east–west route later followed by Euro-American immigrants. Their clashes with
25 the Mohave and Quechan came to a head sometime around 1825. The Halchidhoma were
26 defeated and began to move to the Gila River to join their Maricopa allies. This process
27 continued until about 1840 (Harwell and Kelly 1983).

28 29 30 **Chemehuevi**

31
32 The Chemehuevi, a Southern Paiute group, occupied the Parker and Blythe Valleys along
33 the Colorado at the invitation of the Mohave, with whom they were allied, sometime between
34 1825 and 1830, after the Mohave and Quechan had driven out the Halchidhoma. In the late
35 1860s, hostilities erupted between the Mohave and Chemehuevi, and part of the Chemehuevi
36 moved west to join Cahuilla and Serrano villages near Twentynine Palms. In 1874, the Office of
37 Indian Affairs set aside part of the Mohave reservation along the Colorado River for the
38 Chemehuevi, but many did not want to return. In 1907 a separate reservation was established
39 north of Parker, Arizona (Kelly and Fowler 1986).

40
41 The Chemehuevi ranged through the eastern half of the Mojave Desert, but were
42 concentrated along the Colorado River, where they adopted flood plain agriculture, and the
43 Chemehuevi Valley away from the river, where they retained their ties to the surrounding
44 upland mountains and valleys. The latter have been called Desert Chemehuevi (*Tiiranniwiwi*)
45 (Farmer et al. 2009). Even those living along the river retained more reliance on hunting and
46 gathering than their neighbors. The *Tiiranniwiwi* may have been periodically present in the

1 Riverside East SEZ, although it is somewhat south of their claimed traditional Tribal use area.
2 Taken together, they had a diverse subsistence base including irrigated mixed horticulture, wild
3 plant management, and hunting. Normally they produced a surplus that they were able to trade
4 (Halmo 2003).

5
6 Chemehuevi settlements were scattered and band size varied with the season and
7 available water, plant, and animal resources. Dwellings varied from pole structures covered with
8 brush, to rock shelters, to earth-covered huts often with open fronts, adopted from the Mohave.
9 Other items of Mohave material culture were likewise adopted, including ceramic styles, square
10 metates (grinding stones), storage platforms, and personal adornment (Farmer et al. 2009).

11
12 The relations between the Chemehuevi and neighboring Tribes were mostly amicable.
13 They maintained a trading relationship with the Cahuilla, and groups of Chemehuevi would
14 travel as far west as the coast to trade for shells and as far east as the Hopi mesas. They were
15 involved in a trade network that stretched from the Channel Islands to the Gila River Valley and
16 the Great Plains, with the potential to bring material culture from some distance away to the
17 Chemehuevi homeland.

18 19 20 **9.4.17.1.3 History**

21
22 European explorers first entered the southeastern California deserts in the sixteenth
23 century. Early explorers of Alta, California, reached the Colorado River by way of the Gulf of
24 California, and proceeded up the stream past the confluence of the Gila River, but explored
25 little of the interior deserts. For the next 200 years Spanish penetration of the interior deserts
26 was intermittent, resulting in a prolonged protohistoric period (see Sections 9.4.17.1.1 and
27 9.4.17.1.2). Juan Bautista de Anza crossed the Colorado River with the assistance of the
28 Quechan on his way to Monterey in 1774. His route, which is located well south of the proposed
29 Riverside East SEZ near the border of California and Mexico, became the main travel corridor
30 between Arizona and central California in the 1800s. Another trail, the Cocomaricopa Trail,
31 passed through the SEZ; it began as a Native American trail and later served as the mail route
32 between Sonora, Mexico, and Alta, California. The trail's name changed to Bradshaw Trail over
33 time, as William Bradshaw established an overland stage route using the trail in an effort to
34 attract miners to the area.

35
36 The nineteenth and early twentieth centuries were characterized by mining and
37 prospecting in the Colorado Desert. Gold, silver, copper, gypsum, borax, and manganese were
38 the primary deposits of interest. A series of military camps and forts were established in Arizona,
39 Nevada, and California between 1848 and 1890 to protect those moving into the area from
40 hostile Tribes; tensions had increased between settlers and Native Americans as a result of the
41 estimated 8,000 immigrants to the area during the Gold Rush. In addition to the trail initially
42 established by de Anza, Jedediah Smith created a new trail into California in 1826 that passed
43 through present day Needles, well north of the SEZ. In 1877, gold prospector Thomas Blythe
44 established water rights along the Colorado River in an effort to promote and establish a town
45 bearing his name, located just east of the SEZ. This new development in the deserts was
46 dependent on water and transportation. In 1872, the Southern Pacific Railroad started toward

1 California; by 1877, it extended to Yuma, Arizona, and by 1880 it had reached the Chocolate
2 Mountains southeast of the SEZ. The Eagle Mountain Mine, located immediately west of the
3 SEZ and north of Desert Center, operated as a gypsum and iron mine until 1983, and a 52 mi
4 (84 km) rail line connected the mine with the Southern Pacific Railroad at Duramid. Production
5 at the mines in the area increased during both World Wars as the need for metals (iron, gold,
6 silver, manganese, and gypsum) increased. In addition to the Eagle Mountain Mine, mining
7 prospects are known in the Mule Mountains, Big Maria Mountains, McCoy Mountains, and
8 Palen Mountains, all of which are ranges located in very close proximity to the proposed
9 Riverside East SEZ. Water did not come to the Colorado Desert until the 1930s when the MWD
10 was created and work began on the CRA extending from Parker Dam to Los Angeles; it was
11 completed in 1938. Associated with the construction of the aqueduct were several roads and
12 transmission lines, as well engineering camps, one of which was built at the Eagle Mountain
13 pump lift.
14

15 In 1942, the U.S. Army identified 18,000 mi² (46,000 km²) of desert in California and
16 Arizona for training troops in a desert environment in preparation for combat in North Africa.
17 The area came to be known as the Desert Training Center/California-Arizona Maneuver area,
18 or DTC/C-AMA, in 1943 as the massive training facility expanded its size to 31,500 mi²
19 (81,600 km²) and its range of activities from training troops, testing and developing equipment
20 and supplies, and developing new techniques and tactics for desert warfare to large-scale training
21 and maneuvering. It is estimated that over 1,000,000 men trained at the DTC/C-AMA. Although
22 it only operated between 1942 and 1944, it represents a significant period in U.S. history and
23 includes a number of archaeological features of importance, including the remains of training
24 camps, airfields, bivouacs, maneuver areas, and tank tracks (Bischoff 2000).
25

26 In a larger context, the DTC was a part of the early days of U.S. involvement in WWII.
27 The German army was advancing across Europe and the Italian army had struck out in Libya
28 and Egypt. British forces had been able to successfully counterattack the Italian army, but this
29 resulted in Germany entering North Africa to help the Italians. General Erwin Rommel of the
30 German army was successful with his desert army advancing across Libya and then into Egypt
31 against the British. The prospect of Germany and Italy controlling Egypt and the Japanese
32 successes in India, propelling them toward Persia, leaving Russia wide open to attack, made it
33 clear to the U.S. that they would need to go to North Africa. General Lesley J. McNair, chief of
34 staff for the Army General Headquarters, recognized the need to prepare American soldiers for
35 desert warfare in a terrain similar to that of North Africa. He placed Major General George S.
36 Patton, Jr., who had previously conducted successful training maneuvers in Louisiana, in charge
37 of the desert training center project (Bischoff 2000).
38

39 The location of the DTC was determined in March of 1942, as General Patton toured
40 the desert. Aside from the mountain ranges, the uninhabited desert of eastern California was
41 deemed sufficiently similar to that of North Africa. Patton felt the area was ideal for large-scale
42 training exercises because it was remote and desolate, but water was available and three
43 railroads supplied the area. In addition, there were other military facilities nearby (in Riverside,
44 Las Vegas, Indio, Yuma, and Blythe). Patton worked out deals with the railroad companies
45 (Union Pacific, Santa Fe, and Southern Pacific) and the Municipal Water District in order to
46 supply transportation and water for the troops. Camp Young was the first camp established near

1 Blythe, and it became the DTC headquarters. Several other camps were constructed over the
2 course of the DTC/C-AMA operation. The camps were temporary in nature, constructed mostly
3 of tents with some wooden structures to house administrative centers or hospitals. The only
4 permanent construction consisted of open-air chapels and large relief maps. Associated with
5 most of the camps were maneuver areas, rock-lined insignias, and arms ranges. By late summer
6 of 1942, Patton was ordered to North Africa, where he successfully commanded the western task
7 force of the operation to victory under Operation Torch. The DTC was quickly placed under the
8 command of Major General Alvan Gillem and the first set of maneuvers was conducted in the
9 fall. This first set of maneuvers was considered unrealistic, and the DTC was ordered to operate
10 like a theater of operations in a combat setting, including establishing communication zones
11 and combat zones. This was the first time the Army had simulated a theater of operation.
12 Riverine operations across the Colorado River were also added. At its height the DTC
13 contained 14 camps, with 11 in California and 3 in Arizona, each capable of holding at least
14 15,000 soldiers during a typical 14-week training schedule. There were also airfields, hospitals,
15 supply depots, and railheads. Several airfields were located in close proximity to the SEZ:
16 Shaver's Summit, located near Chiriaco, the Desert Center Army Airfield, and Rice Army
17 airfield, located north of the Riverside East SEZ. The importance of air support should not be
18 overlooked, as it was seen as an integral part of the desert training experience. On-the-ground
19 troops needed to be able to conceal themselves as much as possible to prevent detection during
20 simulated air attacks. In 1943, as the need for desert training waned with the close of the North
21 African campaign, the concept and name of the DTC changed to the California-Arizona
22 Maneuver Area. Its mission was to conduct broader large-scale training to toughen soldiers
23 mentally and physically and to provide battle conditions for conducting firing training and
24 testing and developing equipment, supplies, and training methods. The DTC/C-AMA saw its
25 greatest level of activity in the summer and fall of 1943. In late 1943, personnel shortages
26 (due to needs for personnel overseas) resulted in inefficient operation of the C-AMA, and
27 General McNair recommended the facility be closed. The DTC/C-AMA was declared surplus in
28 April 1944 by the War Department and was closed by the end of the month (Bischoff 2000).

29
30 Of specific interest in the vicinity of the Riverside East SEZ are Camp Coxcomb, Camp
31 Desert Center, and Camp Young. Camp Coxcomb was located just northwest of the SEZ,
32 between State Route 177 and the MWD aqueduct, and was constructed in the summer of 1942.
33 Considered more permanent than some of the other camps, it had wooden floors and screens in
34 the Post Exchange, along with 39 shower buildings, 165 latrines, 284 pyramidal wooden tent
35 frames, a 400,000-gallon water tank, and a combination observation tower and flag tower.
36 Several infiltration courses, machine gun, rifle and pistol ranges, and training areas have been
37 found in the surrounding area associated with the camp. Camp Desert Center was located on the
38 north side of I-10, between Chiriaco Summit and Desert Center west of the SEZ. It consisted of a
39 maneuver area, an encampment with temporary housing, an evacuation hospital, an observers'
40 camp, an ordinance campsite, and a quartermaster truck site. Camp Young was located just east
41 of the SEZ, outside Blythe, and it was here General Patton lived during most of his stay. This
42 camp maintained two station hospitals, several rifle and combat ranges to the south of the camp,
43 98 administration facilities, and 50 warehouses, along with bathhouses, mess halls and kitchens,
44 Post Exchanges, hundreds of latrines, a post office, a radio station, a coliseum, pump stations,
45 officer clubs, and various shops.

46

1 **9.4.17.1.4 Traditional Cultural Properties—Landscape**
2

3 The Tribes in this part of California tend to take a holistic view of the world; they see the
4 features of their environment as an interconnected whole imbued with a life force. Prominent
5 features may be seen as places of power—sacred places. High hills and mountains tend to be
6 regarded as sacred, while some peaks have special status. Other features that tend to be regarded
7 as sacred include caves, certain rock formations, springs, and hot springs. Revered locations
8 include panels of rock art, evidence of ancestral settlements, arranged-rock sites, burial or
9 cremation areas, and systems of trails. Sacred sites are often seen as places of power where
10 offerings are left (Halmo 2003). Tribes see themselves as exercising divinely given
11 responsibilities of stewardship over the lands where they believe they were created and as
12 retaining a divine birthright to those lands. Specific mountain peaks are seen as points of
13 emergence associated with creation stories. Although adopting much of the Mohave cosmology,
14 the Tribes have retained their own identities. For example, the Chemehuevi have their own
15 mountain of creation, Charleston Peak in Nevada (Halmo 2003), distinct from the Mohave’s
16 *Avikwaame* (Spirit Mountain) or Newberry Peak, also in Nevada. As mentioned above, there
17 remains considerable interaction among the Tribes that inhabit the southeastern California
18 deserts. A system of alliances furthered trade and the sharing of hunting and gathering grounds.
19

20 From the Native American perspective, the proposed Riverside East SEZ includes
21 elements of a sacred landscape tied together by a network of trails. A Prehistoric Trails Network
22 Cultural Landscape/Historic District has been proposed for trails near the SEZ (Tremaine and
23 Kline 2010). A trail of importance to the Chemehuevi and other area Tribes is the Salt Song
24 Trail, which runs generally north–south from north of Las Vegas to an area south of Blythe. It
25 enters the SEZ via the Palen Valley and crosses the Chuckwalla Valley to the Colorado River,
26 where it turns north to its point of origin (CSRI 1987). The *Xam Kwatcan* Trail, which is
27 significant to the Quechan, also runs north–south. It follows the Colorado River from Pilot Knob
28 (*Avikwalali*) near the Mexican border with Spirit Mountain (*Avikwaame*), connecting a series of
29 ritually important places of power. It crosses Palo Verde Mesa (Johnson 2003) on its way north,
30 either within or adjacent to the southern lobe of the proposed Riverside East SEZ. It continues
31 northward along the terraces above the Colorado River to the Blythe Intaglios east of the Big
32 Maria Mountains. In particular, the I-10 corridor follows a route with Native American roots.
33 The Cocomaricopa Trail was a major east–west trade route that is intersected by the Salt Song
34 and *Xam Kwatcan* Trails. It forms a culturally significant corridor and ties together culturally
35 important features like Black Rock in the east with Alligator Rock in the Chuckwalla Valley to
36 the west. Segments of this trail have been identified less than 2 mi (3 km) south of the western
37 half of the SEZ. Other segments have been identified in the southern lobe of the SEZ
38 (Eckhardt and Walker 2004). These trails did not consist of a single path, but were a network of
39 intertwining paths most visible on the shoulders and tops of ridge systems, relatively stable
40 alluvial fans, and other upland areas where footing was solid and there was less vegetation to
41 deal with (Cleland and Apple 2003). In addition, the McCoy Springs District, the largest
42 concentration of petroglyphs in the region, is associated with the network of trails. Located on
43 the western slope of the McCoy Mountains, within 4 mi (5.5 km) of the SEZ, the district consists
44 of more than 3,360 rock art panels and associated trail segments, archaeological deposits, and
45 sleeping circles. It was not only a focus of prehistoric activity, but remains a culturally important
46 site for Native Americans in the surrounding area (Bagwell and Kline 2010).

1 During consultations between the BLM and the Tribes regarding the construction of the
2 Blythe, Genesis, and Palen fast-track solar facilities within the Riverside SEZ, Native Americans
3 identified Alligator Rock, the Alligator Rock ACEC, the Palen Dry Lake shoreline, the Palen
4 Dry Lake ACEC, the South Chuckwalla Mountains Petroglyph District, McCoy Springs, Black
5 Rock, and the Mule Mountains ACEC as landscape features within 15 mi (24 km) of the
6 proposed facilities that are of religious or cultural importance to the Tribes (BLM and
7 CA SHPO 2010a–c).

8
9 Other mountains considered sacred include the Big Maria, Coxcomb, and Eagle
10 Mountains (Halmo 2003). The Big Maria Mountains are adjacent to and northwest of the SEZ
11 and form the western wall of McCoy Wash, and the Coxcomb Mountains lie between the
12 Chuckwalla and Palen Valleys. Both valleys include parts of the SEZ. The Eagle Mountains
13 are just west of the SEZ.

14
15 The proposed Riverside East SEZ appears to have been primarily used as a seasonal
16 gathering area. The remains of temporary occupation sites have been found between the
17 Chuckwalla Mountains and the Coxcomb Mountains. Some are associated with roasting pits,
18 suggesting the area was a seasonal agave-harvesting area. This part of the valley has been
19 identified as more likely to include resources important to Native Americans than the eastern
20 end of the basin. Sites associated with rituals tend to be found on the basin floors, with more
21 permanent campsites found in the foothills (CSRI 1987).

22
23 According to a Sacred Lands File Search through the NAHC, no sacred sites were
24 identified within the Riverside East SEZ (Singleton 2010).

25 26 27 ***9.4.17.1.5 Cultural Surveys and Known Archaeological and Historic Resources***

28
29 At least 109 previous surveys have been conducted in the vicinity of the proposed
30 Riverside East SEZ, resulting in the recording of 574 total sites, at least 414 of which lie within
31 the SEZ. The other 160 recorded sites are located within at least 5 mi (8 km) of the Riverside
32 East SEZ. Of these sites, 53% are historic in nature, consisting mostly of artifacts related to
33 the DTC/C-AMA, but some artifacts may be associated with mining, and more rarely
34 homesteading/grazing that occurred in the area. The historic site types consist of refuse scatters,
35 consisting mostly of metal cans, glass bottles and jars, broken ceramics, milled lumber, and
36 sundry metal items; historic trails and roads, as well as tank tracks; historic camps consisting of
37 cleared areas, probably for tent pads, and associated features such as hearths/campfires and
38 refuse scatters, which may be associated with construction camps for the linear facilities or
39 military or mining camps; historic cairns, often associated with mining claims; historic features
40 such as survey markers, rock features, prospect pits, stone and wooden structures, fortified
41 positions, aircraft parts, and smoke land mines. About 45% of the sites in the SEZ are prehistoric
42 sites that consist of lithic scatters and quarries related to stone tool and ground stone tool
43 production and maintenance, which make up the majority of prehistoric sites, and ceramic shards
44 and pot drops, cairns, thermal features, and fragmentary bone and trail segments. The remaining
45 2% of sites are multi-component sites, consisting of both historic and prehistoric artifacts.

1 Most of the information about archaeological sites in and around the Riverside East SEZ
2 was obtained from current solar energy applications, designated as “fast-track” projects, located
3 within the Riverside East SEZ. The Palen Solar Power Project is located in the area around Palen
4 Lake, in the western part of the Riverside East SEZ. The archaeological survey and research of
5 previously recorded sites in the APE found 57 total sites recorded in the project area, 46 of which
6 are within the Riverside East SEZ. Of these 57 sites, 43 are historic, and 14 sites are prehistoric
7 (AECOM 2009a). The Blythe Solar Power Project is located in the eastern portion of the
8 Riverside East SEZ. Through archaeological survey and determination of previously recorded
9 sites that are located in the Blythe APE, 254 total sites were reported. Of the 254 sites, 204 are
10 located in the Riverside East SEZ, the remaining 50 located within 5 mi (8 km) of the SEZ.
11 There are 180 historic sites recorded, 68 prehistoric sites, and 6 multi-component sites that
12 contain both prehistoric and historic artifacts and features (AECOM 2009b). The Genesis Solar
13 Energy Project is located in the central portion of the Riverside East SEZ, just north of Ford Dry
14 Lake. The archaeological survey and previously recorded sites indicated 98 sites present in the
15 Genesis APE, 36 of which are also within the Riverside East SEZ, the other 62 sites being
16 located within 5 mi (8 km) of the SEZ (Tetra Tech 2009). Of the 98 sites, 77 are prehistoric in
17 nature, 15 are historic, 4 are multi-component, and 2 are undetermined. The Desert Sunlight
18 Solar Farm Project is located in the western portion of the proposed Riverside East SEZ, about
19 6 mi (10 km) north of Desert Center. The archaeological survey and previously recorded sites
20 identified 87 sites in the Desert Solar APE, all of which also are present in the proposed
21 Riverside East SEZ. Of these 87 sites, 75 are historic, 5 are prehistoric, 1 is a multicomponent
22 site, and 2 are undetermined (BLM 2010g).

23
24 In addition to the solar energy fast-track projects, the Devers-Palo Verde II 500-kV
25 transmission line survey also served as a valuable source of information regarding archaeological
26 sites. This transmission line survey is located south and west of the Riverside East SEZ until it
27 intersects the southeastern portion of the SEZ (as it crosses I-10 near the Wiley Well Rest Area
28 to the area just west of the Palo Verde Mesa). This survey identified 78 archaeological sites—41
29 sites in the Riverside East SEZ, and 37 sites within 5 mi (8 km) of the SEZ. Fifty-nine of these
30 sites are prehistoric in nature, and the other 19 are historic (Carrico et al. 2005).

31
32 There are two dry lakebeds located in the area of the SEZ, Ford Dry Lake and Palen Dry
33 Lake, portions of which lie in the SEZ. During present times these lakes only hold water during
34 occasional flooding, but it is likely that during the Late Pleistocene and Early Holocene these
35 pluvial lakes were filled with water, providing a lacustrine environment upon which archaic
36 peoples were able to subsist. Lake Cahuilla was located west of the SEZ, and was assuredly
37 filled with water at times due to flooding episodes of the Colorado River and Early Pleistocene
38 pluvial actions; a plethora of sites have been documented along the shores of Ancient Lake
39 Cahuilla, dating from the Early Archaic to the Late Prehistoric period. Therefore, it is not
40 unreasonable to assume that Palen Dry Lake and Ford Dry Lake provided similar potential for
41 habitation and subsistence. Also associated with Lake Cahuilla is Obsidian Butte, a large source
42 of obsidian that became available for ancient peoples to exploit during receding periods of the
43 lake; this obsidian provided a valuable source of raw material for tool production.

44
45 In addition to Eagle Mountain Mine, located in the Eagle Mountains, mining activities
46 took place in the McCoy Mountains, the Little and Big Maria Mountains, and the Mule

1 Mountains. Other than Eagle Mountain Mine, most of these mines operated for only short
2 periods of time. In addition to these more established mines, there are some smaller prospecting
3 pits in the surrounding mountains.
4

5 There are several areas near the SEZ related to DTC/C-AMA activities, in addition to the
6 nearby camps mentioned in Section 9.4.17.1.3. One of these locations is the Desert Center Army
7 Airfield, consisting of two paved runways, taxi-ways, a parking apron, and 40 constructed
8 buildings that were demolished after DTC/C-AMA use. There is another location in the Midland-
9 Big Maria Mountain area, site CA-RIV-1172, that consists of rock features probably related to
10 defensive positions, rock walls, foxholes, dugouts, and cairns. This training area has been
11 recommended as NHRP eligible. North of the SEZ at Palen Pass, is the site of the largest
12 maneuver area in the DTC/C-AMA. This site consists of fortifications constructed throughout
13 the pass, gun emplacements, barbed wire entanglements, bunkers, minefields, and foxholes. The
14 best-preserved maneuver area, consisting of foxholes, associated refuse, concertina wire,
15 concrete defensive positions and tank tracks, is in the valley bordered by the Palen, Little Maria,
16 and McCoy Mountains, just outside the SEZ. A large minefield between the mountains and the
17 sand dunes to the east of the Coxcomb Mountains may be located within the SEZ. In addition,
18 small unit training exercises were held in the Chuckwalla Valley, as well as in the Midland and
19 Styxx Passes.
20

21 The BLM has designated several locations relatively close to the proposed Riverside East
22 SEZ as ACECs because of their significant cultural value. The ACECs contiguous with the SEZ
23 on the south are the Mule Mountains ACEC on the eastern end of the SEZ and the Alligator
24 Rock ACEC on the western end. The proposed SEZ surrounds the Palen Dry Lake ACEC on
25 three sides. Two other ACECs are located just 5 mi (8 km) from the proposed SEZ. These are the
26 Corn Springs ACEC to the south, which includes both historic and prehistoric resources, and the
27 Big Marias ACEC to the east. The latter includes a concentration of Native American cultural
28 resources including the Blythe Intaglios, prehistoric trails, and other archaeological sites.
29 Approximately 12 mi (19 km) to the north is the Patton's Iron Mountain Divisional Camp
30 ACEC, a site representing the importance of military history in the region (BLM 1999; 2008).
31
32

33 ***National Register of Historic Places*** 34

35 There are no historic properties listed in the NRHP within the SEZ; however, there are at
36 least six NRHP-listed sites located within 5 mi (8 km) of the SEZ: McCoy Spring
37 Archaeological Site, Corn Springs, the Gus Lederer Site, the North Chuckwalla Mountains
38 Petroglyph District, the North Chuckwalla Quarry District, and the Blythe Intaglios. Other sites
39 listed in the NRHP within the vicinity of the Riverside SEZ include archaeological sites CA-
40 RIV-504 and CA-RIV-773.
41

42 Camp Coxcomb, mentioned in Section 9.4.17.1.3 and CA-RIV-1172, are two DTC/C-
43 AMA-associated sites that have high integrity and substantial remains, suggesting that they are
44 eligible for listing in the NRHP. Several of the other camps and maneuver areas may be eligible
45 for NRHP inclusion; however, more research needs to be conducted to determine their eligibility.
46 Also considered potentially eligible is the Contractor's General Hospital, located north of Desert

1 Center near the Eagle Mountains. This was a hospital created by Dr. Sidney Garfield in service
2 to the workers on the CRA. Other potentially eligible sites in the vicinity of the SEZ include
3 Wiley's Well Road, an offshoot of the Bradshaw Trail used between 1862 and 1877, the Blythe-
4 Eagle Mountain 161-kV Transmission Line built in 1855, and the Blythe Intake Landmark 948.
5
6

7 **9.4.17.2 Impacts** 8

9 Direct impacts on significant cultural resources could occur in the proposed Riverside
10 East SEZ; however, as stated in Section 9.4.17.1, further investigation is needed in a number of
11 areas. A cultural resource survey of the entire APE of a proposed project would first need to be
12 conducted to identify archaeological sites, historic structures and features, and traditional cultural
13 properties, and an evaluation would need to follow to determine whether any are eligible for
14 listing in the NRHP. The Riverside East area was regularly traversed in prehistoric and
15 ethnohistoric times with trail networks ultimately connecting the Colorado River with Lake
16 Cahuilla and the Pacific Coast. Archaeological sites and traditional cultural properties are likely
17 abundant along these networks, and the trails themselves are considered important properties.
18 Activities associated with the WWII DTC were also prominent in the valley and physical
19 remnants of those activities are present within the SEZ. Possible impacts from solar energy
20 development on cultural resources that are encountered within the Riverside East SEZ or along
21 related ROWs, as well as general mitigation measures, are described in more detail in
22 Section 5.15. Impacts would be minimized through the implementation of required
23 programmatic design features described in Appendix A, Section A.2.2. Programmatic design
24 features assume that the necessary surveys, evaluations, and consultations will occur.
25

26 Programmatic design features to reduce water runoff and sedimentation would reduce the
27 likelihood of indirect impacts on cultural resources resulting from erosion outside of the SEZ
28 boundary (including along ROWs). Indirect impacts on cultural resources through vandalism or
29 theft are possible, given the large size of the SEZ and its accessibility, as well as its proximity to
30 several NRHP-listed historic properties, eligible archaeological sites, areas of significance to
31 Tribes and historic resources associated with the DTC/C-AMA.
32

33 No new access roads or transmission lines have been assessed for the proposed Riverside
34 East SEZ, assuming existing corridors would be used; impacts on cultural resources related to
35 the creation of new corridors would be evaluated at the project-specific level if new road or
36 transmission construction or line upgrades are to occur.
37

38 Because of the interconnectedness of the landscape in Native American cosmology, a
39 change in one part affects the whole, thus damage to one part of the sacred landscape would
40 affect the entire network. The proposed Riverside East SEZ includes the southern end of the
41 Salt Song Trail and a section of the northern branch of the Cocomaricopa Trail. Since visible
42 segments tend to follow the shoulders and tops of ridge systems, it is likely that they will not
43 be directly impacted by the development of solar facilities. However, Native Americans have
44 expressed concern over the visual impacts of development on segments of those trails that
45 have religious importance (Halmo 2003). Development that is visible from the trails may be
46 considered intrusive. The proposed Riverside East SEZ is not pristine wilderness. It is crossed

1 and bordered by a major interstate highway, and is scarred by tank tracks dating from WWII.
2 However, the construction of an extensive solar energy facility would very likely have more
3 visual impact on the landscape than already exists.
4

5 Native Americans have also expressed concern over other impacts likely to accompany
6 development (Halmo 2003). The presence of an industrial facility and the associated increase in
7 traffic and workers are likely to have a negative impact on the qualities that render a site sacred.
8 An increase in the number of people in the area would increase the potential for damage to
9 panels of rock art and the disturbance of burials and archaeological sites. While the development
10 of the Riverside East SEZ would necessarily increase the number of people coming to and
11 working in the SEZ, this impact should be greatest during the construction and decommissioning
12 phases of a facility. The operation of a solar facility would require fewer personnel
13 (see Section 9.4.19.2.2).
14
15

16 **9.4.17.3 SEZ-Specific Design Features and Design Feature Effectiveness** 17

18 Programmatic design features to mitigate adverse impacts on significant cultural
19 resources, such as avoidance of significant sites and features, cultural awareness training for the
20 workforce, and measures for addressing possible looting/vandalism issues through formalized
21 agreement documents, are provided in Appendix A, Section A.2.2.
22

23 SEZ-specific design features would be determined in consultation with the California
24 SHPO and affected Tribes. Consultation efforts should include discussions on significant
25 archaeological sites and traditional cultural properties and on sacred sites and trails, such as the
26 Salt Song Trail, within or with views of the proposed SEZ. SEZ-specific design features could
27 include the following:
28

- 29 • Significant resources clustered in specific areas, such as those in the vicinity
30 of Palen and Ford Dry Lakes, focused DTC/C-AMA activity areas that retain
31 sufficient integrity, and Native American trails evident in the desert pavement
32 should be avoided.
33
- 34 • Troops in training for WWII often used the same locations that Native
35 Americans did for similar purposes (CSRI 1987). Any excavation of historic
36 sites should take into consideration the potential for the co-location of
37 prehistoric and ethnohistoric components.
38

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1 **9.4.18 Native American Concerns**
2

3 As discussed in Section 9.4.17, many Native Americans tend to view their environment
4 holistically and share many environmental and socioeconomic concerns with other ethnic groups.
5 For a discussion of issues of possible Native American concern shared with the population as a
6 whole, several sections in this PEIS should be consulted. General topics of concern are addressed
7 in Section 4.16. Specifically for the proposed Riverside East SEZ, Section 9.4.17 discusses
8 archaeological sites, structures, landscapes, trails, and traditional cultural properties;
9 Section 9.4.8 discusses mineral resources; Section 9.4.9.1.3 discusses water rights and water use;
10 Section 9.4.10 discusses plant species; Section 9.4.11 discusses wildlife species, including
11 wildlife migration patterns; Section 9.4.13 discusses air quality; Section 9.4.14 discusses visual
12 resources; Sections 9.4.19 and 9.4.20 discuss socioeconomics and environmental justice,
13 respectively; and issues of human health and safety are discussed in Section 5.21. This section
14 focuses on concerns that are specific to Native Americans and to which Native Americans bring
15 a distinct perspective.
16

17 The NAHC has been consulted to determine which Tribes have a traditional association
18 with the California SEZs (Singleton 2010). All federally recognized Tribes with traditional ties
19 to the proposed Riverside East SEZ have been contacted so that they could identify their
20 concerns regarding solar energy development. Because Tribal land claims are overlapping and
21 because conflicts among the Tribes and with Euro-Americans resulted in the dispersal of many
22 of the original land occupants, contacts have been initiated over a wide area with Tribes that
23 could include descendants of the indigenous inhabitants of the area. Table 9.4.18-1 lists the
24 Tribes contacted with traditional ties to the SEZs in southeastern California. Appendix K lists all
25 federally recognized Tribes contacted for this PEIS.
26

27 The concerns of Native Americans, including the Serrano, Cahuilla, Quechan,
28 Mohave and Chemehuevi, over other energy development projects in the region also have been
29 documented and are summarized in the next section. These comments provide important insights
30 into their concerns over energy development in the area.
31
32

33 **9.4.18.1 Affected Environment**
34

35 As discussed in Section 9.4.17.1.2, the territorial boundaries of the Tribes who inhabited
36 the Colorado Desert appear to have been fluid over time. At times they overlapped, and
37 resources were shared where abundant. The Riverside East SEZ may well have been an
38 intermittent joint use area (Knack 1981), lying between the home ranges of the Tribes in the
39 region, but occasionally used by all. The Tribal Traditional Use Area boundaries considered here
40 are those presented by the Tribes themselves to the Indian Claims Commission in the 1950s.
41 While the commission recognized the individual claims for the Chemehuevi, Mohave, and
42 Quechan, most of California, including much of the southeastern part of the state, was judged to
43 be the common territory of the “Indians of California” and is so shown on maps of judicially
44 established Native American land claims (Royster 2008). This category was created by Congress
45 to accommodate the claims of California Native Americans who had lost their identities as

TABLE 9.4.18-1 Federally Recognized Tribes with Traditional Ties to the Southeastern California SEZs

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Cabazon Band of Cahuilla Mission Indians	Indio	California
Cahuilla Band of Mission Indians	Anza	California
Campo Kumeyaay Nation	Campo	California
Chemehuevi Indian Tribe	Havasu Lake	California
Colorado River Indian Tribes	Parker	Arizona
Ewiiapaayp Band of Kumeyaay Indians	Alpine	California
Fort Mojave Indian Tribe	Needles	California
La Posta Band of Kumeyaay Indians	Boulevard	California
Los Coyotes Band of Cahuilla & Cupeno Indians	Warm Springs	California
Manzanita Band of Kumeyaay Indians	Boulevard	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
Salt River Pima-Maricopa Indian Community	Scottsdale	Arizona
San Manuel Band of Mission Indians	Patton	California
Soboba Band of Luiseño Indians	San Jacinto	California
Sycuan Band of the Kumeyaay Nation	El Cajon	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twentynine Palms Band of Mission Indians	Coachella	California
Viejas Band of Kumeyaay Indians	Alpine	California

1
2
3 distinct tribes, bands, or villages due to the arrival and policies of Euro-Americans (Indian
4 Claims Commission 1958). The claims of the Serrano and Cahuilla, and much of the land
5 claimed by the Mohave and Quechan, lie within the Indians of California territory, but were also
6 presented individually to the commission. In their claims, Tribes appear to have often taken into
7 consideration the claims made by neighboring Tribes. The Mohave submitted two claims. One
8 claim, accepted by the commission, was restricted to areas along the Colorado River, the other,
9 reflecting their view that they were the original inhabitants of southeastern California and all
10 others latecomers, includes much of Chemehuevi and Indians of California territory also claimed
11 by the Serrano and the Cahuilla (Indian Claims Commission 1958; CSRI 2002). The next section
12 presents territorial claims relevant to the Riverside East SEZ.

13
14
15 **9.4.18.1.1 Territorial Boundaries**

16
17
18 **Serrano**

19
20 Although the primary traditional homeland of the Serrano appears to have been the
21 San Bernardino Mountains west of the SEZ, the Serrano claim includes most of the Riverside
22 East SEZ north of I-10. Their claim extends from Cadiz, California, southeast to a point in the
23 Big Marias 12 mi (19 km) west of the Colorado River, then parallels the Colorado River

1 southward to a point 12 mi (19 km) due west of Blythe and extends westward to Hayfield
2 Reservoir on the CRA. The Halchidhoma Trail appears to have formed the southern boundary of
3 their claim in this part of the desert (CSRI 2002). Serrano descendants live primarily on the
4 Morongo and San Manuel Reservations, where they have mixed with the Cahuilla.

7 **Cahuilla**

8
9 The Coachella Valley, southwest of the Riverside East SEZ, lies at the heart of Cahuilla
10 territory, southwest of the Riverside East SEZ. However, the northern boundary of their claim
11 matches the southern boundary of the Serrano. It extends eastward to a point 12 mi (19 km) west
12 of Blythe then southward paralleling the Colorado River to a point 3 mi (5 km) south of the
13 Riverside County line. It thus includes much of the southern portion of Chuckwalla Valley and
14 the southeastern lobe of the SEZ (CRSI 2002). Cahuilla descendants may be found on several
15 small reservations in Southern California.

17 18 **Quechan**

19
20 While the heart of Quechan territory lies at the confluence of the Gila and Colorado
21 Rivers, well to the south of the SEZ, they have in the past occupied the banks of the Colorado
22 River as far north as Blythe. Their territorial claim includes the eastern half of the SEZ. As
23 presented to the Indian Claims Commission, their eastern boundary extended along the crest of
24 the mountains east of the Colorado River as far north as Blythe, where it jogs westward to the
25 channel of the Colorado River, following the channel northward to a point just north of the
26 Riverside Mountains. It thus includes much of the *Xam Kwatcan* Trail. From the Riverside
27 Mountains it extends southwest to the Little Maria Mountains, then south to the McCoy
28 Mountains and southwest to the Chuckwalla Mountains (Indian Claims Commission 1958). The
29 claim overlaps with those of the Cahuilla, Serrano, and Mohave. Quechan descendants occupy
30 the Fort Yuma Indian Reservation in Arizona and California.

31 32 33 **Mohave**

34
35 The territory claimed by the Mohave lies primarily to the east of the SEZ. They claimed
36 lands on both banks of the Colorado River to the crests of the mountains as far south as Blythe
37 and inland north of a line extending from the Whipple Mountains to the Turtle, the Granite
38 Mountains, the Eagle Mountains, and the San Bernardino Mountains, thus skirting the basins
39 where the SEZ is located (CSRI 2002). Mohave descendants occupy the Fort Mojave Indian
40 Reservation near Needles, California, and may be found on the reservation of the Colorado River
41 Indian Tribes.

1 **Chemehuevi**

2
3 The Chemehuevi were northern neighbors. Their territorial claims extend only as far south
4 as the Granite Mountains and the Little and Big Maria Mountains. As neighbors they are likely
5 to have traversed this joint-use zone as well (CSRI 2002). Chemehuevi descendants occupy the
6 Chemehuevi Reservation and share the Colorado River Indian Tribes Reservation with the
7 Mohave and other Tribes.
8

9
10 **Halchidhoma**

11
12 The Halchidhoma were forced off their lands along the Colorado River by neighboring
13 Tribes in about 1827, before the United States acquired the area from Mexico. They probably
14 occupied territory around Blythe similar in extent to that claimed by the Mohave in that area.
15 Their descendants have been integrated into the Maricopa Tribe and may be found on the
16 Salt River Pima-Maricopa Indian Reservation in Arizona (Harwell and Kelly 1983).
17

18
19 **9.4.18.1.2 Plant Resources**

20
21 Native Americans tend to view the whole of the landscape as imbued with a lifeforce,
22 including features and objects viewed by Euro-American cultures as inanimate. The importance
23 of landscapes, geophysical features, trails, rock art, and archaeological sites is discussed in
24 Section 9.4.17. To the extent that they are religiously significant, it is important to the Tribes that
25 they retain access to such features located on federal land as required by AIRFA. This section
26 focuses on other Native American concerns, including those that have ecological as well as
27 cultural components. For many Native Americans, the taking of game or the gathering of plants
28 or other natural resources may have been seen as both a sacred and secular act
29 (Stoffle et al. 1990).
30

31 The traditional Native American subsistence base in the Colorado Desert was a mixture
32 of floodplain agriculture and hunting and gathering. The proportion of farming to gathering
33 varied with the Tribe and the land they occupied. The Riverside East SEZ does not lie within the
34 heartland of any Tribe and is likely to have been used for hunting and gathering, as the campsites
35 and agave roasting pits found throughout Chuckwalla Valley attest. Traditionally, Native
36 American Tribes in the Colorado Desert practiced a seasonal round in harvesting naturally
37 occurring plant resources. For example, agave heads are harvested in early spring, mesquite
38 produced a summer crop, and fall might include harvests of pine nuts or acorns at higher
39 elevations (Lightfoot and Parish 2009). Proximity to valuable plant resources and water were
40 important factors in determining where Native Americans chose to build their villages and
41 camps. Native Americans commenting on nearby development projects have voiced concern
42 over the loss of culturally important plants used for food, medicine, and ritual purposes and for
43 making tools, implements, and structures. The plant communities observed or likely to be present
44 at the Riverside East SEZ are discussed in Section 9.4.10. Most of the valley bottoms support a
45 combination of Sonora-Mojave Creosotebush-White Bursage Desert Scrub, and North American
46 Warm Desert Wash plant communities. There are some areas of North American Warm Desert

1 Pavement near Palen Dry Lake, while Ford Dry Lake is classified as North American Warm
 2 Desert Playa. There are a few areas of North American Warm Desert Active and Stabilized Dune
 3 (NatureServe 2008). While these communities appear sparse most of the year, seasonal rains
 4 often result in an explosion of ephemeral herbaceous species. Native Americans commenting on
 5 the area for a previous project found that vegetation more luxuriant on the western end of the
 6 Chuckwalla Basin and more likely to attract game (CSRI 1987).

7
 8 Native American populations have traditionally made use of hundreds of native plants.
 9 Table 9.4.18.1-1 lists plants often mentioned as important by Native Americans that were either
 10 observed at the Riverside East SEZ or are possible members of the cover-type plant communities
 11
 12

TABLE 9.4.18.1-1 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Riverside East SEZ

Common Name	Scientific Name	Status
Food		
Beavertail prickly pear cactus	<i>Opuntia basilaris</i>	Possible
Buckwheat	<i>Eriogonum</i> spp.	Possible
Cat claw	<i>Acacia greggii</i>	Possible
Cholla cactus	<i>Cylindropuntia</i> spp.	Observed
Desert almond	<i>Prunus fasciculatum</i>	Possible
Honey mesquite	<i>Prosopis glandolosa</i>	Observed
Palo Verde	<i>Cercidium floridum</i>	Observed
Saltbush	<i>Atriplex</i> spp.	Possible
Smoke tree/indigo bush	<i>Psoralea argophylla</i>	Observed
Sumac	<i>Rhus</i> spp.	Possible
Medicine		
Creosotebush	<i>Larrea tridentata</i>	Observed
Greasewood	<i>Sarcobatus vermiculatus</i>	Possible
Mormon tea	<i>Ephedra nevadensis</i>	Possible
Sagebrush	<i>Artemisia</i> spp.	Possible
Ritual		
Ironwood	<i>Olneya tesota</i>	Observed
Raw Material		
Desert-willow	<i>Chilopsis linaeris</i>	Observed
Unspecified		
Boxthorn	<i>Lycium</i> sp.	Possible
Brittlebush	<i>Opuntia</i> sp.	Observed
Burrowbush	<i>Ambrosia dumosa</i>	Observed
Cheesebush	<i>Hymenoclea salsola</i>	Observed
Ocotillo	<i>Fouquieria splendens</i>	Possible

Sources: Field visit; Lightfoot and Parish (2009); and NatureServe (2008).

1 identified in the SEZ. The plants are grouped by use category, but a plant is not necessarily
2 confined to one use. These plants are the dominant species; however, other plants important to
3 Native Americans could occur in the SEZ, depending on localized conditions and the season.
4 Overall, creosotebush dominates the SEZ, while ironwood and mesquite occur in the washes.
5 Mesquite was among the most important food plants. Its long, bean-like pods were harvested in
6 the summer, could be stored, and were widely traded. Groves were managed by burning. Its
7 blossoms are edible, and the cicadas and grasshoppers that live in the groves were collected and
8 eaten by the Cahuilla. Mesquite trunks served as a source of wood, fiber from its inner bark was
9 made into string, its thorns were used for tattooing, and its gum was used as an adhesive, a
10 cleansing agent, and medicine. Saltbush and buckwheat seeds were harvested, processed, and
11 eaten (Lightfoot and Parish 2009).

12
13 The proposed Riverside East SEZ includes other plants useful to Native Americans.
14 The leaves of the dominant creosotebush were widely made into tea for medicinal purposes.
15 The trunks of greasewood were used in construction, while its leaves and branches were used
16 in curing, as was a tea made from *Ephedra viridis*, or Mormon tea. Desert-willow was used in
17 house construction and for making bows (Lightfoot and Parish 2009), while ironwood was
18 considered sacred by the Cahuilla (Bean et al. 1978).

21 **9.4.18.1.3 Other Resources**

22
23 The proposed Riverside East SEZ may also have been a hunting ground. The mountains
24 surrounding the SEZ provide habitat for the reclusive burro deer, a desert-adapted variety of
25 mule deer, and desert bighorn sheep. Traditionally, deer have been an important source of both
26 food and materials, such as bone, sinew, and hide, used to make a variety of implements. Scat
27 and tracks of both burrow deer and bighorn sheep have been observed seasonally within the
28 SEZ (Chaney-Davis et al. 2010). While big game was highly prized, smaller animals such as
29 black-tailed jackrabbits and desert cottontail, both present in the SEZ, traditionally provided
30 a larger proportion of the protein in Native American diets and were an important source for
31 making blankets and clothing (Lightfoot and Parrish 2009). Animals traditionally hunted by
32 Native Americans are listed in Table 9.4.18.1-2.

33
34 Mineral resources important to Native Americans in the Colorado Desert include clay
35 suitable for making pottery, stone suitable for the manufacture of both cutting and grinding tools,
36 hematite for pigment, and quartz crystals considered to have healing properties (Halmo 2003).
37 The dry lakebeds may have served as a source of clay, while quartz crystals have been recorded
38 during cultural resource surveys in the area (Eckhardt and Wilson 2009).

39
40 As long-time desert dwellers, Native Americans have a great appreciation for the
41 importance of water in a desert environment. They have expressed concern over the use and
42 availability of water for solar energy installations (Halmo 2003; Jackson 2009). One of the main
43 concerns over past industrial projects planned for the region was the contamination of ground
44 water, which they see as ultimately flowing to the Colorado River and affecting the basin as a
45 whole (CSRI 1987).

TABLE 9.4.18.1-2 Animal Species Used by Native Americans Whose Range Includes the Proposed Riverside East SEZ

Common Name	Scientific Name	Status
Mammals		
Badger	<i>Taxidea taxus</i>	All year
Bighorn sheep	<i>Ovis canadensis</i>	All year
Black-tailed jackrabbit	<i>Lepus californicus</i>	All year
Bobcat	<i>Lynx rufus</i>	All year
Coyote	<i>Canis latrans</i>	All year
Desert cottontail	<i>Silvilagus audubonii</i>	All year
Mule deer	<i>Odocoileus hemionus</i>	Seasonally
Squirrel	<i>Spermophilus</i> sp. and <i>Ammospermophilus</i> sp.	All year
Wood rat	<i>Neotoma</i> spp.	All year
Birds		
Gambel's quail	<i>Callipepla gambelii</i>	All year
Doves		
White-winged dove	<i>Zenaida asiatica</i>	Summer
Mourning dove	<i>Zenaida macroura</i>	All year
Reptiles		
Desert tortoise	<i>Gopherus agassizii</i>	All year
Rattlesnake	<i>Crotalus</i> spp.	All year

Sources: Lightfoot and Parrish (2009); Fowler (1986); Stewart (1983).

1
2
3 Some Tribes share with the populace as a whole concerns over potential danger from
4 electromagnetic fields. In traditional Cahuilla culture, electricity, both natural (lightning) and
5 artificially generated, is considered dangerous and something to be avoided (Bean et al. 1978).
6 They may have concerns over a facility that produces electricity and its associated transmission
7 system.
8

9 In addition, Native Americans have expressed concern over ecological segmentation, that
10 is, development that fragments animal habitat and does not provide corridors for movement.
11 They would prefer solar energy development take place on land that has already been disturbed,
12 such as abandoned farmland, rather than on undisturbed ground (Jackson 2009).
13

14 **9.4.18.2 Impacts**

15
16
17 To date, no comments have been received from the Tribes specifically referencing the
18 proposed Riverside East SEZ. However, the Soboba Band of Luiseño Indians, based on their
19 traditional ties to the Cahuilla, find some of the California SEZs to be within their Tribal
20 Traditional Use Area and consider part of the area to be highly sensitive (Ontiveros 2010). The
21 Agua Caliente Band of Cahuilla Indians, commenting on the fast-track solar facilities proposed
22 for within the SEZ, considers much of the proposed Riverside East SEZ to be within their

1 Traditional Use Area. They are concerned about adverse effects on historical resources including
2 traditional cultural places, sacred places, gathering places, trails, and their associated cultural
3 landscapes (Garcia-Tuck 2010). In a response letter, the Quechan Indian Tribe of Fort Yuma
4 indicates that some of the SEZs lie within their Tribal Traditional Use Area. They stress the
5 importance of evaluating impacts on landscapes as a whole. Because trails have both physical
6 and spiritual components, from their perspective the intrusion of industrial development nearby
7 would have negative effects on trails (Jackson 2009).
8

9 In the past, the Chemehuevi have expressed concerns over the Salt Song Trail, which
10 passes down Palen Valley and through the SEZ (Ridder 1998; Halmo 2003), as has the NALC,
11 an inter-tribal organization (Russo 2009). Even if solar energy development within the western
12 portions of the SEZ avoids the trail, facilities would be visible from the trail and would present a
13 visual intrusion.
14

15 The impacts that would be expected from solar energy development within the proposed
16 Riverside East SEZ on resources important to Native Americans fall into two major categories:
17 impacts on the landscape and impacts on discrete localized resources.
18

19 Potential landscape-scale impacts are those caused by the presence of an industrial
20 facility within a sacred landscape that includes sacred mountains and other geophysical features
21 tied together by a network of culturally important trails. Impacts may be visual—the intrusion of
22 an industrial feature in sacred space; audible—noise from the construction, operation, or
23 decommissioning of a facility detracting from the traditional cultural values of the site; or
24 demographic—the presence of a larger number of outsiders in the area that would increase the
25 chance that the sacredness of the area would be degraded by more foot and motorized traffic. As
26 consultation with the Tribes continues and project-specific analyses are undertaken, it is possible
27 that Native Americans will express concerns over potential visual and noise effects of solar
28 energy development within the SEZ on the landscape, such as on the Big Maria, Coxcomb, and
29 Eagle Mountains, physical features such as Alligator Rock and Black Rock, on the Salt Song
30 Trail, and on shrines and sacred places (see also Section 9.4.17).
31

32 Localized effects could occur both within the SEZ and in adjacent areas. Within the
33 SEZ these effects would include destroying or degrading important plant resources, destroying
34 the habitat of and impeding the movement of culturally important animal species, destroying
35 archaeological sites and burials, and degrading or destroying trails and sacred places. Known
36 resources of this type are scattered throughout the SEZ. Any ground-disturbing activity
37 associated with the development within the SEZ has the potential for destruction of localized
38 resources. Since solar energy facilities cover large tracts of ground, even taking into account the
39 implementation of programmatic design features, it is unlikely that avoidance of all resources
40 would be possible. Programmatic design features (see Appendix A, Section A.2.2) assume that
41 the necessary cultural surveys, site evaluations, and Tribal consultations will occur.
42

43 Implementation of programmatic design features, as discussed in Appendix A,
44 Section A.2.2, should eliminate impacts on Tribes' reserved water rights and the potential for
45 groundwater contamination issues.
46

1 Whether there are any issues relative to socioeconomics, environmental justice, or health
2 and safety relative to Native American populations is yet to be determined.

3 4 5 **9.4.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

6
7 Programmatic design features to mitigate impacts of potential concern to Native
8 Americans, such as avoidance of sacred sites, water sources, and tribally important plant and
9 animal species, are provided in Appendix A, Section A.2.2.

10
11 The development of solar energy facilities in the state of California requires developers to
12 follow CEC guidelines for interacting with Native American in addition to federal requirements
13 (CEC 2009c). Developers must obtain information from California’s NAHC on the presence of
14 Native American sacred sites in the project vicinity and a list of Native Americans who want to
15 be contacted about proposed projects in the region. Table 9.4.18.3-1 lists the tribes recommended
16 for contact by the NAHC.

17
18 The need for and nature of SEZ-specific design features regarding potential issues of
19 concern would be determined during government-to-government consultation with affected
20 Tribes.

21
22 The Agua Caliente consider the cumulative effects of the development of solar energy
23 facilities in and around the SEZ on Tribally important resources to be “immeasurable and
24 unmitigable” and wishes to be involved in the process of determining project significance
25 (Garcia-Tuck 2010).

26
27
**TABLE 9.4.18.3-1 Federally Recognized Tribes Listed by the NAHC to
Contact Regarding the Riverside East SEZ**

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Chemehuevi Indian Tribe	Havasus Lake	California
Colorado River Indian Tribes	Parker	Arizona
Cocopah Indian Tribe	Somerton	Arizona
Fort Mojave Indian Tribe	Needles	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
San Manuel Band of Mission Indians	Patton	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twentynine Palms Band of Mission Indians	Coachella	California

Source: Singleton (2010).

1 The Quechan Tribe and the Soboba Band of Luiseño Indians have requested that they be
 2 consulted at the inception of any solar energy project that would affect resources important to
 3 them. The Quechan also suggest that the clustering of large solar energy facilities be avoided,
 4 that priority for development be given to lands that have already been disturbed by agricultural
 5 or military use, and that the feasibility of placing solar collectors on existing structures be
 6 considered, thus minimizing or avoiding the use of undisturbed land (Jackson 2009).

7
 8 The BLM has actively sought the participation of the Tribes of southeastern California in
 9 identifying cultural resources important to Native Americans that would be adversely affected by
 10 the construction and operation of three fast-track solar facilities that lie within the SEZ. Tribes
 11 have participated in the development of programmatic agreements for each of the proposed
 12 Blythe, Genesis, and Palen facilities (see Table 9.4.18.3-2). Under the terms of these agreements,
 13 the Tribes are afforded the opportunity to review and comment on BLM’s findings of effect on
 14 cultural resources important to the Tribes and participate in the development of Historic
 15 Properties Treatment Plans, Historic Properties Management Plans, and monitoring and
 16 discovery plans in order to ensure the resolution of identified adverse effects on cultural
 17 properties important to the Tribes through avoidance, minimization, or mitigation. These plans
 18 will include provisions for Tribal cultural specialists to monitor the construction and operation of
 19 the facilities for adverse effects on cultural properties (BLM and CA SHPO 2010a–c).

20
 21 Mitigation of impacts on archaeological sites and traditional cultural properties is
 22 discussed in Section 9.4.17.3, in addition to programmatic design features for historic properties
 23 discussed in Appendix A, Section A.2.2.

24
 25 **TABLE 9.4.18.3-2 Federally Recognized Tribes Invited to Concur on Programmatic Agreements for the Fast-Track Solar Energy Projects within the Proposed Riverside East SEZ**

Tribe	Blythe	Genesis	Palen
Agua Caliente Band of Cahuilla Indians	×	×	×
Augustine Band of Mission Indians	×	×	×
Cabazon Band of Mission Indians	×	×	-
Chemehuevi Indian Tribe	×	×	×
Cocopah Indian Tribe	×	×	-
Colorado River Indian Tribes	×	×	×
Fort Mojave Indian Tribe	×	×	×
Morongo Band of Mission Indians	×	×	×
Quechan Indian Tribe of the Fort Yuma Reservation	×	×	×
Ramona Band of Mission Indians	-	×	×
San Manuel Band of Mission Indians	×	×	×
Soboba Band of Luiseño Indians	-	×	-
Torres-Martinez Desert Cahuilla Indians	×	×	×
Twenty-nine Palms Band of Mission Indians	×	×	×

Source: BLM and California SHPO (2010a–c).

26
 27

1 **9.4.19 Socioeconomics**

2
3
4 **9.4.19.1 Affected Environment**

5
6 This section describes current socioeconomic conditions and local community services
7 within the ROI surrounding the proposed Riverside East SEZ. The ROI is a one-county area
8 consisting of Riverside County in California. It encompasses the area in which workers are
9 expected to spend most of their salaries and in which a portion of site purchases and nonpayroll
10 expenditures from the construction, operation, and decommissioning phases of the proposed SEZ
11 facility are expected to take place.
12

13
14 **9.4.19.1.1 ROI Employment**

15
16 In 2008, employment in the ROI stood at 839,878 (Table 9.4.19.1-1). Over the period
17 1999 to 2008, the annual average employment growth rate in Riverside County was 2.5%,
18 slightly higher than the average rate for California (0.9%).
19

20 In 2006, the service sector provided the highest percentage of employment in the
21 ROI at 44.3%, followed by wholesale and retail trade with 20.4 % (Table 9.4.19.1-2). Smaller
22 employment shares were held by construction (13.8%) and manufacturing (9.9%).
23

24
25 **9.4.19.1.2 ROI Unemployment**

26
27 Over the period 1999 to 2008, the average rate in Riverside County was 6.0%, slightly
28 higher than the average rate for California (5.8%) (Table 9.4.19.1-3). The unemployment rate for
29 the first 10 months of 2009 (13.8%), contrasts with the rate for 2008 as a whole (8.6%). The
30 average rate for California as a whole (11.6%) was also higher during this period than the
31 corresponding average rates for 2008.
32
33

**TABLE 9.4.19.1-1 ROI Employment in the Proposed
Riverside East SEZ**

Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Riverside County	653,552	839,878	2.5
California	15,566,900	17,059,574	0.9

Sources: U.S Department of Labor (2009a,b).

TABLE 9.4.19.1-2 ROI Employment in the Proposed Riverside East SEZ, by Sector, 2006^a

Industry	Riverside County	% of Total
Agriculture ^a	17,064	3.0
Mining	505	0.1
Construction	78,556	13.8
Manufacturing	56,582	9.9
Transportation and public utilities	21,835	3.8
Wholesale and retail trade	116,343	20.4
Finance, insurance, and real estate	26,964	4.7
Services	252,847	44.3
Other	89	0.0
Total	570,468	

^a Agricultural employment includes 2007 data for hired farmworkers.

Sources: U.S. Bureau of the Census (2009a); USDA (2009).

TABLE 9.4.19.1-3 ROI Unemployment Rates (%) for the Proposed Riverside East SEZ

Location	1999–2008	2008	2009 ^a
Riverside County	6.0%	8.6%	13.8%
California	5.8%	7.2%	11.6%

^a Rates for 2009 are the average for January through May.

Sources: U.S. Department of Labor (2009a–c).

9.4.19.1.3 ROI Urban Population

The population of Riverside County in 2006 to 2008 was 68% urban, with the majority of urban areas located in the western portion of the county. The largest urban area, Riverside, had an estimated 2008 population of 293,207; other large cities in the western portion of the county include Moreno Valley (188,676) and Corona (148,336) (Table 9.4.19.1-4). In addition, there are eight cities in the county with a 2008 population between 50,000 and 99,999 persons. The

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TABLE 9.4.19.1-4 ROI Urban Population and Income for the Proposed Riverside East SEZ

City	Population			Median Household Income (\$ 2008)		
	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	1999	2006–2008	Average Annual Growth Rate, 1999 and 2006–2008 (%) ^a
Riverside	255,166	293,207	1.8	53,620	56,805	0.6
Moreno Valley	142,381	188,676	3.6	61,101	55,178	-1.1
Corona	124,966	148,336	2.2	76,755	78,120	0.2
Murietta	44,282	97,935	10.4	78,424	79,135	0.1
Temecula	57,716	95,853	6.5	76,628	77,394	0.1
Indio	49,116	83,475	6.9	44,579	53,824	2.1
Hemet	58,812	70,821	2.3	34,556	34,974	0.1
Perris	36,189	55,150	5.4	45,774	53,442	1.7
Cathedral City	42,647	51,790	2.5	50,068	42,026	-1.9
Palm Desert	41,155	50,490	2.6	62,208	55,218	-1.3
Lake Elsinore	28,928	50,490	7.1	53,926	58,496	0.9
La Quinta	23,694	43,229	7.8	70,237	78,898	1.3
Coachella	22,724	39,014	7.0	36,810	40,463	1.1
San Jacinto	23,779	37,475	5.9	39,433	47,127	2.0
Norco	24,157	26,455	1.1	80,537	78,141	-0.3
Desert Hot Springs	16,582	23,996	4.7	33,459	38,465	1.6
Blythe	12,155	21,650	7.5	45,480	37,937	-2.0
Rancho Mirage	13,249	16,651	2.9	77,027	NA ^b	NA
Canyon Lake	9,952	11,064	1.3	90,263	NA	NA
Calimesa	7,139	7,478	0.6	48,731	NA	NA
Indian Wells	3,816	5,113	3.7	121,008	NA	NA

^a Data are averages for the period 2006 to 2008.

^b NA = data not available.

Source: U.S. Bureau of the Census (2009b–d).

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majority of these cities are part of the larger urban region that includes Los Angeles, Riverside and San Bernardino, and most are more than 100 mi (161 km) from the site of the proposed SEZ.

Population growth rates among the larger cities in the western part of the county have varied over the period 2000 and 2008. Murietta grew at an annual rate of 10.4% during this period; higher than average growth was also experienced in Lake Elsinore (7.1%), Temecula (6.5%) and San Jacinto (5.9%). The cities of Hemet (2.3%), Corona (2.2%), Riverside (1.8%) all experienced lower growth rates between 2000 and 2008.

1 A smaller group of cities is about 70 mi (113 km) from the SEZ site, including Indio
2 (83,475), Cathedral City (51,790), Palm Desert (50,490), Coachella (39,014), La Quinta
3 (43,229), and Desert Hot Springs (23,996). Population growth in these cities between 2000 and
4 2008 has been relatively high: La Quinta (7.8%), Coachella (7.0%), Indio (6.9%), and Desert Hot
5 Springs (4.7%). One city, Blythe (21,650), is located on the eastern border of the county, on the
6 Colorado River, less than 10 mi (16 km) from the proposed SEZ location, and had a relatively
7 high population growth rate (7.5%) between 2000 and 2008.

8 9 10 **9.4.19.1.4 ROI Urban Income**

11
12 Median household incomes varied considerably across cities in the county. A number
13 of cities in the western San Bernardino County—Murietta (\$79,135), Norco (\$78,141), and
14 Temecula (\$77,394)—had median incomes in 2006-2008 that were higher than the average for
15 the state (\$61,154) (Table 9.4.19.1-4). A number of cities in the western portion of the county
16 had relatively low median household incomes, notably, Hemet (\$34,974) and San Jacinto
17 (\$47,127).

18
19 Among the cities in the western part of the county, median income growth rates between
20 1999 and 2006 to 2008 were highest in San Jacinto (2.0%) and Perris (1.7%), with annual growth
21 rates of less than 1% elsewhere. Moreno Valley (-1.1%) and Norco (-0.3%) had negative growth
22 rates between 1999 and 2006 to 2008. The average median household income growth rate for the
23 state as a whole over this period was less than 0.1%.

24
25 Elsewhere in the county, La Quinta (\$78,898) had a median household income higher
26 than the state average between 2006 and 2008, while other cities—Palm Desert (\$55,218), Indio
27 (\$53,824), Cathedral City (\$42,026), Coachella (\$40,463), and Desert Hot Springs (\$38,465)—
28 had median incomes less than the state average. The median income in Blythe in 2006 to 2008
29 was \$37,937. Growth rates in these cities over the period 1999 and 2006–2008 varied from 2.1%
30 in Indio to -2.0% in Blythe.

31 32 33 **9.4.19.1.5 ROI Population**

34
35 Table 9.4.19.1-5 presents recent and projected populations in Riverside County and in
36 the state as a whole. Population in the county stood at 2,087,917 in 2008, having grown at an
37 average annual rate of 3.8% since 2000. Population growth in the county was higher than that
38 for California (1.5%) over the same period. The county population is expected to increase to
39 2,965,113 by 2021 and to 3,085,643 by 2023.

40 41 42 **9.4.19.1.6 ROI Income**

43
44 Total personal income in Riverside County stood at \$63.1 billion in 2007 and has grown
45 at an annual average rate of 4.1% over the period 1998 to 2007 (Table 9.4.19.1-6). Per-capita

TABLE 9.4.19.1-5 ROI Population for the Proposed Riverside East SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Riverside County	1,559,039	2,087,917	3.8	2,965,113	3,085,643
California	33,871,648	38,129,628	1.5	44,646,420	45,667,413

Sources: U.S. Bureau of the Census (2009e,f); California Department of Finance (2010).

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TABLE 9.4.19.1-6 ROI Personal Income for the Proposed Riverside East SEZ

Location	1998	2007	Average Annual Growth Rate, 1998–2007 (%)
Riverside County			
Total income ^a	42.2	63.1	4.1
Per-capita income	28,886	30,713	0.6
California			
Total income ^a	1,231.7	1,573.6	2.5
Per-capita income	37,339	41,821	1.1

^a Unless indicated otherwise, values are reported in \$ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of Census (2009e,f).

3

4

5 income in the county also rose over the same period at a rate of 0.6%, increasing from \$28,886 to
6 \$30,713. The personal income growth rate in the county was higher than the state rate (2.5%),
7 but the per-capita income growth rate was slightly lower in the ROI than for California as a
8 whole (1.1%).

9

10 Median household income in the ROI stood at \$58,168 in Riverside County (U.S. Bureau
11 of the Census 2009d).

12

13

14

1 **9.4.19.1.7 ROI Housing**
2

3 In 2007, more than 754,415 housing units were located in Riverside County
4 (Table 9.4.19.1-7). Owner-occupied units accounted for approximately 69% of the occupied
5 units in the two counties, with rental housing making up 31% of the total. Vacancy rates in 2007
6 were 14.2% in Riverside County, and 6.5% of housing units in Riverside County were used for
7 seasonal or recreational purposes. With an overall vacancy rate of 14.2% in the county, there
8 were 106,972 vacant housing units in 2007, of which 33,280 are estimated to be rental units that
9 would be available to construction workers. There were 38,208 seasonal, recreational, or
10 occasional-use units vacant at the time of the 2000 Census.

11
12 Housing stock in Riverside County grew at an annual rate of 3.7% over the period
13 2000 to 2007, with 169,741 new units added to the existing housing stock (Table 9.4.19.1-7).

14
15 The median value of owner-occupied housing in Riverside County in 2006–2008 was
16 \$380,600 (U.S. Bureau of the Census 2009g).

17
18
19 **9.4.19.1.8 ROI Local Government Organizations**
20

21 The various local and county government organizations in Riverside County are listed in
22 Table 9.4.19.1-8. In addition, there are 11 tribal governments located in the county; members of
23 other tribal groups are located in the state, but their tribal governments are located in adjacent
24 states.

25
26
27 **9.4.19.1.9 ROI Community and Social Services**
28

29 This section describes educational, health care, law enforcement, and firefighting
30 resources in the ROI.
31
32

**TABLE 9.4.19.1-7 ROI Housing Characteristics
for the Proposed Riverside East SEZ**

Parameter	2000	2007
Riverside County		
Owner-occupied	348,532	446,017
Rental	157,686	201,426
Vacant units	78,456	106,972
Seasonal and recreational use	38,208	NA ^a
Total units	584,674	754,415

^a NA = data not available.

Sources: U.S. Bureau of the Census (2009h,i).

TABLE 9.4.19.1-8 ROI Local Government Organizations and Social Institutions for the Proposed Riverside East SEZ

Governments	
<i>City</i>	
Blythe	Lake Elsinore
Calimesa	Moreno Valley
Canyon Lake	Murietta
Cathedral City	Norco
Coachella	Palm Desert
Corona	Perris
Desert Hot Springs	Rancho Mirage
Hemet	Riverside
Indian Wells	San Jacinto
Indio	Temecula
La Quinta	
 <i>County</i>	
Riverside County	
 <i>Tribal</i>	
Agua Caliente Band of Cahuilla Indians of the Agua Caliente Indian Reservation, California	
Augustine Band of Cahuilla Mission Indians of the Augustine Reservation, California	
Cabazon Band of Mission Indians, California	
Cahuilla Band of Mission Indians of the Cahuilla Reservation, California	
Ione Band of Miwok Indians of California	
Morongo Band of Cahuilla Mission Indians of the Morongo Reservation, California	
Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, California	
Ramona Band or Village of Cahuilla Mission Indians of California	
Santa Rosa Band of Cahuilla Indians, California	
Soboba Band of Luiseno Indians, California	
Torres Martinez Desert Cahuilla Indians, California	

Sources: U.S. Bureau of the Census (2009b); U.S. Department of Interior (2010).

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Schools

Table 9.4.19.1-9 provides summary statistics for enrollment and educational staffing and two indices of educational quality—student-teacher ratios and levels of service (number of teachers per 1,000 population). The student-teacher ratio in Riverside County schools in 2007 was 22.1, while the level of service is slightly higher in Riverside County was 9.3.

Health Care

There were 3,277 physicians in Riverside County in 2007, and the number of doctors per 1,000 population was 1.6 (Table 9.4.19.1-10).

TABLE 9.4.19.1-9 ROI School District Data for the Proposed Riverside East SEZ, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service ^a
Riverside County	421,642	19,105	22.1	9.3

^a Number of teachers per 1,000 population.

Source: NCES (2009).

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TABLE 9.4.19.1-10 Physicians in the ROI for the Proposed Riverside East SEZ, 2007

Location	Number of Primary Care Physicians	Level of Service ^a
Riverside County	3,277	1.6

^a Number of physicians per 1,000 population.

Source: AMA (2009).

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Public Safety

Riverside County has 1,965 officers and would provide law enforcement services to the SEZ (Table 9.4.19.1-11), and currently, there are 2,205 professional firefighters in the. Levels of service of police protection are 1.0 in Riverside County and 1.1 for fire services.

9.4.19.1.10 ROI Social Change

Community social structures and other forms of social organization within the ROI are related to various factors, including historical development, major economic activities and sources of employment, income levels, race and ethnicity, and forms of local political organization. Although an analysis of the character of community social structures is beyond the scope of the current programmatic analysis, project-level NEPA analyses would include a description of ROI social structures, contributing factors, their uniqueness, and consequently, the susceptibility of local communities to various forms of social disruption and social change.

Various energy development studies have suggested that once the annual growth in population is between 5% and 15% in smaller rural communities, alcoholism, depression, suicide, social conflict, divorce, and delinquency would increase, and levels of community satisfaction would deteriorate (BLM 1980, 1983, 1996). Tables 9.4.19.1-12 and 9.4.19.1-13 present data for a number of indicators of social change, including violent crime and property

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TABLE 9.4.19.1-11 Public Safety Employment in the ROI

Location	Number of Police Officers ^a	Level of Service ^b	Number of Firefighters ^c	Level of Service
Riverside County	1,965	1.0	2,205	1.1

^a 2007 data.

^b Number per 1,000 population.

^c 2008 data; number does not include volunteers.

Sources: U.S. Department of Justice (2008); Fire Departments Network (2009).

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TABLE 9.4.19.1-12 County and ROI Crime Rates in the ROI for the Proposed Riverside East SEZ^a

	Violent Crime ^b		Property Crime ^c		All Crime	
	Offenses	Rate	Offenses	Rate	Offenses	Rate
Riverside County	7,351	3.5	57,839	27.5	65,190	31.0

^a Rates are the number of crimes per 1,000 population.

^b Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

^c Property crime includes burglary, larceny, theft, motor vehicle theft, and arson.

Sources: U.S. Department of Justice (2009a, b).

3
4

5 crime rates, alcoholism and illicit drug use, and mental health and divorce, that might be used to
6 indicate social change.

7

8 Violent crime in Riverside County in 2007 stood at 3.5 per 1,000 population
9 (Table 9.4.19.1-12), while the property-related crime rate was 27.5, producing an overall
10 crime rate of 31.0.

11

12 Other measures of social change—alcoholism, illicit drug use, and mental health—are
13 not available at the county level, and thus are presented for the SAMHSA region in which the
14 county is located (Table 9.4.19.1-13).

15

16

17 **9.4.19.1.11 ROI Recreation**

18

19 There are various areas in the vicinity of the proposed SEZ that are used for recreational
20 purposes, with natural, ecological, and cultural resources in the ROI attracting visitors for a

TABLE 9.4.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Riverside East SEZ ROI^a

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health ^b	Divorce ^c
California Region 13 (includes Riverside County)	8.5	3.2	8.6	— ^d
California				4.3

^a Data for alcoholism and drug use represent the percentage of the population over 12 years of age with dependence or abuse of alcohol, illicit drugs. Data are averages for 2004 to 2006.

^b Data for mental health represent the percentage of the population over 18 years of age suffering from serious psychological distress. Data are averages for 2002 to 2004.

^c Divorce rates are the number of divorces per 1,000 population. Data are for 1990.

^d A dash indicates not applicable.

Sources: SAMHSA (2009); CDC (2009).

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range of activities, including hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback riding, mountain climbing, and sightseeing. These areas are discussed in Section 9.4.5.

Because the number of visitors using state and federal lands for recreational activities is not available from the various administering agencies, the value of recreational resources in these areas, based solely on the number of recorded visitors is likely to be an underestimation. In addition to visitation rates, the economic valuation of certain natural resources can also be assessed in terms of the potential recreational destination for current and future users, that is, their nonmarket value (see Section 5.17.1.1.1).

Another method is to estimate the economic impact of the various recreational activities supported by natural resources on public land in the vicinity of the proposed solar development, by identifying sectors in the economy in which expenditures on recreational activities occur. Not all activities in these sectors are directly related to recreation on state and federal lands, with some activity occurring on private land (e.g., dude ranches, golf courses, bowling alleys, and movie theaters). Expenditures associated with recreational activities form an important part of the economy of the ROI. In 2007, 75,858 people were employed in Riverside County in the various sectors identified as recreation, constituting 8.9% of total ROI employment (Table 9.4.19.1-14). Recreation spending also produced almost \$1,871 million in income in the ROI in 2007. The primary sources of recreation-related employment were eating and drinking places.

TABLE 9.4.19.1-14 ROI Recreation Sector Activity for the Proposed Riverside East SEZ, 2007

ROI	Employment	Income (\$ million)
Amusement and recreation services	5,289	172.5
Automotive rental	605	27.5
Eating and drinking places	54,938	1,130.4
Hotels and lodging places	8,589	300.7
Museums and historic sites,	299	21.6
Recreational vehicle parks and campsites	602	16.8
Scenic tours	1,742	114.5
Sporting goods retailers	3,794	86.5
Total ROI	75,858	1,870.5

Source: MIG, Inc. (2009).

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9.4.19.2 Impacts

The following analysis begins with a description of the common impacts of solar development, including common impacts on recreation and on social change. These impacts would occur regardless of the solar technology developed in the SEZ. The impacts of facilities employing various solar energy technologies are analyzed in detail in subsequent sections.

9.4.19.2.1 Common Impacts

Construction and operation of a solar energy facility at the proposed Riverside East SEZ would produce direct and indirect economic impacts. Direct impacts would occur as a result of expenditures on wages and salaries, procurement of goods and services required for project construction and operation, and the collection of state sales and income taxes. Indirect impacts would occur as project wages and salaries, procurement expenditures, and tax revenues subsequently circulate through the economy of each state, thereby creating additional employment, income, and tax revenues. Facility construction and operation would also require in-migration of workers and their families into the ROI surrounding the site, and this would affect population, rental housing, health service employment, and public safety employment. Socioeconomic impacts common to all utility-scale solar energy facilities are discussed in detail in Section 5.17. These impacts will be minimized through the implementation of programmatic design features described in Appendix A, Section A.2.2.

Recreation Impacts

Estimating the impact of solar facilities on recreation is problematic because it is not clear how solar development in the SEZ would affect recreational visitation and nonmarket

1 values (i.e., the value of recreational resources for potential or future visits; see
2 Section 5.17.1.2.3). While it is clear that some land in the ROI would no longer be accessible
3 for recreation, the majority of popular recreational locations would be precluded from solar
4 development. It is also possible that solar facilities in the ROI would be visible from popular
5 recreation locations and that construction workers residing temporarily in the ROI would occupy
6 accommodations otherwise used for recreational visits, thus reducing visitation and consequently
7 affecting the economy of the ROI.
8
9

10 **Social Change**

11
12 Although an extensive literature in sociology documents the most significant components
13 of social change in energy boomtowns, the nature and magnitude of the social impact of energy
14 facilities in small rural communities are still unclear (see Section 5.17.1.1.4). While some degree
15 of social disruption is likely to accompany large-scale in-migration during the boom phase, there
16 is insufficient evidence to predict the extent to which specific communities are likely to be
17 affected, which population groups within each community are likely to be most affected, and
18 the extent to which social disruption is likely to persist beyond the end of the boom period
19 (Smith et al. 2001). Accordingly, because of the lack of adequate social baseline data, it has
20 been suggested that social disruption is likely to occur once an arbitrary population growth rate
21 associated with solar energy development projects has been reached, with an annual rate of
22 between 5% and 10% growth in population assumed to result in a breakdown in social
23 structures and a consequent increase in alcoholism, depression, suicide, social conflict, divorce,
24 delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983, 1996).
25

26 In overall terms, the in-migration of workers and their families into the ROI would
27 represent an increase of 0.1% in county population during construction of the trough technology,
28 with smaller increases for the power tower, dish engine, and PV technologies, and during the
29 operation of each technology. While it is possible that some construction and operations workers
30 will choose to locate in communities closer to the SEZ, the lack of available housing in smaller
31 rural communities in the ROI to accommodate all in-migrating workers and families, and the
32 insufficient range of housing choices to suit all solar occupations, many workers are likely to
33 commute to the SEZ from larger communities elsewhere in the ROI, thereby reducing the
34 potential impact of solar facilities on social change. Regardless of the pace of population growth
35 associated with the commercial development of solar resources and the likely residential location
36 of in-migrating workers and families in communities some distance from the SEZ itself, the
37 number of new residents from outside the ROI is likely to lead to some demographic and social
38 change in small rural communities in the ROI. Communities hosting solar facilities are likely to
39 be required to adapt to a different quality of life, with a transition away from a more traditional
40 lifestyle involving ranching and taking place in small, isolated, close-knit, homogenous
41 communities with a strong orientation toward personal and family relationships, toward a more
42 urban lifestyle, with increasing cultural and ethnic diversity, and increasing dependence on
43 formal social relationships within the community.
44
45
46

1 **9.4.19.2.2 Technology-Specific Impacts**
2

3 The economic impacts of solar energy development in the proposed SEZ were measured
4 in terms of employment, income, state tax revenues (sales and income), population in-migration,
5 housing, and community service employment (education, health, and public safety). More
6 information on the data and methods used in the analysis are provided in Appendix M.
7

8 The assessment of the impact of the construction and operation of each technology was
9 based on SEZ acreage, assuming 80% of the area could be developed. To capture a range of
10 possible impacts, solar facility size was estimated on the basis of land requirements of various
11 solar technologies, assuming that 9 acres/MW (0.04 km²/MW) would be required for power
12 tower, dish engine, and PV technologies, and 5 acres/MW (0.02 km²/MW) for solar trough
13 technologies. Impacts of multiple facilities employing a given technology at each SEZ were
14 assumed to be the same as impacts for a single facility with the same total capacity. Construction
15 impacts were assessed for a representative peak year of construction, assumed to be 2021 for
16 each technology. Construction impacts assumed that a maximum of three projects could be
17 constructed within a given year, with a corresponding maximum land disturbance of up to
18 9,000 acres (36 km²). For operations impacts, a representative first year of operations was
19 assumed to be 2023 for trough and power tower, 2022 for the minimum facility size for dish
20 engine and PV, and 2023 for the maximum facility size for these technologies. The years of
21 construction and operations were selected as representative of the entire 20-year study period,
22 because they are the approximate midpoint; construction and operations could begin earlier.
23

24 **Solar Trough**
25

26 **Construction.** Total construction employment impacts in the ROI (including direct and
27 indirect impacts) from the use of solar trough technologies would be up to 15,633 jobs
28 (Table 9.4.19.2-1). Construction activities would constitute 1.3% of total ROI employment. A
29 solar development would also produce \$927.3 million in income. Direct sales taxes would be
30 \$41.2 million; direct income taxes \$18.9 million.
31
32

33 Given the scale of construction activities and the likelihood of local worker availability
34 in the required occupational categories, construction of a solar facility means that some
35 in-migration of workers and their families from outside the ROI would be required, with
36 2,229 persons in-migrating into the ROI. Although in-migration may potentially affect local
37 housing markets, the relatively small number of in-migrants and the availability of temporary
38 accommodations (hotels, motels, and mobile home parks) would mean that the impact of solar
39 facility construction on the number of vacant rental housing units is not expected to be large,
40 with 1,114 rental units expected to be occupied in the ROI. This occupancy rate would represent
41 2.3% of the vacant rental units expected to be available in the ROI.
42

43 In addition to the potential impact on housing markets, in-migration would also affect
44 community service employment (education, health, and public safety). An increase in such
45 employment would be required to meet existing levels of service in the ROI. Accordingly,
46

TABLE 9.4.19.2-1 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Riverside East SEZ with Trough Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	5,232	7,079
Total	15,633	11,670
Income ^b		
Total	927.3	423.9
Direct state taxes ^b		
Sales	41.2	0.5
Income	18.9	11.2
BLM payments (\$ million 2008)		
Rental	NA ^d	63.7
Capacity ^e	NA	213.5
In-migrants (no.)	2,229	902
Vacant housing ^c (no.)	1,114	812
Local community service employment		
Teachers (no.)	21	8
Physicians (no.)	4	1
Public safety (no.)	5	2

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,800 MW (corresponding to 9,000 acres [36 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 32,469 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

^d Not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010f), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

1 21 new teachers, 4 physicians, and 5 public safety employees (career firefighters and uniformed
2 police officers) would be required in the ROI. These increases would represent 0.1% of total
3 ROI employment expected in these occupations.
4
5

6 **Operations.** Total operations employment impacts in the ROI (including direct and
7 indirect impacts) of a build-out using solar trough technologies would be 11,670 jobs
8 (Table 9.4.19.2-1). Such a solar development would also produce \$423.9 million in income.
9 Direct sales taxes would be \$0.5 million; direct income taxes \$11.2 million. Based on fees
10 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010i), acreage rental
11 payments would be \$63.7 million, and solar generating capacity payments, at least
12 \$213.5 million.
13

14 Given the likelihood of local worker availability in the required occupational categories,
15 operation of a solar facility means that some in-migration of workers and their families from
16 outside the ROI would be required, with 902 persons in-migrating into the ROI. Although
17 in-migration may potentially affect local housing markets, the relatively small number of
18 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
19 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
20 housing units is not expected to be large, with 812 owner-occupied units expected to be occupied
21 in the ROI.
22

23 In addition to the potential impact on housing markets, in-migration would affect
24 community service (health, education, and public safety) employment. An increase in such
25 employment would be required to meet existing levels of service in the provision of these
26 services in the ROI. Accordingly, eight new teachers, one physician, and two public safety
27 employees would be required in the ROI.
28
29

30 **Power Tower**

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32

33 **Construction.** Total construction employment impacts in the ROI (including direct and
34 indirect impacts) from the use of power tower technologies would be up to 6,227 jobs
35 (Table 9.4.19.2-2). Construction activities would constitute 0.5% of total ROI employment. Such
36 a solar development would also produce \$369.3 million in income. Direct sales taxes would be
37 less than \$16.4 million; direct income taxes \$7.5 million.
38

39 Given the scale of construction activities and the likelihood of local worker availability
40 in the required occupational categories, construction of a solar facility means that some
41 in-migration of workers and their families from outside the ROI would be required, with
42 888 persons in-migrating into the ROI. Although in-migration may potentially affect local
43 housing markets, the relatively small number of in-migrants and the availability of temporary
44 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
45 construction on the number of vacant rental housing units is not expected to be large, with

TABLE 9.4.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Riverside East SEZ with Power Tower Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	2,084	3,656
Total	6,227	5,135
Income ^b		
Total	369.3	171.1
Direct state taxes ^b		
Sales	16.4	0.1
Income	7.5	5.8
BLM payments (\$ million 2008)		
Rental	NA ^d	63.7
Capacity ^e	NA	118.6
In-migrants (no.)	888	466
Vacant housing ^c (no.)	444	419
Local community service employment		
Teachers (no.)	8	4
Physicians (no.)	1	1
Public safety (no.)	2	1

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,000 MW (corresponding to 9,000 acres [36 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 18,038 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

^d Not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010i), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

1 444 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.5%
2 of the vacant rental units expected to be available in the ROI.

3
4 In addition to the potential impact on housing markets, in-migration would affect
5 community service (education, health, and public safety) employment. An increase in such
6 employment would be required to meet existing levels of service in the ROI. Accordingly,
7 eight new teachers, one physician, and two public safety employees would be required in the
8 ROI. These increases would represent less than 0.1% of total ROI employment expected in these
9 occupations.

10
11
12 **Operations.** Total operations employment impacts in the ROI (including direct and
13 indirect impacts) of a build-out using power tower technologies would be 5,135 jobs
14 (Table 9.4.19.2-2). Such a solar development would also produce \$171.1 million in income.
15 Direct sales taxes would be less than \$0.1 million; direct income taxes \$5.8 million. Based on
16 fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010i), acreage
17 rental payments would be \$63.7 million, and solar generating capacity payments, at least
18 \$118.6 million.

19
20 Given the likelihood of local worker availability in the required occupational categories,
21 operation of a solar facility means that some in-migration of workers and their families from
22 outside the ROI would be required, with 466 persons in-migrating into the ROI. Although
23 in-migration may potentially affect local housing markets, the relatively small number of
24 in-migrants and the availability of temporary accommodations (hotels, motels and mobile
25 home parks) would mean that the impact of solar facility operation on the number of vacant
26 owner-occupied housing units is not expected to be large, with 419 owner-occupied units
27 expected to be required in the ROI.

28
29 In addition to the potential impact on housing markets, in-migration would affect
30 community service (education, health, and public safety) employment. An increase in such
31 employment would be required to meet existing levels of service in the ROI. Accordingly, four
32 new teachers, one physician and one public safety employee would be required in the ROI.

33 34 35 **Dish Engine**

36
37
38 **Construction.** Total construction employment impacts in the ROI (including direct
39 and indirect impacts) from the use of dish engine technologies would be up to 2,531 jobs
40 (Table 9.4.19.2-3). Construction activities would constitute 0.2% of total ROI employment.
41 Such a solar development would also produce \$150.1 million in income. Direct sales taxes
42 would be less than \$6.7 million, with direct income taxes of \$3.1 million.

43
44 Given the scale of construction activities and the likelihood of local worker availability
45 in the required occupational categories, construction of a solar facility means that some
46 in-migration of workers and their families from outside the ROI would be required, with

TABLE 9.4.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Riverside East SEZ with Dish Engine Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	847	3,553
Total	2,531	4,990
Income ^b		
Total	150.1	166.2
Direct state taxes ^b		
Sales	6.7	0.1
Income	3.1	5.6
BLM payments (\$ million 2008)		
Rental	NA ^d	63.7
Capacity ^e	NA	118.6
In-migrants (no.)	361	453
Vacant housing ^c (no.)	180	407
Local community service employment		
Teachers (no.)	3	4
Physicians (no.)	1	1
Public safety (no.)	1	1

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,000 MW (corresponding to 9,000 acres [36 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 18,038 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

^d Not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010i), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

1 361 persons in-migrating into the ROI. Although in-migration may potentially affect local
2 housing markets, the relatively small number of in-migrants and the availability of temporary
3 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
4 construction on the number of vacant rental housing units is not expected to be large, with
5 180 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.4%
6 of the vacant rental units expected to be available in the ROI.

7
8 In addition to the potential impact on housing markets, in-migration would affect
9 community service (education, health, and public safety) employment. An increase in such
10 employment would be required to meet existing levels of service in the ROI. Accordingly,
11 three new teachers, one physician, and one public safety employee would be required in the ROI.
12 These increases would represent less than 0.1% of total ROI employment expected in
13 these occupations.

14
15
16 **Operations.** Total operations employment impacts in the ROI (including direct and
17 indirect impacts) of a build-out using dish engine technologies would be 4,990 jobs
18 (Table 9.4.19.2-3). Such a solar development would also produce \$166.2 million in income.
19 Direct sales taxes would be \$0.1 million; direct income taxes \$5.6 million. Based on fees
20 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010i), acreage rental
21 payments would be \$63.7 million, and solar generating capacity payments, at least
22 \$118.6 million.

23
24 Given the likelihood of local worker availability in the required occupational categories,
25 operation of a dish engine solar facility means that some in-migration of workers and their
26 families from outside the ROI would be required, with 453 persons in-migrating into the ROI.
27 Although in-migration may potentially affect local housing markets, the relatively small number
28 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
29 home parks) mean that the impact of solar facility operation on the number of vacant owner-
30 occupied housing units is not expected to be large, with 407 owner-occupied units expected to be
31 required in the ROI.

32
33 In addition to the potential impact on housing markets, in-migration would affect
34 community service employment (education, health, and public safety). An increase in such
35 employment would be required to meet existing levels of service in the ROI. Accordingly, four
36 new teachers, one physician, and one public safety employee would be would be required in the
37 ROI.

38 39 **Photovoltaic**

40
41
42
43 **Construction.** Total construction employment impacts in the ROI (including direct and
44 indirect impacts) from the use of PV technologies would be up to 1,181 jobs (Table 9.4.19.2-4).
45 Construction activities would constitute 0.1 % of total ROI employment. Such a solar

TABLE 9.4.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Riverside East SEZ with PV Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	395	354
Total	1,181	498
Income ^b		
Total	70.0	16.6
Direct state taxes ^b		
Sales	3.1	<0.1
Income	1.4	0.6
BLM payments (\$ million 2008)		
Rental	NA ^d	63.7
Capacity ^e	NA	94.9
In-migrants (no.)	168	45
Vacant housing ^c (no.)	84	41
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,000 MW (corresponding to 9,000 acres [36 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 18,038 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c Construction activities would affect vacant rental housing; operations activities would affect owner-occupied housing.

^d Not applicable.

^e The BLM annual capacity payment was based on a fee of \$5,256 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010i), assuming full build-out of the site.

1
2
3

1 development would also produce \$70.0 million in income. Direct sales taxes would be less than
2 \$3.1 million; direct income taxes, of \$1.4 million.

3
4 Given the scale of construction activities and the likelihood of local worker availability
5 in the required occupational categories, construction of a solar facility means that some
6 in-migration of workers and their families from outside the ROI would be required, with
7 168 persons in-migrating into the ROI. Although in-migration may potentially affect local
8 housing markets, the relatively small number of in-migrants and the availability of temporary
9 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
10 construction on the number of vacant rental housing units is not expected to be large, with
11 84 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.2%
12 of the vacant rental units expected to be available in the ROI.

13
14 In addition to the potential impact on housing markets, in-migration would affect
15 community service (education, health, and public safety) employment. An increase in such
16 employment would be required to meet existing levels of service in the ROI. Accordingly,
17 two new teachers would be required in the ROI. This increase would represent less than 0.1%
18 of total ROI employment expected in this occupation.

19
20
21 **Operations.** Total operations employment impacts in the ROI (including direct and
22 indirect impacts) of a build-out using PV technologies would be 498 jobs (Table 9.4.19.2-4).
23 Such a solar development would also produce \$16.6 million in income. Direct sales taxes would
24 be less than \$0.1 million; direct income taxes less than \$0.6 million. Based on fees established by
25 the BLM in its Solar Energy Interim Rental Policy (BLM 2010i), acreage rental payments would
26 be \$63.7 million, and solar generating capacity payments, at least \$94.9 million.

27
28 Given the likelihood of local worker availability in the required occupational categories,
29 operation of a solar facility means that some in-migration of workers and their families from
30 outside the ROI would be required, with 45 persons in-migrating into the ROI. Although
31 in-migration may potentially affect local housing markets, the relatively small number of
32 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
33 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
34 housing units is not expected to be large, with 41 owner-occupied units expected to be required
35 in the ROI.

36
37 No new community service employment would be required to meet existing levels of
38 service in the ROI.

39 40 41 **9.4.19.3 SEZ-Specific Design Features and Design Feature Effectiveness**

42
43 No SEZ-specific design features addressing socioeconomic impacts have been identified
44 for the proposed Riverside East SEZ. Implementing the programmatic design features described
45 in Appendix A, Section A.2.2, as required under BLM's proposed Solar Energy Program, would
46 reduce the potential for socioeconomic impacts during all project phases.

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1 **9.4.20 Environmental Justice**

2
3
4 **9.4.20.1 Affected Environment**

5
6 On February 11, 1994, the President signed E. O. 12898, "Federal Actions to Address
7 Environmental Justice in Minority Populations and Low-Income Populations," which formally
8 requires federal agencies to incorporate environmental justice as part of their missions (*Federal*
9 *Register*, Volume 59, page 7629, Feb. 11, 1994). Specifically, it directs them to address, as
10 appropriate, any disproportionately high and adverse human health or environmental effects of
11 their actions, programs, or policies on minority and low-income populations.

12
13 The analysis of the impacts of solar energy projects on environmental justice issues
14 follows guidelines described in the CEQ's *Environmental Justice Guidance under the National*
15 *Environmental Policy Act* (CEQ 1997). The analysis method has three parts: (1) a description
16 of the geographic distribution of low-income and minority populations in the affected area is
17 undertaken; (2) an assessment is conducted to determine whether construction and operation
18 would produce impacts that are high and adverse; and (3) if impacts are high and adverse, a
19 determination is made as to whether they disproportionately affect minority and low-income
20 populations.

21
22 Construction and operation of solar energy projects in the proposed Riverside East SEZ
23 could affect environmental justice if any adverse health and environmental impacts resulting
24 from either phase of development are significantly high and if these impacts would
25 disproportionately affect minority and low-income populations. If the analysis determines that
26 health and environmental impacts are not significant, there can be no disproportionate impacts
27 on minority and low-income populations. In the event impacts are significant, disproportionality
28 would be determined by comparing the proximity of any high and adverse impacts with the
29 location of low-income and minority populations.

30
31 The analysis of environmental justice issues associated with the development of solar
32 facilities considered impacts within the proposed Riverside East SEZ and an associated 50-mi
33 (80-km) radius around the boundary of the SEZ. A description of the geographic distribution of
34 minority and low-income groups in the affected area was based on demographic data from the
35 2000 Census (U.S. Bureau of the Census 2009k,l). The following definitions were used to define
36 minority and low-income population groups:

- 37
38 • **Minority.** Persons are included in the minority category if they identify
39 themselves as belonging to any of the following racial groups: (1) Hispanic,
40 (2) Black (not of Hispanic origin) or African American, (3) American Indian
41 or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander.

42
43 Beginning with the 2000 Census, where appropriate, the census form allows
44 individuals to designate multiple population group categories to reflect their
45 ethnic or racial origin. In addition, persons who classify themselves as being
46 of multiple racial origin may choose up to six racial groups as the basis of

1 their racial origins. The term minority includes all persons, including those
2 classifying themselves in multiple racial categories, except those who classify
3 themselves as not of Hispanic origin and as White or “Other Race”
4 (U.S. Bureau of the Census 2009k).

5
6 The CEQ guidance proposed that minority populations should be identified
7 where either (1) the minority population of the affected area exceeds 50%, or
8 (2) the minority population percentage of the affected area is meaningfully
9 greater than the minority population percentage in the general population or
10 other appropriate unit of geographic analysis.

11
12 The PEIS applies both criteria in using the Census Bureau data for census
13 block groups, wherein consideration is given to the minority population that is
14 both greater than 50% and 20 percentage points higher than in the state (the
15 reference geographic unit).

- 16
17 • Low-Income. Individuals fall below the poverty line. The poverty line takes
18 into account family size and age of individuals in the family. In 1999, for
19 example, the poverty line for a family of five with three children younger than
20 18 was \$19,882. For any given family below the poverty line, all family
21 members are considered as being below the poverty line for the purposes of
22 analysis (U.S. Bureau of the Census 2009l).

23
24 The data in Table 9.4.20.1-1 show the minority and low-income composition of the total
25 population located in the proposed SEZ based on 2000 Census data and CEQ guidelines.
26 Individuals identifying themselves as Hispanic or Latino are included in the table as a separate
27 entry. However, because Hispanics can be of any race, this number also includes individuals also
28 identifying themselves as being part of one or more of the population groups listed in the table.

29
30 A large number of minority and low-income individuals are located in the 50-mi (80-km)
31 area around the boundary of the SEZ. Within the 50-mi (80-km) radius in Arizona, 24.5% of the
32 population is classified as minority, while 13.0% is classified as low-income. The number of
33 minority individuals does not exceed 50% of the total population in the area, and the number of
34 minority individuals exceeds the state average by 20 percentage points or more, meaning that
35 there is no minority population in the SEZ area based on 2000 Census data and CEQ guidelines.
36 The number of low-income individuals does not exceed the state average by 20 percentage points
37 or more and does not exceed 50% of the total population in the area, meaning that there are no
38 low-income populations in the SEZ.

39
40 Within the 50-mi (80-km) radius in California, 60.3% of the population is classified as
41 minority, while 20.5% is classified as low-income. While the number of minority individuals
42 does not exceed the state average by 20 percentage points or more, the number of minority
43 individuals exceeds 50% of the total population in the area meaning that there is a minority
44 population in the SEZ as a whole area based on 2000 Census data and CEQ guidelines. The
45 number of low-income individuals does not exceed the state average by 20 percentage points or
46

TABLE 9.4.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Riverside East SEZ

Parameter	Arizona	California
Total population	66,364	255,043
White, non-Hispanic	53,608	101,207
Hispanic or Latino	8,717	131,953
Non-Hispanic or Latino minorities	4,039	21,883
One race	3,196	18,253
Black or African American	354	11,721
American Indian or Alaskan Native	2,426	2,184
Asian	341	3,513
Native Hawaiian or Other Pacific Islander	46	453
Some other race	29	382
Two or more races	843	3,630
Total minority	12,756	153,836
Low-income	8,496	46,222
Percentage minority	19.2	60.3
State percent minority	24.5	40.5
Percentage low-income	13.0	20.5
State percent low-income	13.9	14.2

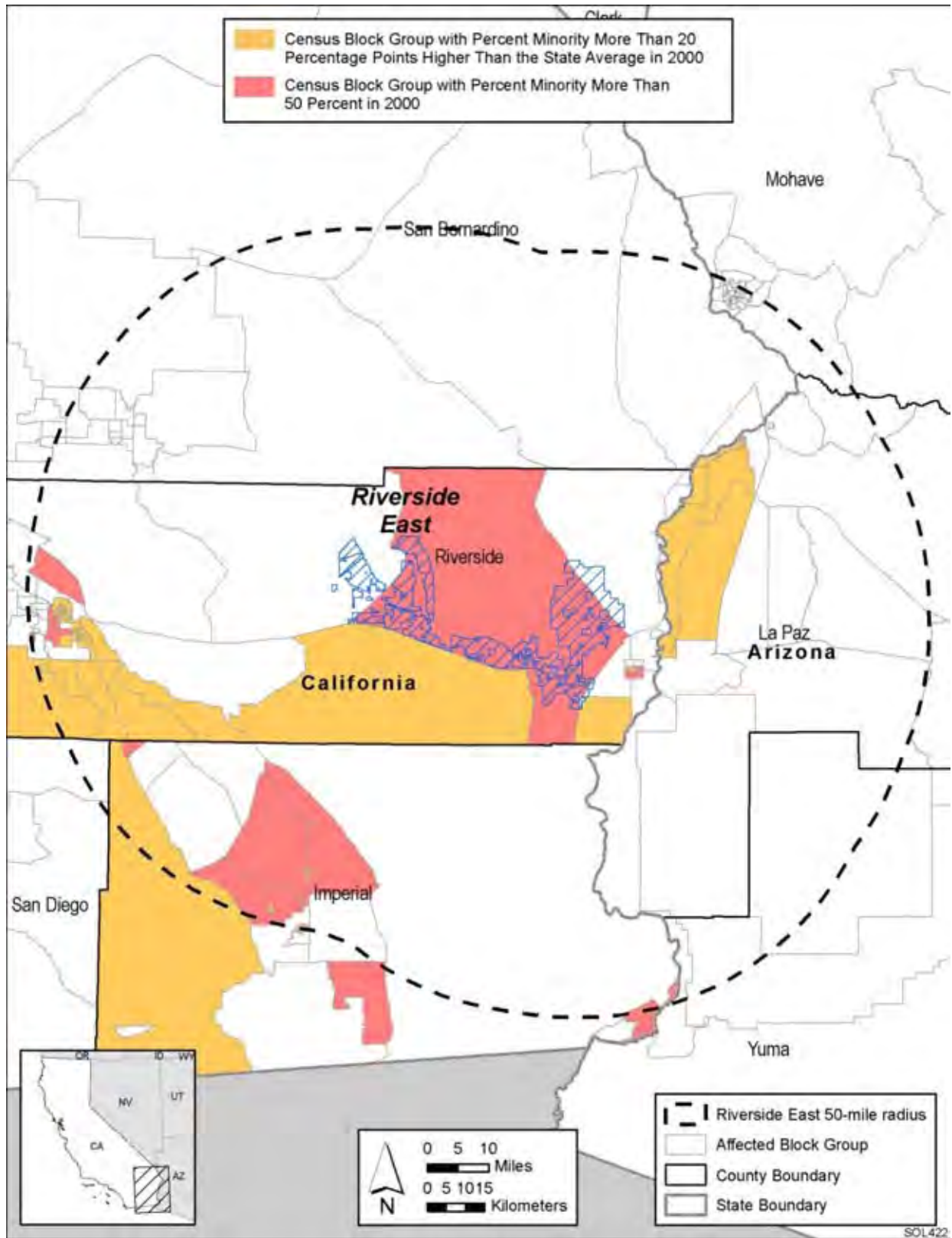
Source: U.S Bureau of the Census (2009k,l).

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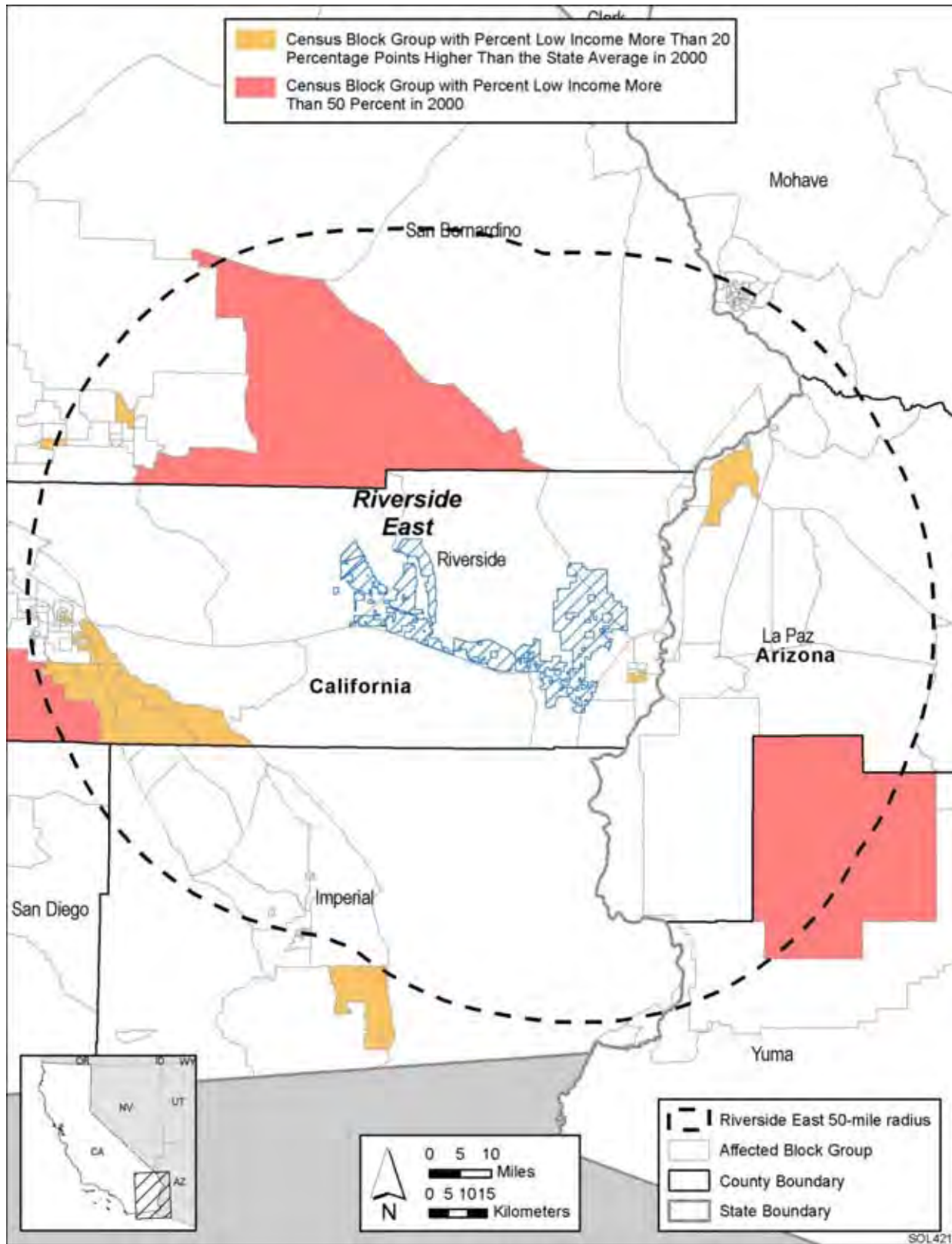
more and does not exceed 50% of the total population in the area, meaning that there are no low-income populations in the SEZ as a whole.

Figures 9.4.20.1-1 and 9.4.20.1-2 show the locations of the minority and low-income population groups within the 50-mi (80-km) radius around the boundary of the SEZ.

In the California portion of the 50-mi (80-km) radius around the SEZ, more than 50% of the population is classified as minority in block groups located in the city of Blythe itself and to the immediate west and southwest of the city; in the western part of the county in the vicinity of Desert Hot Springs; in Imperial County in the vicinity of Calipatria and Westmoreland; and in the Fort Yuma Indian Reservation in the Colorado River valley. Block groups with a minority population which is more than 20 percentage points higher than the state average are located in the city of Blythe, to the immediate west of the city, and in the western portions of the 50-mi (80-km) radius in the vicinity of Indio and Coachella. In the Arizona portion of the 50-mi (80-km) radius, more than 50% of the population is classified as minority in block groups located



1
 2 **FIGURE 9.4.20.1-1 Minority Population Groups within the 50-mi (80-km) Radius Surrounding**
 3 **the Proposed Riverside East SEZ**



1

2 **FIGURE 9.4.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius**
 3 **Surrounding the Proposed Riverside East SEZ**

1 in the Colorado River Indian Reservation, in the city of Parker, and to the east of the Colorado
2 River, south of Blythe.

3
4 Census block groups in the 50-mi (80-km) radius in California that have more than 50%
5 of their population classified as low-income are located in the vicinity of the city of Twentynine
6 Palms, in the western portion of Riverside County, and in Arizona, to the northeast of Yuma.
7 Census block group in California where the low-income population is more than 20 percentage
8 points higher than the state average, are located in the city of Blyth, in the western portion of the
9 county, in the Colorado River Indian Reservation, and in the vicinity of the city of Victorville.

10 11 12 **9.4.20.2 Impacts**

13
14 Environmental justice concerns common to all utility-scale solar energy facilities are
15 described in detail in Section 5.18. These impacts will be minimized through the implementation
16 of programmatic design features described in Appendix A, Section A.2.2, which address the
17 underlying environmental impacts contributing to the concerns. The potentially relevant
18 environmental impacts associated with solar facilities within the proposed Riverside East SEZ
19 include noise and dust during the construction of solar facilities; noise and EMF effects
20 associated with solar project operations; the visual impacts of solar generation and auxiliary
21 facilities, including transmission lines; access to land used for economic, cultural, or religious
22 purposes; and effects on property values as areas of concern that might potentially affect
23 minority and low-income populations.

24
25 Potential impacts on low-income and minority populations could be incurred as a result
26 of the construction and operation of solar facilities involving each of the four technologies.
27 Although impacts are likely to be small, there are minority populations defined by CEQ
28 guidelines (Section 9.4.20.1) within the 50-mi (80-km) radius around the boundary of the SEZ,
29 meaning that any adverse impacts of solar projects could disproportionately affect minority
30 populations. Because there are also low-income populations within the 50-mi (80-km) radius,
31 according to CEQ guidelines, there could also be impacts on low-income populations.

32 33 34 **9.4.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**

35
36 No SEZ-specific design features addressing environmental justice impacts have been
37 identified for the proposed Riverside East SEZ. Implementing the programmatic design features
38 described in Appendix A, Section A.2.2, as required under BLM's proposed Solar Energy
39 Program, would reduce the potential for environmental justice impacts during all project phases.

1 **9.4.21 Transportation**
2

3 The proposed Riverside East SEZ is accessible by road. An interstate highway passes
4 through it, and eight small airports are located within 72 mi (116 km) of the SEZ. General
5 transportation considerations and impacts are discussed in Sections 3.4 and 5.19, respectively.
6

7
8 **9.4.21.1 Affected Environment**
9

10 I-10 passes along the southern edge and then through the proposed Riverside East SEZ as
11 shown in Figure 9.4.21-1. The town of Blythe is situated on the eastern border of the SEZ. To the
12 west of the SEZ, I-10 passes through Indio, about 47 mi (76 km) from the western edge of the
13 SEZ, on its way to the Los Angeles area, about 120 mi (193 km) from the SEZ. There are a
14 number of exits from I-10 as it passes by and through the SEZ; they are listed in Table 9.4.21-1.
15 Figure 9.4.21-1 also shows the designated open OHV routes in the proposed Riverside East SEZ.
16 These routes were designated under the CDCA Plan (BLM 1999).
17

18 Other paved roads that cross parts of the Riverside East SEZ include State Route 177 and
19 Midland Road. State Route 177 runs north–south through the western section of the SEZ
20 between I-10 and State Route 62. In the eastern section of the SEZ, Midland Road crosses the
21 northeastern portion from Blythe to the ghost town of Midland, which is situated at the northern
22 edge of the eastern section of the SEZ. A number of dirt roads also cross the SEZ at various
23 points. Another major route in the area is U.S. 95, which runs north–south through Blythe and
24 passes within 2 to 4 mi (3 to 6 km) of the eastern edge of the SEZ. Table 9.4.21-2 gives the
25 annual average traffic volumes along I-10 and state roads near the SEZ for 2008.
26

27 The nearest operating railroad is the ARZC Railroad, which passes through Rice, about
28 18 mi (29 km) north of the large eastern section of the proposed Riverside East SEZ. However,
29 the shortest drive from the SEZ to Rice is on Midland Road, a dirt road north of Midland. The
30 Vidal rail stop on the ARZC Railroad is about a 41-mi (66-km) drive via U.S. 95 from the
31 eastern edge of the SEZ. The ARZC Railroad is a regional short line railroad that originates in
32 Cadiz, approximately 50 mi (80 km) northwest of Rice, where it has an interchange with the
33 BNSF Railroad (RailAmerica 2010). The ARZC Railroad continues on from Rice through Vidal
34 to the east for about 150 mi (240 km), passing through Parker, California, and eventually joining
35 with the BNSF Railroad again in Matthie, Arizona, northwest of Phoenix. The next closest
36 railroad to the SEZ is the UP Railroad, which provides service in Indio (UPR 2009).
37

38 The ARZC Railroad also has a spur that runs south from Rice through the eastern section
39 of the SEZ and goes to Blythe. However, this spur has become inactive and may be abandoned
40 (Blythe City Council 2008). Another inactive railroad, the Eagle Mountain (EM) Railroad, runs
41 north–south immediately to the west of the large western section of the SEZ and has an
42 interchange with the UP Railroad at Ferrum, approximately 31 mi (50 km) southwest of the
43 southwestern corner of the proposed Riverside East SEZ. The EM Railroad is a private railroad
44 owned by Kaiser Ventures, LLC, that was originally used for hauling iron ore and is currently in
45 need of repair. Kaiser Ventures is seeking to convert its former iron ore mine into a regional
46 municipal solid waste landfill operation (Kaiser Ventures 2010) that would use the railroad for
47 hauling waste to the landfill.

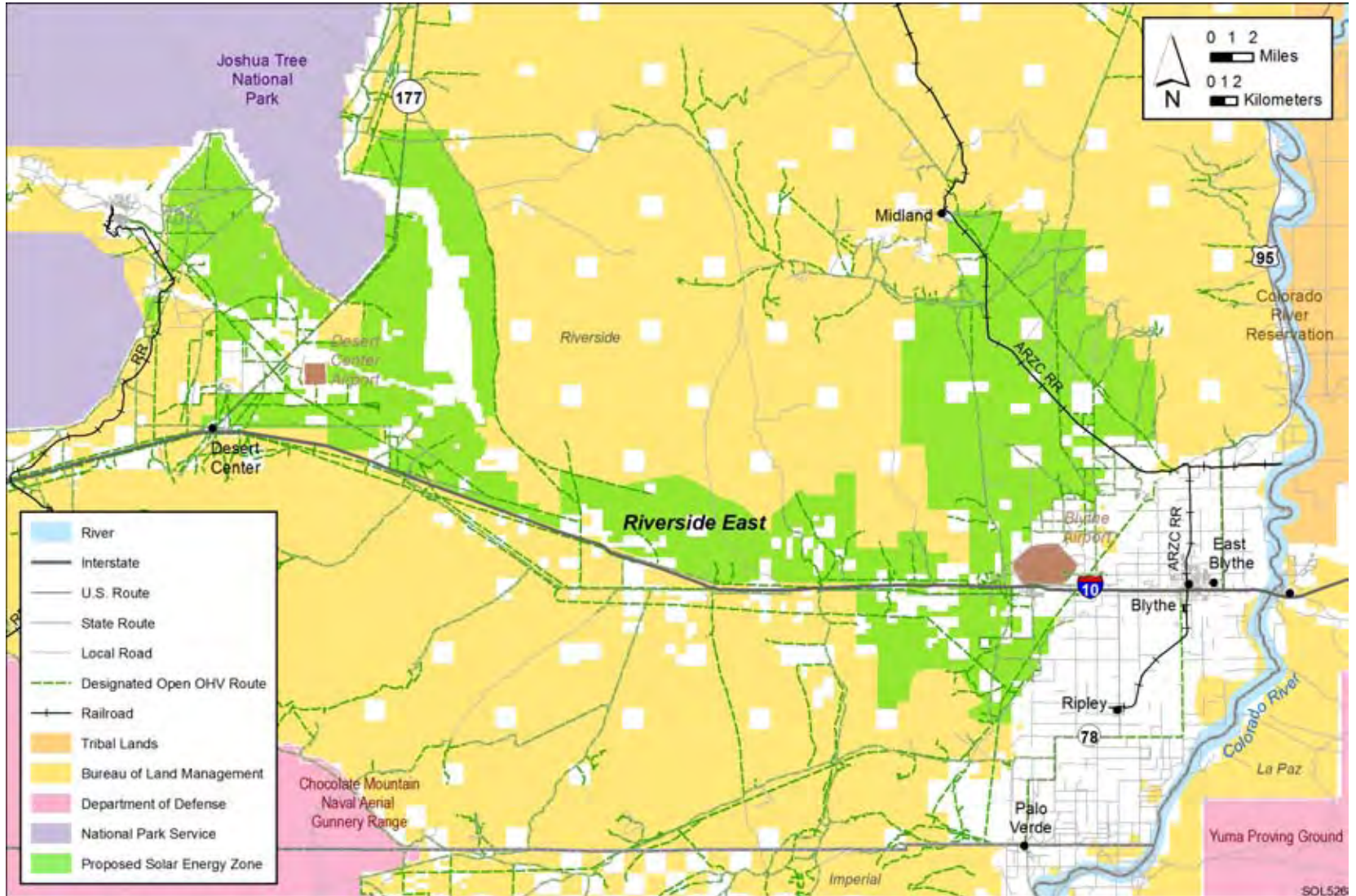


FIGURE 9.4.21.1-1 Local Transportation Network Serving the Proposed Riverside East SEZ

TABLE 9.4.21.1-1 I-10 Freeway Exits in the Vicinity of the Proposed Riverside East SEZ

Road Name	Exit Number/ Mile Marker
Desert Center Rice Road (State Route 177)	192
Corn Springs Road	201
Paled Dunes Drive and Chuckwalla Valley Road	217
Wiley's Well Road	222
Mesa Drive (at Blythe Airport)	232
Neighbours Boulevard (State Route 78) (western side of Blythe)	238

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TABLE 9.4.21.1-2 AADT on Major Roads near the Proposed Riverside East SEZ, 2008

Road	General Direction	Location	AADT (Vehicles)
I-10	East–West	West of junction State Route 62 North	81,000
		East of junction State Route 62 North	79,000
		West of junction State Route 86 South	52,000
		East of junction State Route 86 South	25,000
		West of Chiriaco Summit Interchange	22,500
		West of junction State Route 177 North	23,000
		East of junction State Route 177 North	21,400
		Corn Springs Road Interchange	21,400
		West of Wiley's Well Road	21,300
		East of Wiley's Well Road	23,500
		East of Mesa Drive	22,500
		East of junction State Route 78 South	23,800
		West of junction U.S. 95 North	25,000
		East of junction U.S. 95 North	25,500
State Route 62	East–West	Junction State Route 177	2,200
		Cadiz Road	2,000
		Blythe Rice Road	2,000
		Junction U.S. 95	2,700
State Route 78	North–South	Junction I-10	2,900
		South of 28th Avenue	1,800
		Fourth Street (Palo Verde)	2,650
State Route 177	North–South	Junction I-10	3,700
		Junction State Route 62	1,300
U.S. 95	North–South	Junction State Route 62	3,000
		South of Riverside/San Bernardino Co. Line	1,900
		North of Sixth Avenue (Blythe)	2,400
		North of Hobson Way (Blythe)	3,500

Source: Caltrans (2009).

1 Eight small airports, listed in Table 9.4.21.1-3, are open to the public and within a driving
2 distance of approximately 72 mi (116 km) of the proposed Riverside East SEZ. None of these
3 airports has regularly scheduled passenger service. The nearest public airports are the Blythe and
4 Desert Center Airports, which are immediately adjacent to (Blythe) or within the bounds of
5 (Desert Center) the general SEZ area.
6
7

8 **9.4.21.2 Impacts** 9

10 As discussed in Section 5.19, primary transportation impacts of the SEZ are anticipated
11 to come from commuting worker traffic. I-10, a regional traffic corridor, would experience small
12 impacts for single projects that may have up to 1,000 daily workers, with an additional
13 2,000 vehicle trips per day (maximum). Such an increase is less than 10% of the current traffic
14 on I-10, as summarized in Table 9.4.21.1-2, which provides the available AADT values for
15 routes in the vicinity of the SEZ. However, the exits on I-10 might experience moderate impacts
16 with some congestion. Local road improvements would be necessary in any portion of the SEZ
17 near I-10 that might be developed so as not to overwhelm the local roads near any site access
18 point(s). Similarly, any access to portions of the SEZ using State Route 177 or U.S. 95 may
19 require road improvements on State Route 177 or U.S. 95 and local access roads.
20

21 Solar development within the SEZ would affect public access along OHV routes
22 designated open and available for public use. There are several routes designated as open within
23 the proposed SEZ. Open routes crossing areas granted ROWs for solar facilities would be
24 redesignated as closed (see Section 5.5.1 for more details on how routes coinciding with
25 proposed solar facilities would be treated).
26

27 If up to three large projects with approximately 1,000 daily workers each were under
28 development simultaneously, an additional 6,000 vehicle trips per day could be added to I-10 in
29 the vicinity of the SEZ, assuming ride-sharing was not implemented and all access to the SEZs
30 was funneled through I-10 (i.e., no workers commuted to work via State Route 177 from State
31 Route 62 to the north or via local roads from U.S. 95 to the east). This would be an increase of
32 about 25% of the current average daily traffic on most segments of I-10 near the SEZ, and could
33 have moderate impacts on traffic flow during peak commute times. The extent of the problem
34 would depend on the relative locations of the projects within the SEZ, where the worker
35 populations originate, and work schedules. Affected exits on I-10 would experience moderate
36 impacts with some congestion. Local road improvements would be necessary in any portion of
37 the SEZ near I-10 that might be developed so as not to overwhelm the local roads near any site
38 access point(s). Similarly, any access to portions of the SEZ that use State Route 177 or U.S. 95
39 may also require road improvements on State Route 177 or U.S. 95 and local access roads,
40 depending on the percentage of worker commuter traffic using those routes.
41

TABLE 9.4.21.1-3 Airports Open to the Public in the Vicinity of the Proposed Riverside East SEZ

Airport	Location	Owner/Operator	Runway 1 ^a			Runway 2 ^a		
			Length (ft [m])	Type	Condition	Length (ft [m])	Type	Condition
Avi Suquilla	Just across the border in Parker, Arizona, approximately 62 mi (100 km) by way of U.S. 95 east of the SEZ	Colorado River Indian Tribes	6,250 (1,905)	Asphalt	Good	– ^b	–	–
Bermuda Dunes	54 mi (87 km) west of the SEZ off I-10	Bermuda Dunes Airport Corporation	5,002 (1,525)	Asphalt	Good	–	–	–
Blythe	Off I-10, at the eastern edge of the SEZ	County of Riverside/ City of Blythe	5,800 (1,768)	Asphalt	Good	6,543 (1,994)	Asphalt	Good
Chiriaco Summit	Off I-10, exit 173, 19 mi (31 km) west of the SEZ	County of Riverside	4,600 (1,402)	Asphalt	Fair	–	–	–
Desert Center	Off State Route 177 just north of I-10, surrounded by the SEZ	Chuckwalla Valley Associates	4,200 (1,280)	Asphalt	Fair	–	–	–
Jacqueline Cochran Regional	West of State Route 86 south of I-10 interchange, about 53 mi (85 km) from the SEZ to the west	County of Riverside	4,995 (1,522)	Asphalt	Good	8,500 (2,591)	Asphalt	Good
Palm Springs International	About 72 mi (116 km) to the west of the SEZ near I-10	City of Palm Springs	4,952 (1,509)	Asphalt	Good	10,001 (3,048)	Asphalt/ Porous Friction	Good

TABLE 9.4.21.1-3 (Cont.)

Airport	Location	Owner/Operator	Runway 1 ^a			Runway 2 ^a		
			Length (ft [m])	Type	Condition	Length (ft [m])	Type	Condition
Twentynine Palms	Approximately 55 mi (88 km) to the northwest of the SEZ along State Route 62	County of San Bernardino	3,797 (1,157)	Asphalt	Good	5,531 (1,686)	Asphalt	Good

^a Source: FAA (2009).

^b A dash indicates not applicable.

1 Because of the proximity of the Blythe and Desert Center Airports, there is a potential for
2 impacts on or interference with flight paths and related flight operations, depending on the
3 location of a solar project within the SEZ. Without proper planning, there could be problems
4 with reflector glare interfering with pilot vision during takeoffs and landings. Problems with
5 glare would be dependent on the specific locations of reflectors within the SEZ. Compliance
6 with FAA regulations and implementation of required programmatic design features would
7 address these concerns. For example, the location of power towers and other taller structures
8 would take into account runway takeoff and landing patterns.
9

10
11 **9.4.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**
12

13 The programmatic design features discussed in Appendix A, Section A.2.2, including
14 local road improvements, multiple site access locations, staggered work schedules, and ride-
15 sharing, would all provide some relief to traffic congestion on local roads leading to the SEZ.
16 Depending on the locations of proposed solar facilities within the SEZ, more specific access
17 locations and local road improvements could be implemented.
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1 **9.4.22 Cumulative Impacts**
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3 The analysis presented in this section addresses the potential cumulative impacts in the
4 vicinity of the proposed Riverside East SEZ in Riverside County, California. The CEQ
5 guidelines for implementing NEPA define cumulative impacts as environmental impacts
6 resulting from the incremental impacts of an action when added to other past, present, and
7 reasonably foreseeable future actions (40 CFR 1508.7). The impacts of other actions are
8 considered without regard to the agency (federal or nonfederal), organization, or person that
9 undertakes them. The time frame of this cumulative impacts assessment could appropriately
10 include activities that would occur up to 20 years in the future (the general time frame for PEIS
11 analyses), but little or no information is available for projects that could occur further than 5 to
12 10 years in the future.
13

14 The nearest population center is the small community of Blythe located 6 mi (9 km) east
15 of the SEZ. The small town of Desert Center is adjacent to the southwestern boundary of the
16 SEZ. The proposed Riverside East SEZ is closely surrounded by Joshua Tree NP to the west and
17 seven WAs: the Palen-McCoy WA, Rice Valley WA, and Big Maria Mountains WA are all
18 located north of the SEZ; the Chuckwalla Mountains WA, Little Chuckwalla Mountains WA,
19 and Palo Verde Mountain WA are all located south of the SEZ; and Joshua Tree WA is located
20 to the west. In addition, the Riverside East SEZ is located close to the Iron Mountain SEZ, and in
21 some areas, impacts from the two SEZs overlap.
22

23 The geographic extent of the cumulative impacts analysis for potentially affected
24 resources near the Riverside East SEZ is identified in Section 9.4.22.1. An overview of ongoing
25 and reasonably foreseeable future actions is presented in Section 9.4.22.2. General trends in
26 population growth, energy demand, water availability, and climate change are discussed in
27 Section 9.4.22.3. Cumulative impacts for each resource area are discussed in Section 9.4.22.4.
28
29

30 **9.4.22.1 Geographic Extent of the Cumulative Impacts Analysis**
31

32 The geographic extent of the cumulative impacts analysis for potentially affected
33 resources evaluated near the Riverside East SEZ is provided in Table 9.4.22.1-1. These
34 geographic areas define the boundaries encompassing potentially affected resources. Their extent
35 varies on the basis of the nature of the resource being evaluated and the distance at which an
36 impact may occur (thus, for example, the evaluation of air quality may have a greater regional
37 extent of impact than visual resources). Most of the lands around the SEZ are administered by
38 the BLM, the NPS, or the DoD; there are also some Tribal Lands about 10 mi (16 km) to the east
39 and northeast of the SEZ. The BLM administers approximately 58% of the lands within a 50-mi
40 (80-km) radius of the SEZ.
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43

TABLE 9.4.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Riverside East SEZ

Resource Area	Geographic Extent
Land use	Eastern Riverside County
Specially Designated Areas and Lands with Wilderness Characteristics	Within a 25-mi (40-km) radius of the Riverside East SEZ
Rangeland Resources	Eastern San Bernardino and Riverside Counties
Recreation	All of San Bernardino and Riverside Counties
Military and Civilian Aviation	For Military Aviation, southeastern California and western Arizona For Civilian Aviation, eastern San Bernardino and Riverside Counties
Soil Resources	Areas within and adjacent to the Riverside East SEZ
Minerals	Eastern San Bernardino and Riverside Counties
Water Resources Surface Water Groundwater	CRA, Colorado River, Palen Lake, Ford Dry Lake Chuckwalla Valley and Palo Verde Mesa Basins
Air Quality and Climate	A 31-mi (50-km) radius from the center of the Riverside East SEZ within the Mojave Desert Air Basin
Vegetation, Wildlife and Aquatic Biota, Special Status Species	A 50-mi (80-km) radius from the center of the Riverside East SEZ, including portions of Riverside, San Bernardino, and Imperial Counties in California and La Paz and Yuma Counties in Arizona
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Riverside East SEZ
Acoustic Environment (noise)	Areas adjacent to the Riverside East SEZ
Paleontological Resources	Areas within and adjacent to the Riverside East SEZ
Cultural Resources	Areas within and adjacent to the Riverside East SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the Riverside East SEZ for other properties, such as traditional cultural properties
Native American Concerns	Valley areas and mountains within and adjacent to the Riverside East SEZ; viewshed within a 25-mi (40-km) radius of the Riverside East SEZ
Socioeconomics	A 50-mi (80-km) radius from the center of the Riverside East SEZ
Environmental Justice	A 50-mi (80-km) radius from the center of the Riverside East SEZ
Transportation	U.S. Highway 10; State Route 177; railroads running north-south, one on western and one on eastern portion of Riverside East SEZ.

1 **9.4.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
2

3 The future actions described below are those that are “reasonably foreseeable”; that is,
4 they have already occurred, are ongoing, are funded for future implementation, or are included in
5 firm near-term plans. Types of proposals with firm near-term plans are as follows:
6

- 7 • Proposals for which NEPA documents are in preparation or finalized;
- 8
- 9 • Proposals in a detailed design phase;
- 10
- 11 • Proposals listed in formal NOIs published in the *Federal Register* or state
12 publications;
- 13
- 14 • Proposals for which enabling legislations has been passed; and
- 15
- 16 • Proposals that have been submitted to federal, state, or county regulators to
17 begin a permitting process.
- 18

19 Projects in the bidding or research phase or that have been put on hold were not included in the
20 cumulative impact analysis.
21

22 The ongoing and reasonably foreseeable future actions described below are grouped into
23 two categories: (1) actions that relate to energy production and distribution, including potential
24 solar energy projects under the proposed action (Section 9.4.22.2.1), and (2) other ongoing and
25 reasonably foreseeable actions, including those related to mining and mineral processing,
26 grazing management, transportation, recreation, water management, and conservation
27 (Section 9.4.22.2.2). Together, these actions have the potential to affect human and
28 environmental receptors within the geographic range of potential impacts over the next 20 years.
29
30

31 **9.4.22.2.1 Energy Production and Distribution**
32

33 Reasonably foreseeable future actions related to energy production and distribution and
34 other major actions within a 50-mi (80-km) radius from the center of the Riverside East SEZ,
35 which includes portions of Riverside, San Bernardino, and Imperial Counties in California, and
36 La Paz and Yuma Counties in Arizona, are identified in Table 9.4.22.2-1 and described in the
37 following sections. Future renewable energy facilities are expected to be the main contributors
38 to potential future impacts in this area, because of favorable conditions in the area for their
39 development, large acreages required, and potentially large quantities of water used. The area is
40 otherwise largely undeveloped and would be expected to remain so in the absence of renewable
41 energy development. Thus, this analysis focuses on renewable energy facilities and any other
42 foreseeable energy large projects, nominally covering 500 acres or more or requiring amounts
43 of water on the scale of utility-scale CSP.

TABLE 9.4.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution and Other Major Actions near the Proposed Riverside East SEZ^a

Description	Status	Resources Affected	Primary Impact Location
<i>Renewable Energy Projects on Private or County Lands</i>			
Rice Solar Energy, 150 MW power tower facility, 2,560 total acres (on private land)	In review; AFC filed with CEC Oct. 21, 2009; CEC comments on AFC sent Nov. 23, 2009.	Land use, visual, terrestrial habitats, wildlife, groundwater	About 15 mi (24 km) north of the eastern part of Riverside East SEZ, adjacent to and south of State Route 62
Tessera Solar, up to 500 MW dish engine facility (on county land)	County of Riverside awarded contract June 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	Riverside County
<i>Fast-Track Solar Energy Projects on BLM-Administered Land</i>			
First Solar Desert Sunlight (CACA 48649), 550-MW PV facility; 4,410 disturbed acres	NOI to prepare an EIS issued on Jan. 13, 2010	Land use, visual, terrestrial habitats, wildlife, groundwater	Western part of Riverside East SEZ
Solar Millennium Palen Solar Project (CAC 48810), 484-MW solar trough; 5,200 total acres	NOI to prepare an EIS issued on Nov. 23, 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	West-central part of Riverside East SEZ
Solar Millennium Blythe Solar Project (CACA 48811), 986-MW trough facility; 9,480 total acres ^b	NOI to prepare an EIS issued on Nov. 23, 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	Eastern part of Riverside East SEZ
NextEra Genesis Ford Dry Lake Solar Project (CACA 48880), 250-MW trough facility; 4,640 total acres ^b	NOI to prepare an EIS issued on Nov. 23, 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	Central part of Riverside East SEZ
<i>Renewable Energy Projects</i>			
Orresource Geothermal (CACA 6217, CACA 6218, CACA 17568)	Ongoing	Land use, terrestrial habitats, visual	About 50 mi (80 km) south of Riverside East SEZ, within the East Mesa Known Geothermal Resource Area
Geothermal Power Project (CACA 18092X)	Authorized	Land use, terrestrial habitats, visual	About 50 mi (80 km) south of Riverside East SEZ, within the East Mesa Known Geothermal Resource Area

TABLE 9.4.22.2-1 (Cont.)

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Projects (Cont.)			
Geothermal Power Project (CACA 29853X)	Authorized	Land use, terrestrial habitats, visual	About 45 mi (72 km) southwest of Riverside East SEZ
Transmission and Distribution			
Blythe Energy Project	Under way	Land use, terrestrial habitats, visual	Riverside County
Transmission Line Modifications Devers to Palo Verde No. 2	California portion authorized	Land use, terrestrial habitats, visual	Riverside County
Other Projects			
Cadiz Valley Dry Year Supply Project	Under review	Disturbed areas, terrestrial habitats along railroad ROW	Areas adjacent to ARZC Railroad ROW in southern portion of Iron Mountain SEZ, about 40 mi (64.3 km) north of Riverside East SEZ
Proposed West Chocolate Mountains Renewable Energy Evaluation Area	NOI to prepare an EIS issued on Feb. 10, 2010	Land use, visual, terrestrial habitats, wildlife, groundwater	About 20 mi (32 km) southwest of Riverside East SEZ
Eagle Crest Hydroelectric Plant	Draft license application submitted to FERC June 2009	Land use, surface water	Eagle Mountain Mine, near northwest portion of Riverside East SEZ
Grazing Lease Rice Valley Allotment	EA Issuance of 10-year Grazing Lease; Jan. 2007 (CA-660-EA06-55)	Land use, surface water	Riverside County

^a Projects in later stages of agency environmental review and project development.

^b Project approved. Updated information will be included in the Final EIS. See http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/fast-track_renewable.html for details.

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Renewable Energy Development

Several recent executive and legislative actions in California have addressed renewable energy development within the state. In November 2008, Governor Schwarzenegger signed E.O. S-14-08 to streamline California’s renewable energy project approval process and increase the state’s RPS to the most aggressive in the nation—at 33% renewable power by 2020. On September 15, 2009, the Governor issued a second E.O., now requiring that 33% of all electrical

1 energy produced in the state be from renewable energy sources by the year 2020. The E.O.
2 directed the CARB to adopt regulations increasing California's RPS to 33% by 2020.

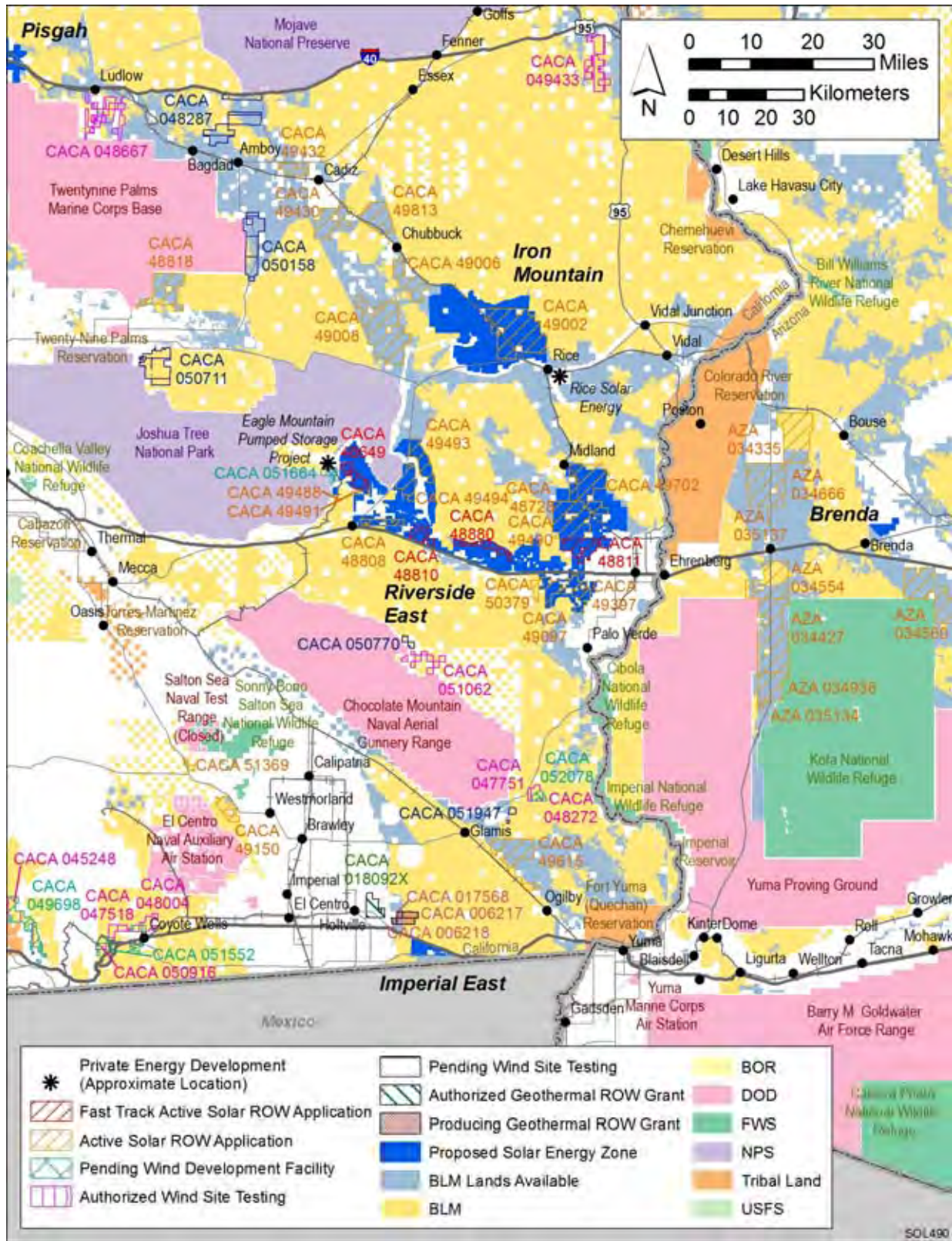
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4 In 2009, the California Legislature drafted bills requiring that electrical energy
5 production meet a standard of 33% from renewable sources. On October 12, 2009,
6 Governor Schwarzenegger vetoed two bills from the California Legislature on electrical
7 energy generated by renewable sources in favor of an alternative plan that would remove
8 limits on the amount of renewable power utilities could buy from other states (African
9 American Environmentalist Association 2009).

10
11
12 **Solar Energy.** Table 9.4.22.2-1 lists one project on private land (Rice Solar Energy), one
13 project on county land (Tessera Solar), and four foreseeable solar energy projects on public land,
14 the so-called fast-track projects. Fast-track projects are those on public lands for which the
15 environmental review and public participation process is under way and the applications could
16 be approved by December 2010 (BLM 2010c). These projects are considered foreseeable
17 because the permitting and environmental review processes are under way. The locations of the
18 Rice and fast-track projects are shown on Figure 9.4.22.2-1. Other, more numerous, pending
19 regular-track applications shown in the figure are discussed collectively at the end of this section.

- 20
21 • **Rice Solar Energy.** The proposed Rice Solar Energy Project would be a power
22 tower facility with an output of 150 MW constructed on 1,410 acres (6 km²)
23 of a 2,560-acre (10-km²) parcel on privately owned land in unincorporated
24 eastern Riverside County, California (CEC 2009b). Access to the site would
25 be from State Route 62 located just north of the site. The site is about 15 mi
26 (24 km) north of the eastern portion of the Riverside East SEZ. Land
27 surrounding the project site consists mostly of undeveloped open desert
28 owned by the Federal Government and managed by the BLM.

29
30 The facility would employ a liquid salt heat transfer and storage medium and
31 a conventional steam turbine. Propane would be used for auxiliary heating,
32 and no natural gas pipeline to the facility would be needed. The facility would
33 use an air-cooled condenser (dry cooling). Water use during the proposed
34 2011 to 2013 (30-month) construction period would be 780 ac-ft/yr
35 (0.96 million m³/yr). Process water requirements for facility operations,
36 commencing by the end of 2013, are estimated to be up to 180 ac-ft/yr
37 (0.22 million m³/yr), assuming an operating capacity factor of 37%. A
38 mostly local construction workforce (averaging 280 workers) would be used.
39 Operations and maintenance of the facility would employ an estimated
40 47 workers (CEC 2009b).

41
42 Surveys found seven desert tortoises, along with shell-skeletal remains,
43 burrows, egg shell fragments, and scat present on the project site, along the
44 generator tie-line route, and within the 1-mi (1.6-km) wide zone surrounding
45 the project site. In addition, Western burrowing owl, Mojave fringe-toed
46 lizard, and loggerhead shrike were found to be present in or near the project



1
 2 **FIGURE 9.4.22.2-1 Location of Renewable Energy Proposals on Public Land within a 50-mi**
 3 **(80-km) Radius of the Proposed Riverside East SEZ**

1
2 area. Several California-listed sensitive plant species were found on the
3 project site or along the proposed transmission line ROW (CEC 2009a).

- 4
5 • *Tessera Solar on County of Riverside Land*. In June 2009, Tessera Solar was
6 selected by the County of Riverside to develop solar energy projects on
7 county-owned land at closed landfills and on undeveloped land adjacent to
8 county airports (Electric Energy Online 2009).

9
10 The solar projects would utilize the CSP dish engine (i.e., SunCatchers)
11 technology and would develop as much as 500 MW of solar power on County
12 of Riverside land. The company is currently analyzing the parcels of available
13 land to determine the best location for the projects.

- 14
15 • *First Solar Desert Sunlight (CACA 48649)*. This proposed fast-track project
16 would use a thin-film PV technology in a facility with an output of 550 MW.
17 The project site is located on approximately 9,480 acres (38.4 km²) and would
18 disturb up to 4,400 acres (17.8 km²) of public land in Riverside County,
19 California, approximately 6 mi (8 km) north of the community of Desert
20 Center, California, and about 7 mi (11 km) north of the I-10 transmission
21 corridor (BLM 2009e). The facility and most of the corridor for the project's
22 230-kV generation interconnection transmission line would be located in the
23 western portion of the proposed Riverside East SEZ. The project would
24 include the solar facility, an on-site substation, a 230-kV interconnection line ,
25 and a planned 230- to 500-kV Red Bluff Substation. The Red Bluff Substation
26 would connect the project to the Southern California Edison (SCE) regional
27 transmission grid.

28
29 The proposed facility would have an estimated water requirement of
30 27 ac-ft/yr (33,000 m³/yr) during its 2011 to 2013 construction period
31 and only 4 ac-ft/yr (5,000 m³/yr) thereafter for operation (BLM and
32 CEC 2010a). On the basis of estimated employment levels for PV facilities
33 (Section 9.4.19.2.2), construction of the facility would employ about
34 220 people, while operations would require an estimated 11 full-time
35 employees.

- 36
37 • *Solar Millennium Palen Solar Project (CACA 48810)*. This proposed fast-
38 track project is a parabolic trough facility with an output of 484 MW. The
39 project site would be on public land within the western portion of the
40 proposed Riverside East SEZ, approximately 10 mi (16 km) east of Desert
41 Center, California, adjacent to the I-10 transmission corridor. The proposed
42 facility would occupy approximately 3,800 acres (15.4 km²) within a
43 proposed 5,200-acre (20.9-km²) ROW. The facility would employ two
44 adjacent and independent solar troughs with nominal output of 250 MW each.
45 It would employ dry cooling and would require about 300 ac-ft/yr
46 (0.37 million m³/yr) of groundwater drawn from two on-site wells for mirror

1 washing and other uses. Water requirements during the proposed construction
2 period of 2011 to 2013 are estimated to be 480 ac-ft/yr (0.59 million m³/yr).
3 The project would disturb about 3,000 acres (12 km²). The facility would
4 connect to the planned Red Bluff substation, to be built approximately 10 mi
5 (16 km) west of the project location. An auxiliary boiler would be fired with
6 propane. An average of 566 workers would be employed during construction,
7 and 134 full-time employees would be required for operations (BLM and
8 CEC 2010a).

9
10 Special status species of concern include desert tortoise and Western
11 burrowing owl. No desert tortoises and only low-quality tortoise habitat were
12 observed during spring 2009 surveys. Cultural surveys have identified both
13 prehistoric and historic cultural resources (BLM and CEC 2010a).

- 14
- 15 • *Solar Millennium Blythe Solar Project (CACA 48811)*. This proposed fast-
16 track project would be a parabolic trough facility with an output of 986 MW.
17 The project site would be on public land within the eastern portion of
18 proposed Riverside East SEZ, approximately 8 mi (13 km) west of Blythe,
19 California, adjacent to the I-10 transmission corridor. The proposed facility
20 would occupy approximately 9,480 acres (38.4 km²) and disturb about
21 7,030 acres (28.5 km²). The facility would employ four adjacent and
22 independent solar troughs with nominal output of 250 MW each. It would
23 employ dry cooling and would require about 600 ac-ft/yr (0.74 million m³/yr)
24 of groundwater drawn from two on-site wells for mirror washing and other
25 uses. Water requirements during the proposed 2011 to 2015 construction
26 period are estimated to be 620 ac-ft/yr (0.77 million m³/yr). The facility
27 would connect to a planned new substation, the Colorado River Substation, to
28 be built approximately 5 mi (8 km) to the southwest of the project location. To
29 supply auxiliary boilers, a 10-mi (16-km) long natural gas pipeline would be
30 built to connect to an existing pipeline south of I-10; about 8 mi (13 km) of
31 the line would be on the project ROW. An average of 604 workers would be
32 employed during construction of the facility and 221 full-time employees
33 would be required for operations (BLM and CEC 2010b).

34
35 Project construction would result in a direct loss of low- to moderate-quality
36 habitat for desert tortoise over the project site and would fragment and
37 degrade adjacent native plant and wildlife communities. The project could
38 also promote the spread of invasive non-native plants and desert tortoise
39 predators such as ravens. Five species of California-listed sensitive plant
40 species are present. Habitat is also present for Western burrowing owl,
41 loggerhead shrike, Le Conte's thrasher, black-tailed gnatcatcher, and
42 California horned lark (BLM and CEC 2010b).

- 43
- 44 • *NextEra Genesis Ford Dry Lake Solar Project (CACA-4880)*. This proposed
45 fast-track project consists of two independent solar trough facilities using wet
46 cooling with a total output of 250 MW. The project site would be located on

1 public land within the central portion of the proposed Riverside East SEZ,
2 approximately 20 mi (32 km) west of Blythe, California, north of I-10 and
3 near Dry Lake, California. The proposed facility would occupy 4,640 acres
4 (18.8 km²) and directly affect 1,800 acres (7.3 km²). The proposed facility
5 would employ wet cooling and would require about 1,640 ac-ft/yr
6 (2.0 million m³/yr) of cooling water that would be obtained from on-site
7 wells. Water requirements during the proposed construction period of 2011 to
8 2013 are estimated to be 870 ac-ft/yr (1.1 million m³/yr). The facility would
9 interconnect to the proposed Colorado River Substation via a 230-kV on-site
10 switchyard and a new transmission line that would tie into the existing Blythe
11 Energy Project transmission line. The new transmission line, natural gas line,
12 and access road would be built in the same corridor that would exit the
13 southern site boundary and extend about 7 mi (11 km) to the south. An
14 average of 646 workers would be employed during construction of the facility
15 and 40 to 50 full-time employees would be required for operations (BLM and
16 CEC 2010c).

17
18 Biological surveys have identified a number of special status species,
19 including Mojave and Colorado fringe-toed lizards, loggerhead shrike,
20 Western burrowing owl, short-eared owl, prairie falcon, and northern harrier.
21 While no live desert tortoise were found, burrows and bones were present on
22 the site, and tracks and carcasses in the surrounding area. As many as
23 15 cultural resource sites would be directly affected by construction of the
24 proposed Genesis Solar Energy Project (BLM and CEC 2010c).

- 25
26 • *Pending Solar ROW Applications on BLM-Administered Lands.* In addition to
27 the four fast-track solar projects described above, a number of regular-track
28 ROW applications for solar projects have been submitted to the BLM that
29 would be located either within the Riverside East SEZ or within 50 mi
30 (80 km) of the SEZ (BLM 2010b). Table 9.4.22.2-2 provides a list of all solar
31 projects that had pending applications submitted to BLM as of March 2010.
32 Figure 9.4.22.2-1 shows the locations of these applications.

33
34 Within 50 mi (80 km) of the proposed Riverside East SEZ, there are 29 active
35 solar applications. Within the boundaries of the Riverside East SEZ, there are
36 11 pending regular-track applications; they are administered through the Palm
37 Springs-Southcoast Field Office.

38
39 The likelihood of any of the regular-track ROW application projects actually
40 being developed is uncertain but is generally assumed to be less than that for
41 fast-track applications. The projects are all listed in Table 9.4.22.2-2 for
42 completeness and as an indication of the level of interest in development of
43 solar energy in the region. Some number of these applications would be
44 expected to result in actual projects. Thus, the cumulative impacts of these
45 potential projects are analyzed in their aggregate effects.

46

1 **Wind Energy.** Table 9.4.22.2-2 lists ROW grant applications for four pending
2 authorization of wind testing, three authorized for wind site testing, and two wind development
3 facilities within a 50-mi (80-km) radius of the proposed Riverside East SEZ. The actual
4 development of all nine proposals is considered pending, however, since they await authorization
5 of development of wind facilities. As shown in Figure 9.4.22.2-1, the locations of the
6 applications lie generally northwest to southwest and within 30 mi (48 km) of the SEZ.
7

8 The likelihood of any of the regular-track wind projects actually being developed is
9 uncertain; the projects are listed to give an indication of the level of interest in development of
10 wind energy in the region. Most are in the wind testing stage, and Environmental Assessments
11 necessary for project approval are being prepared.
12
13

14 **Geothermal Energy.** Imperial County is immediately south of the Riverside East SEZ
15 and contains some of the most productive geothermal resource areas in the United States. Within
16 the El Centro Field Office management area, 118,720 acres (480 km²) is identified as having
17 geothermal resource potential (BLM 2008b). This acreage is divided into seven KGRAs: Dunes,
18 East Brawley, East Mesa, Glamis, Heber, Salton Sea, and South Brawley.
19

20 There are three producing and two authorized geothermal leases within a 50-mi (80-km)
21 radius of the proposed Riverside East SEZ, as listed in Table 9.4.22.2-1 and shown in
22 Figure 9.4.22.2-1. All of these leases are within Imperial County. The producing geothermal
23 leases are about 50 mi (80 km) south of the SEZ and within the East Mesa KGRA. The
24 producing leases CACA 6217, CACA 6218, and CACA 17568 are all owned by Orresource
25 Geothermal. Of the authorized geothermal leases, CACA 29853X is located about 45 mi (72 km)
26 southwest of the Riverside East SEZ and CACA 18092X is located about 50 mi (80 km) south.
27
28

29 **Transmission and Distribution**

30

31 **Blythe Energy Project Transmission Line Modifications.** Blythe Energy LLC is
32 proposing transmission line modifications that would allow electrical output from Blythe Energy
33 Project, a 520-MW natural gas-fired electric generating facility, to be delivered to the southern
34 California International Standards Organization-controlled electrical transmission system. There
35 are two components to the proposed BEP transmission line modifications:
36

- 37 • Buck to Julian Hinds transmission line component:

- 38 – Upgrades to the Buck Substation.

39 Installation of approximately 67 mi (108 km) of new 230-kV transmission
40 line between the Buck Substation located adjacent to the Blythe Energy
41 Project and the Julian Hinds Substation located approximately 60 mi
42 (97 km) to the west.
43
44
45

TABLE 9.4.22.2-2 Pending Renewable Energy Project Applications on BLM-Administered Land within 50 mi of the Riverside East SEZ^a

Serial No.	Project Name	Application Received	Size (acres ^b)	MW	Technology	Field Office
<i>Solar Applications</i>						
AZA 034335	Boulevard Associates, LLC	June 8, 2007	24,221	500	CSP/Trough	Lake Havasu: Yuma
AZA 034427	Pacific Solar Invst., Inc. (Iberdrola)	Sept. 6, 2007	32,000	2,000	CSP/Trough	Yuma
AZA 034554	Nextlight Renewable Power, LLC	March 26, 2008	20,699	500	CSP/Trough	Yuma
AZA 034560	Nextlight Renewable Power, LLC	March 26, 2008	15,040	500	CSP/Trough	Yuma
AZA 034666	SolarReserve, LLC (Quartzsite)	May 27, 2008	25,204	100	CSP/Tower	Yuma
AZA 034936	Wildcat Quartzsite, LLC	Jan. 29, 2009	11,960	800	CSP/Tower	Yuma
AZA 035134	E-on Climate & Renewables (La Posa)	July 2, 2009	1,780	NA	NA	Yuma
AZA 035137	E-on Climate & Renewables (Castle Dome)	July 2, 2009	590	100	PV	Yuma
CACA 48728	FPL Energy	Jan. 31, 2007	20,608	250	CSP	Palm Springs-Southcoast
CACA 48808	Chuckwalla Solar, LLC	Sept. 15, 2006	4,099	200	PV	Palm Springs-Southcoast
CACA 48818	First Solar (Desert Opal)	Feb. 26, 2007	15,824	1,205	PV	Barstow
CACA 49002	Leopold Company, LLC	Apr. 2, 2007	35,466	4,100	CSP	Needles
CACA 49006	Boulevard Associates, LLC	May 14, 2007	12,046	1,000	CSP	Needles
CACA 49008	Boulevard Associates, LLC	May 14, 2007	35,639	1,000	CSP	Needles
CACA 49097	Bull Frog Green Energy, LLC	Oct. 1, 2008	6,634	2,500	PV	Palm Springs-Southcoast
CACA 49150	BCL & Associate, Inc.	July 17, 2007	5,464	500	PV	El Centro
CACA 49397	First Solar (Desert Quartzite)	Sept. 28, 2007	7,548	600	PV	Palm Springs-Southcoast
CACA 49430	Iberdrola Renewables, Inc.	Dec. 8, 2008	13,373	N/A	CSP	Needles
CACA 49432	PG&E	Sept. 24, 2007	5,315	800	Undecided	Needles
CACA 49488	EnXco, Inc.	Nov. 13, 2007	1,327	300	CSP	Palm Springs-Southcoast
CACA 49490	EnXco, Inc.	Nov. 13, 2007	20,608	300	CSP	Palm Springs-Southcoast
CACA 49491	EnXco, Inc.	Nov. 13, /2007	1,327	300	CSP	Palm Springs-Southcoast
CACA 49493	Solel, Inc.	March 27, 2008	8,750	500	CSP	Palm Springs-Southcoast
CACA 49494	Solel, Inc.	Nov. 6, 2007	7,317	500	CSP	Palm Springs-Southcoast
CACA 49615	Pacific Solar Investments, Inc.	Sept. 4, 2007	17,807	1,500	PV	El Centro
CACA 49702	Bull Frog Green Energy, LLC	June 1, 2008	22,717	2,500	PV	Palm Springs-Southcoast
CACA 49813	Iberdrola Renewables, Inc.	April 1, 2008	12,833	1,000	CSP	Needles
CACA 50379	Lightsource Renewables, LLC	Aug. 8, 2008	2,446	550	CSP	Palm Springs-Southcoast
CACA 51369	Invenery Solar Development, LLC	Sept. 16, 2009	1,081	50	PV	El Centro

TABLE 9.4.22.2-2 (Cont.)

Serial No.	Project Name	Application Received	Size (acres ^b)	MW	Technology	Field Office
Wind Applications						
Pending Wind Site Testing						
CACA 50158	Little Mountain Wind Power, LLC	May 12, 2008	15,000	– ^c	Wind	Needles
CACA 50711	Padoma Wind Power	March 17, 2009	23,829	–	Wind	Barstow
CACA 50770	–	–	–	–	Wind	–
CACA 51947	L.H. Renewables, LLC	March 10, 2010 Application Authorized	9,069	–	Wind	El Centro
Authorized Wind Site Testing						
CACA 47751	Renewergy, LLC	Jan. 23, 2007	11,187	–	Wind	El Centro
CACA 48272	Imperial Wind	Aug. 16, 2010	1,960	–	Wind	El Centro
CACA 51062	John Deere Renewables, LLC	April 29, 2009	6,256	–	Wind	El Centro
Pending Wind Development Facility						
CACA 51664	L.H. Renewables, LLC	Dec. 8, 2009	3,500	–	Wind	Palm Springs
CACA 52078	Imperial Wind	May 28, 2010	2,054	65	Wind	El Centro

^a Information taken from pending and authorized wind energy projects listed on BLM California Desert District Web site (BLM 2010h) and downloaded from GeoCommunicator (BLM and USFS 2010b); total solar acres = 389,723 total solar MW = 24,137; total wind acres and MW not available.

^b To convert acres to km², multiply by 0.004047.

^c A dash indicates data not available.

- 1 – The proposed transmission line route would generally follow SCE’s
- 2 existing 500-kV Devers-Palo Verde transmission line.
- 3
- 4 – Transmission line structures would be concrete, single-pole structures.
- 5
- 6 – Upgrades to the Julian Hinds Substation.
- 7
- 8 • Buck to Devers-Palo Verde transmission line component:
- 9
- 10 – Upgrades to Buck Substation.
- 11
- 12 – Installation of approximately 7 mi (11 km) of a new 230-kV transmission
- 13 line (initially operated at 161 kV) between the Buck Substation and SCE’s
- 14 existing Devers-Palo Verde 500-kV transmission line.
- 15
- 16 – Transmission line structures would be concrete single-pole structures.
- 17
- 18 – Construction of a new 161-kV to 500-kV substation at the point of
- 19 interconnection with SCE’s existing Devers-Palo Verde 500-kV
- 20 transmission line (CEC 2010a).
- 21

22 The CEC Web site indicates that Blythe Energy is currently making the transmission line and
 23 substation modifications and expects construction to be completed in 2010 (CEC 2010a).

24

25

26 ***Devers to Palo Verde No.2.*** A second Devers-Palo Verde line has been proposed that will
 27 run adjacent to the existing line south of I-10 and the proposed Riverside East SEZ in an existing
 28 corridor. The 500-kV line would run 230 mi (370 km) following the existing Devers-Palo Verde
 29 500-kV line from San Bernardino in California to the Harquahala Generating Station near the
 30 Palo Verde Nuclear Plant in Arizona. However, the Arizona Corporation Commission has denied
 31 the Arizona portion of the line. In California, the line would run a total of 153 mi (245 km) from
 32 the Colorado River Substation to the Devers Substation and end at Valley Substation. The CPUC
 33 approved the California portion of the line on Nov. 20, 2009 (CPUC 2009). Southern California
 34 Edison is expecting to begin construction of the California portion of the line in 2011 and have
 35 the line in service in 2013. Construction is pending ISO satisfaction with conditions for
 36 interconnection agreements, while the project still requires approval in a BLM ROD.

37

38

39 ***9.4.22.2.2 Other Actions***

40

41

42 **Other Foreseeable Actions**

43

44

45 ***Cadiz Valley Dry-Year Supply Project.*** The Cadiz Valley Dry-Year Supply Project is
 46 a water storage and supply program that will provide southern California with as much as

1 150,000 ac-ft/yr (185 million m³/yr) of water during years of droughts, emergencies, or other
2 periods of urgent need by utilizing the aquifer system that underlies Cadiz's 35,000 acres
3 (142 km²) of land holdings in the Cadiz and Fenner Valleys of eastern San Bernardino County
4 (Cadiz, Inc. 2008), about 40 mi (64 km) north of the western portion of the Riverside East SEZ.
5 Historically, such dry periods occur in about 3 out of every 10 years. In any given dry year, this
6 water would be enough to serve more than 1.2 million people. The project would involve
7 taking water from the CRA during high rainfall years and storing it in aquifer systems to supply
8 southern California's water needs during periods of severe drought (Cadiz Inc. 2008).

9
10 The project was the subject of congressional hearings in August 2009 regarding
11 Cadiz, Inc.'s controversial proposal to use a 42-mi (68-km) long stretch of a Mojave railway
12 line ROW for the water pipeline (Chance of Rain 2009). A portion of the water pipeline would
13 cross the extreme southern part of the Iron Mountain SEZ, about 20 mi (32 km) north of the
14 Riverside East SEZ.

15
16
17 ***Proposed West Chocolate Mountains Renewable Energy Evaluation Area.*** In a
18 February 10, 2010, NOI in the *Federal Register*, the BLM El Centro Field Office announced its
19 intent to prepare an EIS to consider an amendment to the California Desert Conservation Area
20 Plan to identify whether 21,300 acres (86.2 km²) of BLM-administered lands within the West
21 Chocolate Mountains area should be made available for geothermal, solar, or wind energy
22 development (BLM 2010a). The Evaluation Area lies about 20 mi (32 km) southwest of the
23 proposed Riverside East SEZ in Riverside County, east of Niland and northeast of El Centro,
24 California.

25
26
27 ***Eagle Crest Hydroelectric Plant.*** Eagle Crest Energy company proposes to construct and
28 operate a 1,300-MW pumped storage hydroelectric plant at the Eagle Mountain Mine located
29 near the northwest portion of the Riverside East SEZ about 10 mi (16 km) north of Desert
30 Center. A draft license application for project approval was submitted to the FERC in June 2008
31 (Eagle Crest Energy 2008a). In September 2008, Eagle Crest Energy submitted a request to the
32 California Water Resources Control Board for water qualification certification pursuant to
33 Section 401 of the CWA (Eagle Crest Energy 2008b).

34
35 The pumped storage facility would be constructed at the old Eagle Mountain Mine site.
36 The facility would use former mine pits (i.e., upper and lower reservoirs), which would be linked
37 by subsurface tunnels to convey water through four reversible 325-MW turbines. Water would
38 be pumped alternately to the upper storage reservoirs and released to the lower reservoirs. The
39 lower reservoirs would initially be filled with 25,000 ac-ft (30.8 million m³) of water. The
40 system is estimated to lose some water to seepage and evaporation and require makeup water
41 estimated at 2,400 ac-ft/yr (3.0 million m³/yr).

42
43 Eagle Crest Energy would build transmission lines to convey power to a new substation
44 that would in turn connect to the 500-kV Palo Verde-Devers transmission line located about
45 10 mi (16 km) from the project site (Eagle Crest Energy 2009).

1 **Other Ongoing Actions**
2
3

4 **Mining.** Several mining claims are active north of the eastern portion of the Riverside
5 East SEZ. The BLM GeoCommunicator Database showed mining densities of 26 to 50 per
6 section within the five townships in the northern portions of the eastern part of the SEZ.
7 Two townships along the southern portion of the eastern part adjacent to I-10 have mine claim
8 densities of 51 to 100 in each township. Mine claim densities in townships in the western part
9 of the SEZ vary from 1 to 10 in the two townships located northwest of State Route 177. The
10 locations of individual mine claims and their potential conflict with solar energy projects will
11 require additional analysis by solar energy companies and by decision-makers prior to project
12 approval. Developers may have to purchase mine claims in order to site solar energy facilities.
13

14
15 **Grazing**
16

- 17 • *Ten-Year Grazing Lease Rice Valley Allotment.* The BLM prepared an EA on
18 a proposal for a 10-year lease on the Rice Valley Allotment to authorize sheep
19 grazing on 74,740 acres (302 km²) of public land located approximately 26 mi
20 (42 km) northwest of Blythe in Riverside County (BLM 2007a).
21
22

23 **9.4.22.3 General Trends**
24
25

26 **9.4.22.3.1 Population Growth**
27

28 Table 9.4.22.3-1 presents recent and projected populations in the 50-mi (80-km) radius
29 ROI (i.e., the ROI is Riverside County) and in California as a whole. Population in the ROI stood
30 at 2,103,050 in 2008, having grown at an average annual rate of 3.8% since 2000. The growth
31 rate for the ROI was higher than that for California (1.4%) over the same period.
32

33 The ROI population is expected to increase to 2,965,113 by 2021 and to 3,085,643 by
34 2023 (California Department of Finance 2010).
35
36

37 **9.4.22.3.2 Energy Demand**
38

39 The growth in energy demand is related to population growth through increases in
40 housing, commercial floorspace, transportation, manufacturing, and services. With population
41 growth expected in Imperial, Riverside, and San Bernardino Counties between 2006 and 2016,
42 an increase in energy demand is also expected. However, the EIA projects a decline in per-capita
43 energy use through 2030, mainly because of improvements in energy efficiency and the high cost
44 of oil throughout the projection period. Primary energy consumption in the United States
45 between 2007 and 2030 is expected to grow by about 0.5% each year; the fastest growth is
46 projected for the RCI sector, which is expected to grow by about 0.5% (residential), 0.4%
47 (commercial), and 0.1% (industrial) each year (EIA 2009).

TABLE 9.4.22.3-1 ROI Population for the Proposed Riverside East SEZ

Location	2000	2008 ^a	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Riverside County	1,559,039	2,103,050	3.8	2,965,113	3,085,643
California	34,105,437	38,129,628	1.4	44,646,420	45,667,413

^a Data are averages for the period 2006 to 2008.

Sources: U.S. Bureau of the Census (2009f); California Department of Finance (2010).

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9.4.22.3.3 Water Availability

The Riverside East SEZ is located within the Mojave Desert, which is characterized by extreme daily temperature ranges with low precipitation and humidity (CDWR 2009); annual precipitation is between 4 and 6 in./yr (10 and 15 cm/yr) (CDWR 2003).

Palen Lake and Ford Dry Lake are located in the SEZ. Palen Lake is a wet playa having groundwater located near the surface and covering an area of 4,260 acres (17 km²) with only 750 acres (3 km²) within the boundaries of the SEZ. Ford Dry Lake is a dry lakebed covering 4,400 acres (18 km²), most of which is within the SEZ boundaries. The primary surface water features within the proposed Riverside East SEZ are several ephemeral drainages coming off the surrounding mountains.

The SEZ is located within two groundwater basins: Chuckwalla Valley and Palo Verde Mesa. There are no restrictive structures between the two groundwater basins. The total thickness of the principal aquifer is on the order of 1,200 ft (366 m) (CDWR 2003), and the alluvium layer thickness is on the order of 100 to 150 ft (30 to 46 m) in the region of the SEZ (Metzger et al. 1973).

Groundwater recharge in the Chuckwalla Valley is by subsurface underflow and from direct infiltration of precipitation runoff. Estimates of natural recharge have not been quantified in the Chuckwalla Valley. Natural recharge is estimated to be 800 ac-ft/yr (987,000 m³/yr) in the neighboring Palo Verde Mesa and the Cadiz Valley, which have similar climate and precipitation conditions (CDWR 2003). Recharge from precipitation runoff is not suspected to be significant given the limited precipitation in the region (Metzger et al. 1973).

Groundwater discharge in the Chuckwalla Valley is primarily by evapotranspiration at Palen Lake and subsurface underflow to the Palo Verde Mesa; the evapotranspiration rate at Palen Lake is unknown, and the subsurface underflow is estimated to be 400 ac-ft/yr (493,000 m³/yr) to Palo Verde Mesa (CDWR 2003).

1 Groundwater withdrawal rates were 9,100 ac-ft/yr (11.2 million m³/yr) in 1966 (CDWR
2 2003), and between 4,400 and 5,700 ac-ft/yr (5.4 million and 7.0 million m³/yr) during dry and
3 wet years occurring in the period 1998 to 2001 (CDWR 2005). The majority of groundwater
4 withdrawals in the region of the proposed SEZ are for agricultural and domestic uses.
5

6 Groundwater surface elevations are routinely monitored in the Chuckwalla Valley and
7 Palo Verde Mesa. Depth to groundwater ranges between 80 and 270 ft (24 and 82 m) below the
8 surface across the Chuckwalla Valley and into the Palo Verde Mesa (USGS 2010b).
9 Groundwater surface elevations have remained steady for several decades (USGS 2010c,
10 monitoring wells 334438115211101, 333939114411501).
11

12 Groundwater well yields average 1,800 gpm (6,814 L/min) with a maximum of
13 3,900 gpm (14,760 L/min) in the Chuckwalla Valley. However, the majority of the groundwater
14 extractions are clustered on the western and eastern edges of the valley around Desert Center and
15 the Palo Verde Mesa. It is suspected that further groundwater development in this region may
16 lead to declines in groundwater elevations (Metzger et al. 1973; Steinemann 1989).
17

18 In 2005, water withdrawals from surface waters and groundwater in Riverside County
19 were 1.4 million ac-ft/yr (1.7 billion m³/yr), of which 74% came from surface waters and 26%
20 from groundwater. The largest water use category was municipal and domestic supply, at
21 519,000 ac-ft/yr (640 million m³/yr). However, the majority of this water is used in the larger
22 cities located in the western portion of Riverside County. Agricultural water uses accounted for
23 874,000 ac-ft/yr (1.1 billion m³/yr), and industrial water uses on the order of 7,000 ac-ft/yr
24 (8.6 million m³/yr) (Kenny et al. 2009). The primary water use in the eastern portion of
25 Riverside County relevant to the proposed Riverside East SEZ is for agriculture, representing
26 59 to 77% of total groundwater withdrawals during the dry and wet years, respectively, in the
27 period 1998 to 2001 (CDWR 2005).
28
29

30 ***9.4.22.3.4 Climate Change*** 31

32 Global warming continues to affect many desert areas in the southwestern United States
33 with increased temperature and prolonged drought during the past 20 to 30 years. A report on
34 global climate change in the United States prepared on behalf of the National Science and
35 Technology Council by the U. S. Global Research Program documents current temperature and
36 precipitation conditions and historic trends, and projects impacts during the remainder of the
37 twenty-first century through modeling using low and high scenarios of GHG emissions. The
38 report summarizes the science of climate change and the recent and future impacts of climate
39 change on the United States (GCRP 2009). The following excerpts from this report indicate that
40 there has been a trend for increasing global temperature and decrease in annual precipitation in
41 desert regions:
42

- 43 • Average temperature in the United States increased more than 2° F (1.1°C)
44 over the period 1957 to 2007.
45

- 1 • Southern areas, particularly desert regions of southern Arizona and
2 southeastern California, have experienced longer drought and are projected to
3 have more severe periods of drought during the remainder of the twenty-first
4 century. Much of the Southwest has experienced drought conditions since
5 1999. This period represents the most severe drought in 110 years.
6
- 7 • The incidence of wildfires in the western United States has increased in recent
8 decades, partly because of increased drought.
9
- 10 • Temperature increases in the next 20 to 30 years are expected to be strongly
11 correlated with past emissions of heat-trapping gases, such as carbon dioxide
12 and methane.
13
- 14 • Many extreme weather events have increased both in frequency and intensity
15 during the last 40 to 50 years. Precipitation and runoff are expected to
16 decrease in the Southwest in spring and summer based on current data and
17 anticipated temperature increases. Water use will increase over the next
18 several decades as the population of southern California grows, resulting in
19 trade-offs between competing uses.
20
- 21 • Climate project models also show a 10 to 20% decline in runoff in California
22 and Nevada for the period of 2041 to 2060 compared with data from 1901 to
23 1970 used as a baseline.
24
- 25 • In the Southwest average temperatures increased about 1.5°F (0.8°C) in
26 2000 compared to a baseline period of 1960 to 1979. By the year 2020,
27 temperatures are projected to rise 2 to 3°F (1.1 to 1.7°C) above the 1960 to
28 1979 baseline.
29

30 Increased global temperatures from GHG emissions will likely continue to exacerbate
31 drought in the southern California deserts. The State of California has prepared several reports
32 of climate change impact predictions through the remainder of the twenty-first century that
33 address topics such as economics, ecosystems, water use/availability, impacts on Santa Ana
34 winds, agriculture, timber production, and snowpack. The California climate change portal Web
35 site (<http://www.climatechange.ca.gov/publications/cat/index.html>) lists the Climate Action
36 Team reports that are submitted to the Governor and state legislature. These reports are included
37 as final papers of the California Energy Commission's Public Interest Energy Research Program.
38

39 **9.4.22.4 Cumulative Impacts on Resources**

40 This section addresses potential cumulative impacts in the proposed Riverside East SEZ
41 on the basis of the following assumptions: (1) because of the relatively large size of the proposed
42 SEZ (more than 30,000 acres [121 km²]), as many as three projects could be constructed at a
43 time, and (2) maximum total disturbance over 20 years would be 162,317 acres (657 km²) (80%
44 of the entire proposed SEZ). For analysis, it is also assumed that no more than 3,000 acres
45
46

1 (12.1 km²) would be disturbed per project annually and 250 acres (1.01 km²) monthly on the
2 basis of construction schedules planned in current applications. An existing 500-kV transmission
3 line runs east–west along I-10 and parallel to the southern SEZ boundary and a 230-kV line
4 passes through the far western section of the SEZ; therefore, for this analysis, the impacts of
5 construction and operation of new transmission lines outside of the SEZ were not assessed.
6 Regarding site access, because I-10 passes along the southern edge of the SEZ and there are
7 several exits from I-10 as it passes by and through the SEZ, no major road construction activities
8 outside of the SEZ would be needed for development to occur in the SEZ.
9

10 Cumulative impacts in each resource area that would result from the construction,
11 operation, and decommissioning of solar energy development projects within the proposed SEZ
12 when added to other past, present, and reasonably foreseeable future actions described in the
13 previous section are discussed below. At this stage of development, because of the uncertainties
14 of the future projects in terms of location within the proposed SEZ, size, number, and the types
15 of technology that would be employed, the impacts are discussed qualitatively or semi-
16 quantitatively, with ranges given as appropriate. More detailed analyses of cumulative impacts
17 would be performed in the environmental reviews for the specific projects in relation to all other
18 existing and proposed projects in the geographic areas.
19
20

21 ***9.4.22.4.1 Lands and Realty*** 22

23 Although the proposed Riverside East SEZ lies adjacent to the highly developed I-10
24 corridor, which includes a number of major transmission lines, roads, pipelines, and other
25 infrastructure, much of the land within the proposed SEZ exhibits a rural character
26 (Section 9.4.2.1). The SEZ contains only BLM-administered land, but numerous parcels of
27 private land are scattered throughout the SEZ or are located in near proximity. One section of
28 state land is surrounded by the SEZ.
29

30 Development of the SEZ would introduce a highly contrasting industrialized land use into
31 an area that is largely rural. In addition, numerous other renewable energy projects are proposed
32 within a 50-mi (80-km) radius of the Riverside East SEZ. As shown in Table 9.4.22.2-2 and
33 Figure 9.4.22.2-2, as many as 33 solar projects and 9 wind projects have pending applications
34 within this distance, with ROW applications for solar projects alone totaling more than
35 400,000 acres (1,600 km²), including more than 30,000 acres (120 km²) for six advanced solar
36 proposals on private and public land (Section 9.4.22.2.1). As a result of the potential and likely
37 development of other renewable energy projects and accompanying transmission lines, roads,
38 and other infrastructure within the geographic extent of effects, the character of a large portion of
39 the California Desert could be dramatically changed. The contribution to cumulative impacts of
40 utility-scale solar projects on public lands on and around the Riverside East SEZ could be
41 significant, particularly if the SEZ is fully developed with solar projects. Development of the
42 public lands for solar energy production may also result in similar development on the state and
43 private lands in the immediate vicinity of the SEZ.
44

45 Construction of utility-scale solar energy facilities within the SEZ would preclude use of
46 those areas occupied by the solar energy facilities for other purposes. The areas that would be

1 occupied by the solar facilities would be fenced, and access to those areas by both the general
2 public and wildlife would be eliminated.

3 4 5 **9.4.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics** 6

7 The proposed Riverside East SEZ is located in the CDCA and surrounded by specially
8 designated areas, including Joshua Tree NP, seven designated Wilderness Areas, and seven
9 ACECs: Corn Springs, Alligator Rock, Chuckwalla DWMA, Chuckwalla Valley Dune Thicket,
10 Desert Lily Preserve, Mule Mountains, and Palen Dry Lake (Section 9.4.3.1). Construction of
11 utility-scale solar energy facilities within the SEZ in combination with potential development of
12 other renewable energy projects and associated infrastructure would have the potential for
13 contributing to the adverse visual impacts on these specially designated areas. Development of
14 the SEZ, especially full development, would be a dominant factor in the viewshed from large
15 portions of one or more of these areas.
16

17 Solar development both of the Riverside East SEZ and the Iron Mountain SEZ (which is
18 about 25 mi [40 km] north), together with the Rice Solar Energy and Tessera Solar facilities on
19 private land, would combine to adversely affect wilderness values in the Palen-McCoy, Rice
20 Valley, Big Maria Mountains, Chuckwalla Mountains, and Little Chuckwalla Mountains WAs
21 and in Joshua Tree NP. As of February 2010, 15 solar project applications were pending in the
22 SEZ, including four fast-track solar applications, covering about 65% of the SEZ that, in
23 combination with projects within a 50-mi (80-km) radius, likely will result in cumulative effects,
24 particularly visual impacts, on sensitive areas.
25
26

27 **9.4.22.4.3 Rangeland Resources** 28

29 No livestock grazing now occurs in the SEZ; therefore, solar development of the area
30 would not contribute to any cumulative effects on livestock grazing. Likewise, since SEZ is not
31 located within either an HA or HMA, there would be no contribution to any adverse effects on
32 wild horses or burros.
33
34

35 **9.4.22.4.4 Recreation** 36

37 The Riverside East SEZ is quite flat, but it does offer diverse recreational opportunities,
38 especially during cooler months. Those opportunities include back country driving, camping,
39 rockhounding, hunting, and seasonal nature hikes. The area has been traditionally used by the
40 residents of Desert Center, Blythe, and urban areas to the west. It is anticipated there would not
41 be a significant loss of recreational use caused by development of the Riverside East SEZ,
42 although some users would be displaced.
43

44 When SEZ development is considered in combination with other potential renewable
45 energy development within the region, a potential would exist for cumulative visual impacts on
46 recreational users of the specially designated areas surrounding the SEZ (Section 9.4.22.4.2).

1 There is substantial potential for loss of wilderness and scenic values throughout the California
2 Desert wherever solar and wind energy development encroaches on wilderness or on other
3 currently undeveloped areas. Cumulative impacts on recreational use associated with the loss of
4 wilderness values and general open desert scenery also could occur. While the effects cannot be
5 quantified, desert users might avoid areas dominated by industrial-type solar facilities. This
6 situation could result a fundamental change in the way the California Desert has been
7 traditionally used.
8
9

10 **9.4.22.4.5 Military and Civilian Aviation**

11

12 The proposed Riverside East SEZ is located under eight MTRs, which are part of a very
13 large, interconnected system of military aircraft training routes throughout the southwest. The
14 development of any solar energy or transmission facilities that encroach into the airspace of
15 MTRs could create safety issues and could interfere with military training activities. While the
16 military has indicated that some portions of this SEZ are compatible with its existing use
17 regardless of the proposed heights of solar facilities, while other portions should have height
18 limits, and some areas may be incompatible with existing military use. Potential solar
19 development occurring throughout the region, which is currently largely undeveloped, could
20 result in small cumulative effects on the system of MTRs. Such effects would be limited by
21 mitigations developed in consultation with the military.
22

23 Two civilian aviation facilities lie within 2 mi (3.2 km) of the SEZ and operations could
24 be affected by solar facilities. In particular, flight operations at the Blythe Airport could be
25 affected by facility structures and transmission lines, glint and glare, electromagnetic
26 interference, bird attraction, and turbulence from thermal plumes above air-cooled condensers
27 at the adjacent Blythe Solar Power Project (CACA 48811). While these effects may be low
28 individually (CEC 2010c), small cumulative impacts on the Blythe Airport could result.
29
30

31 **9.4.22.4.6 Soil Resources**

32

33 Ground-disturbing activities (e.g., grading, excavating, and drilling) during the
34 construction phase of a solar project, including any associated transmission lines, would
35 contribute to soil loss due to erosion. Construction of new roads within the SEZ or improvements
36 to existing roads would also contribute to soil erosion. During construction, operations, and
37 decommissioning of the solar facilities, worker travel and other road use would also contribute
38 to soil loss. These losses would be in addition to losses occurring as a result of disturbance
39 caused by other users in the area, including from potential construction of several other
40 renewable energy facilities, and recreational users, such as off-road vehicle enthusiasts. As
41 discussed in Section 9.4.7.3, programmatic design features would be implemented to minimize
42 erosion and loss of soil during the construction, operation, and decommissioning phases of the
43 solar facilities and any associated transmission lines. Landscaping of solar energy facility areas
44 could alter drainage patterns and lead to increased siltation of surface water streambeds, in
45 addition to that caused by other development activities. Altering drainage patterns would in turn
46 impact vegetation in washes and associated habitats supported by existing flows. Even with the

1 expected design features in place, cumulative impacts from the disturbance of several large sites
2 and connecting linear facilities in the vicinity could be significant.

3 4 5 **9.4.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)** 6

7 Currently, there are seven mining claims but no geothermal or oil and gas leases within
8 the SEZ. It is assumed there would be no cumulative effect on mineral resources. The SEZ is still
9 open for discretionary mineral leasing, including leasing for oil and gas and other leasable
10 minerals.
11

12 13 **9.4.22.4.8 Water Resources** 14

15 The water requirements for development and operation of various utility-scale solar
16 energy technologies on the proposed SEZ are described in Section 9.4.9.2. If the SEZ is fully
17 developed over 80% of its available land area, the amount of water needed during the peak
18 construction year for the various solar technologies evaluated would be 4,541 to 6,732 ac-ft
19 (5.6 to 8.3 million m³). The amount of water needed during decommissioning would be similar
20 to or less than the amount used during construction. During operations, the amount of water
21 needed for all solar technologies evaluated would range from 914 to 488,000 ac-ft/yr (1.1 to
22 603 million m³/yr), with PV representing the lower end of this range. Since the availability of
23 groundwater (the primary water resource available to solar energy facilities in the SEZ) is
24 limited, it would not be feasible to obtain the upper end of the water requirements range.
25 Assuming the maximum historical groundwater withdrawal rate of 9,100 ac-ft/yr (11.2 million
26 m³/yr) from the underlying groundwater basins is dedicated to solar energy production, the
27 amount of wet-cooled trough or tower solar technology that could be built would be limited to on
28 the order of 1,800 MW, or only about 5% of SEZ capacity if unlimited water was available. For
29 dry-cooling options, about 12,800 MW could be produced, or about 39% and 71% of the
30 estimated SEZ capacity for trough and tower technologies, respectively. Sustainable groundwater
31 yields might represent even lower theoretical energy yields from these technologies. Conversely,
32 PV development would have minimal impacts on groundwater sources, while dish engine
33 technologies could be fully developed without exceeding recharge rates, particularly if water
34 conservation measures were taken for mirror washing.
35

36 As of February 2010, 15 solar project applications were pending in the SEZ, including
37 four fast-track solar applications, covering about 65% of the SEZ (Figure 9.4.22.-1). Impacts
38 on the Chuckwalla Valley and Palo Verde Mesa groundwater basin would be large if several
39 projects were built using wet-cooling trough or tower technologies. Water use is sustainable only
40 if development in the proposed SEZ emphasizes deployment of PV and dish engine facilities and
41 if deployment of trough and tower facilities is limited to the eastern portion of the proposed SEZ.
42

43 The development of the six advanced solar proposals identified within the geographic
44 extent of effects (Section 9.4.22.2.1) could draw up to 8,000 ac-ft (9.9 million m³/yr) of water to
45 support construction during the period 2011–2013, and up to 2,700 ac-ft/yr (3.3 million m³/yr)
46 during the following operational period of approximately 30 years. Four of these projects, the

1 four fast-track solar applications, are located within the proposed Riverside East SEZ and would
2 draw from the Chuckwalla Valley and Palo Verde Mesa groundwater basin. In addition, the
3 Eagle Crest pumped storage project would withdraw an initial 25,000 ac-ft (30.8 million m³)
4 from the Chuckwalla Valley basin and require makeup water of 2,400 ac-ft/yr (3.0 million
5 m³/yr) over its operating life. Some of the makeup water represents water lost to seepage back
6 into the basin. The Rice Solar Energy Project, with construction water use of 780 ac-ft/yr
7 (0.96 million m³/yr) and operational water use of 180 ac-ft/yr (0.22 million m³/yr), likely would
8 not affect groundwater at the Riverside East SEZ, because the SEZ does not lie over the Rice
9 Valley basin, which is separated from the Palo Verde Mesa basin by the Big Maria Mountains to
10 the north (Section 9.4.9.1.2). Likewise, the several pending solar energy project proposals for
11 locations off-site within 50 mi (80 km) of the SEZ, including those to the north in the Iron
12 Mountain SEZ (Figure 9.4.22.2-1), if approved, would likely draw from other groundwater
13 basins and thus not contribute significantly to cumulative impacts within the Riverside East SEZ.
14 Therefore, cumulative impacts on groundwater basins underlying the Riverside East SEZ from
15 currently foreseeable projects would be minimally greater than the impacts from solar energy
16 development within the SEZ. Similarly, potential effects on surface waters and wetlands from
17 drawdown of groundwater underlying the Riverside East SEZ would likely not extent to
18 locations of other potential off-site solar projects.

19
20 The small quantities of sanitary wastewater that would be generated during the
21 construction and operation of utility-scale solar energy facilities within the Riverside East SEZ in
22 combination with similarly small volumes from other foreseeable projects would not be expected
23 to strain available sanitary wastewater treatment facilities in the general area of the SEZ.
24 Blowdown water from cooling towers for wet-cooled technologies would be treated within a
25 project site (e.g., in settling ponds) and injected into the ground, released to surface water bodies,
26 or reused, and thus would not contribute cumulative impacts to any nearby treatment systems.

27 28 29 **9.4.22.4.9 Vegetation**

30
31 The proposed SEZ is in a transitional area that includes many species associated with the
32 Mojave and Sonoran Deserts within the Sonoran Basin and Range ecoregion, which supports
33 creosotebush (*Larrea tridentata*)-bur sage (*Ambrosia dumosa*) plant communities with large
34 areas of palo verde (*Cercidium microphyllum*)-cactus shrub and saguaro cactus (*Carnegiea*
35 *gigantea*) communities. The western portion of the SEZ is within the Mojave Basin and Range
36 ecoregion, which is characterized by broad basins and scattered mountains. Thirty-seven
37 wetlands are located entirely or in part within the SEZ, with a total of 3,807 acres (15.4 km²),
38 while 113 wetlands are located within the indirect impact area within 5 mi (8 km) of the SEZ.
39 Most wetlands are of the intermittent or ephemeral type.

40
41 Desert dry washes in the SEZ support woodlands that include ironwood, smoketree, and
42 blue palo verde. An ironwood forest, identified by BLM as a Unique Plant Assemblage, occurs
43 in the upper reaches of McCoy Wash. If utility-scale solar energy projects were to be constructed
44 within the SEZ, all vegetation within the footprints of the facilities would likely be removed
45 during clearing and grading of land. Vegetation communities primarily affected would be the
46 Sonora-Mojave Creosotebush-White Bursage Desert Scrub cover type. Solar development could

1 result in large impacts on North American Warm Desert Active and Stabilized Dune; moderate
2 impacts on Sonora-Mojave Creosotebush-White Bursage Desert Scrub, North American Warm
3 Desert Volcanic Rockland, North American Warm Desert Wash, North American Warm Desert
4 Pavement, North American Warm Desert Playa, Sonora-Mojave Mixed Salt Desert Scrub,
5 Developed, Open Space—Low Intensity, and North American Warm Desert Riparian Mesquite
6 Bosque; and small impacts on the remaining cover types. Sand dune, playa, mixed salt desert
7 scrub (primarily associated with Ford Dry Lake), and dry wash communities are important
8 sensitive habitats in the region.
9

10 Numerous other renewable energy projects are proposed within a 50-mi (80-km) radius
11 of the Riverside East SEZ. As many as 33 solar projects and 9 wind projects have pending
12 applications within this distance, with ROW applications for solar applications alone totaling
13 more than 400,000 acres (1,600 km²), including more than 30,000 acres (120 km²) for five of six
14 advanced solar proposals on private and public land (Section 9.4.22.2.1). Depending on the
15 actual development of renewable energy projects within and outside the SEZ and accompanying
16 transmission lines, roads, and other infrastructure within the geographic extent of effects,
17 cumulative impacts on certain cover types could be significant, particularly those that favor the
18 basin flats, which are suitable for solar facilities. As other projects and transmission lines are
19 added, natural corridors and safe germination sites may be lost; this would be detrimental to
20 plant populations and ecosystem stability in the region.
21

22 In addition, the cumulative effects of fugitive dust generated during the construction of
23 solar facilities along with other activities in the area, such as transportation and recreation, could
24 increase the dust loading in habitats outside a solar project area. Increased dust loading could
25 result in reduced productivity or changes in plant community composition. Programmatic design
26 features would be implemented to reduce the impacts from solar energy projects and thus reduce
27 the overall cumulative impacts on plant communities and habitats.
28
29

30 ***9.4.22.4.10 Wildlife and Aquatic Biota***

31

32 As many as 173 species of amphibians (2 species), reptiles (31 species), birds
33 (100 species), and mammals (40 species) occur in and around the proposed Riverside East SEZ
34 (Section 9.4.11). The construction of utility-scale solar energy projects in the SEZ and of any
35 associated transmission lines and roads in or near the SEZ would have impacts on wildlife
36 through habitat disturbance (i.e., habitat reduction, fragmentation, and alteration), wildlife
37 disturbance, loss of connectivity between natural areas (e.g., habitat fragmentation and blockage
38 of dispersal corridors for bighorn sheep and desert tortoise), and wildlife injury or mortality. In
39 general, affected species with broad distributions and occurring in a variety of habitats would be
40 less affected than species with a narrowly defined habitat within a restricted area. Programmatic
41 design features include pre-disturbance biological surveys to identify key habitat areas used by
42 wildlife, followed by avoidance or minimization of disturbance to those habitats (e.g., Ford Dry
43 Lake and Palen Lake).
44

45 Up to 33 other solar projects and 9 wind projects have pending applications within 50 mi
46 (80 km) of the SEZ, while the proposed Iron Mountain SEZ about 25 mi (40 km) to the north.

1 ROW applications for solar projects alone total more than 400,000 acres (1,600 km²), including
2 over 30,000 acres (120 km²) for five of six advanced solar proposals on private and public land
3 (Section 9.4.22.2.1). Depending on the actual development of renewable energy projects within
4 and outside the SEZ and of accompanying transmission lines, roads, and other infrastructure
5 within the geographic extent of effects, cumulative impacts on some wildlife species could be
6 significant, particularly those species with habitats or migratory routes in the basin flats, which
7 are suitable for solar facilities.
8

9 While many of the wildlife species have extensive habitat available within the affected
10 counties, in cases where projects are closely spaced, the cumulative impact on a particular
11 species could be moderate to large. Programmatic design features would be implemented to
12 reduce the impacts from solar energy projects and thus reduce the overall cumulative impacts on
13 wildlife. However, even with mitigations in place, cumulative impacts could be moderate within
14 the geographic extent of effects.
15

16 No perennial or intermittent streams occur within the proposed Riverside East SEZ, but
17 numerous dry washes are inundated after rain events; both Palen Lake and Ford Dry Lake are
18 intermittent and rarely have standing water. Temporary ponding may occur in Palen Lake.
19 Similarly, wetlands within the SEZ are intermittently flooded, so surface water is usually absent
20 but may be present for variable periods. Consequently, no aquatic habitat or communities are
21 likely to be present for an extended time within the SEZ. The intermittent wetlands and dry lakes
22 present within and around the SEZ could be affected by runoff of water and sediment from the
23 SEZ, especially if ground disturbance occurred near Palen Lake. However, with programmatic
24 design features in place, the potential for indirect impacts on aquatic habitats and organisms
25 within the region is small. Within the geographic extent of effects (50-mi [80 km] radius), water
26 taken from perennial surface water features could affect water levels and, as a consequence,
27 aquatic organisms in those water bodies. Thus, there would be small cumulative impacts on
28 aquatic biota and habitats resulting from solar development in the region. Similarly, increased
29 future demand on groundwater for multiple uses, including solar power development within the
30 SEZ, could affect surface water levels outside of the SEZ and, as a consequence, could affect
31 aquatic organisms in those water bodies.
32
33

34 ***9.4.22.4.11 Special Status Species (Threatened, Endangered, Sensitive, and Rare*** 35 ***Species)*** 36

37 Thirty special status species are known to occur within the affected area of the Riverside
38 East SEZ. Of these species, the Coachella Valley milkvetch is listed as endangered, and the
39 desert tortoise is listed as threatened under the ESA; nine are listed as BLM-designated sensitive;
40 and the remaining 19 species are considered rare. Numerous additional species occurring on or in
41 the vicinity of the SEZ are listed as threatened or endangered by the states of California or
42 Arizona or are listed as a sensitive species by the BLM. Potential mitigation measures that could
43 be used to reduce or eliminate the potential for cumulative effects on these species from the
44 construction and operation of utility-scale solar energy projects within the geographic extent of
45 effects include avoidance of habitat, translocation of individuals, and minimization of erosion,
46 sedimentation, and dust deposition.
47

1 Numerous reasonably foreseeable future actions could occur within the geographic extent
2 of effects of the proposed Riverside East SEZ, including 33 solar and 9 wind applications for
3 projects that would cover up to 400,000 acres (1,600 km²). A number of sensitive species have
4 been identified within the boundaries of the six advanced solar proposals covering 30,000 acres
5 (120 km²), including the four fast-track solar energy proposals within the proposed Riverside
6 East SEZ (Section 9.4.22.2.1). These species include the federally or state-listed desert tortoise,
7 Mojave fringe-toed lizard, Colorado fringe-toed lizard, Western burrowing owl, short-eared owl,
8 prairie falcon, northern harrier, loggerhead shrike, California horned lark, desert kit fox, and
9 several California-listed sensitive plant species.

10
11 In addition, the proposed Iron Mountain SEZ is about 25 mi (40 km) north of the
12 Riverside East SEZ. Many special status species with potential habitat impacts from solar
13 development are common to both the Riverside East and Iron Mountain SEZs, including the
14 desert tortoise and Mojave fringe-toed lizard. However, projects in these and other areas would
15 employ design features to reduce or eliminate the impacts on protected species as required by
16 the ESA and other applicable federal and state laws and regulations.

17
18 Depending on the number and size of other projects that will actually be built within the
19 next 20 to 30 years within the geographic extent of effects, there could be cumulative impacts
20 on protected species due to habitat destruction and overall development and fragmentation of
21 the area. Habitats that are particularly at risk are those in basin flats, which are suited for solar
22 development. Together, several new solar facilities and the other associated actions would have
23 a cumulative impact on wildlife. Where projects are closely spaced, the cumulative impact on a
24 particular species could be moderate to large.

25 26 27 **9.4.22.4.12 Air Quality and Climate**

28
29 While solar energy generates minimal emissions compared with fossil fuel-generated
30 energy, the site preparation and construction activities associated with solar energy facilities
31 would produce some emissions, mainly particulate matter (fugitive dust) and emissions from
32 vehicles and construction equipment. When these emissions are combined with those from other
33 projects near solar energy facilities or when they are added to natural dust generated by winds
34 and windstorms, the air quality in the general vicinity of the projects could be temporarily
35 degraded. For example, particulate matter (dust) concentration at or near the SEZ boundaries
36 could at times exceed state or federal ambient air quality standards. Generation of dust from
37 construction activities can be partially controlled by implementing aggressive dust control
38 measures, such as increased watering frequency or road paving or treatment, and/or sound
39 practices such as minimizing activities under unfavorable meteorological conditions.

40
41 Several other renewable energy projects are proposed or planned within the air basin
42 shared by Riverside East (Section 9.4.22.2.1 and Figure 9.4.22.2-1), while the proposed Iron
43 Mountain SEZ is about 25 mi (40 km) north. Concurrent construction of solar facilities at the
44 two SEZs could have cumulative impacts. Four fast-track proposed projects lie in the Riverside
45 East SEZ, while a total of 33 solar and 9 wind proposals are pending within 50 mi (80 km) of the
46 Riverside East SEZ. The fast-track projects have overlapping construction schedules for the

1 period 2011 to 2013. These projects in combination with others with pending applications could
2 produce periods of elevated particulate emissions in the affected area.
3

4 Over the long term and across the region, the development of solar energy may have
5 beneficial cumulative impacts on the air quality and atmospheric values in southern California by
6 offsetting the need for energy production with fossil fuels, which results in higher levels of
7 emissions. As discussed in Section 9.4.13, air emissions from operating solar energy facilities are
8 relatively minor, while the displacement of criteria air pollutants, VOCs, TAPs, and GHG
9 emissions currently produced from fossil fuels could be relative large. For example, if the
10 Riverside East SEZ is fully developed (80% of its acreage) with solar facilities, the quantity of
11 pollutants avoided could be as large as 54% of all emissions from the current electric power
12 systems in California (Section 9.4.13.2.2).
13
14

15 ***9.4.22.4.13 Visual Resources*** 16

17 The proposed Riverside East SEZ is within the Mojave basin and range physiographic
18 province, typified by small, rocky mountain ranges with jagged peaks alternating with talus
19 slopes and desert floor. The proposed SEZ site is in the flat plains of the Chuckwalla (including
20 the McCoy Wash area east of the McCoy Mountains) and Palen Valley floors, with the strong
21 horizon line and several mountain ranges surrounding the valley being the dominant visual
22 features. The VRI values for the SEZ and immediate surroundings are VRI Class II, indicating
23 high relative visual values; Class III, indicating moderate relative visual values; and Class IV,
24 indicating low relative visual values. The inventory indicates moderate scenic quality for the
25 Chuckwalla Valley and high sensitivity for the SEZ lands near Joshua Tree NP and for the Class
26 II area in the southeastern portion of the SEZ, based on heavy recreational use, the presence of a
27 BLM scenic highway and historic trails, and proximity to congressionally designated wilderness
28 and areas of critical environmental concern.
29

30 Development of utility-scale solar energy projects within the SEZ would contribute to
31 the cumulative visual impacts in the general vicinity of the SEZ and in the Chuckwalla and
32 Palen valleys. However, the exact nature of the visual impacts and the design features that
33 would be appropriate would depend on the specific project locations within the SEZ and on the
34 solar technologies used. Such impacts and potential design features would be considered in
35 visual analyses conducted for specific future projects. In general, large visual impacts on the
36 SEZ would be expected to occur as a result of the construction, operation, and decommissioning
37 of utility-scale solar energy projects. These impacts would be expected to involve major
38 modification of the existing character of the landscape and would likely dominate the views
39 for some nearby observers. Additional impacts would occur as a result of the construction,
40 operation, and decommissioning of related facilities, such as access roads and electric
41 transmission lines.
42

43 Because of the large size of utility-scale solar energy facilities, the large number of
44 pending applications on public lands in the area, and the generally flat, open nature of the
45 proposed SEZ, some lands outside the SEZ would also be subjected to visual impacts related to
46 the construction, operation, and decommissioning of utility-scale solar energy development.

1 Potential impacts would include night sky pollution, including increased skyglow, light spillage,
2 and glare. Some of the affected lands outside the SEZ would include potentially sensitive scenic
3 resource areas, including large portions of the mountain ranges surrounding the Chuckwalla
4 Valley and some neighboring valleys, including Ward and Rice Valleys, and the Pinto Basin,
5 which could be subject to visual impacts associated with solar energy development within the
6 SEZ. The magnitude of visual impacts on these sensitive areas would range from minimal to
7 major. Visual impacts resulting from solar energy development within the SEZ would be in
8 addition to visual impacts caused by other potential projects in the area, such as other solar
9 facilities on private lands, transmission lines, and other renewable energy facilities, including
10 windmills. The presence of new facilities would normally be accompanied by increased numbers
11 of workers in the area, traffic on local roadways, and support facilities, all of which would add to
12 cumulative visual impacts.

13
14 As many as 33 other solar projects and 9 wind projects have pending applications on
15 public lands within 50 mi (80 km) of the proposed Riverside East SEZ, including 15 solar
16 applications within the SEZ. In addition, the proposed Iron Mountain SEZ is about 25 mi
17 (40 km) north of the Riverside East SEZ. While the overall extent of cumulative effects of
18 renewable energy development in the area would depend on the number of projects actually
19 built, it may be concluded that these projects could transform the general visual character of the
20 landscape from primarily rural desert to more commercial-industrial. Because of the topography
21 of the region, solar facilities, located in flat basins, would be visible at great distances from
22 sensitive viewing locations in the surrounding mountains. Also, the facilities would be located
23 near major roads, thus the facilities would be viewable by motorists. However, some portions of
24 major roads where solar energy facilities would be located, including I-10, are currently visually
25 affected by transmission line corridors, towns, and other infrastructure, as well as the road
26 system itself.

27
28 In addition to cumulative visual impacts associated with views of particular future
29 facilities, as additional facilities are added, several projects might become visible from one
30 location or in succession as viewers move through the landscape, such as driving on local roads.
31 In general, the new facilities would vary in appearance, and depending on the number and type
32 of facilities, the resulting visual disharmony could exceed the visual absorption capability of the
33 landscape and add significantly to the cumulative visual impact. Thus, the overall cumulative
34 visual impacts in the region from solar and wind energy development would be significant.

35 36 37 **9.4.22.4.14 Acoustic Environment**

38
39 The areas around the proposed Riverside East SEZ and in Riverside County in general
40 are relatively quiet. Existing noise sources include road traffic, railroad traffic, aircraft flyovers,
41 agricultural activities, and activities and events at nearby residences. A number of residences are
42 scattered along the SEZ boundaries, while population centers with schools include Desert Center,
43 located at the southwestern edge of the SEZ, and Blythe, located about 5 mi (8 km) east of the
44 eastern SEZ boundary. During construction of solar energy facilities, construction equipment
45 could increase the noise levels over short periods during the day. After the facilities are
46 constructed and begin operating, there would be little or minor noise impacts from any of the

1 technologies, except for solar dish engine facilities and parabolic trough or power tower facilities
2 using TES. It is possible that residents could be cumulatively affected by more than one solar or
3 other development built in or near the SEZ, particularly at night when the noise is more
4 discernable due to relatively low background levels. However, such cumulative impacts are
5 unlikely due the expected wide separation of facilities and the sparse population of the region.
6
7

8 ***9.4.22.4.15 Paleontological Resources***

9
10 The potential for impacts on significant paleontological resources at the Riverside East
11 SEZ as a whole is relatively unknown, but the potential is high in some areas. Further, the
12 specific sites selected for future projects would be surveyed if determined necessary by the
13 BLM, and any paleontological resources encountered would be avoided or mitigated to the
14 extent possible. A similar process would be employed at other facilities constructed in the area,
15 and no significant cumulative impacts on paleontological resources are expected.
16
17

18 ***9.4.22.4.16 Cultural Resources***

19
20 The proposed Riverside East SEZ is located in a transitional area between the Colorado
21 Desert to the south and the Mojave Desert to the north. The area of the SEZ was important as a
22 source of seasonal resources to surrounding Native American groups and includes important
23 trails that connect them. Some trails have spiritual significance, while the surrounding mountains
24 are regarded as sacred, with some peaks having special status. Other culturally important features
25 include caves, rock formations, and springs. Revered locations included panels of rock art,
26 ancestral settlements, arranged-rock sites, and burial or cremation areas. Direct impacts on
27 significant cultural resources during site preparation and construction activities could occur in
28 the proposed Riverside East SEZ. However, further investigation would be needed, including a
29 cultural resource survey of the entire area of potential effects to identify archaeological sites,
30 historic structures and features, and traditional cultural properties in project areas. Numerous
31 cultural surveys have been conducted in the vicinity of the SEZ, including surveys at project sites
32 within the SEZ with fast-track applications (Section 9.4.22.2.1) and have identified a number of
33 prehistoric and historic sites at the project locations. It is possible that the development of utility-
34 scale solar energy projects in the proposed Riverside East SEZ and of other projects likely to
35 occur in the area could contribute cumulatively to cultural resource impacts, in particular along
36 the I-10 corridor. However, historic properties would be avoided or mitigated to the extent
37 possible, in accordance with state and federal regulations. Similarly, through ongoing
38 consultation with the California SHPO and appropriate Native American governments, it is
39 likely that many adverse effects on significant resources within the geographic extent of effects
40 could be mitigated to some extent. Some visual and landscape scale impacts may not be
41 mitigable to the satisfaction of all interested parties. The increment of adverse effects from solar
42 energy development on the overall cumulative effect on cultural resources would depend on the
43 nature of the resources affected and could be significant.
44
45
46

1 **9.4.22.4.17 Native American Concerns**
2

3 All federally recognized Tribes with traditional ties to the area of the proposed Riverside
4 East SEZ have been contacted so that they could identify their concerns regarding solar energy
5 development. The concerns of Native Americans, including the Serrano, Cahuilla, Quechan,
6 Mohave, and Chemehuevi, over other energy development projects in the region have been
7 documented. The Chemehuevi and NALC have expressed concerns over the Salt Song Trail, and
8 the Quechan Indian Tribe of the Fort Yuma Reservation stressed the importance of evaluating
9 impacts on landscapes as a whole within their Tribal Traditional Use Area. Solar development
10 within the SEZ could have adverse effects on these and other Native American concerns even
11 after mitigations are applied. It is further possible that the development of utility-scale solar
12 energy projects in the SEZ, when added to other potential projects likely to occur in the area,
13 including renewable energy projects outside the SEZ, could contribute cumulatively to visual
14 impacts on their traditional landscape and the destruction of other resources in the valley
15 important to Native Americans. Continued discussions with the area Tribes through government-
16 to-government consultation is necessary to effectively consider and address the Tribes' concerns
17 related to solar energy development in the region.
18
19

20 **9.4.22.4.18 Socioeconomics**
21

22 Solar energy development projects in the proposed Riverside East SEZ could
23 cumulatively contribute to socioeconomic effects in the immediate vicinity of the SEZ and in the
24 surrounding multicounty ROI. The effects could be positive (e.g., creation of jobs and generation
25 of extra income, increased revenues to local governmental organizations through additional taxes
26 paid by the developers and workers) or negative (e.g., added strain on social institutions such as
27 schools, law enforcement agencies, and health care facilities). Impacts from solar development
28 would be most intense during facility construction, but of greatest duration during operations.
29 Construction in the Riverside East SEZ and at other new projects in the area, including other
30 renewable energy projects, would temporarily increase the number of workers in the area
31 needing housing and services. The number of workers involved in the construction of solar
32 projects in the proposed Riverside East SEZ alone could range from about 400 to 5,200 in the
33 peak construction year, depending on the solar technology being developed, with solar PV
34 facilities at the low end and solar trough facilities at the high end. The total number of jobs
35 created in the area could range from approximately 1,200 (solar PV) to as high as 16,000 (solar
36 trough).
37

38 Cumulative socioeconomic effects in the ROI from construction of solar facilities would
39 occur to the extent that multiple construction projects of any type were ongoing simultaneously.
40 It is a reasonable expectation that this condition would occur within a 50-mi (80 km) radius of
41 the SEZ occasionally over the 20-year or more solar development period. Six anticipated projects
42 with advanced proposals, including four fast-track projects located within the Riverside East
43 SEZ, would employ up to 2,300 construction workers during the period 2011 to 2013
44 (Section 9.4.22.2.1). This number of workers could place a modest short-term strain on local
45 resources in this sparsely populated area.
46

1 Annual impacts during the operation of solar facilities would be less, but could last 20 to
2 30 years, and could combine with those from other new projects in the area. The number of
3 workers needed at the solar facilities within the SEZ would range from 350 to 7,100, with
4 approximately 500 to 11,700 total jobs created in the region. In addition, approximately
5 460 operation workers are estimated for the five of six projects with advanced proposals in the
6 area (Section 9.4.22.2.1). Population increases resulting from renewable energy development
7 within 50 mi (80 km) of the Riverside East SEZ would contribute to general population growth
8 experienced in the region in recent years. The overall socioeconomic impacts would be positive,
9 through the creation of additional jobs and income. The negative impacts, including some short-
10 term disruption of rural community quality of life, would not be considered large enough to
11 require specific design features.

12 13 14 **9.4.22.4.19 Environmental Justice**

15
16 Environmental impacts associated with solar facilities within the proposed Riverside East
17 SEZ potentially affecting minority and low-income populations include noise and dust during the
18 construction of solar facilities; noise associated with solar project operations; the visual impacts
19 of solar facilities and transmission lines; access to land used for economic, cultural, or religious
20 purposes; and effects on property values. However, such effects from solar development within
21 the proposed Riverside East SEZ would be small and would not be expected to contribute to
22 cumulative impacts on minority and low-income populations with the 50-mi (80-km) geographic
23 extent of effects.

24 25 26 **9.4.22.4.20 Transportation**

27
28 During construction activities, up to 1,000 workers could be commuting to a single
29 construction site at the SEZ, which would be less than 10% of the current traffic on I-10 near the
30 SEZ. Should up to three large projects with approximately 1,000 daily workers each be under
31 development simultaneously, an additional 6,000 vehicle trips per day could be added to I-10, an
32 approximate 30% increase, which could have small to moderate impacts on traffic flow during
33 peak commute times.

34
35 Further, if construction occurred concurrently in the proposed Riverside East and Iron
36 Mountain SEZs, which are about 25 mi (40 km) apart and both served by State Route 177/62,
37 the increase in traffic during shift changes could be significant. Local road improvements may
38 be necessary near site access points. Any impacts during construction activities would be
39 temporary. The impacts could be mitigated to some degree by having different work hours
40 within an SEZ or between the two SEZs. Traffic increases during operation would be reduced
41 because of the lower number of workers needed to operate solar facilities and would have a
42 smaller contribution to cumulative impacts.

1 **9.4.23 References**

2
3 *Note to Reader:* This list of references identifies Web pages and associated URLs where
4 reference data were obtained for the analyses presented in this PEIS. It is likely that at the time
5 of publication of this PEIS, some of these Web pages may no longer be available or their URL
6 addresses may have changed. The original information has been retained and is available through
7 the Public Information Docket for this PEIS.

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