BLM

WESTERN

Proposed Southline Transmission Line Project

Draft Environmental Impact Statement and Draft Resource Management Plan Amendment

Volume 2 of 4

Western AREA POWER ADMINISTRATION

National System of Public Lands
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

March 2014

BLM/NM/PL-14-01-1610 · DOE/EIS-0474

BLM MISSION STATEMENT

The Bureau of Land Management is responsible for stewardship of our public lands. The BLM is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield of our Nation's resources within the framework of environmental responsibility and scientific technology. These resources include recreation, rangelands, timber, minerals, watershed, fish and wildlife habitat, wilderness, air, and scenic quality, as well as scientific and cultural values.

WESTERN MISSION STATEMENT

Western Area Power Administration's mission is to market and deliver reliable, renewable, cost-based hydroelectric power and related services.

VOLUME 2 CONTENTS

FIGURES

TABLES

VOLUME SUMMARY

Volume 1 – Executive Summary, Chapters 1, 2, and 3
Volume 2 – Chapters 4, 5, 6, and 7
Volume 3 – Appendices A through G
Volume 4 – Appendices H through L

Chapter 4

ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter presents the results of the environmental impact analysis for the various resources introduced in chapter 3 of this EIS.

4.1.1 Impact Assessment

The proposed Project outlined in chapter 2 may cause, directly or indirectly, changes in the human environment. This DEIS assesses and analyzes these potential changes and discloses the effects on the decision-makers and public. This process of disclosure is one of the fundamental goals of the NEPA process. The no action alternative is also described. The no action alternative forms the baseline against which the potential impacts of the Proponent Preferred alternative and the other action alternatives are compared.

Effects/Impacts

The terms “effect” and “impact” are synonymous under NEPA. Effects may refer to ecological, aesthetic, historical, cultural, economic, social, or health-related phenomena that may be caused by the Proponent Preferred alternative or action alternatives. Effects may be direct, indirect, or cumulative in nature. Cumulative effects are analyzed at the end of this chapter.

Effects, or impacts, can be beneficial or adverse, result from the action directly or indirectly, and can be long term, short term, temporary, or cumulative in nature. A direct effect occurs at the same time and place as the action. Indirect effects are reasonably foreseeable effects that occur later in time or are removed in distance from the action. Direct and indirect effects are discussed in combination under each affected resource. Short-term effects, or impacts, result in changes to the environment that are stabilized or mitigated rapidly and without long-term effects; these changes typically occur during construction, or may be sporadic maintenance events during the life of the proposed Project. Long-term impacts are defined as those that would remain substantially for the life of the proposed Project, or beyond short-term impacts.

Mitigation and Residual Impacts

The analysis takes into account the proponent-committed measures and BMPs described in table 2-7 and the laws, ordinances, regulations, and standards described under each resource. These proponent-committed measures have been built into the proposed Project to minimize impacts to the extent practicable by project design.

Mitigation measures are a means with which to address environmental impacts that are applied in the impact analysis to reduce the intensity or eliminate potential impacts. To be adequate and effective, CEQ rules (40 CFR 1508.20) require that mitigation measures fit into five broad categories: avoid the impact, minimize the impact, rectify the impact through repair and/or rehabilitation, reduce or eliminate the impact, or compensate for the impact. Where applicable, additional mitigation measures are provided in this document.

If residual effects remain after the mitigation is applied, those effects are described. The residual impacts section addresses impacts that cannot be avoided by the application of mitigation measures and discloses the effectiveness of additional mitigation measures provided for each resource.

Impacts of Decommissioning

The term of the BLM ROW grant to allow use of Federal land would be limited to 50 years, although the useful life of the Project facilities is projected to be at least 50 years and up to 75 years. As discussed in "Decommissioning" in chapter 2, if the ROW and facilities are no longer needed, the transmission lines and associated facilities would be decommissioned. Subsequently, conductors, insulators, concrete pads, and hardware would be dismantled and removed from the ROW. All areas of permanent disturbance would be restored in accordance with a decommissioning plan, to be developed by the ROW grant holder (Southline) and approved by the BLM Authorized Officer.

Impacts resulting from the decommissioning process would be similar in scope to the impacts that would occur during construction of the proposed Project. The amount of ground disturbance for access to the proposed Project facilities would be within the amount of land disturbed during construction. Impacts associated with decommissioning are anticipated to be similar to the impacts during construction in terms of the extent of disturbance. However, potential impacts and the timeframe for decommissioning are so far in the future that determining or estimating the impacts would be speculative. Therefore, the impacts of decommissioning cannot be meaningfully analyzed within each resource section. The Project Decommissioning Plan, discussed in chapter 2, would include procedures that would be implemented under the direction of the land management agencies or landowners, in compliance with applicable regulations and guidelines.

4.1.2 Cumulative Effects

Effects on a resource are considered cumulative when the effects from the Project are added to the potential effects from other past, present, or future projects in the analysis area. Cumulative effects are discussed in detail in section 4.20.

4.1.3 Significance and Impact Indicators

Significance is defined by the CEQ as a measure of the intensity and context of the effects of an action on, or the importance of that action to, the human environment. Significance is a function of the beneficial and adverse effects of an action on the environment.

Intensity refers to the severity or level of magnitude of impact. Proximity to sensitive areas or protected resources, public health and safety, level of controversy, unique risks, or potentially precedent-setting results are all factors considered in determining the intensity of the effect. This DEIS uses the terms major, moderate, or minor/negligible in describing the intensity of effects.

Context means that the effect(s) of an action must be analyzed within a framework or within physical or conceptual limits. Resource disciplines, location, type, or size of area affected (e.g., local, regional, national), and affected interests are all elements of context that ultimately determine significance. Both short- and long-term impacts are relevant.

Use of the term *significant* when referring to resource impacts indicates that some threshold was exceeded for a particular impact indicator. Impact indicators are the consistent parameters used to determine quality, intensity, and duration of change in a resource. Working from an established existing condition (i.e., the baseline conditions described in chapter 3), one or more condition indicators are used to predict

or detect change in a resource related to causal impacts of proposed Project actions. These thresholds are consistent with CEQ's guidance on the criteria for a significant impact. Table 1-8 in chapter 1 lists the key issues for analysis, as derived from public scoping and agency input, and the sections in which these issues are analyzed in the DEIS.

The following categories of magnitude and duration are presented to define relative levels of effects and to provide a common language when describing effects. The definitions in table 4.1-1 below are general. Descriptors are specifically defined for certain resources when the general definitions presented in this table are inadequate.

Table 4.1-1. Standard Resource Impact Descriptions for Magnitude and Duration

	Description Relative to Resource
Magnitude	
No Impact	Would not produce obvious changes in baseline condition of the resource.
Minor/ Negligible	Impacts would occur, but resource would retain existing character and overall baseline conditions.
Moderate	Impacts would occur, but resource would partially retain existing character. Some baseline conditions would remain unchanged.
Major	Impacts would occur that would create a high degree of change within the existing resource character and overall condition of resource.
Duration	
Short term	During construction and up to 5 years (from when ground-disturbing activities begin, through reclamation when vegetation has been reestablished in construction areas).
Long term	More than 5 years, life of the Project.

4.1.4 Analysis Approach Summary

The information available for the proposed Project is preliminary and is subject to change during the detailed design process. This DEIS has been developed based on available information deemed adequate to characterize expected impacts to the extent that the intensity, context, magnitude, and duration are understood for each affected resource.

A representative ROW was identified for the Project's New Build and Upgrade Sections, where the majority of ground disturbance resulting from the Project is expected to occur. The representative ROW for the proposed New Build Section of the Project is 200 feet wide; this includes the Proponent Preferred alternative and all subroutes, segments, and local alternatives. The representative ROW for the Upgrade Section of the Project is 150 feet wide; this includes the Proponent Preferred alternative and all subroutes, segments, and local alternatives.

The Project design is preliminary. Therefore, the ground disturbance that could occur from the proposed Project, whether in the representative ROW or from disturbance areas outside the representative ROW, has been estimated based on typical design characteristics of the Project as described in the July 2013 POD. These estimates include assumptions for typical structure types, a range of structure types needed per mile, structure foundations, staging areas, pulling and tensioning sites, access road types, and spur access routes. It is important to note that not all areas in the ROW or along access roads would be completely disturbed.

The average disturbance acreage per mile for both temporary and permanent ground disturbance within the representative ROW was calculated for both the New Build and Upgrade sections of the Project. Temporary disturbance per mile within the ROW was estimated based on assumptions for structure work

areas, wire pulling and tensioning sites, wire splicing sites, and cross-country travel access to structure sites. Permanent disturbance within the ROW was estimated based on assumptions for structure base and on improving or constructing new access roads.

In addition, there may also be ground disturbance outside the representative ROW from staging areas and substation expansion. The temporary disturbance from staging areas was estimated based on typical staging area needs described in the POD. Substation expansion would result in both temporary and permanent ground disturbance based on preliminary designs in the POD, which is subject to change during the detailed design process. Estimates for both temporary and permanent ground disturbance outside the representative ROW are presented as acreage in table 2-8 in chapter 2.

4.2 AIR QUALITY

4.2.1 Introduction

This section describes the impacts to air quality associated with the construction, operation and maintenance of the transmission line, substations, and ancillary facilities. Impacts to air quality are discussed in terms of proposed Project emissions of criteria air pollutants, HAPs, and GHGs on a subroute basis. In addition to quantifying the proposed Project emissions on a mass basis, a general screening-level impact analysis has been conducted to predict ambient concentrations of air pollutants for proposed Project-related activities that have the greatest potential to exceed applicable ambient air quality standards.

For the purposes of the analysis, emission estimate summaries for each of the subroutes under consideration have been compared with general conformity threshold levels, while predicted ambient air concentrations have been compared with the SILs. Where predicted exceedances to an SIL exist, the predicted ambient concentration plus the representative background concentration have been compared with the applicable national or State ambient air quality standards. Impacts to air quality related values (AQRVs) in relation to Class I areas (national parks) and impacts to climate change are also discussed in a qualitative manner.

All action alternatives would result in emissions of criteria pollutants, HAPs, and GHGs. Only the no action alternative would result in no Project-related emissions or impacts.

Operational emissions and impacts would be much lower than construction phase emissions; therefore, impacts have not been quantified (with the exception of SF_6) from the circuit breakers). Operation and maintenance emissions would include vehicle exhaust from travel to substations and the transmission line for routine inspection, as well as SF_6 emissions from operation of the gas-insulated circuit breakers in the switchyards. The sources of emission categories that have been considered include the following:

- Fugitive dust from earth-moving associated with construction activities in support of the upgrade and new build of the transmission lines and substations;
- Fugitive dust from vehicle movement on paved and unpaved roads accessing various segments of the line route;
- Engine exhaust (tailpipe emissions) from both on-road and non-road vehicles/equipment, including construction worker commuting, delivery of materials and supplies, and onsite construction activities;
- Emissions from concrete batch plants used to mix the concrete for structure and substation equipment foundations; and

- SF_6 emissions from gas-insulated circuit breakers in the switchyards.

Decommissioning activities could also potentially result in air emissions. Impacts resulting from decommissioning activities would be similar in scope to impacts from construction. While impacts are anticipated to be similar in nature, the potential timeframe for decommissioning activities (at least 50 years out) renders the consideration of impacts to air quality from decommissioning activities highly speculative. By the time decommissioning of the line takes place, decommissioning techniques and requirements could have changed, as well as the legal and regulatory setting requirements. Therefore, impacts to air quality from decommissioning activities are not addressed.

This analysis assumes that proposed Project design details would be employed as required by the States of New Mexico and Arizona for fugitive dust for land-clearing, road construction, and construction activities associated with construction of the line. In addition, fugitive emissions would be controlled on unpaved roads to the extent required by the States.

The impacts described in this section are based on data provided in "Southline Transmission Project Resource Report 1: Air Quality and Climate Change" (CH2M Hill 2013a) and described in chapter 3, section 3.2.

4.2.2 Methodology and Assumptions

This section describes the air quality analysis area, the assumptions and methodology used to calculate air pollutant emissions, and the approach to identifying significant impacts and identifies what would be considered a significant air quality impact from the construction, operation, and maintenance of the transmission lines and substations.

Analysis Area

As described in chapter 3, the air quality analysis area for both the New Build and Upgrade sections and the alternative routes and segments is a 50-km radius (approximately 31 miles) along the centerline of the proposed Project (see figure 3.2-1). The 50-km radius was used for consistency with minimum air quality analyses required by PSD guidelines, if applicable, and the ADEQ and New Mexico Department of Environmental Quality modeling guidelines.

Analysis Assumptions

Emissions were calculated to estimate ambient air impacts from construction and, where appropriate, operation and maintenance of the transmission lines, substation, and ancillary equipment associated with the proposed Project. Emission inventories were developed using published and agency-accepted values, such as from emission factors from AP-42, MOBILE6.2, and NONROAD. PM_{10} and $PM_{2.5}$ emissions were quantified for fugitive dust from earth-moving and construction activities that would be associated with construction of the transmission line and substations, including fugitive dust from concrete batch plant construction and operation; fugitive dust from vehicles traveling on paved and unpaved roads accessing various segments of the line route during construction; criteria air pollutants, HAPs, and GHGs resulting from engine exhaust from worker commutes, delivery trucks, and construction equipment during construction; and SF_6 emissions from operation of the gas-insulated circuit breakers in the switchyards. The assumptions used to calculate emission estimates from the proposed Project and alternatives are discussed further in appendix B.

Impact Indicators

Proposed Project emissions of air pollutants for each of the subroutes under consideration are calculated on an annualized basis for the purposes of comparison between the various alternatives and local alternatives. Proposed Project emission estimates are then evaluated to determine compliance with conformity thresholds, and, via an analysis of AERSCREEN (the EPA-preferred screening dispersion model) results from comparable projects, the NAAQS. A significant impact would result should proposed Project emissions and/or pollutant concentrations be anticipated to exceed any of the significant impact criteria outlined in "Significant Impacts." A significant impact would constitute a "major" impact according to the impact description provided in table 4.1-1. The other impact descriptions provided in table 4.1-1 are also used herein for impacts less than major. The proposed Project would result in emissions of air pollutants during the construction and, to a lesser extent, the operations of the proposed Project transmission lines, substations, and ancillary facilities. GHG emissions have also been quantified, where feasible (SF_6 emissions from substation circuit breakers). Due to the comparatively low level of proposed Project emissions (i.e., below the general conformity threshold levels), AQRVs such as acid rain deposition and visibility impacts to Class I areas are not quantified. Instead, a qualitative discussion of proposed Project impacts to these AQRVs is provided.

With the exception of GHG emissions from circuit breakers, emissions from transmission line and substation operation have not been quantified. Emissions from operations would be similar to those from construction, but would be emitted in much smaller amounts. Proposed Project operational activities would include vehicular use for routine maintenance and emergency repair activities.

Significant Impacts

Proposed Project construction and, to a lesser extent, operation would result in some increase to ambient air pollutant concentrations, even though construction emissions would be temporary in nature. The primary indicators for determining whether or not proposed Project emissions would result in a significant impact to air quality are as follows:

- Estimated proposed Project emissions exceed conformity de minimis thresholds; and/or
- The increase in ambient pollutant concentrations for a particular area as a result of proposed Project emissions would result in an exceedance of the NAAQS for that area.

A conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a Federal nonattainment or maintenance area would equal or exceed specified annual emission rates (referred to as "de minimis" thresholds) or would be "regionally significant." A project's direct and indirect emissions are regionally significant if they exceed 10 percent or more of a nonattainment or maintenance area's emissions inventory for that pollutant. For ozone precursors (volatile organic compounds (VOCs) and nitrogen oxides (NO_x)), Pb, PM_{10}, and $PM_{2.5}$ the de minimis thresholds depend on the severity of the nonattainment classification. For other pollutants, the threshold is set at 100 tpy.

As discussed in section 3.2, the analysis area for the proposed Project is within the boundaries of the nonattainment and/or maintenance areas provided in figure 3.2-3 in section 3.2. The conformity de minimis thresholds are provided in table 4.2-1 for each criteria pollutant for which nonattainment or maintenance is at issue. The proposed Project would lie within the boundaries of two nonattainment/maintenance areas regardless of the action alternative chosen: the Rillito PM_{10} nonattainment area and the Tucson CO maintenance area. The proposed Project would be outside of the remaining nonattainment and/or maintenance areas analyzed; however, these nonattainment and/or maintenance areas could lie within the air quality analysis area of 50 km, depending on the alterative chosen.

Table 4.2-1. Project Conformity Thresholds

Nonattainment or Maintenance Area/Pollutant	Conformity de Minimis Level (tpy)
Anthony, New Mexico, PM_{10} Moderate Nonattainment Area	100
Sunland Park, New Mexico, O_3 Nonattainment Area (VOCs and NO_x)*	100
Grant County, New Mexico, SO_2 Maintenance Area	100
Douglas, Arizona, SO_2 Maintenance Area	100
Ajo, Arizona, PM_{10} Moderate Nonattainment Area	100
Ajo, Arizona, SO_2 Maintenance Area	100
Tucson, Arizona, CO Maintenance Area	100
Rillito, Arizona, PM_{10} Moderate Nonattainment Area	100
Phoenix, Arizona, PM_{10} Serious Nonattainment Area	70
Phoenix-Mesa, Arizona, O_3 Marginal Nonattainment Area (VOCs and NO_x)	100
San Manuel, Arizona, SO_2 Maintenance Area	100
Hayden, Arizona, SO_2 Nonattainment Area	100
Hayden, Arizona, PM_{10} Moderate Nonattainment Area	100
West Central Pinal, Arizona, $PM_{2.5}$ Nonattainment Area†	10
Miami, Arizona, PM_{10} Moderate Nonattainment Area	100

* As discussed in section 3.2, the Sunland Park Ozone Nonattainment Area is currently proposed; since the proposed Project would lie outside the boundaries of this nonattainment area (but is within the analysis area), the de minimis levels conformity level for areas outside the transport region of the nonattainment area was used.

† The EPA has not published de minimis conformity determination levels for $PM_{2.5}$; therefore, the cut-off for Federal "significant" emissions of $PM_{2.5}$ was used (40 CFR 51.165-166).

For nonattainment and maintenance areas, proposed Project emissions are compared by route group with the appropriate conformity de minimis thresholds outlined in table 4.2-1. For areas that are in attainment with respect to a pollutant, the de minimis threshold for the criteria pollutant for which the area is in attainment is assumed at 100 tpy, with the exception of $PM_{2.5}$, which is assumed at 10 tpy.

Although there are no conformity standards for HAPs, as discussed in section 3.2, there are significant threshold levels for permitting purposes. Proposed Project HAP emissions are therefore compared with the significant threshold level of 25 tpy of combined HAPs.

Likewise, conformity standards do not exist for GHGs; therefore GHG emissions are compared against the reporting thresholds outlined in 40 CFR Part 98, Subpart A of 25,000 metric tons per year (a metric ton is the equivalent of approximately 1.1 short tons). Additionally, CEQ draft GHG guidance states that NEPA environmental assessment and EIS documents for proposed Federal actions resulting in direct GHG emissions of 25,000 metric tons per year should include a GHG emissions analysis of alternatives (CEQ 2012).

Screening methods such as the EPA-approved AERSCREEN can be used to predict concentration levels of criteria pollutants to demonstrate compliance with the NAAQS, increment thresholds, and SILs. Construction emissions are not fixed to any one point, but range over a wide geographic area. Therefore, proposed Project emissions would already be widely dispersed. Additionally, construction emissions are transient in nature, and any impacts to air quality from construction sources would disappear along with these sources. Operational emissions would be significantly lower than those of construction emissions. Nevertheless, the BLM has conducted recent screening level analyses for transmission line construction projects of comparable or greater-sized projects. The screening level modeling is presented for each

individual route group and compared with the SIL for various air pollutants and short-term averaging periods. If the dispersion modeling impacts are predicted to exceed the applicable SIL, or if there is not a defined EPA SIL, the proposed Project impact has been added to a representative background concentration and the total has been compared with the applicable ambient standards (Federal or State) (BLM 2013a, 2013n).

4.2.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the BLM would not issue a ROW permit and Western would not participate in the Project or allow upgrading of its transmission lines. Impacts to air quality from construction and operation and maintenance of the proposed Project transmission line and associated activities and facilities would not occur. Under the no action alternative, air quality conditions would likely continue at current levels and trends, although it is uncertain whether other changes may occur that affect conditions.

Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, in accordance with Western's 10-year capital improvement plan (Western 2012a).

Impacts Common to All Action Alternatives

CONSTRUCTION

Substation construction activities would result in air pollutant emissions from equipment exhaust, vehicle exhaust from travel to and from substations, and fugitive dust from soil disturbance. Table 4.2-2 presents the estimated total criteria, HAPs, and GHG emissions that would occur from construction of the substations for the New Build Section.

Table 4.2-2. Estimated Substation Construction Criteria and GHG Pollutant Emissions (tpy)

	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	HAPs
Route Group 1 – Afton Substation to Hidalgo Substation								
Afton Substation Expansion	0.13	0.87	1.47	<0.01	0.32	0.15	273	0.0004
Proposed or Alternative Midpoint Substation	0.16	1.04	1.85	<0.01	0.67	0.25	345	0.0004
Hidalgo Substation Expansion	0.19	1.17	2.15	<0.01	0.69	0.27	460	0.0004
Route Group 2 – Hidalgo Substation to Apache Substation								
Apache Substation Expansion	0.21	1.30	2.40	<0.01	0.69	0.27	501	0.0004

Table 4.2-2. Estimated Substation Construction Criteria and GHG Pollutant Emissions (tpy), Continued

	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	HAPs
Route Group 3 – Apache Substation to Pantano Substation								
Adams Tap Substation Expansion	0.06	0.37	0.75	<0.01	0.14	0.08	134	<0.0001
Pantano Substation Expansion	0.04	0.23	0.47	<0.01	0.15	0.06	83	<0.0001
Route Group 4 – Pantano Substation to Saguaro Substation								
Vail Substation Expansion	0.14	0.87	1.75	<0.01	0.25	0.16	314	<0.0001
Nogales Substation Expansion	0.10	0.62	1.27	<0.01	0.21	0.12	233	<0.0001
Del Bac Substation Expansion	0.06	0.38	0.78	<0.01	0.17	0.08	139	<0.0001
Tucson Substation Expansion	0.08	0.46	0.95	<0.01	0.15	0.09	194	<0.0001
DeMoss Petrie Substation Expansion	0.13	0.71	1.48	<0.01	0.11	0.11	300	<0.0001
Rattlesnake Substation Expansion	0.07	0.38	0.80	<0.01	0.17	0.08	162	<0.0001
Marana Substation Expansion	0.07	0.38	0.80	<0.01	0.17	0.08	162	<0.0001
Saguaro Substation Expansion	0.07	0.40	0.82	<0.01	0.21	0.09	166	<0.0001
Tortolita Substation Expansion	0.07	0.42	0.87	<0.01	0.09	0.07	175	<0.0001

Substation construction and expansion is not specific to any subroute or alternative chosen; however, for the purposes of determining whether or not significant air impacts would occur from proposed Project construction, estimated emissions from the various substations constructed have been added to those of the route group they are located within. Emissions related to the construction of the transmission lines are discussed in the individual route group sections below. These total construction emissions are then compared with the significant impact thresholds in the analysis of the individual route groups presented below.

To determine whether the proposed Project's construction emissions would have an impact to the ambient air, the expected Project-related impacts are first compared to respective SILs. Table 4.2-3 compares the screening level maximum short-term (e.g., 1-hour and 24-hour) pollutant concentrations from transmission line and substation construction to the respective SIL.

As shown in table 4.2-3, the expected emissions of CO and SO_2 would be below the SILs that are used to define impacts that are considered to be negligible or de minimis and would not cause or contribute to an exceedance of the NAAQS. Calculated pollutant concentrations for NO_2, PM_{10}, and $PM_{2.5}$ are over their respective SILs and require a more thorough analysis. For each route group, the maximum 1-hour AERSCREEN concentration and the representative background concentration for those pollutants are summed and compared to the applicable ambient air quality standard. Those comparisons are found under each route group section that follows.

Table 4.2-3. Transmission Line and Substation Construction: Comparison of Estimated Maximum Air Pollutant Concentrations with Significant Impact Levels

Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration (µg/m^3)*	SILs (µg/m^3)	Pollutant Over the SIL?
NO_2	1-hour	59.91	7.5	Yes
	24-hour	59.91	–	–
PM_{10}	24-hour	80.32	33	Yes
$PM_{2.5}$	24-hour	10.98	1.2	Yes
CO	1-hour	90.21	2,000	No
	8-hour	90.21	1,034	No
SO_2	1-hour	0.96	7.9	No
	3-hour	0.96	25	No
	24-hour	0.96	5	No

Note: µg/m^3= micrograms per cubic meter.

* Maximum AERSCREEN concentrations obtained from comparable and larger transmission line/substation construction projects (BLM 2013a, 2013n).

Construction of the proposed Project would emit low levels of NO_X and SO_2, which are the potential acid-producing pollutants emitted from mobile sources during construction and operation and maintenance. However, by providing a conduit and contributing a portion of the power from renewable sources (i.e., solar and wind power) to the Southwest region, the net impact of the proposed Project would be to improve atmospheric conditions to the extent that the generation of electricity from renewable sources would avoid the use of electricity generated in fossil fuel–fired power plants and their associated acid-producing pollutants.

The closest Class I area to the Proponent Preferred route and/or local alternatives is the Saguaro National Park outside Tucson, Arizona, located approximately 1 mile from the proposed route. Background visibility data for this park are available. The data demonstrate that visibility is of concern for the Saguaro National Park; however, visibility has showed trending improvement from 1990 to 2008 (NPS 2010b). Proposed Project construction emissions, particularly PM_{10} and $PM_{2.5}$, could impact visibility in this national park and in other nearby Class I areas; however, as demonstrated herein, proposed Project construction emissions are below de minimis thresholds and would only represent a temporary impact to visibility. Other Class I areas that are within the area of analysis for the proposed Project include the Chiricahua National Monument and the Chiricahua Wilderness Area, located as near as approximately 15 miles from the proposed Project or alternatives, and the Saguaro Wilderness Area, located as near as 5 miles from the proposed Project or alternatives. Impacts to visibility to these Class I areas would likely be lower than impacts to the Saguaro National Park due to their increased distance from the proposed Project and alternatives; therefore, as with impacts to the Saguaro National Park, proposed Project construction emissions would be temporary in nature and below de minimis thresholds. Proposed Project operational emissions would be substantially lower than those of construction emissions.

Federal land managers have visibility protection responsibility under 40 CFR 51.307 (New Source Review), which spells out the requirements for SIP visibility protection programs, as well as 40 CFR 52.27 (Protection of visibility from sources in attainment areas) and 40 CFR 52.28 (Protection of visibility from sources in nonattainment areas). These three provisions, taken together along with the SIP-approved rules, establish the visibility protection program for new and modified sources throughout the country. Section 165 (42 U.S.C. 7475) of the CAA requires the EPA, or the State/local permitting authority, to notify the Federal land manager if emissions from a proposed project may impact a Class I area. The permitting authority should forward PSD applications to the Federal land manager for review and analysis as soon as possible after receipt, giving the Federal land manager an opportunity to review the application

concurrently with the permitting authority. The proposed Project does not constitute a major PSD source and therefore does not require notification to the Federal land manager regarding visibility impacts.

OPERATION AND MAINTENANCE

As already noted, because operational emissions and impacts would be much lower than construction phase emissions and impacts, they have not been quantified (with the exception of SF_6 from the circuit breakers). Operation and maintenance emissions would include vehicle exhaust from travel to substations and the transmission line for routine inspection, as well as SF_6 emissions from operation of the gas-insulated circuit breakers in the switchyards. An additional source of air emissions would be the ozone generated from the operation of the line; however, transmission lines do not generally represent a significant source of ozone emissions and therefore ozone emissions from line operation would be expected to be minimal. Emissions from vehicle travel during operation and maintenance would be minimal, and mileage for vehicle travel to substations and the transmission line for routine inspection would be much less than during construction. Emissions from vehicle exhaust during operation and maintenance would therefore be less than those from construction.

Table 4.2-4 presents the potential SF_6 emissions from circuit breaker leakage from each substation during operation and maintenance. As shown in the table, these operation emissions would be minimal and are below the GHG reporting thresholds as outlined in "Significant Impacts." Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to air quality resources would be minor (i.e., impacts would occur but air quality would not be impacted) but long-term (i.e., greater than 5 years in duration). Operational GHG emissions from substations would occur regardless of the action alternative chosen.

Table 4.2-4. Estimated SF_6 Emissions from Substation Circuit Breaker Leakage during Operation

Substation	Emissions (as metric tons CO_2e per year)
Route Group 1 – Afton Substation to Hidalgo Substation	
Afton Substation Expansion	910.48
Proposed Midpoint or Alternative Substation	1,040.54
Hidalgo Substation Expansion	1,560.82
Route Group 2 – Hidalgo Substation to Apache Substation	
Apache Substation Expansion	1,268.16
Route Group 3 – Apache Substation to Pantano Substation	
Adams Tap Substation Expansion	97.55
Pantano Substation Expansion	65.03
Route Group 4 – Pantano Substation to Saguaro Substation	
Vail Substation Expansion	390.20
Nogales Substation Expansion	195.10
Del Bac Substation Expansion	65.03
Tucson Substation Expansion	292.65
DeMoss Petrie Substation Expansion	121.40
Rattlesnake Substation Expansion	97.55
Marana Substation Expansion	97.55
Southline Saguaro Substation Expansion	109.47

Table 4.2-4. Estimated SF_6 Emissions from Substation Circuit Breaker Leakage during Operation (Continued)

Substation	Emissions (as metric tons CO_2e per year)
Tortolita Substation Expansion	812.93
Total Emissions	**7,124.46**
GHG Reporting Threshold	**25,000**
Exceeds Threshold?	**No**

Route Group 1 – Afton Substation to Hidalgo Substation

Table 4.2-5 presents the estimated total fugitive dust, criteria, HAP, and GHG potential air emissions from the construction of the transmission lines from the Afton Substation to Hidalgo Substation (route group 1). For route group 1, fugitive dust from transmission line, staging area, and access road construction earth-moving and grading activities; off-road construction vehicle and commuter, vendor, and haul truck traffic exhaust emissions; and fugitive dust from vehicle travel on both paved and unpaved roads are all estimated on an annualized basis in table 4.2-5. Estimated emissions from various proposed construction scenarios and local alternative routes are presented for comparative purposes.

Table 4.2-5. Route Group 1 Estimated Transmission Line Construction Annualized Emissions by Emission Source (tpy)

			Route Group 1 Local Alternatives				
	Subroute 1.1, Proponent Preferred	Subroute 1.2, Proponent Alternative	DN1	A	B	C	D
Total Miles	146.9	141.2	42.5	17.5	12.2	9.0	22.8
Fugitive Dust from Earth-moving and Grading Activities							
PM_{10}	1.00	0.96	0.21	0.12	0.08	0.06	0.15
$PM_{2.5}$	0.20	0.21	0.06	0.03	0.02	0.01	0.03
Construction Equipment Exhaust Emissions							
VOCs	1.09	1.06	0.35	0.13	0.09	0.07	0.17
CO	5.09	4.90	1.63	0.60	0.42	0.31	0.79
NO_x	13.79	13.26	4.43	1.64	1.15	0.84	2.14
SO_2	0.03	0.03	0.01	<0.01	<0.01	<0.01	<0.01
PM_{10}	0.97	0.94	0.32	0.12	0.08	0.06	0.15
$PM_{2.5}$	0.97	0.94	0.32	0.12	0.08	0.06	0.15
CO_2	2,714	2,609	872	323	226	166	421

Table 4.2-5. Route Group 1 Estimated Transmission Line Construction Annualized Emissions by Emission Source (tpy), Continued

	Subroute 1.1, Proponent Preferred	Subroute 1.2, Proponent Alternative	Route Group 1 Local Alternatives				
			DN1	A	B	C	D
Fugitive Dust from Access Road Construction							
PM_{10}	4.25	3.89	1.87	0.34	0.13	0.11	0.54
$PM_{2.5}$	0.89	0.82	0.39	0.07	0.03	0.02	0.11
Fugitive Dust from Travel on Paved and Unpaved Roads							
PM_{10}	0.54	0.52	0.17	0.06	0.05	0.03	0.08
$PM_{2.5}$	0.12	0.12	0.04	0.01	0.01	0.01	0.02
Traffic Exhaust Emissions							
VOCs	0.03	0.03	0.01	<0.01	<0.01	<0.01	<0.01
CO	0.47	0.44	0.16	0.06	0.04	0.03	0.07
NO_x	0.10	0.11	0.04	0.01	0.01	0.01	0.02
SO_2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PM_{10}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
$PM_{2.5}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CO_2	45	43	15	5	4	3	7
HAPs	0.0017	0.0016	0.0006	0.0002	0.0001	0.0001	0.0003

Temporary portable concrete batch plants would be constructed and operated approximately every 25 miles along the ROW, mainly at construction staging areas. The maximum number of concrete batch plants by subroute and the total anticipated emissions from construction and operation of batch plants are provided in table 4.2-6 (the use of local alternatives to substitute for line segments in route group 1 would not be expected to increase the quantity of concrete batch plants).

Table 4.2-6. Route Group 1 Estimated Concrete Batch Plant Construction and Operation Emissions (tpy)

	Maximum Quantity	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Subroute 1.1, Proponent Preferred	6	0.03	0.12	0.36	<0.01	3.36	0.60	76
Subroute 1.2, Proponent Alternative	9	0.05	0.18	0.54	<0.01	5.04	0.90	114

Quantifying proposed Project expected emissions for comparison to acceptable regulatory emission thresholds is further complicated by the number of possible Project configurations and the overall geographic dispersion of the proposed Project. Proposed Project construction and operation emissions are presented herein in such a manner as to facilitate comparison between the various alternatives even though such analysis makes comparison between the proposed Project and acceptable regulatory criteria more difficult. For example, route group 1 potentially crosses through four counties (Doña Ana, Grant, Hidalgo, and Luna); it is therefore unreasonable to assume that pollutant emissions from a backhoe operating in Afton, located in Doña Ana County, New Mexico, would impact pollutant concentrations in Hidalgo, located in Hidalgo County, New Mexico, approximately 100 miles away, yet both locations are within the same route group for comparison between proposed alternatives.

In order to demonstrate proposed Project criteria pollutant emissions against the conformity de minimis thresholds, estimated emissions for the route group have been aggregated by subalternative along with all additional emission sources (substations and batch plants). Table 4.2-7 presents the summed total of anticipated annualized emissions from all the transmission line construction activities from the various proposed alternatives in the Afton Substation to Hidalgo Substation route group.

Table 4.2-7. Route Group 1 Estimated Annualized Emissions by Alternative (tpy)

	Total Miles	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	HAPs
Subroute 1.1, Proponent Preferred	**146.9**	**1.12**	**5.56**	**13.89**	**0.03**	**6.77**	**2.19**	**2,759**	**0.0017**
Substations	–	0.48	3.08	5.47	0.01	1.68	0.67	1,079	0.0011
Batch Plants	–	0.03	0.12	0.36	<0.01	3.36	0.60	114	
Total Emissions	**–**	***1.63***	***8.76***	***19.72***	***0.04***	***11.81***	***3.46***	***3,914***	***0.0028***
General Conformity Threshold Levels	**–**	**100**	**100**	**100**	**100**	**100**	**10**	**25,000**	**25**
Exceeds Threshold?	**–**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Subroute 1.2, Proponent Alternative	141.2	1.09	5.34	13.37	0.03	6.31	2.08	2,652	0.0016
Substations	–	0.48	3.08	5.47	0.01	1.68	0.67	1,079	0.0011
Batch Plants	–	0.05	0.18	0.54	<0.01	5.04	0.90	114	–
Total Emissions		***1.61***	***8.60***	***19.38***	***0.04***	***13.03***	***3.65***	***3,845***	***0.0027***
Impact Threshold	**–**	**100**	**100**	**100**	**100**	**100**	**10**	**25,000**	**25**
Exceeds Threshold?	**–**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Route Group 1 Local Alternatives									
DN1	42.5	0.36	1.79	4.46	0.01	2.65	0.81	887	0.0006
A	17.5	0.13	0.66	1.65	<0.01	0.64	0.23	329	0.0002
B	12.2	0.09	0.46	1.16	<0.01	0.33	0.14	230	0.0001
C	9.0	0.07	0.34	0.85	<0.01	0.26	0.10	169	0.0001
D	22.8	0.18	0.86	2.16	<0.01	0.93	0.31	428	0.0003

As can be seen from table 4.2-7, expected emissions for criteria pollutants from proposed Project construction regardless of the subroute or local substitutive alternative chosen would be well below de minimis conformity thresholds, even when aggregated over vast geographical distances and multiple regional airsheds. HAPs would also be well below the 25 tpy aggregated HAP threshold level. Additionally, proposed Project GHG emissions would be expected to be well below the 25,000 metric ton threshold. Cumulative impacts from GHG emissions are discussed further in section 4.20.

ROUTE GROUP 1 IMPACTS TO AMBIENT AIR QUALITY

As discussed in "Significant Impacts," if the screening level modeling predicted exceedances of the SIL, the proposed Project impact would be added to a representative background concentration and the sum would be compared to the applicable air quality standard. Background concentrations were obtained from recent and nearby ambient air monitoring sites. These background concentrations represent ambient concentrations of air quality pollutants contributed by other air pollutant emission sources within the airshed. Table 4.2-8 presents a comparison of the expected maximum short-term AERSCREEN concentrations from proposed Project construction, representative background concentrations of NO_2, PM_{10}, and $PM_{2.5}$, and the applicable ambient air quality standards for route group 1.

Table 4.2-8. Route Group 1 Transmission Line and Substation Construction: Comparison of Estimated Maximum Air Pollutant Concentrations Plus Background with Applicable Ambient Air Standards

Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration* ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Project Impact and Background ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	NMAAQS ($\mu g/m^3$)	Below all AAQS?
NO_2	1-hour	59.91	81.1[†]	141.01	188.7	188.7	Yes
PM_{10}	24-hour	80.32	62[‡]	142.32	150	–	Yes
$PM_{2.5}$	24-hour	10.98	13[§]	23.98	35	–	Yes

Note: $\mu g/m^3$ = micrograms per cubic meter; AAQS = Ambient Air Quality Standards.

* Maximum AERSCREEN concentrations obtained from comparable and larger transmission line/substation construction projects (BLM 2013a, 2013n).

[†] Background concentrations of NO_2 from Santa Teresa air quality monitoring station in Doña Ana County, New Mexico.

[‡] Background concentrations of PM_{10} from Sunland Park air quality monitoring station in Doña Ana County, New Mexico.

[§] Background concentrations for $PM_{2.5}$ from Douglas Red Cross air quality monitoring station in Cochise County, Arizona.

As seen in table 4.2-8, the sum of the proposed Project impact and the background concentration would be below all applicable AAQS. The proposed Project would therefore not trigger any significant impact indicator for route group 1 and no significant impacts to air quality would result from the construction or operation and maintenance of the transmission lines and substations.

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

As can be seen from table 4.2-7, even assuming no geographic dispersion of air emissions, annual emissions from transmission line construction activities would be expected to be well below the de minimis thresholds for criteria pollutants and HAPs regardless of the combination of alternatives selected.

Operation and Maintenance

With the exception of SF_6 emissions from substation circuit breakers, potential Project operational air emissions were not analyzed as operational emissions would be substantively lower than those expected

from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

As can be seen from table 4.2-7, even assuming no geographic dispersion of air emissions, annual emissions from transmission line construction activities would be expected to be well below the de minimis thresholds for criteria pollutants and HAPs regardless of the combination of alternatives selected.

Operation and Maintenance

As with subroute 1.1, anticipated Project operational air emissions (with the exception of SF_6 emissions from substation circuit breakers) were not analyzed, since operational emissions would be substantively lower than those expected from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1. These local alternatives include DN1, A, B, C, and D.

Construction

The local alternatives are meant to be substitutive of portions of the main subroute chosen, and therefore any air emission contributions from local alternatives would not substantively contribute to proposed Project emissions since any additions to emissions from an alternative would substitute for emissions from the portion of the route it is replacing. While estimated emissions may be slightly higher or lower than the portion of the route substituted for, depending upon whether or not the substation extended or shortened overall line length, emissions would remain well below de minimis conformity levels as a result of the substitution of a local alternative, as demonstrated in table 4.2-7 above.

Operation and Maintenance

As with the subroutes, proposed Project operational air emissions from the local substitutive alternatives were not analyzed (with the exception of SF_6 emissions from substation circuit breakers) as operational emissions would be substantively lower than those expected from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

ROUTE GROUP 1 IMPACT SUMMARY

None of the subroutes or substitutive alternatives in route group 1 would result in emissions that would be expected to exceed either conformity thresholds or ambient air quality standards for either construction or operation and maintenance activities. Therefore, impacts to air quality resources from route group 1 would be minor (i.e., impacts would occur but air quality would retain its existing character) and short-term (i.e., less than 5 years in duration) for construction activities, and minor and long-term (i.e., greater than 5 years in duration) for operational activities.

Route Group 2 – Hidalgo Substation to Apache Substation

Table 4.2-9 presents the total estimated fugitive dust, criteria, HAP, and GHG potential air emissions from the construction of the transmission lines from the Hidalgo Substation to the Afton Substation (route group 2). For route group 2, fugitive dust from transmission line, staging area, and access road construction earth-moving and grading activities; off-road construction vehicle and commuter, vendor, and haul truck traffic exhaust emissions; and fugitive dust from vehicle travel on both paved and unpaved roads are all estimated on an annualized basis in table 4.2-9. Estimated emissions from various proposed construction scenarios and local alternative routes are presented for comparative purposes.

Table 4.2-9. Route Group 2 Estimated Transmission Line Construction Annualized Emissions by Activity (tpy)

			Route Group 2 Local Alternatives							
	Subroute 2.1, Proponent Preferred	**Subroute 2.2, Proponent Alternative**	**LD1**	**LD2**	**LD3a**	**LD3b**	**LD4**	**LD4-Option 4**	**LD4-Option 5**	**WC1**
Total Miles	**95.6**	**95.8**	**35.4**	**9.6**	**27.9**	**1.9**	**51.7**	**6.5**	**12.3**	**14.8**
Fugitive Dust from Earth-moving and Grading Activities										
PM_{10}	0.64	0.65	0.23	0.07	0.19	0.01	0.35	0.04	0.08	0.10
$PM_{2.5}$	0.12	0.14	0.06	0.01	0.04	<0.01	0.07	0.01	0.02	0.02
Construction Equipment Exhaust Emissions										
VOCs	0.71	0.72	0.27	0.07	0.20	0.01	0.43	0.05	0.10	0.11
CO	3.31	3.32	1.23	0.33	0.96	0.07	1.99	0.25	0.47	0.51
NO_x	8.97	9.00	3.33	0.90	2.62	0.18	5.39	0.68	1.28	1.39
SO_2	0.01	0.02	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
PM_{10}	0.63	0.64	0.23	0.07	0.19	0.01	0.39	0.05	0.09	0.10
$PM_{2.5}$	0.63	0.64	0.23	0.07	0.19	0.01	0.39	0.05	0.09	0.10
CO_2	1,767	1,770	654	177	515	35	1,061	133	252	274
Fugitive Dust from Access Road Construction										
PM_{10}	2.30	2.86	1.09	0.40	0.56	0.01	2.29	0.29	0.44	0.57
$PM_{2.5}$	0.48	0.60	0.23	0.08	0.12	<0.01	0.48	0.06	0.09	0.12

Table 4.2-9. Route Group 2 Estimated Transmission Line Construction Annualized Emissions by Activity (tpy), Continued

			Route Group 2 Local Alternatives							
	Subroute 2.1, Proponent Preferred	Subroute 2.2, Proponent Alternative	LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1
Fugitive Dust from Travel on Paved and Unpaved Roads										
PM_{10}	0.35	0.35	0.15	0.04	0.10	0.01	0.21	0.03	0.05	0.01
$PM_{2.5}$	0.08	0.08	0.03	0.01	0.02	<0.01	0.05	0.01	0.01	<0.01
Traffic Exhaust Emissions										
VOCs	0.02	0.03	0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01
CO	0.30	0.31	0.12	0.03	0.09	0.01	0.19	0.02	0.05	0.05
NO_x	0.07	0.06	0.02	0.01	0.02	<0.01	0.04	0.01	0.01	0.01
SO_2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PM_{10}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
$PM_{2.5}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CO_2	29	29	11	3	9	1	18	2	4	5
HAPs	0.0011	0.0011	0.0009	0.0001	0.0003	<0.0001	0.0007	0.0001	0.0002	0.0002

Temporary portable concrete batch plants would be constructed and operated approximately every 25 miles along the ROW, mainly at construction staging areas. The maximum number of concrete batch plants by subroute and/or alternative and the total anticipated emissions from construction and operation of batch plants are provided in table 4.2-10 (local alternatives LD1, LD2, LD3a, LD4, LD4-Option 4, and LD4-Option5 would not be expected to result in additional concrete batch plants for route group 2 line segments).

Table 4.2-10. Route Group 2 Estimated Concrete Batch Plant Construction and Operation Emissions (tpy)

	Maximum Quantity	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Subroute 2.1, Proponent Preferred	4	0.02	0.08	0.24	<0.01	2.24	0.40	51
Subroute 2.2, Proponent Alternative	5	0.03	0.10	0.30	<0.01	2.80	0.50	64
Local Alternative WC1	1	0.01	0.02	0.06	<0.01	0.56	0.10	13

As can be seen from the various tables above, emissions from any substitutions from the expected proposed Project would result in comparable emissions of criteria pollutants, HAPs, and GHGs. In order to demonstrate proposed Project criteria pollutant emissions against the conformity de minimis thresholds, estimated emissions for the route group have been aggregated by subalternative along with all

additional emission sources (substations and batch plants). Table 4.2-11 presents the summed total of anticipated annualized emissions from all the transmission line construction activities from the various proposed alternatives in the Hidalgo Substation to Apache Substation route group.

Table 4.2-11. Route Group 2 Estimated Annualized Emissions by Alternative (tpy)

	Total Miles	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	HAPs
Subroute 2.1, Proponent Preferred	95.6	0.73	3.62	9.04	0.01	3.92	1.31	1,796	0.0011
Substations	–	0.40	2.47	4.55	0.01	1.46	0.57	961	0.0007
Batch Plants	–	0.03	0.10	0.30	<0.01	2.80	0.50	64	–
Total Emissions	**–**	***1.15***	***6.19***	***13.89***	***0.02***	***8.18***	***2.38***	***2,820***	***0.0018***
Significant Impact Threshold	**–**	**100**	**100**	**100**	**100**	**100**	**10**	**25,000**	**25**
Exceeds Threshold?	**–**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Subroute 2.2, Proponent Alternative	95.8	0.75	3.63	9.06	0.02	4.51	1.46	1,800	0.0011
Substations	–	0.40	2.47	4.55	0.01	1.46	0.57	961	0.0007
Batch Plants	–	0.03	0.12	0.36	<0.01	3.36	0.60	76	-
Total Emissions	**–**	***1.18***	***6.22***	***13.97***	***0.03***	***9.33***	***2.63***	***2,837***	***0.0018***
Impact Threshold	**–**	**100**	**100**	**100**	**100**	**100**	**10**	**25,000**	**25**
Exceeds Threshold?	**–**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Route Group 2 Local Alternatives									
LD1	35.4	0.28	1.35	3.35	0.01	1.71	0.55	665	0.0009
LD2	9.6	0.07	0.36	0.91	<0.01	0.58	0.17	180	0.0001
LD3a	27.9	0.21	1.05	2.64	<0.01	1.03	0.37	524	0.0003
LD3b	1.9	0.01	0.08	0.18	<0.01	0.04	0.01	36	<0.0001
LD4	51.7	0.44	2.18	5.43	0.01	3.24	0.99	1,079	0.0007
LD4-Option 4	6.5	0.06	0.27	0.68	<0.01	0.41	0.12	136	0.0001
LD4-Option 5	12.3	0.11	0.52	1.29	<0.01	0.67	0.21	257	0.0002
WC1	14.8	0.11	0.56	1.40	<0.01	0.78	0.24	278	0.0002

As can be seen from table 4.2-11, expected emissions for criteria pollutants from proposed Project construction regardless of the subroute or local substitutive alternative chosen would be well below de minimis conformity thresholds, even when aggregated over vast geographical distances and multiple regional airsheds. HAPs would also be well below the 25 tpy aggregated HAP threshold level. Additionally, proposed Project GHG emissions would be expected to be well below the 25,000 metric ton threshold. Cumulative impacts from GHG emissions are discussed further in section 4.20.

ROUTE GROUP 2 IMPACTS TO AMBIENT AIR QUALITY

Table 4.2-12 presents a comparison of the expected maximum short-term AERSCREEN concentrations from proposed Project construction, representative background concentrations of NO_2, PM_{10}, and $PM_{2.5}$, and the applicable ambient air quality standards for route group 2.

Table 4.2-12. Route Group 2 Estimated Transmission Line and Substation Construction: Comparison of Maximum Air Pollutant Concentrations Plus Background to Applicable Ambient Air Standards

Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration (µg/m^3)*	Background Concentration (µg/m^3)	Project Impact and Background (µg/m^3)	NAAQS (µg/m^3)	AAAQS (µg/m^3)	NMAAQS (µg/m^3)	Below all AAQS?
NO_2	1-hour	59.91	81.1[†]	141.01	188.7	188.7	188.7	Yes
PM_{10}	24-hour	80.32	62[‡]	142.32	150	150	-	Yes
$PM_{2.5}$	24-hour	10.98	13[§]	23.98	35	65[¶]	-	Yes

Note: µg/m^3 = micrograms per cubic meter.
* Maximum AERSCREEN concentrations obtained from comparable and larger transmission line/substation construction projects (BLM 2013a, BLM2013n).
[†] Background concentrations of NO_2 from Santa Teresa air quality monitoring station in Doña Ana County, NM.
[‡] Background concentrations of PM_{10} from Sunland Park air quality monitoring station in Doña Ana County, NM.
[§] Background concentrations for $PM_{2.5}$ from Douglas Red Cross air quality monitoring station in Cochise County, AZ.
[¶] Arizona's AAQS is listed as 65 µg/m^3 for the $PM_{2.5}$ 24-hour standard; however, the more stringent NAAQS value is used for comparison.

As seen in table 4.2-12, the sum of the proposed Project impact and the background concentration would be below all applicable AAQS. The proposed Project would therefore not trigger any significant impact indicator for route group 2, and no significant impacts to air quality would result from the construction or operation and maintenance of the transmission lines and substations.

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

As can be seen from table 4.2-11, even assuming no geographic dispersion of air emissions, annual emissions from transmission line construction activities would be expected to be well below the de minimis thresholds for criteria pollutants and HAPs regardless of the combination of alternatives selected.

Operation and Maintenance

With the exception of SF_6 emissions from substation circuit breakers, potential Project operational air emissions were not analyzed, since operational emissions would be substantively lower than those expected from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

As can be seen from table 4.2-11, even assuming no geographic dispersion of air emissions, annual emissions from transmission line construction activities would be expected to be well below the de minimis thresholds for criteria pollutants and HAPs regardless of the combination of alternatives selected.

Operation and Maintenance

With the exception of SF_6 emissions from substation circuit breakers, anticipated Project operational air emissions were not analyzed as operational emissions would be substantively lower than those expected from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

LOCAL ALTERNATIVES

There are seven local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, and WC1.

Construction

The local alternatives are meant to be substitutive of portions of the main subroute chosen, and therefore any air emission contributions from local alternatives would not substantively contribute to proposed Project emissions since any additions to emissions from an alternative would substitute for emissions from the portion of the route it is replacing. While estimated emissions may be slightly higher or lower than the portion of the route substituted for, depending upon whether or not the substation extended or shortened overall line length, emissions would not substantively increase as a result of the substitution of a local alternative, as demonstrated in table 4.2-11 above.

Operation and Maintenance

As with the subroutes, proposed Project operational air emissions from the local substitutive alternatives were not analyzed (with the exception of SF_6 emissions from substation circuit breakers) as operational emissions would be substantively lower than those expected from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

ROUTE GROUP 2 IMPACT SUMMARY

None of the subroutes or substitutive alternatives in route group 2 would result in emissions that would be expected to exceed either conformity thresholds or ambient air quality standards for either construction or operation activities. Therefore, impacts to air quality resources from route group 2 would be minor (i.e., impacts would occur but air quality would retain its existing character) and short-term (i.e., less than 5 years in duration) for construction activities, and minor and long-term (i.e., greater than 5 years in duration) for operational activities.

Route Group 3 – Apache Substation to Pantano Substation

Table 4.2-13 presents the total estimated fugitive dust, criteria, HAP, and GHG potential air emissions from the construction of the transmission lines from the Apache Substation to Pantano Substation (route group 3). For route group 3, fugitive dust from transmission line, staging area, and access road construction earth-moving and grading activities; off-road construction vehicle and commuter, vendor, and haul truck traffic exhaust emissions; and fugitive dust from vehicle travel on both paved and unpaved roads are all estimated on an annualized basis in table 4.2-13. Estimated emissions from various proposed construction scenarios and local alternative routes are presented for comparative purposes.

Temporary portable concrete batch plants would be constructed and operated approximately every 25 miles along the ROW, mainly at construction staging areas. The maximum number of concrete batch plants by subroute and the total anticipated emissions from construction and operation of batch plants are provided in table 4.2-14 (the use of the local alternative to substitute for a portion of the line segment in route group 3 would not be expected to increase the quantity of concrete batch plants).

Table 4.2-13. Route Group 3 Estimated Transmission Line Construction Annualized Emissions by Activity (tpy)

	Subroute 3.1, Proponent Preferred	Route Group 3 Local Alternative H
Total Miles	**70.4**	**19.3**
Fugitive Dust from Earth-moving and Grading Activities		
PM_{10}	1.22	0.33
$PM_{2.5}$	0.26	0.07
Construction Equipment Exhaust Emissions		
VOCs	0.62	0.17
CO	2.63	0.73
NO_x	7.18	1.97
SO_2	0.02	<0.01
PM_{10}	0.51	0.14
$PM_{2.5}$	0.51	0.14
CO_2	1,519	416
Fugitive Dust from Access Road Construction		
PM_{10}	1.43	0.59
$PM_{2.5}$	0.30	0.12
Fugitive Dust from Travel on Paved and Unpaved Roads		
PM_{10}	0.30	0.08
$PM_{2.5}$	0.07	0.02
Traffic Exhaust Emissions		
VOCs	0.01	<0.01
CO	0.20	0.05
NO_x	0.06	0.02
SO_2	<0.01	<0.01
PM_{10}	<0.01	<0.01
$PM_{2.5}$	<0.01	<0.01
CO_2	26	7
HAPs	0.0009	0.0003

Table 4.2-14. Route Group 3 Estimated Concrete Batch Plant Construction and Operation Emissions (tpy)

	Maximum Quantity	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Subroute 3.1, Proponent Preferred	4	0.02	0.08	0.24	<0.01	2.24	0.40	51

As can be seen from the various tables above, emissions from any substitutions from the expected subroute 3.1 would result in comparable emissions of criteria pollutants, HAPs, and GHGs. In order to demonstrate proposed Project criteria pollutant emissions against the conformity de minimis thresholds, estimated emissions for the route group have been aggregated by subalternative along with all additional emission sources (substations and batch plants). Table 4.2-15 presents the summed total of anticipated annualized emissions from all the transmission line construction activities from the various proposed alternatives in the Apache Substation to Pantano Substation route group.

Table 4.2-15. Route Group 3 Estimated Annualized Emissions by Alternative (tpy)

	Total Miles	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	HAPs
Subroute 3.1, Proponent Preferred	70.4	0.64	2.83	7.24	0.02	3.47	1.14	1,545	0.0009
Substations	–	0.31	1.90	3.62	0.01	1.06	0.44	718	0.0005
Batch Plants	–	0.02	0.08	0.24	<0.01	2.24	0.40	51	–
Total Emissions	**–**	***0.97***	***4.81***	***11.10***	***0.02***	***6.77***	***1.98***	***2,313***	***0.0014***
Significant Impact Threshold	**–**	**100**	**100**	**100**	**100**	**100**	**10**	**25,000**	**25**
Exceeds Threshold?	**–**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Route Group 3 Local Alternatives									
H	19.3	0.18	0.78	1.98	<0.01	1.15	0.36	423	0.0003

As can be seen from table 4.2-15, expected emissions for criteria pollutants from proposed Project construction regardless of the subroute or local substitutive alternative chosen would be well below de minimis conformity thresholds, even when aggregated over vast geographical distances and multiple regional airsheds. HAPs would also be well below the 25 tpy aggregated HAP threshold level. Additionally, proposed Project GHG emissions would be expected to be well below the 25,000 metric ton threshold. Cumulative impacts from GHG emissions are discussed further in section 4.20.

ROUTE GROUP 3 IMPACTS TO AMBIENT AIR QUALITY

Table 4.2-16 presents a comparison of the expected maximum short-term AERSCREEN concentrations from proposed Project construction, representative background concentrations of NO_2, PM_{10}, and $PM_{2.5}$, and the applicable ambient air quality standards for route group 3.

Table 4.2-16. Route Group 3 Transmission Line and Substation Construction: Comparison of Estimated Maximum Air Pollutant Concentrations Plus Background to Applicable Ambient Air Standards

Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration ($\mu g/m^3$)*	Background Concentration ($\mu g/m^3$)	Project Impact and Background ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	AAAQS ($\mu g/m^3$)	Below all AAQS?
NO_2	1-hour	59.91	30†	89.91	188.7	188.7	Yes
PM_{10}	24-hour	80.32	58†	138.32	150	150	Yes
$PM_{2.5}$	24-hour	10.98	13‡	23.98	35	65§	Yes

Note: $\mu g/m^3$ = micrograms per cubic meter.

* Maximum AERSCREEN concentrations obtained from comparable and larger transmission line/substation construction projects (BLM 2013a, BLM2013n).

† Background concentrations of NO_2 and PM_{10} from ADEQ's Technical Support Document for Concrete Batch Plants, Table 11 (2010). Nonattainment value used for PM_{10}.

‡ Background concentrations for $PM_{2.5}$ from Douglas Red Cross air quality monitoring station in Cochise County, Arizona.

§ Arizona's AAQS is listed as 65 $\mu g/m^3$ for the $PM_{2.5}$ 24-hour standard; however, the more stringent NAAQS value is used for comparison.

As seen in table 4.2-16, the sum of the proposed Project impact and the background concentration would be below all applicable AAQS. The proposed Project would therefore not trigger any significant impact indicator for route group 3, and no significant impacts to air quality would result from the construction or operation and maintenance of the transmission lines and substations.

SUBROUTE 3.1 – PROPONENT PREFERRED

Construction

As can be seen from table 4.2-15, even assuming no geographic dispersion of air emissions, annual emissions from transmission line construction activities would be expected to be well below the de minimis thresholds for criteria pollutants and HAPs regardless of the combination of alternatives selected.

Operation and Maintenance

With the exception of SF_6 emissions from substation circuit breakers, potential Project operational air emissions were not analyzed, since operational emissions would be substantively lower than those expected from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

LOCAL ALTERNATIVES

There is one local alternative for route group 3: local alternative H.

Construction

The local alternatives are meant to be substitutive of portions of the main subroute chosen, and therefore any air emission contributions from local alternatives would not substantively contribute to proposed Project emissions since any additions to emissions from an alternative would substitute for emissions from the portion of the route it is replacing. While estimated emissions may be slightly higher or lower than the portion of the route substituted for, depending upon whether or not the substation extended or shortened overall line length, emissions would not substantively increase as a result of the substitution of a local alternative, as demonstrated in the table 4.2-15 above.

Operation and Maintenance

As with the subroutes, proposed Project operational air emissions from the local substitutive alternatives were not analyzed (with the exception of SF_6 emissions from substation circuit breakers) as operational emissions would be substantively lower than those expected from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

ROUTE GROUP 3 IMPACT SUMMARY

Neither the subroute nor the substitutive alternative in route group 3 would result in emissions that would be expected to exceed either conformity thresholds or ambient air quality standards for either construction or operation activities. Therefore, impacts to air quality resources from route group 3 would be minor (i.e., impacts would occur but air quality would retain its existing character) and short-term (i.e., less than 5 years in duration) for construction activities, and minor and long-term (i.e., greater than 5 years in duration) for operational activities.

Route Group 4 – Pantano Substation to Saguaro Substation

Table 4.2-17 presents the total estimated fugitive dust, criteria, HAP, and GHG potential air emissions from the construction of the transmission lines from the Pantano Substation to the Saguaro Substation (route group 4). For route group 4, fugitive dust from transmission line, staging area, and access road construction earth-moving and grading activities; off-road construction vehicle and commuter, vendor, and haul truck traffic exhaust emissions; and fugitive dust from vehicle travel on both paved and unpaved roads are all estimated on an annualized basis in table 4.2-17. Estimated emissions from various proposed construction scenarios and local alternative routes are presented for comparative purposes.

Table 4.2-17. Route Group 4 Estimated Transmission Line Construction Annualized Emissions by Activity (tpy)

		Route Group 4 Local Alternatives									
	Subroute 4.1, Proponent Preferred	**MA1**	**TH1a**	**TH1b**	**TH1c**	**TH1-Option**	**TH3-Option A**	**TH3-Option B**	**TH3-Option C**	**TH3a**	**TH3b**
Total Miles	**48.4**	**1.1**	**1.4**	**1.6**	**0.3**	**1.0**	**0.8**	**0.8**	**1.8**	**2.7**	**4.5**
Fugitive Dust from Earth-moving and Grading Activities											
PM_{10}	0.86	0.02	0.02	0.03	<0.01	0.02	0.01	0.01	0.03	0.05	0.08
$PM_{2.5}$	0.16	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.02

Table 4.2-17. Route Group 4 Estimated Transmission Line Construction Annualized Emissions by Activity (tpy), Continued

		Route Group 4 Local Alternatives									
	Subroute 4.1, Proponent Preferred	MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b
Construction Equipment Exhaust Emissions											
VOCs	0.43	0.01	0.01	0.01	<0.01	0.01	0.01	0.01	0.02	0.02	0.04
CO	1.80	0.04	0.05	0.06	0.01	0.05	0.03	0.03	0.07	0.10	0.17
NO_x	4.90	0.11	0.14	0.16	0.03	0.09	0.08	0.08	0.18	0.28	0.46
SO_2	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PM_{10}	0.36	0.01	0.01	0.01	<0.01	0.01	0.01	0.01	0.01	0.02	0.03
$PM_{2.5}$	0.36	0.01	0.01	0.01	<0.01	0.01	0.01	0.01	0.01	0.02	0.03
CO_2	1,041	24	30	34	6	22	18	18	39	59	97
Fugitive Dust from Access Road Construction											
PM_{10}	0.77	0.01	0.01	0.01	<0.01	<0.01	0.02	0.01	0.05	0.06	0.07
$PM_{2.5}$	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01
Fugitive Dust from Travel on Paved and Unpaved Roads											
PM_{10}	0.21	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.02
$PM_{2.5}$	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Traffic Exhaust Emissions											
VOCs	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CO	0.14	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01
NO_x	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SO_2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PM_{10}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
$PM_{2.5}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CO_2	18	<1	1	1	<1	<1	<1	<1	1	1	2
HAPs	0.0007	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001

Temporary portable concrete batch plants would be constructed and operated approximately every 25 miles along the ROW, mainly at construction staging areas. The maximum number of concrete batch plants by subroute and the total anticipated emissions from construction and operation of batch plants are

provided in table 4.2-18 (the use of local alternatives to substitute for line segments in route group 4 would not be expected to increase the quantity of concrete batch plants).

Table 4.2-18. Route Group 4 Estimated Concrete Batch Plant Construction and Operation Emissions (tpy)

	Maximum Quantity	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Subroute 4.1, Proponent Preferred	3	0.02	0.06	0.18	<0.01	1.68	0.30	38

As can be seen from the various tables above, emissions from any substitutions from subroute 4.1 would result in comparable emissions of criteria pollutants, HAPs, and GHGs. In order to demonstrate proposed Project criteria pollutant emissions against the conformity de minimis thresholds, estimated emissions for the route group have been aggregated by subalternative along with all additional emission sources (substations and batch plants). Table 4.2-19 presents the summed total of anticipated annualized emissions from all the transmission line construction activities from the various proposed alternatives in the Pantano Substation to Saguaro Substation route group.

Table 4.2-19. Route Group 4 Estimated Annualized Emissions by Alternative (tpy)

	Total Miles	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	HAPs
Subroute 4.1, Proponent Preferred	48.4	0.44	1.93	4.94	0.01	2.20	0.73	1,058	0.0007
Substations	–	0.84	4.85	10.01	0.02	1.68	0.94	1,928	0.0005
Batch Plants	–	0.02	0.06	0.18	<0.01	1.68	0.30	38	–
Total Emissions	**–**	***1.29***	***6.84***	***15.13***	***0.02***	***5.56***	***1.97***	***3,024***	***0.0011***
Significant Impact Threshold	**–**	**100**	**100**	**100**	**100**	**70**	**10**	**25,000**	**25**
Exceeds Threshold?	**–**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Route Group 4 Local Alternatives									
MA1	1.1	0.01	0.04	0.11	<0.01	0.04	0.01	24	<0.0001
TH1a	1.4	0.01	0.05	0.14	<0.01	0.04	0.02	31	<0.0001
TH1b	1.6	0.01	0.06	0.16	<0.01	0.06	0.02	34	<0.0001
TH1c	0.3	<0.01	0.01	0.03	<0.01	0.01	<0.01	6	<0.0001
TH1-Option	1.0	0.01	0.05	0.09	<0.01	0.04	0.01	22	<0.0001
TH3-Option A	0.8	0.01	0.03	0.08	<0.01	0.04	0.01	18	<0.0001
TH3-Option B	0.8	0.01	0.03	0.08	<0.01	0.04	0.01	18	<0.0001
TH3-Option C	1.8	0.02	0.08	0.18	<0.01	0.10	0.03	39	<0.0001
TH3a	2.7	0.02	0.11	0.28	<0.01	0.14	0.04	60	<0.0001
TH3b	4.5	0.04	0.18	0.46	<0.01	0.20	0.07	99	0.0001

As can be seen from table 4.2-19, expected emissions for criteria pollutants from proposed Project construction regardless of the subroute or local substitutive alternative chosen would be well below de minimis conformity thresholds, even when aggregated over vast geographical distances and multiple regional airsheds. HAPs would also be well below the 25 tpy aggregated HAP threshold level.

Additionally, proposed Project GHG emissions would be expected to be well below the 25,000 metric ton threshold. Cumulative impacts from GHG emissions are discussed further in section 4.20.

ROUTE GROUP 4 IMPACTS TO AMBIENT AIR QUALITY

Table 4.2-20 presents a comparison of the expected maximum short-term AERSCREEN concentrations from proposed Project construction, representative background concentrations of NO_2, PM_{10}, and $PM_{2.5}$, and the applicable ambient air quality standards for route group 4.

Table 4.2-20. Route Group 4 Transmission Line and Substation Construction: Comparison of Estimated Maximum Air Pollutant Concentrations Plus Background to Applicable Ambient Air Standards

Pollutant	Averaging Period	Maximum 1-hour AERSCREEN Concentration ($\mu g/m^3$)*	Background Concentration ($\mu g/m^3$)	Project Impact and Background ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	AAAQS ($\mu g/m^3$)	Below all AAQS?
NO_2	1-hour	59.91	30[†]	89.91	188.7	188.7	Yes
PM_{10}	24-hour	80.32	58[†]	138.32	150	150	Yes
$PM_{2.5}$	24-hour	10.98	13[‡]	23.98	35	65[§]	Yes

* Maximum AERSCREEN concentrations obtained from comparable and larger transmission line/substation construction projects (BLM 2013a, 2013n).

[†] Background concentrations of NO_2 and PM_{10} from ADEQ's Technical Support Document for Concrete Batch Plants, table 11. Nonattainment value used for PM_{10}.

[‡] Background concentrations for $PM_{2.5}$ from Douglas Red Cross air quality monitoring station in Cochise County, Arizona.

[§] Arizona's AAQS is listed as 65 $\mu g/m^3$ for the $PM_{2.5}$ 24-hour standard; however, the more stringent NAAQS value is used for comparison.

As seen in table 4.2-20, the sum of the proposed Project impact and the background concentration would be below all applicable AAQS. The proposed Project would not trigger any significant impact indicator for route group 4, and no significant impacts to air quality would result from the construction or operation and maintenance of the transmission lines and substations.

SUBROUTE 4.1 – PROPONENT PREFERRED

Construction

As can be seen from table 4.2-19, even assuming no geographic dispersion of air emissions, annual emissions from transmission line construction activities would be expected to be well below the de minimis thresholds for criteria pollutants and HAPs regardless of the combination of alternatives selected.

Operation and Maintenance

With the exception of SF_6 emissions from substation circuit breakers, potential Project operational air emissions were not analyzed, since operational emissions would be substantively lower than those expected from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

LOCAL ALTERNATIVES

There are 10 local alternatives are available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C.

Construction

The local alternatives are meant to be substitutive of portions of the main subroute chosen, and therefore any air emission contributions from local alternatives would not substantively contribute to proposed Project emissions since any additions to emissions from an alternative would substitute for emissions from the portion of the route it is replacing. While estimated emissions may be slightly higher or lower than the portion of the route substituted for, depending upon whether or not the substation extended or shortened overall line length, emissions would not substantively increase as a result of the substitution of a local alternative, as demonstrated in table 4.2-19 above.

Operation and Maintenance

As with the subroutes, proposed Project operational air emissions from the local substitutive alternatives were not analyzed (with the exception of SF_6 emissions from substation circuit breakers) as operational emissions would be substantively lower than those expected from construction emissions, which are already demonstrated herein as being well below the significant impact thresholds.

ROUTE GROUP 4 IMPACT SUMMARY

Neither the subroute nor the substitutive alternatives in route group 4 would result in emissions that would be expected to exceed either conformity thresholds or ambient air quality standards for either construction or operation activities. Therefore, impacts to air quality resources from route group 4 would be minor (i.e., impacts would occur but air quality would retain its existing character) and short-term (i.e., less than 5 years in duration) for construction activities, and minor and long-term (i.e., greater than 5 years in duration) for operational activities.

Agency Preferred Alternative

Emissions of air pollutants from construction activities from the Agency Preferred Alternative, even aggregated over vast geographic distances and multiple airsheds, would be substantively below the de minimis thresholds for criteria pollutants, GHGs, and HAPs. Emissions of air pollutants would not vary substantively between the Agency Preferred Alternative and the other alternatives. Construction emissions would be transient, short-term, and spread over large distances and multiple airsheds. Operation and maintenance emissions would be long-term and similar, but substantively less than, construction emissions.

The Agency Preferred Alternative would cross the Rillito PM_{10} nonattainment area and the Tucson CO maintenance area, both located in Pima County, Arizona. However, none of the alternatives to the Agency Preferred Alternative would avoid these non-attainment/maintenance areas. As can be seen from table 4.2-21, the total aggregated PM_{10} and CO emissions from construction of the Agency Preferred Alternative would be well the de minimis conformity thresholds of the Rillito PM_{10} nonattainment area and the Tucson CO maintenance area, even with the inclusion of proposed Project emissions from well outside of these areas.

Therefore, overall impacts to air quality resources from the Agency Preferred Alternative would be minor and short-term for construction activities, and minor and long-term for operation and maintenance activities.

Air quality impacts from the Agency Preferred Alternative are quantified by pollutant in Table 4.2-12 below.

Table 4.2-21. Agency Preferred Alternative Estimated Annualized Emissions (tpy)

Route Group	Segments	Total Miles	VOCs	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$	CO_2	HAPs
Route group 1	P1, P2, P3, and P4a	146.9	1.12	5.56	13.89	0.03	6.77	2.19	2,759	0.0017
Route group 2	LD3a, LD4, LD4-Option5, P7	97.1	0.94	4.60	11.47	0.02	5.78	1.87	2,278	0.0014
Route group 3	U1a, U1b, U2, U3a	70.3	0.64	2.83	7.24	0.02	3.47	1.14	1,545	0.0009
Route group 4	TH1a, U4, TH1-Option, U3b, U3c, U3d, U3g, U3h, U3i, MA1, U3k, U3l, U3m	49.3	0.44	1.98	5.03	0.01	2.19	0.74	1,082	0.0007
Substations	–	–	1.59	9.60	18.64	0.03	4.27	1.99	3,641	0.0020
Batch Plants	–	–	0.10	0.38	1.14	<0.01	10.64	1.90	241	<0.0001
Total Emissions	–	***363.6***	***4.81***	***24.95***	***57.41***	***0.11***	***33.13***	***9.83***	***11,546***	***0.0067***
Lowest Significant Impact Threshold	**–**	**–**	**100**	**100**	**100**	**100**	**70**	**10**	**25,000**	**25**
Exceeds Threshold?	**–**	**–**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**

Additional Mitigation Measures

As shown in the calculations presented herein, the proposed Project would not cause or contribute to a significant deterioration in air quality within the airsheds of the proposed Project. The proposed Project would incorporate BMPs from the POD and the mitigation measures from any permitting and/or regulatory requirements (e.g., for concrete batch plants). Therefore, no additional mitigation measures would be necessary and none are proposed.

Residual Impacts

As the proposed Project would not require any additional mitigation measures, any residual impacts to air quality from the proposed Project would be minor and short-term.

Unavoidable Adverse Impacts

The proposed Project would result in some increase to ambient pollutant concentrations. Since adverse impacts to air quality from proposed Project emissions would dissipate with time, there would be no long-term air quality impacts from proposed Project criteria and HAP emissions. GHG emissions, however, tend to be cumulative in nature. No Federal or State ambient air quality standards exist for GHGs. Furthermore, it is impossible to determine accurately the specific impacts on the environment that would be caused by a new source of GHGs. However, GHG emissions would result in an unavoidable adverse impact from the proposed Project.

The February 18, 2010, "Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gases" from the CEQ proposed a threshold of 25,000 tpy CO_2e as a threshold for which

further qualitative and quantitative evaluation may be warranted. CEQ notes that this threshold should be considered as "a useful indicator – rather than an absolute standard of insignificant effects" (CEQ 2010). CEQ draft GHG guidance states that NEPA environmental assessment and EIS documents for proposed Federal actions resulting in direct GHG emissions of 25,000 metric tons per year should include a GHG emissions analysis of alternatives (CEQ 2012).

The total combined GHG construction emissions are anticipated to be well below the 25,000 metric ton threshold, regardless of the sub-routes or local alternatives chosen. As an example, the total GHG construction emissions from the use of all the Proponent Preferred sub-routes would result in GHG emissions of approximately 12,000 tons (11,000 metric tons) of CO_2e. The substitution of other sub-routes or alternatives would not increase emissions above the CEQ threshold. Additionally, these projections are over the entire duration of proposed Project activities over several years and the entire geographic distance. Therefore, emissions from the proposed Project would be much less than the CEQ indicator and would be a tiny fraction of the existing annual Federal and State emissions.

The total GHG operations emissions per year combined for the proposed Project due to SF_6 emission leaks would be approximately 7,124 metric tons of CO_2e per year, which is below the CEQ indicator of 25,000 metric tons. The total GHG operations emissions per year for any of the various substitutive alternatives would be comparable to those for the proposed segments.

Therefore, it is difficult to state with any certainty what impacts on climate change may result from GHG emissions, or to what extent the proposed Project would contribute to those climate change impacts. As a result, any attempt to analyze and predict the local or regional impacts of the proposed Project on GHG emissions cannot be done in any way that produces reliable results. On May 14, 2008, the Director of the FWS noted, "The best scientific data available today do not allow us to draw a causal connection between GHG emissions from a given facility and effects posed to listed species or their habitats, nor are there sufficient data to establish that such impacts are reasonably certain to occur" (FWS 2008:1–2).

Short-term Uses versus Long-term Productivity

The proposed Project would cause some short-term, minor deterioration in existing air quality during the construction of the transmission lines, substations, and ancillary facilities. Long-term impacts would be negligible because operation and maintenance of the proposed Project would not emit pollutants into the atmosphere in quantities that would exceed air pollution standards. Therefore, no effects on the maintenance and enhancement of long-term productivity related to air quality would occur because of the implementation of the proposed Project.

Irreversible and Irretrievable Commitments of Resources

As the proposed Project would eventually be decommissioned, air quality would then be the same as the no action alternative and therefore the Project would not result in an irretrievable commitment to air resources. There may be an irreversible commitment of local ambient air quality if the transmission line enables the transmission of electricity generated from fossil fuels. Additionally, GHG emissions from the construction and operation and maintenance of the proposed Project (including SF_6 leaks from circuit breakers) would result in minor (relative to local, national, and/or global GHG emissions) but irreversible and irretrievable increase in GHGs.

4.3 NOISE AND VIBRATION

4.3.1 Introduction

Noise and vibration impacts are evaluated for all areas where sensitive receptors would be within the analysis area for the proposed Project. Impacts during construction would result from the use of equipment and vehicles but would be limited to the immediate vicinity of the proposed overhead line, along the proposed Project route, and along all transport access routes. Construction noise and vibration would be temporary and sporadic in nature. During operation, corona noise caused by operation of the new transmission line would elevate the current ambient noise levels within the immediate vicinity of the edge of the ROW.

This section describes the potential impacts of noise and vibration associated with the construction and operation of the transmission line, substations, and ancillary facilities. Impacts to noise are discussed in terms of noise levels expected to be produced by the proposed Project and compared to applicable laws and regulations. Potential impacts from vibration are only considered for construction, specifically for pile-driving activities. The impacts described in this section are based on the analysis provided in "Southline Transmission Project Resource Report 8: Noise" (CH2M Hill 2013b). The contents of that report are used herein without specific reference.

Decommissioning activities could also potentially result in noise. Impacts resulting from decommissioning activities would be similar in scope to impacts from construction. While impacts are anticipated to be similar in nature, the potential timeframe for decommissioning activities (at least 50 years out) renders the consideration of impacts to noise levels from decommissioning activities highly speculative. Therefore, impacts to noise from decommissioning activities are not addressed.

4.3.2 Methodology and Assumptions

This section describes the noise analysis area, the assumption and methodology used to calculate noise impacts, a description of the impact approach, and identification of what would be considered a significant noise impact from the construction and operation of the transmission lines and substations.

Analysis Area

The analysis area for the evaluation of noise impacts is 1 mile on either side of the centerline for both the New Build Section and Upgrade Section, and any substation or access roads outside that corridor. The analysis area for the evaluation of proposed Project noise impacts is depicted in figure 3.3-1 in chapter 3.

Analysis Assumptions

CONSTRUCTION

The noise levels expected to be generated by construction equipment have been calculated and published in various reference documents. The FHWA has published construction noise data for construction projects, which is used to determine construction noise impacts. Projected noise levels from proposed Project construction activities, including the expected noise attenuation due to distance from construction activities, are discussed further in appendix C. The values presented for estimated construction noise levels at the nearest new source review (NSR) are the expected maximum noise levels that the nearest

NSR will experience during construction. Due to the short-term, temporary, and intermittent nature of construction activities, these values are conservative.

Ground-borne vibration impacts are only expected to occur during pile-driving activities. At this time, it is not known whether pile-driving would be required. These activities would occur over a limited time period and be confined to daytime hours when noise-sensitive resources are nearby to minimize potential for disturbance. If pile-driving is required, there are two primary pile-driving methods: impact and vibratory. Impact pile drivers typically use a weight (sometimes referred to as a piston or hammer) to impact the top of pile to force it into the ground. Vibratory pile drivers are clamped to the pile and use motors to generate vibrations in the range of 2 to 25 hertz. The vibrations reduce the frictional grip of the soil and permit the soil at the tip of the pile to be displaced, which, coupled with the weight of the pile itself or additional dead weights, allows the pile to advance into the ground. The primary sources of noise associated with vibratory driving are the engine/motor and radiated noise from the vibrating pile. The noise from a vibratory driver is more of a continuous or steady noise. The radiated noise from the pile can be significant and has been reported to be louder than impact drivers when driving sheet or AZ-pile. The noise from pile-driving is incorporated into proposed Project construction noise estimates.

OPERATIONS AND MAINTENANCE

For substation noise, standard acoustical engineering methods were used to determine a range in anticipated sound levels based on the megavolt ampere rating of the substation. Predicted levels at distances of interest were calculated based on geometric spreading attenuation using International Organization for Standardization (ISO) 9613-2, "Acoustics—Sound Attenuation during Propagation Outdoors" (ISO 1996). Additional attenuation factors, such as intervening terrain, structures, barriers, and air absorption were not considered.

For corona noise, the Electric Power Research Institute (EPRI) ENVIRO computer model, containing the EPRI corona model algorithm, was used to calculate noise levels from the transmission lines (in addition to the electric and magnetic fields). A total of 10 scenarios representing combinations of the proposed Project and alternatives with existing adjacent transmission lines were selected for corona modeling. Corona noise results from changes in electric charges that are minimal in fair weather conditions and are increased during wet and humid conditions. Corona noise can increase when a transmission line is in proximity to other transmission lines and with the age and condition of equipment. Along the New Build Section of the proposed Project and alternatives, existing transmission lines cross or are within certain distances of the proposed Project that may have an effect on corona noise, and are included in the model.

Impact Indicators

Noise sensitive receptors, including any residential areas, schools and day care facilities, hospitals, long-term care facilities, places of worship, libraries, parks, and recreational areas specifically known for their solitude and tranquility (such as wilderness areas) are identified for each route. The length from the ROW to the NSR was used to determine estimated impacts from construction or operation and maintenance (substation and corona discharge) noise levels at the NSR. Vibratory impacts are not analyzed directly; instead, if a noise impact exists for a location, then a vibratory impact may be presumed to exist if pile-driving construction activities were to occur at that location.

As discussed in chapter 3, there are no Federal regulations that limit overall environmental noise levels. A number of agencies have issued guidance documents addressing exterior noise and regulations for specific sources. The most stringent noise regulations come from the EPA. The EPA's Noise Control Act of 1972 published guidelines that address the issue of community noise and contains goals for noise levels affecting residential land use of L_{dn} of less than 55 dBA for exterior levels and an L_{dn} of less than

45 dBA for interior levels. For purposes of this analysis, the exterior noise level guidelines of the Noise Control Act of 1972 for NSRs will be used (55 dBA).

Significant Impacts

For the purposes of this analysis, a significant impact on noise could result if any of the following were to occur from construction or operation of the proposed Project:

- Exceedance of local or Federal noise regulations or guidelines. If there are no local guidelines, then Federal guidelines (the Noise Control Act of 1972) will be used;
- Increased noise levels could impose restrictions on land currently planned for residential development; or
- Increased noise levels directly or indirectly could affect any places of traditional use that are NRHP listed or eligible, or identified as important to tribes.

A significant impact would constitute a "major" impact according to the impact description provided in table 4.1-1. The other impact descriptions provided in table 4.1-1 are also used herein for impacts less than major. Increases to noise levels that impose restrictions on land use or that affect NRHP listed or eligible sites are analyzed qualitatively herein. Noise is a potential issue to sites that are in current use by tribal members. The nearest NSRs to the proposed Project were identified; therefore, if operation and maintenance noise impacts affect these NSRs, then land use restrictions from increased noise levels or adverse impacts to NRHP sites could be presumed at these locations. Construction impacts would be of limited duration and therefore would not represent significant impacts to land use restrictions or NRHP sites, even if noise levels would be above impact thresholds.

4.3.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the BLM would not issue a ROW permit and Western would not partner with Southline or uprate its existing lines as part of the proposed Project. Noise and vibration impacts from construction and operation and maintenance of the proposed Project transmission line and associated activities and facilities would not occur. Under the no action alternative, noise and vibration conditions would likely continue at current levels and trends, although it is uncertain whether other changes may occur that affect conditions.

Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a).

Impacts Common to All Action Alternatives

CONSTRUCTION

Construction activities for both the New Build and Upgrade Sections of the proposed Project and alternatives would result in similar noise generation and impacts. Construction activities would be of short duration in any single area and generally would be limited to daytime hours. The majority of the New Build Section would pass through rural and open areas as well as around a number of small cities, including Deming and Lordsburg. As a result, a minimal number of receptors would be located along the New Build Section. The Upgrade Section would cross areas of rural and open lands and several small

communities, including Benson, as well as high-density areas of Tucson and surrounding communities. Residents and commercial establishments would experience short-term noise increases in these areas during construction.

Vibratory impacts from pile-driving construction activities may be a concern for NSRs that are located near the ROW. Vibratory impacts are not analyzed directly; instead, if a noise impact exists for a location, then a vibratory impact may be presumed to exist if pile-driving construction activities were to occur at that location. Vibration from construction activities would be of even more limited duration than the construction activities themselves, since the use of pile-driving construction activities would represent a fraction of total construction activity.

OPERATION AND MAINTENANCE

Corona noise would occur throughout the length of the proposed Project. The level of noise associated with the corona effect strongly depends on weather conditions as well as the condition of the transmission line. The proposed Project location is generally considered to have fair weather during most of the year; however, foul weather, or rain conditions, occurs periodically and seasonally. As noted in the Final WWEC PEIS (DOE and BLM 2008:3-143):

> In arid regions of the 11 western states, corona-generated audible noise would occur infrequently, as most of the areas adjacent to the proposed corridors on federal lands are undeveloped and sparsely populated. Whether occurring on federal or nonfederal land, corona noise would be scarcely discernible within ¼ mile or less from the center of the nearest transmission tower.

Corona noise for both the New Build and Upgrade Sections of the proposed Project and alternatives would be highest in areas where the new lines would be constructed in close proximity to existing transmission lines. Overall, because of the relatively dry nature of the area crossed by the proposed Project, the overall level of operational noise would be minimal and would therefore represent a minor, but long-term impact to ambient soundscapes. Operational noise would decrease rapidly with distance from the transmission line. According to the EPRI ENVIRO model, the maximum corona noise for all modeled scenarios for both the New Build and Upgrade Sections on the edge of the right-of-way would be 52.4 dBA (in foul weather for two double-circuit transmission lines separated by a distance of 200 feet). This value is lower than the exterior noise level guidelines of the Noise Control Act of 1972 and the proposed Project is not expected to cause a significant impact with respect to corona noise.

Corona noise increases with aging, damaged equipment. For the Upgrade Section, where the transmission line would be replacing the existing line with newer equipment, have an increased height above ground, and/or different arrangement of the equipment (e.g., vertical configuration of the double-circuit), corona noise from the proposed Project at the nearest NSR would be expected to decrease from currently existing line conditions. This change in noise due to the corona effect would most likely be minimal and would still be affected by other circumstances (i.e., adverse weather).

Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Maintenance activities are primarily inspection-related (for example, annual inspection of the transmission line from vehicles) and repair of damaged equipment. Actual maintenance activities would occur over a short period of time at any single location and typically would be of shorter duration than during initial construction activities.

Route Group 1 – Afton Substation to Hidalgo Substation

A summary of the noise resource inventory data for route group 1 is presented in table 4.3-1. Some segments have multiple land use descriptions that describe the segment's land use in greater detail. The expected range of baseline noise levels, estimated number of residential NSRs, the estimated closest distance to the NSR, and the estimated construction noise level at the nearest NSR are evaluated for each segment and land use type. Where there are no NSRs identified, the construction noise levels were not evaluated for that particular segment or land use.

Table 4.3-1. Route Group 1 Noise Resource Inventory Data

	Total Miles	Description/ Land Use	Estimated Number of NSRs	Estimated Closest Distance to NSR (feet)	Range of Baseline Noise Levels (dBA)	Estimated Construction Noise Levels at Nearest NSR (dBA)
Subroute 1.1, Proponent Preferred						
P1	5.1	Desert open space	0	–	8–45	–
P2	102	Desert open space	2	1300	8–45	63
		Follows highway (2,500 feet)	5	100	34–54	79
		Crosses highway (< 250 feet)	2	600	44–64	69
		Agricultural areas	0	–	30–52	–
		Near Deming, NM	40	100	40–67	79
P3	31.1	Desert open space	0	–	8–45	–
		Crosses highway (< 250 feet)	7	1100	44–64	63
P4a	8.7	Desert open space	0	–	8–45	–
Subroute 1.2, Proponent Alternative						
S1	13.4	Desert open space	1	2100	8–45	58
S2	11.1	Desert open space	0	–	8–45	–
		Near highway (500 feet)	0	–	41–61	–
S3	12.9	Follows highway (500 feet)	0	–	41–61	–
		Crosses highway (< 250 feet)	0	–	44–64	–
S4	10.6	Desert open space	0	–	8–45	–
		Near highway (1,000 feet)	0	–	38–58	–
S5	29.7	Follows highway (500 feet)	0	–	41–61	–
		Near Columbus, NM	35	2900	33–66	58
		Agricultural areas	2	1300	30–52	63
		Desert open space	0	–	8–45	–

Table 4.3-1. Route Group 1 Noise Resource Inventory Data (Continued)

	Total Miles	Description/ Land Use	Estimated Number of NSRs	Estimated Closest Distance to NSR (feet)	Range of Baseline Noise Levels (dBA)	Estimated Construction Noise Levels at Nearest NSR (dBA)
S6	7.4	Agricultural areas	1	500	30–52	69
		Near highway (1,000 feet)	0	–	38–58	–
		Desert open space	0	–	8–45	–
S7	41.5	Follows highway (250 feet)	2	300	44–64	74
		Crosses highway (< 250 feet)	0	–	44–64	–
		Near Hachita, NM	10	500	33–66	69
		Desert open space	1	<50	8–45	83
S8	14.6	Agricultural areas	3	2200	30–52	58
		Crosses highway (< 250 feet)	0	–	44–64	–
		Desert open space	0	–	8–45	–
Route Group 1 Local Alternatives						
DN1	42.5	Crosses highway (< 250 feet)	0	–	44–64	–
		Desert open space	1	100	8–45	79
		Agricultural areas	1	4900	30–52	52
A	17.5	Follows highway (500 feet)	0	–	41–61	–
		Desert open space	0	–	8–45	–
B	12.2	Follows highway (500 feet)	0	–	41–61	–
C	9	Follows highway (250 feet)	2	300	44–64	74
		Crosses highway (< 250 feet)	0	–	44–64	–
D	22.8	Agricultural areas	3	3700	30–52	52
		Crosses highway (< 250 feet)	1	100	44–64	79
		Desert open space	0	–	8–45	–
		Near Lordsburg, NM	12	3100	33–66	58
		Follows highway (2,500 feet)	1	4900	34–54	52

Current and predicted noise from substations associated with route group 1 is presented in table 4.3-2.

Table 4.3-2. Route Group 1 Current and Predicted Noise from Substations

Substation	Distance to Closest NSR (in feet)	Approximate Substation Noise Based on Existing Conditions at NSR	Predicted Approximate Substation Noise Based on Future Conditions at NSR	Change in Noise at NSR
Afton	35,942	< 40 dBA	< 40 dBA	0 dBA
Hidalgo	15,120	< 40 dBA	< 40 dBA	0 dBA
Proposed Midpoint	N/A	N/A	N/A	N/A
Alternative Midpoint	N/A	N/A	N/A	N/A

Note that neither the Proposed nor Alternative Midpoint substations are currently anticipated to have a transformer, the primary source of noise at the substations.

The New Build Section of the proposed Project and alternatives between the Afton Substation to Hidalgo Substation would pass by five non-residential noise-sensitive receptors and scattered residential areas, primarily near the community of Deming. However, this route group is predominantly open space and has very few noise-sensitive receptors. Non-residential NSRs in this route group are listed in appendix C.

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

There is an estimated total of 56 NSRs along subroute 1.1. The majority of estimated NSRs (40) are located in and around the city of Deming, New Mexico. NSRs identified in table 4.3-1 would be expected to experience noise levels of approximately 63 to 79 dBA during construction activities. NSRs specifically identified other than residences on this route include Holy Cross Cemetery near segment P2, which could experience construction noise levels of 52 dBA. The residential NSRs in subroute 1.1 could experience exceedances of the guidelines contained within the Noise Control Act of 1972, the most stringent regulatory criteria identified in chapter 3. Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from subroute 1.1 could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Substation noise for the Afton and Hidalgo substations would be expected to remain the same, with no change in noise levels at the distance to the closest NSR. Neither the Proposed nor Alternative Midpoint substations are currently anticipated to have a transformer, the primary source of noise at the substations. The nearest NSRs all experience noise levels less than the guidelines in the Noise Control Act of 1972. Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from this route group would be minor and long-term for operation and maintenance activities.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

Fifty-five NSRs were identified along this subroute. The majority of estimated NSRs are located in the communities of Columbus and Hachita. The noise levels at those identified NSRs could range from 58 to 83 dBA, with one location that could experience an estimated construction noise level as high as 83 dBA. Three NSRs (other than residences) were identified along segment S7. These NSRs include two cemeteries (Victorio and Hachita Cemeteries) and a church (Hachita Baptist Church) that could experience construction noise levels ranging from 69 dBA (at Hachita Cemetery and Hachita Baptist Church) to 83 dBA (at Victorio Cemetery). These NSRs could experience exceedances of the guidelines contained within the Noise Control Act of 1972, the most stringent regulatory criteria identified in chapter 3. Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from subroute 1.2 could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Substation noise from this alternative would be expected to be the same as that from subroute 1.1. Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from this route group would be minor and long-term for operation and maintenance activities.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1. These local alternatives include DN1, A, B, C and D.

Construction

There are few NSRs, including residences, near any of the local alternatives. Alternative D includes the most NSRs (12) as it passes by Lordsburg, New Mexico. All other alternatives have been identified as having two or less NSRs. Noise levels at all these NSRs could be expected to range from 52 dBA to 79 dBA. These NSRs could experience exceedances of the guidelines contained within the Noise Control Act of 1972, the most stringent regulatory criteria identified in chapter 3. Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from local alternatives could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration.

Therefore, impacts to noise from local alternatives for this route group would be minor and long-term for operation and maintenance activities.

Route Group 2 – Hidalgo Substation to Apache Substation

A summary of the noise resource inventory data for route group 2 is presented in table 4.3-3. Some segments have multiple land use descriptions that describe the segment's land use in greater detail. The expected range of baseline noise levels, estimated number of residential NSRs, the estimated closest distance to the NSR, and the estimated construction noise level at the nearest NSR are evaluated for each segment and land use type. Where there are no NSRs identified, the construction noise levels were not evaluated for that particular segment or land use.

Table 4.3-3. Route Group 2 Noise Resource Inventory Data

	Total Miles	Description	Estimated Number of NSRs	Estimated Closest Distance to NSR (feet)	Range of Baseline Noise Levels (dBA)	Estimated Construction Noise Levels at Nearest NSR (dBA)
Subroute 2.1, Proponent Preferred						
P4b	14	Crosses highway (< 250 feet)	0	–	44–64	–
		Desert open space	2	3600	8–45	52
P4c	1.9	Desert open space	0	–	8–45	–
P5a	9.6	Desert open space	0	–	8–45	–
P5b	21.1	Desert open space	0	–	8–45	–
		Near highway (1,000 feet)	0	–	38–58	–
P6a	0.9	Near highway (1,000 feet)	0	–	38–58	–
P6b	22.5	Near highway (500 feet)	0	–	41–61	–
		Agricultural areas	1	<50	30–52	83
		Desert open space	0	–	8–45	–
P6c	2.8	Near highway (5,000 feet)	0	–	31–51	–
		Desert open space	0	–	8–45	–
P7	22.3	Near highway (5,000 feet)	0	–	31–51	–
		Desert open space	1	1900	8–45	58
		Agricultural areas	1	800	30–52	63
P8	0.5	Agricultural areas	0	–	30–52	–

Table 4.3-3. Route Group 2 Noise Resource Inventory Data (Continued)

	Total Miles	Description	Estimated Number of NSRs	Estimated Closest Distance to NSR (feet)	Range of Baseline Noise Levels (dBA)	Estimated Construction Noise Levels at Nearest NSR (dBA)
Subroute 2.2, Proponent Alternative						
E	31.8	Near highway (5,000 feet)	0	–	31–51	–
		Desert open space	0	–	8–45	–
		Agricultural areas	1	<50	30–52	83
		Near San Simon, AZ	>100	2400	33–66	58
		Follows highway (2,500 feet)	0	–	34–54	–
F	25.3	Near highway (2,500 feet)	0	–	34–54	–
		Follows highway (5,000 feet)	0	–	31–51	–
		Agricultural areas	1	<50	30–52	83
		Near Bowie, AZ	>100	2400	33–66	58
		Desert open space	1	600	8–45	69
		Follows highway (500 feet)	0	–	41–61	–
Ga	25.7	Near highway (500 feet)	o	–	41–61	–
		Desert open space	1	1900	8–45	58
		Agricultural areas	8	<50	30–52	83
		Follows highway (250 feet)	0	–	44–64	–
		Crosses highway (< 250 feet)	0	–	44–64	–
Gb	1	Follows highway (2,500 feet)	0	–	34–54	–
Gc	7.4	Follows highway (2,500 feet)	0	–	34–54	–
		Crosses highway (< 250 feet)	0	–	44–64	–
		Near Cochise, AZ	25	300	33–66	74
		Agricultural areas	2	<50	33–66	83
I	2.3	Crosses highway (< 250 feet)	0	–	44–64	–
		Near highway (5,000 feet)	0	–	31–51	–
		Desert open space	0	–	8–45	–

Table 4.3-3. Route Group 2 Noise Resource Inventory Data (Continued)

	Total Miles	Description	Estimated Number of NSRs	Estimated Closest Distance to NSR (feet)	Range of Baseline Noise Levels (dBA)	Estimated Construction Noise Levels at Nearest NSR (dBA)
J	2.3	Follows highway (5,000 feet)	2	1000	31–51	63
		Follows highway (2,500 feet)	0	–	34–54	–
		Crosses highway (< 250 feet)	0	–	44–64	–
Route Group 2 Local Alternatives						
LD1	35.4	Desert open space	0	–	8–45	–
		Follows highway (250 feet)	0	–	44–64	–
		Crosses highway (< 250 feet)	5	<50	44–64	83
		Follows highway (1,000 feet)	80	800	38–58	63
		Follows highway (500 feet)	0	–	41–61	–
LD2	9.6	Desert open space	0	–	8–45	–
LD3a	27.9	Crosses highway (< 250 feet)	0	–	44–64	–
		Desert open space	1	50	8–45	83
LD3b	1.9	Desert open space	0	–	8–45	–
LD4	51.7	Desert open space	0	–	8–45	–
		Crosses highway (< 250 feet)	0	–	44–64	–
		Agricultural areas	8	<50	30–52	83
LD4–Option4	6.5	Desert open space	0	–	8–45	–
		Crosses highway (< 250 feet)	0	–	44–64	–
		Follows highway (2,500 feet)	0	–	34–54	–
		Follows highway (1,000 feet)	0	–	38–58	–
LD4–Option 5	12.3	Follows highway (2,500 feet)	0	–	34–54	–
		Desert open space	0	–	8–45	–
		Crosses highway (< 250 feet)	0	–	44–64	–
WC1	14.8	Near Willcox, AZ	>100	<50	40–67	83
		Follows highway (5,000 feet)	2	1000	31–51	63
		Follows highway (1,000 feet)	0	–	38–58	–
		Follows highway (250 feet)	0	–	44–64	–

Current and predicted noise from substations associated with route group 2 is presented in table 4.3-4.

Table 4.3-4. Route Group 2 Current and Predicted Noise from Substations

Substation	Distance to Closest NSR (in feet)	Approximate Substation Noise Based on Existing Conditions at NSR	Predicted Approximate Substation Noise Based on Future Conditions at NSR	Change in Noise at NSR
Apache	2,736	40 dBA	37–47 dBA	0–7 dBA
Hidalgo	15,120	< 40 dBA	< 40 dBA	0

The closest residence to a substation in the New Build Section is located approximately 2,736 feet from the fence line of the Apache Substation. This residence is also located approximately 4,500 feet from an existing coal-fired power plant and approximately 1,800 feet from railroad tracks used to deliver coal to the power plant. For purposes of this analysis, it is assumed that the existing sound level at the residence closest to the proposed Apache Substation is 40 dBA. At this residence the noise level associated with the proposed Project and alternatives' two 650 megavolt ampere (MVA) transformers would be anticipated to be between 37 and 47 dBA. A range is provided, because the precise sound rating of the transformers would be determined during detailed design, as would their location and the location of any noise barriers.

There are six non-residential NSRs identified for this route group (five schools and one cemetery). Non-residential NSRs in this route group are listed in appendix C.

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

There are five identified potential NSRs for this subroute. Most are located greater than 1,000 feet from the edge of the ROW, but one residence is within 50 feet of the ROW. That residence could experience temporary construction noise levels as high as 83 dBA. The other residential NSRs could experience temporary construction noise levels ranging from 52 to 63 dBA. Some NSRs could therefore experience noise levels in excess of the guidelines published in the Noise Control Act of 1972, the most stringent regulatory criteria identified in chapter 3. Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from subroute 2.1 could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Substation noise for the Hidalgo Substation would be expected to remain the same, with no change in noise levels at the distance to the closest NSR. The NSR nearest the Apache Substation could experience an increase in noise levels by 0 to 7 dBA. The nearest NSRs would all experience noise levels less than the guidelines in the Noise Control Act of 1972. Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from this route group would be minor and long-term for operation and maintenance activities.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

There are in excess of 100 identified potential NSRs in this subroute. All identified closest NSRs to the ROW could potentially have estimated construction noise levels over the recommended guidelines in the Noise Control Act of 1972. Non-residential NSRs associated with this Subroute would experience noise levels between 58 and 83 dBA, with four of the six non-residential NSRs below the guidelines of the Noise Control Act of 1972, the most stringent regulatory criteria identified in chapter 3. Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from subroute 2.2 could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Substation noise from this alternative would be expected to be the same as that from subroute 2.1. Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from this route group would be minor and long-term for operation and maintenance activities.

LOCAL ALTERNATIVES

There are eight local alternatives available for route group 2. These local alternatives include LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1.

Construction

Local alternative WC1 contains the most potential NSRs (over 1,000), as it passes through the city of Willcox, Arizona. The nearest NSRs would experience construction noise levels as high as 83 dBA. The second most number of estimated NSRs (85) is found in local alternative LD1, where sound levels would range from 64 to 83 dBA at the nearest NSR. Some local alternatives are desert open space with no identified potential NSRs (for local alternatives LD2, LD3b, LD4-Option 4, and LD4-Option 5). The other local alternatives (LD3a and LD4) have eight or less NSRs, and those nearest potential NSRs could experience construction noise levels between 74 and 83 dBA. Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from local alternatives could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from local alternatives for this route group would be minor and long-term for operation and maintenance activities.

Route Group 3 – Apache Substation to Pantano Substation

A summary of the noise resource inventory data for route group 3 is presented in table 4.3-5. Some segments have multiple land use descriptions that describe the segment's land use in greater detail. The expected range of baseline noise levels, estimated number of residential NSRs, the estimated closest distance to the NSR, and the estimated construction noise level at the nearest NSR are evaluated for each segment and land use type. Where there are no NSRs identified, the construction noise levels were not evaluated for that particular segment or land use.

Table 4.3-5. Route Group 3 Noise Resource Inventory Data

	Total Miles	Description	Estimated Number of NSRs	Estimated Closest Distance to NSR (feet)	Range of Baseline Noise Levels (dBA)	Estimated Construction Noise Levels at Nearest NSR (dBA)
Subroute 3.1, Proponent Preferred						
U1a	16.1	Agricultural areas	8	<50	30–52	83
		Desert open space	0	–	8–45	–
		Near highway (250 feet)	0	–	44–64	–
U1b	2.9	Crosses highway (< 250 feet)	0	–	44–64	–
		Near highway (5,000 feet)	0	–	31–51	–
U2	15.8	Follows highway (5,000 feet)	0	–	31–51	–
		City of Benson, AZ	>100	<50	33–66	83
		Follows highway (2,500 feet)	5	<50	34–54	83
		Mescal, AZ	>100	<50	33–66	83
		Crosses highway	50	200	44–64	74
U3a	35.6	Follows highway (5,000 feet)	75	<50	31–51	83
		Desert open space	0	–	8–45	–
		Vail, AZ	>100	<50	33–66	83
		City of Tucson (near airport)	>100	<50	48–92	83
Route Group 3 Local Alternative						
H	19.3	Desert open space	0	–	8–45	–
		Agricultural areas	20	400	30–52	69
		Follows highway (250 feet)	0	–	44–64	–
		Crosses highway (< 250 feet)	0	–	44–64	–

Current and predicted noise from substations associated with route group 3 is presented in table 4.3-6. The Apache Substation NSR is discussed in route group 2.

Table 4.3-6. Route Group 3 Current and Predicted Noise from Substations

Substation	Distance to Closest NSR (feet)	Approximate Substation Noise Based on Existing Conditions at NSR	Predicted Approximate Substation Noise Based on Future Conditions at NSR	Change in Noise at NSR
Apache	2,736	40 dBA	37–47 dBA	0–7 dBA
Pantano	13,247	< 40 dBA	< 40 dBA	0
Adams Tap	11,977	< 40 dBA	< 40 dBA	0

There are 40 non-residential NSRs identified for this route group, which includes churches, schools, museums, libraries, and parks. Non-residential NSRs in this route group are listed in appendix C.

SUBROUTE 3.1 – PROPONENT PREFERRED

Construction

Subroute 3.1 reaches the southern fringe of the city of Tucson, and has many potential NSRs (greater than 100). Segment U1a has eight potential NSRs, around agricultural areas, that could experience construction noise as high as 83 dBA. Segment U1b is completely vacant of NSRs. Segment U2 passes by the communities of Benson and Mescal, Arizona, and has many potential NSRs (greater than 100) within the Analysis Area. For the communities of Benson and Mescal and other land-use areas for segment U2, estimated construction noise levels would range between 74 and 83 dBA. As segment U3a reaches the City of Tucson, the number of potential NSRs increase. The NSRs located closest to the ROW would experience construction noise levels as high as 83 dBA. Most of the NSRs for this segment are also near the Tucson International Airport, and the baseline values for that area can range from 48-92 dBA. Approximately 40 non-residential NSRs are located within the area of analysis of this subroute. The nearest non-residential NSR is located approximately 600 feet from the proposed Project ROW (both the Skyline Baptist Church located in Benson, Arizona and the Desert Vista Library in Tucson, Arizona). These non-residential NSRs could be expected to experience construction noise levels as high as 69 dBA. Other non-residential NSRs could be expected to experience noise levels as high as 69 dBA. Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from subroute 3.1 could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Substation noise for the Pantano and Adams Tap substations would be expected to remain the same, with no change in noise levels at the distance to the closest NSR. The NSR nearest the Apache Substation would experience an increase in noise levels by 0 to 7 dBA. The nearest NSRs would experience noise levels less than the guidelines in the Noise Control Act of 1972. Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from this route group would be minor and long-term for operation and maintenance activities.

LOCAL ALTERNATIVES

There is one local alternative for route group 3: local alternative H.

Construction

Local alternative H has 20 identified potential NSRs. The nearest NSRs would experience construction noise levels as high as 69 dBA. Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from local alternatives could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from the local alternative for this route group would be minor and long-term for operation and maintenance activities.

Route Group 4 – Pantano Substation to Saguaro Substation

A summary of the noise resource inventory data for route group 4 is presented in table 4.3-7. Some segments have multiple land use descriptions that describe the segment's land use in greater detail. The expected range of baseline noise levels, estimated number of residential NSRs, the estimated closest distance to the NSR, and the estimated construction noise level at the nearest NSR are evaluated for each segment and land use type. Where there are no NSRs identified, the construction noise levels were not evaluated for that particular segment or land use.

Table 4.3-7. Route Group 4 Noise Resource Inventory Data

	Total Miles	Description	Estimated Number of NSRs	Estimated Closest Distance to NSR (feet)	Range of Baseline Noise Levels (dBA)	Estimated Construction Noise Levels at Nearest NSR (dBA)
Subroute 4.1, Proponent Preferred						
U3b	0.5	City of Tucson (near airport)	>100	<50	48–92	83
U3c	1	City of Tucson (6 miles from airport)	>100	<50	44–69	83
U3d	3.4	City of Tucson (6 miles from airport)	>100	<50	44–69	83
U3e	0.9	City of Tucson (6 miles from airport)	>100	<50	44–69	83
U3f	0.7	City of Tucson (6 miles from airport)	>100	200	44–69	74
U3g	0.9	City of Tucson (6 miles from airport)	>100	<50	44–69	83
U3h	1.1	City of Tucson (6 miles from airport)	>100	<50	44–69	83
U3i	18.2	City of Tucson (6 miles from airport)	>100	<50	44–69	83
		City of Tucson (outskirts)	>100	<50	40–67	83
		Agricultural areas	0	–	30–52	–

Table 4.3-7. Route Group 4 Noise Resource Inventory Data (Continued)

	Total Miles	Description	Estimated Number of NSRs	Estimated Closest Distance to NSR (feet)	Range of Baseline Noise Levels (dBA)	Estimated Construction Noise Levels at Nearest NSR (dBA)
U3j	0.9	Agricultural areas	0	–	30–52	–
U3k	16.7	Agricultural areas	10	<50	30–52	83
		Near Silverbell West	>100	100	30-52	79
		Near highway (250 feet)	0	–	44–64	–
U3l	1.6	Crosses highway (< 250 feet)	0	–	44–64	–
		Near highway (2,500 feet)	0	–	34–54	–
U3m	0.6	Crosses highway (< 250 feet)	0	–	44–64	–
U4	1.9	Desert open space	0	–	8–45	–
Route Group 4 Local Alternatives						
MA1	1.1	Agricultural areas	0	–	30–52	–
TH1a	1.4	City of Tucson (6 miles from airport)	>100	<50	44–69	83
TH1b	1.6	City of Tucson (6 miles from airport)	>100	<50	44–69	83
TH1c	0.3	City of Tucson (6 miles from airport)	>100	<50	44–69	83
TH1–Option	0.4	City of Tucson (6 miles from airport)	>100	<50	44–69	83
TH3–Option A	0.8	City of Tucson (6 miles from airport)	>100	<50	44–69	83
TH3–Option B	0.8	City of Tucson (6 miles from airport)	>100	<50	44–69	83
TH3–Option C	1.8	City of Tucson (6 miles from airport)	>100	<50	44–69	83
TH3a	2.7	City of Tucson (6 miles from airport)	>100	<50	44–69	83
TH3b	4.5	City of Tucson (6 miles from airport)	>100	<50	44–69	83

Current and predicted noise from substations associated with route group 4 is presented in table 4.3-8.

Table 4.3-8. Route Group 4 Current and Predicted Noise from Substations

Substation	Distance to Closest NSR (in feet)	Approximate Substation Noise Based on Existing Conditions at NSR	Predicted Approximate Substation Noise Based on Future Conditions at NSR	Change in Noise at NSR
Nogales	5,711	< 40 dBA	< 40 dBA	0
Vail	5,534	< 40 dBA	< 40 dBA	0
Rattlesnake	10,687	< 40 dBA	< 40 dBA	0
Tucson-DMP	934	41 dBA	43–49 dBA	2–8 dBA
Marana	512	<40 dBA	43–53 dBA	3–13 dBA
Saguaro/Tortolita	11,484	< 40 dBA	< 40 dBA	0
DeMoss Petrie	1,476	41 dBA	43–49 dBA	2–8 dBA

Note that the Del Bac and DeMoss Petrie substations are not currently anticipated to have a transformer, the primary source of noise at the substations. Based on a standard existing 100-MVA transformer at the

Tucson Substation, the existing sound level at the closest NSR is estimated to be 41 dBA. These residences are also located approximately 1,900 feet from the I-10 freeway, which represents another existing source of noise. The addition of the proposed Project and alternatives' 287-MVA transformer is anticipated to result in a sound pressure level of between 43 and 49 dBA. A range is provided, because the precise number, size, and sound rating of the transformers would be determined during detailed design, as would their location and the location of any noise barriers. The nearby DeMoss Petrie Substation is located farther away (approximately 1,500 feet) from the residences and is also shielded by a long intervening brick building. The proposed Project and alternatives' modifications of the DeMoss Petrie Substation are therefore not anticipated to have an additive effect on the sound level at the NSRs.

No existing transformers are planned for the proposed Marana Substation; therefore, the existing levels would be expected to be consistent with rural residential areas and may at times be less than 40 dBA. The proposed Project and alternatives' 287-MVA transformer at Marana Substation is anticipated to be between 43 and 53 dBA at the closest NSR. A range is provided, because the precise sound rating of the transformers would be determined during detailed design, as would their location and the location of any noise barriers.

Pinal County has an ordinance that addresses excessive noise, and specifically lists land use categories and times where certain limiting sound levels are allowed (see table 8-9 in chapter 3 of the ordinance). The EPA's Noise Control Act of 1972 is more stringent than these values and is used instead of the local regulations.

There are seventy-five non-residential NSRs identified for this route group (which includes parks, schools, churches, hospitals, libraries, and cemeteries). Non-residential NSRs in this route group are listed in appendix C.

SUBROUTE 4.1 – PROPONENT PREFERRED

Construction

The Upgrade Section would not pass any NSRs until it reaches the city of Tucson (Segment U3) and its surrounding communities. The proposed Project and alternatives would traverse a partially urban area with scattered areas of residential development along the 2-mile study corridor. However, no hospitals, cemeteries, schools, or churches are within the 2-mile study corridor of the Upgrade Section. Likewise, no wilderness areas or other public recreation spaces that require low noise limits are in this section either.

There are 1,350 identified potential NSRs for this subroute. Most NSRs may experience construction noise levels of between 74 and 83 dBA. There is one NSR on segment U3f that could experience construction noise levels of 69 dBA. Some segments (U3j, U3l, U3m, and U4) have no identified potential NSRs. Approximately 60 non-residential NSRs are located within the area of analysis of this subroute. Multiple non-residential NSRs are located on the proposed Project ROW (Joaquin Murrieta Northwest Park, Christopher Columbus Park, and Rattlesnake Ridge Elementary, all located in Tucson, Arizona). These non-residential NSRs could be expected to experience construction noise levels as high as 83 dBA. Other non-residential NSRs could be expected to experience noise levels as high as 83 dBA. Therefore, using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from subroute 4.1 could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Substation noise for the Nogales, Vail, Rattlesnake, and Saguaro/Tortolita substations would be expected to remain the same, with no change in noise levels at the distance to the closest NSR. The nearest NSR to the Tucson-DMP, Marana, and DeMoss Petrie substations would all experience higher noise levels (between 2 and 13 dBA). The nearest NSRs would experience noise levels less than the guidelines in the Noise Control Act of 1972. Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from this route group would be minor and long-term for operation and maintenance activities.

LOCAL ALTERNATIVES

There are 10 local alternatives are available for route group 4. The local alternative includes MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C.

Construction

There are greater than 100 identified potential NSRs. Local alternative MA1 has no identified potential NSRs. For all other segment alternatives, the nearest NSRs could experience construction noise levels as high as 83 dBA. The closest non-residential NSRs were identified along alternative TH1a (Tolson Elementary School), TH1b (Greasewood Park), and TH3-Option C (Santa Cruz River Park). Each of these non-residential NSRs was identified on the ROW; therefore, proposed Project construction noise levels could be expected as high as 83 dBA. Other non-residential NSRs identified for the other alternatives could experience noise levels ranging from 58 to 83 dBA. Using the significance criteria outlined in the beginning of this chapter in table 4.1-1, impacts to noise from local alternatives could be major (i.e., impacts would occur, and could represent a high degree of change over existing baseline conditions); however, construction noise would be short-term, temporary, and intermittent in nature. Therefore, construction noise would represent more of a nuisance and could be mitigated to be below thresholds and/or baseline conditions.

Operation and Maintenance

Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from local alternatives for this route group would be minor and long-term for operation and maintenance activities.

Agency Preferred Alternative

The Agency Preferred Alternative for route group 1 of the New Build Section would cross primarily desert open space and, therefore, there would be few NSRs affected by noise from this alternative. The Agency Preferred Alternative would pass in and around the city of Deming, New Mexico, where several clusters of both residential and non-residential NSRs are located. The nearest identified sensitive receptors to the route group 1 preferred alternative would be located near the interstate (I-10) and in and around the city of Deming at a distance of approximately 100 feet from the proposed Project ROW. The estimated unmitigated noise levels could be as high as 79 dBA during Project construction; however, construction activities would be temporary and intermittent in nature, while operation and maintenance activities would be long-term but would involve less noise point sources and also be intermittent in

nature. Additionally, standard construction mitigation measures, built-in design features, and incorporated BMPs would further reduce noise levels below the predicted maximum. While some of the alternatives to the Agency Preferred Alternative would avoid the city of Deming, these alternatives would pick up additional NSRs (such as in and around Columbus, New Mexico) and, therefore, the amount and proximity of NSRs for these alternatives is not substantively different from those of the Agency Preferred Alternative.

The Agency Preferred Alternatives segments LD3a, LD4, LD4-Option 5, and P7 for route group 2 of the New Build Section would cross primarily desert open space and agricultural areas with few NSRs. The choice of these alternatives avoids the towns and cities of the Proponent Alternative and another local alternative (WC1). While there were few identified NSRs near the Agency Preferred Alternative for route group 2, the nearest NSRs would be located close to the Project ROW (potentially within 50 feet of construction activities) and could experience noise levels as high as 83 dBA. As discussed, construction would be temporary and intermittent in nature, and proposed Project construction noise would be further ameliorated by the use of standard construction mitigation measures, built-in design features, and incorporated BMPs. Project operation and maintenance activities would be long-term, but involve less noise point sources and also be intermittent in nature.

Segments U1a, U1b, U2, and U3a in route group 3 of the Agency Preferred Alternative have a large number of potential NSRs near the proposed Project in and near the towns and cities of Benson, Mescal, Vail, and Tucson in Arizona. Outside of these developed areas, the Agency Preferred Alternative would cross primarily desert open spaces and agricultural lands, with few NSRs. The nearest NSRs identified would be within approximately 100 feet of the proposed Project ROW and therefore could experience construction noise as high as 83 dBA. As discussed, Project construction, operation, and maintenance noise would be short-term and/or intermittent in nature and would be further mitigated through construction mitigation measures, built-in design features, and incorporated BMPs. The only alternative proposed for route group 3 and the Agency Preferred Alternative, local alternative H, would avoid the city of Benson and therefore the NSRs associated with that city.

As all of the route group 4 alternatives pass through a large urban area (the city of Tucson and outskirts), no substantive differences exist between the Agency Preferred Alternative and the other alternatives in regards to noise impacts to sensitive receptors. The nearest identified receptors would be within 50 feet and would experience noise levels as high as 83 dBA under the Agency Preferred Alternative or any other alternative in this route group. Project construction, operation, and maintenance noise would be short-term and/or intermittent in nature and would be further mitigated through construction mitigation measures, built-in design features, and incorporated BMPs.

Therefore, overall impacts to noise from the Agency Preferred Alternative for construction activities could be major; however, construction noise would be short-term, temporary, and intermittent in nature. Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Therefore, impacts to noise from the Agency Preferred Alternative would be minor and long-term for operation and maintenance activities.

Additional Mitigation Measures

In addition to the proponent-committed environmental protection measures and BMPs from the POD, the following measures could be implemented to further reduce or eliminate the effects of the proposed Project. The DOE and BLM prepared a PEIS in November 2008 titled “Designation of Energy Corridors

on Federal Land in the 11 Western States" (DOE and BLM 2008). Within this PEIS, the BLM also offers recommended mitigation measures as ways to reduce potential noise impacts:

- For construction-related noise impacts:
  - "Schedule construction activities and route construction traffic to minimize disruption to nearby residents and existing operations surrounding the Project."
  - "Noisy construction activities (including blasting) should be limited to the least noise-sensitive times of day (daytime only between 7 a.m. and 10 p.m.) and to weekdays. In sensitive wildlife areas, they should be limited to between 1.5 hours after sunrise and 1.5 hours before sunset."
  - "Erect temporary wooden noise barriers around areas where construction equipment would disturb sensitive receptors."
  - "To the extent possible, locate noisy equipment away from sensitive receptors."
  - "Whenever feasible, schedule noise [-generating] activities to occur at the same time, since additional sources of noise generally do not add noise. That is, less-frequent noise activities would be less annoying than frequent less-noisy activities."
  - "If blasting or other noisy activities are required during the construction period, notify nearby residents in advance."
- For operations-related noise impacts:
  - "If possible, minimize trips for surveillance and monitoring of pipelines and/or transmission lines by the energy transport system operating companies."

Residual Impacts

The proposed Project would result in temporary increases to ambient noise levels from the construction of the transmission lines, substations, and ancillary facilities. Some of these temporary increases would exceed local or Federal noise regulations or guidelines. The built-in design features, incorporated BMPs, and mitigation measures would reduce, but not altogether eliminate, proposed Project impacts to noise. Limited increases to ambient noise would result from proposed Project operation over the lifetime of the Project. The proposed Project would not be expected to increase noise levels to levels that could impose restrictions on land currently planned for residential development or affect any places of traditional use that are NRHP listed or eligible, or identified as important to tribes.

Unavoidable Adverse Impacts

The proposed Project could result in unavoidable increases in ambient noise levels over the life of the Project. Construction noise represents the largest increase in noise, but that noise is temporary. Operation and maintenance noise would persist through the life of the proposed Project, but is expected to be negligible. Additionally, operation and maintenance noise from the proposed Project can be expected to decrease for the Upgrade Section because there is expected to be less maintenance activity with the installation of a new transmission line; however, this change can be expected to be negligible. Substation noise at the nearest NSR would stay the same or increase slightly. In general, the DOE and BLM state in a PEIS titled "Designation of Energy Corridors on Federal Land in the 11 Western States" (DOE and BLM 2008) that the sound level at the edge of the ROW (200 feet from the transmission line) would be about 44 dBA and would fall to 35 dBA at 0.25 mile from the edge. As modeled for the proposed Project, corona noise can be expected to be as high as 52.4 dBA in foul weather and where the transmission lines are located near each other. Corona noise on the Upgrade Section of the proposed Project would be

expected to decrease due to new equipment, the increased height from the ground, and configuration of the circuit.

Short-term Uses versus Long-term Productivity

The proposed Project would cause some short-term ambient noise level increase during the construction of the transmission lines, substations, and ancillary facilities. This increase in ambient noise would be reduced through the use of built-in design features, incorporated BMPs, and mitigation measures. Long-term impacts would be negligible because operation of the proposed Project would not create noise that would exceed any standard. Therefore, no effects on the maintenance and enhancement of long-term productivity related to noise would occur because of the implementation of the proposed Project.

Irreversible and Irretrievable Commitments of Resources

While there would be a limited amount of loss of lower ambient noise levels during proposed Project operation, there would not be any irreversible or irretrievable commitment of resources from the implementation of the proposed Project, as ambient soundscapes would be restored after proposed Project decommissioning.

4.4 GEOLOGY AND MINERAL RESOURCES

4.4.1 Introduction

This section describes the impacts to geological and mineral resources that could potentially occur during construction, operation, and maintenance of the proposed Project, and also addresses the impacts of geology on the proposed Project facilities. Impacts to geological and mineral resources are discussed in terms of whether the proposed Project and alternatives would result in significant effects on geological and mineral resources by analyzing the context and intensity of the change that would be introduced by the Project, in accordance with CEQ regulations at 1508.27. This section also addresses the methodology for determining the impacts of geology on the proposed Project facilities. In order to facilitate the comparison of alternatives, potential environmental changes are described in terms of temporal scale, spatial extent, and significance. The impacts described in this section are based on data available in "Southline Transmission Project Resource Report 4: Geology and Minerals" (CH2M Hill 2013c). The contents of that report are used herein without specific reference.

4.4.2 Methodology and Assumptions

This section describes the area that was analyzed for determining the effects of the proposed Project on geological and mineral resources, how effects would be measured, the assumptions used when evaluating the effects, and what criteria must be met for an impact to be considered significant.

Analysis Area

The analysis area for the purpose of evaluating effects and impacts is the corridor of the ROW, plus the footprints of substations and construction laydown areas located outside the ROW. The ROW for the New Build Section would be 200 feet wide, and the ROW for the Upgrade Section would be 150 feet wide. This analysis area is sufficient for identifying resources that could be directly impacted by ground disturbance during construction and that would be precluded from mining access during operation and maintenance.

Analysis Assumptions

The following factors were assumed when evaluating the effects of the proposed Project on geological and mineral resources:

- A geotechnical engineering study would be completed prior to final design and construction of the Project to identify site-specific geological conditions and potential geological hazards. The data collected from the study would be used to guide sound engineering practices, and foundation design would be consistent with geological conditions for each tower site.
- Existing fault lines, land subsidence areas, earth fissures, mining claims, oil/gas reserves, areas of mineral resources of economic value, and other pertinent geological and mineral-related features have been accurately mapped.
- Operation and maintenance of the Project, as it relates to geological and mineral resources, would primarily be the presence of transmission towers and transmission lines and how they could preclude access to underground resources in the immediate vicinity.
- Transmission lines typically have little impact to mining operations. Span lengths are such that access to minerals can be accomplished between spans. Should open pit mining be planned, structures can be left on 'islands,' or the mining interests can have the transmission line locally re-routed (personal communication, Mark Wieringa, 2013).

Impact Indicators

The following indicators were considered when analyzing the effects on geology and mineral resources:

- Types of geological hazards and the potential of the Project to aggravate existing hazards;
- Types of geological hazards and their potential for affecting the Project;
- The potential for the Project to negatively affect important geological resources, including important State-identified rock outcroppings and potential geothermal areas; and
- The potential for the Project to negatively affect access to important mineral and petroleum resources.

While many of the potential impacts are difficult to quantify, "units of change" for the items above are based on the number of claims, leases, oil/gas wells, geological features, and locatable, leasable, and/or saleable mineral areas within the analysis area; or the acreage of overlap between the Project ROW and certain resources. Measured impacts are followed by a binary determination regarding whether or not they are likely to be lost or occluded, and quantification of impacts when possible.

Significant Impacts

For the purposes of this analysis, a significant impact on geology and mineral resources could result if any of the following were to occur from construction or operation and maintenance of the proposed Project:

- Areas of geological importance are lost or made inaccessible for future use;
- Important State-identified rock outcroppings are adversely affected;
- Known mineral resources of economic value are lost or made inaccessible;
- Project activity (construction, operation, or maintenance) would locate ROW over a mining claim located on or before July 23, 1955, or otherwise affect a valid existing mineral right;
- Project activity (construction, operation, or maintenance) would locate ROW over oil or gas well fields, reserves, or otherwise affect valid existing petroleum rights;

- Project would occur in an area of known geological hazard;
- Structures would fail or create hazards due to slope instability, the effects of earthquakes, or land subsidence; and
- Project would create geological hazards, particularly increases in the probability or magnitude of mass wasting events.

4.4.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the New Build Section would not be constructed. In the New Build Section, undisturbed areas and existing geology and mineral resources would remain undisturbed unless they are mined in unrelated actions. Underground resources would not be precluded from access within the proposed Project ROW. Geological activity such as fault creep, earthquakes, landslides, and land subsidence and earth fissures would continue to occur.

Even under the no action alternative, Western still plans to upgrade the existing lines between Apache and Saguaro substations within the next 10 years, in accordance with Western's 10-year capital improvement plan (Western 2012a).The Upgrade Section would remain in its current state as a disturbed ROW with transmission towers and transmission lines, until such time as Western upgrades the line.

Impacts Common to All Action Alternatives

Many of the potential impacts discussed in chapter 3 would universally apply to all action alternatives. Resources not present are discussed first, then potential impacts common to all alternatives are discussed below as they each relate to construction, operation, and maintenance of the Project.

GEOLOGICAL FAULTS

As discussed in chapter 3, no active faults have been mapped in any alternatives in the analysis area.

VOLCANOES

As discussed in chapter 3, no potentially active volcanoes have been identified or are being monitored in the proposed Project vicinity.

AREAS OF UNIQUE GEOLOGICAL INTEREST

As discussed in chapter 3, no areas of unique geological interest, caves, rock outcroppings, or mineral collection areas of recreational or scientific importance have been identified within the analysis area.

OIL AND GAS WELLS AND COAL RESOURCES

As discussed in chapter 3, no wells in the analysis area are currently producing oil or gas, and there are no coal leases or known coal resources within the analysis area.

PRE-1955 MINING CLAIMS

As discussed in chapter 3, no known pre-1955 mining claims are present within the analysis area.

CONSTRUCTION

All action alternatives would involve drilling, blasting, excavation, etc., during construction. The potential impacts from construction include:

- areas of geological importance lost or made inaccessible for future use (direct);
- adversely affected important State-identified rock outcroppings (direct);
- known mineral resources of economic value or pre-1955 mining claims lost or made inaccessible (direct);
- affecting a valid existing mineral right by preclusion of access (direct);
- affecting oil or gas well fields, reserves, or otherwise affecting valid existing petroleum rights by preclusion of access (direct); and
- creation or exacerbation of geological hazards, particularly increases in the probability or magnitude of mass wasting events or hazards due to slope instability (indirect).

Land Subsidence

Most cases of land subsidence in the Southwest are caused by excessive groundwater pumping. This type of subsidence occurs very slowly over decades (AZGS 1993). Therefore, land subsidence would not have direct or indirect effects on the operation and maintenance of the Project.

Earth Fissures

Existing earth fissures are discrete locations that are easily identified and that would be avoided during final Project design for tower placement. Although the exact location of a future fissure cannot be predicted, areas where fissures are likely to form have been identified. These areas would be avoided where feasible, and appropriately engineered foundations would be installed to mitigate this potential hazard. For the purposes of actual construction activities, fissures are generally easy to fill, span, or drive around and would not pose challenges. Therefore, direct or indirect impacts from earth fissures would not be anticipated.

Earthquakes

As described in chapter 3, the seismic hazard is relatively low (“moderate to low” to “low”) for the region that encompasses all action alternatives. Because proposed Project activities would have no means of influencing seismicity, the frequency and magnitude of earthquakes would not be directly or indirectly impacted from construction of any action alternative.

Landslides

Areas with slopes greater than 25 percent were identified in chapter 3 as having the potential for landslides or mass wasting events. The proposed Project would be designed to avoid steep slopes where possible, and a preconstruction geotechnical study would identify areas that need engineered solutions to mitigate for the potential for mass wasting events. Therefore, the potential for landslides would not likely be changed by construction and direct or indirect effects to the potential for landslides would not be anticipated.

Karst and Cave Areas

The mapped karst and cave areas are places that "may have the potential" to contain underground fissures, tubes, and caves. If present, individual caves and voids would be identified during preconstruction geotechnical studies, and would be avoided if it is determined that there is a danger to humans, the environment, or proposed Project infrastructure. Because they would be avoided, no direct or indirect impacts would be anticipated from karst and cave areas during construction of any action alternative.

Mining Districts

Direct impacts to mining districts during construction would be immediate preclusion of access to underground resources within the ROW as the proposed Project is constructed. However, this impact would only have consequences in areas within active mining districts where active mines are located. It should be noted that mining districts are not mines; they are large areas within which mining occurs and within which specific mines are located. Because the final route would be sited such that impacts to active mining operations are avoided, construction would cause no direct impacts to operating mines and mining districts. Because construction would be limited to the ROW, construction-related indirect impacts would not be anticipated. Continued preclusion of access to these resources by virtue of the existence of the proposed Project is described below in the "Operation and Maintenance" section.

However, transmission lines typically have little impact to mining operations. Span lengths are such that access to minerals can be accomplished between spans. Should open pit mining be planned, structures can be left on 'islands,' or the mining interests can have the transmission line locally re-routed. Transmission line structures are routinely moved to accommodate surface mining (personal communication, Mark Wieringa, 2013).

Geothermal Resources

No geothermal leases have ever been established on or near the analysis area, and there has never been any commercial production anywhere in or near the analysis area. The moderate temperatures and limited geographic area likely preclude the potential for generating electricity, leaving only direct-use applications, like heating greenhouses. The potential for geothermal development in this area is "low to very low." No commercially viable geothermal resources are located on the Arizona portion of the analysis area. For these reasons, no direct or indirect impacts to geothermal resources would be anticipated from construction of any action alternative.

OPERATION AND MAINTENANCE

Operation and maintenance of the proposed Project, as it relates to impacts to geological and mineral resources, would primarily consist of the presence of transmission towers, transmission lines, and maintenance roads and how they preclude access to underground resources in the immediate vicinity. Potential impacts from operation include:

- continued preclusion of access to mineral and petroleum resources (direct); and
- damage to the proposed Project from preexisting or exacerbated geological hazards such as mass wasting events, hazards due to slope instability, or the effects of earthquakes or land subsidence (direct).

Land Subsidence

Most cases of land subsidence in the Southwest are caused by excessive groundwater pumping. This type of subsidence occurs very slowly over decades and affects broad areas; as such, structures sink uniformly with the ground and are not damaged. Because the severity of subsidence increases from the edges to the center like a bowl, certain infrastructure like canals and sewers, which rely on slope, can be damaged or rendered inoperable (AZGS 1993). Transmission lines, however, are not slope-dependent and would not be affected in such a way. Therefore, no direct or indirect effects on the proposed Project would be anticipated from land subsidence.

Earth Fissures

Whereas isolated poles and towers have very narrow bases of support and may lean or fall in the case of a new fissure forming, poles that hold utility lines such as electric transmission lines may be prevented from falling or leaning by the support of adjacent poles and taut lines (AZGS 1993). Although the exact location of a future fissure cannot be predicted, areas where fissures are likely to form have been identified. These areas would be avoided where feasible, and appropriately engineered foundations would be designed to mitigate for this potential hazard.

Earthquakes

As described in chapter 3, the seismic hazard is relatively low ("moderate to low" to "low") for the region that encompasses all action alternatives. No direct or indirect impacts would be anticipated from earthquakes during operation and maintenance of any action alternative.

Landslides

Neither operation nor maintenance of the proposed Project would involve blasting, road-cutting, ground disturbance, or other activities that could exacerbate the potential for landslides and mass wasting. Therefore, operation and maintenance of the proposed Project would not be expected to have any direct or indirect effects on the potential for landslides.

Karst and Cave Areas

As discussed above, caves and voids would be identified during preconstruction geotechnical studies and would be avoided if it is determined that there is a danger to humans, the environment, or proposed Project infrastructure. Because they would be avoided, no direct or indirect impacts from karst and cave areas would be anticipated from operation and maintenance of any action alternative.

Mining Districts

During operation and maintenance of the proposed Project, underground resources would be physically precluded from access in the vicinity of the towers. Blasting would be restricted in the vicinity of the towers and anywhere within the ROW. The final route would be located such that impacts to active mining operations are avoided. Therefore, operation and maintenance of the proposed Project would not directly impact active mines or mining districts, but could have potential long-term indirect impacts by precluding access to underground resources within the ROW for future mining.

However, transmission lines typically have little impact to mining operations. Span lengths are such that access to minerals can be accomplished between spans. Should open pit mining be planned, structures can be left on 'islands,' or the mining interests can have the transmission line locally re-routed. Transmission

line structures are routinely moved to accommodate surface mining (personal communication, Mark Wieringa, 2013).

Geothermal Resources

No geothermal leases have ever been established on or near the analysis area, and there has never been any commercial production anywhere in or near the analysis area. The moderate temperatures and limited geographic area likely preclude the potential for generating electricity, leaving only direct-use applications, like heating greenhouses. The potential for geothermal development in this area is "low to very low." No commercially viable geothermal resources are located on the Arizona portion of the analysis area. For these reasons, no direct or indirect impacts to geothermal resources would be anticipated during operation and maintenance of any action alternative.

SUMMARY OF IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Because the only potential impacts identified above are indirect impacts to mining districts during operation and maintenance, this topic will be discussed further below. Because the boundaries of mining districts are somewhat arbitrary and are not exact, the acreages and calculations described below are not intended to be interpreted as precise data. The other topics described above are not further discussed in this chapter. It should be kept in mind that as discussed above, transmission lines typically have little impact to mining operations.

Route Group 1 – Afton Substation to Hidalgo Substation

Several mining districts would be crossed by the various alternatives of route group 1, and table 4.4-1 below details the acres of overlap between the mining districts and the ROWs of the various alternatives. For each alternative, the types of impacts would be as described in the "Impacts Common to All Action Alternatives" section above, with only the amounts of impact (acres of overlap) varying between the alternatives.

Of the mining districts crossed by the alternatives in this route group, only the Aden district is known to be active (McLemore 1998; McLemore et al. 1996; McLemore et al. 2005). Table 4.4-1 describes the acres of each mining district crossed by segment within each alternative, and table 4.4-2 describes the acres of overlap by mining district within each alternative.

Table 4.4-1. Route Group 1 Geology Resource Inventory Data by Segment

Segment	Total Miles	Mining Districts Crossed (acres)	Districts Crossed	Production Years (active or inactive)	Size of Mining District (acres)	Percentage of Mining District Affected
Subroute 1.1, Proponent Preferred						
P1	5.1	125	Aden	1950s to present (active)	514,300	0.02%
P2	102.0	590	Aden	1950s to present (active)	514,300	0.10%
P3	31.1	–	–	–	–	–
P4a	8.7	–	–	–	–	–

Table 4.4-1. Route Group 1 Geology Resource Inventory Data by Segment (Continued)

Segment	Total Miles	Mining Districts Crossed (acres)	Districts Crossed	Production Years (active or inactive)	Size of Mining District (acres)	Percentage of Mining District Affected
Subroute 1.2, Proponent Alternative						
S1	13.4	325	Aden	1950s to present (active)	514,300	0.06%
S2	11.1	204; 63	Aden; Potrillo Mountains	1950s to present (active); Unknown (inactive)	514,300; 16,822	0.040%; 0.40%
S3	12.9	121	Aden	1950s to present (active)	514,300	0.02%
S4	10.6	75	Camel Mountain–Eagle Nest	None (inactive)	13,967	0.50%
S5	29.7	–	–	–	–	–
S6	7.4	120	Carrizalillo Hills	Late 1800s, 1930–1956 (inactive)	41,438	0.30%
S7	41.5	4	Carrizalillo Hills	Late 1800s, 1930–1956 (inactive)	41,438	0.01%
S8	14.6	–	–	–	–	–
Route Group 1 Local Alternatives						
DN1	42.5	142	Fluorite Ridge	1909–1954 (inactive)	26,755	0.50%
A	17.5	265	Aden	1950s to present (active)	514,300	0.05%
B	12.2	54	Camel Mountain–Eagle Nest	None (inactive)	13,967	0.40%
C	9.0	108	Carrizalillo Hills	Late 1800s, 1930–1956 (inactive)	41,438	0.30%
D	22.8	58	Lordsburg Mesa	1885–1978, 1990–1999 (inactive)	34,579	0.20%
Representative Staging Areas						
1	NA	20	Aden	1950s to present (active)	514,300	0.004%
S1	NA	20	Aden	1950s to present (active)	514,300	0.004%
S2	NA	20	Aden	1950s to present (active)	514,300	0.004%
S5	NA	20	Carrizalillo Hills	Late 1800s, 1930–1956 (inactive)	41,438	0.05%

Note: NA = not applicable (size of each staging area is approximately 20 acres, entirely within mining district)

Table 4.4-2. Route Group 1 Geology Resource Inventory Data by Mining District

Mining Districts Crossed	Production Years (active or inactive)	Acres of Overlap with ROW	Size of Mining District (acres)	Percentage of Mining District Affected
Subroute 1.1, Proponent Preferred				
Aden	1950s to present (active)	715	514,300	0.14%
Subroute 1.2, Proponent Alternative				
Aden	1950s to present (active)	650	514,300	0.12%
Potrillo Mountains	Unknown (inactive)	63	16,822	0.37%
Camel Mountain–Eagle Nest	None (inactive)	75	13,967	0.54%
Carrizalillo Hills	Late 1800s, 1930–1956 (inactive)	124	41,438	0.30%
Route Group 1 Local Alternatives				
Fluorite Ridge (DN1)	1909–1954 (inactive)	142	26,755	0.53%
Aden (A)	1950s to present (active)	265	514,300	0.05%
Camel Mountain–Eagle Nest (B)	None (inactive)	54	13,967	0.39%
Carrizalillo Hills (C)	Late 1800s, 1930–1956 (inactive)	108	41,438	0.26%
Lordsburg Mesa (D)	1885–1978, 1990–1999 (inactive)	58	16,333	0.36%

Sources: McLemore (1998); McLemore et al. (1996); McLemore et al. (2005).

SUBROUTE 1.1 – PROPONENT PREFERRED

This alternative would only cross through one mining district, the Aden district. This is an active mining district. A total of 715 acres of the district would be precluded from access for future mining—a long-term indirect impact. Although this represents 20 percent of the total ROW for this alternative, it represents only 0.14 percent of the Aden district. No active mines would be crossed.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

This alternative would cross through 912 acres of mining districts, 650 acres of which are within the active Aden district. The remainder would be within inactive districts. A total of 912 acres would be precluded from access for future mining—a long-term indirect impact. Although this represents 27 percent of the total ROW for this alternative, it represents only 0.16 percent of the 586,527 combined acres of the districts (0.12 percent of the Aden district, 0.37 percent of the Potrillo mountain district, 0.54 percent of the Camel Mountain–Eagle Nest district, and 0.30 percent of the Carrizalillo Hills district). No active mines would be crossed.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1. These local alternatives include DN1, A, B, C, and D. Impacts to mining districts crossed by these alternatives would be long-term indirect impacts from preclusion from access for future mining.

Local alternative DN1 would impact 0.53 percent of the Fluorite Ridge mining district. Local alternative A would impact 0.05 percent of the Aden mining district; B would impact 0.39 percent of the Camel

Mountain–Eagle Nest mining district, C would impact 0.26 percent of the Carrizalillo Hills mining district, and D would impact 0.36 percent of the Lordsburg Mesa mining district. The Aden district is the only active mining district among those impacted by the local alternatives. No active mines would be crossed.

REPRESENTATIVE STAGING AREAS

Representative staging areas 1, S1, and S2 would each overlap 20 acres (0.004 percent) of the active Aden mining district. Staging area S5 would overlap 20 acres (0.05 percent) of the Carrizalillo Hills district. No active mines would be located within the proposed footprint of any staging areas.

Route Group 2 – Hidalgo Substation to Apache Substation

Several mining districts are crossed by the various alternatives of route group 2. Table 4.4-3 details the acres of overlap between the mining districts and the ROWs of the various alternatives. For each alternative, the types of impacts would be as described in the "Impacts Common to All Action Alternatives" section above, with only the amount of impact (acres of overlap) varying between the alternatives.

Of the districts crossed by the alternatives in this route group, only the Bowie mining district is known to be active (McLemore 1998; McLemore et al. 1996; McLemore et al. 2005). Table 4.4-3 describes the acres of each mining district that would be crossed by segment within each alternative and the acres of overlap by mining district within each alternative.

Table 4.4-3. Route Group 2 Geology Resource Inventory Data by Segment

Segment	Total Miles	Mining Districts Crossed (acres)	Districts Crossed	Production Years (active or inactive)	Size of Mining District (acres)	Percentage of Mining District Affected
Subroute 2.1, Proponent Preferred						
P4b	14.0	35	Lordsburg Mesa	None (inactive)	34,579	0.10%
P4c	1.9	–	–	–	–	–
P5a	9.6	–	–	–	–	–
P5b	21.1	77	Kimball	1875–1953 (inactive)	11,078	0.70%
P6a	0.9	–	–	–	–	–
P6b	22.5	–	–	–	–	–
P6c	2.8	–	–	–	–	–
P7	22.3	–	–	–	–	–
P8	0.5	–	–	–	–	–
Subroute 2.2, Proponent Alternative						
E	31.8	74	Kimball	1875–1953 (inactive)	11,078	0.67%
F	25.3	–	–	–	–	–
Ga	25.7	–	–	–	–	–
Gb	1.0	–	–	–	–	–
Gc	7.4	–	–	–	–	–
I	2.3	–	–	–	–	–
J	2.3	–	–	–	–	–

Table 4.4-3. Route Group 2 Geology Resource Inventory Data by Segment (Continued)

Segment	Total Miles	Mining Districts Crossed (acres)	Districts Crossed	Production Years (active or inactive)	Size of Mining District (acres)	Percentage of Mining District Affected
Route Group 2 Local Alternatives						
LD1	35.4	13	Kimball	1875–1953 (inactive)	11,078	0.12%
LD2	9.6	–	–	–	–	–
LD3a	27.9	124	Lordsburg Mesa	None (inactive)	34,579	0.36%
LD3b	1.9	–	–	–	–	–
LD4	51.7	121	Bowie	1960s to present	4,000 (estimated)	3.03%
LD4-Option 4	6.5	–	–	–	–	–
LD4-Option 5	12.3	–	–	–	–	–
WC1	14.8	–	–	–	–	–
Representative Staging Areas						
LD3	NA	18	Lordsburg Mesa	None (inactive)	34,579	0.05%
7	–	–	–	–	–	–
9	–	–	–	–	–	–
E	–	–	–	–	–	–
Ga	–	–	–	–	–	–
Gb	–	–	–	–	–	–
LD1b	–	–	–	–	–	–
Southline Apache Substation Expansion	–	–	–	–	–	–
SWTC Apache Substation Expansion	–	–	–	–	–	–
WC1	–	–	–	–	–	–

Note: NA = not applicable.

SUBROUTE 2.1 – PROPONENT PREFERRED

This alternative would cross through 112 acres of mining districts, none of which are within active districts. A total of 112 acres would be precluded from access for future mining—a long-term indirect impact. Although this would represent 4.8 percent of the total ROW for this alternative, it would represent only 0.25 percent of the 45,657 combined acres of the districts crossed (0.10 percent of the Lordsburg Mesa district and 0.70 percent of the Kimball district). No active mines would be crossed.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

This alternative crosses through 74 acres of the Kimball mining district, an inactive district. A total of 74 acres would be precluded from access for future mining—a long-term indirect impact. Although this would represent 3.2 percent of the total ROW for this alternative, it would represent only 0.67 percent of the 11,078 total acres of the district. No active mines would be crossed.

LOCAL ALTERNATIVES

There are eight local alternatives available for route group 2, three of which (LD1, LD3a, and LD4) would cross through mining districts. Local alternative LD1 would cross through 13 acres (0.12 percent) of the inactive Kimball district, and local alternative LD3a would cross through 124 acres (0.36 percent) of the Lordsburg Mesa district. Local alternative LD4 would cross through approximately 121 acres (3.03%) of the Bowie Mining District. No active mines would be crossed.

REPRESENTATIVE STAGING AREAS

Representative staging area LD3 would cross through 18 acres (0.05 percent) of the inactive Lordsburg Mesa district. No other proposed staging areas would cross mining districts, and no active mines would be crossed. It is unknown if any of the proposed staging areas overlap with the Bowie Mining District.

Route Group 3 – Apache Substation to Pantano Substation

Because the Upgrade Section would run primarily through broad alluvial basins, there are very few mineral resources in the vicinity of route group 3. No metal or nonmetallic mineral resources were specifically identified within the Upgrade Section. No known mines, active or inactive, would be crossed by the Upgrade Section. Therefore, the proposed Project would not have direct or indirect effects on mining in this route group.

Route Group 4 – Pantano Substation to Saguaro Substation

Because the Upgrade Section runs primarily through broad alluvial basins, there are very few mineral resources in the vicinity of route group 4. No metal or nonmetallic mineral resources were specifically identified within the Upgrade Section. No known mines, active or inactive, would be crossed by the Upgrade Section. Therefore, the proposed Project would not have direct or indirect effects on mining in this route group.

AGENCY PREFERRED ALTERNATIVE

Because the Agency Preferred Alternative maximizes use of existing and proposed linear ROW by paralleling existing and proposed infrastructure and transmission lines, the impacts and acreage of mining districts crossed would be similar for all action alternatives, including the Agency Preferred Alternative. No known mines, active or inactive, would be crossed by the Agency Preferred Alternative. Impacts would be similar as described under Impacts Common to All Action Alternatives. However, transmission lines typically have little impact to mining operations. Span lengths are such that access to minerals can be accomplished between spans. Should open pit mining be planned, structures can be left on ‘islands,’ or the mining interests can have the transmission line locally re-routed. Transmission line structures are routinely moved to accommodate surface mining (personal communication, Mark Wieringa, 2013).

The Agency Preferred Alternative would cross approximately 960 acres (combined) of the active Aden Mining District (715 acres), the inactive Lordsburg Mesa Mining District (124 acres), and the active Bowie mining district (121 acres). This represents approximately 0.17 percent of the mining districts crossed.

Additional Mitigation Measures

In addition to the proponent-committed environmental protection measures and BMPs previously described elsewhere, the following measures would be implemented to further reduce or eliminate the

effects of the proposed Project. Southline would prepare a geotechnical engineering study prior to the final Project design to identify site-specific geological conditions and potential geological hazards. The data collected from the study would be used to guide sound design and engineering and mitigate potential geological hazards. By means of this DEIS, Southline would attempt to identify any areas within the ROW where mineral rights, mining claims, and petroleum resources are located. Southline would attempt to design the proposed Project such that access to underground resources in those areas is not precluded by the ROW.

Residual Impacts

It is anticipated that the mitigation described above would eliminate or reduce impacts to geology and mineral resources. However, as previously discussed, transmission lines typically have little impact to mining operations. Access to minerals can be accomplished between spans, or structures can be left on 'islands,' or the mining interests can have the transmission line locally re-routed. In this case, transmission lines would not produce obvious changes in the baseline condition of the resource; there would be no residual impacts. The area of this impact would vary with each alternative, subalternative, and combination of segments. If the area under the ROW was never intended to be mined even if the proposed Project did not exist, then there would be no residual impacts.

Unavoidable Adverse Impacts

Because transmission lines typically have little impact to mining operations, access to minerals can be accomplished between spans, and structures can be left on 'islands' or the mining interests can have the transmission line locally re-routed, there would be no unavoidable adverse impacts to geological and mineral resources.

Short-term Uses versus Long-term Productivity

Transmission lines may need to be locally re-routed to accommodate surface mining. However, this is only considered an adverse impact (1) in areas defined as mining districts, (2) only in specific locations within mining districts that are active or would have become active. Because only one of the several mining districts crossed by the proposed Project is active, because the proposed Project covers only a fraction of a percent of that mining district, and because that fraction of a percent is not currently being mined, the short-term loss of productivity would be minor if and when mining begins in those areas. There would be no long-term loss of productivity.

Irreversible and Irretrievable Commitments of Resources

Because underground resources would not be affected by the proposed Project and because the proposed Project could be decommissioned and removed, no proposed Project impacts to mineral or geological resources would be considered to be irreversible.

Because transmission lines typically have little impact to mining operations, no proposed Project impacts to mineral or geological resources would be considered to be irretrievable.

4.5 SOIL RESOURCES

4.5.1 Introduction

This section describes the impacts to soil resources in association with the construction, operation, and maintenance of the transmission line, substations, and ancillary facilities. Impacts to soil resources are discussed in terms of acreage impacted and percent of disturbance. The impacts described in this section are based on the resource data presented in Section 3.5, "Soil Resources," in chapter 3.

4.5.2 Methodology and Assumptions

Soils data used in this analysis were obtained from soil survey data from the NRCS Soil Survey Geographic (SSURGO) database, which contains more than 158 different soil data variables or attributes. This database provides geo-referenced data on the distribution of soil mapping units and corresponding data on soil properties and related attributes. A GIS data layer was developed, with soil mapping units and associated attributes overlain on the proposed analysis area. It should be noted that NRCS attribute data coverage did not encompass the entire analysis area for the Project and alternatives, and the analyses presented here are based on existing data within the NRCS databases. No alternate sources of soils data outside the NRCS databases were identified.

The selection of the most appropriate soil attributes to consider in the soil resources analysis was coordinated with BLM staff (CH2M Hill 2013d). Soil data variables from this list for which data were available were downloaded for the mapping units within the proposed Project footprint so that they could be summarized on an area (total acreage) basis. Of particular concern for soil resources were the potential hazards related to soil erosion by water and wind, potential losses to soil productivity, and loss of important farmlands.

The data were sorted by Project segment and the total acreages were calculated corresponding to different classes. Where attributes were given as numerical values or indices, ranges of data were classified as "severe," "moderate," or "slight," as described below.

Use of these data assumes mapped soil conditions are representative of actual conditions in the field. As with any mapped data, there is a certain amount of uncertainty related to the accuracy and scale of mapping; therefore, the actual soil conditions could vary substantially from those described at any particular location. The data used represent the best available information for evaluating soil resources. The inherent limitations of soil survey data are resolved with site-specific soil investigations within the actual Project footprint that are part of the permitting and construction design process.

Soil Erosion

In order to determine impacts to soil resources from wind erosion the following variable was analyzed:

- Wind Erodibility Group (WEG).

The WEG index groups soils that have similar properties affecting their resistance to wind erosion. The total acreage for WEG included highly susceptible (1 and 2) and the moderately susceptible (3, 4, and 4L) classes.

Soil Productivity

Another key variable assessed when determining whether the proposed Project would have impacts to the soil resources is looking at the potential loss of soil productivity. In order to do this, the following variables were analyzed:

- T factor -"Sustainable" soil loss factor in tons
- Rangeland Productivity - Normal Year (RngProdNY); and
- Rangeland Productivity - Favorable Year (RngProdFY).

The T factor attribute is an estimate of the annual amount of soil loss from water and wind (expressed in tons) that can be sustained without long-term loss of soil productivity. The total acreage for T factor included very severe (0 and 1 tons of soil loss), severe (2 and 3 tons of soil loss), and moderate (4 tons of soil loss) classes.

The rangeland productivity attributes estimate the amount of natural vegetation that would be produced annually per acre (expressed in pounds, dry weight). The total acreage for RngProdNY was divided into classes according to the following ranges: very highly productive (>2,000 pounds (lb)/acre), highly productive (>1,000 to 2,000 lb/acre), and moderately productive (500 to 1,000 lb/acre) classes. The total acreage for RngProdFY was divided into the following classes: very highly productive (>4,000 lb/acre), highly productive (>2,000 to 4,000 lb/acre), and moderately productive (1,000 to 2,000 lb/acre). The moderate to very high productivity classes were used, as these rangelands are of most importance to domesticated and native wildlife.

Corrosion of Steel and Concrete

Another key variable assessed when determining the longevity of the proposed Project would be looking at the potential of the soil to corrode steel and concrete. In order to do this, the following variables were analyzed

- Corrosion of Steel and Concrete

The Corrosion of steel and concrete can be a concern during the construction and maintenance phase of the Project. Only soils with a high probability of causing corrosion were used in this analysis.

Biological Soil Crusts

The current conditions and spatial extent of the biological soils crusts are not known, since no formal inventory or monitoring system is currently in place. However, all soils within the Project footprint have the ability to support soil biotic crust, and therefore biotic crusts could occur within the Project footprint. The impacts that may occur as a result of this Project will be assessed qualitatively because of the lack of quantitative data available. In order to quantify the impacts to these crusts they will need to be inventoried as part of the biological surveys conducted for the FEIS before construction begins.

Farmlands

The impacts to farmlands found within the analysis area are discussed in detail in the section on land use (section 4.11) and therefore will not be included in this section for analysis.

Other Soil Data

Other soil attribute data that were considered but not used in the resource evaluation (due to inherent difficulties with evaluation or inadequate spatial coverage) included attributes that could be used to assess potential difficulties for restoration of affected areas, such as Erosion Hazard off-road, off-trail; Topsoil Source; Potential for Seedling Mortality; and Depth to a Selected Soil Restrictive Layer. Attributes used to assess flooding or ponding frequency included Flooding Frequency Class and Ponding Frequency Class. Attributes used to assess potentially occurring important ecological habitats included Ecological Site ID and Ecological Site Name. These attributes are summarized for the proposed Project and alternatives and can be found in "Resource Report 12: Soil Resources" (CH2M Hill 2013d).

Analysis Area

The analysis area for the purpose of evaluating impacts to soil resources is the corridor of the ROW, plus the footprints of substations and construction laydown areas located outside the ROW. The ROW for the New Build Section is 200 feet wide, and the ROW for the Upgrade Section is 150 feet wide. This analysis area is sufficient to identify soil resources that could be directly impacted by ground disturbance during construction and during operation and maintenance of the line. The New Build and Upgrade Sections and route groups within those will be addressed separately for impact analysis. The New Build Section includes route group 1: Afton Substation to Hidalgo Substation, and route group 2: Hidalgo Substation to Apache Substation. The Upgrade Section includes route group 3: Apache Substation to Pantano Substation, and route group 4: Pantano Substation to Saguaro Substation.

Analysis Assumptions

The Southline proponent proposed measures (PPMs) under section 8.3.12 of the POD (Southline 2012) provides plans to minimize, mitigate, and/or restore soils resources. These BMPs would reduce the impacts as follows:

PPM SOIL-1: Topsoil Segregation. As appropriate and feasible, Southline would implement topsoil segregation and conservation practices at substation sites and as directed by the BLM and Western. See PPM VEG-2: Reclamation, Restoration, and Revegetation Plan.

Additionally, as described in chapter 2, a SWPPP, Soil Management Plan, as well as the Erosion, Dust Control and Air Quality Plan would define procedures for managing soils, erosion, and sediment control to minimize impacts to soils, air quality, and water quality.

In construction areas (i.e., temporary use areas, structure sites, etc.) where grading is required, surface restoration would be implemented as required by the landowner or BLM authorized officer. The method of restoration would normally consist of returning disturbed areas back to their normal contour, reseeding (where required), installing cross drains for erosion control, placing water bars in the road, and filling ditches.

Impact Indicators

The following impact indicators were considered when analyzing potential impacts to the soil resources: loss of topsoil due to construction, operation, and maintenance activities (i.e., removal or mixing of topsoil);

- soil compaction from vehicular traffic;
- soil erosion due to water and wind; and

- changes in soil productivity that could result from topsoil disturbance after construction and reclamation:
  - disturbance of sensitive soils (soils which may be difficult to reclaim); and
  - disturbance of biotic soil crusts due to surface disturbance due to Project activities.

Significant Impacts

For the purposes of this analysis, a significant impact on soil resources would result if any of the following were to occur from construction, operation, or maintenance of the proposed Project:

- Any disturbance to the land surface which exposes the soil surface that was once covered with vegetation and results in accelerated erosion resulting in rill and gulley formation will be a significant impact.
- Any activity such as compaction or mixing of soils which would result in long-term loss of productivity or significantly alters current use or vegetative growth during restoration would be considered a significant impact.
- Loss of soils that uniquely support threatened or endangered plant species, or contamination of soils that support an existing sensitive ecosystem.

4.5.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, there would no direct or indirect impacts to soil resources in the New Build Section, because the transmission line would not be built or upgraded. For the Upgrade Section, even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, in accordance with Western's 10-year capital improvement plan (Western 2012a).

Impacts Common to All Action Alternatives

CONSTRUCTION

Direct impacts to soil resources as a result of construction activities include the loss of soil productivity due to the removal of soils during construction of access roads, and at structure and substation sites. Limited clearing of vegetation and topsoil, as well as grading, would be required and these activities could result in newly exposed, disturbed soils that could be subject to accelerated erosion by wind and water. Any soil removal associated with development of structure foundations and at substation sites would be permanent. One of the primary impacts of concerns for construction is disturbance to soil biological crusts. It is expected that all soils within the Project footprint have the ability to support soil biotic crust; therefore, it is expected that disturbance caused by excavation and compaction during construction may directly affect biological soil crusts. Clearing of the substation site and access roads could also adversely affect any soil biological crusts in the immediate vicinity. During construction the use of roads already found within the analysis area is expected to improve the soil resources within the Project footprint. Old roads which are not maintained are more susceptible to erosion by wind and water; therefore, any improvements to these roads would be a benefit to the soil resources.

Another important concern for construction impacts would be loss of soil productivity resulting in areas where soils are covered by support structures or other facilities where otherwise not available for production.

Indirect impacts associated with soil removal may include invasive plant colonization, soil erosion, and reduction of soil water retention. Construction may also cause disturbance to fragile biological crusts, which could increase wind and water erosion and delay reestablishment of plant communities post construction. Other indirect effects are associated with the sediment redistribution of the soil resource as a result of wind and water erosion, which could cause damages to WUS, prime farmlands, and air quality.

OPERATION AND MAINTENANCE

Impacts to soil resources as a result of operation and maintenance activities are expected to be minimal. Access roads will be maintained during operation and Project maintenance, which will result in less erosion occurring from wind and water than would be if these roads remained in their current state. Minimal soil resource management would be needed during transmission line operation and most inspection activities would be carried out aerially. On-the-ground inspection would cause minimal damage to existing soil resources if vehicle use is confined to existing roadways. No indirect effects are expected during the operation and maintenance activities.

Route Group 1 – Afton Substation to Hidalgo Substation

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

Subroute 1.1 representative ROW comprises 3,567.5 acres. Within this proposed route the total temporary disturbance would result in 23.1 percent of the ROW being disturbed, and total permanent disturbance would result in 6.1 percent being disturbed. The acreages of the direct impact to the soil resources can be found in table 4.5-1 below.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

Subroute 1.2 representative ROW comprises 3,424.1 acres. Within this proposed route the total temporary disturbance would result in 23.1 percent of the ROW being disturbed, and total permanent disturbance would result in 5.8 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-1.

Table 4.5-1. Route Group 1 Soil Resources Inventory Data

Segment	Total Acreage	Wind Erosion		Productivity		Corrosion of Uncoated Steel (acres)	Corrosion of Concrete (acres)
		T factor (acres)	WEG (acres)	RngProdNY (acres)	RngProdFY (acres)		
Subroute 1.1, Proponent Preferred							
P1	125.1	83	125	0	79	125	0
P2	2,472.0	884	1,946	701	2,311	2469	0
P3	753.3	551	736	270	734	734	0
P4a	217.1	6	72	66	217	217	0

Table 4.5-1. Route Group 1 Soil Resources Inventory Data (Continued)

Segment	Total Acreage	Wind Erosion		Productivity		Corrosion of Uncoated Steel (acres)	Corrosion of Concrete (acres)
		T factor (acres)	WEG (acres)	RngProdNY (acres)	RngProdFY (acres)		
Subroute 1.2, Proponent Alternative							
S1	325.3	325	325	0	20	325	0
S2	267.7	241	230	23	253	253	0
S3	314.0	306	314	0	314	314	0
S4	255.2	120	210	85	178	211	0
S5	720.1	441	489	92	652	713	0
S6	182.1	43	7	45	153	153	0
S7	1,007.0	505	542	298	839	1,007	0
S8	352.8	0	191	139	353	352	0
Route Group 1 Local Alternatives							
DN1	1,030.5	279	648	191	975	1012	0
A	422.9	283	283	0	393	422	0
B	291.5	20	269	49	191	191	0
C	215.7	34	0	48	206	215	0
D	551.1	109	197	80	551	551	0

Source: NRCS SSURGO Database intersected with representative ROW. Total acreages include moderate to very severe (or very susceptible) for erosion hazards; moderate to very high productivity; and all important farmlands.

Tfactor = 'Sustainable' soil loss factor in tons. Acreage total includes moderate (4 tons); severe (2 and 3 tons); and very severe (0 and 1 tons).

WEG = Wind Erodibility Group. Acreage total includes moderately susceptible (WEGs 3, 4, and 4L) and (highly susceptible (WEGs 1 and 2).

RngProdNY = Rangeland Productivity - Normal Year. Acreage total includes moderate (500–1,000 lb/acre [dry weight]); high (1,000–2,000 lb/acre); and very high (>2,000 lb/acre).

RngProdFY = Rangeland Productivity - Favorable Year. Acreage total includes moderate (1,000–2,000 lb/acre [dry weight]); high (2,000–4,000 lb/acre); and very high (>4,000 lb/acre).

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: DN1, A, B, C, and D.

Construction

Local alternative A is a short loop at the southeast end of the Project that would provide an alternative connection between segments S1 and S3. The route comprises 422.9 acres. Total temporary disturbance from construction would result in 23.2 percent of the ROW being disturbed, and total permanent disturbance would result in 4.2 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-1.

Local alternative B is a loop on the south edge of the Project that would provide an alternative connection between segments S3 and S5, going along the north side of segment S4. Total temporary disturbance from construction would result in 23.4 percent of the ROW being disturbed, and total permanent disturbance would result in 2.5 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-1.

Local alternative C is another short loop on the south edge of the Project that would provide an alternative connection between segments S5 and S7. Total temporary disturbance from construction would result in 23.3 percent of the ROW being disturbed, and total permanent disturbance would result in 2.8 percent being disturbed The acreages of direct impacts to the soil resources can be found in table 4.5-1.

Local alternative D provides an alternative connection from the Alternative Southern Route at segment S7 to the New Build Section at segment P5. Total temporary disturbance from construction would result in 23.2 percent of the ROW being disturbed, and total permanent disturbance would result in 5.1 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-1.

Local alternative DN1 provides an alternate route just north and parallel to segment P2. Total temporary disturbance from construction would result in 23.1 percent of the ROW being disturbed, and total permanent disturbance would result in 9.0 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-1.

Route Group 2 – Hidalgo Substation to Apache Substation

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

Subroute 2.1 representative ROW comprises 2,309.8 acres. Within this proposed route the total temporary disturbance would result in 23.2 percent of the ROW being disturbed, and total permanent disturbance would result in 6.2 percent being disturbed. The acreages of direct impacts to the soil resources can be found below in table 4.5-2.

Table 4.5-2. Route Group 2 Soil Resource Inventory Data

Segment	Total Acreage	Wind Erosion		Productivity		Corrosion of Uncoated Steel (acres)	Corrosion of Concrete (acres)
		T factor (acres)	WEG (acres)	RngProdNY (acres)	RngProd FY (acres)		
Subroute 2.1, Proponent Preferred							
P4b	335.8	114	297	111	336	335	0
P4c	44.9	17	25	11	45	44	0
P5a	233.5	41	107	162	234	231	0
P5b	510.9	285	212	252	332	473	145
P6a	21.3	0	21	0	21	21	0
P6b	545.1	293	290	339	380	413	0
P6c	68.3	68	45	68	68	60	0
P7	540.8	244	309	469	469	486	244
P8	9.0	0	8	9	9	9	0

Table 4.5-2. Route Group 2 Soil Resource Inventory Data (Continued)

Segment	Total Acreage	Wind Erosion		Productivity		Corrosion of Uncoated Steel (acres)	Corrosion of Concrete (acres)
		T factor (acres)	WEG (acres)	RngProdNY (acres)	RngProd FY (acres)		
Subroute 2.2, Proponent Alternative							
E	766.6	263	349	481	660	754	127
F	611.1	401	378	490	526	457	68
Ga	622.4	328	268	531	531	465	0
Gb	25.9	0	0	26	26	25	0
Gc	179.6	12	103	180	180	179	0
I	55.4	51	5	37	37	22	0
J	55.6	55	21	43	43	34	0
Route Group 2 Local Alternatives							
LD1	857.5	306	333	431	718	853	139
LD2	233.2	82	150	63	233	233	0
LD3a	677.5	78	467	275	677	677	0
LD3b	46.6	0	2	11	47	46	0
LD4	1,253	719	583	1,116	1,253	1,253	165
LD4-Option 4	156.1	155	31	141	141	48	0
LD4-Option 5	296.8	284	44	250	250	153	0
WC1	359.1	278	220	355	355	358	240

Source: NRCS SSURGO Database intersected with the representative ROW.

Total acreages include moderate to very severe (or very susceptible) for erosion hazards; moderate to very high productivity; and all important farmlands.

T factor = 'Sustainable' soil loss factor in tons. Acreage total includes moderate (4 tons); severe (2 and 3 tons); and very severe (0 and 1 tons).

WEG = Wind Erodibility Group. Acreage total includes moderately susceptible (WEGs 3, 4, and 4L) and (highly susceptible (WEGs 1 and 2).

RngProdNY = Rangeland Productivity - Normal Year. Acreage total includes moderate (500–1,000 lb/acre [dry weight]); high (1,000–2,000 lb/acre); and very high (>2,000 lb/acre).

RngProdFY = Rangeland Productivity - Favorable Year. Acreage total includes moderate (1,000–2,000 lb/acre [dry weight]); high (2,000–4,000 lb/acre); and very high (>4,000 lb/acre).

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

Subroute 2.2 representative ROW comprises 2,316.6 acres. Within this proposed route the total temporary disturbance would result in 23.2 percent of the ROW being disturbed, and total permanent disturbance would result in 6.3 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-2.

LOCAL ALTERNATIVES

There are eight local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1.

Construction

The alternative LD1 total representative ROW comprises 857.5 acres. Total temporary disturbance from construction would result in 23.1 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 6.4 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-2. The alternative LD2 total representative ROW comprises 233.2 acres. Total temporary disturbance from construction would result in 23.1 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 8.6 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-2. The alternative LD3a total representative ROW comprises 677.5 acres. Total temporary disturbance from construction would result in 23.1 percent of the ROW being disturbed, and total permanent disturbance would result in 4.3 percent being disturbed. The acreages of direct impacts to the soil resources can be found below in 4.5-2.

The alternative LD3b total representative ROW comprises 46.6 acres. Total temporary disturbance from construction would result in nearly 23.1 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 1.3 percent being disturbed. The acreages of direct impacts to the soil resources can be found in 4.5-2.

The alternative LD4 total representative ROW comprises 1,253.1 acres. Total temporary disturbance from construction would result in 23.1 percent of the ROW being disturbed, and total permanent disturbance would result in 9.1 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-2. The alternative LD4-Option 4 total representative ROW comprises 156.1 acres. Total temporary disturbance from construction would result in nearly 23.2 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 9.1 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-2. The alternative LD4-Option 5 total representative ROW comprises 296.8 acres. Total temporary disturbance from construction would result in 23.2 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 7.5 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-2.

The alternative WC1 total representative ROW comprises 359.1 acres. Total temporary disturbance from construction would result in 23.1 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 7.9 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-2.

Route Group 3 – Apache Substation to Pantano Substation

SUBROUTE 3.1 – PROPONENT PREFERRED

Construction

Subroute 3.1 representative ROW comprises 1,278.6 acres. Within this proposed route the total temporary disturbance would result in 28.1 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 5.4 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-3.

LOCAL ALTERNATIVES

There is one local alternative for route group 3–local alternative H.

Construction

Local alternative H provides an alternative loop around the north side of Benson, Arizona, to connect segment U1 with segment U3. This route comprises 350.2 acres. Within this proposed route the total temporary disturbance would result in 28.1 percent of the ROW being disturbed, and total permanent disturbance would result in 8.1 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-3.

Table 4.5-3. Route Group 3 Soil Resource Inventory Data

Segment	Total Acreage	Wind Erosion		Productivity		Corrosion of Uncoated Steel (acres)	Corrosion of Concrete (acres)
		T factor (acres)	WEG (acres)	RngProdNY (acres)	RngProdFY (acres)		
Subroute 3.1, Proponent Preferred							
U1a	291.91	129	148	279	283	152	0
U1b	253.0	35	53	53	53	18	0
U2	287.0	101	267	247	255	189	63
U3a	646.7	516	77	430	475	632	0
Route Group 3 Local Alternative							
H	350.2	237	282	201	224	159	199

Source: NRCS SSURGO Database intersected with the representative ROW.

Total acreages include moderate to very severe (or very susceptible) for erosion hazards; moderate to very high productivity; and all important farmlands.

T factor = 'Sustainable' soil loss factor in tons. Acreage total includes moderate (4 tons); severe (2 and 3 tons); and very severe (0 and 1 tons).

WEG = Wind Erodibility Group. Acreage total includes moderately susceptible (WEGs 3, 4, and 4L) and (highly susceptible (WEGs 1 and 2).

RngProdNY = Rangeland Productivity - Normal Year. Acreage total includes moderate (500–1,000 lb/acre [dry weight]); high (1,000–2,000 lb/acre); and very high (>2,000 lb/acre).

RngProdFY = Rangeland Productivity - Favorable Year. Acreage total includes moderate (1–2,000 lb/acre [dry weight]); high (2,000–4,000 lb/acre); and very high (>4,000 lb/acre).

Route Group 4 – Pantano Substation to Saguaro Substation

SUBROUTE 4.1 – PROPONENT PREFERRED

Construction

Subroute 4.1 representative ROW comprises 874.8 acres. Within this proposed route the total temporary disturbance would result in 28.1 percent of the ROW being disturbed, and total permanent disturbance would result in 4.2 percent being disturbed. The acreages of direct impacts to the soil resources can be found below in table 4.5-4.

Table 4.5-4. Route Group 4 Soil Resource Inventory Data

Segment	Total Acreage	Wind Erosion		Productivity		Corrosion of Uncoated Steel (acres)	Corrosion of Concrete (acres)
		T factor (acres)	WEG (acres)	RngProdNY (acres)	RngProdFY (acres)		
Subroute 4.1, Proponent Preferred							
U3b	8.2	3	2	0	2	8	0
U3c	17.5	0	10	16	16	17	0
U3d	62.4	57	6	12	58	62	0
U3e	16.1	5	4	12	13	12	0
U3f	12.4	12	0	11	15	12	0
U3g	16.2	8	5	11	15	16	0
U3h	19.8	0	14	15	290	20	0
U3i	331.1	118	91	269	16	331	0
U3j	15.9	0	7	16	221	16	0
U3k	303.6.	66	208	191	27	304	0
U3l	28.1	28	27	0	9	27	0
U3m	8.9	9	9	0	29	9	0
U4	34.7	14	7	0	28	35	0
Route Group 4 Local Alternatives							
MA1	19.0	0	9	19	19	19	0
TH1a	25.7	11	0	15	28	25	0
TH1b	28.4	27	0	2	5	28	0
TH1c	4.8	0	0	5	8	5	0
TH1-Option	1.0	7.7	0	0	25	8	0
TH3-Option A	15.1	1	7	8	15	15	0
TH3-Option B	14.5	0	3	14	24	14	0
TH3-Option C	29.3	0	9	24	20	29	0
TH3a	49.7	23	8	18	32	50	0
TH3b	81.4	0	69	32	16	81	0

Source: NRCS SSURGO Database intersected with the representative ROW.

Total acreages include moderate to very severe (or very susceptible) for erosion hazards; moderate to very high productivity; and all important farmlands.

T factor = 'Sustainable' soil loss factor in tons. Acreage total includes moderate (4 tons); severe (2 and 3 tons); and very severe (0 and 1 tons).

WEG = Wind Erodibility Group. Acreage total includes moderately susceptible (WEGs 3, 4, and 4L) and (highly susceptible (WEGs 1 and 2).

RngProdNY = Rangeland Productivity - Normal Year. Acreage total includes moderate (500–1,000 lb/acre [dry weight]); high (1,000–2,000 lb/acre); and very high (>2,000 lb/acre).

RngProdFY = Rangeland Productivity - Favorable Year. Acreage total includes moderate (1,000–2,000 lb/acre [dry weight]); high (2,000–4,000 lb/acre); and very high (>4,000 lb/acre).

LOCAL ALTERNATIVES

There are 10 local alternatives available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C.

Construction

The alternative TH1a total representative ROW comprises 25.7 acres. Total temporary disturbance from construction would result in 28.1 percent of the ROW being disturbed, and total permanent disturbance would result in 1.2 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4. The alternative TH1b total representative ROW comprises 28.4 acres. Total temporary disturbance from construction would result in 28.1 percent of the ROW being disturbed, and total permanent disturbance would result in 2.1 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4. The alternative TH1c total representative ROW comprises 4.8 acres. Total temporary disturbance from construction would result in 35.2 percent of the ROW being disturbed, and total permanent disturbance would result in 3.1 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4.

The alternative TH1-Option total representative ROW comprises 7.7 acres. Total temporary disturbance from construction would result in nearly 42.8 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 0.1 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4.

The alternative TH3-Option A total representative ROW comprises 15.1 acres. Total temporary disturbance from construction would result in 28.1 percent of the ROW being disturbed, and total permanent disturbance would result in 5.8 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4. The alternative TH3-Option B total representative ROW comprises 14.5 acres. Total temporary disturbance from construction would result in 28.8 percent of the ROW being disturbed, and total permanent disturbance would result in 4.4 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4. The alternative TH3-Option C total representative ROW comprises 29.3 acres. Total temporary disturbance from construction would result in 31.4 percent of the ROW being disturbed, and total permanent disturbance would result in 8.8 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4. The alternative TH3a total representative ROW comprises 49.7 acres. Total temporary disturbance from construction would result in nearly 28.1 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 5.4 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4.

The alternative TH3b total representative ROW comprises 81.4 acres. Total temporary disturbance from construction would result in nearly 28.2 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 4.0percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4. The alternative MA1 total representative ROW comprises 19.0 acres. Total temporary disturbance from construction would result in nearly 29.4 percent of the ROW being disturbed, and total permanent disturbance would result in nearly 1.6 percent being disturbed. The acreages of direct impacts to the soil resources can be found in table 4.5-4.

Agency Preferred Alternative

Impacts to soils would generally be as described under “Impacts Common to All Action Alternatives,” as described above.

In terms of highly erodible soils, local alternatives LD3a and LD4 and LD4-Option 5 around Lordsburg Playa would cross 338 acres of highly erodible soils, compared to the Proponent Preferred route (segments P4b, P4c, P5b, P6a, P6b, and P6c) which would cross 60 acres of highly erodible soils south of the Lordsburg Playa. Around the Willcox Playa, the Agency Preferred Alternative (segment P7) would cross approximately 41-acres of highly erodible soils and 270-acres of moderately erodible soils. In comparison, segments Gb and Gc of the Proponent Alternative would not intersect any highly erodible soils.

Additional Mitigation Measures

The SWPPP, Soil Management Plan, as well as the Erosion, Dust Control and Air Quality Plan would define procedures for managing soils, erosion, and sediment control to minimize impacts to soils, air quality, and water quality. Mitigation identified in these plans would likely include structural controls (SWPPP), as well dust mitigation measures such as application of water or soil additives, control of vehicle access, vehicle speed restrictions, or even work stoppage during extreme wind.

Residual Impacts

Mitigation efforts would likely alleviate most all environmental impacts to the soil resources as a result of the Project. Maintenance activities aimed at mitigating soil erosion will be ongoing and therefore; impacts will be negligible following the Project construction.

Unavoidable Adverse Impacts

Minor environmental impacts would occur that are necessary for the Project, and no mitigation measures were deemed necessary or feasible. Such impacts include permanent or long-term impact effects, such as the construction of substation enhancements, permanent access roads, and other permanent constructed features that would permanently impact the soil resources. The installation of new transmission facilities would result in the unavoidable loss of soil productivity where structures and other facilities are located.

Short-term Uses versus Long-term Productivity

The productivity or function of soil resources would be affected by both short-term or temporary impacts, and long-term or permanent impacts. Temporary impacts to soil resources would be present until restoration is conducted. Following restoration, temporary impact effects would be alleviated to the soil resources. Relative to temporary impacts, permanent loss of soil resources would be minimal in spatial scale.

Irreversible and Irretrievable Commitments of Resources

Environmental impacts that have irreversible negative effects on soil resources are situations where vegetation and topsoils are impacted and not restored. In most cases, restoration efforts would be made, and irreversible impacts to the soil resources and associated vegetation would be minor, including unavoidable adverse impacts and residual impacts discussed above. In limited areas, soil resources would be significantly impacted, but such areas would be minimal and would focus on low-sensitivity soils.

4.6 PALEONTOLOGICAL RESOURCES

4.6.1 Introduction

Concerns regarding paleontological resources consist of the loss of scientifically important fossils or loss of access to scientifically important fossils from the analysis area; however, encountering previously unknown fossil localities during construction may contribute to scientific knowledge. Scientifically important fossils are generally defined as vertebrate fossils, but may also include invertebrate fossils (BLM 2008f; Society of Vertebrate Paleontology 1995). Assessing a project's likelihood of encountering important fossils is conducted by using the BLM's PFYC system of predicting the sensitivity of a geological unit. Impacts are primarily assessed based on disturbance to geological units with a PFYC of 3 (moderate or unknown potential), 4 (high potential), and 5 (very high potential). The impacts described in this section are based on the analysis found in "Southline Transmission Project Resource Report 9: Paleontology" (CH2M Hill 2013e). The contents of that report are used herein without specific reference.

4.6.2 Methodology and Assumptions

The analysis was conducted by calculating the acreage of each PFYC class within the representative ROW by alternative. A paleontological sensitivity value was then assigned to segments or portions of segments based on their potential to produce important fossils. Although all attempts are made to quantify paleontological sensitivity in terms of acreage, sensitivity is a qualitative value.

Analysis Area

The analysis area for the New Build Section is 1 mile on either side of the centerline of all alternatives. The analysis area for the Upgrade Section is a 500-foot corridor (200 feet on either side of centerline of the existing 100-foot corridor).

Southline has developed a representative ROW to be used in this analysis for both the New Build and Upgrade Sections. The following analysis will discuss resources found along the representative ROW.

Analysis Assumptions

The analysis was conducted under the following assumptions:

- the literature review and BLM PFYC is sufficient to characterize the fossil-bearing potential within the analysis area;
- because ground disturbance would result in the loss of or damage to paleontological resources if present, all direct impacts are permanent and long term; and
- all access routes, substations, and temporary construction easements are within the analysis area.

Impact Indicators

Loss of or restriction of access to scientifically important fossils would be the primary negative direct impact of the Project on paleontological resources. The primary positive direct impact of the Project would be the discovery of important fossils that would otherwise be unavailable for study as an inadvertent result of ground disturbing activities. The relative impacts were assessed by assigning paleontological sensitivity values based on PFYC class and then comparing the acreage of land (both

within the representative ROW and, as a subset, within the anticipated area of disturbance) falling within each paleontological sensitivity value among the various Project segments and alternatives.

The paleontological sensitivity values are as follows:

- Very Low to Low Sensitivity—Geological units with a PFYC of 1 or 2. These areas are unlikely to produce fossils or unlikely to produce important fossils.
- Moderate Sensitivity—Geological units with a PFYC of 3 (Moderate or Unknown). These areas may produce important fossils, or it is unknown whether they may produce important fossils.
- High Sensitivity—Geological units with a PFYC of 4. These areas have a high likelihood of producing important fossils.

Significant Impacts

For the purposes of this analysis, a significant impact on paleontological resources could result if any of the following were to occur from construction or operation of the proposed Project:

- Ground disturbance in areas with moderate paleontological sensitivity (PFYC 3) if they contain important fossils.
- Ground disturbance in areas with high paleontological sensitivity (PFYC 4) if they contain important fossils.
- Access restrictions to areas with moderate and high paleontological sensitivity.

4.6.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the New Build Section would not be constructed from the Afton to Apache substations. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, in accordance with Western's 10-year capital improvement plan (Western 2012a).

The existing transmission line route from Apache to Saguaro substation is almost entirely of Low Sensitivity (PFYC 1-2) for paleontological resources; only 28 acres of the route is classified as Moderate Sensitivity (PFYC 3). Ten of those 28 acres are expected to be disturbed. If fossils are present and if the areas cannot be avoided or mitigated in accordance with applicable regulations, minor direct and indirect are expected for No Action alternative.

Impacts Common to All Action Alternatives

CONSTRUCTION

Direct impacts to paleontological resources during construction have the potential to occur during ground disturbance in areas with moderate or unknown sensitivity to high sensitivity. The severity of the disturbance to areas with moderate to high sensitivity would vary by alternative. Ground disturbance would occur with road construction or improvement, substation expansion and construction, and tower construction. Loss of access to paleontological resources during construction activities only would be the primary potential indirect impact; however access restrictions would vary by alternative and are anticipated to be negligible.

Prior to construction Southline would implement the Paleontological Resource Management Plan (Proponent Proposed Measure (PPM) PAL-1) as described in Section 8.3.8 of the Plan of Development in order to mitigate any adverse effects to important paleontological resources. If areas are identified as containing paleontological resources, a paleontological resources treatment plan would be prepared and implemented. If fossils are found inadvertently during construction Southline would implement the plan outline in PPM PAL-2: Recovery, Testing, and Documentation.

Assessment and mitigation of adverse effects to paleontological resources would be conducted according to BLM manual H-8270-1: "General Procedural Guidance for Paleontological Resource Management" (BLM 2008f). Mitigation measures would be developed and designed to minimize adverse effects. According to the manual, mitigation may involve but is not limited no action, avoidance, or collection of fossils or samples of fossil with curation. Other mitigation could include education of construction and maintenance workers, covering fossils bearing formations with sediment, and monitoring during construction.

OPERATION AND MAINTENANCE

No direct or indirect impacts to paleontological resources are expected during routine operation and maintenance. If during maintenance activities ground disturbance is to occur in areas beyond that disturbed during construction or if access restrictions are imposed, they would be mitigated in accordance with all applicable regulations.

Route Group 1 – Afton Substation to Hidalgo Substation

Impacts to paleontological resources would primarily occur during construction activities. Impacts during operation and maintenance activities are not anticipated or are anticipated to be minor. Because all ground disturbance can result in the loss of scientifically valuable fossils if present, temporary and permanent ground disturbance are both considered permanent.

Table 4.6-1 presents the acreage/mileage of potential disturbance by PFYC class within the representative ROW of route group 1, Afton Substation to Hidalgo Substation. Table 4.6-2 presents the paleontological sensitivity within the representative ROW of route group 1, Afton Substation to Hidalgo Substation.

Table 4.6-1. Route Group 1 Paleontological Resource Inventory Data within the Representative ROW

	Total Miles	Acreage of PFYC 1	Acreage of PFYC 2	Acreage of PFYC 3	Acreage of PFYC 4	Total Acreage
Subroute 1.1, Proponent Preferred						
P1	**5.1**	0	0	0	125.1	**125.1**
P2	**102.0**	1,522.0	49.1	0	900.9	**2,472.0**
P3	**31.1**	353.6	0	0	400.0	**753.6**
P4a	**8.7**	30.1	0	0	187.0	**217.1**

Table 4.6-1. Route Group 1 Paleontological Resource Inventory Data within the Representative ROW (Continued)

	Total Miles	Acreage of PFYC 1	Acreage of PFYC 2	Acreage of PFYC 3	Acreage of PFYC 4	Total Acreage
Subroute 1.2, Proponent Alternative						
S1	**13.4**	0	0	0	325.3	**325.3**
S2	**11.1**	36.3	0	0	231.3	**267.6**
S3	**12.9**	228.6	0	0	85.4	**314.0**
S4	**10.6**	88.4	0	0	166.8	**255.2**
S5	**29.7**	676.5	0	0	43.6	**720.1**
S6	**7.4**	165.3	16.8	0	0	**182.1**
S7	**41.5**	986.2	20.8	0	0	**1,007.0**
S8	**14.6**	316.3	0	0	36.5	**352.8**
Route Group 1 Local Alternatives						
DN1	**42.5**	808.4	77.1	0	145.0	**1,030.5**
A	**17.5**	77.9	0	0	345.0	**422.9**
B	**12.2**	171.6	0	0	120.0	**291.6**
C	**9.0**	187.6	28.1	0	0	**215.7**
D	**22.8**	542.0	9.1	0	0	**551.1**

Table 4.6-2. Route Group 1 Paleontological Sensitivity by Acreage within the Representative ROW

	Total Miles	Percent Permanent and Temporary Disturbance*	Low Sensitivity Acreage (acreage total disturbance)	Moderate Sensitivity Acreage (acreage total disturbance)	High Sensitivity Acreage (acreage total disturbance)
Subroute 1.1, Proponent Preferred					
P1	**5.1**	31.3%	0 (0)	0 (0)	125.1 (39.1)
P2	**102.0**	28.4%	1,571.1 (446.2)	0 (0)	900.9 (255.9)
P3	**31.1**	31.5%	353.6 (111.5)	0 (0)	399.7 (126.1)
P4a	**8.7**	27.5%	30.1 (8.3)	0 (0)	187.0 (51.4)
Total	**146.9**	**NA**	**1,954.8 (566.0)**	**0 (0)**	**1,612.7 (472.5)**
Subroute 1.2, Proponent Alternative					
S1	**13.4**	29.8%	0 (0)	0 (0)	325.3 (96.9)
S2	**11.1**	31.6%	36.3 (11.5)	0 (0)	231.3 (73.0)
S3	**12.9**	25,6%	228.6 (57.8)	0 (0)	85.4 (21.9)
S4	**10.6**	31.7%	88.4 (28.0)	0 (0)	166.8 (52.9)
S5	**29.7**	27.1%	676.5 (183.3)	0 (0)	43.6 (11.8)
S6	**7.4**	30.1%	182.1 (54.8)	0 (0)	0 (0)
S7	**41.5**	28.3%	1,007.0 (285.0)	0 (0)	0 (0)
S8	**14.6**	31.6%	316.3 (99.9)	0 (0)	36.5 (11.5)
Total	**141.2**	**NA**	**2,535.2 (720.3)**	**0 (0)**	**888.9 (268.0)**

Table 4.6-2. Route Group 1 Paleontological Sensitivity by Acreage within the Representative ROW (Continued)

	Total Miles	Percent Permanent and Temporary Disturbance*	Low Sensitivity Acreage (acreage total disturbance)	Moderate Sensitivity Acreage (acreage total disturbance)	High Sensitivity Acreage (acreage total disturbance)
Route Group 1 Local Alternatives†					
DN1	**42.5**	32.1%	885.5 (284.2)	0 (0)	145.0 (46.5)
A	**17.5**	27.4%	77.9 (21.3)	0 (0)	345.0 (94.5)
B	**12.2**	25.9%	171.6 (44.4)	0 (0)	112.0 (29.0)
C	**9.0**	26.2%	215.7 (56.5)	0 (0)	0 (0)
D	**22.8**	38.3%	551.1 (211.1)	0 (0)	0 (0)

Note: NA = not applicable.

* Anticipated disturbance by segment; distribution of anticipated disturbance within each segment not currently known as project is still in engineering/design phase.

† Local alternatives are each considered separately and are not totaled.

SUBROUTE 1.1 – PROPONENT PREFERRED

Subroute 1.1 consists of segments P1, P2, P3, and P4a. Segment P1 connects the Afton Substation to an existing line to the southwest. Segments P2 and P4a form the primary route, which runs from the Afton Substation west and northwest past Deming to the Hidalgo Substation. Segment P3 is an interconnection route running north-south between I-10 and NM 9.

Major direct (loss of scientifically important fossils) and indirect (loss of access to scientifically important fossils) may occur with subroute 1.1 if fossils are present. Within the representative ROW for subroute 1.1, 1,613 acres is classified as high sensitivity (PFYC 4) for paleontological resources; it is anticipated that 473 acres would be disturbed by construction. The remaining 1,955 acres is classified as low sensitivity (PFYC 1 or 2); it is anticipated that 566 acres would be disturbed.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Subroute 1.2 consists of segments S1 through S8. It begins at the Afton Substation and runs south and southwest to NM 9. It then continues west along Columbus Road and eventually runs south of the town of Columbus. It then runs west along NM 9 to the intersection of NM 9 and NM 146, and then runs northwest just east of the Luna and Grant County line. Segment S8 then runs north to segment P4a of subroute 1.1.

Subroute 1.2 is less sensitive for paleontological resources than subroute 1.1; however, major direct and indirect impacts may still occur if fossils are present. Within the representative ROW for subroute 1.2, 889 acres is categorized as high sensitivity (PFYC 4). Disturbance is estimated to affect 268 of the 889 acres. Low sensitivity (PFYC 1 or 2) acreage totals 2,535; 720 of the 2,535 acres is anticipated to be disturbed.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: DN1, A, B, C, and D. DN1 would run north of subroute 1.1 and share ROW with the proposed SunZia project. Alternative A would follow existing unpaved roads south and southeast of subroute 1.2. Alternatives B and C both run parallel to NM 9 for 12 miles. Alternative D runs from segment S7 to just south of Lordsburg, where it continues west and northwest to 1 mile north of I-10.

Moderate direct and indirect impacts would occur for local alternatives DN1, A, and B if fossils are present. For local alternative DN1, 145 acres is categorized as high sensitivity (PFYC 4); 47 of those acres is expected to be disturbed. The remaining 886 acres, with 284 acres to be disturbed, is all categorized as low sensitivity (PFYC 1 or 2). Local alternative A has 345 acres with high sensitivity (PFYC 4); however, only 95 acres is expected to be disturbed. Seventy-eight acres of local alternative A is classified as low sensitivity (PFYC 1 or 2). A total of 112 acres of local alternative B is categorized as high sensitivity (PFYC 4); 29 acres of the 112 acres is expected to be disturbed. The remaining 172 acres of B is categorized as low sensitivity (PFYC 1 or 2).

All of local alternatives C (216 acres) and D (551 acres) is classified as low sensitivity (PFYC 1 or 2). No direct or indirect impacts would occur.

NEW SUBSTATIONS OR SUBSTATION EXPANSION

One new substation and expansion of two existing substations is planned for route group 1 (table 4.6-3). The new substation (Midpoint) would be located along subroute 1.1 (Proposed Midpoint) or subroute 1.2 (Alternative Midpoint). The existing stations are the Afton Substation and the Hidalgo Substation.

Table 4.6-3. Expected Acreage of Ground Disturbance by Substation in Route Group 1

Substation	Low Sensitivity Acreage – PFYC 1 and 2	Moderate or Unknown Sensitivity Acreage – PFYC 3	High Sensitivity Acreage – PFYC 4
Proposed Midpoint (new)	8.8	0.0	68.0
Alternative Midpoint (new)	0.0	0.0	326.6
Afton Substation	0.0	0.0	19.9
Hidalgo Substation	0.0	0.0	38.7

Proposed Midpoint would have a moderate direct and indirect impact on paleontological resources; 68 acres classified as high sensitivity are expected to be disturbed.

Alternative Midpoint would have a major direct and indirect impact on paleontological resources; 327 acres classified as high sensitivity are expected to be disturbed.

The expansion of the Afton and Hidalgo substations is expected to disturb 20 and 39 acres, respectively. If fossils are present, moderate direct and indirect impacts to paleontological resources are expected for both substations.

ROUTE GROUP 1 IMPACT SUMMARY

For route group 1, major direct and indirect impacts to paleontological resources may occur if fossils are present because of the presence of High Sensitivity Acreage within the ROW of subroutes 1.1 and 1.2. Subroute 1.2 is slightly less sensitive overall than subroute 1.1. For local alternatives DN-1, A and B, moderate impacts may occur if fossils are present and no impacts are anticipated for local alternatives C and D. Primarily moderate impacts are expected for the substation construction and/or expansions. Although route group 1 has predicted major and moderate impacts, if fossils are present adverse impacts will be mitigated according to the appropriate regulations and the Project's paleontological resources treatment plan.

Route Group 2 – Hidalgo Substation to Apache Substation

Table 4.6-4 presents acreage/mileage of potential disturbance by PFYC class within the representative ROW of route group 2, Hidalgo Substation to Apache Substation. Table 4.6-5 presents the paleontological sensitivity within the representative ROW of route group 2, Hidalgo Substation to Apache Substation.

Table 4.6-4. Route Group 2 Paleontological Resource Inventory Data within the Representative ROW

	Total Miles	Acreage of PFYC 1	Acreage of PFYC 2	Acreage of PFYC 3	Acreage of PFYC 4	Total Acreage
Subroute 2.1, Proponent Preferred						
P4b	**14.0**	334.3	1.4	0	0	**335.7**
P4c	**1.9**	37.4	7.5	0	0	**44.9**
P5a	**9.6**	233.5	0	0	0	**233.5**
P5b	**21.1**	422.7	66.7	0	21.6	**511.0**
P6a	**0.9**	21.3	0	0	0	**21.3**
P6b	**22.5**	545.1	0	0	0	**545.1**
P6c	**2.8**	68.3	0	0	0	**68.3**
P7	**22.3**	514.8	26.0	0	0	**540.8**
P8	**0.5**	9.0	0	0	0	**9.0**
Subroute 2.2, Proponent Alternative						
E	**31.8**	672.7	77.7	0	16.2	**766.6**
F	**25.3**	611.0	0	0	0	**611.0**
Ga	**25.7**	622.4	0	0	0	**622.4**
Gb	**1.0**	25.9	0	0	0	**25.9**
Gc	**7.4**	166.8	12.8	0	0	**179.6**
I	**2.3**	55.4	0	0	0	**55.4**
J	**2.3**	55.6	0	0	0	**55.6**
Route Group 2 Local Alternatives						
LD1	**35.4**	772.7	84.8	0	0	**857.5**
LD2	**9.6**	233.2	0	0	0	**233.2**
LD3a	**27.9**	637.1	0	0	40.4	**677.5**
LD3b	**1.9**	46.6	0	0	0	**46.6**
LD4	**51.7**	1,253.1	0	0	0	**1,467.7**
LD4-Option 4	**6.5**	156.1	0	0	0	**156.1**
LD4-Option 5	**12.3**	296.8	0	0	0	**296.8**
WC1	**14.8**	359.1	0	0	0	**359.1**

Table 4.6-5. Route Group 2 Paleontological Sensitivity by Acreage within the Representative ROW

	Total Miles	Percent Permanent and Temporary Disturbance	Low Sensitivity Acreage (acreage total disturbance)	Moderate Sensitivity Acreage (acreage total disturbance)	High Sensitivity Acreage (acreage total disturbance)
Subroute 2.1, Proponent Preferred					
P4b	**14.0**	31.7%	335.7 (106.3)	0 (0)	0 (0)
P4c	**1.9**	31.7%	44.9 (14.2)	0 (0)	0 (0)
P5a	**9.6**	28.0%	233.5 (65.4)	0 (0)	0 (0)
P5b	**21.1**	27.3%	489.4 (133.6)	0 (0)	21.6 (5.8)
P6a	**0.9**	26.5%	21.3 (5.6)	0 (0)	0 (0)
P6b	**22.5**	27.8%	545.1 (151.5)	0 (0)	0 (0)
P6c	**2.8**	27.8%	68.3 (19.0)	0 (0)	0 (0)
P7	**22.3**	27.5%	540.8 (148.7)	0 (0)	0 (0)
P8	**0.5**	31.5%	9.0 (2.8)	0 (0)	0 (0)
Total	**95.5**	**NA**	**2,288.0 (647.1)**	**0 (0)**	**21.6 (5.8)**
Subroute 2.2, Proponent Alternative					
E	**31.8**	31.2%	750.4 (234.1)	0 (0)	16.2 (5.1)
F	**25.3**	28.6%	611.0 (174.7)	0 (0)	0 (0)
Ga	**25.7**	28.7%	622.4 (178.6)	0 (0)	0 (0)
Gb	**1.0**	28.2%	25.9 (7.3)	0 (0)	0 (0)
Gc	**7.4**	27.2%	179.6 (48.9)	0 (0)	0 (0)
I	**2.3**	32.1%	55.4 (17.8)	0 (0)	0 (0)
J	**2.3**	28.7%	55.6 (16.0)	0 (0)	0 (0)
Total	**95.8**	**NA**	**2,300.3 (677.4)**	**0 (0)**	**16.2 (5.1)**
Route Group 2 Local Alternatives					
LD1	**35.4**	29.5%	857.5 (253.0)	0 (0)	0 (0)
LD2	**9.6**	31.8%	233.2 (74.1)	0 (0)	0 (0)
LD3a	**27.9**	27.4%	637.1 (174.6)	0 (0)	40.4 (11.1)
LD3b	**1.9**	24.4%	46.6 (11.3)	0 (0)	0 (0)
LD4	**51.7**	32.2%	1,253.1 (403.5)	0 (0)	0 (0)
LD4-Option 4	**6.5**	32.3%	156.1 (50.4)	0 (0)	0 (0)
LD5-Option 5	**12.3**	30.6%	296.8 (90.8)	0 (0)	0 (0)
WC1	**14.8**	31.0%	359.1 (111.3)	0 (0)	0 (0)

Note: NA = not applicable.

SUBROUTE 2.1 – PROPONENT PREFERRED

Within route group 2, subroute 2.1 consists of segments P4b, P4c, P5a, P5b, P6a, P6b, P6c, P7, and P8. Beginning northeast of Lordsburg, subroute 2.1 travels west and south around Lordsburg. It then travels west across the New Mexico–Arizona State line and into Arizona, where it extends south and southwest around the eastern edge of Willcox Playa.

Within the representative ROW for subroute 2.1, 22 acres is categorized as high sensitivity (PFYC 4); 6 of the 22 acres is expected to be disturbed during construction. The remaining 2,288 acres is categorized as low sensitivity (PFYC 1 or 2); 647 of the 2,288 acres is expected to be disturbed. Minor direct and indirect impacts may occur in the area of high sensitivity for paleontological resources if fossils are present.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Subroute 2.2 consists of E, F, Ga, Gb, Gc, I, and J. It begins south of the Lordsburg Playa and heads west across the New Mexico–Arizona State line and north of San Simon. The subroute then travels west-northwest to north of the Dos Cabezas Mountains and then northwest, west, and south around Willcox Playa.

Within the representative ROW for subroute 2.2, only 16 acres, with 5 acres disturbed, is categorized as high sensitivity (PFYC 4). A total of 2,300 acres is categorized as low sensitivity (PFYC 1 or 2), with 677 acres expected to be disturbed. Minor direct and indirect impacts would occur in the area of high sensitivity for paleontological resources if fossils are present.

LOCAL ALTERNATIVES

There are eight local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1. LD1 starts east of Lordsburg, crosses the Peloncillo Mountains, and ends northwest of San Simon. LD2 starts northwest of Lordsburg and crosses the Lordsburg Playa between the north and south playa. LD3a and LD3b travel around the north sites of the Lordsburg Playa. LD4 crosses the Peloncillo Mountains and the San Simon Valley and ends northwest of Willcox. LD4-Option 4 begins in the foothills of the Peloncillo Mountains, travels south across I-10, and ends at the Dos Cabezas Mountains. LD5-Option 5 runs southwest between LD4 and P6c. WC1 runs roughly parallel to I-10 through Sulphur Springs Valley.

For local alternative LD3a, 40 acres is categorized as high sensitivity (PFYC 4); 11 of the 40 acres is expected to be disturbed during construction. Minor direct and indirect impacts would occur in the area of high sensitivity for paleontological resources if fossils are present.

All of local alternatives LD1, LD2, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1 are categorized as low sensitivity (PFYC 1 or 2). No direct or indirect impacts would occur.

NEW SUBSTATIONS OR SUBSTATION EXPANSION

Expansion of one existing substation, the Apache Substation, is proposed for route group 2. The expansion would occur over 68.9 acres of low sensitivity (PFYC 1 or 2) for paleontological resources. No direct or indirect impacts would occur.

ROUTE GROUP 2 IMPACT SUMMARY

For route group 1, minor direct and indirect impacts may occur if fossils are present for both subroute 2.1 and 2.2. For local alternative LD3a minor impacts may occur if fossils are present and no impacts are anticipated for local alternatives LD1, LD2, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1 or the expansion of the Apache substation. If fossils are present, adverse impacts will be mitigated according to the appropriate regulations and the Project's paleontological resources treatment plan.

Route Group 3 – Apache Substation to Pantano Substation

Table 4.6-6 presents acreage/mileage of potential disturbance by PFYC class within the representative ROW of route group 3, Apache Substation to Pantano Substation. Table 4.6-7 presents the paleontological sensitivity within the representative ROW of route group 3, Apache Substation to Pantano Substation.

Table 4.6-6. Route Group 3 Paleontological Resource Inventory Data within the Representative ROW

	Total Miles	Acreage of PFYC 1	Acreage of PFYC 2	Acreage of PFYC 3	Acreage of PFYC 4	Total Acreage
Subroute 3.1, Proponent Preferred						
U1a	**16.1**	291.9	0	0	0	**291.9**
U1b	**2.9**	53.0	0	0	0	**53.0**
U2	**15.8**	259.3	0	27.7	0	**287.0**
U3a	**35.6**	646.7	0	0	0	**646.7**
Route Group 3 Local Alternative						
H	**19.3**	350.2	0	0	0	**350.2**

Table 4.6-7. Route Group 3 Paleontological Sensitivity by Acreage within the Representative ROW

	Total Miles	Percent Permanent and Temporary Disturbance	Low Sensitivity Acreage (acreage total disturbance)	Moderate Sensitivity Acreage (acreage total disturbance)	High Sensitivity Acreage (acreage total disturbance)
Subroute 3.1, Proponent Preferred					
U1a	16.1	32.7%	291.9 (95.5)	0 (0)	0 (0)
U1b	2.9	32.5%	53.0 (17.2)	0 (0)	0 (0)
U2	15.8	35.2%	259.3 (91.3)	27.7 (9.8)	0 (0)
U3a	35.6	33.1%	646.7 (214.1)	0 (0)	0 (0)
Total	**70.4**	**NA**	**1,250.9 (418.1)**	**27.7 (9.8)**	**0 (0)**
Route Group 3 Local Alternative					
H	19.3	36.2%	350.2 (126.8)	0 (0)	0 (0)

SUBROUTE 3.1 – PROPONENT PREFERRED

Subroute 3.1 consists of upgrade of the existing Western 115-kV line running from the Apache Substation west of Willcox Playa, east of the north end of the Dragoon Mountains, and through the San Pedro Valley.

Within the representative ROW for subroute 3.1, 28 acres is categorized as moderate sensitivity (PFYC 3); 10 of the 28 acres is expected to be disturbed during construction. The remaining 1,251 acres

is categorized as low sensitivity (PFYC 1 or 2). Disturbance within the representative ROW would result in a minor direct and indirect impact to paleontological resources if fossils are present.

LOCAL ALTERNATIVES

There is one local alternative for route group 3: local alternative H, which runs around the north side of Benson. Within the representative ROW, all of local alternative H is categorized as low sensitivity (PFYC 1 or 2). No direct or indirect effects on paleontological resources are expected for local alternative H.

NEW SUBSTATIONS OR SUBSTATION EXPANSION

Expansion of two existing substations, the Pantano and Adams Tap substations, is proposed for route group 3. The Pantano Substation expansion would occur over 25.4 acres of low sensitivity (PFYC 1 or 2) for paleontological resources; the Adams Tap Substation expansion would occur over 5.6 acres of low sensitivity. No direct or indirect impacts would occur for either expansion.

ROUTE GROUP 3 IMPACT SUMMARY

For route group 3, minor direct and indirect impacts may occur if fossils are present in subroute 3.1. No impacts are anticipated for local alternative H or the substation expansions. If fossils are present in subroute 3.1, adverse impacts will be mitigated according to the appropriate regulations and the Project's paleontological resources treatment plan.

Route Group 4 – Pantano Substation to Saguaro Substation

Table 4.6-8 presents acreage/mileage of potential disturbance by PFYC class within the representative ROW of route group 4, Pantano Substation to Saguaro Substation. Table 4.6-9 presents the paleontological sensitivity within the representative ROW of route group 4, Pantano Substation to Saguaro Substation.

Table 4.6-8. Route Group 4 Paleontological Resource Inventory Data within the Representative ROW

	Total Miles	Acreage of PFYC 1	Acreage of PFYC 2	Acreage of PFYC 3	Acreage of PFYC 4	Total Acreage
Subroute 4.1, Proponent Preferred						
U3b	**0.5**	8.2	0	0	0	**8.2**
U3c	**1.0**	17.5	0	0	0	**17.5**
U3d	**3.4**	62.4	0	0	0	**62.4**
U3e	**0.9**	16.1	0	0	0	**16.1**
U3f	**0.7**	12.4	0	0	0	**12.4**
U3g	**0.9**	16.2	0	0	0	**16.2**
U3h	**1.1**	19.8	0	0	0	**19.8**
U3i	**18.2**	331.1	0	0	0	**331.1**
U3j	**0.9**	15.9	0	0	0	**15.9**
U3k	**16.7**	303.6	0	0	0	**303.6**
U3l	**1.6**	28.1	0	0	0	**28.1**
U3m	**0.6**	8.9	0	0	0	**8.9**
U4	**1.9**	34.7	0	0	0	**34.7**

Table 4.6-8. Route Group 4 Paleontological Resource Inventory Data within the Representative ROW (Continued)

	Total Miles	Acreage of PFYC 1	Acreage of PFYC 2	Acreage of PFYC 3	Acreage of PFYC 4	Total Acreage
Route Group 4 Local Alternatives						
MA1	**1.1**	19.0	0	0	0	**19.0**
TH1a	**1.4**	25.7	0	0	0	**25.7**
TH1b	**1.6**	28.4	0	0	0	**28.4**
TH1c	**0.3**	4.8	0	0	0	**4.8**
TH1-Option	**1.0**	7.7	0	0	0	**7.7**
TH3-Option A	**0.8**	15.1	0	0	0	**15.1**
TH3-Option B	**0.8**	14.5	0	0	0	**14.5**
TH3-Option C	**1.8**	29.3	0	0	0	**29.3**
TH3a	**2.7**	49.7	0	0	0	**49.7**
TH3b	**4.5**	81.4	0	0	0	**81.4**

Table 4.6-9. Route Group 4 Paleontological Sensitivity within the Representative ROW

	Total Miles	Percent Permanent and Temporary Disturbance	Low Sensitivity Acreage (acreage total disturbance)	Moderate Sensitivity Acreage (acreage total disturbance)	High Sensitivity Acreage (acreage total disturbance)
Subroute 4.1, Proponent Preferred					
U3b	**0.5**	32.2%	8.2 (2.6)	0 (0)	0 (0)
U3c	**1.0**	29.0%	17.5 (5.1)	0 (0)	0 (0)
U3d	**3.4**	32.1%	62.4 (20.0)	0 (0)	0 (0)
U3e	**0.9**	32.2%	16.1 (5.2)	0 (0)	0 (0)
U3f	**0.7**	32.2%	12.4 (4.0)	0 (0)	0 (0)
U3g	**0.9**	30.3%	16.2 (4.9)	0 (0)	0 (0)
U3h	**1.1**	28.9%	19.8 (5.7)	0 (0)	0 (0)
U3i	**18.2**	32.0%	331.1 (106.0)	0 (0)	0 (0)
U3j	**0.9**	32.7%	15.9 (5.2)	0 (0)	0 (0)
U3k	**16.7**	33.2%	303.6 (100.8)	0 (0)	0 (0)
U3l	**1.6**	31.9%	28.1 (8.7)	0 (0)	0 (0)
U3m	**0.6**	35.3%	8.9 (3.1)	0 (0)	0 (0)
U4	**1.9**	33.0%	34.7 (11.5)	0 (0)	0 (0)
Total	**48.4**	**NA**	**874.9 (282.8)**	**0 (0)**	**0 (0)**

Table 4.6-9. Route Group 4 Paleontological Sensitivity within the Representative ROW (Continued)

	Total Miles	Percent Permanent and Temporary Disturbance	Low Sensitivity Acreage (acreage total disturbance)	Moderate Sensitivity Acreage (acreage total disturbance)	High Sensitivity Acreage (acreage total disturbance)
Route Group 4 Local Alternatives					
MA1	**1.1**	31.0%	19.0 (5.9)	0 (0)	0 (0)
TH1a	**1.4**	29.3%	25.7 (7.5)	0 (0)	0 (0)
TH1b	**1.6**	30.2%	28.4 (8.6)	0 (0)	0 (0)
TH1c	**0.3**	35.3%	4.8 (1.7)	0 (0)	0 (0)
TH1-Option	**1.0**	30.1%	7.7 (2.3)	0 (0)	0 (0)
TH3-Option A	**0.8**	28.1%	15.1 (4.2)	0 (0)	0 (0)
TH3-Option B	**0.8**	33.2%	14.5 (4.8)	0 (0)	0 (0)
TH3-Option C	**1.8**	40.2%	29.3 (11.8)	0 (0)	0 (0)
TH3a	**2.7**	33.5%	49.7 (16.6)	0 (0)	0 (0)
TH3b	**4.5**	32.3%	81.4 (26.3)	0 (0)	0 (0)

Note: NA = not applicable

SUBROUTE 4.1 – PROPONENT PREFERRED

Subroute 4.1 begins at the Pantano Substation and travels northwest and north through Green Valley to Tucson. It runs around the Tucson International Airport to the Del Bac Substation and then heads north and northwest across Tumamoc Hill, connecting to the Tucson Substation. The line then continues north and northwest, traveling northeast of the Tucson Mountains to Marana and ending at the Saguaro Substation.

Within the representative ROW, all of subroute 4.1 is categorized as low sensitivity (PFYC 1 or 2). No direct or indirect effects are expected for subroute 4.1.

LOCAL ALTERNATIVES

There are ten local alternatives available for route group 4: TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, TH3-Option C, and MA1. The nine TH alternatives are all options for replacing the existing line that currently runs across Tumamoc Hill. MA1 runs southwest of the Marana Airport in an "L" shape to avoid the airport itself.

Within the representative ROW, all ten local alternatives are categorized as low sensitivity (PFYC 1 or 2). No direct or indirect effects are expected for TH1a, TH1b, TH1c, TH3a, TH3b, TH3-Option A, TH3-Option B, TH3-Option C, and MA1.

NEW SUBSTATIONS OR SUBSTATION EXPANSION

The expansion of nine existing substations is planned for route group 4. The existing stations are Del Bac Substation, DeMoss Petrie Substation, Marana Substation, Nogales Substation, Rattlesnake Substation, Tortolita Substation, Tucson Substation, Vail Substation, and Saguaro Substation. Table 4.6-10 presents the ground disturbance acreage by substation.

Table 4.6-10. Expected Acreage of Ground Disturbance by Substation in Route Group 4

Substation	Low Sensitivity Acreage – PFYC 1 and 2	Moderate or Unknown Sensitivity Acreage – PFYC 3	High Sensitivity Acreage – PFYC 4
Apache Substation	69.8	0.0	0.0
Adams Tap Substation	5.6	0.0	0.0
Del Bac Substation	14.2	0.0	0.0
DeMoss Petrie Substation	4.2	0.0	0.0
Marana Substation	14.5	0.0	0.0
Nogales Substation	10.2	0.0	0.0
Pantano Substation	25.4	0.0	0.0
Rattlesnake Substation	16.7	0.0	0.0
Tortolita Substation	16.1	0.0	0.0
Tucson Substation	10.6	0.0	0.0
Vail Substation	27.7	0.0	0.0
Saguaro Substation	22.7	0.0	0.0

The substation expansions (Del Bac Substation, DeMoss Petrie Substation, Marana Substation, Nogales Substation, Rattlesnake Substation, Tortolita Substation, Tucson Substation, Vail Substation, and Saguaro Substation) are all located on areas of low sensitivity (PFYC 1 or 2) for paleontological resources. No direct or indirect impacts are expected.

ROUTE GROUP 4 IMPACT SUMMARY

For route group 4, no impacts to paleontological resources are expected for subroute 4.1, the local alternatives, or the substation expansions.

Agency Preferred Alternative

In the New Build Section, the Agency Preferred Alternative consists of segments P1, P2, P3, and P4a within route group 1 and of segment P7 and a portion of local alternatives L3a and LD4, and all of LD4-Option 5 within route group 2. The Agency Preferred Alternative within route group 1 has the greatest acreage of potential disturbance within the representative ROW (473 ac) across geological formations with high sensitivity. The high sensitivity formations are the Upper Santa Fe Group and the Gila Group. These formations have produced dinosaur, mammal, avian, and reptilian fossils, although no fossils localities have been recorded in the analysis area or representative ROW of the Agency Preferred Alternative. The majority of route group 2 for the Agency Preferred Alternative would not cross geological formations with high sensitivity. Construction is expected to disturb 11 acres of high sensitivity Gila Group geological formations within the representative ROW of LD3a.

In the Upgrade Section, the Agency Preferred Alternative consists of segments U1a, U1b, U2, and U3a within route group 3 and consists of segments U3b, U3c, U3f, U3g, U3h, U3i, U3g, U3l, U3m, and U4 and local alternatives TH1a, TH1 Option, and MA1 within route group 4. Ten acres of geological formations with moderate sensitivity is expected to be disturbed by construction within the representative ROW of segment U2 of route group 3. The moderate sensitivity geological formations are unnamed Quaternary deposits in the San Pedro River valley which have produced mammal fossils. No impacts to paleontological resources are expected for the remainder of route group 3 and all of route group 4 because they do not cross any geological formations with moderate or high sensitivity.

For the Agency Preferred Alternative, no impacts to paleontological resources are anticipated.

This analysis has identified the following potential impacts to paleontological resources:

- In route group 1, the Agency Preferred Alternative representative ROW crosses the Upper Santa Fe and the Gila Group formations which have a high sensitivity. Although, no fossils localities have been recorded in the analysis area or representative ROW, these formations may produce important fossils. All segments in route group 1 cross high sensitivity formations.
- In route group 2, the Agency Preferred Alternative representative ROW of local alternative LD3a crosses an area of high sensitivity (Gila Group) which may produce fossils.
- In route group 4, segment U2 crosses an area of unnamed Quaternary deposits in the San Pedro River valley with moderate sensitivity.

If fossils are present in the areas of high or moderate sensitivity within the Agency Preferred Alternative, any adverse impacts from construction would be mitigated according to all applicable laws and regulations and Southline's POD. These mitigation measures would also apply to inadvertent discoveries during operation and maintenance. If fossils are present, provided that all mitigation measures are followed, adverse impacts would be reduced to minor for the areas of concern outlined above.

Additional Mitigation Measures

Potential mitigation measures for adverse impacts to paleontological resources include paleontological surveys of PFYC 3 and 4 geological units within the selected route, avoidance by spanning resource areas, training and education for construction and maintenance personnel, monitoring of ground disturbance activities in sensitive areas, covering of fossil-bearing sediment to protect resources, recovery of fossils, and curation of fossils in an appropriate repository. As discussed in the POD for the Project, approved mitigation measures would be detailed in a paleontological resources treatment plan that would be followed before and during construction, as well as during maintenance activities.

Residual Impacts

If the mitigation measures detailed in the paleontological resources treatment plan are followed, there would be no residual impacts.

Unavoidable Adverse Impacts

If areas with moderate or high paleontological sensitivity cannot be avoided by Project design, disturbance to these areas may result in unavoidable adverse impacts due to loss of scientifically important fossils.

Short-term Uses versus Long-term Productivity

Construction of the Project would result in ground disturbance resources during construction. Ground disturbance that results in the loss of scientifically important fossils is considered a long-term impact. Impacts to scientifically important fossils are of concern primarily in the New Mexico portions of the Project; the majority of the representative ROW in Arizona has low sensitivity for paleontological resources.

During construction, the removal of fossils from areas of moderate or high sensitivity would alter the long-term productivity of those fossil sources because fossils are a finite and nonrenewable resource. However, the discovery and removal of previously unknown fossils can contribute to long-term

productivity as well by: (1) allowing those fossils to be studied by the scientific community; and (2) potentially revealing new fossil beds for later research.

Loss of access to resources during construction would be reversed once construction was complete. However, any permanent facilities construction on areas with moderate or high sensitivity would restrict access until the line is decommissioned in 50 years.

Irreversible and Irretrievable Commitments of Resources

Although fossils are a finite and nonrenewable resource, provided that all mitigation measures are followed there are no irreversible or irretrievable commitments of resources.

4.7 WATER RESOURCES

4.7.1 Groundwater, Surface Water, and Wetlands – Introduction

This section describes the impacts to groundwater, surface water, floodplains, and wetlands associated with the construction and operation and maintenance of the transmission line, substations, and ancillary facilities. Impacts to water resources are discussed primarily in terms of the number or acreage of waters impacted, and the potential for contamination to occur. The impacts described in this section are based on data compiled in "Southline Transmission Project Resource Report 17: Water Resources" (CH2M Hill 2013f). The contents of that report are used herein without specific reference.

4.7.2 Methodology and Assumptions

Analysis Area

NEW BUILD SECTION

The environmental consequences for water resources for the New Build Section are based on a 200-foot-wide representative ROW, located along the centerline of the 2-mile-wide analysis area. The actual construction ROW would likely be configured to avoid certain environmental impacts, or for other logistical reasons. Therefore, specific water bodies impacted by the representative ROW could or could not be impacted by the final construction ROW. However, use of the representative ROW allows disclosure of the approximate magnitude of impacts associated with each route group and route segment.

Environmental consequences for water resources could extend beyond the representative ROW in order to incorporate the potential for indirect impacts to water resources aside from direct disturbance. For surface water this also includes any downstream drainages, limited to the downstream confluence of the next major watercourse. For groundwater this includes any aquifers that would be affected by changes in groundwater quantity or quality, but limited just to the area of the aquifer where any impacts would affect known or existing users, or where changes in groundwater quality might migrate.

UPGRADE SECTION

The environmental consequences for water resources for the Upgrade Section are based on a 150-foot representative ROW, located along the centerline of the 500-foot-wide analysis area. Similar to the New Build Section, the analysis area also includes downstream drainages and aquifers as described above.

Analysis Assumptions

SURFACE WATER

There are three primary assumptions for analyzing impacts to surface waters. First, analysis of impacts assumes that all appropriate construction stormwater permits would be in place, that a SWPPP had been prepared and implemented, and that BMPs would be in place and would be followed. Second, it is assumed that spill prevention and spill response would be in place as part of the SWPPP, and that minor accidental spills or discharges could and would be properly addressed. Third, it is assumed that there would be less risk of impact from stormwater runoff to ephemeral washes than perennial or flowing waters. Therefore, the analysis focuses on those areas where perennial surface water has been documented, or where special status waters are present or nearby; the potential for discharge to these waters would be considered an impact. Since the SWPPP, BMPs, and spill prevention plans would be in place, the potential for discharge to ephemeral washes is not considered an impact.

FLOODPLAINS

It is assumed that any mapped floodplain (identified in chapter 3) crossed by the representative ROW would be impacted temporarily. It is assumed that permanent structures would potentially be present only for those floodplains whose span exceeds 900 feet (which is the approximate distance between poles for both the New Build and Upgrade Sections) or for which known constraints exist that require placement within the floodplain. Not all permanent structures placed within floodplains would be considered an impact. In some cases, mapped floodplains represent areas of sheetflow or represent shallow playa lakes. Placement of permanent structures within these areas would not be considered an impact. Placement of permanent structures within well-defined flow channels would be considered an impact.

WETLANDS AND WATERS OF THE U.S.

Ephemeral drainages/ washes are regulated under Section 404 of the Clean Water Act. Should a proposed action require the discharge of dredged or fill material into an ephemeral, intermittent, or perennial drainage, a Department of the Army discharge permit may be required. It is assumed that any linear water feature (identified in chapter 3) crossed by the representative ROW would be a potential WUS that could be impacted. It is also assumed that any wetland (identified in chapter 3) crossed by the representative ROW could be impacted. However, in both cases both the final placement of the ROW and the permitting process that is required under Section 404 of the CWA would have the goal of avoiding both wetlands and WUS. Therefore, while these features may be present within the ROW, there would only be an impact to wetlands and WUS if disturbance is unavoidable. A WUS or wetland would be considered unavoidable if it is large enough or configured such that it cannot be spanned. As noted, the approximate distance between poles is 900 feet.

GROUNDWATER

With respect to groundwater quantity and impacts to local well users, there is insufficient detail to know precisely from where construction water would be obtained, except that it would be obtained from existing sources. The amount of water needed for construction (dewatering, concrete mixing) is relatively minor compared to the large municipal and agricultural uses throughout the analysis area, and it would be widely distributed along the construction route and not concentrated in one area. For these reasons, impacts to groundwater quantity due to withdrawal of construction water are considered minimal and are not explicitly analyzed. Damage to any water infrastructure (wells, canals) from the proposed Project is not expected to occur. If occurring, infrastructure would be replaced or repaired. Therefore, these impacts are not explicitly analyzed.

With respect to groundwater quality, it is assumed that with BMPs in place to prevent and respond to spills or other contamination, there is little risk to contamination of groundwater resources except in areas of known shallow groundwater (defined for this analysis as groundwater less than 20 feet bgs). Therefore, the analysis focuses on those areas where shallow groundwater has been documented.

Impact Indicators

SURFACE WATER

- Qualitative assessment of the potential for accidental or intentional release of contaminants to surface waters.
- Number of springs that occur within the ROW.
- Acreage of any specially designated waters, including impaired waters, Outstanding National Resource Waters (in New Mexico), and Outstanding Arizona Waters, that occurs within the ROW.
- Qualitative assessment of the effects on any specially designated waters, including impaired waters, Outstanding National Resource Waters (in New Mexico), and Outstanding Arizona Waters, including discharge of stormwater.
- Length of perennial or flowing waters that occur within the ROW.
- Qualitative assessment of the effects on any perennial or flowing waters, including discharge of stormwater.
- Number and type of water bodies that occur within the ROW with special management designation and restrictions.

FLOODPLAINS

- Acreage of disturbance within floodplains.
- Presence of any permanent physical structures within floodplains, excluding areas of sheetflow or shallow playa lakes.

WETLANDS AND WATERS OF THE U.S.

- Number and length of WUS for which disturbance would be unavoidable.
- Number, acreage, and type of wetlands or special aquatic sites for which disturbance would be unavoidable.

GROUNDWATER

- Qualitative assessment of the potential for accidental or intentional release of contaminants to shallow groundwater.

Significant Impacts

For the purposes of this analysis, a significant impact on water resources could result if any of the following were to occur from construction or operation and maintenance of the proposed Project:

- A spring were located within the representative ROW, was unavoidable during final design, and was directly disturbed.
- An intentional or accidental release of contaminants, including sediment, were to enter a perennial or intermittent surface water.

- An intentional or accidental release of contaminants, including sediment, were to enter an Outstanding Arizona Water or Outstanding National Resource Water.
- An intentional or accidental release of contaminants were to impact an area of shallow groundwater.
- A WUS, wetland, or special aquatic site were unavoidable and disturbed by the representative ROW.
- Any permanent structures were located within floodplains with well-defined flow channels.

4.7.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, no additional ground disturbance would occur in the New Build Section. Surface waters and wetlands in the analysis area would be subject to impacts from ongoing land management and climatic trends like drought or climate change. Groundwater use would continue in a similar manner to that observed at present. With regard to the Upgrade Section, even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, in accordance with Western's 10-year capital improvement plan (Western 2012a).

Impacts Common to All Action Alternatives

The potential for accidental or intentional release of contaminants to surface waters and shallow groundwater is common to all action alternatives.

CONSTRUCTION

Materials would be used during construction, including petroleum products (oil, gasoline, diesel) and other hazardous materials, that are potential contaminants that could impact surface water or shallow groundwater. The proposed Project includes control measures and BMPs that are intended to minimize this risk (see table 2-7 in chapter 2). These are standard industry practices and are typically effective at minimizing the risk for accidental release of contaminants to surface water or shallow groundwater when implemented properly. The proposed Project does not include the intentional release of any potential contaminants.

The most common contaminant from construction activity is the movement of sediment by stormwater into nearby surface waters, due to ground disturbance. The proposed Project includes control measures and BMPs that are intended to stabilize disturbed ground, control erosion from disturbed areas, and prevent sediment from entering surface waters. The SWPPP(s) required to be prepared for the construction activities would identify the specific structural control measures and BMPs to be implemented. If implemented properly, as required under Section 402 of the CWA, these activities minimize the risk for erosion and movement of sediment in stormwater.

BMPs and control measures are designed to be adapted to site-specific conditions. Some characteristics encountered for individual route segments represent special conditions that could need to be specially assessed. These are identified in the next section for each route group. Proposed structure locations should incorporate avoidance and BMPs to avoid WUS and wetlands. Construction of access roads would likely not impact wetlands if avoidance measures are incorporated. Specific wetlands or special aquatic sites that could be impacted are identified under each route group.

OPERATION AND MAINTENANCE

Similar BMPs and control measures would be implemented during operation and maintenance, and overall minimize the risk for accidental release of potential contaminants and erosion and movement of sediment in stormwater due to ground disturbance.

If avoidance measures and BMPs are incorporated, then most WUS and wetlands would not be affected by the operation and maintenance of the transmission line.

Route Group 1 – Afton Substation to Hidalgo Substation

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

There are no springs impacted for any segments within this subroute.

One segment contains several WUS (P2); all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts. No wetlands or special aquatic sites are impacted under this subroute (table 4.7-1).

The Mimbres River is crossed by one segment within this subroute (P2). The Mimbres River has intermittent flow and could have surface flow present during construction, which represents an increased risk of potential contamination of surface waters. Construction activities in this area could require special management practices or controls to minimize this risk.

Operation and Maintenance

The potential for delivery of sediment into the Mimbres River would be elevated after construction, but with implementation of stabilization and revegetation measures, this potential would decrease over time.

Permanent structures are likely to be located within the floodplains for two segments (P2, P3). These floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

There are no springs impacted for any segments within this subroute.

One segment contains several WUS (S8); all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts. No wetlands or special aquatic sites are impacted under this subroute.

Operation and Maintenance

Permanent structures are likely to be located within the floodplains for four segments (S5, S6, S7, S8). These floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: DN1, A, B, C, and D.

Table 4.7-1. Route Group 1 Groundwater, Surface Water, and Wetlands Resource Inventory Data

	Total Miles	Number of Springs	Length of Perennial or Intermittent Waters (feet)	Acres of Floodplains and Number of Areas with Permanent Structures within Floodplain*	Number and Length of WUS (feet)	Number and Acres of Wetlands	Special Status†
Subroute 1.1, Proponent Preferred							
P1	5.1	0	0	0	0	0	
P2	102.0	0	215	275.9 (16)	5 (1,125)	0	Mimbres River‡
P3	31.1	0	0	235.7 (2)	0	0	
P4a	8.7	0	0	0	0	0	
Subroute 1.2, Proponent Alternative							
S1	13.4	0	0	0	0	0	
S2	11.1	0	0	0	0	0	
S3	12.9	0	0	0	0	0	
S4	10.6	0	0	0	0	0	
S5	29.7	0	0	201.3 (4)	0	0	
S6	7.4	0	0	9.9 (1)	0	0	
S7	41.5	0	0	69.1 (4)	0	0	
S8	14.6	0	0	22.1 (2)	2 (439)	0	
Route Group 1 Local Alternatives							
DN1	42.5	0	200	95.6 (8)	3 (872)	0	Mimbres River‡
A	17.5	0	0	0	0	1 (0.3)	
B	12.2	0	0	0	0	0	
C	9.0	0	0	27.1 (2)	0	0	
D	22.8	0	0	8.8 (1)	2 (804)	0	

Table 4.7-1. Route Group 1 Groundwater, Surface Water, and Wetlands Resource Inventory Data (Continued)

	Total Miles	Number of Springs	Length of Perennial or Intermittent Waters (feet)	Acres of Floodplains and Number of Areas with Permanent Structures within Floodplain*	Number and Length of WUS (feet)	Number and Acres of Wetlands	Special Status†
Substations and Staging Areas							
Proposed Midpoint	NA	0	0	**54.5 (1)**	0	0	
Rep. Staging Area S4	NA	0	0	6.1	0	0	
Rep. Staging Area S6	NA	0	0	6.9	0	0	
Rep. Staging Area S7	NA	0	0	4.1	0	0	

Note: NA = not applicable.

* Number in parentheses indicates number of floodplain areas that are in excess of 900 feet wide, which is the average space between pole structures.

† Includes areas of shallow groundwater, perennial or intermittent surface water, presence of impaired water, Outstanding National Resource Water, Outstanding Arizona Water, or presence of special management area.

‡ The Mimbres River is an intermittent surface water. Surface flow may be present during construction.

Bold-faced items identify a significant impact.

Construction

There are no springs impacted for any segments within these local alternatives.

Two segments contain WUS (DN1, D) and one segment (A) contains a wetland; all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts. The 0.3-acre wetland is a freshwater pond within Kilbourne Hole in Doña Ana County, New Mexico. Proposed structure locations should incorporate avoidance and BMPs to avoid the wetland; therefore the presence of this wetland is not considered a significant impact. This wetland is likely an upland swale where storm runoff within Kilbourne Hole drains and provides temporary drinking water for cattle and possibly local fauna. Construction of access roads would likely not impact the pond if avoidance measures are incorporated.

The Mimbres River is crossed by one segment within the local alternatives (DN1). The Mimbres River has intermittent flow and could have surface flow present during construction, which represents an increased risk of potential contamination of surface waters. Construction activities in this area could require special management practices or controls to minimize this risk.

Operation and Maintenance

The potential for delivery of sediment into the Mimbres River would be elevated after construction, but with implementation of stabilization and revegetation measures, this potential would decrease over time.

Permanent structures are likely to be located within the floodplains for two segments (C, D). These floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact.

SUBSTATIONS AND STAGING AREAS

Construction

There are no springs impacted for any substations or representative staging areas within this route group, and no WUS, wetlands, or special aquatic sites are impacted.

Three staging areas would temporarily impact floodplains, but would be unlikely to have permanent structures.

Operation and Maintenance

Permanent structures are likely to be located within the floodplain for the Proposed Midpoint Substation. Placement of this structure would likely elevate flooding risk; permitting processes would ensure that flooding risk remains within allowable levels. This is considered a significant impact; impacts would be minor and long-term.

Route Group 2 – Hidalgo Substation to Apache Substation

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

There are no springs impacted for any segments within this subroute.

Two segments contain WUS (P5b, P6b) and one additional segment contains two wetland areas (P7); all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts (table 4.7-2). The two wetland areas impacted by segment P7 consist of the Willcox Playa and one additional smaller wetland in Cochise County, Arizona (111.8 acres). The Willcox Playa is classified as a dry ephemeral lake. It is located within the San Pedro Watershed and is known as a terminal or "interior draining" basin, containing approximately 30,000 acres. Willcox Playa is also known to be a remnant of the Pleistocene pluvial Lake Cochise. While the smaller wetland potentially could be spanned, Willcox Playa would be unavoidable and would be impacted by construction disturbance; this is considered a significant impact. Direct impacts associated with the wetlands include the construction of the transmission line structures and temporary access roads. These impacts would be minor and long-term. Proposed structure locations should incorporate avoidance and BMPs to avoid the smaller wetland. Construction of access roads would likely not impact the smaller wetland if avoidance measures are incorporated.

The Lordsburg Playa RNA is crossed by segment P5a, which has management restrictions on authorization of new ROWs.

Operation and Maintenance

Permanent structures are likely to be located within the floodplains for three segments (P5b, P6b, P7). These floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

There are no springs impacted for any segments within this subroute.

Three segments contain WUS (E, F, I); all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts, including the largest, which is the San Simon River. No wetlands or special aquatic sites are impacted under this subroute.

The Lordsburg Playa RNA is crossed by segment E, and the Willcox Playa NNL is crossed by segment Gc, both of which have management restrictions on authorization of new ROWs.

Operation and Maintenance

Permanent structures are likely to be located within the floodplains for five segments (E, F, Ga, Gb, Gc). These floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact.

Table 4.7-2. Route Group 2 Groundwater, Surface Water, and Wetlands Resource Inventory Data

	Total Miles	Number of Springs	Length of Perennial or Intermittent Waters (feet)	Acres of Floodplains and Number of Areas with Permanent Structures within Floodplain*	Number and Length of WUS (feet)	Number and Acres of Wetlands	Special Status†
Subroute 2.1, Proponent Preferred							
P4b	14.0	0	0	0	0	0	
P4c	1.9	0	0	0	0	0	
P5a	9.6	0	0	0	0	0	Lordsburg Playa‡
P5b	21.1	0	0	9.2 (2)	1 (212)	0	
P6a	0.9	0	0	1.9	0	0	
P6b	22.5	0	0	55.2 (4)	2 (506)	0	
P6c	2.8	0	0	0	0	0	
P7	22.3	0	0	116 (2)	0	**2 (111.8)**	
P8	0.5	0	0	0	0	0	
Subroute 2.2, Proponent Alternative							
E	31.8	0	0	6.6 (1)	1 (228)	0	Lordsburg Playa‡
F	25.3	0	0	50.3 (4)	1 (341)	0	
Ga	25.7	0	0	192.7 (5)	0	0	
Gb	1.0	0	0	3.6 (1)	0	0	
Gc	7.4	0	0	9.8 (2)	0	0	Willcox Playa§
I	2.3	0	0	2.0	1 (231)	0	
J	2.3	0	0	0	0	0	

Table 4.7-2. Route Group 2 Groundwater, Surface Water, and Wetlands Resource Inventory Data (Continued)

	Total Miles	Number of Springs	Length of Perennial or Intermittent Waters (feet)	Acres of Floodplains and Number of Areas with Permanent Structures within Floodplain*	Number and Length of WUS (feet)	Number and Acres of Wetlands	Special Status†
Route Group 2 Local Alternatives							
LD1	35.4	0	0	89.7 (1)	**3 (4,788)**	0	
LD2	9.6	0	0	0	0	0	
LD3a	27.9	0	0	0	0	0	
LD3b	1.9	0	0	0	0	0	
LD4	51.7	0	0	117.4 (7)	4 (1,728)	0	
LD4-Option 4	6.5	0	0	0	0	0	
LD4-Option 5	12.3	0	0	11.6	1 (200)	0	
WC1	14.8	0	0	142.2 (3)	0	0	
Substations and Staging Areas							
Rep. Staging Area Ga	NA	0	0	15.9	0	0	

Note: NA = not applicable.

* Number in parentheses indicates number of floodplain areas that are in excess of 900 feet wide, which is the average space between pole structures.

† Includes areas of shallow groundwater, perennial or intermittent surface water, presence of impaired water, Outstanding National Resource Water, Outstanding Arizona Water, or presence of special management area.

‡ Management direction for the Lordsburg Playa RNA excludes authorization of new ROWs.

§ Management direction for the Willcox Playa NNL excludes authorization of new ROWs.

Bold-faced items identify a significant impact.

LOCAL ALTERNATIVES

There are seven local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, and WC1.

Construction

There are no springs impacted for any segments within the local alternatives.

Three segments contain WUS (LD1, LD4, LD4-Option 5); with the exception of LD1, all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts. Segment LD1 roughly parallels Stein's Creek for almost 1 mile, and it is not clear that this WUS could be avoided; therefore this represents a significant impact. This impact would be minor to moderate and long-term. No wetlands or special aquatic sites are impacted under this subroute.

Operation and Maintenance

Permanent structures are likely to be located within the floodplains for two segments (LD1, WC-1). These floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact.

SUBSTATIONS AND STAGING AREAS

Construction

There are no springs impacted for any substations or representative staging areas within this route group, and no WUS are impacted.

One staging area would temporarily impact floodplains, but would be unlikely to have permanent structures.

Operation and Maintenance

There are no permanent impacts to floodplains from substations or staging areas.

Route Group 3 – Apache Substation to Pantano Substation

SUBROUTE 3.1 – PROPONENT PREFERRED

Construction

There are no springs impacted for any segments within this subroute.

Three segments contain WUS (U1a, U2, U3a), and two wetland areas are also present within the ROW (U2); all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts, including the San Pedro River (table 4.7-3). The wetlands consist of a 2.4-acre freshwater pond within the Ash Creek–San Pedro River complex and a 0.7-acre riverine segment in Graham County, Arizona. Proposed structure locations should incorporate avoidance and BMPs to avoid the wetlands; therefore the presence of these wetlands is not considered a significant impact. Construction of access roads would likely not impact the pond if avoidance measures are incorporated.

Table 4.7-3. Route Group 3 Groundwater, Surface Water, and Wetlands Resource Inventory Data

	Total Miles	Number of Springs	Length of Perennial or Intermittent Waters (feet)	Acres of Floodplains and Number of Areas with Permanent Structures within Floodplain*	Number and Length of WUS (feet)	Number and Acres of Wetlands	Special Status†
Subroute 3.1, Proponent Preferred							
U1a	16.1	0	0	0	2 (518)	0	
U1b	2.9	0	0	0	0	0	
U2	15.8	0	157	29.4 (2)	4 (642)	2 (3.05)	San Pedro River‡
U3a	35.6	0	0	6.6	1 (150)	0	Cienega Creek§

Table 4.7-3. Route Group 3 Groundwater, Surface Water, and Wetlands Resource Inventory Data (Continued)

	Total Miles	Number of Springs	Length of Perennial or Intermittent Waters (feet)	Acres of Floodplains and Number of Areas with Permanent Structures within Floodplain*	Number and Length of WUS (feet)	Number and Acres of Wetlands	Special Status†
Route Group 3 Local Alternative							
H	19.3	0	409	47.7 (5)	2 (563)	1 (2.7)	San Pedro River‡

* Number in parentheses indicates number of floodplain areas that are in excess of 900 feet wide, which is the average space between pole structures.

† Includes areas of shallow groundwater, perennial or intermittent surface water, presence of impaired water, Outstanding National Resource Water, Outstanding Arizona Water, or presence of special management area.

‡ The San Pedro River is a perennial surface water. Surface flow is likely to be present during construction. The San Pedro River also has an impaired water designation in the analysis area. The area around the San Pedro River also exhibits shallow groundwater (less than 20 feet bgs).

§ Cienega Creek is an intermittent surface water. Surface flow may be present during construction. Cienega Creek is also a designated Outstanding Arizona Water.

The San Pedro River is crossed by one segment within the subroute (U2). The San Pedro River has perennial flow and is likely to surface flow present during construction, which represents an increased risk of potential contamination of surface waters. In addition, the area near the San Pedro River exhibits very shallow groundwater, which represents an increased risk of potential contamination of groundwater. Construction activities in this area could require special management practices or controls to minimize this risk.

Cienega Creek is crossed by one segment within the subroute (U3a). Cienega Creek has intermittent flow and may have surface flow present during construction, which represents an increased risk of potential contamination of surface waters. In addition, Cienega Creek has been designated an Outstanding Arizona Water. There are additional restrictions associated with obtaining an AZPDES stormwater permit because of the presence of the Outstanding Arizona Water, which has strict anti-degradation standards. Construction activities are very likely to require special management practices or controls to minimize this risk, and likely would also have to be reviewed and approved by the ADEQ prior to issuance of the permit.

Operation and Maintenance

The potential for delivery of sediment into the San Pedro River and Cienega Creek would be elevated after construction, but with implementation of stabilization and revegetation measures, this potential would decrease over time.

Permanent structures are likely to be located within the floodplains for one segment (U2). These floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact.

LOCAL ALTERNATIVES

There is one local alternative for route group 3: local alternative H.

Construction

There are no springs impacted by local alternative H.

Two WUS and one wetland area are contained in local alternative H; all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts, including the San Pedro River. The wetland area is a 2.7-acre riverine segment associated with the Ash Creek–San Pedro River complex. Proposed structure locations should incorporate avoidance and BMPs to avoid the WUS; therefore the presence of these wetlands is not considered a significant impact. Construction of access roads would likely not impact the WUS if avoidance measures are incorporated.

The San Pedro River is crossed by local alternative H. The San Pedro River has perennial flow and is likely to surface flow present during construction, which represents an increased risk of potential contamination of surface waters. In addition, the area near the San Pedro River exhibits very shallow groundwater, which represents an increased risk of potential contamination of groundwater. Construction activities in this area could require special management practices or controls to minimize this risk.

Operation and Maintenance

The potential for delivery of sediment into the San Pedro River would be elevated after construction, but with implementation of stabilization and revegetation measures, this potential would decrease over time.

Permanent structures are likely to be located within the floodplains for local alternative H. These floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact.

Route Group 4 – Pantano Substation to Saguaro Substation

SUBROUTE 4.1 – PROPONENT PREFERRED

Construction

There are no springs impacted for any segments within this subroute.

Five segments contain WUS (U3c, U3d, U3h, U3i, U3k) and four additional segments contain wetland areas (U3b, U3c, U3g, U3h); all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts, including multiple crossings of the Santa Cruz River (table 4.7-4). All four riverine segments are part of the Julian Wash–Santa Cruz River complex in Pima County, Arizona. The total acreage for all four segments is 2.19 acres. Proposed structure locations should incorporate avoidance and BMPs to avoid the riverine segments; therefore the presence of these wetlands is not considered a significant impact. Construction of access roads would likely not impact the riverine segments if avoidance measures are incorporated.

Table 4.7-4. Route Group 4 Groundwater, Surface Water, and Wetlands Resource Inventory Data

	Total Miles	Number of Springs	Length of Perennial or Intermittent Waters (feet)	Acres of Floodplains and Number of Areas with Permanent Structures within Floodplain*	Number and Length of WUS (feet)	Number and Acres of Wetlands	Special Status†
Subroute 4.1, Proponent Preferred							
U3b	0.5	0	0	0.6	0	1 (0.6)	
U3c	1.0	0	0	3.6 (1)	2 (361)	1 (0.5)	
U3d	3.4	0	0	2.2	1 (48)	0	

Table 4.7-4. Route Group 4 Groundwater, Surface Water, and Wetlands Resource Inventory Data (Continued)

	Total Miles	Number of Springs	Length of Perennial or Intermittent Waters (feet)	Acres of Floodplains and Number of Areas with Permanent Structures within Floodplain*	Number and Length of WUS (feet)	Number and Acres of Wetlands	Special Status†
U3e	0.9	0	0	6.1	0	0	
U3f	0.7	0	0	0.5 (1)	0	0	
U3g	0.9	0	0	8.0 (1)	0	0	
U3h	1.1	0	0	7.1 (2)	1 (181)	1 (0.6)	
U3i	18.2	0	0	94.5 (6)	1 (244)	1 (0.5)	
U3j	0.9	0	0	15.9 (1)	0	0	
U3k	16.7	0	0	136.8 (2)	1 (178)	0	
U3l	1.6	0	0	0	0	0	
U3m	0.6	0	0	0	0	0	
U4	1.9	0	0	0	0	0	
Route Group 4 Local Alternatives							
MA1	1.1	0	0	19.0 (1)	0	0	
TH1a	1.4	0	0	3.1	0	0	
TH1b	1.6	0	0	0	0	0	
TH1c	0.3	0	0	0.1	0	0	
TH1-Option	1.0	0	0	1.5 (1)	0	0	
TH3-Option A	0.8	0	0	2.9	1 (219)	1 (2.1)	
TH3-Option B	0.8	0	0	13.9 (1)	1 (867)	0	
TH3-Option C	1.8	0	0	10.8 (1)	2 (1,733)	1 (4.9)	
TH3a	2.7	0	0	3.5	1 (246)	1 (0.2)	
TH3b	4.5	0	0	**46.6 (4)**	**1 (6,329)**	**2 (26.4)**	
Substations and Staging Areas							
Marana Substation Expansion	NA	0	0	**0.2 (1)**	0	0	
Rep. Staging Area 13	NA	0	0	20.3	0	0	

Note: NA = not applicable.

* Number in parentheses indicates number of floodplain areas that are in excess of 900 feet wide, which is the average space between pole structures.

† Includes areas of shallow groundwater, perennial or intermittent surface water, presence of impaired water, Outstanding National Resource Water, Outstanding Arizona Water, or presence of special management area.

Operation and Maintenance

Permanent structures are likely to be located within the floodplains for seven segments (U3c, U3f–U3k). These floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact.

LOCAL ALTERNATIVES

There are 10 local alternatives for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C.

Construction

There are no springs impacted for any segments within these local alternatives.

Five segments contain WUS (TH3-Option A, TH3-Option B, TH3-Option C, TH3a, TH3b) and four additional segments contain wetland areas (TH3-Option A, TH3-Option C, TH3a, TH3b); with the exception of segment TH3b, all of these WUS can be spanned or otherwise avoided, and do not constitute significant impacts. Segment TH3b roughly parallels the Santa Cruz River for approximately 4.5 miles. The constraints on pole placement within this ROW are such that impacts to the Santa Cruz River would be unavoidable; this is considered a significant impact. These impacts would be minor to moderate and long-term. Several local alternatives contain riverine segments and one wetland associated with the Julian Wash–Santa Cruz River complex in Pima County, Arizona. The total acreage for all four riverine segments is 33.6 acres. Also, within local alternative TH3b is a 0.4-acre wetland. With the exception of segment TH3b, proposed structure locations should incorporate avoidance and BMPs to avoid the WUS and the wetland; therefore the presence of these wetlands is not considered a significant impact. Segment TH3b parallels the riverine wetland segments along the Santa Cruz River and impacts within this area would be unavoidable; this is considered a significant impact. These impacts would be minor to moderate and long-term. Construction of access roads would likely not impact the WUS or the wetland if avoidance measures are incorporated.

Operation and Maintenance

Permanent structures are likely to be located within the floodplains for four segments (MA1, TH3-Option B, TH3-Option C, TH3b). With the exception of segment TH3b, these floodplain areas largely consist of areas of sheetflow or overbank areas that would likely have very shallow water, or are urbanized watersheds. Placement of permanent structures within these areas does not elevate flooding risk or represent a significant impact. Segment TH3b would include the placement of multiple structures within the floodplain and defined channel of the Santa Cruz River; permitting processes would ensure that flooding risk remains within allowable levels. This is considered a significant impact. These impacts would be minor and long-term.

SUBSTATIONS AND STAGING AREAS

Construction

There are no springs impacted for any substations or representative staging areas within this route group, and no WUS are impacted.

One staging area would temporarily impact floodplains, but would be unlikely to have permanent structures.

Operation and Maintenance

Permanent structures are likely to be located within the floodplain for the Marana substation. Placement of this structure would likely elevate flooding risk; permitting processes would ensure that flooding risk remains within allowable levels. This is considered a significant impact.

Agency Preferred Alternative

As described in "Impacts Common to All Action Alternatives," the Agency Preferred Alternative would involve implementation of BMPs and control measures. If implemented properly, these activities minimize the risk for erosion and movement of sediment in stormwater, as well as the potential for spills or release of hazardous substances that could impact groundwater. Further, proposed structure locations should incorporate avoidance and BMPs to avoid WUS and wetlands. The only significant impacts identified involve areas where impacts to WUS or wetlands are unavoidable, and where permanent structures would be placed within certain floodplains.

Within the New Build Section of the Agency Preferred Alternative, the proposed Midpoint North substation would be required under the Agency Preferred Alternative; this substation would have significant impacts from permanent structures unavoidably located within a floodplain, which is not the case for the Proponent Alternative (subroutes 1.2 and 2.2). By using segment LD4, the Agency Preferred Alternative avoids significant impacts to WUS along Stein's Creek which would be unavoidable under segment LD1, which parallels Stein's Creek for approximately 1 mile. However, by using segment P7, the Agency Preferred Alternative has unavoidable significant impacts to WUS associated with Willcox Playa. Although this segment follows an existing transmission line around the east side of the playa, expansion of the utility corridor would unavoidably impact WUS.

Within the Upgrade Section of the Agency Preferred Alternative, the proposed Marana Substation expansion would be required under the Agency Preferred Alternative; this substation expansion would have significant impacts from permanent structures unavoidably located within a floodplain; however, no alternative route exists that would avoid these impacts. By using the Agency Preferred Alternative segments west of Sentinel Peak (TH1a and TH1-Option), the Agency Preferred Alternative avoids significant impacts to WUS and floodplains along the Santa Cruz River. These impacts would be unavoidable under all TH3 segments, which parallels the Santa Cruz River for approximately 7 miles.

Additional Mitigation Measures

As indicated in the impact analysis, proponent-committed BMPs and controls are largely effective, if properly implemented, at reducing the risk of accidental discharge of pollutants, including sediment, into WUS. No additional mitigation measures are considered.

Permitting requirements, such as under Section 404 of the CWA, are sufficient to reduce impacts to the extent possible within wetlands and special aquatic sites. Additional mitigation could be applied during this permitting process to offset, compensate, or reduce impacts to wetlands or special aquatic sites.

Residual Impacts

Under CWA Section 404 permitting, required mitigation would be expected to offset or compensate for impacts to wetlands or special aquatic sites. Residual impacts would be expected to be minimal.

Unavoidable Adverse Impacts

Unavoidable adverse impacts could occur from the placement of permanent substation structures within floodplains. Permitting processes would ensure that flooding risk remains within allowable levels, but this would still represent an unavoidable adverse impact. There are numerous floodplain areas where full spanning of floodplains is not possible, based on initial design parameters. However, most of these represent single pole structures in areas of sheetflow or very shallow flood flow, and permanent impacts to floodplain function would not be expected.

Short-term Uses versus Long-term Productivity

Long-term productivity of water resources would be affected by any long-term change in water quality attributable to the proposed Project. As indicated in the impact analysis, proponent-committed BMPs and controls are largely effective at reducing risks that would cause these changes; therefore no impacts are likely to affect long-term productivity.

Irreversible and Irretrievable Commitments of Resources

As indicated in the impact analysis, proponent-committed BMPs and controls are largely effective, if properly implemented, at reducing the risk of accidental discharge of pollutants, including sediment, into WUS. There are unlikely to be any irreversible commitment of groundwater or surface water resources.

Disturbance of WUS, wetlands, or special aquatic sites would generally be mitigated through the CWA Section 404 permitting process. However, there could be an interim time period when aquatic resources have exhibited some temporary impact, before stabilization, restoration, or replacement would occur. This time period would represent an irretrievable commitment of water resources.

Placement of permanent structures within the floodplain would represent an impact to floodplain resources. However, floodplain permitting requirements ensure that the floodplains continue to function for flood conveyance without undue harm to existing structures or landowners. Therefore, there are neither irretrievable nor irreversible impacts to floodplain resources.

4.8 BIOLOGICAL RESOURCES

4.8.1. Vegetation

This section describes impacts to vegetation associated with the construction, operation, and maintenance of the transmission line, substations, and ancillary facilities. Impacts to vegetation are discussed in terms of impacts on vegetation communities, special status species, and noxious weeds. The impacts described in this section are based on the vegetation analysis available in “Southline Resource Report 15: Vegetation” (CH2M Hill 2013g), and presented in chapter 3. Direct (same time and place that the action is performed) and indirect (later in time or farther from the initial action) effects, and short-term or temporary (5 years or less) and long-term (greater than 5 years) or permanent (life of the Project, 50 years) impacts are evaluated relative to vegetation resources. Cumulative effects also will be evaluated; impacts added to the impacts of past, present, and foreseeable future actions, regardless of the cause or source of other impacts. The vegetation resources are partitioned into: (1) vegetation communities, (2) special status species, and (3) noxious weeds and other exotic invasive plant species. Impacts could affect each of those vegetation resources in different ways.

Methodology and Assumptions

ANALYSIS AREA

The analysis area for the purpose of evaluating effects and impacts to vegetation resources is the corridor of the ROW, plus the footprints of substations and construction laydown areas located outside of the ROW. The ROW for the New Build Section is 200 feet wide, and the ROW for the Upgrade Section is 150 feet wide. This analysis area is sufficient to identify vegetation resources that could be directly impacted by ground disturbance during construction. The New Build and Upgrade Sections and route

groups within those will be addressed separately for impact analysis. The New Build Section includes route group 1: Afton Substation to Hidalgo Substation, and route group 2: Hidalgo Substation to Apache Substation. The Upgrade Section includes route group 3: Apache Substation to Pantano Substation, and route group 4: Pantano Substation to Saguaro Substation.

ANALYSIS ASSUMPTIONS

For this analysis, it is assumed that the Southline PPMs under section 8.3.12 of the POD would be implemented to minimize, mitigate, and/or restore vegetation disturbance.

IMPACT INDICATORS

Vegetation Communities

The following indicators were considered when analyzing potential impacts to vegetation:

- Long-term loss of natural (native species dominated) vegetation communities or associations.
- Direct loss of wetland and/or riparian areas caused by degradation of water quality, diversion of water sources, or erosion or sedimentation from altered drainage patterns.

Special Status Species

The potential for occurrence of special status species within the broader analysis area was categorized using the following criteria:

- None – Project is well outside the known geographic and elevational range, or lacks suitable habitat necessary for the species, or both. Plants with highly restricted ranges are considered to have no potential to occur if the analysis area is outside its known range, even if the required habitat characteristics are present onsite.
- Unlikely – Project could contain suitable habitat for this species but is outside its known geographic and/or elevational range.
- Possible – Project is within the geographic and elevational range and has suitable habitat for the species.
- Present – The species was observed during limited field investigations in 2012 for this Project by CH2M Hill (CH2M Hill 2013g). A listing of special status plant species that have the potential to occur within the analysis area are presented in table D-1 in appendix D.

The following indicators were considered when analyzing potential impacts to special status plant species:

- Direct loss to any population of special status plants that would jeopardize the continued existence of that population
- Loss to any population of plants or an activity that would result in a species being listed or proposed for listing as endangered or threatened

Noxious Weeds

The following indicators were considered when analyzing potential impacts to native vegetation resources:

- Introduction or increased spread of noxious weeds and other invasive exotic weed species into the Project footprint and Project perimeter area
- Using the indicator listed above, each category for each phase of the Project (construction, operations and maintenance, and decommissioning) would be analyzed as to how vegetation could be an impact from this Project (e.g., acreage and linear feet of land colonized by non-native species (change through time))

SIGNIFICANT IMPACTS

For the purposes of this analysis, a significant impact on vegetation could result if any of the following were to occur from construction or operation and maintenance of the proposed Project:

- Long-term loss of riparian vegetation or sensitive plants; loss to any population of special status plant species that would jeopardize the continued existence of that population
- Introduction or increased spread of noxious weeds per EO 13112 – Invasive Weed Species
- Loss to any population of plants that would result in a species being listed or proposed for listing as endangered or threatened
- An activity that would result in a plant species being listed or proposed for listing as endangered or threatened
- An activity that would result in an indirect loss of wetland and riparian vegetation, caused by degradation of water quality, diversion of water sources, or erosion and sedimentation from altered drainage patterns

Impacts Analysis Results

NO ACTION ALTERNATIVE

Under the no action alternative, the proposed Project would not be developed. No construction would take place in the New Build Section, therefore, there would be no impacts to vegetation resources. Although the existing transmission line would remain in place in the Upgrade Section, ongoing maintenance activities would occur which could result in impacts to vegetation resources. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 year, per Western's 1-year capital improvement plan (Western 2012a).

IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Construction

New Build Section

The New Build Section would include construction, operation, and maintenance of the transmission line as well as upgrades to and new construction of substations. All these activities would have the potential to impact vegetation resources. Table 4.8-1 summarizes the plant associations within the representative ROW. Tables 4.8-2 through 4.8-6 list the occurrence of each vegetation type and special status species in each New Build Section. Eleven special status species have potential to be present within the proposed New Build Section of these, three are listed as endangered by the State of New Mexico, three are listed as sensitive by the BLM, and eight are listed as salvage restricted by the ANPL (three species are listed with multiple statuses).

Table 4.8-1. Relative Percentage of Cover within the Representative ROW of SWReGAP Plant Associations

Plant Association	Total Acres	Area (%)
Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe	8,249.0	37.08
Apacherian-Chihuahuan Mesquite Upland Scrub	4,632.5	20.82
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	3,534.6	15.89
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	2,291.3	10.30
Sonoran Paloverde-Mixed Cacti Desert Scrub	720.5	3.24
Chihuahuan Mixed Salt Desert Scrub	671.6	3.02
Agriculture	550.3	2.47
Developed, Medium to High Intensity	464.7	2.09
North American Warm Desert Active and Stabilized Dune	309.1	1.39
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	230.1	1.03
North American Warm Desert Riparian Mesquite Bosque	91.0	0.41
Developed, Open Space to Low Intensity	78.2	0.35
Chihuahuan Sandy Plains Semidesert Grassland	64.1	0.29
Chihuahuan Succulent Desert Scrub	61.0	0.27
North American Arid West Emergent Marsh	59.6	0.27
North American Warm Desert Wash	40.0	0.18
North American Warm Desert Volcanic Rockland	36.5	0.16
Madrean Juniper Savanna	30.8	0.14
Sonoran Mid-Elevation Desert Scrub	21.7	0.10
North American Warm Desert Bedrock Cliff and Outcrop	19.8	0.09
North American Warm Desert Riparian Woodland and Shrubland	19.5	0.09
Barren Lands, Non-specific	13.9	0.06
North American Warm Desert Pavement	12.5	0.06
Mogollon Chaparral	11.4	0.05
Open Water	1.2	0.01
North American Warm Desert Playa	7.5	0.03
Madrean Pinyon-Juniper Woodland	6.4	0.03
Chihuahuan Gypsophilous Grassland and Steppe	4.9	0.02
Madrean Encinal	4.6	0.02
Inter-Mountain Basins Semidesert Shrub Steppe	1.8	0.01
Total	**22,240.10**	**100**

Vegetation Communities

All action alternatives would involve the removal of vegetation during construction activities resulting in the direct loss of plant communities. The primary direct and indirect impacts to vegetation during construction and operation and maintenance of the proposed Project would be associated with:

- removal and/or crushing of natural, native-species dominated vegetation communities or associations from construction of transmission lines, substations, temporary work areas, and access roads;
- decreased plant productivity from fugitive dust; and
- plant community fragmentation.

Vegetation removal could have a variety of effects on vegetation communities ranging from changes in community structure and composition to alteration of soil moisture or nutrient regimes. The degree of impact depends on the type and amount of vegetation affected, and the rate at which vegetation would regenerate after construction. Ultimately, these direct and indirect effects could reduce or change the functional qualities of vegetation including habitat and forage. Fugitive dust from construction and maintenance traffic has the potential to affect photosynthetic rates and decrease plant productivity.

Indirectly, removal of protective vegetation would also expose soil to potential wind and water erosion. This could result in further loss of soil and vegetation, as well as increased sediment input to water resources. There would also be indirect effects resulting from the fragmentation of connected vegetation types. Edge areas have different microclimatic conditions and structure, which could lead to different species composition than interior area. The introduction and colonization of disturbed areas by invasive exotic plant species also would lead to changes in vegetation communities, including the possible shift to more wildfire-prone vegetation that favors invasive exotic species over native species.

Much of the Upgrade Section occurs in urban areas where native vegetation has already undergone disturbance and exotic plantings increase the presence of non-native species. Impacts to native plant associations throughout these previously disturbed areas would therefore be minimal relative to open country sections of the proposed route.

The proposed Project could have direct and indirect impacts on vegetation resources located within areas disturbed by construction activity. These potential impacts would be mitigated through implementation of PPM VEG-1, VEG-2, VEG-3, VEG-4, VEG-5, or VEG-6 (see Section 8-8 of the POD).

PPM VEG-1 states that vegetation disturbance would be minimized to the extent practicable. The following mitigation measures would be employed:

- In construction areas where recontouring is not required, vegetation would be left in place wherever possible, to avoid excessive root damage and allow for resprouting.
- In designated areas, structures would be placed or rerouted so as to avoid sensitive features or to allow conductors to clearly span the features, within limits of standard tower design.
- Blading for access roads would be minimized. Use of unimproved access via two-tracks or maximizing overland travel to reduce the need for bladed access roads would be maximized in order to minimize vegetation impacts and minimize erosion.
- All ground-clearing/disturbance activities that could affect special status species or habitat would be monitored. Where warranted, a qualified biologist would be retained to conduct pre-construction surveys to minimize or prevent impacts to sensitive species or habitat.

PPM VEG-2 states that Southline would develop a reclamation and re-vegetation plan that would guide restoration and re-vegetation activities for all disturbed lands associated with construction of the proposed Project and its eventual termination and decommissioning. The plan would address all Federal and private land disturbances. It would be developed in consultation with appropriate agencies and landowners, and would be provided to these entities for review and concurrence. The plan would provide details on topsoil segregation and conservation, vegetation treatment and removal, salvage of succulent species,

re-vegetation methods, including use of native seed mixes, application rates, transplants, and criteria to monitor and evaluate re-vegetation success.

PPM VEG-4 states that clearing of riparian vegetation would be avoided where possible, and restoration of such impacted communities would be conducted. Natural regeneration of native plants would be supported by cutting vegetation with hand tools, moving, trimming, or using other removal methods that allow root systems to remain intact.

Compensatory mitigation could also be necessary where avoidance and restoration have been insufficient in mitigating impacts to vegetation communities.

Special Status Species

PPM VEG-3 calls for a Special Status Plant Restoration and Compensation Plan. Special status plants, including Pima pineapple cactus, would be restored by relocating plants and/or reseeding, replacing topsoil with existing topsoil that was removed, and regarding in compliance with local ordinances (State of Arizona, Pima County) and/or measures in the biological opinion, if an ESA Section 7 consultation is required. Measures to restore special status plants would be implemented through the reclamation, restoration, and re-vegetation plan.

A Compensatory Mitigation Plan would be developed to address any residual impacts following application of the restoration/relocation plan. The plan would be developed in accordance with BLM regulations and approval.

Preconstruction presence/absence surveys would be required in areas where Special Status Species are expected to occur. In consultation with the BLM and Western, Southline would hire qualified biologists to conduct preconstruction surveys in ground-disturbance areas within suitable habitat for appropriate special status species and their habitats.

Noxious Weeds

PPM VEG-5 states that an invasive plant species management plan would be developed in consultation with the BLM.

PPM VEG-6 states that equipment would be washed prior to entering work areas to minimize the spread of invasive weed species.

Special Status Species

The primary direct and indirect impacts to special status species during construction and operation and maintenance of the proposed Project would be associated with:

- removal and/or crushing of special status plants from construction of transmission line, substations, temporary work areas, and access roads; and
- direct and indirect impacts on special status species from increased access by OHVs over newly constructed transmission line access roads.

Vegetation removal could have a variety of effects on special status species ranging from alteration of soil moisture or nutrient regimes to population loss to the extent that continued existence of the population is threatened. Any changes to the habitats of special status species may negatively affect individuals of those species, including altering soils, microenvironments, and introducing invasive weeds and increasing wildfire potential.

Pre-construction surveys for the species with the potential to occur in the ROW could allow direct impacts to be avoided. Furthermore, application of measures PPM VEG 1-6 described above would be used to mitigate these impacts, particularly PPM VEG-1: Minimize Vegetation Impacts; and PPM VEG-3: Special Status Plants Restoration and Compensation. Measures to restore special status species would also be implemented through the reclamation, restoration, and revegetation plan (PPM VEG-2). Measures that reduce ground disturbance and aid reclamation would also reduce any detrimental effects on sensitive biological soil crusts. Specific mitigation measures for the protection of soil crusts are proposed in section 4.5.

Application of BMPs to reduce the transfer of invasive species on construction vehicles (as directed under PPM VEG-5: Invasive Plant Management Plan and PPM VEG-6: Equipment Washing) should also mitigate most direct and indirect impacts to special status species associated with the spread of noxious weeds during construction. Adherence to measures included in these plans would result in only short-term, minor impact to vegetation communities.

Noxious Weeds

The primary direct and indirect impacts to noxious weeds during construction and operation and maintenance of the proposed Project would be associated with:

- introduction or increased spread of noxious weeds and other invasive exotic weed species; and
- direct and indirect impacts on native vegetation and special status species.

The Project would directly affect noxious weeds through soil and native vegetation disturbance. Since noxious weeds are typically effective competitors with native plants, disturbance of vegetative cover that facilitates their introduction, spread and proliferation, could alter plant community composition, reduce native plant species cover, and produce monocultures that could alter natural fire regimes. Noxious weeds are often fire-adapted and so perpetuate increased fire risk once established or following a fire. If present in the ROW, species like Russian thistle, kochia, and Lehmann lovegrass are heavily favored by disturbance and could disperse seed across long distances. As infestations develop, they could displace the herbaceous resident vegetation, reducing species biodiversity and transforming soil properties and hydrology.

Some noxious weeds may exist in the region (for example, buffelgrass is a noxious species known to occur outside the ROW in many route group segments) but may not be currently present in the proposed Project footprint. An influx of vehicles and machinery from outside the representative ROW could facilitate noxious weed introduction into the Project footprint. Because the rate of seed production and seed dispersal (i.e., the likelihood of introduction) differs for each particular noxious and invasive species, it is difficult to define the exact area that would be affected; thus, this impact is quantified as the ROW perimeter.

Development of an Invasive Plant Management Plan and PPM-VEG 6: Equipment Washing would be applied in order to address impacts resulting from the introduction and spread of noxious weeds.

Upgrade Section

The Upgrade Section would include construction, operation, and maintenance of the transmission line as well as upgrades to existing substations. These activities have the potential to impact vegetation resources. In total, 22 special status species have potential to occur within the Upgrade Section (tables 4.8-7 through 4.8-11). Of these species, two are listed as endangered by the FWS, five are listed as sensitive by the BLM, two are listed as sensitive by Coronado National Forest, three are listed as highly safeguarded by the ANPL, 15 are listed as salvage restricted by the ANPL, and four are listed as SDCP

species (seven species have multiple statuses). The Upgrade Section would consist of rebuilding an existing transmission line, mostly within an existing ROW utilizing existing access roads, thus greatly minimizing the amount of currently undisturbed vegetation potentially impacted. Much of the Upgrade Section would occur within an urban setting with exotic plantings and irrigation and minimal native vegetation component. Construction of the Upgrade Section would therefore have minor direct and indirect impacts on native vegetation resources within areas disturbed by this activity, and minor short-term impacts to exotic and cultivated plantings in back yard settings. Since most of the ROW for this section of the line has been previously analyzed for impacts for the existing transmission line; additional impacts would be limited to new ROW within this section. These impacts would be reduced through use of PPMs VEG-1, VEG-2, VEG-3, VEG-4, VEG-5, or VEG-6.

Vegetation Communities

The Project would directly affect vegetation communities though the temporary trampling of herbaceous vegetation, the partial removal of aboveground plant cover, and the complete removal of vegetation due to rebuilding of the transmission line and associated aboveground structures, access roads, temporary work spaces, and other Project facilities within the existing ROW. Direct impacts to vegetation communities in the Upgrade Section would be the same as described above for the New Build Section but at a reduced level since the construction activities are occurring within an existing disturbance area. Indirect impacts to vegetation communities would be the same as described above for the New Build Section but at a reduced level since the construction activities are occurring within an existing disturbance area where communities have already undergone fragmentation.

Application of measures PPM VEG 1-6 discussed above would be used to mitigate these impacts, particularly PPM VEG-1: Minimize Vegetation Impacts; PPM VEG-2: Reclamation, Restoration and Re-vegetation Plan, and PPM VEG-4: Vegetation Clearing. Adherence to these measures would result in short-term, minor impacts to vegetation communities.

Special Status Species

The Project would directly affect special status species though the temporary trampling of species, the partial removal of aboveground plant cover, and the complete removal of vegetation including special status species due to rebuilding of the existing transmission line and associated aboveground structures, access roads, temporary work spaces, and other Project facilities within the existing ROW. Direct impacts to special status species in the Upgrade Section would be the same as described above for the New Build Section but at a reduced level since the construction activities are occurring within an existing disturbance area. Indirect impacts to special status species would be the same as described above for the New Build Section but at a reduced level since the construction activities are occurring within an existing disturbance area where communities have already undergone fragmentation. Application of measures PPM VEG 1-6 discussed above would be used to mitigate these impacts, particularly PPM VEG-1: Minimize Vegetation Impacts, and PPM VEG-3: Special Status Plants Restoration and Compensation. Measures to restore special status species would also be implemented through the reclamation, restoration and re-vegetation plan (PPM VEG-2).

Application of BMPs to reduce the transfer of invasive species on construction vehicles (as directed under PPM VEG-5: Invasive Plant Management Plan and PPM VEG-6: Equipment Washing) should also mitigate most direct and indirect impacts to special status species associated with the spread of noxious weeds during construction.

Adherence to these measures would result in only short-term, minor impacts to special status species.

Noxious Weeds

The Project would directly affect noxious weeds through soil and native vegetation disturbance associated with the transmission line rebuild and associated upgrades to facilities. Direct impacts to noxious weeds in the Upgrade Section would be the same as described above for the New Build Section but at a reduced level since the construction activities are occurring within existing disturbance areas.

Development of an Invasive Plant Management Plan and PPM-VEG 6: Equipment Washing would be applied in order to address impacts resulting from the introduction and spread of noxious weeds. Adherence to measures included in these plans would result in only short-term, minor impact to noxious weeds.

Operation and Maintenance

New Build Section

Following Project construction, operation and maintenance of the new line and facilities would commence. Operation and maintenance activities would consist of ground and aerial inspections, vegetation management, electrical equipment repair, structure and conductor repair, off-road driving by maintenance workers, and regeneration station operation and maintenance. These activities are expected to result in minimal impact to vegetation resources. Due to the nature of much of the vegetation within the analysis area and representative ROW, minimal vegetation management activities would be required to maintain the operating transmission line, for example periodic vegetation trimming under the mid point/ low point of the conductor line. Aerial inspection would not have any impacts on vegetation resources. Ground inspection on existing roads would not be likely to have any additional impacts, direct or indirect, on vegetation resources if vehicle use were confined to within existing roadways. Repairs to the transmission structures and conductors could have minor direct and indirect impacts on vegetation resources within areas disturbed by this activity. Impacts would be reduced by implementing PPMs VEG-1, VEG-2, VEG-3, VEG-4, VEG-5, or VEG-6, and restricting off-road driving.

Vegetation Communities

Routine operation and maintenance activities could introduce additional long-term chances for invasive weed and wildfire threats to vegetation communities.

Application of measures PPM VEG 1-6 as discussed above would be used to mitigate these impacts, particularly PPM VEG-1: Minimize Vegetation Impacts, PPM VEG-2: Reclamation, Restoration and Re-vegetation Plan, and PPM VEG-4: Vegetation Clearing. Adherence to these measures would result in only short-term, minor impacts to vegetation communities.

Special Status Species

Routine operation and maintenance activities could introduce additional long-term chances for invasive weed and wildfire threats to special status plant species.

Application of measures PPM VEG 1-6 as previously discussed would be used to mitigate these impacts particularly PPM VEG-1: Minimize Vegetation Impacts and PPM VEG-3: Special Status Plants Restoration and Compensation. Measures to restore special status species would also be implemented through the reclamation, restoration and re-vegetation plan (PPM VEG-2).

Application of BMPs to reduce the transfer of invasive species on construction vehicles (as directed under PPM VEG-5: Invasive Plant Management Plan and PPM VEG-6: Equipment Washing) should also

mitigate most direct and indirect impacts to special status species associated with the spread of noxious weeds during construction.

Adherence to these measures would result in only short-term, minor impacts to special status species.

Noxious Weeds

Routine operation and maintenance activities could introduce or reintroduce additional invasive weed species in the long-term.

Application of PPM VEG-5: Development of an Invasive Plant Management Plan and PPM VEG-6: Equipment Washing would be applied in order to address this impact. Adherence to measures included in these plans would result in only short-term, minor impact to noxious weeds.

Upgrade Section

Following Project construction, operation and maintenance of the upgraded line and facilities would commence. Operation and maintenance activities and their associated impacts to vegetation for the Upgrade Section would be similar to the ongoing operations and maintenance for the existing Western Saguaro–Tucson and Tucson–Apache 115-kV transmission lines. Operation and maintenance activities would consist of ground and aerial inspections, vegetation management, electrical equipment repair, transmission structure and conductor repair, and regeneration station operation and maintenance. Direct and indirect impacts resulting from operation and maintenance activities are expected to be the same as described above for the New Build Section. Impacts would be reduced by implementing PPMs VEG-1, VEG-2, VEG-3, VEG-4, VEG-5, or VEG-6, and restricting off-road driving.

Vegetation Communities

Routine operation and maintenance activities could introduce additional long-term chances for invasive weed and wildfire threats to vegetation communities.

Application of measures PPM VEG 1-6 described above would be used to mitigate these impacts, particularly PPM VEG-1: Minimize Vegetation Impacts, PPM VEG-2: Reclamation, Restoration and Re-vegetation Plan, and PPM VEG-4: Vegetation Clearing. Adherence to these measures would result in only short-term, minor impacts to vegetation communities.

Special Status Species

Routine operation and maintenance activities could introduce additional long-term chances for invasive weed and wildfire threats to special status plant species.

Application of previously described measures PPM VEG 1-6 would be used to mitigate these impacts particularly PPM VEG-1: Minimize Vegetation Impacts and PPM VEG-3: Special Status Plants Restoration and Compensation. Measures to restore special status species would also be implemented through the reclamation, restoration, and revegetation plan (PPM VEG-2).

Application of BMPs to reduce the transfer of invasive species on construction vehicles (as directed under PPM VEG-5: Invasive Plant Management Plan and PPM VEG-6: Equipment Washing) should also mitigate most direct and indirect impacts to special status species associated with the spread of noxious weeds during construction.

Adherence to these measures would result in only short-term, minor impacts to special status species.

Noxious Weeds

Routine operation and maintenance activities could introduce or reintroduce additional invasive weed species in the long term.

Application of PPM VEG-5: Development of an Invasive Plant Management Plan and PPM VEG-6: Equipment Washing would be applied in order to address this impact. Adherence to measures included in these plans would result in only short-term, minor impact to noxious weeds.

Route Group 1 – Afton Substation to Hidalgo Substation

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

Subroute 1.1 representative ROW acreage totals 3,567.5 acres. Total temporary disturbance, which includes acres for structure sites, tensioning and pulling sites, and spur roads (associated with construction activities), would result in nearly 23.1 percent of the representative ROW being disturbed. Total permanent disturbance, which includes acres for access and structure foundations (associated with operation and maintenance of the facilities), would result in nearly 6.1 percent being disturbed, or approximately 822.6 acres and 216.6 acres, respectively.

Vegetation Communities

Segment P1 (proposed interconnection segment P1) extends approximately 5.5 miles southwest from the Afton Substation in Doña Ana County. Existing impacts to the cover type include transmission lines, gas and oil pipelines, railroads, grazing, and road networks.

Subroute 1.1 is characterized by the following dominant plant associations: Apacherian-Chihuahuan Mesquite Upland Scrub (76.8 acres); Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (1,426.1 acres); Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (640 acres); and Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub (944 acres) (see table 4.8-2).

Construction impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for “Impacts Common to All Action Alternatives.” Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

No ESA-listed plant species are considered to have the potential to occur along segments P1, P2, P3, or P4; however, four sensitive plant species—Sneed’s pincushion cactus, dune pricklypear, Gregg night-blooming cereus, and Parish’s alkali grass—have potential to occur in segments P2, P3, and P4.

Construction impacts to special status species and implementation and effects of mitigation measures would be the same as described for Impacts Common to All Action Alternatives. Adherence to mitigation measures would result in short-term, minor impacts to special status species.

Table 4.8-2. Route Group 1 Vegetation Resource Inventory Data Showing Acres of each Vegetation Type in each Alternative Segment

Segment	Total Miles	Vegetation Communities: Agriculture	Apacherian-Chihuahuan Mesquite Upland Scrub	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	Chihuahuan Gypsophilous Grassland and Steppe	Chihuahuan Mixed Salt Desert Scrub	Chihuahuan Sandy Plains Semi-Desert Grassland	Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	Chihuahuan Succulent Desert Scrub	Developed, Medium - High Intensity	Developed, Open Space Low Intensity	Inter-Mountain Basins Semi-Desert Shrub Steppe	Madrean Encinal	Madrean Juniper Savanna	Madrean Pinyon-Juniper Woodland	Mogollon Chaparral	North American Arid West Emergent Marsh	North American Warm Desert Active and Stabilized Dune	North American Warm Desert Bedrock Cliff and Outcrop	North American Warm Desert Lower Montane Riparian Woodland and Shrubland	North American Warm Desert Pavement	North American Warm Desert Playa	North American Warm Desert Riparian Mesquite Bosque	North American Warm Desert Riparian Woodland and Shrubland	North American Warm Desert Volcanic Rockland	North American Warm Desert Wash	Open Water	Rocky Mountain Lower Montane-Foothill Shrubland
Subroute 1.1, Proponent Preferred																														
P1	5.1	0	11.1	0	10.5	0	0	0	103.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P2	102.0	0	194.2	1,120.6	423.3	0	40.2	45	618	0	2.5	1.6	0	0	2.7	0.3	0	0	2.4	3.1	0	4.8	1.2	0	0	12.0	0	0	0	0
P3	31.1	5.6	31.1	243.3	175	5.3	29.7	0.2	220.3	29.1	1.4	0	0	0	0	0	0	0	9.8	0	0	0	1.4	0	1.1	0	0	0	0	0
P4a	8.7	0	15.4	162.2	31.6	0	0	0	2.7	0	2.7	0	0	0	0	0.6	0	0	0	0	0	2.1	0	0	0	0	0	0	0	0
Subroute 1.2, Proponent Alternative																														
S1	13.4	0	104.3	0.4	46.9	0	43.9	0	121.1	0	0	0	2.9	0	0	0	0	0	5.8	0	0	0	0	0	0	0	0	0	0	0
S2	11.1	0	62.1	4.3	94.2	0	0.1	0	90.5	0	0	0	0	0	0	0	0	0	16.0	0.5	0	0	0	0	0	0	0	0	0	0
S3	12.9	0	105.0	6.4	91.7	0	1.6	0	79.6	0	0	0	0	0	0	0	0	0	29.4	0	0	0	0	0	0.3	0	0	0	0	0
S4	10.6	0	14.7	10.9	62.1	0	2.1	0	102.8	0	0	0	0	0	0	0	0	0	62.6	0	0	0	0	0	0	0	0	0	0	0
S5	29.7	42.4	47.5	342.6	144.3	0	45.8	0	80.7	10.6	0	0	0	4.0	0	0	0	0	0	0.2	0	0	1.9	0	0	0	0	0	0	0
S6	7.4	12.7	1.6	61.9	42.0	0	0	0.7	42.3	0	0	0	0	0	20.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S7	41.5	0	6.2	543.7	415.7	0	0.7	0.4	36.3	0	0	0	0	0	1.1	0	0	0	0	0	0	2.9	0	0	0	0	0	0	0	0
S8	14.6	0	4.5	284.9	7.4	0	0.7	3.6	17.3	0	2.0	0	0	0	0	0.2	1.3	0	0	0	0	0	0	0	0	22.3	8.5	0		
Route Group 1 Local Alternatives																														
DN1	42.5	0	12.1	764.2	147.2	0	3.1	0.6	58.1	0	0	0	0	2.2	0	0	0	0	0	0	0	0	0	0.0	0	43.0	0	0	0	
A	17.5	0	94.6	6.5	92.8	0	0	0	197.7	0	0	0	0	0	0	0	0	0	26.5	3.3	0	0	1.5	0	0	0	0	0	0	0
B	12.2	0	13.0	12.3	99.1	0	2.4	0	104.4	1.4	0	0	0	0	0	0	0	0	58.7	0	0	0	0	0	0	0	0	0	0	0
C	9.0	5.8	0.8	114.6	78.3	0	0	0.1	16.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	22.8	20.9	3.5	380.1	135.1	0	4.0	0	3.3	0	1.9	0	0	0	0	0	0	0	0	0	0	1.8	0	0	0	0	0.5	0	0	

Note: Data comes from SWReGAP GIS desktop analysis and not actual ground surveys.

This page intentionally left blank.

Table 4.8-3. Route Group 1 Vegetation Resource Inventory Data

		Special Status Species					Noxious Weeds / Invasive Exotic Weeds	
Segment	Total Miles	Dune Pricklypear	Sneed's Pincushion Cactus	Gregg Night-blooming Cereus	Parish's Alkali Grass	Chihuahua Scurfpea	Noxious Weeds	Invasive Exotic Weeds
Subroute 1.1, Proponent Preferred								
P1	5.1	X	X					X
Subroute 1.2, Proponent Alternative								
S1	13.4	X	X	X				X
S2	11.1	X	X	X				X
S3	12.9	X	X	X				X
S4	10.6	X	X	X				X
S5	29.7	X	X	X				X
S6	7.4	X	X	X				X
S7	41.5	X	X	X		X		X
S8	14.6	X	X	X	X			X
Route Group 1 Local Alternatives								
DN1	42.5	X	X	X				X
A	17.5	X	X	X				X
B	12.2	X	X	X				X
C	9.0	X	X	X				X
D	22.8	X	X	X	X			X

Noxious Weeds

African rue and starthistle are the primary noxious weeds of concern across the Afton to Hidalgo route group. Based on brief, one-time site visits (and without protocol-level surveys), none of these species were observed in sections P1, P2, P3, or P4. Some exotic invasive species, not classified noxious, were found in P1, P2, P3, and P4a, including Russian thistle, filaree, and mustards. The invasive exotics Lehmann lovegrass and kochia also occur in the region, and readily colonize disturbed soils. Construction impacts to noxious species and implementation and effects of mitigation measures would be the same as described in "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to noxious weeds.

Operation and Maintenance

Total permanent disturbance within subroute 1.1 would result in nearly 6.1 percent of the representative ROW being disturbed, or approximately 216.6 acres.

Vegetation Communities

Operation and maintenance impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

Operation impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to special status species.

Noxious Weeds

Operation impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to noxious weeds.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

Subroute 1.2 (segments S1 through S8) comprises the primary alternative route, following a path close to the international border from Afton to Hachita and then heading north to Lordsburg. The total length is 141 miles and 3,424.1 acres. The majority of the segments are currently impacted by grazing, and a variety of gravel and dirt roads. Total temporary disturbance from construction would result in nearly 23.1 percent of the representative ROW being disturbed and total permanent disturbance would result in nearly 5.8 percent being disturbed, or approximately 790.1 acres and 198.6 acres, respectively.

Vegetation Communities

Segments S1, S2, SE, and S4 are characterized by the following dominant vegetation communities: Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub (570 acres), Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (904.3 acres), Apacherian-Chihuahuan Mesquite Upland Scrub (645.9 acres), and North American Warm Desert Active and Stabilized Dune (113.8 acres) plant associations (see table 4.8-2). In addition to smaller amounts of the associations found in segments S1–S4, segments S5–S8 are also characterized by large percentages of Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (1,233.1 acres). The majority of the segments are currently impacted by grazing and a variety of gravel and dirt roads.

Construction impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Special Status Species

No ESA-listed plant species are considered to have the potential to occur along the Afton to Hidalgo route group, within 2 miles of the Project footprint. Among the other sensitive listed plant species, the Sneed's pincushion cactus, dune pricklypear, and Gregg night-blooming cereus all have potential to occur throughout the Afton to Hidalgo route group. Additionally, among non-ESA listed plant species, Parish's alkali grass has potential to occur within segment S8, and the Chihuahua scurfpea in segment S7 (see table 4.8-2).

Construction impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to special status species.

Noxious Weeds

African rue and starthistle are the primary noxious weeds of concern across the Afton to Hidalgo route group. Tamarisk was observed in sections S1–S8. Some exotic invasive species, not classified noxious, were found in segments S1–S8, including Russian thistle, filaree, and mustards (see table 4.8-2). The invasive exotics Lehmann lovegrass and kochia also occur in the region, and readily colonize disturbed soils.

Construction impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Tamarisk is known to occur in segment S5. Tamarisk can disrupt the structure and stability of native plant communities by outcompeting and replacing native plant species, salinizing soils, monopolizing limited sources of moisture, and increasing the frequency, intensity, and effect of fires and floods.

Adherence to mitigation measures would result in short-term, minor impacts to noxious weeds.

Operation and Maintenance

Subroute 1.2 comprises 3,424.1 acres. Total permanent disturbance within subroute 1.2 would result in nearly 5.8 percent of the representative ROW being disturbed, or approximately 198.6 acres.

Vegetation Communities

Operation and maintenance impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Special Status Species

Operation and maintenance impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to special status species.

Noxious Weeds

Operation and maintenance impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to noxious weeds.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: A, B, C, D, and DN1. Table 4.8-4 lists the acres of disturbance proposed under the route group 1 local alternatives.

Table 4.8-4. Temporary and Permanent Disturbance Acreages for Route Group 1 Local Alternatives

Local Alternative	Total Acres within Representative ROW	Temporary Disturbance (percent of ROW)	Temporary Disturbance (acres)	Permanent Disturbance (percent of ROW)	Permanent Disturbance (acres)
A	422.9	23.2	98.0	4.2	17.8
B	291.5	23.4	68.3	2.5	7.2
C	215.7	23.3	50.3	2.8	6.1
D	551.1	23.2	127.6	5.1	28.1
DN1	1,030.5	23.1	238.0	8.4	92.9

Source: Data comes from SWReGAP GIS desktop analysis and not actual ground surveys.

Construction

Table 4.8-4 lists the acres of temporary and permanent disturbance proposed under the route group 1 local alternatives.

Vegetation Communities

Local alternative A is a short loop at the southeast end of the Project that would provide an alternative connection between segments S1 and S3. The route is characterized by the Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub (197.7 acres), Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (92.8 acres), and Apacherian-Chihuahuan Mesquite Upland Scrub (94.6 acres) plant associations (see table 4.8-2).

Local alternative B is a loop on the south edge of the Project that would provide an alternative connection between segments S3 and S5, going along the north side of segment S4. The route is characterized by the Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (99.1 acres) and North American Warm Desert Active and Stabilized Dune (58.7 acres) plant associations (see table 4.8-2). Local alternative C is another short loop on the south edge of the Project that would provide an alternative connection between segments S5 and S7. The route is characterized by the Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (78.3 acres) and Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub (16.1 acres) plant associations (see table 4.8-2). Local alternative D provides an alternative connection from the subroute at segment S7 to the New Build Section at segment P5.

The route is characterized by the Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (380.1 acres) and the Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (135.1 acres) plant associations (see table 4.8-2). Local alternative DN1 provides an alternate route just north and parallel to

segment P2. The route is characterized by Apacherian-Chihuahuan Piedmont Semi-desert Grassland and Steppe (764.2 acres), Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub (58.1 acres), and Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (147.2 acres) plant associations (see table 4.8-2).

Construction impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Special Status Species

No ESA-listed plant species are considered to have the potential to occur along route group 1, within 2 miles of the Project footprint. Among the other sensitive listed plant species, the Sneed's pincushion cactus, dune pricklypear, and Gregg night-blooming cereus all have potential to occur throughout the Afton to Hidalgo route group. Additionally, among non-ESA listed plant species, Parish's alkali grass has potential to occur within local alternative C (see table 4.8-2). Local alternative DN1 has not been surveyed but due to its close proximity to segment P2, special status species would likely be similar to segment P2. Construction impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to special status species.

Noxious Weeds

African rue and starthistle are the primary noxious weeds of concern across the route group 1. None were observed within the route group 1 local alternatives. Some exotic invasive species, not classified noxious, were found in the local alternatives including Russian thistle, filaree, and mustards (see table 4.8-2). The invasive exotic Lehmann lovegrass also occurs in the region, and it readily colonizes disturbed soils. Local alternative DN1 has not been surveyed but due to its close proximity to segment P2, special status species would likely be similar to segment P2. Construction impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to noxious weeds.

Operation and Maintenance

Table 4.8-4 lists the potential permanent disturbance acres for the route group 1 local alternatives that would result from operation and maintenance of the facilities.

Vegetation Communities

Operation and maintenance impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Special Status Species

Operation and maintenance impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to special status species.

Noxious Weeds

Operation and maintenance impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to noxious weeds.

Route Group 2 – Hidalgo Substation to Apache Substation

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

Subroute 2.1 comprises 2,309.8 total acres. Total temporary disturbance from construction would result in nearly 23.2 percent of the representative ROW being disturbed and total permanent disturbance would result in nearly 5.1 percent being disturbed, or approximately 534.9 acres and 118.5 acres, respectively.

Vegetation Communities

Subroute 2.1 comprises route segments P4 (4b and 4c), P5 (P5a and P5b), P6 (P6a, P6b, and P6c), P7 and P8, local alternatives E, F, G (Ga, Gb, and Gc), I, J, and local alternatives LD3a, LD3b, LD2, LD1, LD4, LD4-Option 4, LD4-Option 5, and WC1.

Segment P4 is a segment of the proposed route from Lordsburg to the Apache Substation and is divided into three subsegments (P4a is in route group 1). Route segment P4 extends south from the west end of segment P2 to a point approximately 6 miles west-southwest of Lordsburg in Hidalgo County. The subroute comprises 2,309.8 acres and is characterized by the following dominant plant associations: Apacherian-Chihuahuan Piedmont Semi-desert Grassland and Steppe plant association (1,059.9 acres), Apacherian-Chihuahuan Mesquite Upland Scrub (681.9 acres), Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (233.2 acres), and Chihuahuan Mixed Salt Desert Scrub (114.5 acres). Segment P8 crosses the Willcox Playa (see table 4.8-5).

Construction impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives."

Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Special Status Species

No ESA-listed plant species have potential to occur along route group 2 within 2 miles of the Project footprint. Of the other sensitive plant species considered in this analysis, the Sneed's pincushion cactus, Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, Gregg night-blooming cereus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, and Wilcox pincushion cactus have some potential to occur in segments P4–P8 (see table 4.8-5).

Construction impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Table 4.8-5. Route Group 2 Vegetation Resource Inventory Data Showing Acres of each Vegetation Type in each Alternative Segment

Segment	Total Miles	Vegetation Communities: Agriculture	Apacherian-Chihuahuan Mesquite Upland Scrub	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	Chihuahuan Mixed Salt Desert Scrub	Chihuahuan Sandy Plains Semi-Desert Grassland	Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	Chihuahuan Succulent Desert Scrub	Developed, Medium - High Intensity	Developed, Open Space - Low Intensity	Madrean Encinal	Madrean Juniper Savanna	Madrean Pine -Oak forest and woodland	Madrean Juniper Savanna	Madrean Pinyon-Juniper Woodland	Mogollon Chaparral	North American Arid West Emergent Marsh	North American Warm Desert Active and Stabilized Dune	North American Warm Desert Bedrock Cliff and Outcrop	North American Warm Desert Lower Montane Riparian Woodland and Shrubland	North American Warm Desert Pavement	North American Warm Desert Riparian Mesquite Bosque	North American Warm Desert Volcanic Rockland	North American Warm Desert Wash	Open Water	Sonoran mid-elevation desert scrub	Sonoran Paloverde-Mixed cactus Desert Scrub
Subroute 2.1, Proponent Preferred																												
P4b	14.0	0	1.3	234.8	33.8	12.6	5.2	42.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.7	0	0	0
P4c	1.9	0	0	21.7	10.6	9.6	0	2.9	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0
P5a	9.6	0	0.1	215.6	3.0	12.3	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P5b	21.1	0	187.9	132.8	90.3	78.9	0	2.9	0	0	0	0	0.4	0	0	0	0	0	0	7.1	0.6	0	0	0	0	0	0	0
P6a	0.9	0.2	12.1	4.1	0	1.9	0	0	0	1.2	0	0	0	0	0	0	0	0.6	0	0	0	0	1.2	0	0	0	0	0
P6b	22.5	49.8	311.0	59.4	103.6	12.2	0	1.0	0	0	0	0	0	0	0	2.0	0.5	5.0	0	0	0	0	0.5	0	0	0	0	0
P6c	2.8	0	45.9	20.5	1.2	0	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P7	22.3	0	123.0	368.0	31.0	9.2	0	8.3	0	0	0	0	0	0	0	0	0.0	0	0	0	0	1.2	0	0	0	0	0	0
P8	0.5	0	1.9	3.0	4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subroute 2.2, Proponent Alternative																												
E	31.8	62.7	136.7	317.6	133.1	91.0	0	12.2	0	0	0	1.4	0	0	0	0	0	0	0	0.2	0	0	10.9	0	0.8	0	0	0
F	25.3	1.9	327.8	123.4	124.4	6.1	0	0.5	0	1.0	0	1.8	0	0	0	0	0.6	11.0	0	0	0	0	11.9	0	0.6	0	0	0
Ga	25.7	6.2	257.6	314.7	34.1	0.3	0	0	0	1.7	0	0	0	0	0	0.9	0.0	0	0	0	0	0	0	0	6.9	0	0	0
Gb	1.0	0	8.5	17.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gc	7.4	0	132.0	46.1	0	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I	2.3	0	12.0	31.1	10.5	0	0	0	0	1.2	0	0	0	0	0	0.3	0.4	0	0	0	0	0	0	0	0	0	0	0
J	2.3	0	12.4	34.6	7.0	0	0	0	0	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.8-5. Route Group 2 Vegetation Resource Inventory Data Showing Acres of each Vegetation Type in each Alternative Segment (Continued)

Segment	Total Miles	Vegetation Communities: Agriculture	Apacherian-Chihuahuan Mesquite Upland Scrub	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	Chihuahuan Mixed Salt Desert Scrub	Chihuahuan Sandy Plains Semi-Desert Grassland	Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	Chihuahuan Succulent Desert Scrub	Developed, Medium - High Intensity	Developed, Open Space - Low Intensity	Madrean Encinal	Madrean Juniper Savanna	Madrean Pine -Oak forest and woodland	Madrean Juniper Savanna	Madrean Pinyon-Juniper Woodland	Mogollon Chaparral	North American Arid West Emergent Marsh	North American Warm Desert Active and Stabilized Dune	North American Warm Desert Bedrock Cliff and Outcrop	North American Warm Desert Lower Montane Riparian Woodland and Shrubland	North American Warm Desert Pavement	North American Warm Desert Riparian Mesquite Bosque	North American Warm Desert Volcanic Rockland	North American Warm Desert Wash	Open Water	Sonoran mid-elevation desert scrub	Sonoran Paloverde-Mixed cactus Desert Scrub
Route Group 2 Local Alternatives																												
LD1	35.4	69.3	171.9	261.0	210.8	45.7	1.0	42.3	0	27.9	0	0	0.1	0	0	0	0	13.5	0	0	0	0.4	12.4	0	1.1	0	0	0
LD2	9.6	0	3.8	172.5	35.9	21.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LD3a	27.9	0	17.0	401.7	137.2	3.7	11.5	79.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27.0	0	0	0
LD3b	1.9	0	0	27.1	18.4	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.0	0	0	0
LD4	51.7	1.3	399.1	297.2	419.4	263.6	0	28.3	0	0	0	11.0	6.2	0	0	22.1	8.1	0	0	0	0	0	2.2	1.2	6.9	0	0.2	0.9
LD4-Option 4	6.5	0	17.0	99.4	31.4	5.1	0	0	0	2.1	0	1.0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
LD4-Option 5	12.3	0	48.3	152.8	68.9	14.0	0	4.0	0	1.6	0	0.6	0	0	0	0	6.7	0	0	0	0	0	0	0	0	0	0	0	0
WC1	14.8	0	85.3	251.8	0.3	11.5	0	0.5	0	7.6	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	0	0	0

Note: Data comes from SWReGAP GIS desktop analysis and not actual ground surveys.

Table 4.8-6. Route Group 2 Vegetation Resource Inventory Data

Segment	Total Miles	Special Status Species												Noxious Weeds/ Invasive Exotics	
		Gregg Night-blooming Cereus	Parish's Alkali Grass	Slender Needle Corycactus	Devilthorn Hedgehog Cactus	Wilcox Pincushion Cactus	San Carlos Wild-Buckwheat	Sneed's pincushion cactus	Varied Fishhook Cactus	Button Cactus	Playa Spider Plant	Dune Pricklypear	Needle-spined Pineapple Cactus	Tamarisk	Invasive Exotic Weeds
Subroute 2.1, Proponent Preferred															
P4b	14.0	X	X												X
P4c	1.9	X	X												X
P5a	9.6	X	X	X	X	X	X							X	X
P5b	21.1	X	X	X	X	X	X	X							X
P6a	0.9	X		X	X	X	X								X
P6b	22.5	X		X	X	X	X		X						X
P6c	2.8	X		X	X	X	X		X						X
P7	22.3			X	X	X	X		X		X				X
P8	0.5			X	X	X	X		X	X	X				X
E	31.8	X	X	X	X	X	X	X							X
F	25.3	X		X	X	X	X		X						X
Ga	25.7				X	X	X		X	X	X		X		X
Gb	1.0				X	X	X		X	X	X		X		X
Gc	7.4				X	X	X		X	X	X		X		X
I	2.3				X	X	X			X			X		X
J	2.3				X	X	X			X			X		X

Table 4.8-6. Route Group 2 Vegetation Resource Inventory Data (Continued)

Segment	Total Miles	Special Status Species												Noxious Weeds/ Invasive Exotics	
		Gregg Night-blooming Cereus	Parish's Alkali Grass	Slender Needle Corycactus	Devilthorn Hedgehog Cactus	Wilcox Pincushion Cactus	San Carlos Wild-Buckwheat	Sneed's pincushion cactus	Varied Fishhook Cactus	Button Cactus	Playa Spider Plant	Dune Pricklypear	Needle-spined Pineapple Cactus	Tamarisk	Invasive Exotic Weeds
Route Group 2, Local Alternatives															
LD1	35.4	X	X												X
LD2	9.6	X	X												X
LD3a	27.9	X	X												X
LD3b	1.9	X	X												X
LD4	51.7	X		X	X	X	X		X					X	X
LD4-Option 4	6.5	X		X	X	X	X		X					X	X
LD4-Option 5	12.3	X		X	X	X	X		X					X	X
WC1	14.8				X	X	X		X	X	X			X	X

Noxious Weeds

Primary noxious weeds of concern in the region of the proposed Project in New Mexico are African rue and starthistles. Tamarisk is known to occur in segment P5 and in the San Simon Creek vicinity (NIISS 2013) (see table 4.8-5). The primary noxious weed of concern in the vicinity of the Project in Arizona is buffelgrass. This species is not currently known to occur within the analysis area. Hoary cress has been documented in the Lordsburg vicinity (NIISS 2013). Other exotic, invasive species, including Russian thistle, filaree, mustards, kochia, and Lehmann lovegrass occur throughout the Hidalgo to Apache region, but these species are not classified as noxious weeds.

Construction impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Tamarisk can disrupt the structure and stability of native plant communities by outcompeting and replacing native plant species, salinizing soils, monopolizing limited sources of moisture, and increasing the frequency, intensity, and effect of fires and floods.

Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Operation and Maintenance

Subroute 2.1 comprises 2,309.8 total acres. Total permanent disturbance would result in nearly 5.1 percent being disturbed, or approximately 118.5 acres.

Vegetation Communities

Operation and maintenance impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Special Status Species

Operation and maintenance impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

Operation and maintenance impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

Subroute 2.2 totals 2,316.6 acres. Total temporary disturbance from construction would result in nearly 23.2 percent of the representative ROW being disturbed and total permanent disturbance would result in nearly 6.3 percent being disturbed, or approximately 537.3 acres and 145.2 acres, respectively.

Vegetation Communities

Subroute 2.2 segments E, F, Ga, Gb, Gc, I, and J all provide alternative route connections. Segment E runs just south and parallel to segments P5a and P5b. Segment F runs just north and parallel to segment

P6b. Segments Ga, Gb, and Gc run west and parallel to segment P7, west of Willcox. Segment I and J are very short alternatives at the intersection of segments P6b and P7. The subroute totals 2,316.6 acres and all seven segments are characterized by the Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (885 acres), the Apacherian-Chihuahuan Mesquite Upland Scrub (887 acres), and the Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (309.1 acres) plant associations (see 4.8-4). These segments are currently impacted by a mixture of grazing, agriculture, railroads, transmission lines, a pipeline, and a variety of roads.

Construction impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

No ESA-listed plant species have potential to occur along the Hidalgo to Apache route group within 2 miles of the Project footprint. Of the other sensitive plant species considered in this analysis, the Sneed's pincushion cactus, Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, Gregg night-blooming cereus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus have some potential to occur in segments E, F, Ga, Gb, Gc, I, and J (see table 4.8-5).

Construction impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

Primary noxious weeds of concern in the region of the proposed Project in New Mexico are African rue and starthistles. The primary noxious weed of concern in the vicinity of the Project footprint in Arizona is buffelgrass. This species is not known to occur along the study corridor. Hoary cress has been documented in the Lordsburg vicinity (NIISS 2013). Other exotic, invasive species, including Russian thistle, filaree, and mustards, kochia, and Lehmann lovegrass occur throughout route group 2, but these species are not classified as noxious weeds (see table 4.8-5).

Construction impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Operation and Maintenance

Subroute 2.2 totals 2,316.6 acres. Total permanent disturbance would result in nearly 6.3 percent of the representative ROW being disturbed, or approximately 145.2 acres.

Vegetation Communities

Operation and maintenance impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

Operation and maintenance impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

Operation and maintenance impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

LOCAL ALTERNATIVES

There are eight local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1. Table 4.8-7 lists the acres of disturbance proposed under the route group 2 local alternatives.

Table 4.8-7. Temporary and Permanent Disturbance Acreages, Route Group 2 Local Alternatives

Alternative	Total Acres within Representative ROW	Temporary Disturbance (percent of ROW)	Temporary Disturbance (acres)	Permanent Disturbance (percent of ROW)	Permanent Disturbance (acres)
LD1	857.5	23.1	198.1	6.4	55.2
LD2	233.2	23.1	54.0	8.6	20.2
LD3	677.5	23.1	156.5	4.3	29.3
LD3b	46.6	23.1	10.8	1.3	0.6
LD4	1,253.1	23.1	289.3	9.1	113.9
LD4-Option 4	156.1	23.2	36.2	9.1	14.3
LD4-Option 5	296.8	23.2	68.7	7.5	22.2
WC1	359.1	23.1	83.0	7.9	28.3

Source: Data come from SWReGAP GIS desktop analysis and not actual ground surveys.

Construction

Table 4.8-7 lists the acres of temporary and permanent disturbance proposed under the route group 2 local alternatives.

Vegetation Communities

The local alternative segments are all characterized by the Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub and Apacherian-Chihuahuan Mesquite Upland Scrub plant associations. Existing impacts are associated with grazing, agriculture, a pipeline, and a variety of roads including an Interstate highway across local alternative LD1.

Local alternative LD1 is characterized by the following dominant plant associations: Agriculture (69.3 acres), Apacherian-Chihuahuan Mesquite Upland Scrub (171.9 acres), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (261.0 acres), Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (210.8 acres), and Chihuahuan Mixed Salt Desert Scrub (45.7 acres) (see table 4.8-5).

Local alternative LD2 is characterized by the following dominant plant associations: Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (172.5 acres), Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (35.9 acres), and Chihuahuan Mixed Salt Desert Scrub (21.7 acres) (see table 4.8-5).

Local alternative L D3a is characterized by the following dominant plant associations: Apacherian-Chihuahuan Mesquite Upland Scrub (17.0 acres), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (401.7 acres), Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (137.2 acres), and Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub (79.4 acres) (see table 4.8-5). The alternative LD3b is characterized by the following dominant plant associations: Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (27.1 acres), Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (18.4 acres) (see table 4.8-5). The alternative LD4 is characterized by the following dominant plant associations: Apacherian-Chihuahuan Mesquite Upland Scrub (399.1 acres), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (297.2 acres), Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (419.4 acres), Chihuahuan Mixed Salt Desert Scrub (263.6 acres, Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub (28.3 acres), and Madrean Pinyon-Juniper Woodland (22.1 acres) (see table 4.8-5).

The alternative LD4-Option 4 is characterized by the following dominant plant associations: Apacherian-Chihuahuan Mesquite Upland Scrub (17.0 acres), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (99.4 acres) and Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (31.4 acres) (see table 4.8-5). The alternative LD4-Option 5 is characterized by the following dominant plant associations: Apacherian-Chihuahuan Mesquite Upland Scrub (48.3 acres), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (152.8 acres) and Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (68.9 acres) (see table 4.8.5). The alternative WC1 is characterized by the following dominant plant associations: Apacherian-Chihuahuan Mesquite Upland Scrub (85.3 acres), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (251.8 acres) (see table 4.8-5). Construction impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for “Impacts Common to All Action Alternatives.” Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

No ESA-listed plant species have potential to occur along route group 2. Of the other sensitive plant species considered in this analysis, the Sneed’s pincushion cactus, Gregg night-blooming cereus, Parish’s alkali grass, button cactus, devilthorn hedgehog cactus, Gregg night-blooming cereus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus have some potential to occur in segments LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, an WC1 (see table 4.8-5). Construction impacts to special status species and implementation and effects of mitigation measures would be the same as described for “Impacts Common to All Action Alternatives.” Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

Primary noxious weeds of concern in the region of the proposed Project in New Mexico are African rue and starthistles. Tamarisk could be present on segment LD1. The primary noxious weed of concern in the vicinity of the Project in Arizona is buffelgrass. This species is not known to occur along the Project footprint. Hoary cress has been documented in the Lordsburg vicinity (NIISS 2013), and it could be present on local alternative LD3a. Other exotic, invasive species, including Russian thistle, filaree,

mustards, kochia, and Lehmann lovegrass occur throughout the route group 2, but these species are not classified as noxious weeds (see table 4.8-5).

Construction impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Operation and Maintenance

Table 4.8-7 lists the potential permanent disturbance acres for the route group 2 local alternatives that would result from operation and maintenance of the facilities.

Vegetation Communities

Operation and maintenance impacts to vegetation communities and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities. Special Status Species

Operation and maintenance impacts to special status species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

Operation and maintenance impacts to noxious species and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Route Group 3 – Apache Substation to Pantano Substation

SUBROUTE 3.1 – PROPONENT PREFERRED

C*O*nstruction

Subroute 3.1 totals 1,278.6 acres and is 70.3 miles in length. Total temporary disturbance from construction would result in nearly 28.1 percent of the ROW being disturbed and total permanent disturbance would result in nearly 5.4 percent being disturbed, or approximately 358.7 acres and 68.7 acres, respectively.

Vegetation Communities

Subroute 3.1 comprises route segments U1a, U1b, U2, and U3a. The subroute totals 1,278.6 acres and the segments are characterized by the Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (255.8 acres), the Apacherian-Chihuahuan Mesquite Upland Scrub (407.9 acres), and the Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (132.3) plant associations (see table 4.8-8). Existing impacts are associated with urban development, highways, ranches, grazing, agriculture, transmission lines, and a railroad.

Construction impacts to vegetation communities relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action

Alternatives." Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

No ESA-listed plant species are considered to have the potential to occur along segments U1 and U3. The Huachuca water umbel, listed as endangered under the ESA, has some potential to be present on segment U2, if suitable habitat is available on this portion of the San Pedro River and where the Project footprint crosses the upper portions of Cienega Creek. This species is known to be present on other parts of the San Pedro River and along Cienega Creek. Of the other sensitive plant species considered in this analysis, the broadleaf ground cherry, button cactus, devilthorn hedgehog cactus, magenta-flowered hedgehog cactus, giant sedge, littleleaf false tamarind, needle-spined pineapple cactus, San Carlos wild-buckwheat, San Pedro River wild-buckwheat, varied fishhook cactus, and Wilcox pincushion cactus have some potential to occur in segments U1, U2, and U3 (see table 4.8-8).

Construction impacts to special status species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." In addition, the Huachuca water umbel could be negatively impacted if construction activities alter riparian environments by increasing or decreasing watershed runoff, or by increasing invasive noxious weeds such as tamarisk. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

The primary noxious weed of concern in the vicinity of route group 2 is buffelgrass, which is not known to occur in segments U1, U2, or U3. The exotic, invasive species Russian thistle, mustards, kochia, Lehman lovegrass, and filaree occur throughout the route group (see table 4.8-8).

Construction impacts to noxious species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Operation and Maintenance

Subroute 3.1 totals 1,278.6 acres. Total permanent disturbance would result in nearly 5.4 percent being disturbed, or approximately 68.7 acres.

Vegetation Communities

Operation and maintenance impacts to vegetation communities relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

Operation and maintenance impacts to special status species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for Impacts Common to All Action Alternatives (page 146). In addition, the Huachuca water umbel could be negatively impacted if construction activities alter riparian environments by increasing or decreasing watershed runoff, or by increasing invasive noxious weeds such as tamarisk. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Table 4.8-8. Route Group 3 Vegetation Resource Inventory Data Showing Acres of each Vegetation Type in each Alternative Segment

		Vegetation Communities																
Segment	**Total Miles**	**Agriculture**	**Apacherian-Chihuahuan Mesquite Upland Scrub**	**Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe**	**Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub**	**Chihuahuan Mixed Salt Desert Scrub**	**Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub**	**Developed, Medium - High Intensity**	**Developed, Open Space - Low Intensity**	**Madrean Encinal**	**Mogollon Chaparral**	**North American Arid West Emergent Marsh**	**North American Warm Desert Bedrock Cliff and Outcrop**	**North American Warm Desert Riparian Mesquite Bosque**	**Open Water**	**Sonoran Paloverde-Mixed Cactus Desert Scrub**	**Sonora-Mojave Creosotebush-White Bursage Desert Scrub**	**Sonoran Mid-Elevation Desert Scrub**
Subroute 3.1, Proponent Preferred																		
U1a	16.1	14.5	88.4	125.4	50.4	9.1	0	0	0	0.0	3.8	0	0	0.3	0	0	0	0
U1b	2.9	0	18.7	14.7	14.5	2.4	0	2.7	0	0	0	0	0	0	0	0	0	0
U2	15.8	14.8	100.8	56.5	56.2	23.1	0	12.5	16.7	0	0	3.4	2.4	0	0.7	0	0	0
U3a	35.6	0	200.0	59.2	11.2	3.7	0	45.7	8.5	0.3	0	0	1.2	1.6	0	210.7	90.3	14.1
Route Group 3, Local Alternative																		
H	19.3	9.3	198.1	62.8	38.3	35.3	0.6	1.7	0	1.3	0	0	0	2.8	0	0	0	0

Table 4.8-9. Route Group 3 Vegetation Resource Inventory Data

		Special Status Species																			Noxious Weeds/ Invasive Exotic Weeds	
Segment	**Total Miles**	**Button Cactus**	**Chihuahua Scurfpea**	**Devilthorn Hedgehog Cactus**	**Giant Sedge**	**Needle-spined Pineapple Cactus**	**San Pedro River Wild Buckwheat**	**Wilcox Pincushion Cactus**	**Broadleaf Ground Cherry**	**Littleleaf False Tamarind**	**San Carlos Wild Buckwheat**	**Varied Fishhook Cactus**	**Huachuca Water Umbel**	**Magenta Flowered Hedgehog Cactus**	**Kelvin Cholla**	**Night-blooming Cereus**	**Pima Indian Mallow**	**Pima Pineapple Cactus**	**Staghorn Cholla**	**Tumamoc Globeberry**	**Buffelgrass**	**Invasive Exotic Weeds**
Subroute 3.1, Proponent Preferred																						
U1a	16.1	X	X	X	X	X	X	X	X	X	X	X										X
U1b	2.9	X	X	X		X	X	X	X	X	X	X	X									X
U2	15.8			X	X	X	X			X	X	X	X	X								X
U3a	35.6				X	X				X	X	X	X	X	X	X	X	X	X	X	X	X
Route Group 3, Local Alternative																						
H	19.3			X	X	X	X	X		X	X	X	X									X

Note: Data come from SWReGAP GIS desktop analysis and not actual ground surveys.

Noxious Weeds

Operation and maintenance impacts to noxious species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

LOCAL ALTERNATIVES

There is one local alternative for route group 3–local alternative H.

Construction

This local alternative comprises 350.2 acres. Total temporary disturbance from construction would result in nearly 28.1 percent of the ROW being disturbed and total permanent disturbance would result in nearly 8.1 percent being disturbed, or approximately 98.4 acres and 28.4 acres respectively.

Vegetation Communities

Local alternative H provides an alternative loop around the north side of Benson, Arizona, to connect segment U1 with segment U3. This route comprises 350.2 acres and is characterized by the Apacherian-Chihuahuan Mesquite Upland Scrub (198.1 acres), the Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe (62.8 acres), and the Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (38.3 acres) plant associations (see table 4.8-8). Existing impacts are associated with a variety of roads, ranches, grazing, agriculture, transmission lines, and a railroad.

Construction impacts to vegetation communities relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

The Huachuca water umbel, listed as endangered under the ESA, has some potential to be present on local alternative H, if suitable habitat is available on this portion of the San Pedro River. This species is known to be present on other parts of the San Pedro River. Of the other sensitive plant species considered in this analysis, the giant sedge, littleleaf false tamarind, needle-spined pineapple cactus, San Carlos wild-buckwheat, San Pedro River wild-buckwheat, varied fishhook cactus, and Wilcox pincushion cactus have some potential to occur in local alternative H (see table 4.8-8).

Construction impacts to special status species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." In addition the Huachuca water umbel could be negatively impacted if construction activities alter riparian environments by increasing or decreasing watershed runoff, or by increasing invasive noxious weeds such as tamarisk. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

The primary noxious weed of concern in the vicinity of route group 3 is buffelgrass, which is not known to occur in local alternative H. Exotic, invasive species Russian thistle, mustards, and filaree occur throughout route group 3 (see table 4.8-8).

Construction impacts to noxious species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Operation and Maintenance

This local alternative comprises 350.2 acres. Total permanent disturbance would result in nearly 8.1 percent being disturbed, or approximately 28.4 acres.

Vegetation Communities

Operation and maintenance impacts to vegetation communities relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Since the subroute already has a significant amount of existing disturbance, any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

Operation and maintenance impacts to special status species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." In addition the Huachuca water umbel could be negatively impacted if construction activities alter riparian environments by increasing or decreasing watershed runoff, or by increasing invasive noxious weeds such as tamarisk. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

Operation and maintenance impacts to noxious species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Route Group 4 – Pantano Substation to Saguaro Substation

SUBROUTE 4.1 – PROPONENT PREFERRED

Route segments U3 (U3a, U3b, U3c, U3d, U3e, U3f, U3g, U3h, U3i, U3j, U3k, U3l, and U3m) and U4, make up subroute 4.1.

Construction

Subroute 4.1 comprises 874.8 acres. Total temporary disturbance from construction would result in nearly 28.1 percent of the ROW being disturbed and total permanent disturbance would result in nearly 4.2 percent being disturbed, or approximately 246.2 acres and 36.9 acres respectively.

Vegetation Communities

Segment U3 extends from the junction with segment U4 northwest around Tucson to the Saguaro Substation. This segment is characterized by the Sonoran Paloverde-Mixed Cacti Desert Scrub plant association, which covers about 36 percent of this subroute (322.1 acres). The Sonora-Mojave Creosote-White Bursage Desert Scrub (3.2 acres) and the Apacherian-Chihuahuan Mesquite Upland Scrub plant (3.2 acres) are also present in the segment (table 4.8-10). Low-, medium-, and high-density urban development cover another 21 percent of this segment (125.3 acres). Existing impacts are associated with urban development, agriculture, a variety of roads and highways, transmission lines, and pipelines.

Table 4.8-10. Route Group 4 Vegetation Resource Inventory Data Showing Acres of each Vegetation Type in each Alternative Segment

		Vegetation Communities																	
Segment	Total Miles	Agriculture	Apacherian-Chihuahuan Mesquite Upland Scrub	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	Barren Lands, Non-Specific	Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	Chihuahuan Mixed Salt Desert Scrub	Developed, Medium - High Intensity	Developed, Open Space - Low Intensity	Madrean Encinal	Madrean Juniper Savanna	North American Warm Desert Bedrock Cliff and Outcrop	North American Warm Desert Riparian Mesquite Bosque	North American Warm Desert Riparian Woodland and Shrubland	North American Warm Desert Wash	Open Water	Sonora-Mojave Creosotebush-White Bursage Desert Scrub	Sonoran Mid-Elevation Desert Scrub	Sonoran Paloverde-Mixed Cacti Desert Scrub
Subroute 4.1, Proponent Preferred																			
U3b	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.2
U3c	1.0	0	0	0	0	0	0	8.2	0	0	0	0	0	0	0	0	0.4	0.3	8.5
U3d	3.4	0	0.1	0	0	0	0	36.5	5.6	0	0	0	0	0	0	0	0	2.2	18.0
U3e	0.9	0	0	0	0	0	0	3.9	0	0	0	0	2.4	0	0	0	0	0	9.8
U3f	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.4
U3g	0.9	0	0	0	0	0	0	15.4	0	0	0	0	0	0	0	0.0	0	0	0.9
U3h	1.1	0	0	0	0	0	0	19.8	0	0	0	0	0	0	0	0.0	0	0	0
U3i	18.2	19.4	0.6	0	0.3	0	0	117.4	26.0	0	0	0	0	3.0	0	0.0	31.2	1.3	128.3
U3j	0.9	15.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U3k	16.7	34.6	2.5	0	10.2	0	0	0.1	13.9	0	0	0	14.5	15.3	1.1	0	78.0	0	133.3
U3l	1.6	0	0	0	3.9	0	0	1.1	0	0	0	0	0	0	0	0	20.4	0	2.7
U3m	0.6	0	0	0	0	0	0	8.8	0	0	0	0	0	0	0	0	0.1	0	0.0
U4	1.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.3	0	31.4

Table 4.8-10. Route Group 4 Vegetation Resource Inventory Data Showing Acres of each Vegetation Type in each Alternative Segment (Continued)

		Vegetation Communities																	
Segment	Total Miles	Agriculture	Apacherian-Chihuahuan Mesquite Upland Scrub	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	Barren Lands, Non-Specific	Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	Chihuahuan Mixed Salt Desert Scrub	Developed, Medium - High Intensity	Developed, Open Space - Low Intensity	Madrean Encinal	Madrean Juniper Savanna	North American Warm Desert Bedrock Cliff and Outcrop	North American Warm Desert Riparian Mesquite Bosque	North American Warm Desert Riparian Woodland and Shrubland	North American Warm Desert Wash	Open Water	Sonora-Mojave Creosotebush-White Bursage Desert Scrub	Sonoran Mid-Elevation Desert Scrub	Sonoran Paloverde-Mixed Cacti Desert Scrub
Route Group 4, Local Alternatives																			
MA1	1.1	19.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TH1a	1.4	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	23.7
TH1b	1.6	0	0	0	0	0	0	12.0	0	0	0	0	0	0	0	0	0	0	16.5
TH1c	0.3	0	0	0	0	0	0	4.8	0	0	0	0	0	0	0	0	0	0	0
TH1-Option	1.0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	7.7
TH3-OptionA	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	0	13.3
TH3-OptionB	0.8	0	1.3	0	0	0	0	6.3	0	0	0	0	0	0	0	0	0.3	0.5	6.2
TH3-Optionc	1.8	0	0.0	0	0	0	0	7.6	0	0	0	0	0	0	0	0	0	1.5	20.2
TH3a	2.7	0	0	0	0	0	0	22.5	0	0	0	0	0	0	0	0	0	1.7	25.4
TH3b	4.5	0	0	0	0	0	0	72.8	0	0	0	0	0	0	0	0	1.1	0.6	6.9

Note: Data come from SWReGAP GIS desktop analysis and not actual ground surveys.

Table 4.8-11. Route Group 4 Vegetation Resource Inventory Data

Segment	Total Miles	Special Status Species																			Noxious Weeds/ Invasive Exotic Weeds	
		Needle-spined pineapple cactus	San Pedro River wild buckwheat	Varied fishhook cactus	Button cactus	Littleleaf false tamarind	San Carlos wild buckwheat	Thornber fishhook cactus	Huachuca water umbel	Magenta flowered hedgehog cactus	Kelvin cholla	Night-blooming cereus	Pima Indian mallow	Pima pineapple cactus	Staghorn cholla	Tumamoc globeberry	Desert barrel cactus	Engelmann pricklypear (var. *flavispia*)	Giant sedge	Devilthorn hedgehog cactus	Slender needle corycactus	Buffelgrass	Invasive Exotic Weeds
Route Group 4. Local Alternatives																							
MA1	1.1																						X
TH1a	1.4									X	X	X	X		X	X	X					X	X
TH1b	1.6									X	X	X	X		X	X	X					X	X
TH1c	0.3									X	X	X	X		X	X	X					X	X
TH1-Option	1.0									X	X	X	X		X	X	X					X	X
TH3-Option A	0.8									X	X	X	X		X	X						X	X
TH3-Option B	0.8									X	X	X	X		X	X						X	X
TH3-Option C	1.8									X	X	X	X		X	X						X	X
TH3a	2.7									X	X	X	X		X	X						X	X
TH3b	4.5									X	X	X	X		X	X						X	X

Segment U4 provides a short segment of new construction to connect the proposed corridor to the Vail Substation, near the Pima County Fairgrounds. This segment is characterized by the Sonoran Paloverde-Mixed Cacti Desert Scrub plant association (31.4 acres).

Construction impacts to vegetation communities relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." The subroute already has a significant amount of existing disturbance, most notably urban development with accompanying exotic plantings and urban yards, therefore the relative portion of the subroute that comprises native vegetation associations is reduced. Any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

The Pima pineapple cactus, listed as endangered under the ESA, has potential to be present on the southern parts of segments U3 and U4. This species is known to be present in this vicinity. Recent spring surveys in 2013 have documented the Pima pineapple cactus between I-19 and Davidson Canyon in the existing Western ROW (Johnida Dockens, personal communication). Additionally, the Huachuca water umbel, listed as endangered under the ESA, has slight potential to be present in segment U3, if suitable habitat is present where it crosses arroyos that feed into Cienega Creek to the north of the Project footprint. This species is known to be present along Cienega Creek. Of the other sensitive plant species considered in this analysis, the desert barrel cactus, Engelmann pricklypear, giant sedge, littleleaf false tamarind, magenta-flowered hedgehog cactus, needle-spined pineapple cactus, night-blooming cereus, Pima Indian mallow, San Carlos wild-buckwheat, San Pedro River wild buckwheat, staghorn cholla, Thornber fishhook cactus, Tumamoc globeberry, varied fishhook cactus, and hybrid Kelvin cholla have some potential to occur in segments U3 and U4 (see table 4.8-11).

Construction impacts to special status species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." In addition the Huachuca water umbel could be negatively impacted if construction activities alter riparian environments by increasing or decreasing watershed runoff, or by increasing invasive noxious weeds such as tamarisk. The Pima pineapple cactus could be negatively impacted by direct impacts to individuals and the vegetation community habitat, and by the establishment of invasive weeds such as buffelgrass that increase wildfire. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

The primary noxious weed of concern in the vicinity of route group 4 is buffelgrass, which has been documented in the Tucson vicinity (NIISS 2013). It is known to be present in segment U3, and likely to occur in segment U4. Other invasive species in this route group include Russian thistle, filaree, and mustards, but these are not classified as noxious weeds (see table 4.8-11).

Construction impacts to noxious species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Operation and Maintenance

Subroute 4.1 comprises 874.8 acres. Total permanent disturbance would result in nearly 4.2 percent being disturbed, or approximately 36.9 acres.

Vegetation Communities

Operation and maintenance impacts to vegetation communities relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." The subroute already has a significant amount of existing disturbance, most notably urban development with accompanying exotic plantings and urban yards, therefore the relative portion of the subroute that comprises native vegetation associations is reduced. Any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

Operation and maintenance impacts to special status species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." In addition the Huachuca water umbel could be negatively impacted if construction activities alter riparian environments by increasing or decreasing watershed runoff, or by increasing invasive noxious weeds such as tamarisk. The Pima pineapple cactus could be negatively impacted by direct impacts to individuals and the vegetation community habitat, and by the establishment of invasive weeds such as buffelgrass that increase wildfire. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

Operation and maintenance impacts to noxious species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

LOCAL ALTERNATIVES

There are 10 local alternatives available for route group 4: TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, TH3-Option C, and MA1. Table 4.8-12 lists the acres of disturbance proposed under the route group 4 local alternatives.

Table 4.8-12. Temporary and Permanent Disturbance Acreages for Route Group 4 Local Alternatives

Alternative	Total Acres within Representative ROW	Temporary Disturbance (percent of ROW)	Temporary Disturbance (acres)	Permanent Disturbance (percent of ROW)	Permanent Disturbance (acres)
TH1a	25.7	28.1	7.2	1.2	0.3
TH1b	28.4	28.1	8.0	2.1	0.6
TH1c	4.8	35.2	1.7	3.1	0.1
TH1 Option	17	29.2	5.0	0.9	0.2
TH3-Option A	15.1	28.1	4.2	5.8	0.9
TH3-Option B	14.5	28.8	4.2	4.4	0.6
TH3-Option C	29.3	31.4	9.2	8.8	2.6
TH3a	49.7	28.1	13.9	5.4	2.7
TH3b	81.4	28.2	23	4.0	3.3
MA1	19.0	29.4	5.6	1.6	0.3

Note: Data come from SWReGAP GIS desktop analysis and not actual ground surveys.

Construction

Table 4.8-12 lists the acres of temporary and permanent disturbance proposed under the route group 4 local alternatives.

Vegetation Communities

The majority of the alternatives for route group 4, with the exception of MA1, are characterized by Sonoran Paloverde-Mixed Cacti Desert Scrub and Developed, Medium – High Intensity plant associations. Existing impacts are associated with a transmission line, commercial and residential development, and a variety of roads.

Local alternative TH1a is characterized by Sonoran Paloverde-Mixed Cacti Desert Scrub (23.7 acres) (see table 4.8-10). The alternative TH1b is characterized by Sonoran Paloverde-Mixed Cacti Desert Scrub (16.5 acres) and Developed, Medium - High Intensity (12.0 acres) (see table 4.8-10).

Local alternative TH1c is characterized by Developed, Medium - High Intensity (4.8 acres) (see table 4.8-10). The alternative TH1 Option is characterized by Sonoran Paloverde-Mixed Cacti Desert Scrub (7.7 acres) (see table 4.8-10). The alternative TH3-Option A is characterized by Sonora-Mojave Creosotebush-White Bursage Desert Scrub (1.8 acres) and Sonoran Paloverde-Mixed Cacti Desert Scrub (13.3 acres) (see table 4.8-10).

Local alternative TH3-Option B is characterized by Developed, Medium - High Intensity (6.3 acres) and Sonoran Paloverde-Mixed Cacti Desert Scrub (6.2 acres) (see table 4.8-10). Local alternative TH3-Option C is characterized by Developed, Medium - High Intensity (7.6 acres), Sonoran Mid-Elevation desert scrub (1.5 acres), and Sonoran Paloverde-Mixed Cacti Desert Scrub (20.2 acres) (see table 4.8-10). The alternative TH3a is characterized by Developed, Medium - High Intensity (22.5 acres), Sonoran Mid-Elevation desert scrub (1.7 acres), and Sonoran Paloverde-Mixed Cacti Desert Scrub (25.4 acres) (see table 4.8-10). The alternative TH3b is characterized by Developed, Medium - High Intensity (72.8 acres), Sonora-Mojave Creosotebush-White Bursage Desert Scrub (1.1 acres), and Sonoran Paloverde-Mixed Cacti Desert Scrub (6.9 acres) (see table 4.8-10). Route segment MA1 is characterized by the Agriculture plant association which accounts for over 99 percent of the acreage (19.0 acres) (see table 4.8-10). The North American Warm Desert Riparian Woodland and Shrubland plant association accounts for the remaining percentage of the acreage for this segment. Existing impacts are associated with agriculture, canals, and dirt roads.

Construction impacts to vegetation communities relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for “Impacts Common to All Action Alternatives.” The subroute already has a significant amount of existing disturbance, most notably urban development with accompanying exotic plantings and urban yards, therefore the relative portion of the subroute that comprises native vegetation associations is reduced. Any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

No ESA-listed plant species are considered to have the potential to occur along local alternatives TH1a, TH1b, TH1c, TH3a, TH3b, and TH1 Option. Of the other sensitive plant species considered in this analysis, the magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla have some potential to occur in local alternatives TH1a, TH1b, TH1c, TH1-Option, TH3a, and TH3b (see table 4.8-11).

Construction impacts to special status species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." In addition the Huachuca water umbel could be negatively impacted if construction activities alter riparian environments along arroyos feeding into Cienega Creek by increasing or decreasing watershed runoff, or by increasing invasive noxious weeds such as tamarisk. The Pima pineapple cactus could be negatively impacted by direct impacts to individuals and the vegetation community habitat, and by the establishment of invasive weeds such as buffelgrass that provide increased fuel for wildfire. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

The primary noxious weed of concern in the vicinity of route group 4 is buffelgrass, which has been documented in the Tucson vicinity (NIISS 2013). It is known to be present in local alternative TH1a, TH1b, TH1c, TH1 Option,TH3a, TH3b, TH3 (Options A, B, and C), and MA1. Two other noxious weed species, field bindweed and hydrilla, have also been documented near the Santa Cruz River on the west edge of Tucson (NIISS 2013) and could be present in local alternative TH3a. Other invasive species in this route group include Russian thistle, filaree, and mustards, but these are not classified as noxious weeds (see table 4.8-11).

Construction impacts to noxious species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." In addition, bindweed, if present in the ROW, can spread prolifically, even when aboveground portions of the plant are removed; continued maintenance is often required in order to control the species. The greatest impacts from bindweed could be felt in adjacent agricultural lands, particularly in segment MA1 which is predominantly agricultural; indirect impacts of the disturbance in these areas could be reduced crop yields due to bindweed infestation. Hydrilla is an aquatic species that will grow with less light and is more efficient at taking up nutrients than native species, therefore outcompeting native aquatic species. Indirect impacts of hydrilla resulting from disturbance could be effects to recreation and destruction of habitat. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Operation and Maintenance

Table 4.8-12 lists the potential permanent disturbance acres for the route group 4 local alternatives that would result from operation and maintenance of the facilities.

Vegetation Communities

Operation and maintenance impacts to vegetation communities relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." The subroute already has a significant amount of existing disturbance, most notably urban development with accompanying exotic plantings and urban yards, therefore the relative portion of the subroute that comprises native vegetation associations is reduced. Any additional disturbance could be reduced by adherence to mitigation measures that would result in only short-term, minor impacts to vegetation communities.

Special Status Species

Operation and maintenance impacts to special status species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." In addition the Huachuca water umbel could be negatively impacted if

construction activities alter riparian arroyo environments that feed in to Cienega Creek, by increasing or decreasing watershed runoff, or by increasing invasive noxious weeds such as tamarisk. The Pima pineapple cactus could be negatively impacted by direct impacts to individuals and the vegetation community habitat, and by the establishment of invasive weeds such as buffelgrass that increase fuel for wildfire. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Noxious Weeds

Operation and maintenance impacts to noxious species relating to the Upgrade Section, and implementation and effects of mitigation measures would be the same as described for "Impacts Common to All Action Alternatives." In addition the aquatic noxious weed hydrilla might be easily introduced into streams and ponds by transporting small pieces of the living plants on equipment, and noxious field bindweed seeds are easily transported in soils on construction equipment. Adherence to mitigation measures would result in short-term, minor impacts to vegetation communities.

Agency Preferred Alternative

Impacts resulting from the construction and maintenance of the Agency Preferred Alternative would be similar to those described under "Impacts Common to All Action Alternatives."

As described in "Impacts Common to All Action Alternatives," the Agency Preferred Alternative would involve the removal of vegetation during construction activities resulting in the direct loss of plant communities, potential impacts to special status species, and impacts associated with noxious weeds.

No ESA-listed species have the potential to occur within the New Build Section of the Agency Preferred Alternative. However, the following sensitive species—dune pricklypear, slender needle corycactus, devilthorn hedgehog cactus, Wilcox pincushion cactus, San Carlos wild-buckwheat, varied fishhook cactus, playa spider plant, and Sneed's pin-cushion cactus—have potential to occur along the Agency Preferred Alternative (see tables 4.8-2 and 4.8-5). Additionally, some exotic invasive species, not classified as noxious (including Lehmann lovegrass, Russian thistle, filaree, and mustards) occur throughout the region of the Agency Preferred Alternative.

Within the Upgrade Section of the Agency Preferred Alternative, the Huachuca water umbel, listed as endangered under the ESA, has some potential to be present along segment U2, if suitable habitat is available on this portion of the San Pedro River. This species is known to be present on other parts of the San Pedro River. Additionally, the Huachuca water umbel has some potential to be present in segment U3, if suitable habitat is present where it crosses Cienega Creek. This species is known to be present on other parts of Cienega Creek. The Pima pineapple cactus, listed as endangered under the ESA, has potential to be present on the southern parts of segments U3 and U4. This species is known to be present in this vicinity. Recent spring surveys in 2013 have documented the Pima pineapple cactus between I-19 and Davidson Canyon in the existing Western ROW (Johnida Dockens, personal communication). Of the other sensitive plant species considered in this analysis, the broadleaf ground cherry, button cactus, devilthorn hedgehog cactus, desert barrel cactus, Engelmann pricklypear, magenta-flowered hedgehog cactus, giant sedge, littleleaf false tamarind, needle-spined pineapple cactus, San Carlos wild-buckwheat, littleleaf false tamarind, San Pedro River wild buckwheat, staghorn cholla, Thornber fishhook cactus, Tumamoc globeberry, varied fishhook cactus, night-blooming cereus, Pima Indian mallow, hybrid Kelvin cholla, and Wilcox pincushion cactus have some potential to occur in segments U1, U2, U3, and U4 (see tables 4.8-9 and 4.8-11).

The primary noxious weed of concern along the Upgrade Section of the Agency Preferred Alternative is buffelgrass, which has been documented in the Tucson vicinity (NIISS 2013). It is known to be present in

segment U3, and likely to occur in segment U4. Other invasive species of concern along the Upgrade Section of the Agency Preferred Alternative are Russian thistle, filaree, and mustards, but these are not classified as noxious weeds.

Additional Mitigation Measures

As previously stated, the Southline PPMs under section 8.3.12 of the POD provides plans to minimize, mitigate, and/or restore vegetation disturbance (PPM VEG-1 through PPM VEG-6).

VEGETATION COMMUNITIES

Additional ground-truthing field surveys will be conducted for any SWReGAP plant associations (communities) that are considered to be environmentally sensitive, such as wetlands, riparian areas, drainages, and special status species habitats, to confirm the presence and extent of such communities. If any such sensitive plant communities are identified and documented, the first response would be a determination on whether the sensitive community can be avoided. If avoidance is not possible, a mitigation plan would be developed as needed for those vegetation communities, including options to reduce impacts to those communities. Exclusion zones (at least 10 feet around the perimeter of the plant community) would be delineated around any such plant communities and marked with flagging. Construction monitoring shall be employed around any such sensitive plant communities, and the biological monitor shall have the authority to halt any construction activity deemed intrusive and causing impacts beyond those stated in the mitigation plan. Any changes in construction plans that occur after the Project approval would require additional field presence/absence surveys for such sensitive plant communities, would require a variance request from the BLM, and the above mitigation measures would apply.

SPECIAL STATUS SPECIES

Field presence/absence surveys would be conducted for special status species in locations where such species are likely to occur within the Project ROW, and specifically locations where vegetation would be impacted, prior to any actual impacts. Surveys would be conducted following established protocols by qualified biologists approved by BLM. For example, pre-impact presence/absence surveys would be conducted for the federally protected Huachuca water umbel and the Pima pineapple cactus within the Project ROW of the final alternative Project route. Additional surveys also would be conducted for other agency special status species within impact locations of the final Project ROW on an as-needed basis. Exclusion zones (at least 10 feet around the perimeter of any individual special status plants) would be delineated around any such special status species and marked with flagging. Construction monitoring would be employed around any such special status plant species, and the biological monitor would have the authority to halt any construction activity deemed intrusive and causing impacts beyond those stated in the mitigation plan. Any actions affecting special status plant species found in Arizona must comply with the Arizona Native Plant Law, permits may be obtained for salvage and/or transplanting. New Mexico does not require such transplant actions for special status species. Any changes in construction plans that occur after the Project approval would require additional field presence/absence surveys for such special status plant species, would require a variance request from the BLM, and the above mitigation measures would apply.

NOXIOUS WEEDS

Noxious weeds and other exotic invasive plant species would be inventoried by a qualified biologist in the immediate proximity to any sensitive plant communities and any special status species populations. Such a detailed noxious weed inventory would then provide information to supplement mitigation plans

for sensitive plant communities and/or special status species habitats, to prevent the expansion of any noxious weeds or other exotic invasive plant species into those locations. Any changes in construction plans that occur after the Project approval would require additional field presence/absence surveys for such noxious weeds and other exotic invasive plant species, would require a variance request from the BLM, and the above mitigation measures would apply.

COMPENSATORY MITIGATION

In addition to a Mitigation Plan that addresses additional mitigation for impacted species, a Compensation Plan would be developed to meet BLM requirements and approval. The Compensation Plan would include calculations of compensation ratios and mitigation acreages for special status plant species requiring additional mitigation. Compensatory mitigation could include payment of an in lieu fee; acquiring mitigation land or conservation easements; or a combination of the two.

Residual Impacts

Mitigation efforts would not alleviate all environmental impacts to vegetation. Despite attempts to minimize temporary and permanent environmental disturbance to vegetation, minor short-term and long-term impacts would occur.

VEGETATION COMMUNITIES

As efforts are made to minimize initial impacts to sensitive vegetation communities and special status species, those impacts would be shifted to less sensitive communities and species. Revegetation would produce vegetation communities similar to those disturbed, but actual species composition and vegetation spatial patterns would likely differ from pre-impact conditions.

SPECIAL STATUS SPECIES

Special status species would be avoided or restored by relocating plants and/or restoring habitats. Avoidance of individual plants would be the preferred approach to mitigation. Such restoration efforts would help and would likely save individual special status plants, but restored habitats would likely be different than the original natural habitats and transplanted special status plants would be moved to different environments where survival rates may be greater or less than the natural setting. Efforts would be made to monitor such mitigation efforts as outlined in the Proponent prepared/agency approved restoration plan in order to verify the success or failure of such restoration efforts for special status species.

NOXIOUS WEEDS

Mitigation efforts to prevent noxious and other exotic invasive weeds from colonizing disturbed soils could possibly not be effective in some cases. In areas where some noxious weeds are particularly likely to have indirect effects on sensitive vegetation communities or special status species, additional post construction monitoring would be conducted, and decisions would be made as to provide or not provide control measures for noxious weed encroachment on sensitive vegetation resources.

Unavoidable Adverse Impacts

The Proponent has selected the route analysis area to avoid areas of critical environmental concern and sensitive habitat; however, some environmental impacts resulting from the Project would be unavoidable, and no mitigation measures were deemed feasible. Such impacts include permanent or long-term impact

effects, such as the construction of substation enhancements, permanent access roads, and other permanent constructed features which would destroy vegetation communities to some extent.

VEGETATION COMMUNITIES

In cases where adverse impacts to vegetation are unavoidable, those impacts would be planned in such a way as to affect less environmentally sensitive vegetation resources. For example, common and widespread vegetation communities would be negatively impacted instead of sensitive plant communities. Specifically how such mitigation will be implemented will depend upon each situation where a sensitive vegetation resource is encountered and alternate disturbance plans will be developed. The initial analysis of vegetation resources indicates that such alterations of disturbance plans will be minor.

SPECIAL STATUS SPECIES

Locations that do not support special status species would be impacted instead of areas that do support special status species. The negative adverse impacts would occur, but not at the expense of any special status species.

NOXIOUS WEEDS

Locations that support sensitive plant communities or special status species would not be impacted, so the introduction and colonization of those locations should be averted. However noxious and other exotic invasive weeds could increase in other impacted areas with less-sensitive vegetation resources.

Short-term Uses versus Long-term Productivity

The productivity or function of vegetation would be affected by both short-term or temporary impacts, and long-term or permanent impacts.

VEGETATION COMMUNITIES

Temporary impacts to vegetation communities would be present until restoration is conducted, resulting in short-term production loss. Following restoration, temporary impact effects would be alleviated to vegetation communities and long-term productivity will be reestablished. Restoration of herbaceous vegetation (e.g., perennial native grasses) should take less than 5 years, depending on climate during that time. Long-term establishment of native woody species (e.g., shrubs and riparian trees) would take longer periods of time, from 5 to 20 years to restore long-term woody vegetation productivity. Relative to temporary impacts that would include both short-term and long-term restoration of native vegetation production, permanent loss of vegetation communities would be minimal in spatial scale. Vegetation of semi-arid regions generally takes years (herbaceous) to decades (woody) to recover from disturbances that impact the aboveground plants themselves, but not the topsoils. Such recovery is very dependent on rainfall and temperature conditions during the recovery period.

SPECIAL STATUS SPECIES

If restoration and relocation methods are employed for any special status plant species, the temporary impacts would be during the restoration activities. Productivity of such plants would be reduced in the short-term, but would be unaffected in the long-term once such plants have become reestablished. Permanent impacts to those plant species (individuals) would be based on survival of transplanted individuals, and persistence of restored habitat. Long-term loss of productivity would result if such plants do not survive, or suffer reduced growth following relocation. Given the importance of special status species, all efforts would be made to ensure the survival and continued productivity levels of such plants.

The health of any transplanted individuals would be monitored for at least 5 years comparatively to other non-transplanted individuals of the same species in the same area, to provide reference growth and survival conditions.

NOXIOUS WEEDS

The introduction and colonization of noxious weeds and other exotic invasive plant species would be temporary if monitoring and control are performed. Colonization of noxious weeds and other exotic invasive plant species would be permanent if such monitoring and control measures are not implemented.

Irreversible and Irretrievable Commitments of Resources

Environmental impacts that have irreversible negative effects on vegetation are situations where vegetation and topsoils are impacted and not restored. In most cases, restoration efforts would be made, and irreversible impacts to vegetation would be minor, including unavoidable adverse impacts and residual impacts discussed above.

VEGETATION COMMUNITIES

In areas of sub-station expansions, vegetation communities and their habitat (topsoils) would be destroyed, but these structure foundations would be minimal in extent, and vegetation community loss minimal relative to the acreage of each community in the region, and would focus on low-sensitivity or low-value communities. Vegetation would take many decades to recover in such locations, and may never recover under current climate regimes without soil nutrient enhancements.

SPECIAL STATUS SPECIES

Although environments of special status species throughout the analysis area have been recognized and would be avoided to the greatest extent, avoidance of every individual of all special status species is unlikely. Where individuals would be impacted, restoration should mitigate such impacts, but relocation to suboptimal habitats or inadequate habitat restoration could result in permanent declines for the species in those locations.

NOXIOUS WEEDS

Despite restoration and control efforts, introduction and colonization of noxious weeds and other exotic invasive plant species could occur and persist in some areas.

4.8.2 Wildlife

Introduction

This section describes the impacts to wildlife and special status wildlife species associated with the construction, operation and maintenance of the proposed transmission line, substations, and ancillary facilities. Impacts to wildlife and special status wildlife species are discussed in terms of impacts on the species and their habitat(s). The impacts described in this section are based on the “Southline Transmission Project Resource Report 18: Wildlife” (CH2M Hill 2013h) and presented in chapter 3. Temporary effects (end with completion of construction activities); short-term (less than 5 years) and long-term (greater than 5 years) impacts are evaluated relative to wildlife resources. Cumulative effects are also evaluated; impacts added to the impacts of past, present, and foreseeable future actions, regardless of the cause or source of other impacts.

Methodology and Assumptions

ANALYSIS AREA

The analysis area for wildlife resources includes the representative ROW, staging areas, substations, and access roads. This area is used to identify resources that could be directly impacted by ground disturbance and where construction materials, equipment, and workers may be present. The ROW for the New Build Section is 200 feet wide, and the ROW for the Upgrade Section is 150 feet wide. This analysis area is sufficient to identify wildlife habitat that could be directly impacted by ground disturbance during construction, operation and maintenance of the proposed line. Some indirect impacts to wildlife could occur outside of the analysis area but these would occur within the analysis area given in chapter 3. Indirect impacts are described below in "Impacts Common to All Action Alternatives."

ANALYSIS ASSUMPTIONS

The primary assumption for analyzing impacts to wildlife is that the PPMs would be in place and would limit impacts on wildlife and wildlife habitat. These measures are listed below in "Impacts Common to All Action Alternatives."

IMPACT INDICATORS

- Loss or degradation of habitat:
  - Loss or degradation of terrestrial habitat from clearing of vegetation during construction.
  - Degradation of terrestrial habitat due to increased soil erosion or introduction of invasive non-native plants.
  - Degradation of aquatic and wetland habitat from increased soil erosion and/or chemical contamination.
- Increased risk of electrocution or predation due to construction of linear transmission line.
- Increased risk of vehicular mortality (direct and indirect) due to construction activities.
- Displacement or decrease in fitness due to noise and human activity associated with all aspects of construction, operation, and maintenance.
- Decreased forage availability and foraging habitat quality due to the spread of invasive and noxious weed species and the removal of habitat.
- Indirect impacts related to loss of habitat or direct loss of wildlife individuals due to increased risk of wildfire from the introduction of invasive and noxious weed species.
- Habitat fragmentation, including a decrease in function to wildlife corridors, due to the construction of linear features (power lines and roads) and large areas of habitat (power facilities).

SIGNIFICANT IMPACTS

A significant impact to wildlife special status species and/or special designation areas would result if any of the following were to occur:

- Loss to any population of special status species that would jeopardize the continued existence of that population;

- Loss to any population of special status species that would result in the species being listed or proposed for listing as endangered or threatened;
- Introduction of constituents into a water body in concentrations that could cause adverse effects on wildlife;
- Interference with the movement (including special designation areas such as wildlife corridors) of any native, resident, or migratory special status species for more than two reproductive seasons;
- Local loss of special status species habitat and/or special designation areas (as compared to total available resources within the area) or habitat productivity;
- Any activity that would violate the ESA, MBTA, or the BGEPA;
- Adverse modification of designated critical habitat;
- Modification of habitat used by special status species for breeding, rearing, foraging, and dispersal;
- Interference with nesting or breeding periods of any species; and
- Reduction in the range of occurrence of any special status species.

Impacts Analysis Results

NO ACTION ALTERNATIVE

Under the no action alternative, the proposed Project would not be developed. No construction would take place in the New Build Section; therefore, there would be no additional impacts to wildlife, wildlife habitat, or special status species habitat. The existing transmission line would remain in place in the Upgrade Section and ongoing maintenance activities would occur which could result in impacts to wildlife and wildlife habitat. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, in accordance with Western's 10-year capital improvement plan (Western 2012a).

IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Construction

Potential construction-related impacts from the proposed Project common to all wildlife groups would include the loss, degradation, and /or fragmentation of breeding, rearing, foraging, and dispersal habitats; collisions with and crushing by construction vehicles; loss of burrowing animals in burrows in areas where grading would occur, increased invasive and noxious weed establishment and spread; and increased noise/vibration levels. Construction-related impacts would be minor/negligible to moderate and short-term to long-term.

Noise and vibration associated with construction activities would change habitat use patterns for some species. Some individuals would move away from the source(s) of the noise/vibration to adjacent or nearby habitats; which may increase competition for resources within these areas. Noise/vibration and other disturbances may also lead to increased stress on individuals, which could decrease their overall fitness due to increased metabolic expenditures. These effects would be temporary and of short duration and would cease with the completion of construction activities.

Proponent proposed measures to minimize the impacts to wildlife and wildlife habitat are given below (Southline 2013).

PPM VEG-1: Minimize Vegetation Effects. Every effort would be made to minimize vegetation removal and permanent loss at construction sites to the extent practicable. Final structure and spur road locations would be selected to avoid sensitive vegetation to the greatest extent feasible.

PPM VEG-2: Reclamation, Restoration, and Revegetation Plan. Southline would develop a reclamation, restoration, and revegetation plan that would guide restoration and revegetation activities for all disturbed lands associated with construction of the proposed Project and its eventual termination and decommissioning. The plan would address all Federal, state, and private land disturbances. It would be developed in consultation with appropriate agencies and landowners, and would be provided to these entities for review and concurrence. The plan would provide details on topsoil segregation and conservation, vegetation treatment and removal, salvage of succulent species, revegetation methods, including use of native seed mixes, application rates, transplants, and criteria to monitor and evaluate revegetation success.

PPM VEG-3: Special Status Plants Restoration and Compensation. Special status plants, including Pima pineapple cactus, would be restored by relocating plants and/or reseeding, replacing topsoil with existing topsoil that was removed, and regarding in compliance with local ordinances (Pima County) and/or measures in the biological opinion, if an ESA Section 7 consultation is required. Measures to restore special status plants would be implemented through the reclamation, restoration, and revegetation plan.

PPM VEG-4: Vegetation Clearing. Removal of riparian scrubland vegetation would be avoided where possible. Natural regeneration of native plants would be supported by cutting vegetation with hand tools, moving, trimming, or using other removal methods that allow root systems to remain intact.

PPM VEG-5: Invasive Plant Management Plan. In consultation with local BLM Field Offices and local resource agencies, Southline would develop an invasive plant management plan.

PPM VEG-6: Equipment Washing. As feasible, equipment would be washed prior to entering, to minimize the potential for the spread of invasive species.

PPM WILD-1: Worker Environmental Awareness Training. A WEAP would be prepared in consultation with BLM and Western and a point of contact designated for any reportable events. All construction crews and contractors would be required to participate in WEAP training prior to starting work on the proposed Project. The WEAP training would include a review of the special status species; WUS; riparian habitat; cultural, paleontological, and other sensitive resources that could exist in the proposed Project footprint; the location of sensitive biological resources and their legal status and protections; reporting process, contacts and reporting time frames; hazardous material information; and measures to be implemented for avoidance of these sensitive resources. A record of all trained personnel would be maintained during the construction period.

PPM WILD-2: Biological Monitoring Plan. In consultation with the BLM and Western, Southline would prepare a biological monitoring plan for construction that would specify the level of biological monitoring to be provided throughout construction activities in all construction zones with the potential for presence of sensitive biological resources. The number of monitors and monitoring frequency would be specified for each work zone.

PPM WILD-3: Preconstruction Surveys. Preconstruction surveys would be required in areas where Morafka's desert tortoise (also known as Sonoran desert tortoise), Gila monster (*Heloderma suspectum*), and Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*) would be expected to occur. In consultation with the BLM and Western, Southline would hire qualified biologists to conduct preconstruction surveys in ground-disturbance areas within habitat for appropriate special status species and their habitats.

PPM WILD-4: Morafka's Desert Tortoise Impact Reduction Measures. To reduce impacts on the Morafka's desert tortoise known to exist in the western portion of the proposed Project, only authorized biologists with a valid AGFD permit would handle desert tortoises if encountered within the proposed Project footprint, following the most current desert tortoise handling guidelines published by the AGFD.

PPM WILD-5: Migratory Birds and Raptors Impacts Reduction Measures. To reduce impacts on migratory birds and raptors, especially near the Willcox Playa: (1) Southline would consult with FWS on a case-by-case basis if active nests were found in the proposed Project footprints, unless directed to do otherwise by these same agencies; (2) active bird nests would not be moved during breeding season, in compliance with the MBTA, unless the proposed Project is expressly permitted to do so by the FWS ; (3) all active nests and disturbance or harm to active nests would be reported to the FWS or BLM upon detection; and (4) work would halt if it is determined that active nests would be disturbed by construction activities, until further direction or approval to work is obtained from the appropriate agencies. Clearing, grubbing, blading, and access road improvements occurring within identified sensitive areas would be conducted outside of the breeding season for most desert-nesting migratory birds.

PPM WILD-6: Bird and Bat Conservation Strategy, Bald and Golden Eagle Protection Act. To reduce impacts on golden eagles and other raptors, Southline would submit a Bird and Bat Conservation Strategy Plan to BLM and Western for approval. The plan would be prepared according to guidance provided by the FWS (2011), and in consultation with best practices such as the "Suggested Practices for Avian Protection on Power Lines" (APLIC 2006).

PPM WILD-7: Western Burrowing Owl Guidelines. Southline would follow Pima County guidelines for surveys prior to disturbance in priority conservation areas for western burrowing owls.

PPM WILD-8: Facility Siting. Final structure and spur road locations would be adjusted to avoid sensitive wildlife resources to the greatest extent feasible.

PPM HAZ-4: Soil Management Plan. A soil management plan would be developed and implemented for construction of the proposed Project. The objective of the soil management plan is to provide guidance for the proper handling, onsite management, and disposal of impacted soil that might be encountered during construction activities. Appropriately trained personnel would be onsite during preparation, grading, and related earthwork activities to monitor the soil conditions encountered.

PPM HAZ-5: Spill Prevention, Countermeasure, and Control Plan. In the event of a spill, workers would immediately cease work, begin spill cleanup operations, and notify appropriate agencies as required by law. Southline would prepare an SPCC Plan for proposed and/or expanded substations with the applicable quantity of oil in order to minimize, avoid, and/or clean up unforeseen spills during facility operation and maintenance. Appropriate clean-up materials including plastic sheeting and absorbent materials would be available at each work site.

PPM HAZ-6: Nonhazardous Construction Waste Disposal Plan. All construction and demolition waste, including trash and litter, garbage, and other solid waste, would be removed and transported to an appropriately permitted recycling or disposal facility. Southline would prepare a construction waste disposal plan for all nonhazardous wastes generated during construction of the proposed Project. The plan would contain a description of all nonhazardous solid and liquid construction wastes, recycling plans, and waste management methods to be used for each type of waste.

PPM HAZ-7: Equipment and Vehicle Maintenance. Southline or the applicable contractors would maintain all vehicles in good working order. Equipment would be properly tuned and maintained to avoid leaks of fluids.

PPM HAZ-8: Refueling Procedures. Service and refueling procedures would not be conducted within 500 feet of a seep, wash, or other water body.

PPM HEA-3: Fire Management Plan. Southline would develop and implement a fire management plan for the proposed Project.

PPM WAT-1: Stormwater Pollution Prevention Plan. A Project-specific construction SWPPP would be prepared and implemented prior to the start of construction of the transmission line and substation in compliance with any CWA Section 404 Permit terms and conditions, if required. The SWPPP would use BMPs to address the storage and handling of hazardous materials and sediment runoff during construction activities to minimize the risk of an accidental release. As part of the SWPPP, soil disturbance at structure construction sites and access roads would be the minimum necessary for construction and designed to prevent long-term erosion through the following activities: restoration of disturbed soil, revegetation, and/or construction of permanent erosion-control structures.

PPM WAT-2: Avoid Stream and Active Drainage Channels. Construction equipment would be kept out of flowing stream channels to the extent possible. Structures would be located to avoid active drainage channels, especially downstream of steep slope areas, to minimize the potential for damage by flash flooding and mud and debris flows.

PPM WAT-3: Ditch and Drainage Design and Runoff Management. Flood control devices would be located where required to protect structures or other Project structures from flooding or erosion. Appropriate design of structure foundations would be used to prevent scour or inundation by a 100-year flood to avoid disturbed areas. The locations of transmission structures would be designed to avoid steep, disturbed, or otherwise unstable slopes. If drainages cannot be avoided by structure placement, Southline would design drainage crossings to accommodate estimated peak flows and ensure that natural volume capacity could be maintained throughout construction and upon post-construction restoration.

PPMs would reduce the amount of habitat that would be lost or degraded/fragmented during construction activities. Some of the habitat would be restored after the completion of construction activities; however, restoration in arid environments is difficult and slow and may require 50 to 100 or more years. As such, impacts from ground disturbance would be long-term.

A Project speed limit for construction areas and spur roads would be implemented to reduce the potential for construction activities leading to wildlife collisions with construction equipment. Burial of some individuals would occur during ground-disturbing activities. The presence of construction-related trash and debris would be an attractant for some wildlife species. This would be minimized by PPM HAZ-6.

Proponent proposed measures PPM Veg-4 and PPM Veg-5 would minimize the introduction and spread of invasive and noxious weeds within or to the analysis area from construction equipment. Minimization of ground-disturbing activities (PPM Veg-1) would decrease conditions that favor the establishment and spread of invasive and noxious weed species. These species could adversely modify wildlife habitat by changing vegetation composition and altering fire regimes. In areas that are not adapted to fire, increased frequency and intensity of fires could lead to dramatic changes in the overall vegetation community and available habitat for wildlife. Impacts from fire would be minimized through PPM HEA-3.

Operation and Maintenance

Potential impacts from maintenance activities would be similar in nature to those previously described above for construction activities. However, the scope of maintenance impacts would be lower in magnitude than those for construction as there would be less equipment and fewer people working. Maintenance impacts would be temporary and would occur sporadically over the life of the proposed

Project. It is estimated that maintenance activities would occur once or twice a year under normal circumstances.

Impacts from the operation and maintenance of the proposed Project would be minor/negligible and long-term. These would include habitat loss, fragmentation and degradation; changes to species movement corridors; and increased access for OHV users. The transmission line ROW would serve as a movement corridor for some species and as a barrier to others. Transmission structures may provide some of the only available shade in the area for some species. This could be a beneficial impact for those species that would utilize the increased shade.

The proposed Project would increase the amount of edge habitat along the ROW. Effects from increased amounts of edge would include decreased habitat block size. Decreased habitat block size may negatively impact those species that require large blocks of contiguous habitat and benefit other species that utilize edge habitats or have more general habitat requirements.

Proponent proposed measure PPM REC-2 to provide spur and access road closure signage at the entrances to these roads would reduce the potential for impacts from habitat disturbance, OHV collisions with wildlife, and increased fire ignition sources from increased OHV access along access and spur roads. While mitigation would minimize OHV use along the transmission line and access roads, trespass use of the area could still occur. The increased potential for fire ignition could lead to fires that dramatically modify habitat over large areas, especially in habitat types that are not adapted to fire.

Potential decommissioning-related impacts from the proposed Project common to all wildlife groups would include the loss, degradation, and/or fragmentation of breeding, rearing, foraging, and dispersal habitats; collisions with and crushing by construction vehicles; loss of burrowing animals in burrows in areas where grading would occur, increased invasive and noxious weed establishment and spread; and increased noise/vibration levels. Impacts on habitat would be minimized as areas decommissioned would be reclaimed including pad sites, substations, and access roads. Proponent proposed measures PPM Veg-4 and PPM Veg-5 would minimize the introduction and spread of invasive and noxious weeds within or to the analysis area from construction equipment. Minimization of ground-disturbing activities (PPM Veg-1) would decrease conditions that favor the establishment and spread of invasive and noxious weed species. Decommissioning-related impacts would be temporary to short-term and would cease with the completion of restoration activities.

ADDITIONAL IMPACTS

Mammals

Potential impacts on mammals from the proposed Project would include those described above as common to all species. Small mammals that shelter underground would be susceptible to being crushed by construction equipment. Potential impacts on mammals would be long-term and minor/negligible for most mammal species. The lesser long-nosed bat and Mexican long-nosed bat would experience moderate, long-term effects from removal of foraging habitat. Operation and maintenance impacts would be minor/negligible and long-term for mammal species.

Birds

Potential impacts on bird species from the proposed Project would include those described above as common to all species. Additional impacts to bird species outside of the ROW would occur and would include disturbance from noise as well as changes to habitat use. Noise-related construction activities could affect nesting, roosting, and foraging activities. Changes to behavior could include increased alertness, turning toward the disturbance, fleeing the disturbance, changes in activity patterns, and nest

abandonment. Raptors would be especially susceptible to noise disturbance early in the breeding season, when it can cause nest abandonment and failure. Measures to avoid working in sensitive habitats during the breeding season would reduce these impacts (PPM WILD-5). Potential impacts from operation and maintenance would be from birds striking electrical transmission lines and towers. With the application of PPMs, operation and maintenance impacts would be reduced and would be long-term and minor/negligible.

Proponent proposed measures to design the transmission lines and structures in accordance with "Reducing Avian Collision with Power Lines" (APLIC 2012) would minimize the potential for bird collisions with transmission lines or poles (PPM WILD-6). However, during poor weather conditions and along elevated terrain migrating birds and raptors would be at greater risk for collisions as they would fly nearer to transmission line facilities.

The presence of transmission poles would provide perches as well as nesting habitat for some species. In some areas the transmission poles may be the only suitable nesting structures for some species. This would allow some species to utilize areas that would otherwise be unsuitable.

The increased amount of edge habitat created by the proposed Project would allow for an increase in species that use edge habitats, such as brown-headed cowbirds (*Molothrus ater*). This would change the species composition of the ROW area and impact species that utilize larger blocks of habitat as they would be subject to increased predation and nest parasitism. Other species that utilize edge habitats or have more general habitat requirements would benefit from the increased amount of edge habitat.

Fish

All aquatic sites would be spanned and construction equipment would be kept out of flowing stream channels and active drainages to the extent possible to avoid directly impacting fish habitat (PPM WAT-2). Potential construction impacts on fish species would be short-term and minor/negligible. No operational or maintenance impacts on fish species are anticipated.

Increases in soil erosion from ground-disturbing activities would be avoided through the development and implementation of a SWPPP (PPM WAT-1). A spill prevention plan (PPM HAZ-5) would be developed that would limit the potential for construction equipment to leak any hazardous materials that could impact water quality. Proponent proposed measures PPMs VEG-6 and WAT-2 requiring equipment to be washed prior to entering the analysis area and avoiding flowing stream channels would minimize the potential for construction equipment to spread non-native species such as crayfish from one water body to another.

Areas of ground disturbance would be restored to the extent possible upon completion of construction activities. If restoration activities were successful potential erosion would be minimized. However, if restoration activities were not successful erosion could continue to impact water quality for fish species throughout the operation and maintenance of the transmission line.

Reptiles

Potential impacts on reptile species from the proposed Project would include those described above as common to all species. In addition, reptile species that shelter underground would be susceptible to being crushed by construction equipment. Construction-related trash may attract reptile predators such as ravens (*Corvus corax*) and raptor species. The presence of the transmission line and poles could provide perching and nesting habitat for ravens and other species. In some instances this may provide the only roosting/nesting habitat in the area and may increase raven and other reptile predator numbers along the transmission line. Potential construction impacts on reptiles would be long-term and moderate. Impacts

from the operation and maintenance of the proposed Project on reptiles would be long-term and minor/negligible.

Amphibians

Potential impacts on amphibian species from the proposed Project would include those described above as common to all species. Amphibian species would also be affected by any changes to water quality. Potential construction impacts on amphibian species would be short-term and minor/negligible. No operational or maintenance impacts on amphibians are anticipated.

Increases in erosion from ground-disturbing activities would be avoided through the development and implementation of a SWPPP (PPM WAT-1). A spill prevention plan (PPM HAZ-5) would be developed that would limit the potential for construction equipment to leak any hazardous materials that could impact water quality. Proponent proposed measures PPM VEG-6 and WAT-2 requiring equipment to be washed prior to entering the analysis area and avoiding flowing stream channels would minimize the potential for construction equipment to spread non-native species such as crayfish and diseases such as Chytridiomycosis from one water body to another.

Areas of ground disturbance would be restored to the extent possible upon completion of construction activities. If restoration activities were successful potential erosion would be minimized. However, if restoration activities were not successful erosion could continue throughout the life of the transmission line operation and maintenance, which may contribute to long-term impacts to water quality for amphibian species.

Invertebrates

Potential impacts on invertebrate species from the proposed Project would include those described above as common to all species such as habitat loss and collisions with construction equipment. Impacts on aquatic invertebrates would be similar in nature to those described above such as changes to water quality from increased erosion and direct habitat loss. However, habitat loss would be a greater impact on some invertebrates that have very limited geographic distributions, limited localized populations, and specific foraging and reproductive requirements. Potential construction impacts on invertebrates would be short-term and minor/negligible. No operational or maintenance impacts on invertebrates are anticipated.

Route Group 1 – Afton Substation to Hidalgo Substation

Tables 4.8-13 and 4.8-14 give the amount of each habitat type within the representative ROW for route group 1 and the associated substations and staging areas. Within route group 1 the estimated percentage of the ROW to be disturbed would be approximately 23 percent.

Table 4.8-13. Route Group 1 Wildlife Resource Inventory Data

Habitat Type	Subroute 1.1	Subroute 1.2	DN1	A	B	C	D
Agriculture	5.6	55.1	-	-	-	5.8	20.9
Apacherian-Chihuahuan Mesquite Upland Scrub	241	345.8	12.1	94.6	13	0.8	3.5
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	1,526.10	1,255.10	764.7	-	12.3	114.6	380.1
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	640.4	904.4	147.2	92.8	99.1	78.3	135.1
Chihuahuan Gypsophilous Grassland and Steppe	5.3	-	-	-	-	-	4
Chihuahuan Mixed Salt Desert Scrub	69.9	94.9	3.1	-	2.4	-	-

Table 4.8-13. Route Group 1 Wildlife Resource Inventory Data (Continued)

Habitat Type	Subroute 1.1	Subroute 1.2	DN1	A	B	C	D
Chihuahuan Sandy Plains Semi-Desert Grassland	45.2	4.6	0.6	-	-	0.1	-
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	984.2	570.7	58.1	197.7	104.4	16.1	3.3
Chihuahuan Succulent Desert Scrub	29.1	10.6	-	-	1.4	-	-
Developed, Medium - High Intensity	6.6	2	-	-	-	-	1.9
Developed, Open Space - Low Intensity	1.6	-	-	-	-	-	-
Inter-Mountain Basins Semi-Desert Shrub Steppe	-	2.9	-	-	-	-	-
Madrean Encinal	-	-	2.2	-	-	-	-
Madrean Juniper Savanna	2.7	25.9	-	-	-	-	-
Madrean Pinyon-Juniper Woodland	0.3	0.2	-	-	-	-	-
Mogollon Chaparral	-	1.3	-	-	-	-	-
North American Warm Desert Active and Stabilized Dune	12.2	113.8	-	26.5	58.7	-	-
North American Warm Desert Bedrock Cliff and Outcrop	3.1	0.7	-	3.3	-	-	-
North American Warm Desert Pavement	6.9	2.9	-	-	-	-	1.8
North American Warm Desert Playa	2.6	1.9	-	1.5	-	-	-
North American Warm Desert Riparian Mesquite Bosque	-	-	0*	-	-	-	-
North American Warm Desert Riparian Woodland and Shrubland	1.1	0.3	-	-	-	-	-
North American Warm Desert Volcanic Rockland	12	22.3	43	-	-	-	-
North American Warm Desert Wash	-	8.5	-	-	-	-	0.5

0* = greater than zero but less than 0.1

Table 4.8-14 shows impacts by habitat type for substations and staging areas for route group 1.

Table 4.8-14. Route Group 1 Wildlife Resource Inventory Data for Substations and Staging Areas

Habitat Types	Subroute 1.1	Subroute 1.2
Apacherian-Chihuahuan Mesquite Upland Scrub	8.9	20.7
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	43.1	97.0
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	90.6	98.1
Chihuahuan Gypsophilous Grassland and Steppe	-	1.3
Chihuahuan Mixed Salt Desert Scrub	0.2	11.2
Chihuahuan Sandy Plains Semi-Desert Grassland	5.3	0.4
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	47.5	235.5
North American Warm Desert Active and Stabilized Dune	0.2	-
North American Warm Desert Bedrock Cliff and Outcrop	3.3	-

Acres of impacts on general wildlife and special status species from route group 1 are given in table 4.8-15.

SUBROUTE 1.1 – PROPONENT PREFERRED

General Wildlife

Construction

Impacts on general wildlife species would be as described above in the "Impacts Common to All Action Alternatives" and "Additional Impacts" sections. Acres of impacts are given in table 4.8-15.

Operation and Maintenance

Impacts from the operation and maintenance of subroute 1.1 would include those described above for the "Impacts Common to All Action Alternatives" and "Additional Impacts" sections.

Special Status Species

Federally Listed Species

The northern aplomado falcon (*Falco femoralis septentrionalis*) and the Sprague's pipit (*Anthus spragueii*) were identified as possible to occur because this subroute would be within the species' range and habitat parameters would be present. In addition, the interior population of the least tern (*Sterna antillarum*) would be considered unlikely to occur because although it could migrate through the area, habitat parameters would not be present. Therefore, the Project activities in the Afton to Hidalgo route group would have no effect to the populations of interior least tern or its habitat.

Construction

Potential impacts on northern aplomado falcon and Sprague's pipit from construction activities would include those described above as common to all bird species. Acres of impacts are given in table 4.8-15. However, there would be no detectable effect on the viability of the non-essential experimental population of northern aplomado falcon or a detectable effect on the viability of Sprague's pipit or contribution towards a downward population trend or listing of this species as threatened or endangered.

Operation and Maintenance

Potential impacts on northern aplomado falcon and Sprague's pipit from operation and maintenance activities would include those described above as common to all bird species. There would be no detectable effects on the viability of the non-essential experimental population of aplomado falcon or on the viability of Sprague's pipit or contribution towards a downward population trend or listing of this species as threatened or endangered.

BLM Sensitive Species

Of the 45 species listed as BLM Sensitive for this region, 16 species were identified as possible to occur because the analysis area would be within their range and habitat parameters would be present. These species include the Colorado River toad also known as the Sonoran desert toad (*Anaxyrus alvarius*), Texas horned lizard (*Phrynosoma cornutum*), New Mexico population of the burrowing owl, loggerhead shrike (*Lanius ludovicianus*), white-faced ibis (*Plegadis chihi*), Mexican long-tongued bat, pale Townsend's big-eared bat, spotted bat (*Euderma maculatum*), Allen's big-eared bat (*Idionycteris*

phyllotis), western small-footed myotis (*Myotis ciliolabrum melanorhinus*), little brown myotis (*Myotis lucifugus occultus*), fringed myotis (*Myotis thysanodes thysanodes*), cave myotis (*Myotis velifer*), long-legged myotis (*Myotis volans*), Yuma myotis (*Myotis yumanensis yumanensis*), and big free-tailed bat (*Nyctinomops macrotis*).

Construction

Potential impacts on BLM Sensitive Species would be as described in "Impacts Common to All Action Alternatives" and "Additional Impacts" sections. Acres of impacts on BLM Sensitive Species are given in table 4.8-15.

Potential impacts on Colorado River toad from construction activities would include those described above as common to all amphibian species. There would be no detectable effect on the viability of this species by Project-related activities or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on Texas horned lizard from construction-related activities would include those described above as common to all reptile species. Based on the amount of available Texas horned lizard habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on western burrowing owl from construction activities in this subroute group would include those described above as common to all bird species. As this species shelters underground impacts could include burial in burrows during ground disturbing activities. In addition, burrows of this ground-nesting bird have the potential to occur within portions of the analysis area in this subroute. In order to minimize impacts on burrowing owls, PPM 7 would be implemented. Additionally, in New Mexico the NMDGF protocols for surveying for burrowing owls would be followed in areas where the species could potentially occur (NMDGF 2007).

Based on the amount of available burrowing owl habitat in the analysis area, construction-related activities would have no detectable effect on the viability of this species or to contribute towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on loggerhead shrike from construction activities would include those described above as common to all bird species. Based on the amount of available foraging habitat in the analysis area, construction-related activities would have no detectable effect on the viability of this species or contribute towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on white-faced ibis from construction activities would include those described above as common to all bird species. Individuals may experience impacts common to migratory birds during migration as they move through the subroute group during construction with the potential for strikes to transmission lines and structures (see migratory species impacts describe below). However, construction-related activities would have no detectable effect on the viability of this species or to contribute towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on the 11 bat species noted above from construction activities would include disturbance to habitat and a decrease in potential foraging habitat. However, there would be no potential roost sites in the ROW corridor that would provide shelter for these species. Based on the amount of available foraging habitat in the analysis area, construction-related activities would have no detectable effect on the viability of these species or contribute towards a downward population trend or listing of these species as threatened or endangered.

Table 4.8-15. Route Group 1 Acres of Impacts on BLM Sensitive Wildlife Species

Common name	Subroute 1.1	Subroute 1.2	Local Alt A	Local Alt B	Local Alt C	Local Alt D	Local Alt DN-1
General Wildlife Species	1,036.1	1,275.6	342.0	239.3	177.2	453.0	237.1
Federally Listed Species							
Northern aplomado falcon	336.7	312.2	2.5	2.8	26.4	87.4	175.9
Sprague's pipit	375.0	324.8	2.5	2.8	27.7	92.3	175.9
BLM Sensitive Species							
Allen's big-eared bat	0.3	0.1	-	-	-	-	-
Big free-tailed bat	191.1	232.3	21.3	23.7	18.0	32.0	34.6
Cave myotis	168.1	230.6	21.3	22.8	18.0	31.1	33.9
ringed myotis	591.0	654.2	44.6	29.5	44.6	120.2	213.2
Little brown myotis	1,036.1	1,275.6	342.0	239.3	177.2	453.0	237.1
Long-legged myotis	191.1	232.3	21.3	23.7	18.0	32.0	34.6
Mexican long-tongued bat	0.3	0.1	0	0	0	0	0
Pale Townsend's big-eared bat	191.8	263.5	21.3	29.5	18.0	32.0	34.6
Spotted bat	863.1	881.2	97.2	67.0	48.2	121.9	237.0
Western small-footed myotis	0.3	0.1	0	0	0	0	0
Yuma myotis	191.1	232.3	21.3	23.7	18.0	32.0	34.6
Loggerhead shrike	273.9	347.7	43.1	26.7	18.2	32.8	37.4
Western burrowing owl (NM population)	625.9	666.2	44.6	29.2	45.9	125.0	213.3
White-faced ibis	0.9	0.5	0.3	-	-	-	-
Texas horned lizard	852.8	842.5	68.3	66.3	48.3	121.0	226.6
Colorado River toad (aka Sonoran desert toad)	591.0	654.2	44.6	29.5	44.6	120.2	213.2

Table 4.8-15. Route Group 1 Acres of Impacts on BLM Sensitive Wildlife Species (Continued)

Common name	Subroute 1.1	Subroute 1.2	Local Alt A	Local Alt B	Local Alt C	Local Alt D	Local Alt DN-1
State of New Mexico Wildlife Conservation Act Species							
Desert bighorn sheep	0.7	5.8	0.8	-	-	-	-
Abert's towhee	577.2	815.0	88.6	50.7	21.9	32.6	50.7
American peregrine falcon	386.7	1,149.3	97.3	67.0	48.3	122.0	237.1
Bell's vireo	577.2	815.0	88.6	50.7	21.9	32.6	50.7
Gila woodpecker	577.2	815.0	88.6	50.7	21.9	32.6	50.7
Lucifer hummingbird	577.2	815.0	88.6	50.7	21.9	32.6	50.7
Varied bunting	577.2	815.0	88.6	50.7	21.9	32.6	50.7
Gila monster	975.1	1,114.1	90.0	53.5	48.3	121.0	226.7
Great Plains narrow-mouthed toad	373.8	312.4	1.5	2.8	26.4	87.4	175.9
State of New Mexico Species of Greatest Conservation Need							
Pocketed free-tailed bat	863.1	881.2	97.2	67.0	48.2	121.9	237.0
Western red bat	0.3	0.1	0	0	0	0	0
American bittern	0	0	0	-	-	-	-
Bank swallow	0.3	2.0	-	-	-	0.1	-
Common black hawk	0.3	2.0	-	-	-	0.1	-
Eared grebe	0	0	0	-	-	-	-
Northern harrier	625.9	666.2	44.6	29.2	45.9	125.0	213.3
Northern pintail	0.8	0.5	0.4	-	-	-	-
Painted bunting	577.2	815.0	88.6	50.7	21.9	32.6	50.7
Sandhill crane	0.8	0.5	0.4	-	-	-	-
Yellow warbler	577.2	815.0	88.6	50.7	21.9	32.6	50.7
Arizona toad	251.7	342.2	21.7	26.7	18.2	1.8	34.6

Operation and Maintenance

White-faced ibis, burrowing owl, and loggerhead shrike impacts would include the potential for strikes to transmission lines and structures. These impacts are not anticipated to reach population levels or lead to the species being listed as threatened or endangered.

There would be no operational or maintenance impacts detectable at the population level for the Mexican long-tongued bat, pale Townsend's big-eared bat, spotted bat, Allen's big-eared bat, western small-footed myotis, little brown myotis, fringed myotis, cave myotis, long-legged myotis, Yuma myotis, and big free-tailed bat, Colorado River toad, and Texas horned lizard.

State of New Mexico Wildlife Conservation Act Species

Eleven New Mexico Wildlife Conservation Act species were identified as possibly occurring in route group 1. Of these 11 species, 9 could potentially occur within subroute 1.1. These would include the spotted bat, Gila monster, Gila woodpecker (*Melanerpes uropygialis*), Lucifer hummingbird (*Calothorax lucifer*), Bell's vireo, varied bunting (*Passerina versicolor*), Abert's towhee, northern aplomado falcon, and American peregrine falcon (*Falco peregrinus*). Impacts on northern aplomado falcon and spotted bat are addressed above in "Federally Listed Species" and "BLM Sensitive Species" sections, respectively. Impacts on the remaining seven species are given below.

Construction

Potential impacts on State of New Mexico Wildlife Conservation Act bird species would be as described above in "Additional Impacts."

Potential impacts on the Gila monster would include those described above as common to all species and specifically to reptiles as described above. As this species spends the majority of its life underground, it would be more susceptible than non-burrowing species to burial during construction activities. Based on the amount of habitat for these species in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential operational and maintenance impacts on State of New Mexico Wildlife Conservation Act species would be as described above in the "Impacts Common to All Action Alternatives" and "Additional Impacts" sections.

State of New Mexico Species of Greatest Conservation Need

Seventeen New Mexico Species of Greatest Conservation Need were identified as possibly occurring in subroute 1.1. Of these 17, five are addressed above (white-faced ibis, spotted bat, and Allen's big-eared bat are addressed in the "BLM Sensitive Species" section and Bell's vireo and American peregrine falcon are addressed in the "State of New Mexico Wildlife Conservation Act Species" section). The other 12 species are addressed below.

Construction

Potential impacts on Species of Greatest Conservation Need mammal species from the proposed Project would include those described above as common to all species and specifically to mammals as described

above in "Additional Impacts." Mammal species impacts would include western red bat and pocketed free-tailed bat (*Nyctinomops femorosacca*).

Potential impacts on Species of Greatest Conservation Need bird species from the proposed Project would include those described above as common to all species and specifically to birds as described above in "Additional Impacts." Bird species impacted would include common black hawk, yellow warbler (*Setophaga petechia*), northern pintail (*Anas acuta*), American bittern (*Botaurus lentiginosus*), eared grebe (*Podiceps nigricollis*), bank swallow (*Riparia riparia*), northern harrier (*Circus cyaneus*), sandhill crane, and painted bunting (*Passerina ciris*). Impacts on American bittern and eared grebe habitat would be avoided by placing structures and access roads outside of wetland and open water areas.

Impacts on sandhill cranes would include impacts to habitat, including migratory and stopover habitat. Within subroute 1.1 approximately 1,359.0 acres of migratory/stopover habitat occurs, of this area approximately 312.6 acres would be disturbed. Based on the amount of migratory/stopover habitat for this species in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered. Potential impacts on the Arizona toad (*Anaxyrus microscaphus*) from the proposed Project would include those described above as common to all species and specifically to amphibians.

Based on the amount of habitat for these species in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential operational and maintenance impacts on Species of Greatest Conservation Need species would be as described in "Impacts Common to All Action Alternatives" and "Additional Impacts" above. Acreages of potential impacts on species habitat would be as described above in "Construction" for the areas to be disturbed.

Migratory Birds

Construction

Impacts on migratory birds would include those described above for additional impacts on birds.

The representative ROW would contain approximately 1.1 acres of North American Warm Desert Woodland and Shrubland, 5.6 acres of Agricultural, and 2.6 acres of North American Warm Desert Playa, all of which may have higher concentrations of birds than other habitat types during nesting, wintering, or migration. No open water would be found in this subroute. A total of approximately 990.3 acres of migratory bird habitat would be disturbed by subroute 1.1. Based on the amount of habitat for these species in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Impacts on migrating sandhill cranes would be as described above under State of New Mexico Species of Greatest Conservation Need.

Operation and Maintenance

The habitats mentioned above may harbor higher concentration of migratory birds than surrounding areas, and may be associated with an elevated risk of collision events. However, that risk would still be unlikely to reach population-level impacts given the amount of available habitat in the area.

Wildlife Special Designation Areas

Construction

Wildlife designated habitat for the northern aplomado falcon and the Big Burro Mountains to Cedar Mountains Potential Cougar Corridor would occur within the ROW for subroute 1.1. Northern aplomado falcon habitat areas are recognized as avoidance areas by the Mimbres RMP. Disturbance would occur on 30.6 acres. An additional 16.5 acres for a staging area would also be disturbed. This would total approximately 47.1 acres of disturbance to designated aplomado falcon habitat from subroute 1.1. Potential impacts on northern aplomado falcon habitat would include habitat loss, degradation, and fragmentation as well as increased OHV access due to the presence of access roads. This could lead to increased use of areas by OHV users, which could conflict with management objectives. Based on the amount of designated habitat in the analysis area, there would be no detectable effect on the function of those habitats.

The Big Burro Mountains to Cedar Mountains Potential Cougar Corridor would occur on approximately 316 acres of the ROW, of which approximately 72.7 acres would be disturbed. Impacts on the potential cougar corridor would include habitat loss, degradation, and fragmentation as well as increased OHV access due to the presence of access roads. Habitat fragmentation creates more isolated and smaller patches of habitat. As cougars are a wide-ranging species and impacts would occur on a small portion of the corridor, it is not anticipated that the proposed Project would create a significant barrier to cougar movement along the corridor. Based on the amount of designated habitat and the area of the potential cougar corridor in the analysis area, there would be no detectable effect on the function of those habitats or wildlife corridors.

Operation and Maintenance

Potential operational and maintenance impacts on northern aplomado falcon designated habitat areas would include habitat loss, degradation, and fragmentation as described above for construction. Impacts on the cougar corridor would include habitat loss, degradation and fragmentation, and potential barriers to movement along the corridor. Impacts on Special Designations, including designated northern aplomado falcon habitat, are analyzed in section 4.12.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

General Wildlife

Construction

Impacts on general wildlife species would be as described above for subroute 1.1. Acres of impacts are given in table 4.8-15. Disturbance to habitat would be long-term.

Operation and Maintenance

Impacts from the operation and maintenance of subroute 1.2 would include those described above subroute 1.1. Based on the amount of habitat for these species in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Special Status Species

Federally Listed Species

Construction

The construction impact types and intensities to northern aplomado falcon and Sprague's pipit would be the same as described under subroute 1.1. Acres of habitat impacted are given in table 4.8-15. Based on the amount of habitat for these species in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

The operation and maintenance impact types and intensities to northern aplomado falcon and Sprague's pipit would be the same as described under subroute 1.1.

BLM Sensitive Species

Construction

The construction impact types and intensities to the BLM Sensitive Species Colorado River toad (also known as Sonoran desert toad), Texas horned lizard, desert ornate box turtle, New Mexico population of the burrowing owl, loggerhead shrike, white-faced ibis, Mexican long-tongued bat, pale Townsend's big-eared bat, spotted bat, Allen's big-eared bat, western small-footed myotis, little brown myotis, fringed myotis, cave myotis, long-legged myotis, Yuma myotis, and big free-tailed bat would be the same as described under subroute 1.1. Acres of impacts are given in table 4.8-15.

Operation and Maintenance

The operation and maintenance impact types and intensities to BLM sensitive species would be the same as described under subroute 1.1.

State of New Mexico Wildlife Conservation Act Species

Eleven New Mexico Wildlife Conservation Act species were identified as possibly occurring in route group 1. All of these species could potentially occur within subroute 1.2. These would include desert bighorn sheep (*Ovis canadensis mexicana*), spotted bat, Gila woodpecker, Lucifer hummingbird, Bell's vireo, varied bunting, Abert's towhee, northern aplomado falcon, peregrine falcon, Gila monster, and Great Plains (western) narrow-mouthed toad (*Gastrophryne olivacea*). Impacts on northern aplomado falcon and spotted bat are addressed above in "Federally Listed Species" and "BLM Sensitive Species" sections, respectively. Impacts on the remaining species are given below; acres of impacts are given in table 4.8-15.

Construction

Potential impacts on desert bighorn sheep, State of New Mexico Wildlife Conservation Act bird species, Gila monster, and Great Plains narrow-mouthed toad would be as described for subroute 1.1.

Based on the amount of habitat for these species in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential operational and maintenance impacts on State of New Mexico Wildlife Conservation Act species would be as described for subroute 1.1.

State of New Mexico Species of Greatest Conservation Need

Twelve New Mexico Species of Greatest Conservation Need were identified as possible to occur in subroute 1.2. Of these 12, six are addressed above (white-faced ibis, spotted bat, and Allen's big-eared bat are addressed in the "BLM Sensitive Species" section and Bell's vireo, peregrine falcon, and desert bighorn sheep are addressed in the "State of New Mexico Wildlife Conservation Act Species" section). The remaining five species are addressed below. Acres of impacts are given in table 4.8-15.

Construction

Potential impacts on the western red bat and Species of Greatest Conservation Need bird species would be as described for subroute 1.1.

A sandhill crane migratory flyway and a wintering site near Columbus, New Mexico would be located in subroute 1.2 (Mitchusson 2003). Sandhill crane migratory/stopover habitat would occur on approximately 750.4 acres of which 172.6 acres would be disturbed.

Operation and Maintenance

Sandhill crane mortality by collision with power lines has been documented in several recent studies. During spring 2006, Wright et al. (2009) recorded 61 carcasses of sandhill cranes during twice-weekly searches below two 69-kV power line arrays at the National Audubon Society's Lillian Rowe Sanctuary. In 2007, they searched more intensively and, after accounting for several potential detectability biases, estimated 165 to 219 sandhill cranes were killed by colliding with the power lines (Wright et al. 2009). While the proposed transmission lines would be larger than the 69-kV lines in the study there would be more lines. As such it would not be possible to quantify the potential impacts on sandhill cranes. However, the movement of sandhill cranes along segment S5 would be associated with a risk of collision with the transmission lines.

Migratory Birds

Construction

Impacts on migratory birds would be as described above for subroute 1.1. The representative ROW contains approximately 0.3 acre of North American Warm Desert Woodland and Shrubland, 42.4 acres of Agricultural, and 1.9 acres of North American Warm Desert Playa, all of which may have higher concentrations of birds than other habitat types during nesting, wintering, or migration. Avian protection areas and bird habitat conservation areas would occur on approximately 1,581.9 acres of subroute 1.2 with 363.8 acres of disturbance. No open water would be found in this subroute. A total of approximately 1,168.8 acres of migratory bird habitat would be affected by subroute 1.2. This would be 178.5 acres greater than disturbance levels for subroute 1.1.

Operation and Maintenance

The habitats mentioned above may harbor higher concentration of migratory birds than surrounding areas, and may thus be associated with an elevated risk of collision events. That risk would still be unlikely to reach population-level impacts.

Impacts on the sandhill crane migratory flyway and a wintering site near Columbus, New Mexico are described above in State of New Mexico Species of Greatest Conservation Need.

The ROW lies within close proximity of several high ridges and low passes (table 4.8-16), which would increase the possibility of somewhat higher impacts on migratory birds.

Table 4.8-16. Route Group 1 Proximity of Mountain Ridges and Low Passes to the ROW of Proposed Subroutes

Subroutes	Ridge or Low Pass	Distance (miles)
Subroute 1.1, Proponent Preferred	Highest ridge in the Aden Hills	0.94
Subroute 1.2, Proponent Alternative	Nearest high ridge in the East Potrillo Mountains	0.27
	Highest ridge of Camel Mountain	0.27
	Highest ridge of the Carrizalillo Hills	1.17
	Lowest pass in the Carrizalillo Hills	0.36
	Nearest high ridge in the Cedar Mountains	2.18
	High ridges in the Flat Hill	0.86
Route Group 1 Local Alternatives		
Local Alternatives for Subroute 1.2		
Local Alternative C	Nearest ridges in the Cedar Mountains	1.21
	Nearest ridges in the Carrizalillo Hills	0.80
	Low pass between the Cedar Mountains and the Carrizalillo Hills	0.00
Local Alternative D	Nearest high ridge in the Pyramid Mountains	0.62
	Nearest low pass in the Pyramid Mountains	0.15
Local Alternatives for Subroute 1.2	NA*	NA

* No ridge or low pass present within proximity of any of the segments of the proposed subroute's ROW
Note: NA = not applicable.

Wildlife Special Designation Areas

Impacts on Wildlife Special Designation Areas would be as described above for subroute 1.1.

Construction

Wildlife designated habitat for the northern aplomado falcon and suitable/occupied bighorn habitat would occur within the ROW for subroute 1.2. Bighorn habitat within the representative ROW is suitable but is not currently occupied by the species and is over 50 miles from the nearest occupied habitat. If this designated bighorn habitat were to become occupied by the species then no Project facilities other than the transmission line would be built in this area. Disturbance would occur on approximately 33.3 acres of aplomado falcon habitat and 4.7 acres of suitable/occupied bighorn habitat. This would be a decrease of 13.8 acres from subroute 1.1 for aplomado falcon and an increase of 4.7 acres for suitable/occupied bighorn habitat. Impacts on Special Designations would not be significant when compared to the total area of this resource along subroute 1.2.

Operation and Maintenance

Potential operational and maintenance impacts on northern aplomado falcon and suitable/occupied bighorn habitat areas would be as described above for subroute 1.1. Impacts on Special Designations,

including designated northern aplomado falcon and suitable/occupied bighorn habitat, are analyzed in section 4.12.

Local Alternatives

There are five local alternatives available for route group 1. These local alternatives include DN1, A, B, C, and D.

General Wildlife

Construction

Construction-related impacts for the local alternatives would be similar to those described above for subroute 1.1. Acres of impacts are given in table 4.8-15.

Operation and Maintenance

Impacts from the operation and maintenance of the local alternatives would include those described above for subroute 1.1.

Special Status Species

Federally Listed Species

Construction

The construction impact types and intensities to northern aplomado falcon and Sprague's pipit would be the same as described under subroute 1.1 for all local alternatives. Acres of impacts are given in table 4.8-15.

Operation and Maintenance

The operation and maintenance impact types and intensities to both the northern aplomado falcon and Sprague's pipit would be the same as described under subroute 1.1 for all local alternatives.

BLM Sensitive Species

The construction impact types and intensities to the BLM Sensitive Species Colorado River toad, Texas horned lizard, New Mexico population of the burrowing owl, loggerhead shrike, white-faced ibis, Mexican long-tongued bat, pale Townsend's big-eared bat, spotted bat, Allen's big-eared bat, western small-footed myotis, little brown myotis, fringed myotis, cave myotis, long-legged myotis, Yuma myotis, and big free-tailed bat would be the same as described under subroute 1.1 for all the local alternatives. Acres of impacts are given in table 4.8-15.

Construction

Under local alternative DN1 Texas horned lizard, burrowing owl, loggerhead shrike, and bat species habitat would be impacted as described for subroute 1.1.

Under local alternative A Texas horned lizard, burrowing owl, loggerhead shrike, white-faced ibis and bat species habitat would be impacted as described for subroute 1.1.

Under local alternative B Texas horned lizard, burrowing owl, loggerhead shrike, and bat species habitat would be impacted as described for subroute 1.1.

Under local alternative C Texas horned lizard, burrowing owl, loggerhead shrike, and bat species habitat would be impacted as described for subroute 1.1.

Under local alternative D Texas horned lizard, burrowing owl, loggerhead shrike, and bat species habitat would be impacted as described for subroute 1.1.

Operation and Maintenance

The operation and maintenance impact types and intensities to BLM Sensitive Species would be the same as described under subroute 1.1. The ROW under all the local alternatives (DN1, A, B, C, and D) would be greater than the corresponding segments (portion of P2, S2, S4, S6, and S8, respectively). Therefore there would be a slightly greater chance for impacts to BLM sensitive avian species from striking the transmission lines and structures under all the local alternatives.

State of New Mexico Wildlife Conservation Act Species

Ten New Mexico Wildlife Conservation Act species were identified as possibly occurring on the local alternatives. The northern aplomado falcon was previously described in the "Federally Listed Species" section above and the spotted bat was described in the 'BLM Sensitive Species" above. The remaining eight species are addressed below. Impacts on these species would be as described for subroute 1.1 for each of the local alternatives. Acres of impacts are given in table 4.8-15.

Construction

Local alternative DN1 would intersect habitat for the Gila monster, peregrine falcon, Abert's towhee, Gila woodpecker, Lucifer hummingbird, varied bunting, and Bell's vireo. The representative ROW would intersect foraging habitat for the peregrine falcon as well as foraging and nesting habitat for the Abert's towhee, Gila woodpecker, Lucifer hummingbird, varied bunting, and Bell's vireo.

Local alternative A would intersect with habitat for Gila monster, Abert's towhee, peregrine falcon, Lucifer hummingbird, Gila woodpecker, varied bunting, and Bell's vireo. Local alternative B would intersect with habitat for Gila monster, peregrine falcon, Lucifer hummingbird, varied bunting, and Bell's vireo. Local alternative C would intersect with habitat for Great Plains narrow-mouthed toad, Gila monster, peregrine falcon, Lucifer hummingbird, varied bunting, and Bell's vireo.

Local alternative D would intersect with habitat for Gila monster, peregrine falcon, Lucifer hummingbird, varied bunting, Bell's vireo, Abert's towhee, and Gila woodpecker.

Operation and Maintenance

Potential operation and maintenance impacts on State of New Mexico Wildlife Conservation Act species would be as described above for subroute 1.1.

State of New Mexico Species of Greatest Conservation Need

Fourteen New Mexico Species of Greatest Conservation Need were identified as possible to occur on the local alternatives. Of these, five are addressed above (white-faced ibis, spotted bat, and Allen's big-eared bat are addressed in the "BLM Sensitive Species" section and Bell's vireo and American peregrine falcon are addressed in the "State of New Mexico Wildlife Conservation Act Species" section). The other nine species are addressed below. Impacts on these species would be as previously described for subroute 1.1.

Local alternative DN1 could impact habitat for Arizona toad, northern harrier, and painted bunting. Based on the amount of habitat for these species in the analysis area it is not anticipated that local alternative A would cause any significant population-level impacts for these species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Local alternative A would intersect with habitat for Arizona toad, northern harrier, sandhill crane, northern pintail, American bittern, eared grebe, and painted bunting. Habitat for eared grebe and American bittern would be avoided. No migratory/stopover habitat for sandhill cranes would be impacted by local alternative A. Based on the amount of habitat for these species in the analysis area it is not anticipated that local alternative A would cause any significant population-level impacts for these species.

Local alternative B would intersect with habitat for Arizona toad, northern harrier, and painted bunting as well as migratory/stopover habitat for sandhill crane. Migratory/stopover habitat would occur on 16.1 acres, of which 3.7 acres would be disturbed. Based on the amount of habitat for these species in the analysis area, including migratory/stopover habitat for sandhill crane, it is not anticipated that local alternative B would cause any significant population-level impacts for these species.

Local alternative C would intersect with habitat for Arizona toad, northern harrier, and painted bunting. Based on the amount of habitat for these species in the analysis area it is not anticipated that local alternative C would cause any significant population-level impacts for these species.

Local alternative D would intersect with habitat for Arizona toad, northern harrier, bank swallow, painted bunting, and pocketed free-tailed bat as well as migratory/stopover habitat for sandhill crane. Migratory/stopover habitat would occur on 180.3 acres, of which 41.5 acres would be disturbed. Based on the amount of habitat for these species in the analysis area, including migratory/stopover habitat for sandhill crane, it is not anticipated that local alternative D would cause any significant population-level impacts for these species.

Migratory Birds

Construction

Impacts on migratory birds would include those described above for subroute 1.1 for all local alternatives. Local alternative DN1 would occur on approximately 1,031.0 acres of ROW, approximately 237.1 acres of which would be disturbed.

Local alternative A would occur on approximately 416.4 acre, which would include 1.5 acres of playa habitat that could have a higher concentration of migratory birds. The potential area to be disturbed would be approximately 95.8 acres.

Local alternative B would occur on approximately 291.3 acres of the ROW with a disturbance area of 70.0 acres.

Local alternative C would occur on approximately 215.7 acres of the ROW, including 5.8 acres of Agricultural lands, which could have a higher concentration of migratory birds. The approximate area of disturbance would be 49.6 acres. This entire local alternative would occur within the Cedar Mountain Range/Continental Divide Avian Protection Area for raptor species.

Local alternative D would occur on approximately 551.5 acres of the ROW, including 20.9 acres of Agriculture and 0.5 acre of riparian woodland and shrubland, which could have a higher concentration of migratory birds. Disturbance would occur on approximately 126.8 acres.

Operation and Maintenance

The habitat mentioned above may harbor higher concentrations of migratory birds than surrounding areas, and may thus be associated with an elevated risk of collision events. Other impacts would be as described above for subroute 1.1.

The ROW for local alternative C crosses a low pass between the Cedar Mountains and the Carrizalillo Hills (see table 4.8-16), raising the possibility of somewhat higher impacts on migratory birds.

The ROW for local alternative D lies near a low pass in the Pyramid Mountains (see table 4.8-7), raising the possibility of somewhat higher impacts on migratory birds.

Wildlife Special Designation Areas

Impacts on Wildlife Special Designation Areas would be as described above for subroute 1.1.

Construction

The Big Burro Mountains to Cedar Mountains Potential Cougar Corridor would occur on approximately 140.8 acres within the ROW for local alternative DN-1; of this area approximately 32.4 acres would be disturbed. Northern aplomado falcon habitat would occur on approximately 141.0 acres of the ROW. Disturbance would occur on approximately 32.4 acres. No other local alternatives intersect with special designation areas. Based on the area of northern aplomado falcon habitat in the area it is not anticipated that impacts from local alternative DN-1 would reach population levels. As cougars are a wide-ranging species and impacts would occur on a small portion of the corridor, it is not anticipated that the proposed Project would create a significant barrier to cougar movement along the corridor.

Operation and Maintenance

Impacts on Wildlife Special Designation Areas from operation and maintenance s would be as described for subroute 1.1.

Route Group 2 – Hidalgo Substation to Apache Substation

Table 4.8-17 gives the approximately acreage of habitat types that would be within the representative ROW for route group 2 in New Mexico. Approximately 23 percent of the ROW would be disturbed within route group 2.

Table 4.8-17. Route Group 2 Wildlife Resource Inventory Data for New Mexico

Habitat Type	Subroute 2.1 (acres)	Subroute 2.2 (acres)	LD1 (acres)	LD2 (acres)	LD3a (acres)	LD3b (acres)	LD4 (acres)	LD4-Option 4 (acres)	LD4-Option 5 (acres)	WC1 (acres)
Apacherian-Chihuahuan Mesquite Upland Scrub	2.1	0.5	3.0	3.8	17.0	-	9.3	-	-	-
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	547.6	246.5	231.8	172.5	401.7	27.1	16.7	-	-	-
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	76.2	56.5	108.7	35.9	137.2	18.4	64.5	-	-	-

Table 4.8-17. Route Group 2 Wildlife Resource Inventory Data for New Mexico (Continued)

Habitat Type	Subroute 2.1 (acres)	Subroute 2.2 (acres)	LD1 (acres)	LD2 (acres)	LD3a (acres)	LD3b (acres)	LD4 (acres)	LD4-Option 4 (acres)	LD4-Option 5 (acres)	WC1 (acres)
Chihuahuan Mixed Salt Desert Scrub	35.0	37.9	4.9	21.1	3.7	-	-	-	-	-
Chihuahuan Sandy Plains Semi-Desert Grassland	5.2		1.0	-	11.5	-	-	-	-	-
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	47.9	5.1	42.3	-	79.4	-	-	-	-	-
Developed, Medium - High Intensity	-	-	27.9	-	-	-	-	-	-	-
Madrean Pinyon-Juniper Woodland	-	-	-	-	-	-	5.5	-	-	-
Madrean Juniper Savanna	-	-	0.1	-	-	-		-	-	-
North American Warm Desert Bedrock Cliff and Outcrop	2.4	0*	-	-	-	-	-	-	-	-
North American Warm Desert Pavement	-	-	0.4	-	-	-	-	-	-	-
North American Warm Desert Wash	5.7	0.8	-	-	27.0	1.0		-	-	-

0*- greater than 0 but less than 0.1 acre

Table 4.8-18 gives the acreage of habitat types that would be within the representative ROW for route group 2 in Arizona.

Table 4.8-18. Route Group 2 Wildlife Resource Inventory Data for Arizona

Habitat Type	Subroute 2.1 (acres)	Subroute 2.2 (acres)	LD1 (acres)	LD2 (acres)	LD3a (acres)	LD3b (acres)	LD4 (acres)	LD4-Option 4 (acres)	LD4-Option 5 (acres)	WC1 (acres)
Agriculture	50.0	70.9	69.3	-	-	-	-	-	-	-
Apacherian-Chihuahuan Mesquite Upland Scrub	681.2	886.4	168.9	-	-	-	298.8	17.0	48.3	85.3
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	522.4	638.4	29.2	-	-	-	206.7	99.4	152.8	251.8
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	201.6	252.7	102.1	-	-	-	404.3	31.4	68.9	0.3
Chihuahuan Mixed Salt Desert Scrub	101.8	60.9	40.8	-	-	-	263.3	5.1	14.0	11.5

Table 4.8-18. Route Group 2 Wildlife Resource Inventory Data for Arizona (Continued)

Habitat Type	Subroute 2.1 (acres)	Subroute 2.2 (acres)	LD1 (acres)	LD2 (acres)	LD3a (acres)	LD3b (acres)	LD4 (acres)	LD4-Option 4 (acres)	LD4-Option 5 (acres)	WC1 (acres)
Chihuahuan Sandy Plains Semi-Desert Grassland	0.7	-	-	-	-	-	-	-	-	-
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	12.2	7.5	0*	-	-	-	28.3	-	4.0	0.5
Developed, Medium - High Intensity	1.2	5.5		-	-	-	-	2.1	1.6	7.6
Developed, Open Space - Low Intensity	-	-	-	-	-	-	-	-	-	1.3
Madrean Encinal	-	3.3	-	-	-	-	11.0	1.0	0.6	-
Madrean Pinyon-Juniper Woodland	-	1.2	-	-	-	-	22.1	0.1	-	-
Madrean Juniper Savanna	0.4	-	-	-	-	-	6.2	-	-	-
Mogollon Chaparral	0.6	1.0	-	-	-	-	8.1	-	6.7	-
North American Arid West Emergent Marsh	5.6	11.0	13.5	-	-	-	-	-	-	-
North American Warm Desert Bedrock Cliff and Outcrop	4.7	0.2	-	-	-	-	-	-	-	-
North American Warm Desert Pavement	1.2	-	-	-	-	-	-	-	-	-
North American Warm Desert Riparian Mesquite Bosque	2.3	22.8	12.4	-	-	-	2.2	-	-	-
North American Warm Desert Volcanic Rockland	-	-	-	-	-	-	1.2	-	-	-
North American Warm Desert Wash	-	7.5	1.1	-	-	-	0*	-	-	0.9
Sonoran Mid-Elevation Desert Scrub	-	-	-	-	-	-	0.2	-	-	-
Sonoran Paloverde-Mixed Cacti Desert Scrub	-	-	-	-	-	-	0.9	-	-	-

0*- greater than 0 but less than 0.1 acre

Table 4.8-19 gives the acreage of habitat types that would be within the staging areas and substations for route group 2 in New Mexico.

Table 4.8-19. Route Group 2 Wildlife Resource Inventory Data for Staging Areas and Substations in New Mexico

Habitat Types	Subroute 2.1 (acres)	Subroute 2.2 (acres)	Local Alternative LD1 (acres)
Apacherian-Chihuahuan Mesquite Upland Scrub	0.6	-	-
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	28.1	26.4	19.7
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	38.4	10.8	-
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	1.9	-	19.9
Developed, Medium - High Intensity	3.2	-	-
North American Warm Desert Pavement	0.6	-	-
North American Warm Desert Wash	5.4	2.4	-

Table 4.8-20 gives the acreage of habitat types that would be within the staging areas and substations for route group 2 in Arizona.

Table 4.8-20. Route Group 2 Wildlife Resource Inventory Data for Staging Areas and Substations in Arizona

Habitat Types	Subroute 2.1 (acres)	Subroute 2.2 (acres)	Local Alternative LD1 (acres)	Local Alternative WC1 (acres)
Agriculture	11.9	-	0.3	-
Apacherian-Chihuahuan Mesquite Upland Scrub	85.5	63.7	2.3	17.7
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	37.8	3.1	-	-
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	0.5	-	-	-
Chihuahuan Mixed Salt Desert Scrub	3.4	11.8	17.0	-
Developed, Medium - High Intensity	-	-	-	0.6
North American Warm Desert Riparian Mesquite Bosque	-	-	0*	-
North American Warm Desert Wash	-	-	-	1.5

0*- greater than 0 but less than 0.1 acre

Table 4.8-21 gives the acres of impacts on general wildlife and special status species for route group 2.

Table 4.8-21. Route Group 2 Acres of Impacts on Wildlife

Common name	Subroute 2.1	Subroute 2.2	Local Alt LD1	Local Alt LD2	Local Alt LD3a	Local Alt LD3b	Local Alt LD4	Local Alt LD4-Opt4	Local Alt LD4-Opt5	Local Alt WC-1
General wildlife	574.5	522.0	197.2	53.6	155.8	10.8	288.2	35.9	68.3	82.6
Federally Listed Species										
Lesser long-nosed bat	349.3	324.3	125.6	52.7	133.6	10.7	219.5	31.8	54.6	62.9
Mexican long-nosed bat	349.3	324.3	125.6	52.7	133.6	10.7	219.5	31.8	54.6	62.9
Northern aplomado falcon	262.6	210.3	64.8	39.7	95.0	10.7	48.9	22.8	35.1	57.9
Southwestern willow flycatcher	-	-	-	-	-	-	-	-	-	-
Sprague's pipit	276.8	242.9	80.8	39.7	95.0	10.7	53.6	22.8	35.1	57.9
Chiricahua leopard frog	-	-	-	-	-	-	-	-	-	-
BLM Sensitive Species										
Allen's big-eared bat	285.1	327.9	101.6	14.1	42.5	4.5	223.6	12.3	30.2	22.8
Big free-tailed bat	105.5	98.8	59.2	13.2	38.6	4.5	154.0	0.5	19.1	3.2
Cave myotis	105.5	98.8	59.2	13.2	38.6	4.5	154.0	8.4	85	3.2
Fringed myotis	386.2	312.0	119.5	52.9	133.6	10.7	206.7	31.3	46.2	61.1
Greater western mastiff bat	105.5	98.8	59.2	13.2	38.6	4.5	154.0	8.4	85	3.2
Little brown myotis	367.7	328.2	138.6	52.9	133.6	10.7	202.9	31.3	47.7	61.1
Long legged-myotis	105.5	98.8	62.3	13.2	38.6	4.5	154.0	8.4	19.1	3.2
Mexican long-tongued bat	105.5	98.8	62.3	13.2	38.6	4.5	154.0	8.4	19.1	3.2
Pale Townsend's big-eared bat	106.0	99.0	59.2	13.2	38.6	4.5	154.0	8.4	19.1	3.2
Western small-footed myotis	-	-	-	-	-	-	-	-	-	-
Yuma myotis	105.5	98.8	62.3	13.2	38.6	4.5	154.0	8.4	19.1	3.2
Burrowing owl (New Mexico population)	382.0	311.8	119.5	52.9	133.6	10.7	202.9	31.3	46.2	61.1
Loggerhead shrike	435.4	101.8	59.2	13.2	38.6	4.5	160.3	8.4	19.1	3.2
White-faced ibis	16.8	18.8	19.0	-	-	-	-	-	-	-
Desert ornate box turtle	385.7	311.8	119.5	52.9	133.6	10.7	207.5	31.3	46.2	61.1
Texas horned lizard	385.7	311.8	119.5	52.9	133.6	10.7	201.3	31.3	46.2	61.1
Colorado River toad (aka Sonoran green toad).	385.7	311.8	119.5	52.9	133.6	10.7	201.3	31.3	46.2	61.1
Lowland leopard frog	1.3	2.5	-	-	-	-	-	-	-	-
New Mexico Wildlife Conservation Act Species- Acreages given are for the portion of route group 2 in New Mexico										
Desert bighorn sheep	325.7	87.7	84.2	52.9	133.6	10.7	18.7	-	-	-
Abert's towhee	37.7	24.9	32.5	13.2	38.6	4.5	14.8	-	-	-
American peregrine falcon	81.7	30.5	26.1	13.2	38.6	4.5	14.8	-	-	-
Arizona grasshopper sparrow	170.6	87.7	84.2	52.9	133.6	10.7	18.7	-	-	-
Bell's vireo	-	-	-	-	-	-	-	-	-	-
Gila woodpecker	37.7	24.9	32.5	13.2	38.6	4.5	14.8	-	-	-
Lucifer hummingbird	34.4	30.5	26.1	13.2	38.6	4.5	14.8	-	-	-
Varied bunting	28.9	16.2	25.0	13.2	31.6	4.2	14.8	-	-	-
Gila monster	325.1	87.7	84.2	52.9	133.6	10.7	18.7	-	-	-

Table 4.8-21. Route Group 2 Acres of Impacts on Wildlife (Continued)

Common name	Subroute 2.1	Subroute 2.2	Local Alt LD1	Local Alt LD2	Local Alt LD3a	Local Alt LD3b	Local Alt LD4	Local Alt LD4-Opt4	Local Alt LD4-Opt5	Local Alt WC-1
State of Arizona Wildlife Species of Concern- Acreages given are for the portion of route group 2 in Arizona										
Pocketed free-tailed bat	249.2	302.8	82.1	-	-	-	207.9	12.3	30.2	3.2
Western red bat	-	-	-	-	-	-	-	-	-	-
Abert's towhee	70.9	76.6	36.8	-	-	-	138.9	8.4	19.3	5.2
Bank swallow	1.3	4.3	3.1	-	-	-	0.5	-	-	-
Bell's vireo	-	-	-	-	-	-	-	-	-	-
Gila woodpecker	70.9	79.1	79.8	-	-	-	138.9	8.4	19.3	5.2
Northern harrier	226.1	226.6	62.9				182.6	31.3	46.2	61.1
Yellow warbler	0.5	7.8	6.0	-	-	-	0.5	-	-	-
State of New Mexico Species of Greatest Conservation Need- Acreages given are for the portion of route group 2 in New Mexico										
Pocketed free-tailed bat	37.6	27.6	27.5	14.1	42.5	4.5	16.9	-	-	-
Western red bat	-	-	-	-	-	-	-	-	-	-
American bittern	0	-	-	-	-	-	-	-	-	-
Bank swallow	2.6	-	-	-	-	-	-	-	-	-
Eared grebe	0	-	-	-	-	-	-	-	-	-
Northern harrier	170.6	87.7	84.2	52.9	133.6	10.7	18.7	-	-	-
Northern pintail	-	-	-	-	-	-	-	-	-	-
Sandhill crane	133.6	62.8	58.1	39.7	95.0	6.2	3.8	-	-	-
Varied bunting	28.9	15.5	25.0	8.3	31.6	4.5	14.8	-	-	-
Yellow warbler	-	-	-	-	-	-	-	-	-	-
Arizona toad	37.0	24.9	26.1	13.2	38.6	4.5	14.8	-	-	-
State of Arizona Species of Greatest Conservation Need- Acreages given are for the portion of route group 2 in Arizona										
Desert bighorn sheep	200.8	222.4	43.5	-	-	-	182.6	31.3	46.2	61.1
American bittern	1.3	2.5	3.1	-	-	-	-	-	-	-
American peregrine falcon	76.7	21.6	39.9	-	-	-	143.5	8.4	19.1	61.1
Eared grebe	1.3	2.5	3.1	-	-	-	-	-	-	-
Northern harrier	215.2	241.2	62.9	-	-	-	182.6	31.3	46.2	61.1
Northern pintail	1.3	2.5	3.1	-	-	-	-	-	-	-
Sandhill crane	144.5	166.4	9.8	-	-	-	43.7	-	35.1	57.9
Arizona toad	70.6	79.1	39.9	-	-	-	143.5	8.4	19.1	61.1

SUBROUTE 2.1 – PROPONENT PREFERRED

General Wildlife

Construction

Impacts on general wildlife species would be as described above for subroute 1.1. Acres of impacts are given in table 4.8-21. Some of the habitat would be restored after the completion of construction activities; however, restoration in arid environments would be difficult and slow and as such, there would be short-term impact in areas where restoration activities would be successful, and long-term impact in areas where they would be unsuccessful. Based on the amount of available habitat in the analysis area it is not anticipated that subroute 2.1 would significantly impact general wildlife populations or contribute to a need to list species as threatened or endangered.

Operation and Maintenance

Impacts from the operation and maintenance of subroute 2.1 would be as described above for subroute 1.1.

Special Status Species

Federally Listed Species

Within this route group, six federally listed species were identified as possible to occur because the analysis area would be within their range and habitat parameters would be present. These species include the Chiricahua leopard frog (*Lithobates chiricahuensis*), southwestern willow flycatcher (*Empidonax traillii extimus*), Sprague's pipit, lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), Mexican long-nosed bat (*Leptonycteris nivalis*), and the northern aplomado falcon. Acres of impacts to federally listed species are given in table 4.8-21.

In addition, three other species—the Sonoran desert tortoise, the interior population of the least tern, and the ocelot (*Leopardus pardalis*)—could also occur but would be considered unlikely to occur, because although habitat parameters may be present, the analysis area within this route group would not be within the species' typical range. Therefore the Project activities in the Hidalgo to Apache route group would have no effect on the populations of Sonoran desert tortoise, interior least tern, or ocelot.

Construction

Potential impacts to Chiricahua leopard frog from construction activities would include those described above as common to all amphibian species. There would be no perennial or intermittent waterways in this subroute analysis area that would be similar to those used by this species, and pole structures and laydown areas would not be placed in ephemeral waterways that could provide dispersal habitats for Chiricahua leopard frogs. Therefore, construction-related impacts would be related to the potential for crushing by vehicles, especially after precipitation events when this species could be active in the analysis area. There would be no effect on this species' designated critical habitat and no detectable effect on the viability of this species from Project-related activities.

Potential impacts on southwestern willow flycatcher from construction activities in this subroute group would include those described above as common to all bird species. However, there would be no perennial or intermittent waterways in this subroute that would provide nesting habitat for this species and this subroute group would not intersect with any designated critical habitat for this species. Individuals could experience impacts common to migratory birds during migration as they move through the subroute

group during construction with the potential for strikes to transmission lines and structures (see migratory species impacts described below). However, given the small size and mobility of this species, it would be anticipated to be a very low potential. Based on the lack of nesting habitat and the mobility of the species, construction-related activities would have no detectable effect on the viability of this species.

Potential impacts on Sprague's pipit from construction activities would include those described above for subroute 1.1. Based on the amount of available habitat in the analysis area, construction-related activities would have no detectable effect on the viability of the local population of this species and no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on the lesser long-nosed bat and Mexican long-nosed bat from construction activities would include those described above for mammals. Habitat for these species along subroute 2.1 is within 40 miles of known roost sites in the Peloncillo and Chiricahua Mountains and is therefore within the foraging range of these species. Approximately 2,459 acres of foraging habitat for lesser long-nosed bat and Mexican long-nosed bat would occur within the analysis area. However, there would be no roost sites in the 200-foot-wide corridor that would provide shelter for these species. Based on the amount of available foraging habitat in the analysis area and lack of roosting sites within the area to be disturbed, construction-related activities would have a minor/negligible, long-term effect on these species.

Potential impacts on northern aplomado falcon from construction activities would include those described above for subroute 1.1. Based on the amount of available habitat in the analysis area, construction-related activities would have no detectable effect on the viability of this species.

Operation and Maintenance

There would be no perennial or intermittent waterways in this subroute analysis area that are similar to those used by Chiricahua leopard frogs, and pole structures and laydown areas would not be placed in ephemeral waterways that could provide dispersal habitats for the species. As such, there would likely not be operational and maintenance impacts to individual Chiricahua leopard frogs or to any populations of Chiricahua leopard frogs under this subroute group. In addition, there would be no operational and maintenance impacts to Chiricahua leopard frog designated critical habitat.

There would be no perennial or intermittent waterways in this subroute that would provide nesting habitat for southwestern willow flycatcher and this subroute group would not intersect with any designated critical habitat for this species. As such, there would likely not be operational or maintenance impacts to individual southwestern willow flycatchers nor to any populations of southwestern willow flycatchers under this subroute group. In addition, there would be no operational and maintenance impacts to southwestern willow flycatcher designated critical habitat.

There would be no detectable operational or maintenance impacts on lesser long-nosed bat and Mexican long-nosed bat and there would be no impact on the viability of this species.

Potential impacts on Sprague's pipit from operation and maintenance activities would be as described for subroute 1.1. However, based on the amount of available foraging habitat in the analysis area there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on northern aplomado falcon from operation and maintenance activities would be as described for subroute 1.1. Based on the amount of available foraging habitat in the analysis area there would be no detectable effects on the viability of the non-essential experimental population of aplomado falcon.

BLM Sensitive Species

In total, 18 BLM Sensitive Species were identified as possible to occur because the analysis area would be within the species' range and habitat parameters for the species would be present. These species include the Colorado River toad (also known as Sonoran desert toad), lowland leopard frog, Texas horned lizard, desert ornate box turtle, New Mexico population of the burrowing owl, loggerhead shrike, white-faced ibis, Mexican long-tongued bat, pale Townsend's big-eared bat, spotted bat, Allen's big-eared bat, western small-footed myotis, little brown myotis, fringed myotis, cave myotis, long-legged myotis, Yuma myotis, big free-tailed bat, and greater western mastiff bat (*Eumops perotis californicus*). Acres of impacts on these species are given in table 4.8-21. Based on the amount of available habitat for these species in the analysis area, construction-related activities would have no detectable effect on the viability of these species, or contribute towards a downward population trend or listing of these species as threatened or endangered.

An additional seven BLM Sensitive species—the Slevin's bunchgrass lizard (*Sceloporus slevini*), Baird's sparrow (*Ammodramus bairdii*), desert pocket gopher (*Geomys arenarius arenarius*), desert sucker (*Catostomus clarki*), giant spotted whiptail, ferruginous hawk (*Buteo regalis*), and yellow-nosed cotton rat (*Sigmodon ochrognathus*)—could also occur but would be considered unlikely to occur because although habitat parameters may be present, the analysis area within this route group would not be within the species' typical range. There would be no effect on habitat for these seven species and no detectable effect on the viability of these species from Project-related activities, or contribution towards a downward population trend or listing of these species as threatened or endangered.

Construction

Potential impacts on Colorado River toad and lowland leopard frog from construction activities would include those described above as common to all amphibian species. However, there would be no perennial or intermittent waterways in this subroute and pole structures and laydown areas would not be placed in ephemeral waterways that could provide dispersal habitats for Colorado River toads or lowland leopard frog.

Potential impacts on Texas horned lizard, western burrowing owl, loggerhead shrike, white-faced ibis, and the 12 bat species from construction-related activities would be as described above for subroute 1.1.

Potential impacts on desert ornate box turtle from construction-related activities would include those described above as common to all reptile species. Based on the amount of available habitat in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of any of these species as threatened or endangered.

Operation and Maintenance

Potential impacts from operation and maintenance activities to the white-faced ibis would be related to individuals striking the transmission lines and structures. Colorado River toad, lowland leopard frog, Texas horned lizard, New Mexico population of the burrowing owl, loggerhead shrike and bat species would likely not experience operational and maintenance impacts detectable at the population level.

State of New Mexico Wildlife Conservation Act Species

Sixteen New Mexico Wildlife Conservation Act species were identified as possibly occurring in route group 2. Of these 16 species, 12 could potentially occur within subroute 2.1. These would include the lowland leopard frog, Gila monster, Gila woodpecker, Bell's vireo, varied bunting, Abert's towhee, Arizona grasshopper sparrow (*Ammodramus savannarum ammolegus*), northern aplomado falcon,

peregrine falcon, Lucifer hummingbird, desert bighorn sheep, and lesser long-nosed bat. Impacts on northern aplomado falcon, lesser long-nosed bat and lowland leopard frog are addressed above in "Federally Listed Species" and "BLM Sensitive Species" sections, respectively. Impacts on the remaining 9 species are given below. Acres of impacts on these species are given in table 4.8-21. Based on the amount of habitat for these species in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Construction

Potential impacts on desert bighorn sheep and State of New Mexico Wildlife Conservation Act bird species would be as described above for subroute 1.1.

Potential impacts on the Gila monster would include those described above as common to all species and specifically to reptiles as described above. As this species spends the majority of its life underground it would be more susceptible than non-burrowing species to burial during construction activities.

Operation and Maintenance

Potential operational and maintenance impacts on State of New Mexico Wildlife Conservation Act species would be as described above for subroute 1.1.

State of Arizona Wildlife Species of Concern

Eight Arizona listed Wildlife Species of Concern were identified as possibly occurring in subroute 2.1. One of these species, white-faced ibis is addressed in the "BLM Sensitive Species" section. The other seven species are addressed below. Acres of impacts on these species are given in table 4.8-21.

Construction

Potential impacts on Arizona Wildlife Species of Concern mammal species from the proposed Project would include those described above as common to all species and specifically to mammals as described above in "Additional Impacts." Mammal species impacts would include impacts to pocketed free-tailed bat and western red bat. Construction-related impacts would be short-term with impacts on habitat being long-term.

Potential impacts on Arizona Wildlife Species of Concern bird species from the proposed Project would include those described above as common to all species and specifically to birds as described above in "Additional Impacts." Bird species impacted would include Bell's vireo, Abert's towhee, Gila woodpecker, bank swallow, and yellow warbler.

Operation and Maintenance

Potential operational and maintenance impacts on Species of Greatest Conservation Need species would be as described above in the "Impacts Common to All Action Alternatives" and "Additional Impacts" sections.

State of New Mexico Species of Greatest Conservation Need

Eighteen New Mexico Species of Greatest Conservation Need were identified as possibly occurring in subroute 2.1. Of these, seven are addressed above (white-faced ibis and spotted bat are addressed in the "BLM Sensitive Species" section and Bell's vireo, Abert's towhee, Gila woodpecker, peregrine falcon

and desert bighorn sheep are addressed in the "State of New Mexico Wildlife Conservation Act Species" section). The other 11 species are addressed below. Acres of impacts on these species are given in table 4.8-21.

Construction

Potential impacts on Species of Greatest Conservation Need mammal species and the Arizona toad from the proposed Project would be as described above for subroute 1.1. Mammal species impacted would be western red bat and pocketed free-tailed bat.

Potential impacts on Species of Greatest Conservation Need bird species from the proposed Project would include those described above as common to all species and specifically to birds as described above in "Additional Impacts." Bird species impacted would include yellow warbler, northern pintail, American bittern, eared grebe, bank swallow, northern harrier and sandhill crane. Habitat for American bittern and eared grebe would be avoided.

Operation and Maintenance

Potential operational and maintenance impacts on Species of Greatest Conservation Need species would be as described above in the "Impacts Common to All Action Alternatives" and "Additional Impacts" sections.

State of Arizona Species of Greatest Conservation Need

Ten Arizona Species of Greatest Conservation Need were identified as possibly occurring in subroute 2.2. Of these 10 species, two are addressed (the southwestern willow flycatcher is addressed in the "Federally Listed Species" section and the spotted bat is addressed in the "BLM Sensitive Species" section). The other eight species are addressed below.

Construction

Potential impacts on desert bighorn sheep from the proposed Project would include those described above as common to all species and specifically to mammals as described above for subroute 1.1. Potential impacts on the Arizona toad from the proposed Project would include those described above as common to all species and specifically to amphibians as described above.

Potential impacts on Species of Greatest Conservation Need bird species from the proposed Project would include those described above as common to all species and specifically to birds as described above in "Additional Impacts." Bird species impacted would include northern harrier, peregrine falcon, eared grebe, northern pintail, sandhill crane, and American bittern.

Habitat for the American bittern, eared grebe and northern pintail would occur within the ROW. As this area would likely be spanned by the transmission lines and access would be from either side no disturbance of habitat for these species would be anticipated.

Habitat for the sandhill crane would occur within the ROW; potential impacts on sandhill crane from striking transmission lines and structures could occur at Willcox Playa. Acres of impacts on sandhill cranes are given in table 4.8-21. Near Willcox Playa, subroute 2.1 would cross near the AGFD-owned Willcox Playa Wildlife Area and would be near to Crane Lake. Crane Lake has high biological and economic value to AGFD and sandhill cranes use the lake as a roost. Increased mortality to sandhill cranes from collisions with the proposed transmission line could affect management of the species by AGFD and would conflict with the AGFD conservation mission.

Operation and Maintenance

Potential operational and maintenance impacts on Species of Greatest Conservation Need species would be as described above in the "Impacts Common to All Action Alternatives" and "Additional Impacts" sections.

Potential impacts on sandhill cranes could occur during operation/maintenance. Sandhill cranes make a daily migration during wintering from Willcox Playa to the agricultural fields to the east. Subroute 2.1 would cross this area of daily migration and would lead to increased numbers of collisions of sandhill cranes and transmission lines/structures. The risk of collision of sandhill cranes and other birds with the proposed transmission line in the Willcox Playa area would be minimized through utilization of line marking devices. With mitigation, impacts on sandhill cranes would be minor/negligible to moderate and long-term.

Migratory Birds

Impacts on migratory birds would be as described above for subroute 1.1.

Construction

The ROW for subroute 2.1 contains a total of 70.8 acres of agricultural lands, found along segments E (62.7 acres), F (1.9 acres), and Ga (6.2 acres), of which 19.8 acres would be disturbed.

A total of 22.8 acres of North America Warm Desert Riparian Mesquite Bosque would occur in the ROW of subroute 2.2, of which 6.4 acres would be disturbed. The two segments with this land cover type would be E (10.9 acres) and F (11.9 acres).

No wetlands or bodies of perennial water would be present in the analysis area of subroute 2.1. However, 11 acres of Arid West Emergent Marsh would occur in the ROW along segment F. Proposed structure locations should incorporate avoidance and BMPs to avoid this wetland. Construction of access roads would likely not impact these features within the ROW if avoidance measures were incorporated and with the implementation of BMPs.

Subroute 2.1 would cross approximately 84.6 acres of the Lordsburg Playas avian protection area. Approximately 19.5 acres of this area would be disturbed.

Operation and Maintenance

Under this alternative, a significant risk of collision would exist for the many species of waterfowl, waders, and shorebirds documented at Willcox Playa. Sandhill cranes, waterfowl, and migrant shorebirds can be found throughout Willcox Playa depending on the presence of water. However, AGFD pumps water into Crane Lake to ensure the lake does not dry. As a result, birds consistently use the lake as a roost, including sandhill cranes. When cranes take flight from the lake, they initially circle it before turning towards their preferred foraging areas (agricultural fields) to the southeast. Sandhill cranes usually leave and return at least twice a day. The risk of collision of sandhill cranes and other birds with the proposed transmission line in the Willcox Playa area would be minimized through utilization of line marking devices.

The ROW falls within close proximity of a low pass in the Peloncillo Mountains (segment P5) and another in the Dos Cabezas Range (segments P7 and P8), which would increase the possibility of somewhat higher impacts on migratory birds (table 4.8-22).

Table 4.8-22. Route Group 2 Proximity of Mountain Ridges and Low Passes to the ROW of Proposed Subroutes

Subroutes	Ridge or Low Pass	Distance (miles)
Subroute 2.1, Proponent Preferred	Roostercomb Ridge in the Peloncillo Mountains	0.31
	Nearest low pass in the Peloncillo Mountains	0.03
	Nearest high ridge in the Dos Cabezas Range	0.19
Subroute 2.2, Proponent Alternative	Nearest ridge in the Peloncillo Mountains	0.83
	Powers Canyon (low pass in the Peloncillo Mountains)	0.00
	Highest ridge in the Circle I Hills	1.10
Route Group 2 Local Alternatives		
Local Alternatives for Subroute 2.1		
Local Alternative LD3b	Eastern ridgeline of the Peloncillo Mountains near Rustler Draw	0.49
Local Alternatives for Subroute 2.2		
Local Alternative LD1	Nearest ridge in the Peloncillo Mountains	0.10
	Nearest ridge of Cedar Mountain within the Peloncillo Mountains	0.85

Wildlife Special Designation Areas

Impacts on Wildlife Special Designation Areas would be as described for subroute 1.1.

Construction

Wildlife designated habitat for the desert bighorn sheep would occur within the ROW for subroute 2.1. The desert bighorn habitat would occur on approximately 74.5 acres of the ROW. Desert bighorn habitat areas are recognized as avoidance areas by the Mimbres RMP. Disturbance would occur on approximately 17.1 acres.

Subroute 2.1 would cross two wildlife linkage areas: the Willcox Playa-Winchester-Pinaleño-Dos Cabezas and the Pinaleño-Dos Cabezas-San Simon Valley PLZs. These linkages would occur on approximately 981.2 acres of the ROW, of which approximately 225.7 acres would be disturbed. Impacts on these linkages would be as described for the potential cougar corridor in route group 1.

Subroute 2.1 would cross approximately 200.4 acres of the Willcox Playa/Lake Cochise Important Bird Area. Approximately 46.1 acres of the Important Bird Area would be disturbed.

Based on the amount of designated habitat for desert bighorn sheep in the analysis area and the acreage of wildlife linkage areas it is not anticipated that subroute 2.1 would cause any significant population-level impacts to the northern aplomado falcon, IBA, or form a significant barrier to wildlife movement.

Operation and Maintenance

Potential operational and maintenance impacts would be as described for subroute 1.1. Impacts on Special Designations, including designated northern aplomado falcon habitat, are analyzed in section 4.12.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

General Wildlife

Construction

Impacts on general wildlife species would be as described above for subroute 1.1. Acres of impacts are given in table 4.8-21.

Operation and Maintenance

Impacts from the operation and maintenance of subroute 2.2 would be as described above for subroute 1.1.

Special Status Species

Federally Listed Species

Construction

Acres of impacts to federally listed species from subroute 2.2 are given in table 4.8-21.

The construction impact types to Chiricahua leopard frog would be the same as described under subroute 2.1.There would be a lack of perennial and intermittent water that could provide habitats for this species and there would be no critical habitat for this species in subroute 2.2. There would be no effect on this species' designated critical habitat and no detectable effect on the viability of this species by Project-related activities.

The construction impact types and intensities to southwestern willow flycatcher would be the same as described under subroute 2.1.There would be a lack of perennial and intermittent water that could provide habitats for this species and there would be no critical habitat for this species in subroute 2.2. Based on the lack of nesting habitat and the mobility of the species, construction-related activities would have no detectable effect on the viability of this species under subroute 2.2.

The construction impact types and intensities to lesser long-nosed bat, Mexican long-nosed bat, northern aplomado falcon, and Sprague's pipit would be the same as described under subroute 2.1. Habitat for the lesser long-nosed bat and the Mexican long-nosed bat along subroute 2.2 is within 40 miles of known roost sites in the Peloncillo and Chiricahua Mountains and is therefore within the foraging range of these species. However, there would be no roost sites in the 200-foot-wide corridor that would provide shelter for lesser long-nosed bat or Mexican long-nosed bat. Based on the amount of foraging habitat for these species in the analysis area; there would be a minor/negligible, long-term impact on these species.

Operation and Maintenance

The operation and maintenance impact types and intensities to Chiricahua leopard frog, southwestern willow flycatcher, northern aplomado falcon, Sprague's pipit, lesser long-nosed bat, and Mexican long-nosed bat would be the same as described under subroute 2.1.

BLM Sensitive Species

The Project-related subroute 2.2 impact types and intensities to the BLM Sensitive Species Colorado River toad (also known as Sonoran desert toad), lowland leopard frog, Texas horned lizard, desert ornate box turtle, New Mexico population of the burrowing owl, loggerhead shrike, white-faced ibis, Mexican

long-tongued bat, pale Townsend's big-eared bat, spotted bat, Allen's big-eared bat, western small-footed myotis, little brown myotis, fringed myotis, cave myotis, long-legged myotis, Yuma myotis, big free-tailed bat, and the greater western mastiff bat would be the same as described under subroute 2.1.

There would be no effect on these species habitat and no detectable effect on the viability of these species by Project-related activities or contribution towards a downward population trend or listing of these species as threatened or endangered. Acres of impacts are given in table 4.8-21.

Construction

The construction impact types to the Texas horned lizard, desert ornate box turtle, western burrowing owl, loggerhead shrike, and bat species would be as described under subroute 2.1.

Operation and Maintenance

The operation and maintenance impact types and intensities to BLM sensitive species would be the same as described under subroute 2.1.

State of New Mexico Wildlife Conservation Act Species

Sixteen New Mexico Wildlife Conservation Act species were identified as possibly occurring in subroute 2.2. These would include the lowland leopard frog, Gila monster, Gila woodpecker, Bell's vireo, varied bunting, Abert's towhee, Arizona grasshopper sparrow, northern aplomado falcon, peregrine falcon, Lucifer hummingbird, desert bighorn sheep, and lesser long-nosed bat. Impacts on northern aplomado falcon and lesser long-nosed bat are addressed above in the "Federally Listed Species" section and lowland leopard frog addressed in the "BLM Sensitive Species" section. Impacts on the remaining 10 species are given below. Acres of impacts on these species are given in table 4.8-21.

Based on the amount of habitat for these species in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Construction

Potential impacts on desert bighorn sheep and Gila monster would be as described above in for subroute 2.1.

Potential impacts on State of New Mexico Wildlife Conservation Act bird species would be as described above for subroute 2.1.

Operation and Maintenance

Potential operational and maintenance impacts on State of New Mexico Wildlife Conservation Act species would be as described above for subroute 1.1.

State of Arizona Wildlife Species of Concern

Eight Arizona listed Wildlife Species of Concern were identified as possible to occur in subroute 2.2. One of these species, white-faced ibis, is addressed in the "BLM Sensitive Species" section. The other seven species are addressed below. Acres of impacts on these species are given in table 4.8-21.

Construction

Potential impacts on Arizona listed Wildlife Species of Concern mammal species from the proposed Project would be as described above for subroute 2.1. These species would include pocketed free-tailed bat and western red bat. Based on the amount of habitat for these species in the analysis area it is not anticipated that subroute 2.2 would cause any significant population-level impacts for these species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on Arizona listed Wildlife Species of Concern bird species from the proposed Project would be as described above for subroute 2.1. Based on the amount of habitat for these species in the analysis area it is not anticipated that subroute 2.2 would cause any significant population-level impacts for these species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Operation and Maintenance

Potential operational and maintenance impacts on Arizona listed Wildlife Species of Concern species would be as described above in subroute 2.1.

State of New Mexico Species of Greatest Conservation Need

Seventeen New Mexico Species of Greatest Conservation Need were identified as possibly occurring in subroute 2.2. Of these seven are addressed above (white-faced ibis and spotted bat are addressed in the "BLM Sensitive Species" section and Bell's vireo, Abert's towhee, Gila woodpecker, peregrine falcon, and desert bighorn sheep are addressed in the "State of New Mexico Wildlife Conservation Act Species" section). The other 10 species are addressed below. Acres of impacts on these species are given in table 4.8-21.

Potential impacts on the western red bat, pocketed free-tailed bat, Species of Greatest Conservation Need bird species and the Arizona toad would be as described for subroute 2.1. Based on the amount of habitat for these species in the analysis area it is not anticipated that subroute 2.2 would cause any significant population-level impacts for these species or contribution towards a downward population trend or listing of this species as threatened or endangered.

State of Arizona Species of Greatest Conservation Need

Ten Arizona Species of Greatest Conservation Need were identified as possibly occurring in subroute 2.2. Of these 10 species, two are addressed above (the southwestern willow flycatcher is addressed in the "Federally Listed Species" section and the spotted bat is addressed in the "BLM Sensitive Species" section). The other eight species are addressed below. Acres of impacts are given in table 4.8-21.

Construction

Potential impacts on desert bighorn, Species of Greatest Conservation Need bird species, and Arizona toad from the proposed Project would be as described above for subroute 2.1. Based on the amount of habitat for these species in the analysis area it is not anticipated that subroute 2.2 would cause any significant population-level impacts for these species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Operation and Maintenance

Potential operational and maintenance impacts on Species of Greatest Conservation Need species would be as described above for subroute 2.1. Potential impacts on sandhill cranes would be from striking transmission lines and structures could occur at Willcox Playa. Subroute 2.2 avoids crossing the daily migration corridor between Willcox Playa and the agricultural fields to the east. This impact would be mitigated with the use of line marking devices. This alignment would have a lower likelihood of collisions of sandhill cranes and transmission lines/structures than subroute 2.1.

Migratory Birds

Impacts on migratory birds would be as described above for subroute 1.1. Additional impacts on sandhill crane and the many species of waterfowl, waders, and shorebirds documented at Willcox Playa. The risk would be mitigated with use of line marking devices.

Construction

The ROW for subroute 2.2 contains a total of 50 acres of agricultural lands, found along segments P6a (0.2 acre) and P6b (49.8 acres). 11.5 acres of agricultural lands would be disturbed.

A total of 2.3 acres of North America Warm Desert Riparian Mesquite Bosque would occur in the ROW of subroute 2.2. The three segments with North America Warm Desert Riparian Mesquite Bosque would be P5b (0.6 acre), P6a (1.2 acres), and P6b (0.5 acre) of which a total of 0.5 acre would be disturbed.

According to the National Wetlands Inventory, two wetlands totaling 111.8 acres occur within the ROW along segment P7. These features would be associated mainly with the Willcox Playa (109.6 acres). SWReGAP mapping indicates 0.6 acre of North America Arid West Emergent Marsh would occur in the ROW along segment P6a and another 5 acres of this same land cover type along segment P6b. Proposed structure locations should incorporate avoidance and BMPs to avoid any wetland, playa, and open water. Construction of access roads would likely not impact these features within the ROW if avoidance measures were incorporated and with the implementation of BMPs.

Subroute 2.2 would cross approximately 114.0 acres of the Lordsburg Playas avian protection area. Approximately 26.2 acres of this area would be disturbed.

Operation and Maintenance

The habitats and land cover types mentioned above may harbor higher concentration of migratory birds than surrounding areas, and may thus be associated with an elevated risk of collision events. However, that risk is still unlikely to reach population-level impacts for most species.

The ROW for segment E crosses Powers Canyon, a low pass in the Peloncillo Mountains, raising the possibility of somewhat higher impacts on migratory birds (see table 4.8-19).

Wildlife Special Designation Areas

Impacts on Wildlife Special Designation Areas would be as described above for subroute 1.1.

Construction

Wildlife designated habitat for the desert bighorn sheep would occur within the ROW for subroute 2.2. The desert bighorn habitat would occur on approximately 71.3 acres of the ROW. Desert bighorn habitat

areas are recognized as avoidance areas by the Mimbres RMP. Disturbance would occur on 16.4 acres of the ROW.

Subroute 2.2 would cross two wildlife linkage areas: the Willcox Playa-Winchester-Pinaleño-Dos Cabezas and the Pinaleño-Dos Cabezas-San Simon Valley PLZs. Impacts on linkages would occur on approximately 1,573.5 acres of the ROW, of which approximately 361.9 acres would be disturbed. Impacts on these linkages would be as described for the potential cougar corridor in route group 1.

Operation and Maintenance

Potential operation and maintenance impacts on desert bighorn habitat would be as described above for subroute 2.1. Impacts on Special Designations, including desert bighorn habitat, are analyzed in section 4.12.

LOCAL ALTERNATIVES

There are eight local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1.

General Wildlife

Impacts on general wildlife species would be as described above for subroute 1.1. Acres of impacts on general wildlife for the local alternatives are given in table 4.8-21.

Construction

Construction impacts from the local alternatives would be as described above for subroute 1.1. Based on the amount of habitat for these species in the analysis area it is not anticipated that the eight local alternatives would cause any significant population-level impacts for these species or contribute towards a downward population trend or listing of this species as threatened or endangered.

Operation and Maintenance

Impacts from the operation and maintenance of the local alternatives would include those described above for subroute 1.1.

Special Status Species

Federally Listed Species

Construction

Local alternative LD1 would cross and closely parallel I-10 throughout its length, as such it would be unlikely that northern aplomado falcon or Sprague's pipit would occur in this alternative. The construction impact types and intensities to northern aplomado falcon and Sprague's pipit would be the same as described under subroute 2.1. In addition, because of a lack of perennial or intermittent water and no designated critical habitat for Chiricahua leopard frog and southwestern willow flycatcher in local alternative LD1, there would be no effect on these species' designated critical habitat and no detectable effect on the viability of either of these species by Project-related activities. The construction impact types and intensities to lesser long-nosed bat and Mexican long-nosed bat would be the same as described under subroute 2.1.

The construction impact types and intensities to northern aplomado falcon and Sprague's pipit from local alternative LD2 would be the same as described under subroute 2.1. In addition, because of a lack of perennial or intermittent water and no designated critical habitat for Chiricahua leopard frog and southwestern willow flycatcher in local alternative LD2, there would be no effect on these species' designated critical habitat and no detectable effect on the viability of either of these species by Project-related activities. The construction impact types and intensities to lesser long-nosed bat and Mexican long-nosed bat would be the same as described under subroute 2.1.

The construction impact types and intensities to northern aplomado falcon and Sprague's pipit from local alternative LD3a would be the same as described under subroute 2.1. In addition, because of a lack of perennial or intermittent water and no designated critical habitat for Chiricahua leopard frog and southwestern willow flycatcher in local alternative LD3a, there would be no effect on these species' designated critical habitat and no detectable effect on the viability of either of these species by Project-related activities. The construction impact types and intensities to lesser long-nosed bat and Mexican long-nosed bat would be the same as described under subroute 2.1.

The construction impact types and intensities to northern aplomado falcon and Sprague's pipit from local alternative LD3b would be the same as described under subroute 2.1. In addition, because of a lack of perennial or intermittent water and no designated critical habitat for Chiricahua leopard frog and southwestern willow flycatcher in local alternative LD3b, there would be no effect on these species' designated critical habitat and no detectable effect on the viability of either of these species by Project-related activities under local alternative LD3b.

The construction impact types and intensities from local alternative LD-4 to lesser long-nosed bat, Mexican long-nosed bat would be the same as described under subroute 2.1. Sprague's pipit and northern aplomado falcon habitat would be impacted through loss and fragmentation under this alternative. In addition, because of a lack of perennial or intermittent water and no designated critical habitat for Chiricahua leopard frog and southwestern willow flycatcher in local alternative LD4, there would be no effect on these species' designated critical habitat and no detectable effect on the viability of either of these species by Project-related activities. The construction impact types and intensities to lesser long-nosed bat and Mexican long-nosed bat would be the same as described under subroute 2.1.

Construction impact types and intensities to northern aplomado falcon and Sprague's pipit for local alternative LD4-Option 4 would be the same as described under subroute 2.1. In addition, because of a lack of perennial or intermittent water and no designated critical habitat for Chiricahua leopard frog and southwestern willow flycatcher in local alternative LD4-Option 4, there would be no effect on these species' designated critical habitat and no detectable effect on the viability of either of these species by Project-related activities. The construction impact types and intensities to lesser long-nosed bat and Mexican long-nosed bat would be the same as described under subroute 2.1.

Construction impact types and intensities to northern aplomado falcon and Sprague's pipit for local alternative LD4-Option 5 would be the same as described under subroute 2.1. In addition, because of a lack of perennial or intermittent water and no designated critical habitat for Chiricahua leopard frog and southwestern willow flycatcher in local alternative LD4-Option 5, there would be no effect on these species' designated critical habitat and no detectable effect on the viability of either of these species by Project-related activities. The construction impact types and intensities to lesser long-nosed bat and Mexican long-nosed bat would be the same as described under subroute 2.1

Construction impact types and intensities to northern aplomado falcon and Sprague's pipit for local alternative WC-1 would be the same as described under subroute 2.1. In addition, because of a lack of perennial or intermittent water and no designated critical habitat for Chiricahua leopard frog and southwestern willow flycatcher in local alternative WC1, there would be no effect on these species'

designated critical habitat and no detectable effect on the viability of either of these species from Project-related activities. The construction impact types and intensities to lesser long-nosed bat and Mexican long-nosed bat would be the same as described under subroute 2.1

Operation and Maintenance

The operation and maintenance impact types and intensities to Chiricahua leopard frog, southwestern willow flycatcher, northern aplomado falcon, Sprague's pipit, lesser long-nosed bat, and Mexican long-nosed bat would be the same for all the local alternatives (LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1) as described under subroute 2.1. There would be about the same chance for impacts to northern aplomado falcons from striking the transmission lines and structures under any of the local alternatives relative to the length of the local alternative.

BLM Sensitive Species

The Project-related impact types and intensities to the BLM Sensitive Species Colorado River toad (also known as Sonoran desert toad), lowland leopard frog, Texas horned lizard, desert ornate box turtle, New Mexico population of the burrowing owl, loggerhead shrike, white-faced ibis, Mexican long-tongued bat, pale Townsend's big-eared bat, spotted bat, Allen's big-eared bat, western small-footed myotis, little brown myotis, fringed myotis, cave myotis, long-legged myotis, Yuma myotis, big free-tailed bat, and the greater western mastiff bat would be the same as described under subroute 2.1 for all the local alternatives (LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1). Acres of impacts are given in table 4.8-21. There would be no detectable effect on the viability of these species from Project-related activities or contribution towards a downward population trend or listing of these species as threatened or endangered.

Construction

Habitat for the Texas horned lizard, desert ornate box turtle, western burrowing owl, loggerhead shrike and bat species would be impacted under local alternative LD1.

Under local alternative LD2 habitat for Texas horned lizard, desert ornate box turtle, western burrowing owl, loggerhead shrike and bat species would be impacted.

Under local alternative LD3a habitat for the Texas horned lizard, western burrowing owl, loggerhead shrike, and bat species would be impacted.

Under local alternative LD3b habitat for the Texas horned lizard, western burrowing owl, loggerhead shrike, and bat species would be impacted.

Under local alternative LD4 habitat for the Texas horned lizard, desert ornate box turtle, western burrowing owl, loggerhead shrike and bat species would be impacted.

Under local alternative LD4-Option 4 habitat for the Texas horned lizard, desert ornate box turtle, western burrowing owl, loggerhead shrike, and bat species would be impacted.

Under local alternative LD4-Option 5 habitat for the Texas horned lizard, desert ornate box turtle, western burrowing owl, loggerhead shrike and bat species would be impacted.

Under local alternative WC1 habitat for the Texas horned lizard, desert ornate box turtle, western burrowing owl, loggerhead shrike, and bat species would be impacted.

Operation and Maintenance

The operation and maintenance impact types to BLM Sensitive Species would be the same as described under subroute 2.1. The ROW length under all the local alternatives (LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1) would determine the relative chance for impacts to BLM sensitive avian species from striking the transmission lines and structures.

State of New Mexico Wildlife Conservation Act Species

Sixteen New Mexico Wildlife Conservation Act species were identified as possibly occurring on the local alternatives. Impacts on northern aplomado falcon and lesser long-nosed bat are addressed above in Federally Listed Species and lowland leopard frog is addressed above in BLM Sensitive Species. The remaining 14 species are addressed below. Potential impacts for all local alternatives would be similar in nature to those described for subroute 2.1. Acres of impacts are given in table 4.8-21. There would be no detectable effect on the viability of these species from Project-related activities or contribution towards a downward population trend or listing of these species as threatened or endangered.

Construction

Local alternative LD1 would intersect habitat for the Gila monster, Gila woodpecker, Bell's vireo, varied bunting, Abert's towhee, Arizona grasshopper sparrow, peregrine falcon, Lucifer hummingbird, and desert bighorn sheep.

Local alternative LD2 would intersect with habitat for Gila monster, Gila woodpecker, Bell's vireo, varied bunting, Abert's towhee, Arizona grasshopper sparrow, peregrine falcon, Lucifer hummingbird, and desert bighorn sheep.

Local alternative LD3a would intersect with habitat for Gila monster, Gila woodpecker, Bell's vireo, varied bunting, Abert's towhee, Arizona grasshopper sparrow, peregrine falcon, Lucifer hummingbird, and desert bighorn sheep.

Local alternative LD3b would intersect with habitat for Gila monster, Gila woodpecker, Bell's vireo, varied bunting, Abert's towhee, Arizona grasshopper sparrow, peregrine falcon, Lucifer hummingbird, and desert bighorn sheep.

Local alternative LD4 would intersect with habitat for Gila monster, Gila woodpecker, Bell's vireo, varied bunting, Abert's towhee, Arizona grasshopper sparrow, peregrine falcon, Lucifer hummingbird, and desert bighorn sheep.

Local alternatives LD4-Option 4, LD4-Option 5, and WC1 would not occur in New Mexico.

Operation and Maintenance

Potential operational and maintenance impacts on State of New Mexico Wildlife Conservation Act species would be as described for subroute 2.1.

State of Arizona Wildlife Species of Concern

Eight Arizona listed Wildlife Species of Concern were identified as possible to occur in the local alternatives routes. One of these species, white-faced ibis is addressed in the "BLM Sensitive Species" section. The other seven species are addressed below. Acres of impacts are given in table 4.8-21. There

would be no detectable effect on the viability of these species from Project-related activities or contribution towards a downward population trend or listing of these species as threatened or endangered.

Construction

Local alternative LD1 would intersect habitat for pocketed free-tailed bat, western red bat, Bell's vireo, Abert's towhee, Gila woodpecker, bank swallow, and yellow warbler.

Local alternative LD4 would intersect habitat for pocketed free-tailed bat, western red bat, Bell's vireo, Abert's towhee, Gila woodpecker, bank swallow, and yellow warbler.

Local alternative LD4-Option 4 would intersect habitat for pocketed free-tailed bat, western red bat, Bell's vireo, Abert's towhee, and Gila woodpecker.

Local alternative LD4-Option 5 would intersect habitat for pocketed free-tailed bat, western red bat, Bell's vireo, Abert's towhee, and Gila woodpecker.

Local alternative WC1 would intersect habitat for pocketed free-tailed bat, Bell's vireo, Abert's towhee, and Gila woodpecker.

Operation and Maintenance

Potential operational and maintenance impacts on Arizona listed Wildlife Species of Concern species would be as described above for subroute 2.1.

State of New Mexico Species of Greatest Conservation Need

Seventeen New Mexico Species of Greatest Conservation Need were identified as possibly occurring within the local alternatives. Of these, seven are addressed above (white-faced ibis and spotted bat are addressed in the "BLM Sensitive Species" section and Bell's vireo, Abert's towhee, Gila woodpecker, peregrine falcon, and desert bighorn sheep are addressed in the "State of New Mexico Wildlife Conservation Act Species" section). The other 10 species are addressed below. Impacts on these species would be as previously described for subroute 2.1 with acreages of impacts given in table 4.8-21. There would be no detectable effect on the viability of these species from Project-related activities or contribution towards a downward population trend or listing of these species as threatened or endangered.

Local alternative LD1 would intersect with habitat for western red bat, pocketed free-tailed bat, northern pintail, eared grebe, American bittern, northern harrier, sandhill crane, yellow warbler, bank swallow, and Arizona toad. Habitat for American bittern and eared grebe would be avoided.

Local alternative LD2 could impact habitat for western red bat, pocketed free-tailed bat, northern harrier, yellow warbler, and Arizona toad.

Local alternative LD3a would intersect habitat for western red bat, pocketed free-tailed bat, northern harrier, yellow warbler, and Arizona toad.

Local alternative LD3b would intersect habitat for western red bat, pocketed free-tailed bat, northern harrier, yellow warbler, and Arizona toad.

Local alternative LD4 would intersect habitat for western red bat, pocketed free-tailed bat, northern pintail, eared grebe, American bittern, northern harrier, sandhill crane, yellow warbler, bank swallow, and Arizona toad. No structures, access roads or other disturbance would occur in American bittern and eared grebe habitat. Local alternatives LD4-Option 4, LD4-Option 5, and WC1 do not occur in New Mexico.

State of Arizona Species of Greatest Conservation Need

Ten Arizona Species of Greatest Conservation Need were identified as possibly occurring in the local alternatives. Of these 10 species, two are addressed above (the southwestern willow flycatcher is addressed in the "Federally Listed Species" section and the spotted bat is addressed in the "BLM Sensitive Species" section). The other eight species are addressed below. Acreages of impacts on these species are given in table 4.8-21. There would be no detectable effect on the viability of these species from Project-related activities or contribution towards a downward population trend or listing of these species as threatened or endangered.

Construction

Local alternative LD1 would intersect habitat for northern harrier, peregrine falcon, eared grebe, northern pintail, sandhill crane, American bittern, and Arizona toad. No structures, access roads or other disturbance would occur in American bittern and eared grebe habitat.

Local alternative LD4 would intersect habitat for desert bighorn sheep, northern harrier, peregrine falcon, sandhill crane, American bittern, and Arizona toad. No structures, access roads or other disturbance would occur in American bittern habitat.

Local alternative LD4-Option 4 would intersect habitat for northern harrier, peregrine falcon, and Arizona toad.

Local alternative LD4-Option 5 would intersect habitat for northern harrier, peregrine falcon, and Arizona toad.

Local alternative WC1 would intersect habitat for northern harrier, peregrine falcon, and Arizona toad.

Local alternative WC1could also impact sandhill cranes at Willcox Playa. Potential impacts from striking transmission lines and structures could occur at Willcox Playa. Local alternative WC1 would avoid crossing the daily migration corridor between Willcox Playa and the agricultural fields to the east. This alignment would have a lower likelihood of collisions of sandhill cranes and transmission lines/structures than the corresponding segment of subroute 2.1.

Operation and Maintenance

Potential operational and maintenance impacts on Species of Greatest Conservation Need species would be as described above for subroute 1.1.

Migratory Birds

Impacts on Migratory Birds from the local alternatives would be similar to those described above for subroute 1.1.

Construction

A total of 69.3 acres of agricultural lands would occur within the analysis area for local alternative LD1, of which approximately 15.9 acres would be disturbed. Also present in the analysis area for alternative LD 1 would be12.4 acres of North America Warm Desert Riparian Mesquite Bosque, of which 2.9 acres would be disturbed. Local alternative LD1 would cross approximately 202.2 acres of the Lordsburg Playa avian protection area. Approximately 46.5 acres of this area would be disturbed.

A total of 1.3 acres of agricultural lands would occur within the analysis area for local alternative LD4, of which 0.3 acre would be disturbed. Also present in the analysis area for alternative LD4 would be 2.2 acres of North America Warm Desert Riparian Mesquite Bosque, of which 0.5 acre would be disturbed.

No wetlands or bodies of perennial water would occur in the analysis area for any of the local alternatives according to the National Wetlands Inventory. However, SWReGAP mapping shows 13.5 acres of North America Arid West Emergent Marsh for alternative LD1. Marsh areas would be avoided to the extent possible.

Operation and Maintenance

The habitats and land cover types mentioned above may harbor higher concentration of migratory birds than surrounding areas, and may thus be associated with an elevated risk of collision events. However, that risk would still be unlikely to reach population-level impacts for most species.

The ROW for local alternative LD1 falls within approximately 0.1 mile of a ridge in the Peloncillo Mountains (see table 4.8-22), raising the possibility of somewhat higher impacts on migratory birds.

Wildlife Special Designation Areas

Impacts on Wildlife Special Designation Areas would be as described for subroute 1.1 for all local alternatives.

Construction

Local alternatives LD2 and LD4-Option4 would not cross any Wildlife Special Designation Areas.

Wildlife designated habitat for the northern aplomado falcon, desert bighorn sheep, and the Peloncillo Bighorn Avoidance Area would occur within the ROW for local alternative LD1. The northern aplomado habitat would occur on approximately 102.2 acres of which 23.5 would be disturbed. Desert bighorn habitat would occur on approximately 41.5 acres of which 9.5 would be disturbed. Approximately 33.2 acres of the Peloncillo Bighorn Avoidance Area occur within the ROW. Of this area 7.6 acres would be disturbed. Local alternative LD1 would cross the Willcox Playa-Winchester-Pinaleño-Dos Cabezas and Pinaleño-Dos Cabezas-San Simon Valley PLZs on approximately 460.3 acres of which 105.9 acres would be disturbed.

Local alternative LD3b would cross approximately 3.5 acres of desert bighorn habitat, of which 0.8 acre would be disturbed.

Local alternative LD4 would cross the Willcox Playa-Winchester-Pinaleño-Dos Cabezas and Pinaleño-Dos Cabezas-San Simon Valley, and the Pinaleno- San Simon Valley PLZs on approximately 311.7 acres of which 71.7 acres would be disturbed.

Local alternative LD4-Option 5 would cross the Willcox Playa-Winchester-Pinaleño-Dos Cabezas and Pinaleño-Dos Cabezas-San Simon Valley PLZs on approximately 296.8 acres of which 68.3 acres would be disturbed.

Local alternative WC-1 would cross the Willcox Playa-Winchester-Pinaleño-Dos Cabezas PLZ on approximately 355.2 acres of the ROW, of which approximately 81.7 acres would be disturbed. It would also cross approximately 2.2 acres of the Willcox Playa/Lake Cochise I Important Bird Area, of which 0.5 acre would be disturbed.

Operation and Maintenance

Potential operation and maintenance impacts on desert bighorn habitat and the Peloncillo Bighorn Avoidance Area would be as described above for subroute 1.1. Potential operation and maintenance impacts on northern aplomado falcon would be as described above for subroute 2.1. Impacts on Special Designations, including designated northern aplomado falcon habitat, are analyzed in section 4.12.

Route Group 3 – Apache Substation to Pantano Substation

Tables 4.8-23 and 4.8-24 show impact acreages by habitat type for route group 3.

Table 4.8-23. Route Group 3 Wildlife Resource Inventory Data

Habitat Type	Subroute 3.1 (acres)	Local Alternative H (acres)
Agriculture	29.3	9.3
Apacherian-Chihuahuan Mesquite Upland Scrub	407.8	198.1
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	255.8	62.8
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	132.3	38.3
Chihuahuan Mixed Salt Desert Scrub	38.4	35.3
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	-	0.6
Developed, Medium - High Intensity	60.8	1.7
Developed, Open Space- Low Intensity	25.2	-
Madrean Encinal	0.3	1.3
Mogollon Chaparral	3.8	-
North American Arid West Emergent Marsh	3.4	-
North American Warm Desert Bedrock Cliff and Outcrop	3.6	-
North American Warm Desert Riparian Mesquite Bosque	1.9	2.8
Open Water	0.7	-
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	90.3	-
Sonoran Mid-Elevation Desert Scrub	14.1	-
Sonoran Paloverde-Mixed Cacti Desert Scrub	210.7	-

Table 4.8-24. Route Group 3 Wildlife Resource Inventory Data for Substations and Staging Areas

Habitat Type	Subroute 3.1 (acres)	Local Alternative H (acres)
Apacherian-Chihuahuan Mesquite Upland Scrub	0.2	-
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	25.0	-
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	0.3	-

Table 4.8-25 gives the acreages of impacts on general wildlife and special status species for route group 3.

1 **Table 4.8-25.** Route Group 3 Acres of Impacts on Wildlife

Common name	Subroute 3.1	Local Alt H
General Wildlife	376.3	98.1
Federally Listed Species		
Lesser long-nosed bat	323.4	94.6
Mexican long-nosed bat	323.4	94.6
Southwestern willow flycatcher	0	0
Sprague's pipit	50.3	17.9
Western yellow-billed cuckoo	0	0
Northern Mexican gartersnake	0	0
Sonoran desert tortoise	250.8	77.1
Gila chub	0	0
BLM Sensitive Species		
Allen's big-eared bat	0.5	0.8
Arizona myotis	0	0
Banner-tailed kangaroo rat	71.6	17.6
California leaf-nosed bat	136.1	20.8
Cave myotis	125.3	10.7
Greater western mastiff bat	88.3	0
Mexican long-tongued bat	250.3	76.2
Pale Townsend's big-eared bat	250.3	76.2
Spotted bat	250.8	77.0
American peregrine falcon	323.4	94.6
Arizona grasshopper sparrow	159.9	17.6
Bald eagle	323.4	94.6
Desert purple martin	88.8	0.8
Gilded flicker	88.8	0.8
Golden eagle	323.4	94.6
Western burrowing owl	321.9	93.9
Arizona striped whiptail	71.6	17.6
Desert ornate box turtle	233.6	93.8
Sonoran mud turtle	0	0
Lowland leopard frog	0	0
Coronado National Forest Sensitive Species		
Cockrum's desert shrew	1.2	-
Greater western mastiff bat	2.5	-
Hooded skunk	2.5	-
Northern pygmy mouse	2.5	-
Pale Townsend's big-eared bat	2.5	-
Plains harvest mouse	2.0	-
Yellow-nosed cotton rat	2.0	-

Table 4.8-25. Route Group 3 Acres of Impacts on Wildlife (Continued)

Common name	Subroute 3.1	Local Alt H
Coronado National Forest Sensitive Species, cont'd.		
Abert's towhee	1.2	-
American peregrine falcon	2.5	-
Arizona grasshopper sparrow	2.0	-
Western burrowing owl	2.5	-
Reticulate Gila monster	2.5	-
Coronado National Forest Management Indicator Species		
White-tailed deer	2.5	-
American peregrine falcon	2.5	-
Bell's vireo	1.2	-
State of Arizona Wildlife Species of Concern		
Antelope jackrabbit	166.9	17.6
Harris' antelope squirrel	136.1	20.8
Mexican free-tailed bat	136.1	20.8
Common nighthawk	394.1	22.0
Dusky-capped flycatcher	1.2	0.4
Gila woodpecker	308.7	76.7
Rufous-winged sparrow	72.2	18.4
Savannah sparrow	71.6	17.6
Yellow warbler	1.5	1.2
Hooded nightsnake	324.9	95.0
Desert ornate box turtle	207.7	38.2
Regal horned lizard	214.8	38.4
Sonoran coralsnake	207.7	38.2
Sonoran whipsnake	167.9	17.5
Tiger rattlesnake	250.3	34.0
State of Arizona Species of Greatest Conservation Need		
American bittern	0	0
Lincoln's sparrow	9.9	4.3
Mississippi kite	1.9	1.1
Western grasshopper sparrow	80.0	11.2
Wood duck	0	-

SUBROUTE 3.1 – PROPONENT PREFERRED

General Wildlife

Construction

Impacts on general wildlife species would be as described above for subroute 1.1. However, as the analysis area has been previously disturbed for the existing transmission line and access roads the scope of impacts would be less than for route groups 1 and 2. Disturbance to wildlife habitat would occur on approximately 28 percent of the analysis area in route groups 3 and 4. Acreages of impacts on general wildlife habitat are given in table 4.8-25. Based on the amount of habitat for general wildlife in the analysis area it is not anticipated that subroute 2.2 would cause any significant population-level impacts for these species or contribute towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Impacts from the operation and maintenance of subroute 3.1 would be as described above for subroute 1.1.

Special Status Species

Federally Listed Species

Within this route group, seven species were identified as having the potential to occur because the analysis area would be within their ranges and habitat parameters would be present: the lesser long-nosed bat, Mexican long-nosed bat, northern Mexican gartersnake, Sonoran desert tortoise, southwestern willow flycatcher, Sprague's pipit, and western yellow-billed cuckoo. In addition, designated critical habitat for the Gila chub (*Gila intermedia*) occurs downstream of the Project along Cienega Creek and north of I-10. While there is no habitat for the Gila chub in the analysis area, impacts could occur that would affect the species' designated critical habitat. Potential impacts to these species are discussed below. Acreages of impacts on these species are given in table 4.8-25.

In addition, six other species, the California least tern (*Sterna antillarum browni*), Chiricahua leopard frog, Gila topminnow (*Poeciliopsis occidentalis occidentalis*), jaguar (*Panthera onca*), Mexican spotted owl (*Strix occidentalis lucida*), and ocelot, could also occur but would be considered unlikely to occur because although habitat parameters may be present, the analysis area within this route group would not be within the species' typical range or vice versa (i.e., the route group would be within the known range, but habitat parameters would not be present). Therefore the Project activities in the Apache to Pantano route group would have no effect to the populations of California least tern, Chiricahua leopard frog, Gila topminnow, jaguar, or ocelot.

Construction

Construction-related impacts would be similar to those described for route groups 1 and 2. However, as the ROW has been previously disturbed for the existing transmission line and access roads the scope of impacts would be less than for route groups 1 and 2.

Potential impacts on the lesser long-nosed bat and Mexican long-nosed bat from construction activities would include foraging habitat loss and disturbance. Habitat for these species along subroute 3.1 is within 40 miles of a known roost site and is therefore within the foraging range of the species. However, there would be no roost sites in the ROW that would provide shelter for this species. Habitat disturbance would

result in fragmentation of foraging areas for this bat species. Based on the amount of available foraging habitat in the analysis area, construction-related activities would have no detectable effect on the viability of this species.

Potential impacts on northern Mexican gartersnake from construction-related activities would include those described above as common to all reptile species. The ROW would cross northern Mexican gartersnake proposed critical habitat at two locations; approximately 1,550 feet across the San Pedro River in segment U2 and approximately 1,280 feet across Cienega Creek at Empirita Ranch in segment U3a. As siting of structures would be done to avoid critical habitat and riparian habitat, no disturbance would occur in the riparian area, and access would come from outside of habitat and proposed critical habitat for the species, construction-related impacts would avoid impacts on this species' and its proposed critical habitat.

Potential impacts on Sonoran desert tortoise from construction-related activities would include those described above as common to all reptile species. However, route group 3.1 would not intersect with any BLM designated category of desert tortoise habitat. Based on the amount of available Sonoran desert tortoise habitat in the analysis area, there would be no detectable effect on the viability of this species or that would contribute towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on southwestern willow flycatcher from construction activities in this subroute group would include those described above as common to all bird species. However, there would be no perennial or intermittent waterways in this subroute that would provide appropriate vegetation structure for nesting habitat for this species and this subroute group would not intersect with any designated critical habitat for this species. Foraging and migratory habitat for the species along the San Pedro River and Cienega Creek would be spanned and no Project-related ground disturbance would occur in those areas. Based on the lack of nesting habitat, the mobility of the species, and mitigation to avoid impacting riparian habitat construction-related activities would have no detectable effect on individuals or the viability of this species.

Potential impacts on Sprague's pipit from construction activities would include those described for subroute 1.1. Based on the amount of habitat in the analysis area there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on western yellow-billed cuckoo from construction activities in this subroute group would include those described above as common to all bird species. However, there would be no large cottonwood and willow galleries that would provide nesting habitat for this species in the area to be disturbed. Foraging and migratory habitat for the species along the San Pedro River and Cienega Creek would be spanned and no Project-related ground disturbance would occur in those areas. Based on the lack of nesting habitat, no impacts to foraging and migratory habitat, and the mobility of the species, construction-related activities would have no detectable effect on individuals or the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on Gila chub designated critical habitat could include increased sedimentation levels downstream from the Project. As the proposed ground-disturbing activities would not occur within the area of riparian vegetation along Cienega Creek, no equipment would be used in the riparian area, access roads would avoid the riparian area and approach Cienega Creek from both sides of the creek, and erosion control measures would be in place there would be no Project-related sedimentation or channel alterations at Cienega Creek that could impact designated critical habitat for the Gila chub. Therefore, there would be no impacts on designated critical habitat for the Gila chub.

Operation and Maintenance

There would likely not be operational or maintenance impacts to lesser long-nosed bats and Mexican long-nosed bats or their habitat under this subroute group.

There would likely not be operational or maintenance impacts to individual Sonoran desert tortoise or to any populations of Sonoran desert tortoise or habitat under this subroute group.

There would likely not be operational or maintenance impacts to individual northern Mexican gartersnake or to any populations of northern Mexican gartersnake or habitat under this subroute group.

There would likely not be operational or maintenance impacts to individual southwestern willow flycatchers or to any populations of southwestern willow flycatchers or designated critical habitat under this subroute group.

Potential impacts on Sprague's pipit from operation and maintenance activities would include those described above for subroute 1.1.There would be no operational or maintenance impacts to Sprague's pipit winter or migratory habitat. Therefore, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on western yellow-billed cuckoo from operation and maintenance activities would include those described above as common to all bird species. There would be no operational or maintenance impacts to western yellow-billed cuckoo habitat. Individuals may experience impacts common to migratory birds during migration as they move through the subroute group during construction with the potential for strikes to transmission lines and structures (see migratory species impacts described below). However, given the size and mobility of this species, it would be anticipated to be a very low potential for collisions. Therefore, there would be no detectable effects on the viability of the western yellow-billed cuckoo or contribution towards a downward population trend or listing of this species as threatened or endangered.

BLM Sensitive Species

Of the 45 species listed as BLM Sensitive Species for this region (the Gila District), 21 species were identified as having the potential to occur because the analysis area would be within the species' range and habitat parameters would be present. These species include the lowland leopard frog, Arizona striped whiptail (*Aspidoscelis arizonae*), Sonoran mud turtle (*Kinosternon sonoriense sonoriense*), desert ornate box turtle, Arizona grasshopper sparrow, western burrowing owl, golden eagle, gilded flicker (*Colaptes chrysoides*), American peregrine falcon, bald eagle, desert purple martin (*Progne subis hesperia*), Mexican long-tongued bat, pale Townsend's big-eared bat, banner-tailed kangaroo rat (*Dipodomys spectabilis*), spotted bat, greater western mastiff bat, Allen's big-eared bat, California leaf-nosed bat, Arizona myotis (*Myotis occultus*), and cave myotis. Mexican long-tongued bat is addressed above in the "Federally Listed Species" section.

In addition, five other species—longfin dace, Slevin's bunchgrass lizard, Arizona Botteri's sparrow (*Aimophila botterii arizonae*), the ferruginous hawk, and the black-tailed prairie dog—could also occur but would be considered unlikely to occur because either habitat parameters would be present (e.g., healthy grasslands for black-tailed prairie dog), but the analysis area within this route group would not be within the species' typical range, or the analysis area would be within the species' typical range, but habitat parameters would not be present (e.g., perennial streams for longfin dace). There would be no effect on these species' habitat and no detectable effect on the viability of these species from Project-

related activities or that would contribute towards a downward population trend or listing of these species as threatened or endangered.

Construction

Construction-related impacts would be similar to those described for route groups 1 and 2. However, as the ROW has been previously disturbed for the existing transmission line and access roads the scope of impacts would be less than for route groups 1 and 2. Acres of impacts are given in table 4.8-25.

Potential impacts on lowland leopard frog from construction activities would include those described above as common to all amphibian species. However, there would be no perennial waterways in this subroute and pole structures and laydown areas would not be placed in ephemeral or intermittent waterways that could provide dispersal habitats for toads or frogs. There would be no impacts on these species' habitat and no detectable effect on the viability of these species by Project-related activities or that would contribute towards a downward population trend or listing of these species as threatened or endangered.

Potential impacts on Arizona striped whiptail, Sonoran mud turtle, and desert ornate box turtle from construction-related activities would include those described above as common to all reptile species. Construction-related impacts would be temporary and negligible to the species and consist of a small detectable long-term disturbance of the species' habitat. Based on the amount of available reptile habitat in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of any of these species as threatened or endangered.

Potential impacts on Arizona grasshopper sparrow, western burrowing owl, golden eagle, gilded flicker, American peregrine falcon, bald eagle, and desert purple martin from construction activities in this subroute group would include those described above as common to all bird species. Based on the amount of available bird nesting habitat in the analysis area, construction-related activities would have no detectable effect on the viability of any of these bird species or contribute towards a downward population trend or listing of the species as threatened or endangered.

Potential impacts on the banner kangaroo rat from construction-related activities would include those described above as common to all mammal species. Based on the amount of available small mammal habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on the eight bat species noted above from construction activities would include those described above for subroute 1.1. However, there would be no roost or nest sites in the Project footprint that would provide shelter for these species. Based on the amount of available foraging habitat in the analysis area, construction-related activities would have no detectable effect on the viability of these species or to contribute towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential impacts from operation and maintenance activities to the western burrowing owl, golden eagle, gilded flicker, American peregrine falcon, bald eagle, and desert purple martin would be related to the potential for individuals striking the transmission lines and structures.

Mexican long-tongued bat, pale Townsend's big-eared bat, spotted bat, greater western mastiff bat, Allen's big-eared bat, California leaf-nosed bat, Arizona myotis, cave myotis, plains leopard frog, lowland leopard frog, Sonoran green toad, Arizona striped whiptail, Sonoran mud turtle, desert ornate box

turtle, and banner-tailed kangaroo rat would likely not experience operational or maintenance impacts detectable at the population level or contribute to a downward population trend or listing of these species as threatened or endangered.

Coronado National Forest Sensitive Species and Management Indicator Species

Coronado National Forest Sensitive Species

The area of the Coronado National Forest that would be crossed by subroute 3.1 would be approximately 0.5 mile in length and would follow the route of the existing transmission line. Of the 87 species listed as USFS sensitive in Coronado National Forest, 12 are identified as possible to occur because the analysis area would be within their ranges and habitat parameters would be present. These species include the reticulate Gila monster (*Heloderma suspectum suspectum*), Arizona grasshopper sparrow, western burrowing owl, American peregrine falcon, Abert's towhee, northern pygmy mouse (*Baiomys taylori ater*), pale Townsend's big-eared bat, greater western mastiff bat, hooded skunk (*Mephitis macroura milleri*), Cockrum's desert shrew (*Notiosorex cockrumi*), plains harvest mouse (*Reithrodontomys montanus*), and yellow-nosed cotton rat.

For all other sensitive species the analysis area would be either outside of the known range, would not contain habitat or both. There would be no effect on these species habitat and no detectable effect on the viability of these species from Project-related activities or that would contribute towards a downward population trend or listing of these species as threatened or endangered.

Construction

Construction-related impacts would be similar to those described for route groups 1 and 2. However, as the ROW has been previously disturbed for the existing transmission line and access roads and the area of Coronado National Forest to be crossed is only 0.5 mile in length, the scope of impacts would be minimal. Acres of impacts are given in table 4.8-25.

Potential impacts to the reticulate Gila monster would include those described above as common to all reptile species. Gila monsters shelter in burrows and rock outcrops for shade and as winter hibernacula and would be susceptible to being crushed by construction equipment. These construction-related impacts would be temporary to individuals and consist of a small detectable long-term effect to this species' habitat within Coronado National Forest. Based on the amount of available reticulate Gila monster habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts to the Arizona grasshopper sparrow from construction activities in this subroute group would include those described above as common to all bird species. These construction-related impacts would be temporary to individuals and consist of a small detectable long-term effect to this species' habitat within the Coronado National Forest. Based on the amount of available habitat in the analysis area, there would be no detectable effect on the viability of this species or to contribute towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on Abert's towhee, American peregrine falcon, and western burrowing owl from construction activities in this subroute group would be as described above for subroute 1.1. Based on the amount of available western burrowing owl habitat in the analysis area, construction-related activities would have no detectable effect on the viability of this species or contribute towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts from construction activities on the northern pygmy mouse, Cockrum's desert shrew, plains harvest mouse, yellow-nosed cotton rat, and hooded skunk would include those described as common to all mammals. Based on the amount of available habitat for these species in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Potential impacts from construction on the pale Townsend's big-eared bat and the greater western mastiff bat would include habitat disturbance. It is unlikely that construction would impact any roost sites as the pale Townsend's big-eared bat typically roosts in abandoned mines and buildings (AGFD 2003) and the greater western mastiff bat roosts in horizontal crevices usually in steep canyon walls (AGFD 2002). If roost sites were present in construction areas there would be the possibility that bats could be flushed. Based on the lack of roost sites and the amount of available habitat for these species in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Operation and Maintenance

Potential impacts from operation and maintenance activities to the Arizona grasshopper sparrow, American peregrine falcon, and Abert's towhee would be related to individuals striking the transmission lines and structures. Additionally, transmission structures may provide roosting sites for bat species. Transmission structures may increase the presence of avian predators, primarily raptors and ravens, in the analysis area and increase predation on the northern pygmy mouse, Cockrum's desert shrew, plains harvest mouse, and yellow-nose cotton rat. Reticulate Gila monster, western burrowing owl, hooded skunk, and the bat species would likely not experience operational and maintenance impacts detectable at the population level.

Coronado National Forest Management Indicator Species

Coronado National Forest lists 33 species in total, as well as general groups of primary and secondary cavity nesters, as management indicator species across eight management groups. MIS are "Plant and animal species, communities or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (FSM 2620.5). Based on range and habitat, three MIS are identified as possible to occur within the analysis area. These species include Bell's vireo, American peregrine falcon, and white-tailed deer (*Odocoileus virginianus couesi*). For all other MIS the analysis area would be either outside of the species' known range, would not contain habitat for the species, or both.

Construction

Bell's vireo is an indicator species in the riparian species, species needing dense canopy, and threatened and endangered species management groups. Potential impacts on Bell's vireo from construction activities include those described above as common to all bird species. Based on the amount of available Bell's vireo habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

The American peregrine falcon is an indicator species in the threatened and endangered management group. Potential impacts from construction activities on the American peregrine falcon would be as described above for the Coronado National Forest sensitive species.

The white-tailed deer is an indicator species in the species needing diversity, species needing herbaceous cover, and game species management groups. Potential impacts from construction activities on the white-tailed deer include those described above as common to all species with collisions, habitat loss, and habitat fragmentation being the most likely to occur. Based on the amount of available white-tailed deer habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Operation and Maintenance

Potential impacts from operation and maintenance activities to Bell's vireo and the American peregrine falcon would be related to individuals striking the transmission lines and structures. White-tailed deer would likely not experience operational and maintenance impacts detectable at the population level.

State of Arizona Wildlife Species of Concern

In total, 15 Wildlife Species of Concern were identified as possible to occur because the analysis area would be within the species' range and habitat parameters for the species would be present. These species include antelope jackrabbit (*Lepus alleni*), common nighthawk (*Chordeiles minor*), dusky-capped flycatcher (*Myiarchus tuberculifer*), Gila woodpecker, Harris' antelope squirrel (*Ammospermophilus harrisii*), hooded nightsnake (*Hypsiglena* sp. *nov*.)**,** Mexican free-tailed bat (*Tadarida brasiliensis*), desert ornate box turtle, regal horned lizard (*Phrynosoma solare*), rufous-winged sparrow (*Aimophila carpalis*), savannah sparrow (*Passerculus sandwichensis*), Sonoran coralsnake (*Micruroides euryxanthus*), Sonoran whipsnake (*Coluber bilineatus*), tiger rattlesnake (*Crotalus willardi obscurus*), and yellow warbler. Acres of impacts on these species are given in table 4.8-25.

Six additional Wildlife Species of Concern—white-tailed deer, kit fox (*Vulpes macrotis*), American beaver (*Castor canadensis*), northern rock mouse (*Peromyscus nasutus*), banded rock rattlesnake (*Crotalus lepidus klauberi*), and Sonoran Desert toad (*Incilius alvarius*)— would be unlikely to occur within the analysis area because it would be either outside of the species' known range, would not contain habitat for the species, or both. There would be no effect on these species' habitat and no detectable effect on the viability of these species by Project-related activities or that would contribute towards a downward population trend or listing of these species as threatened or endangered.

Construction

Potential impacts from construction on antelope jackrabbit and Harris' antelope squirrel include those described as common to all mammals. Based on the amount of available habitat for these two species in the analysis area, there would be no detectable effect on the viability of these species and it would not contribute towards a downward population trend or listing of these species as threatened or endangered.

Potential impacts on common nighthawk, dusky-capped flycatcher, Gila woodpecker, rufous-winged sparrow, savannah sparrow, and yellow warbler from construction activities would include those described above as common to all bird species. Based on the amount of available foraging and breeding habitat in the analysis area, construction-related activities would have no detectable effect on the viability of these species and it would not contribute towards a downward population trend or listing of these species as threatened or endangered.

Potential impacts on Mexican free-tailed bat from construction activities would include habitat disturbance. Based on the amount of available foraging and breeding habitat in the analysis area, construction-related activities would have no detectable effect on the viability of these species and would not contribute towards a downward population trend or listing of these species as threatened or endangered.

Potential impacts to the desert ornate box turtle, hooded nightsnake, regal horned lizard, Sonoran coralsnake, Sonoran whipsnake, and tiger rattlesnake from construction activities would include those described above as common to all reptile species. Based on the amount of available habitat in the analysis area, there would be no detectable effect on the viability of these species and no contribution towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential impacts from operation and maintenance activities to the common nighthawk, dusky-capped flycatcher, Gila woodpecker, rufous-winged sparrow, savannah sparrow, and yellow warbler would be related to individuals striking the transmission conductors. Additional impacts may occur to antelope jackrabbit, Harris' antelope squirrel, ornate box turtle, regal horned lizard, Sonoran coralsnake, Sonoran whipsnake, and tiger rattlesnake due to increased predation from raptors hunting from transmission lines and structures. No operation or maintenance impacts are expected for the Mexican free-tailed bat.

State of Arizona Species of Greatest Conservation Need

In total, five Species of Greatest Conservation Need were identified as possible to occur because the analysis area would be within the species' range and habitat parameters for the species would be present. These species include American bittern, Lincoln's sparrow (*Melospiza lincolnii*), Mississippi kite, western grasshopper sparrow (*Ammodramus savannarum perpallidus*), and wood duck (*Aix sponsa*). Acres of impacts on these species are given in table 4.8-25.

Two additional Species of Greatest Conservation Need, southern pocket gopher (*Thomomys umbrinus*), and sulphur-bellied flycatcher (*Myiodynastes luteiventris*) would be unlikely to occur within the analysis area because it would be either outside of the species' known range, would not contain habitat for the species, or both. There would be no effect on this species' habitat and no detectable effect on the viability of this species by Project-related activities or contribution towards a downward population trend or listing of this species as threatened or endangered.

Construction

Construction-related impacts would be similar to those described for route groups 1 and 2. However, as the ROW has been previously disturbed for the existing transmission line and access roads, the scope of impacts would be less than for route groups 1 and 2. There would be no effect on the viability of this species by Project-related activities or that would contribute towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on American bittern, Lincoln's sparrow, Mississippi kite, western grasshopper sparrow, and wood duck from construction activities would include habitat disturbance and those described above as common to all bird species.

Operation and Maintenance

Potential impacts from operation and maintenance activities to the American bittern, Lincoln's sparrow, Mississippi kite, western grasshopper sparrow, and wood duck would be related to individuals striking the transmission lines and structures. There would be no detectable effect on the viability of these species by Project-related activities or contribution towards a downward population trend or listing of this species as threatened or endangered.

Migratory Birds

Impacts on migratory birds would be as previously described for subroute 1.1.

Construction

Construction-related impacts would be similar to those described for route groups 1 and 2. However, as the ROW has been previously disturbed for the existing transmission line and access roads, the scope of impacts would be less than for route groups 1 and 2.

The ROW for subroute 3.1 contains a total of 29.3 acres of agricultural lands, found along segments U1a and U2, of which 8.2 acres would be disturbed.

A total of 1.9 acres of North America Warm Desert Riparian Mesquite Bosque would occur in the ROW of subroute 3.1, of which approximately 0.5 acre would be disturbed. The two segments with North America Warm Desert Riparian Mesquite Bosque would be U1a (0.3 acre) and U3a (1.6 acres).

According to the National Wetlands Inventory, 157 feet of perennial water and two wetlands totaling 3.05 acres occur within the ROW along segment U2. SWReGAP mapping indicates 3.4 acres of North American Arid West Emergent Marsh and 0.7 acre of open water along U2. The body of perennial water and wetlands mapped within the ROW for subroute 3.1 would be located along the San Pedro River. Construction-related impacts to the river and associated wetlands would be related to the construction of the transmission line structures and temporary access roads.

Proposed structure locations would incorporate avoidance and BMPs to avoid any wetland and open water. Construction of access roads would likely not impact the San Pedro River and Cienega Creek within the ROW and downstream with the incorporation of avoidance measures and BMP implementation.

Operation and Maintenance

The land cover types above may harbor higher concentration of migratory birds than surrounding areas, and may thus be associated with an elevated risk of collision events. That risk would still be unlikely to reach population-level impacts for all species, but the risk of collision for migratory birds would likely be influenced by the exact placement of the San Pedro River and Cienega Creek crossings.

Table 4.8-26 gives the proximity of areas with elevated terrain to the ROW in route group 3.

Table 4.8-26. Route Group 3 Proximity of Mountain Ridges and Low Passes to the ROW of Proposed Subroutes

Subroutes	Ridge or Low Pass	Distance (miles)
Subroute 3.1, Proponent Preferred	Low pass between the Dragoon Mountains and the Gunnison Hills	0.50
Route Group 3 Local Alternatives		
Local Alternatives for Subroute 3.1	NA*	NA

* No ridge or low pass present within proximity of any of the segments of the proposed subroute's ROW.
Note: NA = not applicable.

The ROW for route group 3 would not be near any mountain ridges and low passes and as such would have a decreased risk for impacts on migratory birds.

Wildlife Special Designation Areas

Impacts on Wildlife Special Designation Areas would be as described for subroute 1.1. However, as the ROW has been previously disturbed for the existing transmission line and access roads the scope of impacts would be less than for route groups 1 and 2**.**

Construction

Pima County Biological Core Management Areas, Important Riparian Areas, Multiple Use Management Areas, the Las Cienegas NCA, Pima County groundsnake PCA, Pima County Pima pineapple cactus PCA, and Bar V Ranch would all intersect with subroute 3.1. Pima County Biological Core Management Areas are managed to include a mitigation ratio of 5:1. Important Riparian Areas are managed to "…protect, restore, and enhance the structure and functions of Important Riparian Areas, including their hydrological, geomorphological, and biological functions." Multiple Use Management Areas are managed to include a mitigation ratio of 2:1.

Approximately 137.2 acres of the rufous-winged sparrow PCA would intersect the ROW with 38.4 acres of disturbance. Approximately 349.3 acres of the Pima pineapple cactus PCA would intersect the ROW with 97.8 acres of disturbance.

Biological Core Management Areas would intersect the ROW on approximately 315.1 acres, of which 88.2 acres would be disturbed. Important Riparian Areas would intersect with the ROW on approximately 15.2 acres, of which 4.3 acres would be disturbed. Mitigation to minimize disturbance in riparian areas would reduce the construction-related impacts. Multiple Use Management Areas would intersect the ROW on approximately 41.8 acres of which 11.7 would be disturbed. Impacts on Pima County Biological Core Management Areas, Important Riparian Areas, and Multiple Use Management Areas would require mitigation. A compensatory mitigation plan would be developed upon completion of final plans for the proposed Project.

Empirita Ranch would intersect the ROW on approximately 91.0 acres of which 25.5 would be disturbed. The Bar V Ranch would intersect the ROW on approximately 107.1 acres of which 30.0 acres would be disturbed.

Potential impacts on special designation areas from subroute 3.1 would include direct ground disturbance and temporary increases in ambient noise levels in areas where the transmission line, substations, and ancillary facilities intersect with special designations. Impacts on Special Designations, including Empirita Ranch and Bar V Ranch, are analyzed in section 4.12.

Subroute 3.1 would cross the Galiuro-Winchester-Dragoon PLZ, the Rincon-Whetstone-Santa Rita PLZ, and the Rincon-Santa Rita-Whetstone PLZ. Approximately 873.3 acres of the ROW intersects with these PLZs of which 244.5 acres would be disturbed. Impacts would be as described above for subroute 2.1.

Operation and Maintenance

Potential operation and maintenance would include potential conflicts with management objectives for the special designation areas.

Local Alternatives

There is one local alternative for route group 3–local alternative H. Acres of impacts from local alternative H are given in table 4.8-25. Based on the amount of habitat in the analysis area it is not

anticipated that local alternative H would cause any significant population-level impacts for these species or contribution towards a downward population trend or listing of this species as threatened or endangered.

General Wildlife

Construction

Impacts on general wildlife species would be as described above for subroute 1.1. Disturbance to wildlife habitat would occur on approximately 28 percent of the ROW. No staging areas or substations would be proposed for local alternative H.

Operation and Maintenance

Potential impacts from the operation and maintenance of local alternative H would be as described above for subroute 1.1.

Special Status Species

Federally Listed Species

Within local alternative H, four species were identified as having the potential to occur because the analysis area would be within their ranges and habitat parameters would be present: the lesser long-nosed bat, northern Mexican gartersnake with proposed critical habitat, Sonoran desert tortoise, and Sprague's pipit. Potential impacts to these species are discussed below.

The remaining ESA listed species for Cochise County, Arizona would have no potential to occur within local alternative H.

Construction

Potential impacts on the lesser long-nosed bat from construction activities would be as described for subroute 3.1. Habitat for this species along local alternative H would be within 40 miles of a known roost site and is therefore within the foraging range of the species. However, there would be no roost or nest sites in the Project footprint that would provide shelter for this species. Based on the amount of available foraging habitat in the analysis area, construction-related activities would have no detectable effect on the viability of this species.

Potential impacts on northern Mexican gartersnake from construction-related activities would include those described above for subroute 3.1. Local alternative H would cross more than 2,100 feet of northern Mexican gartersnake proposed critical habitat at the San Pedro River. Construction-related impacts would avoid adverse modification to this species' proposed critical habitat, as structures would be designed to span the two critical habitat units and the specific siting of access roads would avoid those areas.

Potential impacts on Sonoran desert tortoise from construction-related activities would be as described for subroute 3.1. Local alternative H would not intersect with any BLM-designated category of desert tortoise habitat. Based on the amount of available Sonoran desert tortoise habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on Sprague's pipit from construction activities would be as described for subroute 1.1. There would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Operation and Maintenance

There would likely not be operational and maintenance impacts to lesser long-nosed bats, Sonoran desert tortoise, and Sprague's pipit or to any populations of these species under local alternative H. Therefore, there would be no detectable effect on the viability of these species.

There would likely not be operational impacts to northern Mexican gartersnake or to any populations of northern Mexican gartersnake under local alternative H. In addition, there would be no operational impacts to northern Mexican gartersnake proposed critical habitat.

BLM Sensitive Species

Of the 45 species listed as BLM Sensitive for this region (the Gila District), 15 species were identified as having the potential to occur in local alternative H because the analysis area would be within the species' range and habitat parameters would be present. These species include the lowland leopard frog, Sonoran mud turtle, desert ornate box turtle, gilded flicker, desert purple martin, Mexican long-tongued bat, pale Townsend's big-eared bat, banner-tailed kangaroo rat, spotted bat, greater western mastiff bat, Allen's big-eared bat, California leaf-nosed bat, Arizona myotis, and cave myotis. Acres of impacts on these species are given in table 4.8-25. Mexican long-tongued bat is addressed above in the "Federally Listed Species" section.

In addition, five other species—longfin dace, Slevin's bunchgrass lizard, Arizona Botteri's sparrow, ferruginous hawk, and black-tailed prairie dog—could also occur but would be considered unlikely to occur in local alternative H because either habitat parameters would be present (e.g., healthy grasslands for black-tailed prairie dog), but the analysis area within this route group would not be within the species' typical range, or the analysis area would be within the species' typical range, but habitat parameters would not be present (e.g., perennial streams for longfin dace).

Construction

Potential impacts on lowland leopard frog from construction activities would be as described for subroute 3.1. There would be no impacts on this species habitat and no detectable effect on the viability of this species by Project-related activities or contribute towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on Sonoran mud turtle and desert ornate box turtle would be as described above for subroute 3.1. Based on the amount of available reptile habitat in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of any of these species as threatened or endangered.

Potential impacts on gilded flicker and desert purple martin from construction activities in local alternative H would be as described in subroute 3.1. Based on the amount of available bird nesting habitat in the analysis area, construction-related activities would have no detectable effect on the viability of these bird species or contribution towards a downward population trend or listing of the species as threatened or endangered.

Potential impacts on the banner-tailed kangaroo rat from construction-related activities would be as described in subroute 3.1. Based on the amount of available small-mammal habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on the eight bat species noted above from construction activities would be as described for subroute 3.1. Based on the amount of available foraging habitat in the analysis area, construction-

related activities would have no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential impacts from operation and maintenance activities to the gilded flicker, and desert purple martin would be related to the potential for individuals striking the transmission lines.

Lowland leopard frog, Sonoran mud turtle, desert ornate box turtle, banner-tailed kangaroo rat, Mexican long-tongued bat, pale Townsend's big-eared bat, spotted bat, greater western mastiff bat, Allen's big-eared bat, California leaf-nosed bat, Arizona myotis, and cave myotis would likely not experience operational and maintenance impacts detectable at the population level or contribution towards a downward population trend or listing of these species as threatened or endangered.

State of Arizona Wildlife Species of Concern

In total, 14 Wildlife Species of Concern were identified as possible to occur because the analysis area would be within the species' range and habitat parameters for the species would be present. These species include antelope jackrabbit, common nighthawk, Gila woodpecker, Harris' antelope squirrel, hooded nightsnake, Mexican free-tailed bat, ornate box turtle, regal horned lizard, rufous-winged sparrow, savannah sparrow, Sonoran coralsnake, Sonoran whipsnake, tiger rattlesnake, and yellow warbler. Acres of impacts on these species are given in table 4.8-25. The dusky-capped flycatcher would be unlikely to occur within local alternative H due to lack of habitat.

Construction

The construction impact types and intensities to antelope jackrabbit, common nighthawk, Gila woodpecker, Harris' antelope squirrel, hooded nightsnake, Mexican free-tailed bat, desert ornate box turtle, regal horned lizard, rufous-winged sparrow, savannah sparrow, Sonoran coralsnake, Sonoran whipsnake, tiger rattlesnake, yellow warbler, and dusky-capped flycatcher would be the same as described under subroute 3.1. Based on the amount of available habitat for these species in the analysis area, construction-related activities would have no detectable effect on the viability of these species or contribute towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

The operation and maintenance impact types and intensities would be as described for subroute 3.1.

State of Arizona Species of Greatest Conservation Need

Three Arizona Species of Greatest Conservation Need would be likely to occur on local alternative H. These species include American bittern, Lincoln's sparrow, and western grasshopper sparrow. All other Species of Greatest Conservation Need that are listed under the ESA, BLM, and/or U.S. Forest Service that would be likely to occur in the analysis area are discussed above. The Mississippi kite would be unlikely to occur on local alternative H. The analysis area would be either outside of the species' known range, would not contain habitat for the species, or both.

Construction

Construction-related impacts would be similar to those described for subroute 3.1. Acreages of impacts are given in table 4.8-25.

The construction impact types and intensities to American bittern, Lincoln's sparrow, and western grasshopper sparrow would be the same as described under subroute 3.1. Based on the amount of available habitat for these species construction-related activities would have no detectable effect on the viability of these species or contribute towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

The operation and maintenance impact types and intensities would be as described for subroute 3.1.

Migratory Birds

Impacts on migratory birds would be as described above for subroute 1.1. Based on the amount of migratory bird habitat for these species in the analysis area it is not anticipated that any significant population-level impacts for these species or contribution towards a downward population trend or listing of this species as threatened or endangered would occur.

Construction

Approximately 9.3 acres of agricultural lands would be present in the ROW for alternative H, 2.6 acres of which would be disturbed.

Approximately 2.8 acres of North America Warm Desert Riparian Mesquite Bosque would occur in the ROW for alternative H, 0.8 acre of which would be disturbed.

According to the National Wetlands Inventory, the ROW for alternative H contains 409 feet of perennial water as well as one wetland totaling 2.7 acres. These features would all be associated with the intermittent reach of the San Pedro River. SWReGAP does not show any wetlands or open water. Construction-related impacts to the river and associated wetlands would be related to the construction of the transmission line structures and temporary access roads. Proposed structure locations would incorporate avoidance and BMPs to avoid any wetland and open water. Construction of access roads would likely not impact the San Pedro River within the ROW and downstream if avoidance measures were incorporated and with the implementation of BMPs.

Operation and Maintenance

The land cover types above may harbor higher concentration of migratory birds than surrounding areas, and may thus be associated with an elevated risk of collision events. That risk would still be unlikely to reach population-level impacts for all species, but the risk of collision for migratory birds would likely be influenced by the exact placement of the San Pedro River crossing.

Wildlife Special Designation Areas

Impacts on Wildlife Special Designation Areas would be as described for subroute 1.1.

Construction

Pima County Biological Core Management Areas and Important Riparian Areas would all intersect with local alternative H. Biological Core Management Areas would intersect the ROW on approximately 46.1 acres, of which 12.9 acres would be disturbed. Important Riparian Areas would intersect with the ROW on approximately 1.3 acres, of which 0.4 acre would be disturbed. Impacts would be as described above for subroute 3.1. Impacts on Special Designations, including the Las Cienegas NCA and Bar V Ranch, are analyzed in section 4.12.

Local alternative H would cross the Rincon-Whetstone-Santa Rita PLZ. Approximately 83.8 acres of the representative ROW in the Rincon-Whetstone-Santa Rita PLZ would be crossed with 23.5 acres being disturbed. Impacts would be as described above for subroute 2.1.

Operation and Maintenance

Operation-related impacts from local alternative H would be as described above for subroute 3.1.

Route Group 4 – Pantano Substation to Saguaro Substation

Tables 4.8-27 and 4.8-28 give the acres of impacted habitat types for the ROW as well as staging areas and substations for route group 4.

Table 4.8-27. Route Group 4 Wildlife Resource Inventory Data

Habitat Type	Subroute 4.1 (acres)	MA1 (acres)	TH1a (acres)	TH1b (acres)	TH1c (acres)	TH1-Option (acres)	TH3a (acres)	TH3b (acres)	TH3-Option A (acres)	TH3-Option B (acres)	TH3-Option C (acres)
Agriculture	69.9	19.0	-	-	-	-	-	-	-	-	-
Apacherian-Chihuahuan Mesquite Upland Scrub	3.2	-	-	-	-	-	-	-	-	1.3	0*
Barren Lands, Non-specific	14.5	-	-	-	-	-	-	-	-	-	-
Developed, Medium - High Intensity	211.1	-	2.0	12.0	4.8	0.8	22.5	72.8	-	6.3	7.6
Developed, Open Space - Low Intensity	45.6	-	-	-	-	-	-	-	-	-	-
North American Warm Desert Riparian Mesquite Bosque	19.4	-	-	-	-	-	-	-	-	-	-
North American Warm Desert Riparian Woodland and Shrubland	18.2	-	-	-	-	-	-	-	-	-	-
North American Warm Desert Wash	1.1	-	-	-	-	-	-	-	-	-	-
Open Water	1.1	-	-	-	-	-	-	-	-	-	-
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	133.3	-	-	-	-	-	-	1.1	1.8	0.3	-
Sonoran Mid-Elevation Desert Scrub	3.9	-	-	-	-	-	1.7	0.6	-	0.5	1.5
Sonoran Paloverde-Mixed Cacti Desert Scrub	353.5	-	23.7	16.5	-	16.18	25.4	6.9	13.3	6.2	20.2

0*- greater than zero acres but less than 0.1 acre

Table 4.8-28. Route Group 4 Wildlife Resource Inventory Data for Substations and Staging Areas

Habitat Type	Subroute 4.1 (acres)	Local Alternatives (acres)
Apacherian-Chihuahuan Mesquite Upland Scrub	33.5	-
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	7.6	-
Barren Lands, Non-specific	2.9	-
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	12.0	-
Chihuahuan Mixed Salt Desert Scrub	0.2	-
Developed, Medium - High Intensity	26.2	-
North American Warm Desert Riparian Mesquite Bosque	0*	-
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	105.9	-
Sonoran Mid-Elevation Desert Scrub	8.4	-
Sonoran Paloverde-Mixed Cacti Desert Scrub	83.8	-

0*- greater than zero acres but less than 0.1 acre

Table 4.8-29 gives the acreages of impacts on general wildlife and special status species for route group 4.

SUBROUTE 4.1 – PROPONENT PREFERRED

General Wildlife

Construction

Construction-related impacts would be similar to those described for subroute 3.1. Impact levels from disturbance would be lower than for route groups 1 and 2 as the ROW has been previously disturbed for the existing transmission line. Acreages of impacts are given in table 4.8-29. Based on the amount of available habitat for general wildlife species, construction-related activities would have no detectable effect on the viability of these species or contribute towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Impacts from the operation and maintenance of subroute 4.1 would be as described above for subroute 3.1.

Special Status Species

Federally Listed Species

Within this route group, six federally listed species were identified as having the potential to occur because the analysis area would be within the species' range and habitat parameters would be present: the lesser long-nosed bat, northern Mexican gartersnake, Sonoran desert tortoise, Tucson shovel-nosed snake, southwestern willow flycatcher, and western yellow-billed cuckoo. Acres of impacts on these species are given in table 4.8-29.

In addition, 9 other species, the ocelot, California least tern, Mexican spotted owl, Chiricahua leopard frog, Gila chub, Gila topminnow, jaguar, ocelot, and Sprague's pipit, could also occur but would be considered unlikely to occur because although habitat parameters would be present the analysis area within this route group would not be within the species' typical range, or the route group would be within the species' typical range, but habitat parameters would not be present. Therefore the Project activities in subroute 4.1 would have no effect to the populations of California least tern, Chiricahua leopard frog, Gila chub, Gila topminnow, jaguar, ocelot, or Sprague's pipit.

Construction

Construction-related impacts would be as described for subroute 3.1.

There would be no roost sites for lesser long-nosed bat in the ROW that would provide shelter for this species. However, subroute 4.1 would be within 40 miles of a known roost site, and would be within the foraging range of the species. Based on the amount of available foraging habitat in the analysis area, construction-related activities would have no detectable effect on the viability of this species.

Potential impacts on northern Mexican gartersnake would be as described for subroute 3.1. As the Project facilities would be located to avoid habitat and proposed critical habitat for the species there would be no impact on habitat or proposed critical habitat.

Potential impacts on Tucson shovel-nosed snake would include those described previously for all reptiles. Habitat for the species occurs in Pinal County where segment UK3 would cross the Santa Cruz River floodplain. Mitigation measures to close areas of Tucson shovel-nosed snake habitat to OHV use, use of drift fencing, worker education programs, and revegetation of disturbed areas with plants to support prey species would minimize impacts on the species. Based on the amount of available habitat in the analysis area, construction-related impacts would have a long-term, minor/negligible effect on Tucson shovel-nosed snake and its habitat.

The ROW for subroute 4.1 would intersect desert tortoise habitat. Based on the amount of available Sonoran desert tortoise habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on southwestern willow flycatcher would be as described for subroute 3.1. However, there would be no perennial or intermittent waterways in this subroute that would provide appropriate vegetation structure for nesting habitat for this species and this subroute group would not intersect with any designated critical habitat for this species. Based on the lack of nesting habitat and the mobility of the species, construction-related activities would have no detectable effect on individuals or the viability of this species.

Potential impacts on western yellow-billed cuckoo from construction activities in this subroute group would be as described for subroute 3.1. However, there would be no large cottonwood and willow galleries that would provide nesting habitat for this species in the ROW. Based on the lack of nesting habitat in the Project footprint and the mobility of the species, construction-related activities would have no detectable effect on individuals or the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Table 4.8-29. Route Group 4 Acres of Impacts on Wildlife

Common name	Subroute 4.1	Local Alt MA-1	Local Alt TH1a	Local Alt TH1b	Local Alt TH1c	Local Alt TH1-Option	Local Alt TH3a	Local Alt TH3b	Local Alt TH3-Option A	Local Alt TH3-Option B	Local Alt TH3-Option C
General Wildlife	**621.7**	**5.3**	**7.2**	**8.0**	**1.3**	**4.8**	**13.9**	**22.8**	**4.2**	**4.0**	**8.1**
Federally Listed Species											
Lesser long-nosed bat	262.7	-	7.2	8.0	1.1	**4.8**	13.9	22.8	4.2	3.7	8.1
Southwestern willow flycatcher	0	-	-	-	-	-	-	-	-	-	-
Western yellow-billed cuckoo	0	-	-	-	-	-	-	-	-	-	-
Northern Mexican gartersnake	0	-	-	-	-	-	-	-	-	-	-
Sonoran desert tortoise	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Tucson shovel-nosed snake	8.3		-	-		-	-	-	-	-	
BLM Sensitive Species											
Allen's big-eared bat	193.6	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Arizona myotis	5.1	-	-	-	-	-	-	-	0.2	-	-
Banner-tailed kangaroo rat	209.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
California leaf-nosed bat	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Cave myotis	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Greater western mastiff bat	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Mexican long-tongued bat	262.7	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Pale Townsend's big-eared bat	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Spotted bat	20.8	-	-	-	-	-	-	-	-	-	-
American peregrine falcon	190.4	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Arizona grasshopper sparrow	190.4	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Bald eagle	190.4	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Cactus ferruginous pygmy-owl	196.4	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Desert purple martin	196.4	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Gilded flicker	196.4	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Golden eagle	5.1	-	-	-	-	-	-	-	-	-	-
Western burrowing owl	224.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Ornate box turtle	4.6	-	-	-	-	-	-	-	-	-	-
Sonoran mud turtle	5.4	-	-	-	-	-	-	-	0.2	-	-
Great Plains narrow-mouthed toad	186.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Lowland leopard frog	5.4	-	-	-	-	-	-	-	0.2	-	-
Plains leopard frog	2.1	-	-	-	-	-	-	-	-	-	-
State of Arizona Wildlife Species of Concern											
Sonoran green toad	185.3	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Antelope jackrabbit	186.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Arizona pocket mouse	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Harris' antelope squirrel	191.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Kit fox	207.3	5.3	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Little pocket mouse	2.1	-	-	-	-	-	-	-	-	-	-

Table 4.8-29. Route Group 4 Acres of Impacts on Wildlife (Continued)

Common name	Subroute 4.1	Local Alt MA-1	Local Alt TH1a	Local Alt TH1b	Local Alt TH1c	Local Alt TH1-Option	Local Alt TH3a	Local Alt TH3b	Local Alt TH3-Option A	Local Alt TH3-Option B	Local Alt TH3-Option C
Pocketed free-tailed bat	196.4	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Abert's towhee	262.7	-	7.2	8.0	1.1	**4.8**	13.9	22.8	4.2	3.7	8.1
Bell's vireo	5.1	-	-	-	-	-	-	-	-	-	-
Crested caracara	191.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Gila woodpecker	275.3	-	7.2	8.0	1.1	**4.8**	13.9	22.8	4.2	3.7	8.1
Canyon spotted whiptail	186.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Gila monster	186.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Regal horned lizard	186.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Saddled leaf-nosed snake	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Sonora mud turtle	0.3	-	-	-	-	-	-	-	0.2	-	-
Sonoran collared lizard	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Sonoran coralsnake	209.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Sonoran whipsnake	186.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Tiger rattlesnake	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Variable sandsnake	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Colorado River toad (aka Sonoran desert toad)	186.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
State of Arizona Species of Greatest Conservation Need											
Mexican free-tailed bat	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	183.1
Western yellow bat	5.1	-	-	-	-	-	-	-	-	-	-
Buff-collared nightjar	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Savannah sparrow	21.7	5.3	-	-	-	-	-	-	-	-	-
Goode's horned lizard	183.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1
Pima County Species											
Merriam's mesquite mouse	20.8	-	-	-	-	-	-	-	-	0.4	-
Western red bat	5.1	-	-	-	-	-	-	-	-	-	-
Rufous-winged sparrow	17.9	-	-	-	-	-	-	-	-	0.4	-
Swainson's hawk	191.1	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	4.1	8.1
Ground snake	186.8	-	6.6	4.6	-	**4.8**	7.6	2.1	4.2	3.7	8.1

Operation and Maintenance

There would likely not be operational impacts to lesser long-nosed bats, Sonoran desert tortoise, southwestern willow flycatcher, Sprague's pipit, western yellow-billed cuckoo, or to any populations of these species under this subroute group. There would likely not be operational impacts to northern Mexican gartersnake or to Tucson shovel-nosed snake under this subroute group. In addition, there would be no operational impacts to northern Mexican gartersnake proposed critical habitat.

BLM Sensitive Species

Of the 45 species listed as BLM Sensitive for this region (the Gila District), 23 species were identified as having the potential to occur in subroute 4.1, because the analysis area would be within the species' range and habitat parameters would be present. These species include the plains leopard frog (*Lithobates blairi*), lowland leopard frog, Sonoran green toad (*Bufo retiformis*), Great Plains narrow-mouthed toad, Sonoran mud turtle, desert ornate box turtle, Arizona grasshopper sparrow, western burrowing owl, golden eagle, gilded flicker, American peregrine falcon, cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), bald eagle, desert purple martin, Mexican long-tongued bat, pale Townsend's big-eared bat, banner-tailed kangaroo rat, spotted bat, greater western mastiff bat, Allen's big-eared bat, California leaf-nosed bat, Arizona myotis, and cave myotis. Acres of impacts on these species are given in table 4.8-29.

In addition, four other species—desert sucker, longfin dace, Slevin's bunchgrass lizard, and Arizona Botteri's sparrow—could also occur but would be considered unlikely to occur because either habitat parameters would be present (e.g., healthy grasslands for Slevin's bunchgrass lizard), but the analysis area within this route group would not be within the species' typical range, or the analysis area would be within the species' typical range, but habitat parameters would not be present (e.g., perennial streams for longfin dace).

Construction

Construction-related impacts would be as described for subroute 3.1.

Potential impacts on plains leopard frog, lowland leopard frog, Sonoran green toad, and Great Plains narrow-mouthed toad from construction activities would include those described above as common to all amphibian species and subroute 3.1. There would be no perennial waterways in this subroute and pole structures and laydown areas would not be placed in ephemeral or intermittent waterways that could provide dispersal habitats for toads or frogs. There would be no impacts on these species' habitat and no detectable effect on the viability of these species by Project-related activities or that would contribute towards a downward population trend or listing of these species as threatened or endangered.

Potential impacts on Sonoran mud turtle and desert ornate box turtle from construction-related activities would be as described for subroute 3.1. Construction-related impacts would include habitat disturbance. Based on the amount of available reptile habitat in the analysis area, there would be no detectable effect on the viability of these species or contribution towards a downward population trend or listing of any of these species as threatened or endangered.

Potential impacts on Arizona grasshopper sparrow, western burrowing owl, golden eagle, gilded flicker, American peregrine falcon, cactus ferruginous pygmy-owl, bald eagle, and desert purple martin from construction activities would be as described for subroute 3.1. Based on the amount of available bird nesting habitat in the analysis area, construction-related activities would have no detectable effect on the viability of any of these bird species or to contribute towards a downward population trend or listing of the species as threatened or endangered.

Potential impacts on the banner kangaroo rat from construction-related activities would include those described above as common to all mammal species. Based on the amount of available small mammal habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered.

Potential impacts on the eight bat species noted above from construction activities would include those described above for subroute 3.1. However, there would be no roost or nest sites in the ROW that would provide shelter for these species. Based on the amount of available foraging habitat in the analysis area, construction-related activities would have no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential impacts from operation and maintenance activities to BLM Sensitive Species would likely not experience operational impacts detectable at the population level or contribution towards a downward population trend or listing of these species as threatened or endangered.

State of Arizona Wildlife Species of Concern

Twenty-six Arizona listed Wildlife Species of Concern are identified as possibly occurring in subroute 4.1. Of these, five are addressed above (Sonoran green toad, ornate box turtle, cave myotis, pale Townsend's big-eared bat, and gilded flicker are addressed in the "BLM Sensitive Species" section). The other 20 species are addressed below. Acres of impacts on these species are given in table 4.8-29.

Construction

Construction-related impacts would be similar to those described for subroute 3.1.

Amphibian species impacted would include the Sonoran desert toad. Mammal species impacted would include antelope jackrabbit, kit fox, Arizona pocket mouse (*Perognathus amplus*), little pocket mouse (*Perognathus longimembris*), and Harris' antelope squirrel.

Bird species impacted would include Abert's towhee, Bell's vireo, crested caracara (*Caracara cheriway*) and Gila woodpecker. The crested caracara is known to breed in areas approximately 4 miles north of the Project terminus and is seen infrequently in the area near the Project terminus.

Reptile species impacted would include canyon spotted whiptail (*Aspidoscelus burti*), Gila monster, regal horned lizard, saddled leaf-nosed snake (*Phyllorhynchus browni*), Sonora mud turtle, Sonoran collared lizard (*Crotaphytus nebrius*), Sonoran coralsnake, Sonoran whipsnake, tiger rattlesnake, and variable sandsnake (*Chilomeniscus stramineus*). Based on the amount of habitat for these species in the analysis area it is not anticipated that subroute 4.1 would cause any significant population-level impacts for these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential operational impacts on Arizona listed Wildlife Species of Concern species would be as described above for subroute 3.1.

State of Arizona Species of Greatest Conservation Need

Seventeen Arizona Species of Greatest Conservation Need were identified as possibly occurring in subroute 4.1. Of these, 12 are addressed above (lesser long-nosed bat, cactus ferruginous pygmy-owl, Sprague's pipit, southwestern willow flycatcher, and Sonoran desert tortoise are addressed in the "Federally Listed Species" section, and greater western mastiff bat, California leaf-nosed bat, spotted bat, peregrine falcon, desert purple martin, western burrowing owl, and lowland leopard frog are addressed in the "BLM Sensitive Species" section). The other five species are addressed below. Acres of impacts on these species are given in table 4.8-29.

Construction

Construction-related impacts would be similar to those described for subroute 3.1. Mammal species impacts would include Mexican free-tailed bat and western yellow bat. Bird species impacted would include buff-collared nightjar (*Caprimulgus ridgwayi*) and savannah sparrow. Reptile species impacted would include Goode's horned lizard (*Phyrnosoma goodei*). Based on the amount of habitat for these species in the analysis area it is not anticipated that subroute 4.1 would cause any significant population-level impacts for these species or contribute towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential operational and maintenance impacts on Species of Greatest Conservation Need species would be as described for subroute 3.1.

Pima County Species

Fifteen Priority Vulnerable Species in Pima County were identified as possibly occurring in subroute 4.1. Of these, 10 are addressed above (California leaf-nosed bat, pale Townsend's big-eared bat, Mexican long-tongued bat, western burrowing owl, ornate box turtle, and lowland leopard frog are addressed in the "BLM Sensitive Species" section and western yellow bat, Abert's towhee, Bell's vireo, and spotted canyon whiptail are addressed in the "Arizona Species of Greatest Conservation Need" section). The remaining five species are addressed below. Acres of impacts on these species are given in table 4.8-29.

Construction

Construction-related impacts would be as described for subroute 3.1.

Mammal species impacts would include western red bat and Merriam's mesquite mouse. Bird species impacted would include rufous-winged sparrow and Swainson's hawk. Reptile species impacted would include the ground snake. Based on the amount of habitat for these species in the analysis area it is not anticipated that subroute 4.1 would cause any significant population-level impacts for these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Operation and Maintenance

Potential operational and maintenance impacts on the Priority Vulnerable Species in Pima County species would be as described for subroute 3.1.

Migratory Birds

Impacts on migratory birds would be as described for subroute 1.1.

Construction

The ROW for subroute 4.1 contains a total of 69.9 acres of agricultural lands, found along segments U3i (19.4 acres), U3j (15.9 acres), and U3k (34.6 acres). Disturbance would occur on 19.6 acres.

In total, 19.4 acres of North America Warm Desert Riparian Mesquite Bosque and 18.2 acres of North America Warm Desert Riparian Woodland and Shrubland habitat types occur in the ROW. The three segments with those two cover types would be U3e (2.4 acres), U3i (5.6 acres), and U3k (29.8 acres). Disturbance would occur on 5.4 acres of North America Warm Desert Riparian Mesquite Bosque and 5.1 acres of North America Warm Desert Riparian Woodland and Shrubland.

According to the National Wetlands Inventory, a total of four wetlands totaling 2.2 acres would occur within the ROW, along segments U3b, U3c, U3h, and U3i. These would be associated with the ephemeral reach of the Santa Cruz River that passes through Tucson. SWReGAP mapping indicates 1.1 acres of open water along segment U3i. Proposed structure locations should incorporate avoidance and BMPs to avoid any wetland and open water. Construction of access roads would likely not impact the Santa Cruz River within the ROW and downstream if avoidance measures were incorporated and with the implementation of BMPs.

Operation and Maintenance

The land cover types above may harbor higher concentration of migratory birds than surrounding areas, and may thus be associated with an elevated risk of collision events. Due in part to the small size of the wetlands in the ROW that risk would be unlikely to reach population-level impacts for all species, but the risk of collision for migratory birds would likely be influenced by the exact placement of the Santa Cruz River.

The ROW for subroute 4.1 lies less than 0.1 mile from an unnamed ridge near Ajo Way and Rattlesnake Pass in the Tucson Mountains (table 4.8-30), raising the possibility of somewhat higher impacts on migratory birds in that area.

Table 4.8-30. Route Group 4 Proximity of Mountain Ridges and Low Passes to the ROW of Proposed Subroutes

Subroutes	Ridge or Low Pass	Distance (miles)
Subroute 4.1, Proponent Preferred	Unnamed ridge near Ajo Way and Rattlesnake Pass in the Tucson Mountains	0.06
Route Group 4 Local Alternatives		
Local Alternatives for subroute 4.1	NA*	NA

Note: NA = not applicable.

* No ridge or low pass present within proximity of any of the segments of the proposed subroute's ROW.

Wildlife Special Designation Areas

Impacts on Wildlife Special Designation Areas would be as described for subroute 1.1.

Construction

Subroute 4.1 would cross Tumamoc Hill as well as Pima County Biological Core Management Areas, Important Riparian Areas, Multiple Use Management Areas, and Agricultural Inholdings. It would also

cross Tumamoc Hill, Tucson Mountain Park, and Pima County PCAs for western burrowing owl, cactus ferruginous pygmy owl, rufous-winged sparrow, and Pima pineapple cactus.

Tumamoc Hill would intersect the ROW on approximately 14.7 acres of which 4.1 acres would be disturbed. Tucson Mountain Park would intersect the ROW on 8.0 acres, 1.8 acres of which would be disturbed. Pima County Biological Core Management Areas would intersect the ROW on approximately 18.8 acres of which 5.3 acres would be disturbed. Important Riparian Areas would intersect the ROW on approximately 95.9 acres of which 26.9 acres would be disturbed. Agricultural Inholdings would intersect the ROW on approximately 60.4 acres of which 16.9 acres would be disturbed.

Pima County Agricultural Inholdings are managed to "emphasize the use of native flora, facilitate the movement of native fauna and pollination of native flora across and through the landscape, and conserve on-site conservation values when they are present. Development within these areas would be configured in a manner that would not compromise the conservation values of adjacent and nearby CLS lands." Impacts on these areas would be similar to those described for subroute 3.1.

Pima County PCAs would intersect the ROW. Approximately 773.1 acres of the western burrowing owl PCA would intersect the ROW with 216.5 acres of disturbance. Approximately 335.4 acres of the cactus ferruginous pygmy owl PCA would intersect the ROW with 93.9 acres of disturbance. Approximately 137.2 acres of the rufous-winged sparrow PCA would intersect the ROW with 38.4 acres of disturbance. Approximately 218.9 acres of the ground snake PCA would intersect the ROW with 61.3 acres of disturbance. Approximately 92.5 acres of the Pima pineapple cactus PCA would intersect the ROW with 25.9 acres of disturbance.

Subroute 4.1 would cross the Ironwood-Tortolita PLZ, Coyote-Ironwood-Tucson PLZ, the Ironwood-Picacho PLZ, and the Tucson-Tortolita-Santa Catalina PLZ. Approximately 599.0 acres of the representative ROW in these PLZs would be crossed with 167.7 acres of disturbance.

Operation and Maintenance

Operation-related impacts from subroute 4.1 would be as described above for subroute 3.1.

Local Alternatives

There would be 10 local alternatives available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C.

General Wildlife

Impacts on general wildlife would be as described for subroute 1.1.

Construction

Impacts on general wildlife from the local alternatives would be as described for subroute 1.1. Acreages of impacts on general wildlife for each local alternative are given in table 4.8-29.

Operation and Maintenance

Potential impacts from operation and maintenance of the local alternatives would be similar in nature to those described for subroute 3.1.

Special Status Species

Federally Listed Species

Impacts to federally listed species would be as described for subroute 4.1. Acres of impacts on these species for the local alternatives are given in table 4.8-29.

Construction

Local alternative TH1a total representative ROW would comprise 25.7 acres, TH1b ROW would comprise 28.4 acres, TH1c ROW would comprise 7.7 acres, TH1-Option would comprise 17.0 acres, TH3-Option A ROW would comprise 15.1 acres, TH3-Option B ROW would comprise 14.5 acres, TH3-Option C ROW would comprise 29.3 acres, TH3a ROW would comprise 49.7 acres, and TH3b ROW would comprise 81.4 acres. Impacts on these species would be as described for subroute 3.1.

There would be no roost sites for lesser long-nosed bat in the ROW of any of the local alternatives that would provide shelter for this species. However, the local alternatives, with the exception of MA-1 contain foraging habitat for the species and are within 40 miles of a known roost location and are within the foraging range of the species. Based on the amount of available foraging habitat in the analysis area, construction-related activities would have no detectable effect on the viability of this species under any of these alternatives.

Sonoran desert tortoise habitat would be impacted by local alternatives. However, no BLM-designated category of desert tortoise habitat would occur in any of the route group 4 local alternatives. Based on the amount of available Sonoran desert tortoise habitat in the analysis area, there would be no detectable effect on the viability of this species or contribution towards a downward population trend or listing of this species as threatened or endangered under any of the alternatives.

The alternative TH1c total representative ROW comprises 4.8 acres and would be characterized by Developed, Medium - High Intensity (4.8 acres). Route segment MA1 would be characterized by the Agriculture plant association which accounts for over 99 percent of the acreage (19.0 acres). There would be no federally listed species anticipated to occur in these two alternatives, therefore there would be no effects to any federally listed species or their habitats.

Operation and Maintenance

Operational impacts on lesser long-nosed bat and Sonoran desert tortoise would be as described for subroute 3.1.

There would be no effects to any threatened or endangered species or their habitat from operational and maintenance activities under the remaining two local alternatives, TH1 and MA1.

BLM Sensitive Species

Of the 45 species listed as BLM Sensitive for this region (the Gila District), 20 species were identified as having the potential to occur in the local alternatives of route group 4, because the analysis area is within the species' range and habitat parameters would be present. These species are listed above for subroute 4.1. Acres of impacts on these species are given in table 4.8-29.

In addition, four other species—desert sucker, longfin dace, Slevin's bunchgrass lizard, and Arizona Botteri's sparrow—could also occur but would be considered unlikely to occur because either habitat parameters would be present (e.g., healthy grasslands for Slevin's bunchgrass lizard), but the analysis area within this route group would not be within the species' typical range, or the analysis area would be

within the species' typical range, but habitat parameters would not be present (e.g., perennial streams for longfin dace).

Construction

Potential impacts on plains leopard frog, lowland leopard frog, Sonoran green toad, and Great Plains narrow-mouthed toad from construction activities would be as described for subroute 4.1. However, there would be no perennial waterways in the local alternatives and pole structures and laydown areas would not be placed in ephemeral or intermittent waterways that could provide dispersal habitats for toads or frogs. There would be no impacts on these species' habitat, limited temporary negligible impacts to individuals, and no detectable effect on the viability of these species by Project-related activities or that would contribute towards a downward population trend or listing of these species as threatened or endangered.

Additional impacts would occur along the local alternatives for the remaining BLM Sensitive Species would be as described for subroute 4.1. Acreages of impacts are given in table 4.8-29. Based on the amount of available foraging habitat in the analysis area, construction-related activities would have no detectable effect on the viability of these species or contribution towards a downward population trend or listing of these species as threatened or endangered under any of the alternatives.

Operation and Maintenance

Potential impacts from operation and maintenance activities to the western burrowing owl, gilded flicker, cactus ferruginous pygmy-owl, and desert purple martin would be related to the potential for individuals striking transmission lines.

Mexican long-tongued bat, pale Townsend's big-eared bat, spotted bat, greater western mastiff bat, Allen's big-eared bat, California leaf-nosed bat, Arizona myotis, cave myotis, Plains leopard frog, lowland leopard frog, Sonoran green toad, Great Plains narrow-mouthed toad, Sonoran mud turtle, desert ornate box turtle, and the banner-tailed kangaroo rat would likely not experience operational and maintenance impacts detectable at the population level or contribution towards a downward population trend or listing of these species as threatened or endangered under any of the local alternatives.

State of Arizona Wildlife Species of Concern

Twenty-six State of Arizona listed Wildlife Species of Concern Species were identified as possible to occur on the local alternatives. Of these five are addressed above (Sonoran green toad, ornate box turtle, cave myotis, pale Townsend's big-eared bat, and gilded flicker are addressed in the "BLM Sensitive Species" section). The other 21 species are addressed below. Impacts on these species would be as previously described for subroute 4.1. Acres of impacts on these species are given in table 4.8-29.

Construction

Local alternative MA1 could impact habitat for pocketed free-tailed bat and crested caracara. Impacts on crested caracara would not occur in any other of the local alternatives.

Local alternatives TH1a, Th1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C could impact habitat for Sonoran desert toad, antelope jackrabbit, kit fox, Arizona pocket mouse, little pocket mouse, Harris' antelope squirrel, pocketed free-tail bat, Abert's towhee, Bell's vireo, Gila woodpecker, canyon spotted whiptail, Gila monster, regal horned lizard, saddled leaf-nosed snake, Sonora mud turtle, Sonoran collared lizard, Sonoran coralsnake, Sonoran whipsnake, tiger rattlesnake, and variable sandsnake.

Operation and Maintenance

Potential operational and maintenance impacts on Arizona listed Wildlife Species of Concern species would be as described above for subroute 4.1.

State of Arizona Species of Greatest Conservation Need

Thirteen Arizona Species of Greatest Conservation Need were identified as possible to occur on the local alternatives. Of these, 10 are addressed above (Sprague's pipit, southwestern willow flycatcher, and Sonoran desert tortoise are addressed in the "Federally Listed Species" section and greater western mastiff bat, California leaf-nosed bat, spotted bat, peregrine falcon, desert purple martin, western burrowing owl, and lowland leopard frog are addressed in the "BLM Sensitive Species" section). The other three species are addressed below. Impacts on these species would be as previously described for subroute 4.1. Acres of impacts on these species are given in table 4.8-29.

Construction

Local alternative MA1 could impact habitat for Mexican free-tailed bat and savannah sparrow. Local alternative TH1a could impact habitat for Mexican free-tailed bat, and Goode's horned lizard. Local alternative TH1b could impact habitat for Mexican free-tailed bat, pocketed free-tail bat, and Goode's horned lizard.

Local alternative TH1c would not intersect habitat for any Arizona Species of Greatest Conservation Need.

Local alternative TH1-Option would intersect habitat for Mexican free-tailed bat and Goode's horned lizard.

Local alternative TH3a would intersect habitat for Mexican free-tailed bat, pocketed free-tail bat, and Goode's horned lizard.

Local alternative TH3b would intersect habitat for Mexican free-tailed bat and Goode's horned lizard.

Local alternative TH3-Option A would intersect habitat for Mexican free-tailed bat and Goode's horned lizard.

Local alternative TH3-Option B would intersect habitat for Mexican free-tailed bat and Goode's horned lizard.

Local alternative TH3-Option C would intersect habitat for Mexican free-tailed bat and Goode's horned lizard.

Operation and Maintenance

Potential operational and maintenance impacts on Species of Greatest Conservation Need species would be as described above for subroute 4.1.

Pima County Species

Thirteen Priority Vulnerable Species in Pima County were identified as possibly occurring in the local alternatives. Of these 10 are addressed above (California leaf-nosed bat, pale Townsend's big-eared bat, Mexican long-tongued bat, western burrowing owl, ornate box turtle, and lowland leopard frog are addressed in the "BLM Sensitive Species" section and western yellow bat, Abert's towhee, Bell's vireo,

and spotted canyon whiptail are addressed in "Arizona Species of Greatest Conservation Need" section). The other three species are addressed below. Impacts on these species would be as previously described for subroute 4.1. Based on the amount of habitat for these species in the analysis area it is not anticipated that the local alternatives would cause any significant population-level impacts for these species or contribution towards a downward population trend or listing of these species as threatened or endangered.

Construction

Local alternative MA1 could impact habitat for Swainson's hawk. Local alternative TH1a, TH1b, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C could impact habitat for Merriam's mesquite mouse and ground snake.

Local alternative TH1c would not impact habitat for any Priority Vulnerable Species in Pima County.

Operation and Maintenance

Impacts on Pima County Species from operation and maintenance activities would be as described for subroute 4.1.

Migratory Birds

Impacts on migratory birds would be as described for subroute 1.1.

Construction

The ROW for local alternative MA1 would occur on 19 acres of agricultural lands of which 5.3 acres would be disturbed. No other agricultural lands would be present along the other segments.

The National Wetlands Inventory records riverine wetlands totaling 7.6 acres associated with the intermittent reaches of the Santa Cruz River that would pass through the ROW. The four alternatives involved would be TH3-Option A, TH3-Option C, TH3a, and TH3b. Open water would occur on 0.7 acre in the ROW for local alternative TH1c. Proposed structure locations would incorporate avoidance and BMPs to avoid any wetland and open water.

Operation and Maintenance

The land cover types above may harbor higher concentration of migratory birds than surrounding areas, and may thus be associated with an elevated risk of collision events. Due in part to the small size of the wetlands in the ROW, that risk would still be unlikely to reach population-level impacts for all species, but the risk of collision for migratory birds would likely be influenced by the exact placement of the Project in relation to the Santa Cruz River.

Wildlife Special Designation Areas

Impacts on Wildlife Special Designation Areas would be as described for subroute 1.1.

Construction

Local alternatives would cross Pima County Important Riparian Areas and Multiple Use Management Areas as well as Tumamoc Hill and the Santa Cruz River Park. Local alternatives would not intersect with any PLZs or Tucson Mountain Park.

Local alternative TH1a would intersect Pima County Multiple Use Management Areas on approximately 25.7 acres of which 7.2 acres would be disturbed. It would also cross Tumamoc Hill on approximately 21.7 acres of which 6.1 acres would be disturbed.

Local alternative TH1b would intersect Pima County Multiple Use Management Areas on approximately 0.6 acre of which 0.2 acre would be disturbed.

Local alternative TH1-Option would intersect Pima County Multiple Use Management Areas on approximately 17.0 acres of which 24.8 acres would be disturbed.

Local alternative TH3-Option A would intersect Pima County Important Riparian Areas on approximately 5.3 acres of which 1.5 acres would be disturbed. It would also intersect Pima County Multiple Use Management Areas on approximately 3.4 acres of which 1.0 acres would be disturbed. TH3-Option A would intersect with the River Park on approximately 3.6 acres of which 1.0 acres would be disturbed. This local alternative would also intersect with the western burrowing owl PCA on approximately 15.1 acres of which 4.2 acres would be disturbed.

Local alternative TH3-Option B would intersect Pima County Important Riparian Areas on approximately 1.2 acres of which 0.3 acre would be disturbed. TH31-Option B would also intersect Pima County Multiple Use Management Areas on approximately 1.3 acres of which 0.4 acre would be disturbed. It would also intersect with the Santa Cruz River Park on approximately 0.3 acre of which 0.1 acre would be disturbed. This local alternative would also intersect with the western burrowing owl PCA on approximately 14.5 acres of which 4.1 acres would be disturbed.

Local alternative TH3-Option C would intersect on approximately 8.3 acres of which 2.3 acres would be disturbed. TH3-Option C would intersect Pima County Multiple Use Management Areas on approximately 14.5 acres of which 4.1 acres would be disturbed. It also would intersect with Santa Cruz River Park on 9.2 acres of which 2.6 acres would be disturbed. This local alternative would also intersect with the western burrowing owl PCA on approximately 29.3 acres of which 8.2 acres would be disturbed.

Local alternative TH3a would intersect Pima County Important Riparian Areas on approximately 7.1 acres of which 2.0 acres would be disturbed. It would also cross Pima County Multiple Use Management Areas on less than 0.1 acre. This local alternative would also intersect with the western burrowing owl PCA on approximately 49.7 acres of which 13.9 acres would be disturbed.

Local alternative TH3b would intersect with the Santa Cruz River Park on 36.4 acres of which 10.2 acres would be disturbed. This local alternative would also intersect with the western burrowing owl PCA on approximately 81.4 acres of which 22.8 acres would be disturbed.

Construction-related impacts on special designation areas would be as described for subroute 3.1. Impacts on Special Designations are analyzed in section 4.12.

Operation and Maintenance

Operation-related impacts for local alternatives would be as described above for subroute 3.1.

Agency Preferred Alternative

Impacts on wildlife from the Agency Preferred Alternative would be similar to those described under "Impacts Common to All Action Alternatives." In route group 1 the Agency Preferred Alternative would follow subroute 1.1. Thus impacts on wildlife in route group 1 from the preferred alternative would be the same as described for subroute 1.1.

In route group 2, impacts on wildlife would be as described for portions of subroute 2.1 and local alternative LD3a, as well as all of local alternatives LD4, and LD4-Option 5. For the portions of the New Build Section of the Agency Preferred Alternative that would parallel the proposed SunZia project (LD4), collocation of the transmission lines would minimize the cumulative impact of the proposed Project on wildlife in this area. Utilizing local alternatives LD3a, LD4, and LD4-Option 5 would avoid the Lordsburg Playa area, thus minimizing potential impacts on bird species near Lordsburg Playa.

In route group 2 near Willcox Playa, the Agency Preferred Alternative would be segment P7 around the east side of the playa. The AGFD expressed concerns about segment P7 due to its close proximity to the Willcox Playa Wildlife Watching Area. Additionally, segment P7 would pose a higher collision risk to sandhill cranes and other birds that fly daily between the playa and agricultural fields to the south and east.

In the Upgrade Section, route group 3, the Agency Preferred Alternative would follow subroute 3.1. Impacts in this route group would be as described for subroute 3.1. Subroute 3.1 would cross a shorter area of the San Pedro River than local alternative H, which would decrease impacts on species that utilize riparian areas. Other impacts would be as described previously for subroute 3.1.

In route group 4, the Agency Preferred Alternative would follow subroute 4.1 except for where local alternatives TH1a, TH1-Option, and MA-1 would deviate off of the existing ROW. These local alternatives were selected as the Agency Preferred Alternative in order to avoid the Tumamoc Hill and Marana Airport areas. Avoiding these areas would minimize resource conflicts and would reduce impacts on wildlife habitat. Additional impacts would be as described above for subroute 4.1.

Additional Mitigation Measures

- A Project speed limit of 25 mph would be designated for all construction areas, spur roads, and new access roads to minimize the potential for construction equipment collisions with wildlife. In areas with mountainous terrain and/or poor site distances, the Project speed limit would be 15 mph.
- In construction areas where recontouring is not required, vegetation would be left in place wherever possible, to avoid excessive root damage and allow for resprouting.
- In designated areas, structures would be placed or rerouted so as to avoid sensitive features or to allow conductors to clearly span the features, within limits of standard structure design.
- All ground-clearing/disturbance activities that could affect special status species or habitat would be monitored. Where warranted, a qualified biologist would be retained to conduct pre-construction activities to minimize or prevent impacts to sensitive species or habitat.
- Pre-construction surveys for federally listed species would occur in areas where the species potentially occur.
- Pre-construction surveys would be implemented during the nesting season to locate raptor and other migratory bird nests. If a nest were found, a timing or spatial buffer may be implemented following BLM guidelines and in accordance with the MBTA.
- Surveys would be done following established protocols and would be done by qualified biologists approved by BLM. In cases where established protocols do not exist, protocols would be developed by the Proponent's biological consultant and approved by BLM and the wildlife agencies.
- Surveys for western burrowing owl in New Mexico would follow the NMDGF Guidelines and Recommendations for Burrowing Owl Surveys and Mitigation (NMDGF 2007).

- If designated suitable bighorn habitat along subroute 1.2 in segment S2 were to become occupied by bighorn sheep then no Project facilities except transmission lines would be built in that area.
- Southline and its construction contractor would provide training to all personnel working on the proposed Project to identify noxious weeds and prevent spread. Training would discuss known invasive and noxious weed species, known locations, identification methods, and treatment protocols. Training materials and a list of Project personnel completing the course would be provided to BLM/Western.
- Invasive and noxious weed populations would be mapped and reported to BLM/Western. BLM/Western would use the survey data and other available resources to determine in which areas vehicle washing would be required based upon the results of the invasive/noxious weed surveys.
- Access roads in Tucson shovel-nosed snake habitat would be posted closed to off-road vehicle use and gated if appropriate to decrease the potential for vehicles striking the subspecies.
- Where appropriate, protective drift fencing would be placed along access roads and disturbance areas in suitable Tucson shovel-nosed snake habitat during the active season of the snake to limit the potential for vehicle strikes.
- In Tucson shovel-nosed snake habitat, temporarily disturbed areas would be revegetated with native shrubs, grasses, and forbs to reduce impacts on habitat for prey populations of the Tucson shovel-nosed snake.
- Tucson shovel-nosed snake identification and avoidance measures would be included in the worker training program. If during construction activities Tucson shovel-nosed snakes are discovered in or near areas being disturbed, biological monitors would be required to be present on-site during construction activities.
- An agency-approved habitat compensation plan would be developed and compensatory mitigation ratios established.

Residual Impacts

Residual impacts as a result of this Project would include a permanent loss of breeding and foraging habitat due to access roads and structure pads. Additional residual impacts would include increased mortality to avian species due to collisions with the transmission line, increased predation on invertebrate, reptile, and small mammal species due to predators using the transmission line as a hunting perch, and increased hunting opportunities for raptors and corvids. The residual impacts to general wildlife are not expected to be significant. The residual impacts to sandhill cranes at the Willcox Playa would be reduced, but any mortality would be a significant impact.

Unavoidable Adverse Impacts

Implementation of the proposed Project would result in short-term impacts to wildlife breeding and foraging in the area. The construction activities coupled with the attempt to occupy new habitat may result in the loss of some individuals. In addition, long-term impacts include increased mortality to avian species due to collisions with the transmission line and increased predation on invertebrate, reptile, and small mammal species due to predators, including raptors and corvids using the transmission line as a hunting perch. A negligible loss of individuals from vehicle strikes could occur during maintenance activities when vehicles/equipment would be present. There are no feasible mitigation measures that would further reduce these impacts. Therefore, implementation of the proposed Project would result in both Project-related and cumulative unavoidable adverse impacts (short-term and long-term) to the wildlife in the area.

Short-term Uses versus Long-term Productivity

Construction of the proposed transmission line would result in some short-term and long-term impacts to wildlife resources and habitat. During construction, breeding and foraging within the area may decrease due to temporary habitat loss, construction noise, and human presence. In addition, there may be increased mortality due to collisions with construction equipment. The decrease in productivity during construction would be expected to be short-term; breeding and foraging within the proposed Project footprint would commence following construction activities. Long-term productivity of some species may be impacted by increased mortality due to predation while some predator species, especially raptors and corvids would benefit; collisions with power lines; as well as long-term habitat loss.

Irreversible and Irretrievable Commitments of Resources

Irreversible and irretrievable commitment of resources would occur in cases of wildlife mortality due to collisions with construction equipment, transmission lines, or structures. No other irreversible and/or irretrievable commitments of resources would occur.

Cumulative impacts

Reasonably foreseeable and future projects that could affect wildlife resources in the analysis area are discussed below. Potential impacts from such projects would include the loss, degradation, and/or fragmentation of breeding, rearing, foraging, and dispersal habitats; collisions with project vehicles and equipment; increased invasive and noxious weed establishment and spread; and increased noise/vibration levels during construction activities.

Solar energy projects that would contribute to cumulative impacts on wildlife resources include the enXco Development Corporation, Solar Reserve, Lordsburg Mesa, and Safford Solar Energy projects in New Mexico as well as the Whetstone Solar Ranch, University of Arizona Technology Park Thermal Storage, Fotowatio Renewable Ventures, and Avra Valley Solar projects in Arizona. Typical impacts from solar development would include wildlife habitat loss, degradation, fragmentation and would create barriers to species movement and dispersal. These impacts would be most intensive if development were to occur in previously undeveloped areas.

Power generation projects that would contribute to cumulative impacts on wildlife resources include the Sapphire Energy Algae Facility, Lightning Dock Geothermal Power Plant, and Bowie Power Station. Typical impacts from power generation projects would include wildlife habitat loss, degradation, and fragmentation. These impacts would be most intensive if development were to occur in previously undeveloped areas.

Transmission line projects that would contribute to cumulative impacts on wildlife resources include the SunZia project, Bowie Power, Tortolita transmission lines, and the Willow Substation. Typical impacts from transmission line development are described above in the “Impacts Common to All Action Alternatives” section.

Other potential projects that could contribute to cumulative impacts on wildlife resources include the Silverbell Road Improvements project and the Rosemont Copper Mine. These projects would contribute to habitat loss, degradation, and fragmentation.

4.9 CULTURAL RESOURCES

4.9.1 Introduction

The following section details anticipated impacts to cultural resources, including archaeological sites, historic built environment resources, trails, and American Indian traditional use areas and sacred sites associated with the construction, operation, and maintenance of the proposed Project. Impacts to cultural resources are discussed in both terms of potential disturbance to previously recorded sites and historic built environment resources that are listed in, eligible for listing in, or that may be eligible for listing in the NRHP (historic properties), and predicted number of historic properties for areas not previously surveyed. The following analysis is based on the Class I data presented in Section 3.9, "Cultural Resources" and appendices G and H, and site forecasts provided in "Southline Transmission Project Resource Report 2: Cultural Resources" (CH2M Hill 2013i), as well as a BLM sensitivity model for southern New Mexico (Heilen et al. 2012). The Class I data include all Class III pedestrian survey data within the analysis area, including the surveys of the Upgrade Section existing transmission line ROW (Effland and Green 1985; Goldstein 2008; Hart 2012), and a survey performed by Western on portions of the line from the Tucson to the Saguaro substations (personal communication, Maria Martin, Galileo 2013).

4.9.2 Methodology and Assumptions

The following analysis is based on Class I records search data only; no field checks or pedestrian surveys have been conducted at this time. The Project-specific PA will stipulate the areas of potential effects (APEs) for this Project and the "direct effects" APE would be inventoried at the Class III level. For the New Build Section, the APE for direct effects as described in the PA consists of a 200-foot-wide permitted ROW corridor plus 100 feet on either side of the corridor (400 feet wide total). For the Upgrade Section, the APE for direct effects will consist of the 150-foot-wide permanent ROW corridor plus 100 feet on either side of the corridor (350 feet wide total). The APE will include the transmission corridor any associated access roads, substations, and temporary construction ROW. All cultural resources identified during the inventory would be evaluated for eligibility to the NRHP, based on the criteria set forth in federal regulation 36 CFR 60.4, which states the following:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) that have yielded, or may be likely to yield, information important in prehistory or history.

Adverse effects to individual historic properties will then be assessed as stipulated in the executed PA developed to comply with Section 106 of the NHPA. Assessment of adverse effects will be conducted according to BLM Manual MS-8110: "Identifying and Evaluating Cultural Resources" (BLM 2004c).

Measures to avoid, minimize, and/or mitigate any adverse effects on historic properties will then be developed by BLM in consultation with the Section 106 consulting parties. Avoidance of sites during final design is the preferred choice for impact reduction (see PPM CR-4: Avoid Direct Impacts on Significant Cultural Resources through Final Design of the POD); impacts that cannot be avoided or minimized through design will mitigated by other measures such as data recovery as outlined in an HTPT (see PPM CR-3: Historic Properties Treatment Plan of the POD).

Early in the Project planning, the BLM made an "adverse effect" determination based on the sheer scope of the Project, and because of the clear potential for the Project to have adverse effects on previously known historic properties. In compliance with 36 CFR 800.4(b)(2) and 800.14(b)(1)(ii), a PA for the proposed Project is currently being developed. The PA is a legally binding document which will outline the process that will be followed to identify, evaluate, and mitigate historic properties that may be affected by the proposed Project.

Analysis Area

As discussed in chapter 3 (see section 3.9), the analysis area for direct impacts to cultural resources is 1 mile on either side of the centerline (2-mile corridor) for the New Build Section and the existing 500-foot corridor for the Upgrade Section. The analysis area for visual and indirect effects is 5 miles on either side of the centerline (10-mile corridor) for all alternatives.

For this analysis, a representative ROW has been developed by using the centerline as a base for the proposed transmission line. Using Google Earth to identify impediments to structure siting, the transmission line was moved off the centerline to avoid these impediments. The representative ROW then follows the new alignment. The following analysis will discuss resources found or projected to be found within the representative ROW.

Several approaches are taken in this analysis: impacts to known archaeological sites and historic built environment resources within the representative ROW, predicted number of resources within the representative ROW, and archaeological sensitivity data within the representative ROW (New Mexico only).

KNOWN ARCHAEOLOGICAL SITES AND HISTORIC BUILT ENVIRONMENT RESOURCES

In NEPA analysis, Federal agencies treat archaeological sites and historic built environment resources with unevaluated and/or unknown NRHP eligibility the same as sites which are recommended or determined eligible for the NRHP. The Class I includes all recorded data from previous Class III surveys and potential historic features taken from historical maps. Using the Class I data, counts of NRHP- listed, determined eligible, and unevaluated/unknown archaeological sites, and potential historic built environment resources, are calculated for the proposed Project and the alternatives by alternative segment for the representative ROW. Resources that have been determined to be not eligible for the NRHP are not considered in this analysis.

ARCHAEOLOGY SOUTHWEST'S CULTURAL RESOURCES PRIORITY AREAS

Archaeology Southwest's CRPAs as defined by Laurenzi et al. (2013) were also used in this analysis. CRPAs crossed by the representative ROW for the proposed Project and the alternatives were identified by segment, as well as for new and existing substation expansions.

RESOURCE FORECASTS (NEW MEXICO AND ARIZONA)

Data from the Class I records search was used to forecast the anticipated number of resources within each segment's representative ROW (CH2M Hill 2013i). The forecast represents an estimate of the number of sites within a segment's analysis area that would be expected if the entire analysis area had been surveyed. Because systematic surveys represent the best available data, only resources that were part of a formal, systematic inventory were used to create the forecasts. In addition, data from historical GLO and USGS maps were included in the number of known resources. Although these forecasts are quantities, they cannot be expressed in terms of probabilities or statistical significance because the data were not collected according to statistical sampling methods (CH2M Hill 2013). In addition, because of the variable survey coverage of the segments and the lack of consistent sampling, the forecasts must be considered with caution.

The Class I inventory includes the data from the Class III inventories conducted on the existing ROW along the Upgrade Section of the proposed Project (Effland and Greene 1985; Goldstein 2008; Hart 2012). Because a larger portion of the representative ROW within the Upgrade Section has been inventoried for cultural resources, a greater amount of detailed information has been collected which will affect the outcome of the predictive model for route groups 3 and 4. Please note that there is limited data available for route groups 1 and 2 and that the predictions of numbers of resources may not be as accurate or reliable than that for route groups 3 and 4. For that reason, a second predictive model based on data collected for the New Mexico BLM is used in conjunction with the resource forecasts to gauge route sensitivity.

The methodology used to arrive at the estimated number of archaeological sites for each segment follows that of Mueller (1974), Plog (1976), Plog et al. (1978), and Schiffer et al. (1978). Corrections for inventory area shape and sites size were factored into the analysis (CH2M Hill 2013i). These corrections then create an "effective" coverage inventory area or sampling fraction. As discussed in chapter 3, the formula used to generate the estimated number consists of the number of recorded resources within the inventoried area of the segment multiplied by 1 divided by the effective sampling fraction, or

$$Forecast\ resources = number\ of\ resources \times \frac{1}{effective\ sampling\ fraction}$$ (CH2M Hill 2013i).

Number of forecast resource was calculated for each segment, as well as number of forecast NRHP-eligible resources (historic properties). The forecast number of historic properties was calculated by taking the percentage of recorded historic properties multiplied by the total number of forecast resources for each segment. Predicted resource density was also calculated by dividing the number of predicted resources by the acreage of each segment. Segments can then be compared based on total numbers of forecast resource, forecast number of historic properties, and forecast site density to evaluate the potential resource sensitivity of the segment. Longer routes can be compared by adding up the total numbers of forecast resources; however, please note that longer routes will generally have more resources because of their length.

It must be noted that there is much less resource data for the New Build Section (primarily located in New Mexico) than the Upgrade Section (Arizona). As noted in section 3.9.8, only 3.7 to 9.1 percent of the New Build Section has been previously surveyed, whereas 50 to 65 percent of the Upgrade Section has been surveyed. The entire 100-foot ROW from Tucson to Saguaro substations was surveyed in 1985 (Effland and Green 1985). Two recent surveys have been performed along the existing transmission line in the Upgrade Section (Goldstein 2008; Hart 2012). Goldstein (2008) conducted a Class III pedestrian survey along the existing Tucson-Apache 115-kV Transmission Line. The survey covered approximately 80 miles within a 200-foot wide corridor from the Tucson Substation to the Apache Substation. Hart (2012) conducted a Class III survey of a 100-foot access road ROW between several pole structures along the

line between the Tucson and Apache substations for a total of 4.45 miles. An additional check for sites along the ROW from the Tucson to the Saguaro Substation was conducted in 2012 by a Western archaeologist but no survey corridor width was specified and no report was generated (personal communication, Maria Martin, Galileo 2013). Because so little of the New Build Section has been surveyed, the forecast resource numbers are lower than should be expected. For this reason, a second model using BLM site sensitivity data was used to analyze the portion of the New Build Section that is located within New Mexico (see below).

In addition, some segments have been identified "of potential cultural resource concern":

> Segments were designated "of potential cultural resource concern" if they contain any of the following characteristics: anticipated resource densities greater than 50 resources per 100 acres; State or National Register-listed properties; anticipated densities of Register eligible properties greater than 10 properties per 100 acres; or groupings of prehistoric habitation sites. In many cases, segments of potential concern possess more than one of these characteristics. (CH2M Hill 2013i:20)

Following the definitions provided in table 4.1-1, the following magnitude descriptions are used:

- No impact – Would not alter the characteristics of cultural resources that would make them eligible for the NRHP or alter their integrity of location, design, setting, materials, workmanship, feeling, or association.
- Minor – Impacts would occur but overall cultural resources would retain characteristics that would make them eligible for the NRHP or alter their integrity of location, design, setting, materials, workmanship, feeling, or association.
- Moderate – Impacts would occur, but overall cultural resources would partially retain characteristics that would make them eligible for the NRHP or alter their integrity of location, design, setting, materials, workmanship, feeling, or association.
- Major – Impacts would occur that overall, would substantially alter characteristics of cultural resources that would make them eligible for the NRHP or alter their integrity of location, design, setting, materials, workmanship, feeling, or association.

INDEX OF TOTAL POTENTIAL EFFECT (NEW MEXICO)

For the New Mexico portion of the proposed Project, an additional measure is available to quantitatively estimate the number of archaeological sites present within the representative ROW. In 2012 the New Mexico State Office of the BLM sponsored the creation of a quantitative sensitivity model of the southern portion of the State (Heilen et al. 2012). For model development, southern New Mexico was divided into seven modeling units based on environmental zones, hydrological basins, and culture areas. The New Mexico portion of the proposed Project is contained within Modeling Units 1 (Southwestern New Mexico Upland) and 2 (Southwestern New Mexico Lowland). Multiple sensitivity models were developed by statistical techniques for each modeling unit using data on site locations and previous archaeological surveys in conjunction with a variety of environmental and cultural variables.

For Modeling Units 1 and 2 models were created for Archaic sites, Formative period residential and non-residential sites, Protohistoric sites, and historic residential sites. In addition, a model for historic period non-residential sites was created for Modeling Unit 1 but not for Modeling Unit 2. Residential sites were identified by the presence of features indicative of a residential function, such as rooms, pit houses, rock shelters, foundations, kivas, cabins, tipi rings, wickiups, and hearths (Heilen et al. 2012: 3.4). The final form of each model is a GIS raster data file, each cell of which contains a number between zero and one

representing the probability of that cell being a site as opposed to non-site cell. Each cell in the raster matrix measures 30 x 30 m, or 0.222 acre.

Taken as a whole, these models provide a quantitative measure of the likelihood of archaeological site occurrence throughout the Southline representative ROW. They therefore provide another method of analyzing cultural resource impacts of the various route, subroutes, and segments of the Project within New Mexico. The models were used to generate an Index of Total Potential Effect (TPE) in the following manner:

1) For each of the models, probability values of each cell were summed for each segment, subroute, and route group in New Mexico. The result is an estimate of the number of "site" (as opposed to "non-site") cells present in each segment—a direct measure of archaeological site area likely to be present within each segment.

2) In this analysis we are primarily concerned with impacts to significant archaeological resources. Since the sensitivity models predict the total area of all archaeological sites, the numbers needed to be corrected by an estimate of significance for each site type. In other words, the total site cell values for each segment need to be corrected using an "eligibility multiplier" reflecting the percentage of sites of each type that are considered eligible for the NRHP. Eligibility multipliers (e) for each site type were derived as follows:

    a. Unfortunately, Heilen et al. (2012) do not provide information on what percentage of sites of each type have been recommended or determined eligible for inclusion in the NRHP. No adequate data are presented by CH2M Hill (2013i) to allow for such a calculation. In order to derive eligibility multipliers for the southwestern New Mexico sensitivity models, a complete site database for the area of Modeling Units 1 and 2 was obtained from the Archaeological Records Management Section in Santa Fe.

    b. Sites components were classified according to the criteria outlined in Heilen et al. (2012) as Archaic, Formative residential, Formative non-residential, Protohistoric, and Historic residential. The resulting site database therefore replicated as closely as possible the database that was employed in producing the sensitivity model. Eligibility multipliers were calculated directly from this database.

    c. Of 710 Archaic sites in the sample 191 were recommended or determined eligible, while 28 were recommended or determined not eligible ($e = 0.87$).

    d. Of 1471 Formative residential sites in the sample 434 were recommended or determined eligible, while 11 were recommended or determined not eligible ($e = 0.98$).

    e. Of 2578 Formative non-residential sites in the sample 467 were recommended or determined eligible, while 79 were recommended or determined not eligible ($e = 0.86$).

    f. Of 46 Protohistoric sites in the sample 12 were recommended or determined eligible, while only two were recommended or determined not eligible ($e = 0.86$).

    g. Of 661 Historic residential sites in the sample 317 were recommended or determined eligible, while 28 were recommended or determined not eligible ($e = 0.88$).

3) The total number of "site" cells for each segment was then multiplied by the value of e for each site type to derive an estimate of the number of "eligible site cells" of each site type in each segment.

4) The total number of eligible site cells for each segment was then multiplied by 0.222 to generate a measure of total eligible site acres for each site type in each segment.

5) The total number of eligible site acres for each segment was then divided by the mean site size (in acres) of each site type to derive an estimate of the number of eligible sites of each site type in each segment (see tables 4.9-3 and 4.9-6). The mean site size was calculated using all single-component eligible sites of each type in the database. Protohistoric sites were an exception to this procedure since there was only one single-component eligible Protohistoric site in the database. Mean site size for protohistoric sites was calculated using all available Protohistoric sites in the database.

    a. Mean site sizes (and sample sizes) were: 4.26 acres for Archaic (n=78), 3.23 acres for Formative residential (n=308), 4.56 acres for Formative non-residential, 8.47 acres for Protohistoric, and 14.72 acres for Historic residential.

6) An estimate of total eligible sites was produced by combining the five available sensitivity surfaces to generate a layer representing probability of each cell containing an eligible site of any time period. This was done by converting each period-specific sensitivity layer into a probability of each cell being a non-eligible-site cell, multiplying the five model values together to generate a probability that each cell does not contain an eligible site, and subtracting that value from 1. The resulting cell values, representing the probability that each cell was located within an eligible site, were summed by Project alternatives and corrected by mean eligible site size (6.22 acres), as described above. This procedure eliminated errors related to double-counting multicomponent sites.

7) Finally, an Index of TPE was calculated for each segment by standardizing the estimated number of eligible sites as a percentage of the value for the segment with the largest number of total eligible sites. The segment with the largest number of estimated eligible sites was segment P2 with 317.23 (see table 4.9-3), so that segment has a TPE value of 1.0.

This method is imperfect for a several reasons. First, multiplying the number of "site" cells by *e* is an imperfect method since eligible sites of each type are probably larger on average than not-eligible sites of the same type. Second, use of a raster grid automatically overestimates site acreage, since all cells which intersect a site boundary are classified as "site" cells, even though only a portion of their area may be within a site boundary. Both of these considerations mean that the method employed here will tend to overestimate the number of eligible sites in a subroute or segment. However, imperfect as it may be, the method is preferable to a straightforward count of "site" cells, since it does correct for different levels of significance within the defined site types. In particular, Formative residential sites are weighted more heavily other site types.

The TPE therefore provides a relative measure of probable impact to NRHP-eligible archaeological sites that can be used to compare segments with one another. Moreover, segment TPE values can be summed to calculate and compare the total probable impacts of subroutes. Although it does not consider impacts to cultural resources other than archaeological sites, the TPE is nevertheless a valuable quantitative measure that can be used to compare segments and subroutes in terms of their impacts to archaeological sites. The sensitivity model is based on sound statistical procedures and generalizes from established site location patterns in southwestern New Mexico. The regional archaeological sensitivity model derived from this method is presented graphically in figure 4.9-1 in relation to the proposed Project. The archaeological sensitivity of the subroutes and segments in New Mexico are depicted in figure 4.9-2. Please note that Arizona is not shown because no data for this portion of the analysis were available for Arizona.

ARCHAEOLOGICAL SENSITIVITY

As discussed in chapter 3, each site from the 2-mile analysis area was assigned a relative value based on NRHP eligibility, site type, and site characteristics. Values assigned included unknown (0), low (1), low to moderate (2), moderate (3), moderate to high (4), and high (5). Analysis was then run to determine the numbers of each value present in the representative ROW for each alternative. Percentages for each value were then calculated for each alternative within the representative ROW. Assuming that the percentage for each value is consistent throughout each alternative by route group, the forecast percentage of each sensitivity value was calculated by multiply the total number of forecast resources for each alternative by the percentages for each value. For example, 67 percent of the previously recorded sites along subroute 1.1 are classified as moderate sensitivity (level 3). It is projected that 173 resources will be found in the representative ROW for subroute 1.1; therefore, 67 percent of 173 totals 116 resources that will have moderate sensitivity.

VISUAL ANALYSIS

The APE for indirect effects as described in the PA consists of areas visible and within 5 miles of any Project component or to the visual horizon, whichever is closer. According to BLM VRI Handbook H-8410-1 (BLM 1986a), the BLM divides landscapes into three zones: foreground-middleground (less than 3 to 5 miles away), background (areas beyond the foreground-middleground but less than 15 miles away), and seldom seen (areas not seen or hidden). Visual impacts to historic properties are not likely for resources outside the foreground-middleground zone. Visual impacts to historic properties are those that affect the integrity of setting, association, or feeling of those properties; for resources greater than 5 miles away, any impacts to setting, association, or feeling would be minimal.

For towers up to 170 feet (New Build Section) and 140 feet (Upgrade Section), the area of visual effects would generally be 3 miles or less; therefore, the analysis area was divided into three zones: from 0 to 0.5 mile from the centerline, 0.5 to 3 miles away from the centerline, and 3 to 5 miles away from the centerline.

Analysis Assumptions

The analysis was conducted with the following assumptions:

- The Class I and BLM sensitivity model data are sufficient to assess impacts to cultural resources within the analysis area. The Class I model data include data from the Class III surveys within the representative ROW for the Upgrade Section (Effland and Green 1985; Goldstein 2008; Hart 2012). A Class III inventory would be conducted of the selected route in areas where no valid Class III inventory exists in accordance with Section 106 of the NHPA.
- The analysis of the representative ROW will sufficiently characterize the potential impacts to cultural resources. If the ROW is amended after the FEIS is complete, any additional areas would be inventoried for the presence of cultural resources in accordance with the terms of the PA.
- All access routes and substation locations are located within the analysis area. Any access routes or substations outside the analysis area, if selected, would be inventoried for the presence of cultural resources in accordance with the terms of the PA.

Impact Indicators

The primary direct impact to historic properties would consist of damage, loss, or disturbance from construction that would alter the characteristic(s) which make it eligible for listing in the NRHP.

Figure 4.9-1. Regional archaeological sensitivity of southwestern New Mexico in relation to the Project footprint.

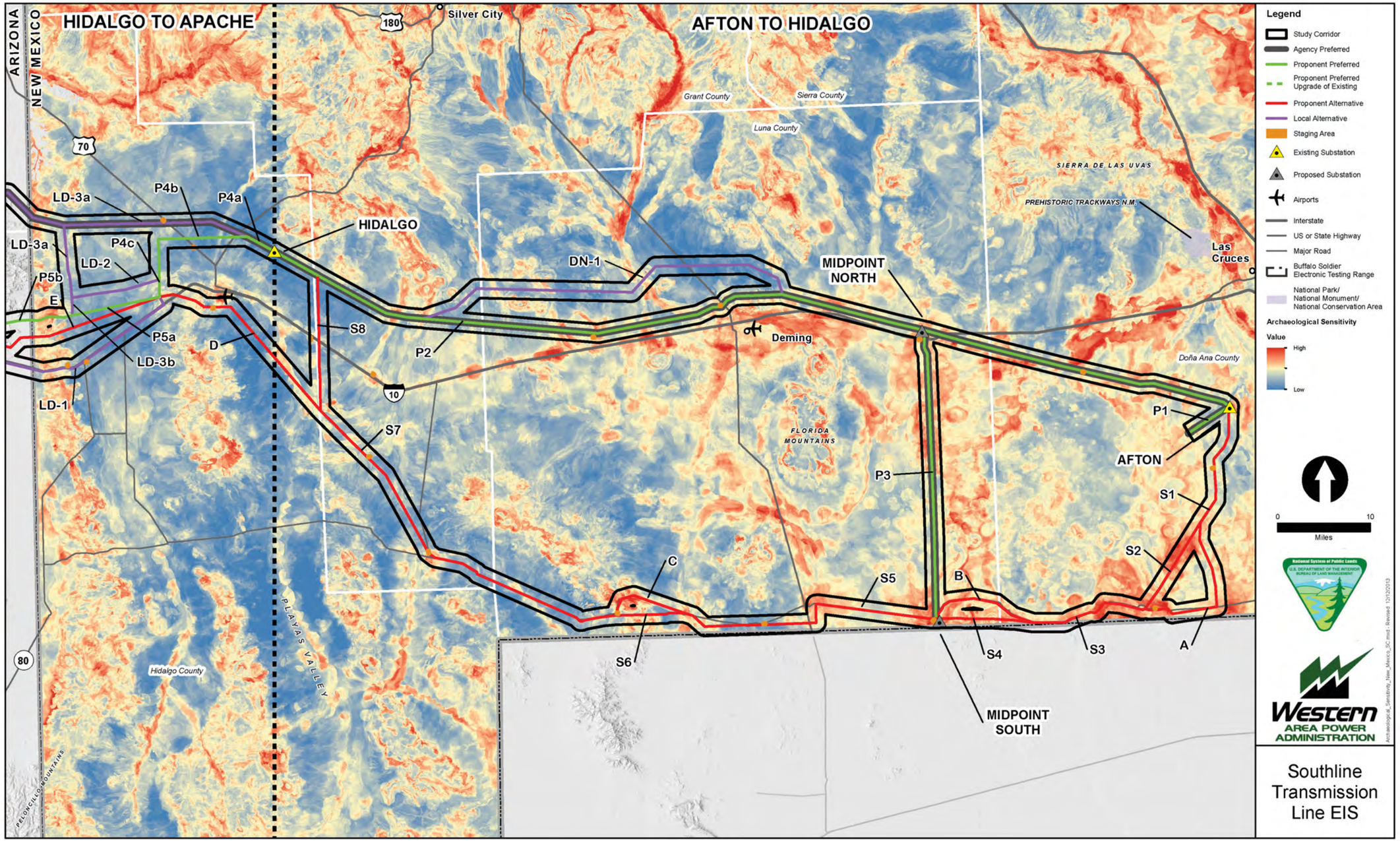
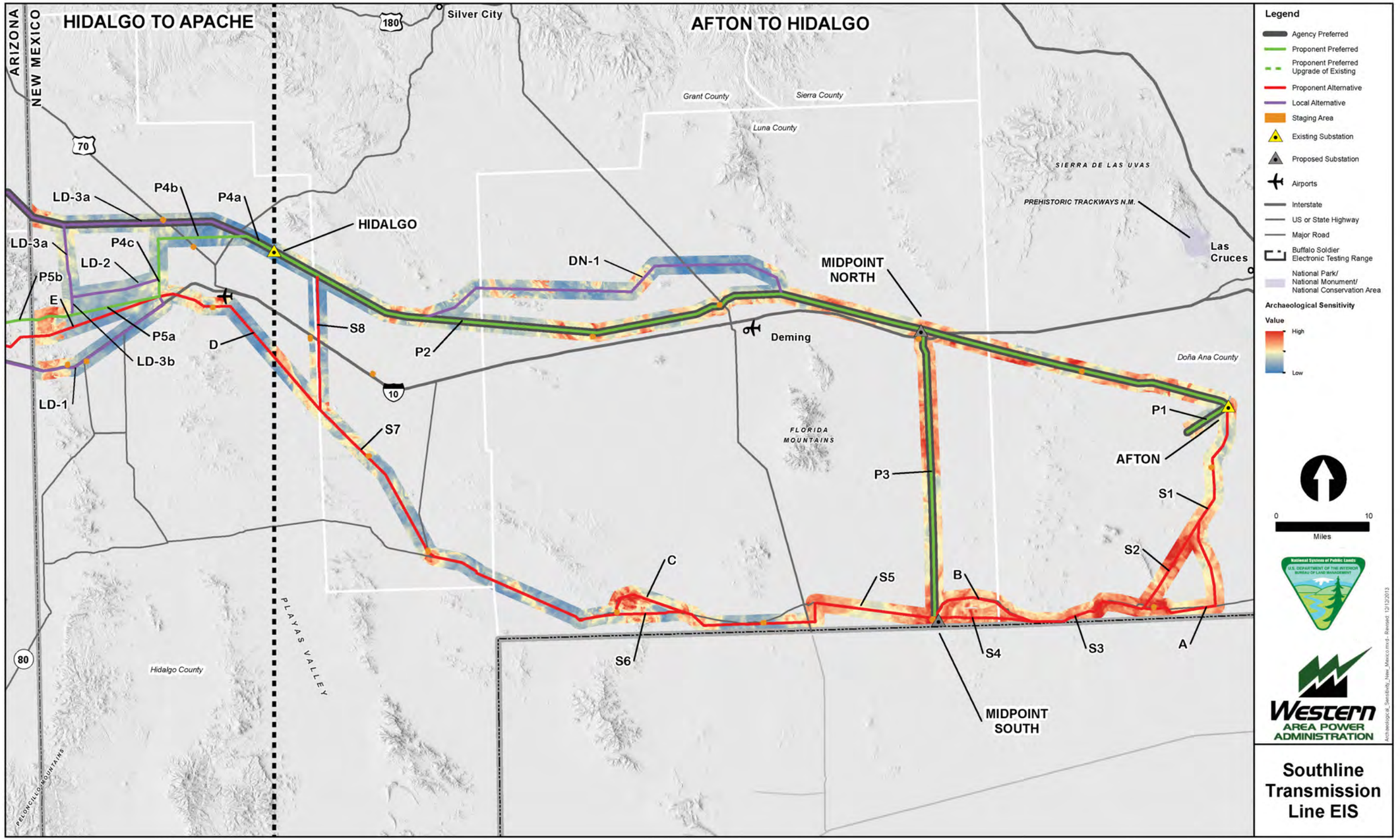


Figure 4.9-2. Archaeological sensitivity of Project subroutes and segments in New Mexico.



Therefore, the relative direct impacts were assessed by comparing the number of known resources and the predicted number of resources within each alternative's representative ROW. Because the primary indirect impact to cultural resources would consist of alterations to setting, feeling, or association of a resource where setting is a significant component of its NRHP eligibility, the relative visual effects were assessed by comparing numbers and types of historic properties listed on State or Federal registers and historic properties which are eligible under Criterion A, B, or C.

Impacts to historic trails and historic trail corridors would consist mainly of alterations to the setting and/or loss of recreational value of a historic trail or NHT corridor. Therefore, relative impacts were assessed by comparing where and how many times an alternative's analysis area would cross a trail.

Direct impacts to historic properties is most often caused by ground disturbance, but can also result from restricting access to a resource or from permanent visual or other intrusions within or adjacent to a property. Because cultural resources are finite and fragile, direct impacts to cultural resources are usually considered permanent and/or long-term, because ground disturbance generally results in damage to or loss of a property's characteristics that make it eligible for listing in the NRHP. Direct impacts may also be ongoing. Maintenance activities can result in continued degradation (direct and/or indirect impacts) of resources from additional ground disturbance.

Indirect, primarily visual, impacts to cultural resources can be temporary or permanent and/or long-term. Temporary indirect impacts are usually those caused by construction; permanent and/or long-term indirect impacts are those caused by the structures themselves.

IMPACT MAGNITUDE

Impact magnitude for cultural resources follows that presented in table 4.1-1.

- No impact – Would not produce obvious changes in baseline condition of resource, e.g., no changes to characteristics that contribute to a resource's eligibility for State or Federal registers.
- Minor/Negligible – Impacts would occur, but resource would retain existing character and overall baseline conditions, e.g., some changes to characteristics that contribute to a resource's eligibility would occur but would not alter that resource's eligibility for State or Federal registers.
- Moderate – Impacts would occur, but resource would partially retain existing character. Some baseline conditions would remain unchanged, e.g., some changes to characteristics that contribute to a resource's eligibility would occur which may alter that resource's eligibility for State or Federal registers.
- Major – Impacts would occur that would create a high degree of change within the existing resource character and overall condition of resource, e.g., changes to characteristics that contribute to a resource's eligibility would occur that would alter that resource's eligibility for State or Federal registers.

Significant Impacts

For the purposes of this analysis, a significant impact on cultural resources under NEPA could result if any of the following were to occur from construction or operation/maintenance of the proposed Project that could not be mitigated:

- Loss, damage, or disturbance to resources (including trails) listed on State or Federal registers;
- Loss, damage, or disturbance to resources (including trails) that are eligible or may be eligible for State and Federal registers;
- Loss, damage, or disturbance to resources of tribal concern;

- Alterations to setting, feeling, or association for an NRHP or State register–listed historic property; and
- Alterations of the setting or feeling to resources of tribal concern.

4.9.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the BLM would not grant the ROW for the proposed Project. Analysis area conditions would likely continue at current levels and trends. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro Substations within the next 10 years, in accordance with Western's 10-year capital improvement plan (Western 2012a).

Because under the no action alternative the existing lines would still be upgraded, impacts would be the same as described under route groups 3 and 4 Proponent Preferred alternatives 3.1 and 4.1 (see sections 4.9.6 and 4.9.7). Importantly, in subroute 4.1, the representative ROW of segments U3d, U3e, U3f, and U3g all cross the NRHP-listed Tumamoc Hill Archaeological District and Desert Laboratory NHL. Although this is an existing line, direct and indirect impacts to the NHL would be expected to continue.

Impacts Common to All Action Alternatives

CONSTRUCTION

Ground disturbance during construction is expected with all action alternatives and may result in the damage or loss of cultural resources; however, the number and types of resources affected would vary depending on the alternative. The primary contributions to ground disturbance would be access road improvements, structure construction, and substation expansion and/or construction.

As discussed in section 4.9.2, adverse impacts to cultural resources would be mitigated in accordance with the PA and the POD. As stated in the POD (Southline 2013), avoidance of resources during the final design stage would be the preferred form of mitigation.

OPERATION AND MAINTENANCE

Indirect impacts would occur from the presence of towers in sight of NRHP-listed historic properties or properties eligible under Criterion A, B, or C by altering the setting of the properties. However, the number and types of historic properties affected would vary by alternative.

Route Group 1 – Afton Substation to Hidalgo Substation

For the analysis of direct impacts, three data sets are discussed for each alternative within route group 1: known cultural resources, forecast resources, and the Index of TPE for archaeological sites. Because linear or large cultural resources may intersect with more than one segment within an alternative, each segment within an alternative is discussed separately. For this route group, the forecast resource numbers are based on very limited samples of surveyed space and are therefore likely to be unreliable. The Index of TPE should be used for evaluating alternatives rather than the forecast resources. However, forecast resources are presented here for the sake of completeness.

Table 4.9-1 presents counts of known cultural resources within the representative ROW for route group 1, Afton Substation to Hidalgo Substation. Table 4.9-2 presents forecast number of resources for the representative ROW. Table 4.9-3 presents the Index of TPE for archaeological sites based on BLM sensitivity data. Table 4.9.4 presents archaeological sensitivity of the representative ROW.

Table 4.9-1. Route Group 1 Cultural Resources Inventory Data within the Representative ROW

	Total Miles	Listed Sites	Determined Eligible Sites	Unevaluated or Unknown Sites	Resources from Historical Maps	Total Number of Resources
Subroute 1.1, Proponent Preferred						
P1	5.1				6	**6**
P2	102.0	1	2	16	70	**89**
P3	31.1			11	15	**26**
P4a	8.7				3	**3**
Subroute 1.2, Proponent Alternative						
S1	13.4			2	17	19
S2	11.1				8	8
S3	12.9		1		7	8
S4	10.6				5	5
S5	29.7		3	7	30	40
S6	7.4				9	9
S7	41.5		1	2	41	45
S8	14.6	1	1	1	10	13
Route Group 1 Local Alternatives						
DN1	42.5			5	28	33
A	17.5		1	5	17	23
B	12.2		2	3	3	8
C	9.0		1	1	11	13
D	22.8	1		2	30	33

Table 4.9-2. Route Group 1 Cultural Resources Projected Resource Numbers and Density within the Representative ROW

	Total Miles	Projected Number of Resources	Projected Resources Density (per 100 acres)	Projected Number of NRHP-eligible Resources	Percentage of Representative ROW Surveyed	Segment of Cultural Concern
Subroute 1.1, Proponent Preferred						
P1	5.1	6	4.80	0	12.8	
P2	102.0	121	4.90	22	4.4	Yes
P3	31.1	43	5.70	1	1.8	
P4a	8.7	3	1.38	3	24.7	
Subroute 1.2, Proponent Alternative						
S1	13.4	29	8.88	2	4.3	
S2	11.1	8	2.99	0	1.0	
S3	12.9	7	2.19	1	8.4	
S4	10.6	5	1.96	1	0.1	
S5	29.7	66	9.16	20	8.7	Yes
S6	7.4	9	4.94	0	0.32	
S7	41.5	65	6.44	13	5.7	Yes
S8	14.6	41	11.66	8	14.0	Yes
Route Group 1 Local Alternatives						
DN1	42.5	143	13.9	0	1.6	
A	17.5	32	7.48	3	3.1	
B	12.2	31	10.55	9	1.7	
C	9.0	15	7.00	3	2.1	
D	22.8	53	9.71	9	1.8	Yes

Table 4.9-3. Route Group 1 Estimated Eligible Sites and Index of Total Potential Effect for Archaeological Sites within the Representative ROW

Segment	Total Miles	Archaic	Formative Residential	Formative Non-Residential	Proto-Historic	Historic Residential	All Eligible Sites	Index of TPE	Eligible Sites/mile
Subroute 1.1, Proponent Preferred									
P1	5.1	2.75	4.59	2.74	1.10	1.33	15.33	0.05	3.01
P2	102.0	107.35	116.76	138.76	40.16	16.82	317.23	1.00	3.11
P3	31.1	31.95	42.44	37.56	9.13	5.30	105.40	0.33	3.39
P4a	8.7	6.84	5.80	6.73	3.46	0.05	16.31	0.05	1.87

Table 4.9-3. Route Group 1 Estimated Eligible Sites and Index of Total Potential Effect for Archaeological Sites within the Representative ROW (Continued)

Segment	Total Miles	Archaic	Formative Residential	Formative Non-Residential	Proto-Historic	Historic Residential	All Eligible Sites	Index of TPE	Eligible Sites/mile
Subroute 1.2, Proponent Alternative									
S1	13.4	5.46	8.08	10.12	2.97	2.16	40.49	0.13	3.02
S2	11.1	13.19	28.05	22.52	1.87	3.47	39.79	0.13	3.58
S3	12.9	16.03	23.21	19.94	8.17	4.04	46.66	0.15	3.62
S4	10.6	10.94	25.79	21.71	3.62	2.77	37.92	0.12	3.58
S5	29.7	23.39	24.97	41.48	17.57	5.92	90.49	0.29	3.05
S6	7.4	9.66	8.56	9.40	3.44	1.37	21.95	0.07	2.97
S7	41.5	29.42	24.14	39.26	32.13	3.45	108.15	0.34	2.61
S8	14.6	7.83	2.78	8.60	5.42	0.73	33.45	0.11	2.29
Route Group 1 Local Alternatives									
DN1	42.5	41.57	25.64	31.32	11.84	3.22	92.52	0.29	2.18
A	17.5	13.60	23.80	26.04	5.71	2.29	59.14	0.19	3.38
B	12.2	12.47	24.64	24.61	9.10	2.36	42.45	0.13	3.48
C	9.0	21.50	15.06	14.92	5.16	2.03	30.45	0.10	3.38
D	22.8	25.89	18.04	34.08	13.72	2.72	62.70	0.20	2.75

Table 4.9-4. Route Group 1 Archaeological Sensitivity within the Representative ROW

Alternative	Total Miles	Projected Number of Resources: Level 0 (%)	Projected Number of Resources: Level 1 (%)	Projected Number of Resources: Level 2 (%)	Projected Number of Resources: Level 3 (%)	Projected Number of Resources: Level 4 (%)	Projected Number of Resources: Level 5 (%)
Subroute 1.1	146.9	12 (7%)	7 (4%)	33 (19%)	116 (67%)	7 (4%)	0 (0%)
Subroute 1.2	141.2	32 (14%)	32 (14%)	41 (18%)	94 (41%)	32 (14%)	0 (0%)
DN1	42.5	86 (60%)	0 (0%)	0 (0%)	29 (20%)	29 (20%)	0 (0%)
A	17.5	0 (0%)	0 (0%)	0 (0%)	24 (75%)	8 (25%)	0 (0%)
B	12.2	13 (43%)	0 (0%)	0 (0%)	18 (57%)	0 (0%)	0 (0%)
C	9.0	0 (0%)	0 (0%)	0 (0%)	8 (50%)	0 (0%)	8 (50%)
D	22.8	0 (0%)	23 (43%)	0 (0%)	23 (43%)	0 (0%)	7 (14%)

SUBROUTE 1.1 – PROPONENT PREFERRED

Subroute 1.1 consists of segments P1, P2, P3, and P4a. Segment P1 connects the Afton Substation to an existing line to the southwest. Segments P2 and P4a are the primary route: it runs from the Afton Substation west and north-west past Deming to the Hidalgo Substation. Segment P3 is an interconnection route running north-south between I-10 and NM 9.

Direct Impacts

Known Cultural Resources

For subroute 1.1, segments P1 and P4a have no previously recorded cultural resources which are eligible or may be eligible for the NRHP within the representative ROW. Segment P1 has 6 potential historic resources found on historical maps; segment P4a has 3 potential historic resources. Survey coverage of the subroute 1.1 representative ROW is low and ranges from 1.8 percent for segment P1 to 24.7 percent for segment P4a.

The representative ROW of segment P2 crosses the Butterfield Trail, which is NRHP-eligible. Two NRHP-eligible (LA 15330 and LA 35176) and 16 unevaluated/unknown resources are also present in P2, as well as 70 potential resources found on historical maps. Both eligible sites are prehistoric artifact scatters.

Segment P3 has 11 unevaluated/unknown resources and 15 potential historic resources within the representative ROW.

Though it is located slightly outside of the representative ROW, it is worth mentioning that the Black Mountain site (LA 49) is located very close to local alternative DN1 northwest of Deming. This site is of the greatest significance, and is listed on both the State and Federal registers.

Archaeology Southwest's Cultural Resources Priority Areas

The representative ROW of segment P2 crosses the southern edge of the Burro Creek Cienega CRPA for 1.0 mile. The Burro Creek Cienega CRPA is an area of dense prehistoric and historic occupation, and includes a section of the Butterfield Trail.

Forecast Resources

For subroute 1.1, 173 resources are anticipated to be found in the representative ROW, with the majority of those (121) located within segment P2. A total of 26 NRHP-eligible historic properties is predicted for this subroute and resource density would range from 1.38 resources to 5.70 resources per 100 acres. Segment P2 has been categorized as a segment of cultural concern; P2 is sensitive primarily because of its length, which means more historic properties should be located within its representative ROW. However, because of the low percentage of surveyed representative ROW, this forecast must be used with caution.

Index of Total Potential Effect

Subroute 1.1 segments have TPE values ranging from 0.05 to 1.00, with segment P2 having the highest value. Because segment P2 is the longest segment of the subroute, the greater projected impact is partially due to its length. However, segment P2 also has a high number of eligible sites per mile at 3.39. It is both long and is projected to have a relatively high density of eligible sites. Subroute 1.1 as a whole has a total estimate number of eligible sites of 454, slightly higher than the subroute 1.2 estimate of 418. It is therefore to be expected that subroute 1.1 would have slightly greater total effects on archaeological sites than would subroute 1.2. However, the difference is a relatively subtle one.

Archaeological Sensitivity

Sixty-seven percent of sites within subroute 1.1 are moderate sensitivity (level 3) which means 116 of the 173 projected resources for the representative ROW should be of moderate sensitivity. No resources should be of high sensitivity (level 5) while only 7 (4%) of the Project resources should be of moderate to high sensitivity (level 4).

Historic Trails

Subroute 1.1 would cross the Butterfield Trail and crosses the potential routes of the Mormon Battalion Trail and the Janos Copper Road. Segment P2 would cross all three trails. Segment P2 would cross the Butterfield Trail east of Lordsburg and the Mormon Battalion Trail and the Janos Copper Road just south of Grandmother Mountain and north of I-10.

Summary of Direct Impacts for Subroute 1.1

Direct impacts to cultural resources for subroute 1.1 would be major and long-term. One NRHP-listed, two NRHP-eligible, and 27 unevaluated resources are found within the representative ROW for subroute 1.1. Because only 1.8 to 24.7 percent of the representative ROW has been surveyed, projected resources are anticipated to total 173 resources with 73 percent in the moderate to high or high sensitivity category. However, adverse impacts to cultural resources would be mitigated in accordance with the terms of the PA and the POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Visual Impacts

Visual impacts data for subroute 1.1 consist of historic properties listed on State or Federal registers and historic properties eligible for the NRHP under Criterion A, B, or C within 5 miles of the centerline (10-mile corridor). As discussed in section 4.9.2, historic properties were divided into three categories based on distance from the centerline: 0–0.5 mile, 0.5–3 miles, and 3–5 miles. Significant visual impacts are more likely to occur in the 0–0.5 mile and 0.5–3 miles zones than the 3–5 miles zone due to the increased distance in the 3–5 miles zone; however, the proposed 170-foot lattice structures for the New Build Section and the 140-foot tubular steel poles for the Upgrade Section can be seen as far away as 3 miles (Jones and Jones 1976:table 11; BLM 2006).

Listed Properties

Twenty historic properties that are listed on State or Federal registers are located within the 10-mile visual effects corridor. All of the properties are found in the 0.5- to 3-mile range along segment P2, but are located at the far end (3-mile) of that range south of I-10 in Deming. Due to the distance few visual impacts are expected. The properties are as follows:

- Deming Armory
- Seaman Field House
- Luna County Courthouse and Park
- Mahoney Building
- US Post Office–Deming Main
- 105–107 North, Silver Avenue, Deming
- Baker Hotel
- Diamond Furniture Warehouse, Deming
- 100 South Gold Avenue, Deming (Deming Art Council)
- 110 South Gold Avenue, Deming (Waymaker Christian Store)

- 200 South Gold Avenue, Deming (Mimbres Valley Brewing Company)
- 202 South Gold Avenue, Deming (Liberty Finance)
- Old Deming National Bank
- Palmas Restaurant
- 118 East Pine Street, Deming (The New T-Shirt Print Shop)
- 116 North Silver Avenue, Columbus (Star Barber Shop (possible location))
- 116 North Silver Avenue, Deming (Tinaja Alta Trading Co.)
- Silver Avenue, Deming (Antique Shop)
- 112–120 East Spruce Street, Deming
- 113 East Spruce Street, Deming (Delaney & Hernandez)

Determined Eligible Historic Properties

There is one resource which has been determined eligible under Criterion A, B, or C within the 10-mile visual analysis corridor for subroute 1.1. The historic site LA 164811, the Cambray Civilian Conservation Corps camp, is within 0.5 mile of the centerline of segment P2; visual impacts to the setting of this property are expected due to the distance from the proposed transmission line.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Subroute 1.2 consists of segments S1 through S8. It begins at the Afton Substation and runs south and southwest to NM 9. It then continues west along Columbus Road and eventually runs south of the town of Columbus where it runs west along NM 9 until the intersection of NM 9 and NM 146. The subroute then runs northwest just east of the Luna and Grant County line. Segment S8 then runs north to segment P4a of subroute 1.1.

Direct Impacts

Known Cultural Resources

For subroute 1.2, segments S2, S4, and S6 have no previously recorded NRHP-eligible or unevaluated/unknown sites within the representative ROW; segment S2 has eight potential historic resources, S4 has five potential historic resources, and S6 has nine potential historic resources. Previous survey coverage of the subroute 1.2 representative ROW is lower than that of subroute 1.1; it ranges from a low of 0.1 percent for segment S4 to 14.0 percent for segment S8.

One resource which is NRHP-unevaluated/unknown is found within the representative ROW for segment S3, along with seven potential resources from historical maps.

In the representative ROW for segment S5, three NRHP-eligible resources (LA 54882, LA 54883, and LA 76114) and seven unevaluated/unknown previously recorded resources are found. All three eligible sites are historic and at least two are associated with the railroad; no information was available for LA 76114. Segment S5 also has 30 potential historic resources.

In segment S7, one NRHP-eligible (LA 44811) and two unevaluated/unknown previously recorded resources along with 41 potential historic resources are found. LA 44881 is the historic Victorio Station.

One listed property, the Butterfield Trail, crosses the representative ROW of segment P8. One NRHP-eligible (LA 134502) and one unevaluated/unknown previously recorded resource are found within the segment P8 representative ROW; 10 potential historic resources are also present. LA 134502 is a prehistoric artifact scatter.

In addition, while not recorded as an archaeological site in New Mexico, or a historic built environment resource, the historic railroad grade of the El Paso and Southwestern Railroad can be seen on historical maps running alongside a large portion of subroute 1.2. It is labeled as OLD RAILROAD GRADE. The grade originates southeast of segment S2 and is crossed by segment S3. The grade then runs along the north side of segment S3, S5, and S6, although it is only found in the representative ROW where it is crossed by S3. The El Paso and Southwestern Railroad grade is considered an NRHP-eligible site by the BLM (personal communication, Jane Childress 2013).

Archaeology Southwest's Cultural Resources Priority Areas

The representative ROW for subroute 1.2 does not cross any of the Archaeology CRPAs.

Forecast Resources

Based on forecasted resources analysis, impacts to cultural resources for subroute 1.2 would be major and long-term and more intense than that of subroute 1.1. For subroute 1.2, 170 cultural resources are anticipated to be in the representative ROW, of which 45 are anticipated to be eligible for the NRHP. Predicted resource density ranges from 1.96 to 11.66 resources per 100 acres. Segments S5, S7, and S8 have been flagged as segments of cultural concern.

Index of Total Potential Effect

Subroute 1.2 segments have TPE values ranging from 0.07 to 0.34, with S7 having the highest value. Because segment S7 is the longest segment of the subroute, the greater projected impact is due mainly to its length; segments S2, S3, and S4 have much larger estimated numbers of eligible sites per mile. Subroute 1.2 as a whole has a total estimated number of eligible sites of 418, slightly lower than the subroute 1.1 estimated number of 454. Subroute 1.2 also has a slightly lower number of eligible sites per mile (2.97) than does subroute 1.1 (3.09). Therefore, it is expected that subroute 1.2 would have slightly lesser impact on archaeological sites than would subroute 1.1. However, the difference is a relatively subtle one.

Archaeological Sensitivity

Subroute 1.2 is projected to have 94 resources (41 percent) with moderate sensitivity (level 3); 41 resources (18 percent) at low to moderate (level 2); and 32 (14 percent) at both low and moderate to high sensitivity. No resources are projected to be in the high sensitivity group (level 5).

Historic Trails

Subroute 1.2 crosses the Butterfield Trail and crosses the potential routes of the Mormon Battalion Trail and the Janos Copper Road. Segment S6 crosses the Janos Copper Road, segment S7 crosses the Mormon Battalion Trail, and segment S8 crosses the Butterfield Trail. Segment S6 crosses the Janos Copper Road on the northeast side of the Carrizalillo Hills and west of Columbus. Segment S7 crosses the Mormon Battalion Trail southeast of the Brockman Hills. Segment S8 crosses the Butterfield Trail east of Lordsburg.

Summary of Direct Impacts for Subroute 1.2

Direct impacts to cultural resources for subroute 1.2 would be moderate/major and long-term. One NRHP-listed, six NRHP-eligible, and 12 unevaluated resources are found within the representative ROW for subroute 1.2. Projected resources are anticipated to total 230 resources with 55 percent in the moderate to high or high sensitivity category. However, adverse impacts to cultural resources would be mitigated in accordance with the terms of the PA and the POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Visual Impacts

Listed Historic Properties

Eight historic properties within the 10-mile visual corridor have been listed on State or Federal registers for subroute 1.2. All listed properties are within the visual corridor for segments S5 and S7.

For segment S5, the Village of Columbus and Camp Furlong NHL are located within 0.5 mile of the centerline. The transmission line would be located to the east of the Village of Columbus and Camp Furlong NHL. Some impacts to setting would occur for the eastern edge of the NHL which is less than 0.5 mile from the line. Within 0.5 to 3 miles are: the Hoover Hotel, the Columbus Village Jail, the Railroad Station Complex, the U.S. Army Headquarters, the U.S. Customs House, and the Camp Furlong Recreation Hall. All of these historic properties are located within downtown Columbus, approximately 1.5 miles from the transmission line. Visibility of the line from these properties would be negligible; therefore, few visual impacts are expected.

For segment S7, the Old Hatchet Mine in Hachita is within 3 to 5 miles of the centerline. Because the mine is over 3 miles from the proposed transmission line, no visual impacts are expected.

Determined Eligible Historic Properties

Along subroute 1.2, there is one resource which has been determined eligible under Criterion A, B, or C within the visual impact analysis corridor. LA 12839 is within 0.5 to 3 miles of the centerline of segment S5. LA 12839 is the El Paso and Southwestern Railroad Columbus Station. The station is located in downtown Columbus, approximately 1.5 miles from the proposed transmission line and visibility of the transmission line would be limited from the station; therefore, few visual impacts are expected.

The El Paso and Southwestern Railroad grade, which is considered an NRHP-eligible site by the BLM (personal communication, Jane Childress 2013) is within the 0.5-mile visual impact zone. In many places the railroad grade is less than 150 m from the centerline of subroute 1.2; therefore, visual impacts to the railroad grade would be major and long-term.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: DN1, A, B, C, and D. DN1 would run north of subroute 1.1 and share ROW with the proposed SunZia project. Alternative A would follow existing unpaved roads south and southeast of subroute 1.2; both alternatives B and C parallel NM 9 for 12 miles; and alternative D runs from segment S7 to just south of Lordsburg where it continues west and northwest to 1 mile north of I-10.

Direct Impacts

Known Cultural Resources

The representative ROW for segment DN1 contains 5 unevaluated/unknown previously recorded resources and 33 potential resources from historical maps; 1.6 percent of the representative ROW has been previously surveyed.

Local alternative A has 1 eligible resource, 5 unevaluated/unknown previously recorded resources, and 17 potential resources from historical maps; 3.1 percent of local alternative A has been previously surveyed. The eligible resource (LA 79551) is a prehistoric artifact scatter.

Local alternative B has two NRHP-eligible and three unevaluated/unknown previously recorded resources, as well as three potential resources from historical maps. Within the representative ROW, however, only 1.7 percent of the representative ROW has been surveyed. Both the eligible resources (LA 54880 and LA 159468) are historic; however, no information was available for LA 159468. LA 54880 is a railroad station.

Local alternative C has 1 eligible resource, 1 unevaluated/unknown resource, and 11 potential historic resources; 2.1 percent of the representative ROW has been previously surveyed.

One NRHP-listed resource, the Town of Shakespeare, is located within the representative ROW of local alternative D, along with 2 unevaluated/unknown previously recorded resources, and 30 potential resources from historical maps; however, only 1.8 percent of the representative ROW has been surveyed.

In addition, the El Paso and Southwestern railroad grade begins approximately 150 m south of local alternative A. Local alternative B and C run parallel approximately 100 m to the south of the railroad grade along the same basic alignment; however, it is not found within the representative ROW for local alternatives A, B, and C.

Archaeology Southwest's Cultural Resources Priority Areas

The representative ROW for local alternative DN1 crosses the northwest portion of the Black Mountain CRPA for 1.4 miles and the southern tip of the Burro Creek Cienega CRPA for 0.7 mile.

The Black Mountain CRPA includes the habitation site of Black Mountain and associated sites. The Burro Creek Cienega CRPA is an area of dense prehistoric and historic occupation, and includes a section of the Butterfield Trail.

Forecast Resources

Local alternative A is predicted to have 32 cultural resources in the representative ROW, 3 of which would be NRHP-eligible. Local alternative B is predicted to have 31 cultural resources, 9 of which would be NRHP-eligible. Fifteen resources are also predicted for local alternative C; 3 of which would be NRHP-eligible. Local alternative D is predicted to have 53 cultural resources with 9 resources eligible for the NRHP. Resource density for local alternative D is anticipated to be 9.71 resources per 100 acres within the representative ROW. Local alternative DN1 is forecast to have 143 resources but no resources eligible for the NRHP. Local alternative D is the only local alternatives categorized as being of cultural concern with route group 1.

Index of Total Potential Effect

Local alternative DN1 has a TPE index of 0.29 with 93 estimated eligible sites. DN1 is 42.50 miles long; there are 2.18 eligible sites per mile.

Local alternative A has a TPE index of 0.19 with 59 estimated eligible sites. DN2 is 17.50 miles long; there are 3.38 eligible sites per mile.

Local alternative B has a TPE index of 0.13 with 42 estimated eligible sites. B is 12.20 miles long; there are 3.48 eligible sites per mile.

Local alternative C has a TPE index of 0.10 with 30 estimated eligible sites. DNC is 9.00 miles long; there are 3.38 eligible sites per mile.

Local alternative D has a TPE index of 0.23 with 94 estimated eligible sites. DND is 22.80 miles long; there are 2.75 eligible sites per mile.

Archaeological Sensitivity

Local alternative DN1 is projected to have 29 resources (20 percent) with moderate sensitivity (level 3) and 29 resources with moderate to high sensitivity (level 4).

Local alternative A is projected to have 24 resources (75 percent) with moderate sensitivity (level 3) and 8 resources (25 percent) at moderate to high sensitivity (level 4). No resources are projected with high sensitivity (level 5).

Eighteen resources (57 percent) with moderate sensitivity are projected for local alternative B; 13 resources (43 percent) are projected as unknown sensitivity (level 0). No resources are projected with moderate to high (level 4) or high sensitivity (level 5).

Local alternative C is projected to have eight resources (50 percent) in both the moderate (level 3) and high (level 5) sensitivity category.

Local alternative D is projected to have 23 resources (43 percent) in both the low (level 1) and moderate (level 3) categories; seven resources (14 percent) are projected to be of high sensitivity (level 5).

Historic Trails

Local alternatives C and DN1 cross potential route of the Janos Copper Road. DN1 also crosses the potential route of the Mormon Battalion Trail. Local alternative C crosses the potential route of the Janos Copper Road northeast of the Carrizalillo Hills and north of where segment S6 crosses the road. Segment DN1 crosses the potential Mormon Battalion Trail route west of Luna, just southwest of Clabber Top Hill.

Summary of Direct Impacts for Route Group 1 Local Alternatives

Direct impacts to cultural resources for local alternative DN1 would be minor to moderate. Five unevaluated resources have been previously recorded within the representative ROW. Projected resources total 38, with 40 percent being of moderate and moderate to high sensitivity.

Direct impacts for local alternative A would be moderate: one eligible and five unevaluated resources are located within the representative ROW. Projected resources total 32, with 100 percent being of moderate or moderate to high sensitivity.

For local alternative B, direct impacts would be moderate: two eligible and two unevaluated resources have been previously recorded in the representative ROW. Thirty-one resources are projected for the representative ROW of local alternative B, with 57 percent falling in the moderate sensitivity category.

Direct impacts for local alternative C would be moderate. One eligible and one unknown resource have been recorded in the representative ROW and only 15 resources are projected for local alternative C; however, 50 percent of the projected resources are anticipated to fall in the high sensitivity category and 50 percent in the moderate sensitivity category.

For local alternative D, direct impacts would be moderate. One listed and two unevaluated resources have been previously recorded in the representative ROW. Project resources total 53, with 43 percent having moderate sensitivity and 14 percent having high sensitivity.

However, adverse impacts to cultural resources would be mitigated in accordance with the terms of the PA and the POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Visual Impacts

Listed Historic Properties

For local alternative D, five historic properties which are listed on State or Federal registers are found within the visual analysis corridor. Two properties, the Shakespeare Ghost Town and the Shakespeare Cemetery, are found within 0.5 mile of the centerline. The centerline currently crosses the southwestern corner of the Shakespeare Ghost Town. Alterations to setting for these two properties would be major or moderate, depending on the exact location of the towers. Three properties, the Hidalgo County Courthouse, the Hidalgo County Library, and the Lordsburg Coaling Tower which no longer exists, are found within 0.5 to 3 miles of the centerline. These properties are all located in downtown Lordsburg on the northern side of I-10; therefore the visibility of the transmission line would be limited from these properties. Few to no impacts are expected to these properties.

One NRHP-listed historic property is found within 3 to 5 miles of local alternative DN1, the Luna County Courthouse. Because of the distance from DN1, few to no visual impacts are anticipated for this property.

No listed historic properties are within the visual analysis corridor for local alternatives A, B, and C.

Determined Eligible

No resources which have been determined eligible under Criterion A, B, or C are within the visual analysis area for local alternative A, B, or C.

Two properties are between 0.5 to 3 miles of local alternative D: LA 50129 and LA 111003. Visual impacts to the setting for these two sites would be minor.

The El Paso and Southwestern Railroad grade, which is considered an eligible site by the BLM (personal communication, Jane Childress 2013), is within the 0.5-mile visual impact zone. In many places the railroad grade is less than 150 m from the centerline of local alternatives A, B, and C; therefore, visual impacts to the railroad grade would be major and long-term.

Route Group 2 – Hidalgo Substation to Apache Substation

There are three tables of data for direct analysis: table 4.9-5 presents counts of known cultural resources within the representative ROW for route group 2, Hidalgo Substation to Apache Substation. Table 4.9-6 presents forecast number of resources for representative ROW for route group 2, Hidalgo Substation to Apache Substation. Table 4.9-7 presents Index of TPE for archaeological sites based on BLM sensitivity data for route group 2, Hidalgo Substation to Apache Substation (New Mexico portion only). Table 4.9-8 presents the archaeological sensitivity of route group 2, Hidalgo Substation to Apache Substation.

For this route group, the forecast resource numbers are based on very limited samples of surveyed space and are therefore likely to be unreliable. Where available (in New Mexico), the Index of TPE should be used for evaluating alternatives rather than the forecast resources. However, forecast resources are presented here for the sake of completeness an due to the fact that no Index of TPE can be calculated for the Arizona portion of this route group.

Table 4.9-5. Route Group 2 Cultural Resource Inventory Data

	Total Miles	Listed Sites	Determined Eligible Sites	Unevaluated or Unknown Sites	Resources from Historic Maps	Total Number of Resources
Subroute 2.1, Proponent Preferred						
P4b	14.0				5	5
P4c	1.9	1			2	3
P5a	9.6			1	5	6
P5b	21.1	1	2	5	17	25
P6a	0.9			1	2	3
P6b	22.5			12	37	49
P6c	2.8			1	7	8
P7	22.3		2	12	32	36
P8	0.5				2	2
Subroute 2.2, Proponent Alternative						
E	31.8	1		1	38	40
F	25.3			4	36	40
Ga	25.7			1	45	46
Gb	1.0				4	4
Gc	7.4		3	2	13	18
I	2.3				4	4
J	2.3				6	6

Table 4.9-5. Route Group 2 Cultural Resource Inventory Data (Continued)

	Total Miles	Listed Sites	Determined Eligible Sites	Unevaluated or Unknown Sites	Resources from Historic Maps	Total Number of Resources
Route Group 2 Local Alternatives						
LD1	35.4	1	1	11	46	59
LD2	9.6	1			3	4
LD3a	27.9	1			18	19
LD3b	1.9				2	2
LD4	51.7		1	4	13	18
LD4-Option 4	6.5				10	10
LD5-Option 5	12.3				17	17
WC1	14.8			1	82	83

Table 4.9-6. Route Group 2 Cultural Resources Projected Resources Numbers and Density within the Representative ROW

	Total Miles	Projected Number of Resources	Projected Resource Density (per 100 acres)	Projected Number NRHP-eligible Historic Properties	Percentage of Representative ROW Surveyed	Segment of Cultural Concern
Subroute 2.1, Proponent Preferred						
P4b	14.0	5	1.49	0	1.0	
P4c	1.9	3	6.68	1	1.7	Yes
P5a	9.6	7	2.86	0	16.5	
P5b	21.1	42	8.14	9	52.0	Yes
P6a	0.9	12	57.60	6	16.8	Yes
P6b	22.5	93	17.10	2	11.0	
P6c	2.8	19	27.71	0	2.6	
P7	22.3	58	10.79	1	82.5	Yes
P8	0.5	2	22.22	0	100.0	
Subroute 2.2, Proponent Alternative						
E	31.8	41	5.26	4	0.64	Yes
F	25.3	60	9.80	5	16.13	
Ga	25.7	73	11.67	3	2.1	
Gb	1.0	4	15.42	1	35.4	
Gc	7.4	24	13.02	3	67.2	
I	2.3	3	5.42	0	6.1	
J	2.3	5	7.72	0	14.8	

Table 4.9-6. Route Group 2 Cultural Resources Projected Resources Numbers and Density within the Representative ROW (Continued)

	Total Miles	Projected Number of Resources	Projected Resource Density (per 100 acres)	Projected Number NRHP-eligible Historic Properties	Percentage of Representative ROW Surveyed	Segment of Cultural Concern
Route Group 2 Local Alternatives						
LD1	35.4	73	8.55	7	31.3	Yes
LD2	9.6	4	1.67	0	1.2	Yes
LD3a	27.9	61	8.77	0	11.0	Yes
LD3b	1.9	3	6.42	0	1.6	
LD4	51.7	45	3.6	0	2.1	
LD4-Option 4	6.5	0	0	0	29.1	
LD4-Option 5	12.3	0	0	0	77.6	
WC1	14.8	89	24.78	0	12.2	Yes

Table 4.9-7. Route Group 2 Estimated Eligible Sites and Index of Total Potential Effect for Archaeological Sites within the Representative ROW (New Mexico)

Segment	Total Miles	Archaic	Formative Residential	Formative Non-Residential	Proto-Historic	Historic Residential	Eligible Sites	Index of TPE	Eligible Sites/mile
Subroute 2.1, Proponent Preferred									
P4b	14.00	7.41	5.27	10.14	3.81	0.80	28.46	0.09	2.03
P4c	1.90	1.07	2.29	2.10	0.72	0.52	5.29	0.02	2.79
P5a	9.60	6.41	2.69	7.61	1.20	0.48	21.03	0.07	2.19
P5b	21.10	10.11	10.28	5.63	1.36	0.82	14.64	0.05	0.69
Subroute 2.2, Proponent Alternative									
E	31.80	13.61	7.67	11.51	2.08	1.11	34.13	0.11	1.07
Route Group 2 Local Alternatives									
LD1	35.40	10.83	8.32	13.24	10.45	1.59	41.37	0.13	1.17
LD2	9.60	12.19	2.20	8.53	3.05	0.65	23.92	0.08	2.49
LD3a	27.90	14.72	11.88	24.28	8.01	1.01	63.36	0.20	2.27
LD3b	1.90	2.54	0.91	2.22	0.49	0.13	4.96	0.02	2.61
LD4	51.70	3.64	6.41	7.40	2.12	0.67	12.32	0.04	0.24

Table 4.9-8. Route Group 2 Archaeological Sensitivity within the Representative ROW

Alternative	Total Miles	Projected Number of Resources: Level 0 (%)	Projected Number of Resources: Level 1 (%)	Projected Number of Resources: Level 2 (%)	Projected Number of Resources: Level 3 (%)	Projected Number of Resources: Level 4 (%)	Projected Number of Resources: Level 5 (%)
Subroute 2.1	95.6	24 (10%)	0 (0%)	77 (32%)	77 (32%)	65 (27%)	0 (0%)
Subroute 2.2	95.8	0 (0%)	0 (0%)	48 (23%)	145 (69%)	17 (8%)	0 (0%)
LD1	35.4	5 (7%)	0 (0%)	9 (13%)	53 (73%)	5 (7%)	0 (0%)
LD2	9.6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (100%)	0 (0%)
LD3a	27.9	0 (0%)	0 (0%)	0 (0%)	0 (0%)	61 (100%)	0 (0%)
LD3b	1.9	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
LD4	51.7	9 (20%)	0 (0%)	9 (20%)	27 (60%)	0 (0%)	0 (0%)
LD4-Option 4	6.5	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
LD4-Option 5	12.3	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
WC1	14.8	0 (0%)	0 (0%)	0 (0%)	89 (100%)	0 (0%)	0 (0%)

SUBROUTE 2.1 – PROPONENT PREFERRED

Subroute 2.1 consists of segments P4b, P4c, P5a, P5b, P6a, P6b, P6c, P7, and P8. Beginning northeast of Lordsburg, subroute 2.1 travels west and south around Lordsburg. It then travels west across the New Mexico–Arizona State line and into Arizona, where it extends south and southwest around the eastern edge of Willcox Playa.

Direct Impacts

Known Cultural Resources

Previous survey coverage for subroute 2.1 is variable, ranging from 1.0 percent for segment P4b to 100 percent for segment P8.

Within subroute 2.1, segments P4b and P8 have no previously recorded resources which are eligible or unevaluated/unknown. Segment P4b has five potential resources digitized from historical maps; segment P8 has eight potential historic resources.

Segment P4c crosses the Butterfield Trail (historic property) twice and segment P5b once. Segment P4b has an additional two potential historic resources. Segment P5b also has 2 NRHP-eligible resources (LA 55762 and LA 130265), 5 unevaluated/unknown resources, and 17 potential resources from historical maps. LA 55762 is a habitation site with both prehistoric and historic components; LA 130265 is a historic habitation.

Segment P5a has one unevaluated/unknown resource and five potential historic resources; segment P6a has one unevaluated/unknown resource and two potential historic resources. Segment P6b has 12 unevaluated/unknown resources and 37 potential historic resources; segment P6c has 1 unevaluated/unknown resource and 7 potential historic resources.

Within segment P7, there are 2 eligible resources (AZ CC:3:91[ASM] and AZ FF:1:34[ASM]), 12 unevaluated/unknown resources, and 32 potential resources from historical maps. AZ CC:3:91(ASM) is the historic alignment of U.S. 191 and U.S. 71; AZ FF:1:34(ASM) is the Arizona & Colorado Railroad.

Archaeology Southwest's Cultural Resource Priority Areas

Subroute 2.1 does not cross any the Archaeology Southwest's CRPAs.

Forecast Resources

For subroute 2.1, it is predicted that 241 cultural resources would be present within the representative ROW; 19 of these resources would be eligible for the NRHP. Predicted resource density ranges from 1.49 to 57.60 per 100 acres. Segments P4c, P5b, 6a, and P7 have been categorized as being of cultural concern. Impacts to cultural resources due to ground disturbance would be major for subroute 2.1.

Index of Total Potential Effect (New Mexico only)

Subroute 2.1 segments have TPE values ranging from 0.02 to 0.09, with P4b and P5a having the highest values. P5b is the longest segment of the subroute, but has a relatively low TPE value reflecting its low predicted site density. P5a has a higher density of eligible sites per mile. Subroute 2.1 as a whole has a total estimated number of eligible sites of 69, significantly higher than the subroute 2.2 estimated number value of 34. It is therefore to be expected that subroute 2.1 would have significantly greater total effects on archaeological sites within New Mexico than would subroute 2.2. This greater effect is due both to the greater length of subroute 2.1 and its higher resource density (1.49 eligible sites per mile, as opposed to 1.07 for segment 2.2).

Archaeological Sensitivity

Subroute 2.1 is projected to have 77 resources (32 percent) which fall in the low to moderate (level 2) and 77 resources in the moderate (level 3) sensitivity category. Sixty-five resources (27 percent) are projected to have moderate to high sensitivity. No resources are projected to have high sensitivity (level 5).

Summary of Direct Impacts for Subroute 2.1

Direct impacts to cultural resources for subroute 2.1 would be moderate and long-term. Two listed, four eligible, and 32 unevaluated resources are found within the representative ROW for subroute 2.1. Projected resources are anticipated to total 241 resources with 59 percent in the moderate or moderate to high sensitivity category. However, adverse impacts to cultural resources would be mitigated in accordance with the terms of the PA and the POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Historic Trails

Segments P4c and P5b of subroute 2.1 cross the Butterfield Trail. Segment P4c crosses the trail just west of Lordsburg and segment P5b crosses it east of San Simon in the southwest foothills of the Peloncillo Mountains.

Visual Analysis

Listed Historic Properties

One listed property (Stein's Peak Station) is located within 0.5 to 3 miles of the centerline of subroute 2.1 along segment P5b. The station is approximately 2.5 miles from the line and there is a line of mountains between it and the proposed transmission line; few to no visual impacts are anticipated.

Determined Eligible

Three resources which have been determined eligible under Criterion A, B, or C are found within the visual analysis area. AZ Z:2:40(ASM) is found within 0.5 to 3 miles and AZ CC:3:91(ASM) is found within 3 to 5 miles of P6b. AZ Z:2:40(ASM) is the Southern Pacific Mainline and is approximately 2 miles away from the centerline. The transmission line would be in the foothills while the railroad is in the valley to the north; the transmission line may be visible but would only have a minor effect on the setting of the railroad. AZ CC:3:91(ASM) is historic route US191/US71 and is over 3 miles from the transmission line; no visual effects are anticipated because of the distance.

The proposed transmission line would cross AZ FF:1:34(ASM), the Arizona and Colorado Railroad, south of Cochise near the edge of Wilcox Playa. Impacts to setting of the abandoned railroad are expected.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Subroute 2.2 consists of segments E, F, Ga, Gb, Gc, I, and J. It begins south of the Lordsburg Playa and travels west across the New Mexico–Arizona State line and north of San Simon. The subroute then travels west-northwest to north of the Dos Cabezas Mountains and then northwest, west, and south around Willcox Playa.

Direct Impacts

Known Cultural Resources

Survey coverage in the representative ROW of subroute 2.2 ranges from 0.6 percent for segment E to 35.4 percent for segment Gb.

For subroute 2.2, segments Ga, I, and J have no previously recorded cultural resources which are NRHP-eligible or unevaluated/unknown within the representative ROW. Four potential resources from historical maps are found in segments Ga and I; six potential historic resources are found in segment J.

Segment E crosses the Butterfield Trail. Also found in segment E are 1 unevaluated/unknown resource and 38 potential historic resources.

In segment F, 4 unevaluated/unknown resources and 36 potential historic resources are found.

In segment Ga, one unevaluated/unknown resource and 45 potential historic resources are found.

In segment Gc, 3 eligible (AZ CC:3:91[ASM], AZ CC:13:5[ASM], and AZ FF:1:34[ASM]), 2 unevaluated/unknown resources, and 13 potential historic resources are found. AZ CC:3:91(ASM) is the alignment of historic roads U.S. 191 and U.S. 71. AZ CC:13:5(ASM) is a prehistoric artifact scatter with features. AZ FF:1:34(ASM) is the Arizona & Colorado Railroad.

Archaeology Southwest's Cultural Resource Priority Areas

Subroute 2.2 does not cross any the Archaeology Southwest's CRPAs.

Forecast Resources

Based on forecast resources, impacts to cultural resource due to ground disturbance along subroute 2.2 would be major but slightly less than that of subroute 2.1. The total anticipated number of resources within the representative ROW for subroute 2.2 is 210; 16 resources are anticipated to be NRHP-eligible. Predicted resource density ranges from 5.26 to 15.42 sites per 100 acres. Segment E has been categorized as a segment of cultural concern.

Index of Total Potential Effect (New Mexico only)

The New Mexico portion of subroute 2.2 has a total estimated number of eligible sites of 34, significantly lower than the subroute 2.1 estimated number of 69. It is therefore to be expected that subroute 2.2 would have significantly fewer total effects on archaeological sites within New Mexico than would subroute 2.1. This lesser effect is due both to the shorter length of subroute 2.2 and to its lower resource density (1.07 eligible sites/mile, as opposed to 1.49 for segment 2.1).

Archaeological Sensitivity

Subroute 2.2 is projected to have 145 resources (69 percent) with moderate sensitivity (level 3). Forty-eight resources (23 percent) are projected to have low to moderate sensitivity (level 2). Seventeen resources (8 percent) with moderate to high sensitivity (level 4) are projected for subroute 2.2. No resources are projected to have high sensitivity (level 5).

Summary of Direct Impacts for Subroute 2.2

Direct impacts to cultural resources for subroute 2.2 would be major and long-term. One listed, three eligible, and eight unevaluated resources are found within the representative ROW for subroute 2.2. Projected resources are anticipated to total 210 resources, with 77 percent in the moderate and moderate to high sensitivity category. However, adverse impacts to cultural resources would be mitigated in accordance with all applicable regulations, guidelines, and Southline's POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Historic Trails

Subroute 2.2 crosses the Butterfield Trail and the potential location of the Zuñiga Trail. Segment E crosses the Butterfield Trail directly east of San Simon. Segment Ga crosses the potential Zuñiga Trail route northeast of Willcox.

Visual Analysis

Listed Historic Properties

One listed historic property, the Cochise Hotel, is located within 0.5 to 3 miles of segment Gc. The transmission line would pass by the hotel approximately 1.0 mile to the east on the other side of U.S.191; because of the distance and the presence of the highway, few impacts to the hotel's setting are expected.

Determined Eligible

No resources which have been determined eligible under Criterion A, B, or C are found within the visual analysis area for subroute 2.2.

LOCAL ALTERNATIVES

There are 10 local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 1, LD4-Option 2, LD4-Option 3, LD4-Option 4, and WC1. LD1 starts east of Lordsburg, crosses the Peloncillo Mountains, and ends northwest of San Simon. LD2 starts northwest of Lordsburg and crosses the Lordsburg Playa between the north and south Playa. LD3a and LD3b travel around the north sides of the Lordsburg Playa. LD4 crosses the Peloncillo Mountains and the San Simon Valley and ends northwest of Willcox. LD4-Option 4 begins in the foothills of the Peloncillo Mountains, travels south across I-10 and ends at the Dos Cabezas Mountains. LD5-Option 5 runs southwest between LD4 and segment P6c. WC1 runs roughly parallel to I-10 through the Sulphur Springs Valley.

Direct Impacts

Known Cultural Resources

Local alternatives LD1, LD2, and LD3a cross the Butterfield Trail. In addition, 1 eligible resource (LA 129570), 11 unevaluated/unknown resources, and 46 potential resources from historical maps are found in LD1; 31.3 percent of the LD1 representative ROW has been previously surveyed. LA 129570 is a historic artifact scatter.

In addition to the Butterfield Trail, 3 potential resources are found in LD2; 18 potential historic resources are found in LD3a. Previous survey coverage for LD2 is 1.2 percent and for LD3a is 11.0 percent.

In segment LD3b, only 2 potential historic resources are found; only 1.6 percent of the representative ROW of LD3b has been previously surveyed.

One eligible resource, 4 unevaluated/unknown resources, and 13 potential historic resources are found in LD4; however, only 2.1 percent of the representative ROW has been surveyed.

LD4-Option 4 (29.1 percent surveyed) has 4 potential historic resources and LD4-Option 5 (77.6 percent surveyed) has 8 potential resources. Neither segment has any previously recorded eligible or unevaluated/unknown resources.

WC1 has 1 unevaluated/unknown resource and 82 potential resources from historical maps; 12.2 percent of the representative ROW has been previously surveyed.

Archaeology Southwest's Cultural Resource Priority Areas

Local alternative LD4 crosses the Peloncillo North Priority Area for 0.4 mile. The Peloncillo North Priority Area consists of caves and rock shelters, some with rock art.

Forecast Resources

Local alternative LD1 is predicted to have 73 cultural resources within the representative ROW; 7 of those resources are anticipated to be NRHP eligible. Segment LD2 is anticipated to have 4 cultural resources; LD3a is anticipated to have 61 resources; and LD3b is anticipated to have 3 resources. No resource from LD2, LD3a, or LD3b is anticipated to be eligible for the NRHP; however, LD1, LD2, and LD3a are classified as local alternatives of cultural concern.

Local alternative LD4 is forecast to have 70 resources but none eligible for the NRHP; LD4-Option 4 and LD4-Option 5 are forecast to have no resources.

WC1 is forecast to have 89 resources with none eligible for the NRHP; however, due to the number of potential resources, WC1 is a segment of cultural concern.

Index of Total Potential Effect (New Mexico Only)

Local alternative LD1 has a TPE index of 0.13 with 41 estimated eligible sites. Local alternative LD1 is 35.40 miles long; there are 1.17 estimated eligible sites per mile.

Local alternative LD2 has a TPE index of 0.08 with 24 estimated eligible sites. Local alternative LD2 is 9.60 miles long; there are 2.49 estimated eligible sites per mile.

Local alternative LD3a has a TPE index of 0.20 with 63 estimated eligible sites. Local alternative LD3a is 27.90 miles long; there are 2.27 estimated eligible sites per mile.

Local alternative LD3b has a TPE index of 0.02 with 5 estimated eligible sites. Local alternative LD3b is 1.90 miles long; there are 2.61 estimated eligible sites per mile.

Local alternative LD4 has a TPE index of 0.04 with 12 estimated eligible sites. Local alternative LD4 is 51.70 miles long; there are 0.24 estimated eligible sites per mile.

Archaeological Sensitivity

Local alternative LD1 is projected to have 53 resources (73 percent) with moderate sensitivity (level 3) and 5 (7 percent) with moderate to high sensitivity (level 4)

Local alternative LD2 is projected to have four resources (100 percent) with moderate to high sensitivity (level 4). Local alternative LD3a is projected to have 61 resources (100 percent) with moderate to high sensitivity; local alternative WC1 is projected to have 89 resources (100 percent) with moderate sensitivity. No resources are projected for LD3b, LD4-Option 4, or LD3-Option 5.

Local alternative LD4 is projected to have 9 resources (20 percent) with moderate to low sensitivity (level 2) and 27 resources (60 percent) with moderate sensitivity.

Summary of Direct Impacts for Route Group 2 Local Alternatives

There are no direct impacts anticipated for LD4-Option 4 and LD4-Option 5 and minor impacts for LD3b due to a low number of estimated resources.

For local alternative LD1, direct impacts would be moderate. Seventy-three resources are projected for the representative ROW with 80 percent being of moderate or moderate to high sensitivity.

Direct impacts for local alternatives LD2 and LD3a may be major because all of the projected resources, 4 and 61 respectively, are anticipated to be of high sensitivity; however, only one resource, which is listed, is present in both alternatives which has skewed the predictions towards the high sensitivity category. It is more likely that impacts will be moderate for both alternatives.

Direct impacts for local alternatives LD4 and WC1 would be moderate. Projected resources for LD4 total 45 with 60 percent having moderate sensitivity. Projected resources for WC1 total 89 with 100 percent having moderate sensitivity.

However, adverse impacts to cultural resources would be mitigated in accordance with all applicable regulations, guidelines, and Southline's POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Historic Trails

Several local alternatives cross the Butterfield Trail and the potential route of the Zuñiga Trail: local alternatives LD1, LD2, and LD3a cross the Butterfield Trail and local alternatives LD4, LD4-Option 4, and LD4-Option 5 cross the Zuñiga Trail. LD1 crosses the Butterfield Trail southeast of San Simon; LD 2 crosses the trail as LD2 enters the gap between the north and south playa of the Lordsburg Playa; and, LD3a crosses it just east of the gap between the north and south playa of the Lordsburg Playa.

LD 4 crosses the potential Zuñiga Trail route north of Bowie; LD4-Option 4 crosses it north-northeast of Willcox; and LD4-Option 5 crosses it north of the I-10 and SR 191 junction.

Tribal Resources

LD4 and LD4-Option are approximately 20 miles southeast of Mount Graham.

Visual Analysis

Listed Historic Properties

No listed historic properties are found within the visual analysis area for LD1, LD2, LD3a, LD3b, and LD4.

One listed historic property, the Hecker House, is found within 3 to 5 miles of LD4-Option 4 and LD4-Option 5. Because of the distance from either local alternative, few to no impacts are expected for this property.

Thirteen listed historic properties are found within the visual analysis area for WC1. All of the resources are within 0.5 to 3 miles of the centerline in the town of Willcox:

- Benjamin E. Briscoe House
- Crowley House
- John Gung'l House
- Hooker Town House
- Johnson-Tillotson House
- Joe Mee House
- Morgan House
- John H. Norton and Company Store
- Harry Saxon House
- Schwertner House
- Pablo Soto House
- Willcox Women's Club
- J. C. Wilson House

All of these resources are located in downtown Willcox between 0.5 and 1.5 miles from the proposed transmission line which is located along I-10 in this section. Because they are located within the town the visibility of the line from the historic properties is minimal; therefore, little impact to setting is expected.

Determined Eligible

No resources that have been determined eligible under Criterion A, B, or C are found within the visual analysis 10-mile corridor for any of the route group 2 local alternatives.

Route Group 3 – Apache Substation to Pantano Substation

Please note that the route group 3 data includes data from two recent surveys have been performed along the existing transmission line in the Upgrade Section (Goldstein 2008; Hart 2012). Goldstein (2008) conducted a Class III pedestrian survey along the existing Tucson-Apache 115-kV Transmission Line. The survey covered approximately 80 miles within a 200-foot wide corridor from the Tucson Substation to the Apache Substation. Hart (2012) conducted a Class III survey of a 100-foot access road ROW between several pole structures along the line between the Tucson and Apache substations for a total of 4.45 miles. A very high percentage of the representative ROW has been previously surveyed, so forecast resource numbers for this route group should be reliable.

For route group 3, there are two tables of data for direct analysis: table 4.9-9 presents counts of known cultural resources within the representative ROW for route group 3, Apache Substation to Pantano Substation. Table 4.9-10 presents forecast number of resources for the representative ROW for route group 3, Apache Substation to Pantano Substation. Table 4.9-11 presents the archaeological sensitivity within the representative ROW for route group 3, Apache Substation to Pantano Substation.

Table 4.9-9. Route Group 3 Cultural Resources Inventory Data

	Total Miles	Listed Sites	Determined Eligible Sites	Unevaluated or Unknown Sites	Resources from Historic Maps	Total Number of Resources
Subroute 3.1, Proponent Preferred						
U1a	16.1	1		18	29	48
U1b	2.9			1	2	3
U2	15.8	1	2	9	17	29
U3a	35.6	3		24	78	105
Route Group 3 Local Alternative						
H	19.3	1	2	5	6	14

Table 4.9-10. Route Group 3 Cultural Resources Projected Resources Numbers and Density within the Representative ROW

	Total Miles	Projected Number of Resources	Projected Resource Density (per 100 acres)	Projected Number NRHP-eligible Historic Properties	Percentage of Representative ROW Surveyed	Segment of Cultural Concern
Subroute 3.1, Proponent Preferred						
U1a	16.1	53	18.08	0	93.9	Yes
U1b	2.9	4	6.77	0	89.4	
U2	15.8	27	9.41	5	90.4	Yes
U3a	35.6	109	16.86	3	89.6	Yes

Table 4.9-10. Route Group 3 Cultural Resources Projected Resources Numbers and Density within the Representative ROW (Continued)

	Total Miles	Projected Number of Resources	Projected Resource Density (per 100 acres)	Projected Number NRHP-eligible Historic Properties	Percentage of Representative ROW Surveyed	Segment of Cultural Concern
Route Group 3 Local Alternative						
H	19.3	40	11.35	6	7.25	Yes

Table 4.9-11. Route Group 3 Archaeological Sensitivity within the Representative ROW

Alternative	Total Miles	Projected Number of Resources: Level 0 (%)	Projected Number of Resources: Level 1 (%)	Projected Number of Resources: Level 2 (%)	Projected Number of Resources: Level 3 (%)	Projected Number of Resources: Level 4 (%)	Projected Number of Resources: Level 5 (%)
Subroute 3.1	70.4	21 (11%)	0 (0%)	14 (7%)	120 (62%)	23 (12%)	15 (8%)
H	19.3	0 (0%)	0 (0%)	14 (36%)	23 (57%)	3 (7%)	0 (0%)

SUBROUTE 3.1 – PROPONENT PREFERRED

Subroute 3.1 consists of the upgrade of the existing Western 115-kV line running from the Apache Substation north of the Dragoon Mountains and through the San Pedro Valley.

Direct Impacts

Known Cultural Resources

Previous survey coverage for the subroute 3.1 representative ROW is excellent and is approximately 90 percent for all segments.

In subroute 3.1, segment U1a crosses the Butterfield Trail and has 18 unevaluated/unknown sites and 29 potential resources from historical maps.

Segment U1b has 1 unevaluated/unknown resource and 2 potential historic resources.

Segment U2 also crosses the Butterfield Trail, as well as having 2 eligible resources (AZ EE:3:74[ASM] and AZ FF:9:17[ASM]), 9 unevaluated/unknown resources, and 17 potential historic resources. AZ EE:3:74(ASM) is the El Paso&Southwestern Railroad. AZ FF:9:17(ASM) is the historic alignment of SR 80.

Three listed resources are located in segment U3a: the Valencia Site (AZ BB:13:15[ASM]), AZ BB:13:315(ASM), and the Empirita Ranch Historic District. Twenty-four unevaluated/unknown resources and 78 potential historic resources are also located in segment U3a.

Archaeology Southwest's Cultural Resource Priority Areas

Segment U3a of subroute 3.1 crosses the Zanardelli Priority Area for 1.0 mile; it crosses the Valencia Priority Area for 2.2 miles; and it crosses the Middle Santa Cruz Priority Area for 1.2 miles. The Valencia Priority Area is the area surrounding the Valencia Site; the Middle Santa Cruz Priority Area is the area surrounding the Julian Wash site; and the Zanardelli Priority Area is the area surrounding the Zanardelli site.

Forecast Resources

For subroute 3.1, 193 resources are predicted for the representative ROW; 8 of these are anticipated to NRHP-eligible. Predicted resource density ranges from 9.41 to 18.08 resources per 100 acres. Segments U1a, U2, and U3a are considered as being of cultural concern. Because subroute 3.1 is within the Upgrade Section and less ground disturbance would be needed, impacts to cultural resources due to ground disturbance would be minor.

Archaeological Sensitivity

Subroute 3.1 is projected to have 120 resources (62 percent) with moderate sensitivity; 23 resources (12 percent) are projected to have moderate to high sensitivity (level 4); and 15 resources (8 percent) are projected to have high sensitivity (level 5).

Summary of Direct Impacts for Subroute 3.1

Direct impacts to cultural resources for subroute 3.1 would be minor. Five listed, 2 eligible, and 52 unevaluated resources are found within the representative ROW for subroute 3.1.Although, projected resources are anticipated to total 193 resources with 62 percent having moderate sensitivity, 12 percent having moderate to high sensitivity, and 8 percent having high sensitivity, subroute 3.1 is an existing line and less ground disturbance would been needed than for a new line; therefore, impacts would be minor.

In addition, any adverse impacts to cultural resources would be mitigated in accordance with the terms of the PA and the POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Historic Trails

Subroute 3.1 crosses the Butterfield Trail and the potential routes of the Mormon Battalion Trail and the Zuñiga Trail. Segment U1a crosses the Butterfield Trail at West Dragoon Road just north of the Ammon Airport and segment U2 crosses it just northeast of Benson. Segment U1b crosses the potential Mormon Battalion Trail route in northwestern Benson and segment U3a crosses it northwest of Vail. Segment U1b crosses the potential Zuñiga Trail route crosses west-northwest of Benson and segment U2 crosses it in Mescal just north of I-10.

Visual Analysis

Listed Historic Properties

There are 12 listed historic properties within the visual analysis area of subroute 3.1. Two are within 0.5 mile of the centerline: the Empirita Ranch Historic District and the Valencia Site. The transmission line is located along the northern border of the southern portion of Empirita Ranch Historic District and would impact the setting of the property; however, because the line is existing, impacts would only be moderate. Segment U3a crosses through the southern portion of the Valencia Site and then runs along its eastern border; however, because the line is existing impacts would only be moderate.

Seven resources are within 0.5 to 3 miles of the centerline of segment U2 of subroute 3.1 in Benson:

- Benson Railroad Historic District
- Hi Wo Company Grocery
- W. D. Martinez General Merchandise Store

- Oasis Court
- Redfield-Romine House
- Smith-Beck House
- Max Treu Territorial Meat Company

All six properties are located in downtown Benson from 0.9 to 1.2 miles south from the proposed transmission line. The transmission line is located on the northern side of I-10 in the Benson area. Visibility of the transmission line would be limited from the historic properties, so little impact their setting would be expected.

The Cienega Bridge is located slightly less than 3 miles north of the proposed transmission line on the northern side of I-10. Several hills and mountain ridges are located between the bridge and the proposed transmission line making it unlikely that the line could be seen from the bridge. No visual impacts are expected.

The Old Vail Post Office is located about 3 miles north of the existing transmission line on the northern side of I-10. Because it is an existing line and almost 3 miles away, no visual impacts would be expected.

San Xavier del Bac is located just less than 2 miles west of segment U3a on the eastern side of I-19. Because this is an existing line and almost 2 miles away, visual impacts to the historic property would be minimal.

One listed property, the Colossal Cave Preservation Park Historic District, is in the 3- to 5-mile zone. No impacts would be expected due to the distance of the Project location from the resource.

Determined Eligible

One resource that has been has been determined eligible under Criterion A is found within 0.5 mile of segment U2 of subroute 3.1— AZ EE:3:74(ASM), the El Paso and Southwestern Railroad. The existing transmission line crosses the railroad east of Benson. Some alternations in the setting of AZ EE:3:74(ASM) would be expected with the upgrade of the line.

LOCAL ALTERNATIVES

There is one local alternative for route group 3–local alternative H, which runs around the northern side of Benson.

Direct Impacts

Known Cultural Resources

Located within local alternative H are 3 eligible resources (Butterfield Trail, AZ Z:2:40[ASM] and AZ FF:9:17[ASM]), 5 unevaluated/unknown resources, and 6 potential historic resources. AZ Z:2:40(ASM) is the Southern Pacific Railroad Mainline–Southern Route; AZ FF:9:17(ASM) is the historic alignment of SR 80. Only 7.25 percent of local alternative H has been previously surveyed.

Archaeology Southwest's Cultural Resource Priority Areas

Local alternative H does not cross any CRPAs.

Forecast Resources

For local alternative H, 40 cultural resources are predicted for a resource density of 11.35 resources per 100 acres. Six of the resources are anticipated to be NRHP eligible and local alternative H is considered a segment of cultural concern.

Archaeological Sensitivity

For local alternative H, 23 resources (57 percent) are projected to have moderate sensitivity (level 3), 7 percent to have moderate to high sensitivity (level 4), and 14 resources (36 percent) are projected to have low to moderate sensitivity (level 2).

Summary of Direct Impacts for Route Group 3 Local Alternative H

Direct impacts for local alternative H would be moderate. One listed, two eligible, and five unevaluated cultural resources are found in the representative ROW for local alternative H. Project resources total 40 with 64 percent having moderate or moderate to high sensitivity. However, adverse impacts to cultural resources would be mitigated in accordance with all applicable regulations, guidelines, and Southline's POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Historic Trails

Local alternative H crosses the Butterfield Trail just north of where it leaves subroute 3.1 west of Benson, the potential Mormon Battalion Trail route north of Mescal, and the potential route of the Zuñiga Trail west of Mescal.

Visual Analysis

Listed Historic Properties

There are no listed historic properties within the visual analysis area for local alternative H.

Determined Eligible

AZ EE:3:74(ASM), the El Paso and Southwestern Railroad, is crossed by local alternative H. The proposed transmission line crosses the railroad east of Benson. Impacts to the setting of the site would be expected because a new transmission line would be constructed.

AZ FF:9:17[ASM], State Route 80, crosses local alternative H towards its eastern end. Impacts to the setting of the site are expected because a new transmission line would be constructed.

Route Group 4 – Pantano Substation to Saguaro Substation

Please note that the route group 4 data includes data from three surveys that have been performed along the existing transmission line in the Upgrade Section (Effland and Green 1985; Goldstein 2008; Hart 2012). Effland and Green (1985) surveyed the 100-foot ROW for the existing 115-kV transmission line from the Tucson to the Saguaro substations, which is approximately 35 miles. Goldstein (2008) conducted a Class III pedestrian survey along the existing Tucson-Apache 115-kV Transmission Line. The survey covered approximately 80 miles within a 200-foot-wide corridor from the Tucson Substation to the Apache Substation. Hart (2012) conducted a Class III survey of a 100-foot access road ROW between several pole structures along the line between the Tucson and Apache substations for a total of 4.45 miles. An additional check for sites along the ROW from the Tucson to the Saguaro Substation was

conducted in 2012 by a Western archaeologist but no survey corridor width was specified and no report was generated (personal communication, Maria Martin, Galileo 2013). A very high percentage of the representative ROW has therefore been previously surveyed, so forecast resource numbers for this route group should be reliable.

For route group 4, there are two tables of data for direct analysis. Table 4.9-12 presents counts of known cultural resources within the representative ROW for route group 4, Pantano Substation to Saguaro Substation. Table 4.9-13 presents forecast number of resources for the representative ROW for route group 4, Pantano Substation to Saguaro Substation. Table 4.9-14 presents the archaeological sensitivity of the representative ROW for route group 4, Pantano Substation to Saguaro Substation.

Table 4.9-12. Route Group 4 Cultural Resource Inventory Data

	Total Miles	Listed Sites	Determined Eligible Sites	Unevaluated or Unknown Sites	Resources from Historical Maps	Total Number of Resources
Subroute 4.1, Proponent Preferred						
U3b	0.5		1	3	18	**22**
U3c	1.0			4	20	**24**
U3d	3.4	1	1	3	27	**32**
U3e	0.9	1		1	1	**3**
U3f	0.7	1		1	1	**3**
U3g	0.9	1	1	2	37	**41**
U3h	1.1		2	2	14	**18**
U3i	18.2		6	18	386	**410**
U3j	0.9			1	1	**2**
U3k	16.7	1	1	3	121	**126**
U3l	1.6		3	1	8	**12**
U3m	0.6		4	1	3	**8**
U4	1.9			2	4	**6**
Route Group 4 Local Alternatives						
MA1	1.1				1	**1**
TH1a	1.4	1		1		**2**
TH1b	1.6	1		2	11	**14**
TH1c	0.3		1	1	5	**7**
TH1-Option	1.0	1			2	**3**
TH3-Option A	0.8		1	4	30	**35**
TH3-Option B	0.8				3	**3**
TH3-Option C	1.8		1	2	22	**24**
TH3a	2.7		1	4	31	**36**
TH3b	4.5		4	4	43	**51**

Table 4.9-13. Route Group 4 Cultural Resources Projected Resources Numbers and Density within the Representative ROW

	Total Miles	Projected Number of Resources	Projected Resource Density (per 100 acres)	Projected Number NRHP-eligible Historic Properties	Percentage of Representative ROW Surveyed	Segment of Cultural Concern
Subroute 4.1, Proponent Preferred						
U3b	0.5	10	93.86	0	100.0	Yes
U3c	1.0	11	62.98	0	76.6	Yes
U3d	3.4	19	30.43	12	90.3	Yes
U3e	0.9	4	28.56	2	100.0	Yes
U3f	0.7	4	48.92	3	100.0	Yes
U3g	0.9	15	92.31	5	75.1	Yes
U3h	1.1	11	55.58	0	90.2	Yes
U3i	18.2	98	29.60	17	79.4	Yes
U3j	0.9	6	37.78	0	66.7	
U3k	16.7	51	16.80	15	52.5	Yes
U3l	1.6	9	80.55	9	99.3	Yes
U3m	0.6	8	40.38	3	100.0	Yes
U4	1.9	11	31.82	0	25.9	
Route Group 4 Local Alternatives						
MA1	1.1	1	5.27	0	0.0	
TH1a	1.4	3	52.75	2	100.0	Yes
TH1b	1.6	15	52.76	10	21.6	Yes
TH1c	0.3	7	160.81	0	33.2	Yes
TH1-Option	1.0	4	47.83	4	100.0	Yes
TH3-Option A	0.8	16	76.83	3	100.0	Yes
TH3-Option B	0.8	3	21.14	0	62.0	Yes
TH3-Option C	1.8	25	85.39	17	82.6	Yes
TH3a	2.7	39	79.73	7	91.8	Yes
TH3b	4.5	51	62.63	16	87.0	Yes

Table 4.9-14. Route Group 4 Cultural Resources Archaeological Sensitivity within the Representative ROW

Alternative	Total Miles	Projected Number of Resources: Level 0 (%)	Projected Number of Resources: Level 1 (%)	Projected Number of Resources: Level 2 (%)	Projected Number of Resources: Level 3 (%)	Projected Number of Resources: Level 4 (%)	Projected Number of Resources: Level 5 (%)
Subroute 4.1	20.8	54 (21%)	15 (6%)	5 (2%)	111 (43%)	51 (20%)	23 (9%)
MA1	1.1	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
TH1a	1.4	0 (0%)	0 (0%)	0 (0%)	1 (33%)	0 (0%)	2 (67%)
TH1b	1.6	0 (0%)	0 (0%)	0 (0%)	10 (67%)	0 (0%)	5 (33%)
TH1c	0.3	0 (0%)	0 (0%)	0 (0%)	7 (100%)	0 (0%)	0 (0%)
TH1-Option	1.0	0 (0%)	0 (0%)	0 (0%)	1 (33%)	0 (0%)	3 (67%)
TH3-Option A	0.8	0 (0%)	3 (17%)	0 (0%)	8 (50%)	5 (33%)	0 (0%)
TH3-Option B	0.8	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
TH3-Option C	1.8	0 (0%)	0 (0%)	0 (0%)	17 (67%)	8 (33%)	0 (0%)
TH3a	2.7	0 (0%)	0 (0%)	0 (0%)	16 (40%)	23 (60%)	0 (0%)
TH3b	4.5	0 (0%)	0 (0%)	0 (0%)	26 (50%)	26 (50%)	0 (0%)

SUBROUTE 4.1 – PROPONENT PREFERRED

Subroute 4.1 begins at the Pantano Substation and travels northwest and north through Green Valley to Tucson. It runs around the Tucson International Airport to the Del Bac Substation and then heads north and northwest across Tumamoc Hill. The line then continues north and northwest traveling northeast of the Tucson Mountains to Marana and ending at the Saguaro Substation.

Direct Impacts

Known Cultural Resources

In subroute 4.1, the representative ROW of segments U3d, U3e, U3f, and U3g all intersect with the NRHP-listed Tumamoc Hill Archaeological District and Desert Laboratory NHL. In addition, 1 eligible resource (AZ AA:16:420[ASM]), 3 unevaluated/unknown resources, and 27 potential historic resources are found in segment U3d; 1 unevaluated/unknown resource and 1 potential historic resource are found both in segment U3e and segment U3f; and, 1 eligible resource (AZ AA:16:333[ASM]), 2 unevaluated resources, and 37 potential historic resources are found in segment U3g. Both AZ AA:16:420(ASM) and AZ AA:16:333(ASM) are prehistoric artifact scatters.

The representative ROW of segments U3h, U3i, and U3l all intersect with the Butterfield Trail. In addition, 1 eligible resource (AZ AA:16:333[ASM]), 2 unevaluated/unknown resources, and 14 potential resources from historical maps are found in segment U3h. AZ AA:16:333(ASM) is a prehistoric artifact scatter.

In segment U3i, there are 5 eligible resources, 18 unevaluated/unknown resources, and 386 potential resources from historical maps in addition to the Butterfield Trail.

Two eligible resources (AZ Z:2:40[ASM] and AZ AA:2:118[ASM]), one unevaluated/unknown resource, and eight potential resources from historical maps are found in segment U3l along with the Butterfield Trail. AZ Z:2:40(ASM) is the Southern Pacific Railroad Mainline–Southern Route; AZ AA:2:118(ASM) is the historic alignment of SR 84.

One listed resource, the Los Robles Archaeological District, is found within segment U3k, as well as 1 eligible resource (AZ AA:1:95[ASM]), 3 unevaluated/unknown resources, and 121 potential historic resources. AZ AA:1:95(ASM) is the Maricopa-Saguaro 115-kV transmission line.

Segment U3b has 1 eligible resource, 3 unevaluated/unknown resources, and 18 potential historic resources. The eligible resource, AZ BB:13:102(ASM), is a prehistoric artifact scatter.

Segment U3c has 4 unevaluated/unknown resources and 20 potential historic resources. Segment U3j has 1 unevaluated/unknown resource and 1 potential historic resource.

Four eligible resources, one unevaluated resource, and three potential historic resources are found in segment U3m. AZ Z:2:40(ASM) is the Southern Pacific Railroad Mainline–Southern Route; AZ AA:2:118(ASM) is the historic alignment of SR 84. AZ AA:1:95(ASM) is the Maricopa-Saguaro 115-kV transmission line. AZ AA:8:366(ASM) is the Saguaro-Oracle 115-kV transmission line.

Two unevaluated/unknown resources and 43 potential historic resources are found in segment U4.

Previous survey coverage is good to excellent for the subroute 4.1 representative ROW. Several segments (U3b, U3e, U3f, and U3m) have 100 percent survey coverage. Segment U4 has the lowest with 25.9 percent. The remaining segments range from 50 percent to almost 100 percent.

Archaeology Southwest's Cultural Resource Priority Areas

Segments U3b, U3c, U3e, U3f, U3g, U3h, and U3i of subroute 4.1 cross the Middle Santa Cruz Priority Area for 12.6 miles. Segments U3b and U3c cross the Valencia Priority Area for 0.9 mile; segments U3c and U3d cross the West Branch Priority Area for 1.4 miles. Segment U3i crosses the Los Morteros Priority Area for 1.7 miles and the River Confluence Priority Area for 8.2 miles. Segment U3k crosses the Los Robles Priority Area for 5.6 miles. The Valencia Priority Area is the area surrounding the Valencia Site; the Middle Santa Cruz Priority Area is the area surrounding the Julian Wash site; and the West Branch Priority Area is the area surrounding the West Branch site. The Los Morteros Priority Area is the area surrounding the Los Morteros site. The River Confluence Priority Area is where the Santa Cruz and Rillito rivers meet.

Forecast Resources

For subroute 4.1, 257 cultural resources are anticipated within the representative ROW with 66 of the resources being eligible for the NRHP. Predicted resource density is high for all segments and ranges from 16.80 to 93.86 predicted resources per 100 acres. All segments except for segments U3j and U4 have been categorized as being of cultural concern. Although subroute 4.1 is within the Upgrade Section and less ground disturbance would be needed, impacts to cultural resources due to ground disturbance would range from moderate to major due to the greater number of predicted resources within this section.

Archaeological Sensitivity

Subroute 4.1 is projected to have 111 resources (43 percent) with moderate sensitivity (level 3); 51 resources (20 percent) with moderate to high sensitivity (level 4); and 23 resources (9 percent) with high sensitivity (level 5).

Summary of Direct Impacts for Subroute 4.1

Direct impacts to cultural resources for subroute 4.1 would be moderate. Several segments cross NRHP-listed Tumamoc Hill Archaeological District and Desert Laboratory NHL. Fourteen eligible and 31 unevaluated cultural resources are also present within the representative ROW for subroute 4.1. Although

projected resources are anticipated to total 257 resources with 43 percent having moderate sensitivity, 20 percent having moderate to high sensitivity, and 9 percent having high sensitivity, subroute 4.1 is an existing line and less ground disturbance would be needed than for a new line; therefore, impacts would be moderate.

In addition, any adverse impacts to cultural resources would be mitigated in accordance with the terms of the PA and the POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Historic Trails

Subroute 4.1 crosses one National Historic Trail (the Anza Trail corridor) and one known and one potential historic trail routes (the Butterfield Trail and the Mormon Battalion Trail). The various trails all converge as they exit Tucson to the northwest and follow the same basic route as subroute 4.1. The greatest concern along this route would be the visual effects from towers and lines; however, because this is an already heavily developed corridor, additional visual effects would be minor. Segment U3i crosses the Anza Trail south of West Grant Road and southwest of I-10; segment U3k crosses it north of West Copper Street and west of I-10. Segment U3h crosses the Butterfield Trail at North Aztec Street in Tucson, and segment U3i crosses it along The Loop north of West Grant Road and segment U3k crosses the trail again at just before the Saguaro Substation. Segment U3f crosses the potential route of the Mormon Battalion Trail north of West Starr Pass Boulevard, segment U3 crosses the potential route along The Loop north of West Grant Road, and segment U3k crosses it southwest of the Saguaro Substation.

Tribal Resources

As discussed above, subroute 4.1 crosses Tumamoc Hill.

Visual Analysis

Listed Historic Properties

One hundred and one listed historic properties are found within the visual analysis area for subroute 4.1. Five are within 0.5 mile of the centerline: the Pascua Cultural Plaza, the Ghost Ranch, the Antonio Matus House and Property, the Miracle Mile Historic District, and the Tumamoc Hill Archaeological District and Desert Laboratory NHL. The existing line crosses through the center of the Tumamoc Hill Archaeological District and Desert Laboratory NHL. Because this portion of the proposed Project consists of upgrading an existing line, the alteration to setting for these resources would be moderate, rather than major.

Seventy-three resources are within 0.5 to 3 miles:

- 4th Avenue
- Arizona Daily Star
- Arizona Hotel
- Armory Park Historic Residential District
- Barrio Anita Historic District
- Barrio El Hoyo Historic District
- Barrio El Membrillo Historic District
- Barrio Libre Historic District
- Barrio Santa Rosa Historic District
- Bear Down Gym
- Blenman-Elm Historic District
- Blixt-Avita House
- Boudreaux-Robison House
- Bray-Valenzula
- Dr. William Austin Cannon House
- Catalina Vista Historic District

- Copper Bell Bed and Breakfast
- Cordova House
- Coronado Hotel
- Dodson-Esquival House
- Don Martin Apartments
- Downtown Tucson Historic District
- Eckbo Landscape
- El Paso and Southwestern Railroad Depot
- El Paso and Southwestern Historic District
- El Presidio Historic District
- El Tiradito
- Feldmans Historic District
- First Hittinger Block
- Fox Commercial Building
- Fox Theatre
- Haynes House
- Hotel Congress
- Iron Horse Expansion Historic District
- J.C. Penny Store
- Jefferson Park Historic District
- Julian-Drew Building
- Manning House
- Marist College Historic District
- Menlo Park Historic District, Type A Joesler, and Type B Joesler, the
- Old Adobe Patio
- Old Main, University of Arizona
- Owen Homesite
- Pie Allen Residential Historic District
- Pima County Courthouse
- Rebeil Building
- Rialto Building
- Rialto Racetrack Historic District
- Rialto Theatre
- Rincon Heights Historic District
- Ronstadt-Sims Warehouse
- Ronstadt House
- Sabedra-Huerta House
- Santa Cruz Catholic Church
- Schwalen-Gomez House
- Sixth Avenue Underpass
- Professor George E.P. Smith House
- Sosa-Carillo-Fremont House
- Southern Pacific Railroad Locomotive No. 1673
- John Spring Neighborhood Historic District
- Stone Avenue Underpass
- Type A Joesler
- Type B Joesler
- University Heights Elementary School
- University of Arizona Historic District
- University Library, Arizona State Museum, North
- US Post Office & James A. Walsh Courthouse
- USDA Tucson Plant Materials Center
- Valley National Bank
- Velasco House
- Veterans Administration Hospital Historic District
- Warehouse Historic District
- Solomon Warner House and Mill
- West University Historic District

This portion of the proposed Project consists of upgrading an existing line; therefore, additional alterations to setting (visual impact) would be minor.

The remaining 23 properties are within 3 to 5 miles and, due to distance, no visual impacts are expected:

- James P. and Sarah Adams House
- Binghampton Rural Historic Landscape
- Erksine P. Caldwell House
- John P. and Helen S. Corcoran House
- El Conquistador Water Tower
- El Encanto Apartments
- El Encanto Estates Residential Historic District
- El Montevideo Residential Historic District
- P.W. Fletcher House
- Gabel House
- Arthur C. Hall and Helen Neel House
- Sam Hughes Residential Historic District
- Phillip G. McFadden House
- Ramada House
- Rillito Racetrack-Chute
- St. Philip's in the Hills Episcopal Church
- Virginia Heights
- Winterhaven Historic District
- Cocoraque Butte Archeological District
- Los Robles Archeological District, Red Rock
- Santa Ana del Chiquiburitac Mission Site
- Valley of the Moon Historic District
- Villa Catalina

Determined Eligible

Two resources determined eligible under Criterion A, B, or C are found within 0.5 mile of the centerline of subroute 4.1: AZ AA:2:118(ASM) and AZ AA:8:366(ASM). AZ AA:2:118(ASM) is SR 84; AZ AA:8:366(ASM) is the Saguaro-Oracle 115-kV transmission line. No visual impacts are expected to these two resources from the transmission line.

LOCAL ALTERNATIVES

There are 10 local alternatives available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C. MA1 runs southwest of the Marana Airport in an L shape to avoid the airport itself. The nine TH alternatives are all options for replacing the existing line, which currently runs across Tumamoc Hill. The TH alternatives were developed by a working group of stakeholders such as the University of Arizona, City of Tucson, Pima County, and the Tohono O'odham Nation, to avoid or minimize impacts to the Tumamoc Hill Archaeological District and Desert Laboratory NHL.

Direct Impacts

Known Cultural Resources

Local alternative MA1 has one potential resource from a historical map; however, none of the representative ROW for MA1 has been previously surveyed.

The representative ROW for local alternatives TH1a, TH1b, and TH1-Option crosses one listed property (Tumamoc Hill Archaeological District and Desert Laboratory). In addition, TH1a has one unevaluated/unknown resource; TH1b has two unevaluated/unknown resources and 11 potential resources from historical maps; and TH1-Option has two potential resources from historical maps.

The representative ROWs for TH1a and TH1-Option have been 100 percent surveyed; TH1b has been 21.6 percent surveyed.

Local alternative TH1c has one eligible (AZ AA:16:333[ASM]), one unevaluated/unknown, and five potential historic resources. AZ AA:16:333(ASM) is a prehistoric artifact scatter. The TH1c representative ROW has been 33.2 percent surveyed.

TH3-Option A has one eligible resource (AZ BB:13:101[ASM]), four unevaluated/unknown, and five potential historic resources. AZ BB:13:101(ASM) is a prehistoric artifact scatter. The TH3-Option A representative ROW has been 100 percent surveyed.

TH3-Option B has three potential historic resources; 62.0 percent of the representative ROW has been surveyed. TH3-OptionC, which has been 82.6 percent surveyed, has 1 eligible resource (AZ BB:13:17[ASM]), 2 unevaluated/unknown resources, and 22 potential historic resources. AZ BB:13:17(ASM) is a prehistoric artifact scatter.

One eligible resource (AZ BB:13:17[ASM]), 4 unevaluated/unknown resources, and 31 potential historic resources are found in TH3a which has been 91.8 percent surveyed. AZ BB:13:17(ASM) is a prehistoric artifact scatter.

The Butterfield Trail and 3 additional eligible resources (AZ BB:13:17[ASM], AZ BB:13:94[ASM], and AZ BB:13:111[ASM]), 4 unevaluated/unknown resources, and 43 potential resources from historical maps are found in local alternative TH3b. AZ BB:13:17(ASM) and AZ BB:13:94(ASM) are prehistoric artifact scatters. AZ BB:13:111(ASM) is the historic Lee's Mill. The TH3b representative ROW has been 87.0 percent surveyed.

Archaeology Southwest's Cultural Resource Priority Areas

TH1a crosses the Middle Santa Cruz Priority Area for 0.3 mile; TH1b and TH1c do not cross any Priority Areas. TH1-Option crosses the Middle Santa Cruz Priority Area for 0.9 mile. The Valencia Priority Area is the area surrounding the Valencia Site; the Middle Santa Cruz Priority Area is the area surrounding the Julian Wash site.

TH3-Option A crosses both the Middle Santa Cruz and Valencia Priority Areas for 0.8 mile. TH3-Option B crosses the Middle Santa Cruz Priority Area for 0.4 mile, the West Branch Priority Area for 0.3 mile, and the Valencia Priority Area for 0.1 mile.

TH3a crosses the Middle Santa Cruz Priority Area for 1.7 miles and the Valencia Priority Area for 1.4 miles; TH3b crosses the Middle Santa Cruz Priority Area for 4.5 miles.

Forecast Resources

Local alternative MA1 is predicted to have one cultural resource which would not be eligible for the NRHP. Local alternative TH1a is anticipated to have three resources, two of which would be eligible for the NRHP. Local alternative TH1b is anticipated to have 15 resources with 10 of them being eligible for the NRHP; local alternative TH1c is anticipated to have seven resources with none of them being eligible for the NRHP.

Local alternative TH3-Option A is anticipated to have 16 cultural resources, with 3 being eligible; local alternative TH3-Option B is anticipated to have 3 resources with none being NRHP eligible; and local alternative TH3-Option C is anticipated to have 25 resources with 17 being eligible for the NRHP. TH3a

is predicted to have 39 cultural resources; 7 of them are anticipated to be eligible. Local alternative TH3b is forecast to have 52 resources with 16 of them being NRHP eligible.

Archaeological Sensitivity

Local alternative TH1a is projected to have two resources (67 percent) with high sensitivity (level 5) and one resource (33 percent) with moderate sensitivity (level 3). Local alternative TH1b is projected to have 10 resources (67 percent) with moderate sensitivity (level 3) and 5 resources (33 percent) with high sensitivity (level 5). Local alternative TH1c is projected to have 7 resources (100 percent) with moderate sensitivity (level 3).

Local alternative TH1-Option is projected to have 3 resources (67 percent) with high sensitivity (level 5) and 1 resource (33 percent) with moderate sensitivity. TH13-Option A is projected to have 8 resources (50 percent) with moderate sensitivity (level 3) and 5 resources (33 percent) with moderate to high sensitivity (level 4). TH3-Option C is projected to have 17 resources (67 percent) with moderate sensitivity (level 3) and 8 resources (33 percent) with moderate to high sensitivity (level 4).

Local alternative TH3a is projected to have 23 resources (60 percent) with moderate to high sensitivity (level 4) and 16 resources (40 percent) with moderate sensitivity (level 3). Local alternative TH3b is projected to have 26 resources (50 percent) in both the moderate sensitivity (level 3) and moderate to high sensitivity (level 4) categories.

No resources are projected for local alternative MA1 or TH3-Option B.

Summary of Direct Impacts for Route Group 4 Local Alternatives

No direct impacts for local alternatives MA and TH3-Option B are anticipated.

Direct impacts for local alternative TH1a would be moderate because the representative ROW crosses the Tumamoc Hill Archaeological District and Desert Laboratory NHL. Projected resources in the representative ROW total 3 with 33 percent having moderate sensitivity and 67 percent having high sensitivity. Direct impacts for local alternative TH1b would also be moderate because the representative ROW crosses the Tumamoc Hill Archaeological District and Desert Laboratory NHL. Projected resources in the representative ROW total 15 with 67 percent having moderate sensitivity and 33 percent having high sensitivity.

For local alternative TH1c, direct impacts would be minor. One eligible and one unevaluated resource are found within the representative ROW. Seven cultural resources are projected to be present; all resources have moderate sensitivity.

For local alternative TH1-Option, direct impacts would be moderate because the representative ROW crosses the Tumamoc Hill Archaeological District and Desert Laboratory NHL. Project resources total 4 with 33 percent having moderate sensitivity and 67 percent having high sensitivity.

Direct impacts for local alternative TH3-Option A would be minor. One eligible and 4 unevaluated resources are present in the representative ROW. Sixteen resources are projected with 55 percent of them falling in the moderate sensitivity category.

Direct impacts for local alternative TH3-Option B would be minor. One eligible and 2 unevaluated resources are present in the representative ROW. Twenty-five resources are projected with 100 percent of them falling in the moderate sensitivity category.

For local alternative TH3a, direct impacts would be minor. One eligible and 4 unevaluated resources are present in the representative ROW. Thirty-nine resources are projected for the representative ROW with 100 percent of them falling in the moderate sensitivity category.

Direct impacts for local alternative TH3b would be moderate. Four eligible and 4 unknown cultural resources are present in the representative ROW. Project resources within the representative ROW total 51 with 100 percent having moderate or moderate to high sensitivity.

However, adverse impacts to cultural resources would be mitigated in accordance with the terms of the PA and the POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation.

Historic Trails

The local alternatives intersect with the Butterfield Trail, the potential routes of the Mormon Battalion Trail and the Zuñiga Trail, and the Anza Trail.

Local alternative TH1c crosses the potential route of the Mormon Battalion Trail north of West Speedway Boulevard.

TH3-Option B crosses the Anza Trail north of West Irvington Road.

Local alternatives TH3-Option C and TH3a cross the potential Zuñiga Trail route northwest of the West Ajo Way exit off I-19.

Local alternative TH3b crosses the Anza Trail three times: south of West Silverlake Road, north of West Cushing Street, and south of The Loop between West Grant Road and West Speedway Boulevard. Local alternative TH3b crosses the Butterfield Trail south of West Speedway Boulevard.

Tribal Resources

Local alternatives TH1a, TH1b, and TH1 Option cross portions of Tumamoc Hill.

Visual Analysis

Listed Historic Properties

No listed properties are within the visual analysis area for MA1.

One listed property is located within 0.5 mile of local alternatives TH1a,TH1b, TH1 Option: the Tumamoc Hill Archaeological District and Desert Laboratory NHL. TH1a passes through the Tumamoc Hill Archaeological District and Desert Laboratory NHL; TH1b is located just north of the property. Moderate to major visual impacts due to alterations to the setting of Tumamoc Hill are expected for both routes because a new transmission line would be constructed. Although Tumamoc Hill is located within a residential area, the residential area itself contains several historic homes and Tumamoc Hill is considered a component of that residential area (see section 4.10.7 in Visual Resources). As discussed in section 4.10.7, the visual sensitivity of Tumamoc Hill is moderate to high because of the NHL itself and the surrounding community; therefore, visual impact of the new tower structures along the route would be moderate to high. However, because routing the line along TH1a, TH1b, or TH1 Option would entail removing the existing line across Tumamoc Hill visual impacts from the existing line would be reduced.

Ninety-six listed historic properties are located within the visual analysis area of TH3b. Twenty-four listed historic properties are located within 0.5 mile of the TH3b centerline:

- Barrio Anita Historic District
- Blixt–Avitia House
- Bray–Valenzuela House
- Cordova House
- Dodson–Esquivel House
- Eckbo Landscape
- El Paso and Southwestern Railroad Depot
- El Paso and Southwestern Historic District
- El Presidio Historic District
- El Tiradito
- Levi H. Manning House
- Antonio Matus House and Property
- Pascua Cultural Plaza
- Pima County Courthouse
- Ronstadt–Sims Adobe Warehouse
- Sabedra–Huerta House
- Schwalen–Gomez House
- Sosa-Carrillo-Fremont House
- Solomon Warner House and Mill
- Barrio El Hoyo Historic District
- Barrio El Membrillo Historic District
- San Agustin del Tucson
- Menlo Park Historic District
- Warehouse Historic District

These properties are part of an urban environment and many are located on the eastern side of I-10 while the proposed transmission line would be located on the western side of I-10; therefore, alterations to setting (visual impact) would be minor to properties on the eastern side of I-10. The Menlo Park Historic District, the Blixt–Avitia House, the Bray-Valenzuela House, the Dodson-Esquival House, the Schwalen-Gomez House, the Solomon Warner House and Mill are located just east of TH3b on the eastern side of Tumamoc Hill; visual impacts would be greater to these properties than on the other side of I-10 in this distance category.

Sixty-three listed historic properties which are also part of an urban environment and are mostly located on the eastern side of I-10 are found within the 0.5- to 3-mile range of the local alternative:

- 4th Avenue (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Arizona Daily Star Building (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Arizona Hotel (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Arizona Inn (TH3b)
- Armory Park Historic Residential District (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Bear Down Gym (TH3b)
- Barrio Libre (TH3b)
- Barrio Santa Rosa Historic District
- Boudreax-Robinson House (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Dr. William Austin Cannon House (TH1c, TH3b)
- Catalina Vista Historic District (TH3b)
- Copper Bell Bed and Breakfast (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Coronado Hotel (TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Don Martin Apartments (TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)

- Downtown Tucson Historic District (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- El Encanto Apartments (TH3b)
- El Tiradito (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- First Hittinger Block (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Fourth Avenue Underpass (TH3b)
- Fox Commercial Building (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Fox Theatre (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Ghost Ranch Lodge (TH1b, TH1c, TH3b, TH1-Option)
- Haynes House (TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Hotel Congress (TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Sam Hughes Neighborhood Historic District (TH3b)
- Iron Horse Expansion Historic District (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- J. C. Penney–Chicago Store (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Jefferson Park Historic District (TH1b, TH1c, TH3b)
- Julian-Drew Building (TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Marist College Historic District (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Men’s Gymnasium, University of Arizona (TH3b)
- Old Adobe Patio (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Old Library Building (TH3b)
- Old Main, University of Arizona (TH1c, TH3b)
- Pascua Cultural Plaza (TH1a, TH1b, TH1c, TH3b, TH1-Option)
- Pie Allen Historic District (TH1b, TH1c, TH3a, TH3b, TH3-OptionC)
- Pima County Courthouse (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Rebeil Block (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Rialto Building (TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Rialto Theatre (TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Rincon Heights Historic District (TH1c, TH3a, TH3b, TH3-OptionC)
- Ronstadt House (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Sam Hughes Neighborhood Historic District (Boundary Increase) (TH3b)
- Santa Cruz Catholic Church (TH1a, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Sixth Avenue Underpass (TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Professor George E. P. Smith House (TH1c, TH3b)
- Southern Pacific Railroad Locomotive No. 1673 (TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)

- Speedway–Drachman Historic District (TH3b)
- John Spring Neighborhood Historic District (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Stone Avenue Underpass (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Tucson Warehouse Historic District (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Type A Joesler (TH3b)
- Type B Joesler (TH3b)
- U.S. Post Office and Courthouse (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- University Heights Elementary School (TH1b, TH1c, TH3b)
- University of Arizona Campus Historic District (TH1c, TH3b)
- University Library, Arizona State Museum North (TH1c, TH3b)
- USDA Tucson Plant Materials Center (TH1b, TH1c, TH3b, TH1-Option)
- Valley National Bank Building (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Velasco House (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Veterans Administration Hospital Historic District (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- West University Historic District (TH1a, TH1b, TH1c, TH3a, TH3b, TH1-Option, TH3-OptionC)
- Hotel Heidel (TH3b)

No visual impacts are expected for these listed historic properties.

Nine listed properties are found within 3 to 5 miles of the route group 4 local alternatives and, due to distance, no visual impacts are anticipated: Blenman-Elm Historic District, the Villa Catalina, the Catalina American Baptist Church, Colonia Solana Residential Historic District, the El Conquistador Water Tower, El Encanto Estates Historic District, El Montevideo Residential Historic District, the First Joesler House, and Virginia Heights.

Determined Eligible

There are no historic properties which have been determined eligible under Criterion A, B, or C within the visual analysis areas for local alternatives MA1, TH1a, TH1b, TH1c, TH3-Option A, TH3-Option B, TH3-Option C, TH3a, and TH3b; therefore, there would be no visual effects to determined eligible properties.

Substation and Substation Expansions

One new substation and expansion of 14 existing substations is planned for the proposed Project. The new substation (Midpoint) would be located along the subroute 1.1 (Proposed Midpoint) or subroute 1.2 (Alternative Midpoint). The existing stations are: Adams Tap Substation, Afton Substation, Apache Substation, De Bac Substation, DeMoss Petrie Substation, Hidalgo Substation, Marana Substation, Nogales Substation, Pantano Substation, Rattlesnake Substation, Saguaro Substation, Tortolita Substation, Tucson Substation, and Vail Substation. Table 4.9-15 summarizes the known resources within each substation footprint.

Table 4.9-15. Substations, Cultural Resource Inventory Data

Substation	Total Acreage of Disturbance	Listed Sites	Determined Eligible Sites	Unevaluated or Unknown Sites	Resources from Historical Maps	Total Number of Resources
Proposed Midpoint	35	0	0	0	0	**0**
Alternative Midpoint	35	0	0	2	0	**2**
Adams Tap Substation	4	0	0	1	0	**1**
Afton Substation	20	0	0	0	2	**2**
Apache Substation	38	0	0	0	4	**4**
De Bac Substation	10	1	0	1	5	**7**
DeMoss Petrie Substation	0	0	0	0	4	**4**
Hidalgo Substation	35	0	0	0	1	**1**
Marana Substation	10	0	1	1	1	**3**
Nogales Substation	9	0	0	0	0	**0**
Pantano Substation	10	0	0	0	0	**0**
Rattlesnake Substation	10	0	0	0	1	**1**
Saguaro Substation	14	0	0	0	2	**2**
Tortolita Substation	1.4	0	0	0	0	**0**
Tucson Substation	3.7	0	0	0	0	**0**
Vail Substation	10	0	0	0	1	**1**

KNOWN CULTURAL RESOURCES

One listed historic property, the Valencia Site, is within the footprint of the De Bac Substation expansion. One determined eligible historic property is found within the footprint of the Marana Substation expansion.

Archaeology Southwest's Cultural Resource Priority Areas

The Del Bac Substation is located within the Middle Santa Cruz and Valencia Priority Areas. The DeMoss Petrie Substation is located with the Middle Santa Cruz Priority Area. The Marana Substation is located with the Los Robles Priority Area. The Valencia Priority Area is the area surrounding the Valencia site. The Los Robles Priority Area corresponds to the Los Robles Archaeological District.

Agency Preferred Alternative

The Agency Preferred Alternative for route group 1 consists of P1, P2, P3, and P4a. Segment P2 is the segment of primary concern for cultural resource mainly because of its length at 102 miles. Within the representative ROW of P1, P2, P3, and P4a, 30 cultural resources have been recorded. Forecast number of resources for the entire representative ROW of route group 1 total 173 resources with 121 of those resources located in P2. Seventy-three of the 173 resources are anticipated to be of moderate to high or high sensitivity. Segment P2 is expected to have direct and indirect impacts to the Butterfield Trail (which it crosses) and visual impacts to one NRHP-eligible historic property.

The Agency Preferred Alternative for route group 2 consists of P7, LD3a, LD4, and LD4-Option 5. The LD3a, LD4, and LD4-Option 5 local alternatives were designed to go around the Lordsburg and Willcox playas and parallel existing or proposed transmission lines. Within the representative ROW, segment P7 has 14 previously recorded and 58 projected cultural resources. Fifty-nine percent of the projected resources would be classified as moderate or moderate to high sensitivity. Segment P7 does not cross any historic trails and has no visual impacts to NRHP-listed or eligible historic properties. Local alternative LD3a has one recorded and 61 projected cultural resources. All of the cultural resources are anticipated to be of moderate to high sensitivity. LD3a does cross the Butterfield Trail. LD4 has 5 recorded and 45 projected cultural resources; 60 percent of the projected resources are expected to be of moderate to high sensitivity. LD4-Option 5 has no recorded and no Project resources. LD3a, LD4, and LD4-Option 5 are not expected to have visual impacts on historic properties other than on the Butterfield Trail for LD3a.

The Agency Preferred Alternative for route group 3 consists of U1a, U1b, U2, and U3a which all consist of an existing Western transmission line. Segment U3a is of greatest cultural concern because it travels through an area of dense resources. Within U1a, U1b, U2, and U3a there are 29 recorded resources; three of those resource are listed on the NRHP (the Valencia Site, AZ BB:13:315[ASM], and the Empirita Ranch Historic District) and are within the representative ROW of U3a. Projected resources within the route group representative ROW total 193, with 109 of those resources in U3a. Of the total projected resources, 62 percent would be of moderate sensitivity, 12 percent of moderate to high sensitivity, and 8 percent of high sensitivity. Segment U3a also crosses three CRPAs, but U1a is the only segment that crosses the Butterfield Trail. Although there are several existing and projected resources for the route, the route is an existing line and ground disturbance would be significantly less than that of the New Build Section. The fact that this is an existing line also would minimize additional visual impacts to the several historic properties found within 3 miles of the centerline.

The Agency Preferred Alternative for route group 4 consists of U3b, U3c, U3f, U3g, U3h, U3i, U3k, U3l, U3m, U4, MA1, TH1a, and TH1 Option. Segments U3b, U3c, U3f, U3g, U3h, U3i, U3k, U3l, U3m, and U4 consist of the existing Western transmission line. Local alternative MA1 was developed to route around the Marana Airport and will minimize impacts to military training at the airport. Local alternatives TH1a and TH1 Option were designed to minimize impacts to the Tumamoc Hill Archaeological District and Desert Laboratory NHL.

While all of segments U3b, U3c, U3f, U3g, U3h, U3i, U3k, U3l, U3m, and U4 are in culturally sensitive areas with dense resources, segments U3f, U3g, U3i, and U3k are of particular concern. Within U3b, U3c, U3f, U3g, U3h, U3i, U3k, U3l, U3m, and U4, 57 cultural resources have been recorded within the representative ROW including two NRHP-listed historic properties: Tumamoc Hill Archaeological District and Desert Laboratory NHL (U3f and U3g) and the Los Robles Archaeological District (U3k). Two hundred and twenty-eight cultural resources have been projected for the representative ROW; 98 of which are in U3i and 51 of which are in U3k. Almost all of the projected resources are expected to fall in the moderate, moderate to high, and high sensitivity categories. Six CRPAs are crossed by the route.

The Butterfield Trail is crossed by U3h, U3i, and U3k and the Anza Trail is crossed by U3i and U3k. Seventy-eight historic properties are within 3 miles of the route as well. Although there are several existing and projected resources for the route, the route is an existing line and ground disturbance would be significantly less than that of the New Build Section. The fact that this is an existing line also would minimize additional visual impacts to the historic properties found within 3 miles of the centerline.

Local alternative MA1 has no recorded and one anticipated cultural resource. No impacts are anticipated for MA1.

Local alternative TH1a and TH1 Option go around the southern, western, and northern edges of Tumamoc Hill but are still within the boundaries of the NHL. Project resources in local alternative TH1a total 3 and in THI Option total 4; for both alternatives, 67 percent of those resources are anticipated to have moderate sensitivity and 33 percent to have high sensitivity. Visual impacts to Tumamoc Hill created by the new tower structures would be moderate to high. However, because routing the line along TH1a and TH1 Option would entail removing the existing line across Tumamoc Hill visual impacts from the existing line would be reduced.

Based on this analysis, several issues have been identified for cultural resources:

- Direct and visual impacts are expected to the Butterfield Trail in segments P2, LD3a, U1a, U3h, U3i, and U3k and to the Anza Trail in segments U3i and U3k.
- The Agency Preferred Alternative in route group 1 is culturally sensitive, especially segment P2. A high number of cultural resources is forecast for this segments which can be partially attributed to the overall length of the segment.
- Segments U3a of route group 3 and U3i and U3k of route group 4 are also culturally sensitive. These routes travel through areas of high cultural density and/or importance including several CRPAs. However, because these segments represent an existing line impacts due to ground disturbance will be reduced.
- Several segments cross portions of Tumamoc Hill (U3f, U3g, TH1a, and TH1 Option); however, the selection of TH1a and TH1 Option will reduce visual impacts by routing the line around the NHL rather than through it and will allow the existing line crossing through the NHL to be removed.

The above issues mean that adverse impacts to cultural resources for the Agency Preferred Alternative will be long-term and major; however, adverse effects to historic properties will be mitigated in accordance with the terms of the PA. According to Southline's POD (PPM CR-4: Avoid Direct Impacts on Significant Cultural Resources through Final Design), the preferred choice for impact reduction will be avoidance of resources. If resources cannot be avoided other types of mitigation would be developed and implemented including an HPTP, data recovery, construction monitoring, and public outreach. Provided that mitigation measure appropriate to the resource are implemented prior to, during, and/or after construction, impacts to historic properties would be reduced to moderate but still long-term.

Additional Mitigation Measures

The Section 106 PA would stipulate the development of an HPTP which would detail mitigation measures for this Project. If possible, direct impacts to historic properties and other cultural resources would be avoided through engineering design, such as spanning.

For unavoidable direct impacts to resources which are eligible for the NRHP under Criterion D (the potential to provide important information about the past), mitigation measures prior to construction may include NRHP-eligibility testing and data recovery for prehistoric archaeological sites and NRHP-

eligibility testing, data recovery, documentary research, and oral history for historic archaeological sites and built environment historic resources.

In addition, a NAGPRA Plan of Action will be developed to outline the procedures to be followed in the event human remains are encountered during ground disturbance. The NAGPRA Plan of Action would be applicable to discoveries of human remains on Federal and Tribal land, and in consideration of State laws from Arizona and New Mexico which protect human remains on State or private lands, may also be applicable to discoveries on those lands. For State and private lands in Arizona, "burial agreements" are developed with each tribe that may claim cultural affiliation to possible human remains discoveries.

Adverse direct impacts to historic properties which are eligible for the NRHP under Criterion A, B, or C are more difficult to mitigate. Measures may include education, interpretation, signage, and community outreach.

During construction and maintenance, all vehicle movement would be restricted to designated access routes. If necessary, a cultural resources/archaeological monitor would be present at all construction activities in or near a resource to ensure the resource was not disturbed. Construction crews would be required to report any unanticipated subsurface resources to the proper agency.

Residual Impacts

For resources eligible for the NRHP under Criterion D, provided that the data recovery plan as detailed in the HPTP is followed, there would be no residual impacts. For resources eligible for the NRHP under Criteria A, B, or C, there may still be residual impacts associated with alterations to integrity of setting, feeling, or association due to the presence of the transmission line and associated facilities. Resources would partially retain characteristics that make them eligible under Criteria A, B, and C, and residual impacts from the presence of the proposed Project would be moderate.

Unavoidable Adverse Impacts

If resources cannot be avoided due to Project design, any disturbance, damage, or loss of cultural resources that are or may be eligible for the NRHP due to ground disturbance is considered an unavoidable adverse impact.

Short-term Uses versus Long-term Productivity

The short-term use of the ROW during construction of the transmission line and its associated facilities would result in ground disturbance. If that ground disturbance results in the disturbance, damage, or loss of cultural resources that are or may be eligible for the NRHP, the long-term productivity of that resource is reduced or eliminated. This is primarily true of resources eligible under criterion D; however, if a resource eligible under Criteria A, B, or C is damaged or lost due to construction, that would also affect its long-term productivity.

Irreversible and Irretrievable Commitments of Resources

Because cultural resources are non-renewable resources, any disturbance, damage, or loss to a resource that is or may be eligible for the NRHP would constitute an irreversible and irretrievable impact to that resource. However, archaeological data recovery of sites along the proposed transmission line would increase knowledge and understanding about the history of southwestern New Mexico and southeastern Arizona which would be a benefit (positive impact) to science.

4.10 VISUAL RESOURCES

4.10.1 Introduction

This section addresses the potential impacts to visual resources from Southline's preferred, proposed, and local alternatives during construction and operation and maintenance of the transmission line, substations, and ancillary facilities. The potential Project routes would traverse multiple landscape types, viewing areas, and land jurisdiction as identified in Chapter 3, "Affected Environment." The visual resources analysis provides an assessment of impacts to existing conditions given the introduction of the proposed Project into the aesthetic environment. Impacts from construction and operation and maintenance of the New Build and Upgrade Sections are disclosed in this visual resources analysis. The degree of impact to visual resources was measured in terms of proportionate change to the aesthetic environment using defined criteria such as visual contrast.

4.10.2 Methodology and Assumptions

The methodology used for the impact analysis of the visual resources is three-tiered. The first level of analysis is a discussion of the changes to the landscape in the areas of analysis resulting from the actions prescribed under each alternative. The second level of analysis is an assessment of impacts resulting from those same actions as seen from KOPs along the potential project routes. The third level of analysis is an assessment of whether the proposed changes to the landscape would meet BLM's objectives for management of visual resources where the potential project routes crossed BLM-managed lands. The three-tiered methodology was based primarily upon the BLM VRM 8400 Series guidance, BLM third-party contractor experience with visual resource analyses for transmission line and substation projects, and extensive project-level coordination with BLM, NPS, U.S. Forest Service, and inclusion of several tiers of agency staff.

Specifically, GIS technology was used to assess initial impacts to scenery and views by establishing a viewshed. Comprehensive field reconnaissance informed the baseline conditions, described in Chapter 3, "Affected Environment." Visual contrast as defined in BLM Manual 8431 was used in the site analysis from the perspective of each selected KOP (BLM 1986a).

Visual contrast, or the degree of visual change to the landscape, based on construction and operation and maintenance of the proposed Project, was used as the primary indicator of impacts. Visual contrast rating analysis is the assessment performed by evaluating the visual elements of form, line, color, and texture of the existing landscape. Contrast results from landform modifications necessary to prepare the ROW for construction including removal of vegetation, or creation of permanent access roads to build structures.

The degree of impact to visual resources to determine what is allowable administratively based on VRM Class allocations was measured in terms of: high, moderate, and low (as defined by BLM VRM guidance). A "high" degree of impact occurs where the project facilities would dominate the landscape in areas of remarkable scenic quality, landscape character, and visual sensitivity, meaning the landscape is unique, rare, and important to the community, and has no or little tolerance for change to the form, line, color, and texture features. A "moderate" degree of impact occurs when project facilities would co-exist within the landscape but would be apparent from viewing locations, and changes would modify the inherent quality of the landscape but the facilities would blend with the existing form, line, color, and texture. A "low" degree of visual impact would be a change that is subordinate, or not readily apparent. Low impacts are considered minimal changes to the existing landscape character, such as parallel existing facilities or placement within an existing utility corridor with a similar form, line, color, and texture.

The visual resource evaluation began with the establishment of the area of exposure; identification of the sensitive receptors (e.g., public and stakeholders) within the area of exposure; identifying issues of concern as expressed during scoping, public outreach, field reconnaissance, and specific communications with property owners; an assessment of scenic values (as expressed by the public); and the assessment and description of the degree of effect on public scenic value as required by NEPA.

Though the proposed Project traverses several jurisdictions, the visual resource assessment was conducted consistently throughout the analysis area and objectivity and consistency was applied to reduce the subjectivity associated with assessing visual quality.

The assessment of visual contrast was based upon 10 environmental factors: distance, angle of observation, length of time the project is in view, relative size or scale, season of use, light conditions, recovery time, spatial relationships, atmospheric conditions, and motion. The BLM Manual 8431, Visual Contrast Rating (BLM 1986a) defines these factors as follows:

Distance. The contrast created by a project usually is less as viewing distance increases.

Angle of Observation. The apparent size of a project is directly related to the angle between the viewer's line-of-sight and the slope upon which the project is to take place. As this angle nears 90 degrees (vertical and horizontal), the maximum area is viewable.

Length of Time the proposed Project is in View. If the viewer has only a brief glimpse of the project, the contrast may not be of great concern. If, however, the project is subject to view for a long period, as from an overlook, the contrast may be very significant.

Relative Size or Scale. The contrast created by the project is directly related to its size and scale as compared to the surroundings in which it is placed.

Season of Use. Contrast ratings consider the physical conditions that exist during the heaviest or most critical visitor use season, such as snow cover and tree defoliation during the winter, leaf color in the fall, and lush vegetation and flowering in the spring.

Light Conditions. The amount of contrast can be substantially affected by the light conditions. The direction and angle of lighting can affect color intensity, reflection, shadow, form, texture, and many other visual aspects of the landscape. Light conditions during heavy periods of rain must be a consideration in contrast ratings.

Recovery Time. The amount of time required for successful revegetation should be considered. Few projects meet the VRM management objectives during construction activities. Recovery usually takes several years and goes through several phases (e.g., bare ground to grasses, shrubs, trees, etc.). It may be necessary to conduct contrast ratings for each of the phases that extend over long time periods. Those conducting contrast rating should verify the probability and timing of vegetative recovery.

Spatial Relationships. The spatial relationship within a landscape is a major factor in determining the degree of contrast.

Atmospheric Conditions. The visibility of projects due to atmospheric conditions such as air pollution or natural haze should be considered.

Motion. Movement such as waterfalls, vehicles, or plumes draws attention to a project.

Because it is not possible to analyze every view toward proposed Project features, the contrast rating process requires selection of representative views, or KOPs. KOPs represent a range of views available to the public, including common views and sensitive views; sensitive views are those from communities, recreational areas, and travel routes. In consultation with the BLM Field Office representatives, a list of potential KOP locations was compiled. Based on observations made during the field visit, 79 KOPs were identified, of which 29 were selected as candidates for visual simulation. No simulation would be created for the remaining 50 KOPs. The agencies made additional recommendations over time, resulting in a final total of 96 KOPs, with 40 being simulated. Visual simulations were prepared using computer modeling techniques to depict the view as it would appear were the proposed Project completed. A combination of computer-aided drafting, GIS tools, and rendering programs was used to produce images of the proposed Project facilities, which were then superimposed on photographs.

The KOPs are discussed in detail in section 3.10 and, along with visual contrast rating sheets (VCRSs) are summarized in appendix I. Simulations for select KOPs can be found in appendix K. For each KOP, the existing and with-project conditions are assessed for land and water features, vegetation, and structures in terms of the elements of form, line, color, and texture. The degree of contrast—strong, moderate, weak, or none—is assessed for each of these features and elements. The visual resources impact analysis was largely based upon BLM Visual Contrast Ratings and the assessment of the degree of potential impact on viewers, based upon the level of viewer sensitivity combined with proposed Project visibility and contrast within the existing landscape.

Analysis Area

The analysis area for visual resources was established through preliminary assessment of scenic quality, visual sensitivity, and the derivation of a viewshed analysis using digital elevation modeling and ESRI ArcGIS viewshed tools. Field reconnaissance was conducted to verify onsite existing conditions, establish or validate boundaries for scenic quality, identify sensitive viewers, and determine visual contrast. Field reconnaissance and application of distance zones revealed an analysis area between 2 and 10 miles either side of centerline. Typically, views beyond 5 miles result in the visual deterioration of transmission line structures, although lattice-type structures begin to deteriorate in visibility beginning at 0.25 mile, and monopole structures begin to blend into the landscape at further distances (dependent upon the background or horizon line conditions).

All action alternatives are located within the Basin and Range physiographic province and are split between the Mexican Highlands (roughly within the New Mexico area) and Sonoran Desert (roughly within the Arizona area) (USGS 2003). Both of these physiographic subregions are distinctive in the topography and vegetation that they comprise; however, the proposed Project is located entirely within desert landscape characterized by large swaths of open space, variation of the degree of vegetation growth, topography, and color contrast (i.e., form, line, color, and texture). Additionally, the proposed transmission line traverses varying degrees of human-made development ranging from highly rural, low-density communities, to moderate- to high-density urban landscape (within the city of Tucson).

Though the proposed Project traverses several landowner jurisdictions, the visual resource assessment was conducted consistently throughout the analysis area, and objectivity and uniformity in the analysis was applied to reduce the subjectivity associated with assessing visual quality.

Analysis Assumptions

The analysis assumptions for visual resources include both temporal and spatial dimensions. The temporal bounds of analysis include the phasing of construction and operation and maintenance. The spatial bounds of analysis are defined by areas in which the proposed Project would be visible, or its

viewshed. However, the concept of analyzing visual contrast, or the degree of change to the existing landscape, was used to determine the level of visual impact within the viewshed as a result of the proposed Project. Lastly, the cumulative effect of the proposed Project is disclosed to illustrate the potential impacts to visual resources for viewers, residents, and visitors in the lands adjacent to or surrounding the Project footprint. Past, present, and reasonably foreseeable future actions are described and considered that could cumulatively contribute to visual impacts.

The analysis area included a 10-mile buffer around all proposed Project alternatives. The visual resource impacts analysis included an assessment of the landscape changes that would result from the construction and operation and maintenance of the proposed Project. The relative impacts of each alternative on the characteristic landscape was assessed by comparing visual contrasts that would result from changes to the form, line, texture, and color of the existing environment directly resulting from the implementation of the proposed Project. The analysis area was determined by a viewshed analysis in which potential viewing would be possible.

Impact Indicators

Visual contrast was the primary indicator determining the degree of impact from the implementation of the proposed Project into the existing environment. Visual contrast was determined through a thorough evaluation of scenic quality, sensitivity levels, and distance zones establishing the baseline conditions, and adheres to the BLM VRM system (BLM 1986a). Impacts resulting from the introduction of the proposed Project into the existing visual environment, that cannot be mitigated or reduced, are measured in terms of high, moderate, and low:

- High Impacts—occur where the proposed Project and/or facilities associated with the proposed Project (e.g., access roads, towers, ancillary facilities, and other structures) are dominant in the visual landscape from sensitive viewing locations. The visual impacts measured in terms of form, line, color, and texture would be incompatible with the existing high-quality, unique, or rare natural landscape. Typically, these landscapes are categorized as Class A or Class B scenic quality and high or moderate sensitivity level.
- Moderate Impacts—occur where the proposed Project or portions of the proposed Project are co-dominant with existing landscape features and are visible from high to moderate sensitivity–level viewpoints. Moderate impacts may occur in Class B or Class C designated scenic quality levels where the implementation of the proposed Project features would change the inherent scenic quality of the landscape in terms of form, line, color, and texture.
- Low Impacts—occur where the proposed Project or portions of the proposed Project are not dominant or considerably noticeable from sensitive viewing locations, and minimal change to the existing scenic landscape is detectible. Low impacts would occur in Class B or Class C landscapes in areas of weak sensitivity. Examples of low visual impacts would be if the proposed Project paralleled an existing transmission line or utility corridor where similar or more dominant structures are currently built, and the form, line, color, and texture contrast would result in similar views or modifications.

Significant Impacts

For the purposes of this analysis, a significant impact on visual resources could result if any of the following were to occur from construction or operation and maintenance of the proposed Project:

- Areas that would no longer meet, or be in conformance with established VRM objectives and would require a plan amendment (see figures 3.10-14 and 3.10-18 for VRM class and segment conformance).

- Introduction of a structure contrast within a landscape that is highly sensitive from a natural resources or community perspective.
- Qualitative assessment of the degree of change in the landscape character from analysis viewpoints over time resulting in the permanent degradation of scenic quality in established areas of aesthetic importance.
- Miles of Project visibility in areas established as highly scenic (i.e., scenic roads, community or historic areas).

4.10.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the BLM would not issue permission to Southline for the use of the ROW; therefore, the New Build Section of the proposed Project would not be constructed across Federal lands and Western would not rebuild its existing transmission lines as part of the Southline Project. No Project-related impacts to visual resources would occur in the New Build Section and visual resource conditions would remain unaffected by the proposed Project. Visual resources would continue to be affected by current actions and activities in the analysis area. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations, including the upgrade of Western's transmission lines to 230-kV, within the next 10 years, in accordance with Western's 10-year capital improvement plan (Western 2012a).

Impacts Common to All Action Alternatives

This section presents the direct and indirect effects common to all action alternatives during construction and operation and maintenance and maintenance of the proposed Project.

CONSTRUCTION

During construction, visual impacts would result from the introduction of construction vehicles, equipment, and construction materials within staging areas, access roads, and within the transmission line ROW. Disturbance resulting from construction would be temporary and largely short in duration, and visible effects from active construction would cease subsequent to clean up and restoration of the temporary staging areas and access roads.

Sensitive viewers would be affected by the temporary proposed Project construction impacts. However, the transmission line structures would cause the major, long-term change to scenery, while construction of the structures and facilities would be short-term and temporary. During construction, alteration of topography, earthwork, vegetation clearing, short-term impacts from dust generation, and landform modification would be noticeable and create visual contrast within the viewshed.

OPERATION AND MAINTENANCE

The towers, transmission lines, permanent access roads, substations, and maintenance facilities would increase visual contrast during the entire duration of proposed Project operations. Visual impacts would be most evident where cleared areas created scars, barren areas, or unnatural lines and contrast resulting from clearing which would remain for the life of the proposed Project (although, as discussed in the mitigation measures, some areas would be revegetated to reduce contrast resulting from landform and vegetation modification). The most evident and long-term visual contrasts result from the addition of

transmission lines and facility structures within the landscape. These vertical structures (towers), conductors, lines, and access roads would produce long, linear contrast within the landscape.

Route Group 1 – Afton Substation to Hidalgo Substation

Visual contrast in route group 1 would directly result from introduction of transmission line structures and substations into the landscape, removal of vegetation to construct and maintain the transmission lines, construction of temporary and permanent access roads, temporary construction laydown yards, and any landform modifications necessary to prepare the ROW for construction. Table 4.10-1 provides a summary of scenic quality ratings and VRM Classes for route group 1.

Table 4.10-1. Route Group 1 Scenic Quality Ratings and VRM Class

		Scenic Quality Rating (in miles)			VRM Class (BLM lands only) (in miles)		
Segment	**Total Miles**	**A**	**B**	**C**	**II**	**III**	**IV**
Subroute 1.1, Proponent Proposed							
P1	5.1	0.0	0.0	5.1	0.0	3.0	0.0
P2	102.0	0.0	6.0	96.0	0.0	29.9	2.5
P3	31.1	0.0	0.0	31.1	0.0	2.6	22.9
P4a	8.7	0.0	0.0	8.7	0.0	0.4	3.6
Subroute 1.2, Proponent Alternative							
S1	13.4	0.0	0.0	13.4	0.0	10.9	0.0
S2	11.1	0.0	0.8	10.3	0.0	9.8	0.0
S3	12.9	0.0	7.0	5.9	0.0	8.7	3.7
S4	10.6	0.0	0.6	10.0	0.0	0.0	10.5
S5	29.7	0.0	7.6	22.1	1.2*	4.8	6.1
S6	7.4	0.0	0.0	7.4	4.4*	0.0	0.0
S7	41.5	0.0	0.0	41.5	13.7*	1.7	5.2
S8	14.6	0.0	0.0	14.6	0.0	0.3	0.0

Table 4.10-1. Route Group 1 Scenic Quality Ratings and VRM Class (Continued)

Segment	Total Miles	Scenic Quality Rating (in miles)			VRM Class (BLM lands only) (in miles)		
		A	B	C	II	III	IV
Route Group 1 Local Alternatives							
DN1	42.5	0.0	12.3	30.2	0.0	4.0	2.9
A	17.5	0.0	0.0	17.5	0.0	14.7	0.0
B	12.2	0.0	0.7	11.5	0.0	0.0	10.0
C	9.0	0.0	0.0	9.0	3.7*	0.0	0.0
D	22.8	0.0	5.2	17.6	1.8*	4.3	1.9

* Not compliant with VRM objectives.

SUBROUTE 1.1 – PROPONENT PREFERRED

Scenic Quality

Changes to scenic quality along subroute 1.1 would result where vegetation is removed for construction access, substation expansion, and ROW clearing during the operation and maintenance of the transmission line and substations. Additional changes to scenic quality would occur from the introduction of new transmission structures, including monopole and lattice-type structures on the landscape. The majority of subroute 1.1 crosses Class C scenery (140.9 miles or 96 percent), crossing areas of low, rolling landscape, minimal vegetation, muted colors, and open desert. The area is not known for its scenery; and impacts from those changes to scenic quality would be low. A portion of segment P2 of subroute 1.1 crosses Class B scenery where impacts from those changes would be moderate. In addition, segments P1, P2, and P4a would be adjacent to existing transmission corridors and the I-10, repeating the basic visual elements of that existing infrastructure, further contributing to low visual contrasts. Although segment P3 crosses Class C scenery, it would pass through relatively undeveloped land and would require new or improved construction access resulting in moderate impacts (see figure 3.10-11 for scenic quality ratings and subroute 1.1). Contrasts would be further reduced by implementing VRM-1 and VRM-2, as described in Section 4.10.4, “Additional Mitigation Measures.”

Key Observation Points

Residential

Residences located along subroute 1.1 are generally dispersed, except for higher concentrations in the community of Deming (see figure 3.10-9 for location of KOPs and subroute 1.1). In the Deming area, impacts to residential viewers are expected to be moderate. There would be unobstructed views of segment P2 crossing gently rolling terrain with low shrub and grass cover from over 3 miles away. New structures would be visible, but would repeat the basic visual elements of the existing transmission structures (see appendix I: VCRS P2-05).

The southern half of segment P3 is considered to have moderate sensitivity because of its rural residential character. Moderate impacts to dispersed residences along segment P3 are expected to occur. There are no existing transmission structures, and viewers would have unobstructed views of the proposed Project

transmission structures crossing flat to rolling terrain within 0.5 mile (see appendix I: VCRS P3-01 and P3-02).

Recreation

Subroute 1.1 comes in proximity to the Aden Hills OHV area, Aden Lava Flow WSA, West Potrillo Mountains WSA, Florida Mountains WSA, Mount Riley WSA as well as access to the CDNST (see figure 3.10-9 for location of KOPs and subroute 1.1). Because dispersed recreation viewers would have views of segments of subroute 1.1 where it is adjacent to existing transmission facilities, low impacts would occur. Along segments P1 and P2, low to moderate impacts are expected for recreation viewers associated with the Aden Hills OHV area and Aden Lava Flow WSA, Mount Riley WSA, and the West Potrillo Mountains WSA. The addition of new transmission structures would repeat the existing horizontal patterns associated with current infrastructure visible across the landscape, and views would be visible from 2 miles or more (see appendix I: VCRS P1-01 and P2-02).

Impacts would be moderate for dispersed recreation users associated with the Florida Mountains WSA. Because segment P2 would be viewed across slightly rolling terrain with low shrub vegetation cover, recreation viewers would have clear views of lattice structures and horizontal transmission lines (see appendix I: VCRS P2-05).

It also crosses the CDNST (see figure 3.10-9 for location of KOPs and subroute 1.1). Where it crosses the CDNST, impacts to viewers are expected to be low. The view is located along a portion of the CDNST that parallels NM 90 approximately 0.25 mile northeast of the intersection with NM 70. Very few residents or destinations are located along NM 90. There is no marked trailhead located here, and landscape is characterized by large expanses of open space. Recreation users seeking a solitary experience on the CDNST may use this portion of the trail. Low impacts are expected from Grandmother Mountain and the CDNST. Views of segment P2 would repeat the basic patterns of existing transmission structures (see appendix I: VCRS P2-07).

Travel Routes

High sensitivity travel routes along subroute 1.1 include I-10 and NM 549 (see figure 3.10-9 for location of KOPs and subroute 1.1). Viewers traveling along the I-10 corridor, which has high viewer sensitivity because it is a major travel corridor, would have clear views of segments P2 and P4a following the I-10 corridor. Low impacts are anticipated because the new transmission lines would follow existing transmission lines, and views of transmission structures would be against the backdrop of surrounding mountains for portions of these segments, which would further reduce contrast (see appendix I: VCRS P2-03 and P2-04).

Compliance

A majority of subroute 1.1 where it crosses BLM land would pass through VRM Class III lands (35.9 miles). Of the remaining portion of subroute 1.1 across BLM lands, 28.9 miles would cross VRM Class IV lands. The remaining length of subroute 1.1 crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, all segments of subroute 1.1 would be in compliance with BLM VRM Class III and Class IV objectives.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Scenic Quality

Changes to scenic quality along subroute 1.2 would result where vegetation is removed for construction access, temporary laydown areas, substations, and for ROW clearing for the operation and maintenance of the transmission line. Direct impacts would also occur from the introduction of new transmission structures, including monopole and lattice-type structures, on the landscape. Subroute 1.2 crosses Class B (16 miles or 11.3 percent) and Class C scenery (125.2 miles or 85.8 percent) and impacts from these changes would be low, moderate, and high. Subroute 1.2 would pass through the East Potrillo Mountain SQRU (segment S2) and the West Potrillo Mountain SQRU (segment S3), which the BLM considers to have high sensitivity. Subroute 1.2 would also pass through an area of moderate sensitivity between Columbus and Hachita (segments S5, S6, and S7). Low to moderate impacts would occur where there is some existing construction access and with the addition of new tall transmission structures alongside existing developments. High impacts would occur along 7 miles of segment S1 where new transmission structures and construction access are introduced into currently undeveloped areas (see figure 3.10-11 for scenic quality ratings and subroute 1.2).

Subroute 1.2 would have higher levels of contrast because it would pass mostly through rural and undeveloped landscapes with no existing transmission line corridors, as opposed to the subroute 1.1 segments, which would pass primarily along existing transmission line routes and in proximity to I-10, a major freeway.

Key Observation Points

Residential

Dispersed rural residences are located along portions of the subroute 1.2. There are concentrations of residences in the communities of Lordsburg, Columbus, and Hachita (see figure 3.10-9 for location of KOPs and subroute 1.2). In the Lordsburg area, impacts to residential viewers are expected to be moderate. There would be views of segment S8 paralleling existing shorter utility lines. New transmission structures would be clearly visible, would be taller than the existing infrastructure, and would be visible against the sky (see appendix I: VCRS S8-02). In the Columbus area, impacts to residential viewers are expected to be moderate. There would be unobstructed views of segment S5 crossing gently rolling terrain with low shrub and grass cover. New structures would be visible, but would repeat some of the basic visual elements of existing vertical structures/towers in the Columbus area (see appendix I: VCRS S5-01). In the Hachita area, impacts to residential viewers are expected to be low to moderate. There would be views of segment S7 interspersed with residential development, water towers, and existing utility towers. New structures would be visible, but would repeat some of the basic visual elements of existing development. Impacts would be moderate where new structures would be visible against the sky and where vegetation is removed for a temporary construction laydown yard (see appendix I: VCRS S7-02 and S7-03).

Recreation

There are few recreation viewers associated with subroute 1.2. The subroute comes in proximity to Pancho Villa State Park (1 to 2 miles from the alignment) and the CDNST (4 miles from the alignment) (see figure 3.10-9 for location of KOPs and subroute 1.2). Segments S3 and S4 are located just south of the West Potrillos WSA boundary. Although the WSA receives little visitation, there is access from NM 9 just north of Segments S3 and S4. Low to moderate impacts are expected for travelers along NM 9 accessing the WSA. Along segments S5 and S7, low to moderate impacts are expected for recreation viewers associated with the Pancho Villa State Park and the CDNST. The addition of new transmission

structures would repeat the existing angular patterns visible across landscape and views would be from a distance of less than 2 miles. Impacts would be moderate for dispersed recreation users along the CDNST, where views of new structures occur in front of existing structures, and where structures are visible against the sky (see appendix I: VCRS P1-01 and P2-02).

Travel Routes

Low- to medium-concern sensitive viewing areas for subroute 1.2 include NM 9 (see figure 3.10-9 for location of KOPs and subroute 1.2). Viewers traveling along NM 9 would have views of segments S3, S5, S6, and S7. Moderate impacts would occur where new transmission structures are introduced into largely undeveloped areas, resulting in increased contrast from more pronounced linear features and strong geometric angles compared with existing roads and structures in the landscape (see appendix I: VCRS S3-01, S5-01, and S6-01).

The I-10 corridor has high viewer sensitivity because it is a major travel corridor. Low impacts are anticipated because the new transmission lines would follow existing transmission lines, and views of transmission structures would be against the backdrop of surrounding mountains for portions of these segments, which would reduce contrast (see appendix I: VCRS S8-01 and S8-02). I-10 follows an east-west path located to the north of subroute 1.2 ranging from 8 to 30 miles from the alignment.

Compliance

A majority of subroute 1.2 where it crosses BLM land (36.1 miles) would pass through VRM Class III lands. Of the remaining portion of subroute 1.2 across BLM lands, 25.5 mile would cross VRM Class IV lands, and 19.6 miles would cross VRM Class II lands. The remaining length of subroute 1.2 crosses private or State lands and does not have BLM VRM classifications. Segment S5 would cross 1.5 miles of VRM II land in the Tres Hermanas Mountains SQRU, segment S6 would cross 4.4 miles of VRM Class II lands, and segment S7 would cross 13.7 miles of VRM Class II lands. These portions of subroute 1.2 would not be compliant with VRM Class II where moderate visual contrasts would occur.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: DN1, A, B, C, and D. Impacts to scenic quality, KOPs, and BLM VRM compliance are described for each local alternative segment below.

Local Alternative DN1

Scenic Quality

Impacts along segment DN1 are similar to those described for subroute 1.1, segment P2, low to moderate. Segment DN1 crosses 12.3 miles of Class B scenery and 30.2 miles of Class C scenery, which is characterized by low, rolling landscape, minimal vegetation, muted colors, and open desert (see figure 3.10-11 for scenic quality ratings and segment DN1).

Key Observation Points

Residential

Impacts to dispersed rural residences are located along portions of segment DN1 would be similar to those described for subroute 1.1, moderate. There are concentrations of residences in the communities of Lordsburg, Columbus, and Hachita (see figure 3.10-9 for location of KOPs and segment DN1).

Recreation

There are few recreation resources known along segment DN1, and impacts to dispersed recreation viewers would be similar to those described for subroute 1.1.

Travel Routes

Segment DN1 is not located along existing roadways and there would be no impacts to sensitive viewers along travel routes.

Compliance

Segment DN1 would pass through 2.9 miles of VRM Class IV lands and 4.0 miles of VRM Class III lands. The remaining length of DN1 crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, all segments of DN1 would be in compliance with BLM VRM Class III and Class IV objectives.

Local Alternative A

Scenic Quality

Impacts along local alternative segment A would be similar to those described for segment S2 in subroute 1.2, moderate, crossing 17.5 miles of Class C scenery lands with a low sensitivity level throughout its extent (see figure 3.10-11 for scenic quality ratings and segment A).

Key Observation Points

Residential

Segment A would pass near few, if any, rural residences.

Recreation

There are few recreation resources known along segment A, and impacts to dispersed recreation viewers would be similar to those described for segment S2 in subroute 1.2.

Travel Routes

Segment A would follow existing roads for its entire length along County Road A015 and NM 9. Viewers would experience moderate impacts while traveling along those routes where new transmission structures are introduced into largely undeveloped areas, resulting in increased contrast from more pronounced linear features and strong geometric angles compared with existing roads and structures in the landscape.

Compliance

Local alternative segment A would result in lower levels of visual contrast than would segment S2. Segment A would pass through 14.7 miles of VRM Class III lands. The remaining length of segment A crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, segment A would be in compliance with BLM VRM Class III objectives.

Local Alternative B

Scenic Quality

Impacts along local alternative segment B would be similar to those described for segment S4 in subroute 1.2, moderate, crossing 0.7 mile of Class B scenery and 11.5 miles of Class C scenery lands with a low sensitivity level (see figure 3.10-11 for scenic quality ratings and segment B).

Key Observation Points

Residential

Segment B would pass no residential areas.

Recreation

There are few recreation resources known along segment B, and impacts to dispersed recreation viewers would be similar to those described for segment S4 in subroute 1.2. Segment B is located along the West Potrillos WSA boundary, and there would be greater visibility from the WSA of segment B over segment S4.

Travel Routes

Segment B would follow NM 9. Viewers would experience moderate impacts while traveling along NM 9 where new transmission structures are introduced into largely undeveloped areas, resulting in increased contrast from more pronounced linear features and strong geometric angles compared with existing roads and structures in the landscape (see appendix I: VCRS B-01).

Compliance

Segment B would pass through 10.0 miles of VRM Class IV lands. The remaining length of segment B crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, segment B would be in compliance with BLM VRM Class IV objectives.

Local Alternative C

Scenic Quality

Impacts along local alternative segment C would be similar to those described for segment S6 in subroute 1.2, low to moderate, crossing 9 miles of Class C scenery lands with a low sensitivity level throughout its extent (see figure 3.10-11 for scenic quality ratings and segment C).

Key Observation Points

Residential

Segment C would pass near few, if any, rural residences.

Recreation

There are few recreation resources known along segment C, and impacts to dispersed recreation viewers would be similar to those described for segment S6 in subroute 1.2.

Travel Routes

Segment C would follow NM 9 for its entire length. Viewers would experience low to moderate impacts while traveling along NM 9 where new transmission structures are introduced into largely undeveloped areas, resulting in increased contrast from more pronounced linear features and strong geometric angles compared with existing roads and structures in the landscape. There would be fewer visual contrasts from new construction access associated with segment C, since existing roads would be available (see appendix I: VCRS C-01).

Compliance

Segment C would pass through 3.7 miles of VRM Class II lands. The remaining length of segment C crosses private or State lands and does not have BLM VRM classification. Segment C would not be compliant with VRM Class II where moderate visual contrasts would occur.

Local Alternative D

Scenic Quality

Impacts along local alternative segment D would be moderate to high, crossing 5.2 miles of Class B scenery and 17.6 miles of Class C scenery lands with low to moderate sensitivity level throughout its extent (see figure 3.10-11 for scenic quality ratings and segment D).

Key Observation Points

Residential

Segment D would pass near few rural residences.

Recreation

Segment D crosses perpendicular to the CDNST. There are few other recreation resources known along segment D, and impacts to dispersed recreation viewers would be similar to those described for segment S8 in subroute 1.2.

Travel Routes

Segment D would follow existing roads until approximately 1.6 miles south of I-10, where it would turn due west, from which point it would not follow any established road or energy corridor. Moderate impacts would occur to viewers traveling along those routes where new transmission structures are introduced into largely undeveloped areas, resulting in increased contrast from more pronounced linear features and strong geometric angles compared with existing roads and structures in the landscape (see appendix I: VCRS D-01).

Compliance

Segment D would pass through 1.9 miles of VRM Class IV, 2.3 miles of VRM Class III lands, and 1.8 miles of BLM Class II lands. The remaining length of segment D crosses private or State lands and does not have BLM VRM classification. The 1.8 miles of segment D that crosses VRM Class II lands would not be compliant with VRM Class II objectives where a moderate visual contrast would occur. Although there would be low to moderate impacts to visual resources, the remaining 4.2 miles of segment D would be in compliance with BLM VRM Class III and IV objectives.

Route Group 2 – Hidalgo Substation to Apache Substation

Visual contrast in route group 2 would directly result from introduction of transmission line structures and substations into the landscape, removal of vegetation to construct and maintain the transmission lines, construction of temporary and permanent access roads, temporary construction laydown yards, and any landform modifications necessary to prepare the ROW for construction. Table 4.10-2 provides a summary of scenic quality ratings and VRM Classes for route group 2.

Table 4.10-2. Route Group 2 Scenic Quality Ratings and VRM Class

		Scenic Quality Rating (in miles)			VRM Class (BLM lands only) (in miles)		
Segment	**Total Miles**	**A**	**B**	**C**	**II**	**III**	**IV**
Subroute 2.1, Proponent Preferred							
P4b	14.0	0.0	0.0	14.0	0.0	0.7	0.0
P4c	1.9	0.0	0.0	1.9	0.0	0.4	0.0
P5a	9.6	0.0	0.0	9.6	0.0	5.0	1.1
P5b	21.1	0.0	21.1	0.0	0.0	6.4	11.5
P6a	0.9	0.0	0.9	0.0	0.0	0.9	0.0
P6b	22.5	2.4	20.1	0.0	0.0	0.2	0.0
P6c	2.8	0.0	0.8	2.0	0.0	0.0	0.0
P7	22.3	0.9	0.0	21.2	0.0	0.0	2.3
P8	0.5	0.0	0.0	0.5	0.0	0.0	0.0
Subroute 2.2, Proponent Alternative							
E	31.8	0.0	22.4	10.4	0.0	14.6	4.1
F	25.3	0.0	24.4	0.9	0.0	3.2	0.0
Ga	25.7	0.0	0.0	25.5	0.0	0.0	0.0
Gb	1.0	0.0	0.0	1.0	0.0	0.0	0.0
Gc	7.4	0.0	0.0	7.4	0.0	0.0	0.0
I	2.3	0.0	0.8	1.5	0.0	0.0	0.0
J	2.3	0.0	0.0	2.3	0.0	0.0	0.0
Route Group 2 Local Alternatives							
LD1	35.4	0.0	21.9	14.2	0.0	19.4	0.0
LD2	9.6	0.0	0.0	9.6	3.1*	0.0	0.6
LD3a	27.9	0.0	0.0	27.9	0.5*	7.0	2.5
LD3b	1.9	0.0	0.0	1.9	0.0	0.0	1.2
LD4	60.6	0.0	42.3	19.4	0.0	0.0	37.1
LD4-Option 4	6.5	0.0	0.0	6.5	0.0	0.0	0.0
LD4-Option 5	12.2	0.0	9.1	3.1	0.0	0.0	0.0
WC1	14.8	0.0	0.0	14.8	0.0	0.0	0.0

* Not compliant with VRM objectives.

SUBROUTE 2.1 – PROPONENT PREFERRED

Scenic Quality

Changes to scenic quality along subroute 2.1 would result where vegetation is removed for construction access, construction laydown yards, substation expansion, and ROW clearing during the operation and maintenance of the transmission line and substations. Additional changes to scenic quality would occur from the introduction of new transmission structures including monopole and lattice-type structures on the landscape. There are 49.2 miles of subroute 2.1 that cross Class C scenery (52 percent of the subroute), and 42.9 miles which cross Class B scenery (45 percent of the subroute). Impacts from those changes to scenic quality in Class B and C would be low to moderate. A portion of segment P6b of subroute 2.1 also crosses Class A scenery where impacts from those changes would be moderate (see figure 3.10-11 for scenic quality ratings and subroute 2.1).

In addition, segments P5a, P5b, P6a, P6b, and P6c follow the existing El Paso Natural Gas Pipeline. P7 and P8 would be adjacent to existing transmission corridors, repeating the basic visual elements of that existing infrastructure and further contributing to low visual contrasts. Although segment P6b crosses Class A scenery, there would be a moderate visual contrast based on proximity of viewers to the representative ROW.

Key Observation Points

Residential

Residences located along subroute 2.1 are generally dispersed, except for higher concentrations in the communities of San Simon and Bowie (see figure 3.10-9 for location of KOPs and subroute 2.1). In the San Simon area, impacts to residential viewers are expected to be low. There would be distant views of segment P5b crossing a level alkali flat over 2 miles away with the Peloncillo Mountain in the background. New structures would be faintly visible, and introduce a new linear component on the landscape (see appendix I: VCRS P5-01 and P5-02).

In the Bowie area, impacts to residential viewers are expected to be low to moderate. There would prominent views of segment P6b crossing the valley floor with the western extent of the Peloncillo Mountains in the background. There would be unobstructed views of new structures visible against the sky, adding a strong linear and angular element to the landscape (see appendix I: VCRS P6-01 and P6-02).

Recreation

Subroute 2.1 comes in proximity to the Peloncillo Mountains, Dos Cabezas Wilderness, Fort Bowie, and the Willcox Playa. There would be views of segment P4b crossing rolling terrain against a backdrop of mountains. Although the structures would introduce a new vertical element to the landscape, they would repeat the basic elements of existing linear disturbances present on the landscape (see appendix I: VCRS P4-01 and P4-02).

Impacts to viewers from the Peloncillo Mountains are expected to be low. The view is located in a wash southwest of Peloncillo Mountains. There would be faint views of structures associated with segment P5b more than 2 miles away. The Chiricahua Mountains are visible in the distant background (see appendix I: VCRS P5-02 and associated simulation in appendix K).

Impacts to viewers from the Dos Cabezas Mountains would be moderate. There would be unobstructed views of segment P6c crossing rolling hills and leading into the steeper, jagged mountains. The structures

would introduce new regular vertical and horizontal linear components to the landscape (see appendix I: VCRS P6-03 and associated simulation in appendix K).

There are several views of subroute 2.1 associated with the Willcox Playa. Because dispersed recreation viewers would have views of portions of segment P7 where it is adjacent to existing transmission facilities, impacts to viewers from the Willcox Playa are expected to be low. The addition of new transmission structures would repeat the existing vertical and horizontal patterns associated with current infrastructure visible across an open and flat landscape (see appendix I: VCRS P7-01, P7-02, and P7-03).

Travel Routes

High sensitivity travel routes along subroute 2.1 include NM 70 (see figure 3.10-9 for location of KOPs and subroute 2.1). From the intersection of Hook and Anchor Road and NM 70 (Duncan Highway), this view is oriented north approximately 0.4 mile from segment P4b, crossing rolling terrain against a backdrop of mountains. There would be views to the northwest of a temporary construction laydown yard which would introduce short-term contrasts with the surrounding vegetation. Although the structures would introduce a new vertical element to the landscape, they would repeat the basic elements of existing linear disturbances present on the landscape (see appendix I: VCRS P4-02).

Compliance

Subroute 2.1 where it crosses BLM land would pass through 13.5 miles of VRM Class III lands and 14.9miles of VRM Class IV lands (see table 4.10-2). The remaining length of subroute 2.1 crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, all segments of subroute 2.1 crossing VRM Class III and IV lands would be in compliance with BLM VRM Class III and IV objectives.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Scenic Quality

Changes to scenic quality along subroute 2.2 would result where vegetation is removed for construction access, substation expansion, and ROW clearing during the operation and maintenance of the transmission line and substations. Additional changes to scenic quality would occur from the introduction of new transmission structures, including monopole and lattice-type structures on the landscape. There are 49.0 miles of subroute 2.2 which cross Class C scenery (51 percent of the subroute), and 47.6 miles which cross Class B scenery (49 percent of the subroute). Impacts from those changes to scenic quality in Class B and C would be low to moderate (see figure 3.10-11 for scenic quality ratings and subroute 2.2).

In addition, portions of subroute 2.2 follow a variety of existing transmission alignments, pipelines, and highways, repeating some of the basic visual elements of that existing infrastructure and further reducing visual contrasts.

Key Observation Points

Residential

Residences located along subroute 2.2 are generally dispersed, except for higher concentrations in the communities of San Simon, Bowie, and Cochise (see figure 3.10-9 for location of KOPs and subroute 2.2). In the San Simon and Bowie areas, impacts to residential viewers are expected to be low to moderate. There would be views of segments E and F crossing a rolling terrain area from between 1 and 2

miles. New structures would be visible, and would introduce a new linear component on the landscape (see appendix I: VCRS E-01, E-02, F-01 and associated simulation in appendix K, and F-02).

Impacts to viewers from the Cochise area are expected to be low to moderate, where there are somewhat denser residential areas along the western edge of the Willcox Playa surrounded by agricultural lands. The proposed transmission tower along segment Gc would result in moderate contrast to view; although relatively large, it would be partially obscured by intervening structures and vegetation within Cochise, and would appear as one of a few utility pole structures in the view (see appendix I: VCRS G-03 and associated simulation in appendix K).

Recreation

Views of segments Ga and Gb of subroute 2.2 are associated with the Willcox Playa. Because dispersed recreation viewers would have views of the segments where they are adjacent to existing transmission facilities, impacts to viewers from the Willcox Playa are expected to be low. The addition of new transmission structures would repeat the existing vertical and horizontal patterns associated with current infrastructure visible across an open and flat landscape (see appendix I: VCRS G-01 and G-02).

Compliance

A majority of subroute 2.2 where it crosses BLM land would pass through VRM Class III lands (17.8 miles). Of the remaining portion of subroute 2.1 across BLM lands; 4.1 miles would cross VRM Class IV lands (see table 4.10-2). The remaining length of subroute 2.2 crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, all segments of subroute 2.2 crossing VRM Class III and IV lands would be in compliance with BLM VRM Class objectives.

LOCAL ALTERNATIVES

There are eight local alternatives available for route group 2. These local alternatives include LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1. Impacts to scenic quality, KOPs, and BLM VRM compliance are described for each local alternative segment below.

Local Alternative LD1

Scenic Quality

Impacts along segment LD1 are similar to those described for segment E of subroute 2.2 segment P2, and would result where vegetation is removed for construction access, temporary construction laydown yards, and ROW clearing during the operation and maintenance of the transmission line and substations. Additional changes to scenic quality would occur from the introduction of new transmission structures, including monopole and lattice-type structures on the landscape. There would be 21.9 miles of LD1 crossing Class B scenery, and 14.2 miles crossing Class C scenery (see figure 3.10-11 for scenic quality ratings and LD1). Impacts would be low to moderate, crossing Class B and C scenery which is characterized by low, rolling landscape, minimal vegetation, muted colors, and open desert.

Key Observation Points

Residential

LD1 would pass several small areas of concentrated rural residences, including San Simon, Steins Ghost Town, and Road Forks. The remainder of LD1 is sparsely populated. Impacts to dispersed rural

residences located along portions of segment LD1 would be similar to those described for subroute 2.2, moderate (see figure 3.10-9 for location of KOPs and LD1).

Travel Routes

LD1 crosses the I-10 Deming to Lordsburg, and I-10 Willcox to New Mexico SLRUs which are both rated as high viewer sensitivity. The SLRUs are both high sensitivity because they are major travel corridors for local residents and tourism with scenic areas visible from the Interstate. Impacts to dispersed travelers along I-10 with views of portions of segment LD1 would be similar to those described for subroute 2.2, moderate.

Compliance

Segment LD1 would pass through 19.4 miles of VRM Class III lands. The remaining length of LD1 crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, all segments of LD1 crossing VRM Class III lands would be in compliance with BLM VRM Class objectives.

Local Alternative LD2

Scenic Quality

Impacts along segment LD2 are similar to those described for subroute 2.2, and would result where vegetation is removed for construction access and ROW maintenance during the operation and maintenance of the transmission line. Additional changes to scenic quality would occur from the introduction of new transmission structures including monopole and lattice-type structures on the landscape. All 9.6 miles of LD2 cross Class C scenery (see figure 3.10-11 for scenic quality ratings and LD2). Impacts from those changes to scenic quality in class C would be low, crossing scenery which is characterized by a broad, flat valley and the Lordsburg Playa RNA. There are no existing major transmission lines near LD2.

Key Observation Points

No critical KOPs were identified for LD2. The area has no known populations, and representative views of subroute 2.2 from I-10 are already available.

Compliance

Segment LD2 would pass through 3.1 miles of VRM Class II lands and 0.6 mile of VRM Class IV lands. The remaining length of LD2 crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, LD2 would be in compliance with BLM VRM Class IV objectives. Where 3.1 miles of LD2 cross VRM Class II lands, it would not be in compliance with BLM VRM Class II objectives. This area of Class II is associated with the historic Butterfield Trail and impacts to the trail are described in appendix F.

Local Alternative LD3a

Scenic Quality

Impacts along segment LD3a would result where vegetation is removed for construction access, construction temporary laydown yards, and ROW maintenance during the operation of the transmission line. Additional changes to scenic quality would occur from the introduction of new transmission structures including monopole and lattice-type structures on the landscape. All 27.9 miles of LD3a cross

Class C scenery (see figure 3.10-11 for scenic quality ratings and LD3a). Impacts from those changes to scenic quality in Class C would be low, crossing scenery which is characterized by a broad, flat valley and the Lordsburg Playa RNA. LD3a follows an existing 345-kV transmission line for much of its length.

Key Observation Points

No critical KOPs were identified for LD3a. The area has no known populations, and representative views from I-10 are already available from consideration of subroute 2.2 (see appendix I: VCRS for P4-01 and P4-02 as examples).

Compliance

Segment LD3a would pass through 0.5 mile of VRM Class II lands, 7.0 miles of VRM Class III lands, and 2.5 miles of VRM Class IV lands. The remaining length of LD3a crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, LD3a would be in compliance with BLM VRM Class III and IV objectives. Where 0.5 miles of LD3a cross VRM Class II lands, it would not be in compliance with BLM VRM Class II objectives. This area of Class II is associated with the historic Butterfield Trail and impacts to the trail are described in appendix F.

Local Alternative LD3b

Scenic Quality

Impacts along segment LD 3b would result where vegetation is removed for construction access and ROW maintenance during the operation and maintenance of the transmission line. Additional changes to scenic quality would occur from the introduction of new transmission structures including monopoles, on the landscape. All 1.9 miles of LD3b cross Class C scenery (see figure 3.10-11 for scenic quality ratings and LD3b). Impacts from those changes to scenic quality in Class C would be low, crossing scenery which is characterized by a broad, flat valley and the Lordsburg Playa RNA. LD3b also follows an existing 345-kV transmission line for much of its length.

Key Observation Points

No critical KOPs were identified for LD3b. The area has no known populations, and representative views from I-10 are already available from consideration of subroute 2.2 (see appendix I: VCRS for P4-01 and P4-02 as examples).

Compliance

Segment LD3b would pass through 1.2 miles of VRM Class IV lands. Although there would be low to moderate impacts to visual resources, LD3a would be in compliance with BLM VRM Class IV objectives.

Local Alternative LD4

Scenic Quality

Impacts along segment LD4 would result where vegetation is removed for construction access and ROW maintenance during the operation and maintenance of the transmission line. Additional changes to scenic quality would occur from the introduction of new transmission structures, including monopole and lattice-type structures on the landscape. There would be 19.4 miles of LD4 crossing Class B scenery, and 42.3 miles crossing Class C scenery (see figure 3.10-11 for scenic quality ratings and LD4). Impacts from

those changes to scenic quality in Class B and C would be low to moderate, crossing scenery which is characterized by flat desert valleys and playas surrounded by mountains (including the Willcox Playa), and more scenic areas in Class B lands characterized by steep undulating ridgelines, low rounded hills, and eroded rocky peaks. There are a number of existing transmission lines and other existing development along the length of LD4.

Key Observation Points

No critical KOPs were identified for LD4. Representative views from I-10 are already available from consideration of subroute 2.2.

Compliance

Segment LD4 would pass through 37.1 miles of VRM Class IV lands. The remaining length of LD4 crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, LD4 would be in compliance with VRM IV objectives.

Local Alternative LD4-Option 4

Scenic Quality

Impacts along segment LD4-Option 4 would result where vegetation is removed for construction access and ROW maintenance during the operation and maintenance of the transmission line. Additional changes to scenic quality would occur from the introduction of new transmission structures, including monopole and lattice-type structures on the landscape. All 6.5 miles of LD4-Option 4 would cross Class C scenery (see figure 3.10-11 for scenic quality ratings and LD4-Option 4). Impacts from those changes to scenic quality in Class C would be low to moderate, crossing scenery which is characterized by flat desert valleys and playas surrounded by mountains, including the Willcox Playa. LD4-Option 4 follows an existing 230-kV transmission line for much of its length.

Key Observation Points

No critical KOPs were identified for LD4-Option 4. Representative views from I-10 are already available from the consideration of subroute 2.2.

Compliance

Segment LD4-Option 4 does not cross BLM lands and VRM compliance is not an issue.

Local Alternative LD4-Option 5

Scenic Quality

Impacts along segment LD4-Option 5 would result where vegetation is removed for construction access and ROW maintenance during the operation and maintenance of the transmission line. Additional changes to scenic quality would occur from the introduction of new transmission structures, including monopole and lattice -type structures on the landscape. There would be 9.1 miles of LD4-Option 5 crossing Class B scenery, and 3.1 miles crossing Class C scenery (see figure 3.10-11 for scenic quality ratings and LD4-Option 5). Impacts from those changes to scenic quality in Class B would be low to moderate, crossing scenery which is characterized by steep undulating ridgelines, low rounded hills, and eroded rocky peaks. Impacts from those changes to scenic quality in Class C would be low to moderate, crossing scenery which is characterized by flat desert valleys and playas surrounded by mountains, including the Willcox Playa.

Key Observation Points

No critical KOPs were identified for LD4-Option 5. Representative views from I-10 are already available from consideration of subroute 2.2.

Compliance

Segment LD4-Option 5 does not cross BLM lands and VRM compliance is not an issue.

Local Alternative WC1

Scenic Quality

Impacts along segment WC1 would result where vegetation is removed for construction access and ROW maintenance during the operation and maintenance of the transmission line. Additional changes to scenic quality would occur from the introduction of new transmission structures including monopoles, on the landscape. All 14.8 miles of WC1 cross Class C scenery (see figure 3.10-11 for scenic quality ratings and LD3b). Impacts from those changes to scenic quality in Class C would be low, crossing scenery which is characterized by the 191 corridor, development associated with the community of Willcox, and the flat open expanse of the Willcox Playa. WC1 does not follow any existing transmission lines.

Key Observation Points

No critical KOPs were identified for WC1. The area has no known populations, and representative views are already available from consideration of subroute 2.2 (see appendix I: VCRS for P7-01, P7-02, and P7-03 as examples).

Compliance

Segment WC1 does not cross BLM lands and VRM compliance is not an issue.

Route Group 3 – Apache Substation to Pantano Substation

Visual contrast in route group 3 would directly result from the replacement of existing transmission line structures with taller structures, substation expansion, removal of vegetation to construct and maintain the transmission lines, temporary construction laydown yards, and any landform modifications necessary to prepare the existing ROW for upgrading and construction. Because there is an existing access road system in place for maintenance of the existing line, there is little need for additional temporary or permanent access roads. Table 4.10-3 provides a summary of Scenic Quality Ratings and VRM Classes for route group 3.

Table 4.10-3. Route Group 3 Scenic Quality Ratings and VRM Class

		Scenic Quality Rating (in miles)			VRM Class (BLM Lands Only) (in miles)		
Segment	**Total Miles**	**A**	**B**	**C**	**Class II**	**Class III**	**Class IV**
Subroute 3.1, Proponent Preferred							
U1a	16.1	0.0	11.1	4.9	0.0	0.0	0.4
U1b	2.9	0.0	2.9	0.0	0.0	0.0	0.0

Table 4.10-3. Route Group 3 Scenic Quality Ratings and VRM Class (Continued)

		Scenic Quality Rating (in miles)			VRM Class (BLM Lands Only) (in miles)		
Segment	**Total Miles**	**A**	**B**	**C**	**Class II**	**Class III**	**Class IV**
U2	15.8	0.0	15.8	0.0	0.0	0.0	0.0
U3a	32.7	0.0	32.7	0.0	0.0	0.0	0.0
Route Group 3 Local Alternative							
H	19.3	0.0	19.3	0.0	0.0	0.0	0.0

SUBROUTE 3.1 – PROPONENT PREFERRED

The Proponent Preferred action follows a 67.5-mile segment between the Apache and Pantano substations. The upgraded portion of the transmission line begins at the Apache Substation and would involve rebuilding Western's existing 115-kV power line within the existing corridor. This segment crosses 0.5 mile of U.S. Forest Service land and 0.6 mile of BLM-administered lands, which do not have planning-level VRI and VRM classification. A site analysis was performed and scenic quality and sensitivity levels were derived and used to determine the visual impact of the introduction of the proposed Project on lands outside of BLM jurisdiction.

Scenic Quality

Subroute 3.1 is largely characterized by low levels of development and natural desert landscape, including desert scrub vegetation, bare rock to low vegetation cover, and a range of topography from low hills to visually dominant rock outcroppings and distant isolated mountain ranges. Impacts along subroute 3.1 would result where vegetation is removed for construction access, temporary laydown areas, substation expansion, and for ROW clearing for the operation and maintenance and maintenance of the proposed Project. There would also be direct impacts to the existing landscape from the addition of new transmission upgrade structures. Subroute 3.1 crosses 62.5 miles (93 percent) of Class B scenery lands and 4.9 miles (7 percent) of Class C scenery land. Subroute 3.1 crosses Class B scenery lands between the Little Dragoon and Dragoon Mountains (running south of Texas Canyon) and into the San Pedro Valley agricultural and rural residential areas, and the northern corner of the Coronado National Forest. These lands are rated Class B for the mix of natural-appearing landscape, agricultural fields, and communities. Low to moderate impacts would occur where there is some existing construction access and with the addition of new transmission structures alongside existing H-frame transmission line.

Class C scenery lands are located on lands just west of the Apache Substation within Sulphur Springs Valley south of critical viewing areas associated with the Willcox Playa. The lands west of Apache Substation within the Sulphur Springs Valley within 4.9 miles of the 16-mile segment U1a are associated with Class C scenic quality, and impacts along this segment of subroute 3.1 are anticipated to be low where the Project parallels existing transmission lines (see figure 3.10-15 for scenic quality ratings and subroute 3.1). Contrasts from vegetation clearing would be further reduced by implementing VRM-1 and VRM-2, described in section 4.10.4. In addition, contrasts from the addition of adjacent upgrade structures would be further reduced by the implementation of VRM-4 and VRM-5, described in section 4.10.4.

Key Observation Points

Residential

Residences located along subroute 3.1 are generally dispersed, except for higher concentrations in the community of Pomerene and the city of Benson (see figure 3.10-11 for location of KOPs and subroute 3.1). Subroute 3.1 passes through the south part of the community of Pomerene, 1.15 miles north of I-10. This area consists of cropland with several pockets of single-family homes. Segment U2 would also cross a residential area in Pomerene along Pomerene Road, the primary route from Pomerene to I-10. In the Pomerene area, impacts to residential viewers are expected to be moderate. There would be unobstructed views of segment U2 crossing gently rolling terrain with low shrub and grass cover from over 3 miles away. Upgrade structures would be visible, but would repeat the basic visual elements of the existing transmission structures (see appendix I: VCRS U2-02, U2-03).

West of Pomerene, segment U2 would cross the San Pedro Golf Course, one of two public courses within the city of Benson. Segment U2 would then cross adjacent to central Benson by passing through a semi-industrial corridor just north of I-10. West of Benson, this segment would pass through rural residential and light industrial development just north of I-10 and through the community of Mescal, then would cross Mescal 0.2 mile north of I-10 through a residential zone. Segment U2 would also cross the main access road from the community to I-10. Upgrade structures would be visible, but would repeat the basic visual elements of the existing transmission structures (see appendix I: VCRS U2-04).

Visual contrast rating worksheets were conducted at: KOP U2-01, located 3.5 miles from the Proponent Preferred alignment on the western edge of residential development between U.S. 80 and I-10; KOP U2-02, located along Dark Star Road near the site of future development and an existing ranch; and KOP U2-03, near the Mescal area approximate to residences.

Recreation

There are few designated recreational opportunities along subroute 3.1. Peaks in the Little Dragoon and Dragoon Mountains, north and south of the proposed Project, do not have developed trails and are infrequently visited, despite having unique views within the region. KOP U1-01 represents views from just north of the Dragoon Mountains along subroute 3.1. Segment U1a would pass south of Texas Canyon, a granite boulder zone that provides scenic views from I-10. Texas Canyon, a boulder-strewn, uniquely scenic area, is a popular rest stop along one of the most scenic portions of I-10 in the region. The addition of the upgrade transmission structures would repeat the existing horizontal patterns associated with current infrastructure visible across landscape and views.

Impacts to viewers along Lizard Lane would be moderate. Replacement structures of segment U1a where it crosses a sweeping valley floor along the Coronado National Forest would be more prominent than the existing structures in the landscape and would introduce stronger horizontal line elements above the existing lines (see appendix I: VCRS U1-01).

Impacts to viewers from the Benson Recreational Park of segment U2 on the opposite side of I-10 are expected to be low to moderate. Replacement structures approximately 0.5 mile away would be more prominent than the existing structures in the landscape, and would introduce stronger vertical linear elements visible against the skyline (see appendix I: VCRS U2-01).

The lands immediately west of Apache Substation are located just south of the Willcox Playa. Sensitivity in this area is considered high because of its proximity to the Willcox Playa, which is an important ecotourism and viewing area for migrating birds including the sandhill crane. Subroute 3.1 is south of critical viewing areas associated with the Willcox Playa (outside of critical viewing locations), and no

KOP was identified in this area because of the general lack of sensitive viewers including residences, and recreators that would be impacted by the presence of a new transmission line. Visual impacts in this area would be low to moderate in the immediate foreground, and low beyond 1 mile of the transmission line.

Travel Routes

Segment U1a would cross the I-10 Willcox-to-Texas Canyon SLRU, which is rated as having high visual sensitivity because it is noted to be a highly traveled corridor with a popular rest stop in the Texas Canyon area. Segment U1a would cross I-10 as it enters the San Pedro River Valley and would cross through the San Pedro Basin. Visual impacts in this area would be low to moderate in the immediate foreground and low beyond 1 mile of the transmission line.

Compliance

Segment U1a of subroute 3.1 would pass through 0.4 mile of VRM Class IV lands. The remaining length of subroute 3.1 crosses private or State lands and does not have BLM VRM classification. Although there would be low to moderate impacts to visual resources, the portion of subroute 3.1 (segment U1a) crossing BLM VRM Class IV lands would be in compliance with VRM objectives. A portion of segment U3a that crosses State lands lies directly north of a block of BLM VRM Class II land.

LOCAL ALTERNATIVES

There is one local alternative for route group 3–local alternative H.

Scenic Quality

Local alternative H crosses the San Pedro Valley SQRU between 2 and 3 miles north of segment U2. Unlike segment U2, local alternative H would not replace an existing transmission line but would entail construction of a new transmission line which parallels an existing H-frame transmission line. Local alternative H would bypass the city of Benson and the communities of Pomerene and Mescal. It would follow an existing H-frame transmission line for its entire length. Where the segment U1/U2 boundary would exist at the eastern edge of the San Pedro Valley, local alternative H would head northwest along the alignment of the existing H-frame transmission line, cross the north end of the valley west of Benson, and extend south until it met a railroad line. Local alternative H would follow the railroad line west along with the existing transmission line, then would drop south again to connect to where the segment U2/U3 boundary would be, east of Mescal. Lands crossed by local alternative H traverse the San Pedro River basin and valley and are a mix of vacant desert landscape, crop and ranch lands, and rural residential (see figure 3.10-15 for scenic quality ratings and segment H).

Local alternative H would pass through the same SQRUs and SLRUs (San Pedro Valley and San Pedro Basin) as segment U2, and the site analysis revealed a scenic quality rating of B, sensitivity level rating of moderate, and visual impact of moderate.

Key Observation Points

Residential

Local alternative H would bypass the communities of Pomerene and Mescal, and the city of Benson. Impacts to dispersed rural residences located along portions of local alternative H south of I-10 within rural residential areas would be similar to those described for subroute 3.1, moderate (see appendix I: VCRS H-02) (see figure 3.10-11 for location of KOPs and local alternative H).

Recreation

There are few recreation resources known along local alternative H. Visual contrast rating worksheets were conducted for KOP H-02 located on North Mescal Road in proximity to the Butterfield Trail crossing. Impacts to viewers would be low because the replacement structures would be visually similar to existing landscape and would be viewed against a backdrop of distant mountains (see appendix I: VCRS H-03).

Travel Routes

Local alternative H is not located along major roadways and there would be low impacts to sensitive viewers along North Cascabel Road just east of the San Pedro River (see appendix I: VCRS H-01).

Compliance

Local alternative H does not cross BLM lands and VRM compliance is not an issue.

Route Group 4 – Pantano Substation to Saguaro Substation

Visual contrast in the Upgrade Section would result from introduction of taller transmission structures into the landscape. Visual contrast to the Upgrade Section was determined to be low to moderate. A summary of Scenic Quality Ratings by subroute and segment is provided in table 4.10-4. Route group 4 does not cross BLM lands, and there are no VRM Class Compliance issues.

Table 4.10-4. Route Group 4 Scenic Quality Ratings and VRM Class

		Scenic Quality Rating (in miles)			VRM Class (BLM Lands Only) (in miles)		
Segment	**Total Miles**	**A**	**B**	**C**	**II**	**III**	**IV**
Subroute 4.1, Proponent Preferred							
U3b	0.5	0.0	0.5	0.0	0.0	0.0	0.0
U3c	1.0	0.0	0.0	1.0	0.0	0.0	0.0
U3d	3.4	0.0	0.0	3.4	0.0	0.0	0.0
U3e	0.9	0.0	0.0	0.9	0.0	0.0	0.0
U3f	0.7	0.0	0.0	0.7	0.0	0.0	0.0
U3g	0.9	0.0	0.0	0.9	0.0	0.0	0.0
U3h	1.1	0.0	0.0	1.1	0.0	0.0	0.0
U3i	18.2	0.0	0.0	18.2	0.0	0.0	0.0
U3j	0.9	0.0	0.0	0.9	0.0	0.0	0.0
U3k	16.7	0.0	0.0	16.7	0.0	0.0	0.0
U3l	1.6	0.0	0.0	1.6	0.0	0.0	0.0
U3m	0.6	0.0	0.0	0.6	0.0	0.0	0.0
U4	1.9	0.0	1.9	0.0	0.0	0.0	0.0

Table 4.10-4. Route Group 4 Scenic Quality Ratings and VRM Class (Continued)

		Scenic Quality Rating (in miles)			VRM Class (BLM Lands Only) (in miles)		
Segment	**Total Miles**	**A**	**B**	**C**	**II**	**III**	**IV**
Route Group 4 Local Alternatives							
MA1	1.1	0.0	0.0	1.1	0.0	0.0	0.0
TH1a	1.4	0.0	1.4	0.0	0.0	0.0	0.0
TH1b	1.6	0.0	1.6	0.0	0.0	0.0	0.0
TH1c	0.3	0.0	0.3	0.0	0.0	0.0	0.0
TH1-Option	1.0	0.0	1.0	0.0	0.0	0.0	0.0
TH3-Option A	0.8	0.0	0.0	0.8	0.0	0.0	0.0
TH3-Option B	0.8	0.0	0.0	0.8	0.0	0.0	0.0
TH3-Option C	1.8	0.0	0.0	1.8	0.0	0.0	0.0
TH3a	2.7	0.0	0.0	2.7	0.0	0.0	0.0
TH3b	4.5	0.0	0.0	4.5	0.0	0.0	0.0

SUBROUTE 4.1 – PROPONENT PREFERRED

Scenic Quality

Changes to scenic quality along subroute 4.1 would result where vegetation is removed for construction access, construction laydown yards, substation expansion, and ROW clearing during the operation and maintenance of the transmission line and substations. Additional changes to scenic quality would occur from the introduction of upgraded transmission structures, including monopole and lattice-type structures along the existing transmission line. There are 2.4 miles of subroute 4.1 which cross Class B scenery (5 percent of the subroute), and 46.0 miles which cross Class C scenery (95 percent of the subroute). Impacts from those changes to scenic quality in Class B and C would be minor to moderate (see figure 3.10-15 for scenic quality ratings and subroute 4.1).

In the San Pedro Valley scenic quality unit, segment U3a would cross a broad alluvial fan with large swaths of native vegetation (largely paloverde) and mixed cacti/Sonoran creosote-bursage communities. Developed areas are scattered throughout this area and become slightly more common westward toward Vail, Arizona.

Within the Vail scenic quality rating unit, which encompasses a large portion of segment U3a, the scenic quality was determined to be Class C, given the flat, common nature of desert landscape in the area and the increasingly dense human modification (e.g., residences, utility corridors, industrial areas, etc.). In addition, sensitivity levels were determined to be low to moderate, given that several concentrations of residential communities exist along the line. The visual impact in this unit is considered low because the proposed transmission line and facilities would replace a similar, existing transmission line along the same alignment, and the areas of sensitive natural features are located outside of 1 mile of the corridor.

In addition to residential areas, segment U3a would pass through or near sensitive areas, including recreational areas and a historic landmark. The segment then passes within 1 mile of Cienega Creek Natural Preserve, a perennial wetland system. The preserve is located north of the Proponent Preferred alignment and is located outside of the analysis area. The preserve offers scenic views of a lush riparian corridor within a desert setting and of many wildlife species. A permit is required to visit the preserve, which is mainly accessed from the Davidson Canyon Trailhead along Marsh Canyon Road. The segment would cross near Cienega Creek in the Davidson Canyon Wash area, an undeveloped area south of I-10. Additionally, the 800-mile Arizona Trail passes through the Cienega Creek Natural Preserve along the Gabe Zimmerman Trail.

The developed areas along segment U3a include residential subdivisions, isolated residences, mining operations, office parks, manufacturing complexes, and the Pima County Fairgrounds. Residential areas through which segment U3a would pass or near where segment U3a would pass include: relatively new subdivisions in the Vail area, low-density subdivisions around Swan Road, older residential areas around Country Club and Old Vail Connection Roads, a narrow band of residences north of Summit that are adjacent to the SR 19 (the Tucson-Nogales Highway) corridor, and a densely populated subdivision east of I-19 and north of Los Reales Road.

Segment U3a would cross over, or be located near, designated Pima County scenic routes. Segment U3a would come within 300 feet of a portion of I-10 designated as a scenic highway by Pima County. It also would cross Pima County Scenic Highways SR 83 and Old Sonoita Highway at their northern termini near I-10. Segment U3a would cross Pima County scenic routes such as Wentworth Road 1 mile south of I-10 and Houghton Road near the Pima County Fairgrounds. Segment U3a also would come within 0.2 mile of the beginning and end points of Marsh Station Road but would be separated from it by I-10.

The Anza Trail/Tucson SQRU encompasses the majority of subroute 4.1 as it traverses through southern Tucson, the city of Tucson, and north toward Marana, Arizona. This segment is located along an existing transmission line alignment flanked by varying degrees of dense urban development. Scenic quality along this segment is considered to be Class C because of the degree of urban modification and the co-location of the line within an existing utility corridor. Additionally, sensitivity along the segment is considered low to moderate given the presence of existing modifications. Visual impact would be low along this segment.

Just north of Grant Road, subroute 4.1 diverges from the dense urban environment of Tucson into a more industrial area to the north, and follows roughly adjacent and parallel to the Anza Trail. Scenery along the Trail is characterized by pockets of urban recreational places, linear biking and pedestrian trails, and access to adjacent communities. Additionally, a segment of the Butterfield Trail runs parallel to subroute 4.1, from 0.2 mile to 1 mile away to the east. Scenic quality along this segment is considered Class C because of the substantial human modification and urban industrial activities, and sensitivity is considered low to moderate given that the subroute follows an existing power line for the entirety of the segment. Thus, visual impacts are considered low.

Approximately 5 miles to the southeast of the Marana Airpark, subroute 4.1 crosses open desert landscape with undulating topography at the southern end, and desert valley as the segment runs northwest towards the agricultural development that surrounds the Marana Airpark. Scenic quality in this area is determined to be Class C as the lands within the immediate foreground and middleground are common desert valley landscape, with agricultural and budding residential development within the Marana town limits. Sensitivity in this area is also considered low to moderate as viewers are accustomed to views of the existing transmission line in which the proposed line would replace. Visual impacts in this area would be low given the common nature of the landscape and the lack of sensitivity viewers.

The Red Rock scenic quality unit encompasses the lands connecting Avra Valley, Marana, and Pinal County to the terminus of the Proponent Preferred alternative at the Saguaro Substation. This area is

characterized by open desert landscape, agricultural development, and budding residential development. Additionally, the Pinal Airpark is located approximately 2.5 miles southeast of the Saguaro Substation and 2 miles east of the Proponent Preferred alignment. The scenic quality in this area is classified as Class C because of the developed landscape, and the sensitivity level is considered low to moderate, because viewers are accustomed to views of the existing transmission line, which the proposed Project would replace.

Key Observation Points

Residential

High concentrations of residential development occur along subroute 4.1 in the communities of Vail, Marana, and in Tucson (see figure 3.10-10 for location of KOPs along subroute 4.1). In the Vail area, impacts to residential viewers are expected to be low to moderate. Replacement structures would be taller and more visible, but scenery would not vary from the current landscape. Impacts would be moderate where taller replacement structures would be visible against the skyline (see appendix I: VCRS U3-03, U3-04, and associated simulation in appendix K).

In the Summit area, impacts to residential viewers are expected to be low. Replacement structures would be visible, but scenery would not vary from the current landscape (see appendix I: VCRS U3-06 and associated simulation in appendix K).

Impacts to viewers from the fairgrounds west of Vail would be low. The upgrade structures would be visually similar to multiple existing transmission lines spanning the view (see appendix I: VCRS U3-05 and associated simulation in appendix K).

Impacts to viewers from the San Xavier Mission just south of Tucson would be low. The upgrade structures of segment U3a are more than 1.5 miles away on the opposite side of I-19, and would be visually similar to the multiple existing transmission lines spanning the view and would be viewed against the distant mountain forms (see appendix I: VCRS U3-07).

In the Tucson area, impacts to residential viewers are expected to be low to moderate. Subroute 4.1 through Tucson is dominated by existing transmission structures, linear paved highways and roads, sound walls, and blocky signs. Replacement structures would be visible, but scenery would not vary from the current landscape. There would be moderate impacts where taller replacement structures are visible against the skyline (see appendix I: VCRS U3-09, U3-20, U3-21, and U3-24 and associated simulation in appendix K).

Recreation

Recreation use along subroute 4.1 takes place at Sentinel Peak, along the Anza Trail, the Butterfield Trail, the Arizona Trail, at Saguaro National Park, and within pockets of urban recreational places, linear biking, and pedestrian trails. There are also views of the proposed upgraded line from the El Rio Golf Course.

Impacts to viewers along the Santa Cruz River Bikeway East River Trail and Santa Cruz riverbed crossing near Juhan Park would be low. The upgrade structures of segment U3b would introduce low vertical contrast to the existing strong linear element of the landscape. The replacement structures of segment U3i would be taller and visible against the skyline interspersed with several transmission lines, buildings, and communication structures which currently dominate views from the trail (see VCRS U3-08 and U3-15). Impacts to viewers along the Anza Trail south of Irvington Road would be moderate. Where segment U3c crosses the Santa Cruz River channel, one new structure concrete base would be clearly visible from the trail.

The foundation where a pole would be located within the channel would need to be 25 feet tall, and would introduce a large blocky, pale structure into the gravelly river channel. The taller monopole structures and substantial concrete base where the line crosses the channel would be viewed against the skyline and the backdrop of the channel alongside existing lattice structures and other human development extending across the flat and open landscape of the Santa Cruz River channel (see appendix K: simulation NPS-02).

Impacts to viewers at the Kennedy Park Fiesta Area Outdoor Amphitheatre and Tucson Mountain Park would be low. Replacement structures would be visible, but scenery would not vary from the current landscape. There would be moderate impacts where taller replacement structures and horizontal conductors are visible against the skyline (see appendix I: VCRS U3-10, U3-11 and their associated simulations in appendix K).

Impacts to viewers from Sentinel Peak Observation Area would be low. The replacement structures and line would be similar in form to the existing line, but would be taller. Although the structures would be taller, the increased height would be barely distinguishable when viewed against the backdrop of the valley floor and surrounding hills. Replacement structures would be visible, but scenery would not vary from the current landscape. Short-term impacts to viewers from Sentinel Peak would occur as a result of improved construction access needs, but these impacts would end once construction equipment is removed and reclamation of temporary disturbance is complete. There would be moderate impacts where taller replacement structures and horizontal conductors are visible against the skyline from KOP U3-13 on Tumamoc Hill Road (see appendix I: VCRS U3-12, U3-13 and their associated simulation in appendix K).

Impacts to viewers from Joaquin Murrieta Northwest Park would be moderate. The replacement structures add prominent vertical and horizontal elements to foreground views from the park that would be skylined against distant mountains (see appendix I: VCRS U3-14).

Impacts to viewers at the Silverbell Public golf course would be low. Replacement structures would be visible, but would be similar to existing structures and horizontal conductors. The scenery would not vary from the current landscape (see appendix I: VCRS U3-16 and VCRS U3-18 and their associated simulations in appendix K).

Impacts to viewers from Silverbell Lake at Christopher Columbus Park would be low. The replacement monopole structures add prominent vertical and horizontal elements to foreground views from the park that would be skylined against distant mountains (see appendix I: VCRS U3-17 and its associated simulation in appendix K; see also simulation AN-04).

Impacts to viewers traveling on West Picture Rocks Road both to and from Saguaro National Park would be low. The replacement structures would be barely visible against the valley floor along an existing developed corridor. They would be visually similar to the existing line, and would blend into the visual disturbance of existing development in the area (see appendix I: VCRS U3-19). Impacts to hikers in Saguaro National Park located northwest of Tucson would be low. The distance (over 1 mile), vegetation screening along the use trails in the park, and extensive development along segment U3i contribute to the replacement structures blending in to the surrounding development (see appendix K: simulation SA-01).

Impacts to potential views from the planned extension of paved recreation trail of the Anza Trail west of Pinal Airpark near North Aguirre Road would be low. The existing H-frame structures are not visible from this location. The taller replacement monopoles and conductors would be visible just above the existing vegetation set against the distant mountains (see appendix K: simulation MA-03).

Travel Routes

High sensitivity travel routes along subroute 4.1 include I-10, Avra Valley Road out to the Marana Airport, West Twin Peaks Road, and Picture Rocks Road. From North Silverbell Road, this view is oriented south-southeast 150 feet from segment U3i, crossing rolling terrain against a backdrop of mountains. Although the replacement monopole structures would introduce a new vertical element to the landscape, and would be visible against the skyline, they would repeat the basic elements of existing transmission lines present on the landscape (see appendix I: VCRS U3-18 and simulation MA-03 in appendix K).

Impacts to viewers from the West Twin Peaks Road would be moderate. The replacement monopole structures of segment U3i would be visible to the south, and would introduce a new taller vertical element to the landscape visible against the mountainous horizon line (see appendix I: VCRS U3-22 and its associated simulation in appendix K).

From West Silverbell Road (Historic Auto Route), the replacement monopole structures of segment U3k would be visible to the south, and would introduce a taller vertical element to the landscape. Because the replacement line would be similar to existing transmission lines visible on the landscape, impacts would be low (see appendix I: VCRS U3-23 and its associated simulation in appendix K).

Compliance

Subroute 4.1 does not cross BLM lands and VRM compliance is not an issue.

LOCAL ALTERNATIVES

There are 10 local alternatives available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, TH3-Option C. Local alternatives TH1a, TH1b, and TH1c, were all derived as alternatives to the Proponent Preferred alignment for the purpose of avoiding the Tumamoc Hill area, which is considered an important natural and cultural resource within the city and region. This site is a nationally recognized historic site and also supports research, recreation, and educational opportunities for the University of Arizona and the community. Though the Tumamoc Hill area has been preserved and protected for decades, there is an existing H-frame transmission line that runs north on the west side of the Tumamoc Hill and Sentinel Peak. The Proponent Preferred route would replace the existing H-frame transmission line; however, several local alternative options were developed through public and agency outreach to avoid further environmental and scenic impact to the Tumamoc Hill area itself.

Local alternatives TH1a, TH1b, and TH1c provide a “picket fence” diverging from the Proponent Preferred alternative at West Starr Pass Road (TH1a) heading west and north at South Greasewood Road (TH1b) then east at West Speedway Boulevard (TH1c) before it connects again with the Proponent Preferred alignment just west of the El Rio Golf Course and 0.14 mile north of West Speedway Boulevard.

Local alternatives TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C were derived through multiple discussions with a working group that included representatives of the public and agencies concerned with locating a transmission line alternative through the Tumamoc Hill area. This local alternative and options would be located roughly within the Santa Cruz River bed along the Anza Trail, which follows the Santa Cruz River and provides pedestrian and bicycle paths through the heart of Tucson.

Local Alternative MA1

Scenic Quality

Local alternative MA1 would be a new, approximately 1.1-mile transmission line that would provide an alternative route to segment U3j. Segment MA1 would be located approximately 4.5 miles west of I-10 on the western boundary of the Marana Regional Airport. This new segment would cross agricultural fields between North Sandario Road and North Sanders Road, turn north along North Sanders Road, and terminate before reaching West Avra Valley Road. The MA1 segment avoids future expansion of the Marana Airpark. This local alternative is located within scenic quality Class C landscape and has a sensitivity level of low to moderate, given the proximity to existing development and existing transmission line. Visual impact would be low. A simulation was rendered from approximately 1 mile northeast of the local alternative and is included with the visual contrast worksheet (see figure 3.10-15 for scenic quality ratings and segment MA1).

Key Observation Points

No critical KOPs were identified for MA1. Representative views of the area from the intersection of Sanders Road and Avra Valley Road are already available from consideration of segment U3j of subroute 4.1. Although the replacement monopole structures would introduce a new vertical element to the landscape, and would continue to be visible against the skyline, MA1 would cross farther away from the observation point and would repeat the basic elements of existing transmission lines in the foreground of the simulation (see appendix K: simulation MA-02).

Compliance

Segment MA1 does not cross BLM lands and VRM compliance is not an issue.

Local Alternative TH1a

Scenic Quality

The majority of this route follows existing arterial roads flanked by residential development. Along South Greasewood Road, an existing 69-kV power line runs on the east side of the road. Several KOPs located along this local alternative reveal that the addition of a power line would produce similar, but increased contrast due to the height and structure type being larger, taller, and more noticeable than the existing power line. In addition, viewer sensitivity is heightened in this area due to the community concern over the Tumamoc Hill cultural and scenic resource. Scenic quality in this area is considered Class B given the unique character of the Tumamoc Hill in the middle of a highly dense urban area. Additionally, viewer sensitivity is considered moderate to high because of Tumamoc Hill, as well as the established nature of the surrounding community. Homes in this area are historic and well maintained; residents are extremely vigilant and concerned with changes to the composition of the neighborhood and natural landscape. Visual impact is considered moderate to high in this area because of the increased scenic quality and visual sensitivity associated with Tumamoc Hill. Visual impacts would be reduced by the removal of existing line across Tumamoc Hill (see figure 3.10-15 for scenic quality ratings and TH1a).

Key Observation Points

In the Tumamoc Hill area, impacts to residential viewers and views to the west from Sentinel Peak Road are expected to be low to moderate. Impacts to viewers located along West Starr Pass Boulevard would be moderate. New transmission structures and lines associated with TH1a would be clearly visible in the foreground. The taller monopole structures would be viewed against the skyline and the backdrop of

Tumamoc Hill extending north and south across the open landscape of Tumamoc Hill and east up West Starr Pass Boulevard (see appendix K: simulation TH1-3, TH1-S3, TH1-02).

Compliance

Segment TH1a does not cross BLM lands and VRM compliance is not an issue.

Local Alternative TH1b

Scenic Quality

The scenic quality of segment TH1b would be the same as that described for segment TH1a.

Key Observation Points

No critical KOPs were identified for TH1b. Representative views of the area from KOPs identified for TH1a are already available. The new taller monopole structures would introduce a strong vertical element to the landscape and would result in moderate impacts to viewers in the Tumamoc Hill area.

Compliance

Segment TH1b does not cross BLM lands and VRM compliance is not an issue.

Local Alternative TH1c

Scenic Quality

The scenic quality of segment TH1b would be the same as that described for segment TH1a.

Key Observation Points

No critical KOPs were identified for TH1c. Representative views of the area from KOPs identified for TH1a are already available. The new taller monopole structures would introduce a strong vertical element to the landscape and would result in moderate impacts to viewers in the Tumamoc Hill area.

Compliance

Segment TH1c does not cross BLM lands and VRM compliance is not an issue.

Local Alternative TH1-Option

Scenic Quality

The TH1-Option runs perpendicular from North Greasewood Road eastward to connect with the Proponent Preferred alignment. This portion runs along West Anklam Road for 1 mile. This segment would provide a closer access to the Proponent Preferred alternative but would similarly create a boundary along the northwestern edge of Tumamoc Hill where currently no similar structures exist. Scenic quality in this area is the same as that described for TH1a, TH1b, and TH1c, and is considered a moderate to high visual impact (see figure 3.10-15 for scenic quality ratings and segment TH1-Option).

Key Observation Points

No critical KOPs were identified for TH1-Option. Representative views of the area from KOPs identified for TH1a are already available.

Compliance

Segment TH1 option does not cross BLM lands and VRM compliance is not an issue.

Local Alternative TH3a

Scenic Quality

TH3a runs approximately 3 miles connecting at the southern end with the Proponent Preferred alignment and running due north parallel to I-19 along the highway corridor. Scenic quality in this area would be Class C and sensitivity would be low given the lack of highly sensitive viewers and being located parallel to a major transportation corridor. Visual impact would be low for this segment of the local alternative (see figure 3.10-15 for scenic quality ratings and segment TH3a).

Key Observation Points

No critical KOPs were identified for TH3a.

Compliance

Segment TH3a does not cross BLM lands and VRM compliance is not an issue.

Local Alternative TH3b

Scenic Quality

TH3b runs north from TH3a to connect at the northern point with the Proponent Preferred alignment. TH3b is co-located along the Santa Cruz River route and parallel to the Anza Trail for the entirety of its length. This local alternative also parallels existing transmission lines currently located within the river bed. To the east, ranging from 0.5 mile to directly adjacent, is I-10, a major travel corridor. KOPs were selected at varying distances from this local alternative and two simulations were rendered to illustrate how the local alternative would impact the existing visual impact of the area. Scenic quality along this segment of the local alternative is considered Class C and sensitivity is considered low to moderate, resulting in a low visual impact given the proximity to existing transmission lines and congested industrial, transportation, and commercial development (see figure 3.10-15 for scenic quality ratings and segment TH3b).

Key Observation Points

There are superior views of TH3b to the east as it follows the Anza Trail through heavy development of Tucson, paralleling existing transmission lines and roads. Impacts to viewers from the observation point on Sentinel Hill would be low. Although new transmission structures and lines associated with TH3b would be visible, they would blend in with the surrounding utilities and development. Where new structures associated with TH3b would be located within the river channel, the foundation would need to be 25 feet tall, and would introduce a large blocky, pale structure into the gravelly river channel. The taller monopole structures and substantial concrete base where the line crosses the channel would be viewed against the backdrop of the channel alongside existing lattice structures and other human development extending across the flat and open landscape of the Santa Cruz River channel (see appendix K: simulation TH3-S1).

Compliance

Segment TH3b does not cross BLM lands and VRM compliance is not an issue.

Local Alternative TH3-Option A

Scenic Quality

TH3-Option A, located to the east of TH3-Option B, runs parallel through 1-mile-long, channelized portion of the Santa Cruz River parallel to commercial development. A bike and pedestrian access way located on the Anza Trail also would parallel the proposed local alternative option. Scenic quality in this area is considered Class C because of its proximity to human-made development as well as being located within a corridor with existing lattice tower transmission lines. Sensitivity in this area would be low to moderate and the visual impact would be low given the degree of modification and the lack of highly sensitive viewers in this area (see figure 3.10-15 for scenic quality ratings and segment TH3-Option A).

Key Observation Points

Impacts to viewers along the Anza Trail south of Irvington Road would be moderate. Where TH3-Option A crosses the Santa Cruz River channel, new structure concrete bases would be clearly visible from the trail. Foundations would need to be 25 feet tall, and would introduce a large blocky, pale structure into the gravelly river channel. The taller monopole structures and substantial concrete base where it is located within the channel would be viewed against the skyline and the backdrop of the channel alongside existing lattice structures and other human development following the open landscape of the Santa Cruz River Channel (see appendix K: simulation NPS-02 subroute 4.1 for an example of the larger concrete foundations that would be required).

Compliance

Segment TH3-Option A does not cross BLM lands and VRM compliance is not an issue.

Local Alternative TH3-Option B

Scenic Quality

From the southern end of the route, TH3-Option B is a spur that runs nearly 1 mile, bypassing a mix of high-density residential development and commercial development through a green corridor where no utility lines currently exist. Scenic quality in this area is considered Class C and sensitivity is considered moderate, visual impact is considered moderate (see figure 3.10-15 for scenic quality ratings and segment TH3-Option B).

Key Observation Points

Impacts to viewers of TH3-Option B would be similar to those described for TH3-Option A.

Compliance

Segment TH3-Option B does not cross BLM lands and VRM compliance is not an issue.

Local Alternative TH3-Option C

Scenic Quality

TH3-Option C runs parallel to the Santa Cruz bikeway along the river route west of I-19 and would have similar visual impacts as compared to TH3-Option B. Scenic quality in this area is considered Class C and sensitivity and visual impact is considered low (see figure 3.10-15 for scenic quality ratings and segment TH3-Option C).

Key Observation Points

Impacts to viewers of TH3-Option C would be similar to those described for TH3-Option A.

Compliance

Segment TH3-Option C does not cross BLM lands and VRM compliance is not an issue.

Agency Preferred Alternative

NEW BUILD SECTION

The Agency Preferred Alternative for the New Build Section would cross predominantly flat desert valleys and playa surrounded by mountains the visual impact is considered low to moderate. The VRM Class B designated lands in this area are characterized by steep and undulating ridgelines, low rounded hills, and eroded rocky plains. However, there is low to moderate visual sensitivity given the existence of other disturbance such as transmission lines and utility development along the length of the route. The LD4-Option 5 portion of the Agency Preferred Alternative does not cross BLM-administered lands and is not subject to VRM compliance, however, the introduction of a new transmission line within the existing environment along this route would result in low to moderate visual impacts. Short-term visual impacts resulting from construction, access, and ROW maintenance during the construction and operation of the transmission line would include the removal of vegetation, the introduction of new transmission structures on the landscape, and the development of access roads resulting in low to moderate visual impacts. The Agency Preferred Alternative further avoids visual disruption to Lordsburg Playa, the community of Bowie, and the BSETR. Development of the New Build Section Agency Preferred Alternative route would reduce visual congestion resulting in minimized impact to sensitive views, and would not require plan amendments for visual resources.

UPGRADE SECTION

The Agency Preferred Alternative for the Upgrade Section includes the re-routing of the proposed transmission line to avoid the Tumamoc Hill area using TH1 and TH1a to connect with the Proponent Preferred alternative (U3e) perpendicular on West Starr Pass Boulevard then north on North Greasewood Road and east on West Anklam Road to reconnect with U3g. This configuration largely avoids visual impacts to Tumamoc Hill and would be located on segments with existing utility development and transmission lines. This area is outside of BLM-administered lands and is not subject to VRM compliance. However, along Greasewood Road, an existing 69-kV power line runs on the east side of the road, and the introduction of an additional power line would result in increased visual contrast due to the height, scale, and structure type being taller and more noticeable than the existing power line. In this area, viewer sensitivity is heightened due to community concern and relatively high density residential development as compared to the rest of the Project. The introduction of the proposed structures in this area is considered moderate to high because of the well-established residential community and the historic nature of Tumamoc Hill. However, as compared to the other alternatives under consideration, visual impacts would be reduced by constructing the power line within a corridor that is currently disturbed.

Local alternative MA1 of the Agency Preferred Alternative provides an alternative route to avoid the western boundary of the Marana Regional Airport and would cross between North Sandario Road and North Sanders Road, turn north along North Sanders Road and terminate before reaching West Avra Valley Road. The purpose of this Agency Preferred Alternative segment is to avoid future expansion of the airpark. This segment is also located outside of BLM-administered land and visual impact from the development of MA1 would be low because it avoids visually sensitive areas associated with the airpark. The Marana Airpark is a destination for local aviation enthusiasts who currently view airplanes from the

Sky Rider Café (one of the most popular airport restaurants in Arizona), however, the airpark is slated for future development and MA1 would avoid obstruction of future viewing locations at the airpark.

Additional Mitigation Measures

- **VRM-1.** The alignment of new access roads or cross-country routes would follow the landform contours where practicable to minimize ground disturbance and reduce visual scarring of the landscape, providing the alignment does not affect other resource values.
- **VRM-2.** Clearing of trees in and adjacent to the ROW would be minimized to reduce visual contrast to the extent practicable to satisfy conductor-clearance requirements. Trees and other vegetation would be removed selectively to blend the edge of the ROW into adjacent vegetation patterns, as practicable and appropriate.
- **VRM-3.** All new or improved access that would not be required for maintenance would be closed or rehabilitated to make it less visually apparent.
- **VRM-4.** Tower design may be modified, or an alternative tower type may be selected to minimize visual contrast if practical (BLM 2013o).
- **VRM-5.** Standard tower design would be modified to correspond with spacing of existing transmission structures, where feasible and within the limits of standard tower design, to reduce visual contrast (BLM 2013o).
- **VRM-6.** At highway, canyon, and trail crossings, towers would be placed at the maximum feasible distance from the crossing within the limits of standard tower design to reduce visual impacts.

Also, the "Amended Plan of Development for the Southline Transmission Project" (Southline 2012a) includes the following PPMs:

- PPM VIS-1: Revegetation in Areas Disturbed by Construction. In order to restore disturbed areas to an appearance that will blend back into the overall landscape, seeding and/or planting will be conducted 1) at road cuts where new roads are required to access new or existing transmission towers, and 2) in areas around new or rebuilt transmission structures that must be cleared during the construction process.
- PPM VIS-2: Use of Existing Access Roads and Road Modification. To the extent feasible, existing access roads will be used. Widening and grading of roads will be kept to the minimum required for access by Project construction equipment.
- PPM VIS-3: Dust Suppression. During the construction period, dust suppression measures will be used to minimize the creation of dust clouds potentially associated with the use of access roads.
- PPM VIS-4: Use of Nonspecular Conductors. The Project will incorporate nonspecular conductors into the Project design to decrease reflectivity and visibility of Project features.

Residual Impacts

The effectiveness of using and implementing established BMPs and mitigation measures would be limited by the distance of the viewer and the presence of other sources of contrast; therefore, impacts would generally be the same as the direct and indirect impacts described under each alternative. Regardless of the alternative selected, certain views during the construction period would be altered by the presence of construction vehicles, equipment, and the erection and operation and maintenance of towers and facilities associated with the transmission line itself. Residual impacts to landscape features from the presence of the proposed Project would be low to moderate. Where the proposed Project would not meet BLM VRM objectives, there would be significant impacts.

Unavoidable Adverse Impacts

The visual impact resulting from the construction and operation and maintenance of the transmission line within the landscape would be an unavoidable consequence.

Short-term Uses versus Long-term Productivity

Construction and operation and maintenance of the proposed Project would require short-term and long-term use of land for placement of the structures, access roads, and ancillary facilities. Implementation of the proposed Project under all action alternatives would create long-term and permanent disruptions of the characteristic landscape from soil, vegetation, and topographic disturbances and would, in some cases, change the landscape from vacant to a utility corridor. One of the intents of the Project was to parallel existing linear development where possible to minimize the disruption of vacant landscapes.
The proponent's preferred route follows existing linear developments for a majority of its length.
The proponent's alternative crosses vacant landscape along segments S1, S2, S4, and S6. In addition, local alternative A crosses vacant land. The Upgrade Section follows existing linear development its entire length.

Irreversible and Irretrievable Commitments of Resources

The visual contrasts that would result from the construction and operation and maintenance of the proposed Project would result in loss of a portion of the characteristic landscape within the Project footprint for the lifetime of the proposed Project (presumed to be a minimum of 50 years). If, however, at some future date all proposed Project-related facilities were removed, these visual characteristics—including vegetation levels within the ROW—would return after a few years to approximately previous levels. Thus, impacts to these resources are neither irreversible nor irretrievable.

4.11 LAND USE, INCLUDING FARM AND RANGE RESOURCES AND MILITARY OPERATIONS

4.11.1 Land Use Introduction

This section describes the potential impacts to the land use baseline conditions (as described in section 3.11.1, the land use affected environment) associated with the construction and operation and maintenance of the transmission line, substations, and ancillary facilities. Potential impacts to land use are discussed in terms of land ownership, compliance with management of lands, land use authorizations and ROWs (including lands and realty actions), and future or planned land uses. The potential impacts described in this section are based on the land use data available in "Southline Transmission Project Resource Report 7: Land Use" (CH2M Hill 2013k). The contents of that report are used herein without specific reference.

Methodology and Assumptions

ANALYSIS AREA

The land use analysis area for the New Build Section is a 2-mile corridor around the action alternatives (1-mile buffer on either side of the centerline). In addition, Project elements that are proposed outside the 2-mile corridor are included in the land use analysis area. The 2-mile corridor is used to identify land uses and land use resources that could be directly impacted by surface disturbance and where construction

materials, equipment, and workers may be present. The land use analysis area for the Upgrade Section is a 500-foot corridor (250-foot buffer on either side of the centerline). The Upgrade Section would not change the physical location of the existing Apache-Saguaro 115-kV transmission line by more than 100 feet after construction since one option is to build the upgraded line directly adjacent to the existing line then remove the existing line.

Land use resources concerning farmlands and rangelands as well as military operations are discussed in separate subsections (4.11.2 and 4.11.3, respectively) herein.

IMPACT INDICATORS

For the purposes of this analysis, an impact to land use could result if any of the following were to occur from construction or operation and maintenance of the proposed Project:

- Potential conflicts with applicable land use plans, policies, goals or regulations (incompatible land uses).
- Potential conflicts with existing multi-use or utility ROWs.
- Potential conflicts with existing land uses, specifically where the Project would create a direct long-term impact:
  - Physically conflict with existing residential, commercial, industrial, military, or agricultural uses (i.e., displacement of homes, businesses, center-pivot irrigation agricultural fields).
  - Indirect conflict with residential, commercial, or military uses.
- Potential conflicts with planned land uses, specifically residential subdivisions or other sensitive land uses at the final plat approval stage.
- Potential conflicts with State or federally established, designated or reasonably foreseeable planned land use areas (e.g., lands and realty actions, resource inventory determinations [avoidance areas])recreation, wildlife management area, game management areas, waterfowl production areas, scientific and natural areas, wilderness areas, ACECs, etc.).
- The potential for the Project to result in nuisance impacts.

The laws, regulations, and land management plans below were referenced to determine conflicting or consistency determinations with the action alternatives. The following plans were found to intersect with the analysis area.

- Mimbres Resource Management Plan
- Safford Resource Management Plan
- Phoenix Resource Management Plan
- Continental Divide National Scenic Trail Comprehensive Plan
- Coronado National Forest Plan
- Las Cienegas National Conservation Area Resource Management Plan
- Juan Bautista de Anza National Historic Trail Comprehensive Management and Use Plan
- Willcox Playa Wildlife Area
- County of Doña Ana Comprehensive Plan
- Luna County
- Grant County, New Mexico, 1978 ordinance
- Hidalgo County Comprehensive Plan
- Graham County Comprehensive Plan
- Greenlee County Comprehensive Plan
- County of Cochise Comprehensive Plan
- Pima County Comprehensive Plan Update

- Pinal County Comprehensive Plan
- Pima County Multi-Species Conservation Plan
- Cienega Creek Natural Preserve Management Plan
- City of Deming Comprehensive Plan Update
- City of Lordsburg Comprehensive Plan Update
- City of Willcox General Plan
- City of Benson General Development Plan
- City of Tucson General Plan
- Marana General Plan

Impacts Analysis Results

NO ACTION ALTERNATIVE

Under the no action alternative, the BLM would not issue a ROW grant to the Southline. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a). There would be no new impacts to land uses occurring within the analysis area. It is assumed that land ownership, management of lands, land use authorizations and ROWs would continue as they are currently managed. The demand for electricity, particularly renewable energy, would likely continue to grow in the analysis area. The current capacity on the existing transmission lines would be exceeded by the demand, and other transmission line developments would likely be sought to meet the current demand, including renewable energy transmission.

Since the Project would not be constructed, there would not be a conflict with the Mimbres RMP VRM Class II land classifications, and the Mimbres RMP would not require a plan amendment under the No Action,

IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Construction, Operation, and Maintenance

Land Ownership and Management of Lands

The implementation of any of the action alternatives would not alter existing BLM (and all agency-managed) land ownership. All staging areas would be returned to their existing condition in accordance with BLM standards following construction. Standard BLM leases for ROW grants, in accordance with Title V of the FLPMA, as amended (43 U.S.C. 1761–1771) would apply for all portions of BLM-managed lands that would be included in the Project footprint, should the proposed Project be approved. For non-BLM lands, such as private or New Mexico or Arizona State lands, the private lands (approximately 23 percent of the proposed Project footprint) would be leased or purchased in fee under applicable laws.

The landowners would be compensated at market value for the land that may be acquired for the proposed Project, as discussed in chapter 2. Private land would likely stay in private ownership, but there may be leasing or purchasing involved that would change the ownership of certain privately owned lands. All land transactions would be subject to Federal, state, and local laws. In fee purchasing would only be required for substation expansion. Though the construction disturbances for the proposed Project would be far less than the overall permanent ROW acreage, for the purposes of land ownership and surface land management, the entire Project ROW acreages are discussed.

Private land owners may experience minor, temporary nuisance impacts in residential areas where the temporary activities involved with construction (i.e., noise, dust, and heavy equipment) is typically incompatible with local zoning restrictions. However, all private lands would be intersected by the Project in existing ROWs, and the proposed Southline Project would only be located in areas that would be in compliance with local zoning restrictions subject to land use nuisance standards. The temporary impacts would be short-term and would cease once construction activities are completed at a particular segment. (Refer to chapter 2 for a listing of BMPs intended to reduce construction impacts.) No new access roads would be developed in the residential areas of the municipalities that occur within the analysis area. Further, the transmission lines proposed in these residential areas (particularly within route group 4) would be upgrades to existing facilities.

Decommissioning of the Project (i.e., after the life of the Project) would make the ROW available for other similar uses, or could be completely reclaimed and revert land uses to the existing conditions.

As described in chapter 3, the analysis area is located within Federal, State, and local planning areas. Table 4.11-1 outlines the plans that are applicable within the analysis area, land use goals and objectives therein, and consistency with those plans if any of the action alternatives is implemented.

Table 4.11-1. Consistency of the Project Alternatives with Local Plans

Plan	Goals/Objectives/Policy	Consistency Determination
Mimbres RMP	The Mimbres Resource Area grants ROWs, leases and permits to qualified individuals, businesses and governmental entities for the use of public land. New ROWs are issued within existing ROWs whenever possible. All ROW activities are subject to site-specific environmental analysis.	Not Consistent. There are existing VRM settings (VRM II) and an avoidance area where the proposed Project would be in conflict with the prescriptions of the Mimbres RMP. A plan amendment would be required to change the VRM designation if the segments of the Project in VRM Class II areas are approved in the ROD. Segments that would conflict with VRM II classifications include S5, S6, S7, Alternative C, Alternative D of route group 1 and LD2, and LD3a of route group 2. LD2 would also conflict with the Butterfield Trail avoidance area.
Safford RMP	Land Use Authorizations, ROWs, leases, and permits would be considered on a case-by-case basis, in accordance with the decisions of this RMP. Major ROWs, however, would be directed to designated corridors where possible.	Consistent. Existing VRM settings (VRM II) would not be intersected by the proposed Project. The proposed Project would be in conformance with the prescriptions of the Safford RMP. A plan amendment would not be required.
Phoenix RMP	Land use authorizations (ROWs, leases, permits, and easements) would continue to be issued on a case-by-case basis and in accordance with recommendations in this DEIS. ROWs would be issued to promote the maximum utilization of existing ROW routes, including joint use whenever possible.	Consistent. An EIS has been determined as the appropriate level of environmental review. Where feasible, the actions alternatives would occur within existing ROWs.

Table 4.11-1. Consistency of the Project Alternatives with Local Plans (Continued)

Plan	Goals/Objectives/Policy	Consistency Determination
Continental Divide National Scenic Trail Comprehensive Plan	The primary purpose of this plan is to provide management guidance for a continuous, appealing trail route, designed for the hiker and horseman, but compatible with other land uses. Trail segments in the Roaded Natural class pass through areas where the natural setting may have modifications that range from being easily noticed to strongly dominant to observers within the area. Trail segments in Rural or Urban class pass through areas where the natural setting is culturally modified to the point that it is dominant to the travel route observer. The setting may include pastoral, agricultural, intensively managed wildland resource landscapes or utility corridors. The urban settings may be dominated by structures with the natural elements playing an important but visually subordinate role.	Consistent. The action alternatives would cross the CDNST in areas that have been determined as having a sensitivity level rating unit as “Maintenance of Visual Quality has low Value,” no critical habitat or unique biological features, and low potential for cultural resources.*
Coronado National Forest Plan	Existing utility and transportation corridors would continue to be used for those types of uses. Every attempt should be made to locate new utilities within those existing corridors that meet the visual quality objective. New corridors shall be located so that the visual quality objectives are met.	Consistent. The approximately 0.5-mile segment that would cross the Coronado National Forest would be located within an existing ROW.
Las Cienegas National Conservation Area RMP	All new major utilities crossing public lands would be routed through designated corridors.	Consistent. Portions of the action alternatives would occur along an existing ROW within the Las Cienegas Sonoita Valley Acquisition Planning District; though not on BLM lands.
Juan Bautista de Anza National Historic Trail Comprehensive Management and Use Plan	Management objectives for visitor experience emphasize promotion of public understanding, appreciation, and enjoyment of the Anza Trail and outdoor recreation.	Consistent. The Anza Trail occurs within the development area of Tucson, primarily along the channelized Santa Cruz River that parallels I-10 and existing transmission lines. *
Willcox Playa Wildlife Area	Management emphasis for the Willcox Playa Wildlife Area is to support the best wildlife habitat possible on the wildlife area for present and future generations. This emphasis includes keeping opportunities available for public hunting and other wildlife-oriented recreation	Consistent. Portions of the action alternatives would occur along an existing ROW; however, some seasonal restrictions may be required in accordance with AGFD hunting regulations but would not likely be implemented since the area is already occupied by development and therefore not actively hunted.
County of Doña Ana Comprehensive Plan	Maintain and protect residential areas from incompatible land uses.	Consistent. There are no residential areas in the vicinity of the action alternatives in Doña Ana County.
Luna County Comprehensive Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.
Grant County Ordinance 1978-12-04-01	The Grant County Board of Commissioners is hereby empowered to adopt rules and regulations concerning the construction and maintenance of utilities and other facilities within Grant County road ROWs.	Consistent. Design and location of the action alternatives must comply with existing ROWs and would not occur within Grant County road ROWs.
Hidalgo County Comprehensive Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.
Greenlee County Comprehensive Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.
Graham County Comprehensive Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.

Table 4.11-1. Consistency of the Project Alternatives with Local Plans (Continued)

Plan	Goals/Objectives/Policy	Consistency Determination
County of Cochise Comprehensive Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.
Pima County Comprehensive Plan	The Plan does not specifically address transmission of electricity, although electrical transmission requires a Conditional Use Permit under some zoning districts.	Consistent. Portions of the action alternatives would occur within an existing ROW within Pima County. A conditional use permit would be required for portions of the proposed Project and alternatives that would occur on County lands.
Pinal County Comprehensive Plan	Transmission lines for the distribution of electricity and power substations shall be permitted in any zoning district and not be subject to the minimum lot area requirement.	Consistent. Portions of the action alternatives would occur within an existing ROW within Pinal County.
Pima County Multi-Species Conservation Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.
Cienega Creek Natural Preserve Management Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.
City of Deming Comprehensive Plan	Transmission development is allowed in all zones.	Consistent. Portions of the action alternatives would occur within an existing ROW within Deming.
City of Lordsburg Comprehensive Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.
City of Willcox Comprehensive Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.
City of Benson General Development Plan	The plan acknowledges the city's presence along a transmission and transportation corridor. The transmission of electricity is allowed in all zoned areas of Benson.	Consistent. Portions of the action alternatives would occur within an existing ROW within Benson.
City of Tucson General Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.
Marana General Plan	No goals/objectives/policies pertaining to transmission line are identified.	Consistent.

* A National Trails Assessment in accordance with BLM Manual 6250 and 6280 is provided in Appendix F of this DEIS.

Land Use Authorizations and Rights-of-way

The primary land use change associated with the proposed Project is the development of currently natural or undeveloped land for a new and/or upgraded transmission line and ancillary facilities (i.e., substations, access roads).

If the proposed Project is authorized, the Project would have to conform to the terms and conditions of other previously issued BLM ROWs in the Project footprint (e.g., transportation ROWs and gas line ROWs), if applicable (e.g., other linear ROWs). There would be no impacts to BLM-designated utility corridors and other existing BLM ROWs (see chapter 3, table 3.11-9) since the Project would span all pipelines, and tower construction would avoid other facilities. The action alternatives, if authorized, would include new terms and conditions (applicable to those BLM-managed lands on which the proposed Project and alternatives would occur) that would be developed under Title V of the FLPMA, as amended (43 U.S.C. 1761–1771). Therefore, there would be conflicts to other existing BLM-designated utility corridors or existing BLM ROW authorizations. Existing, authorized adjacent or intersecting linear land use facilities (transmission and utility corridors) would not be impacted if any action alternative were implemented.

The action alternatives cross portions of various irrigation, drainage, pipes, and related facilities within agricultural areas in both New Mexico and Arizona. Where necessary to construct transmission facilities across canals or other conveyance systems, the action alternatives would be constructed to allow conductors to span these facilities, resulting in low or minimal impacts to the canal or other conveyance system. An encroachment permit would be required by the managing agency (e.g., Reclamation) to cross these facilities in accordance with federal and local regulations. Similarly, the action alternatives would across numerous Federal, State, County, and local highways and railroads, electric transmission and delivery lines, and gas and oil pipelines. The exact alignment and design configurations of these crossings would be in accordance with applicable regulations and codes. Special construction protection measures would be undertaken at road and other ROW crossings. For a listing of construction BMPs, refer to Chapter 2, Section 2.4.6, "Typical Design Features."

Other authorized land uses, such as outdoor recreation and grazing, may experience minor displacement during construction since these activities are dispersed and not concentrated within certain areas (refer to sections 4.11.2 and 4.14). Recreation along the National Trails that would be crossed by the Project would not be precluded since the transmission towers, substations, and access roads would not be constructed upon the National Trails; the intersections with National Trails would be spanned by the lines. The recreation setting along National Trails (an authorized land use) would not change since there are existing transmission lines already in place; further discussion to the potential impacts to the recreation setting along National Trails is discussed in section 4.14. Existing land uses surrounding the proposed Project would not be precluded during the construction period. Access to all existing land uses would be maintained, and the minor displacements experienced by outdoor recreation and grazing would cease during operation/maintenance of the proposed Project, areas occupied by the transmission line towers, substations, and access roads notwithstanding. These areas would be precluded from recreation and grazing for the life of the Project.

Substations that are proposed outside the existing ROW would not include new construction; the activity would be limited to expanding the existing substation. Thus, no new ROW requests are anticipated for the substation-related activities. Similarly, some staging areas would be located outside of the ROW. These staging areas would be located in areas that would not conflict with land ownership agreements, existing land use authorizations, RMP-prescriptions, or future or planned land use.

Future or Planned Land Use

Potential effects on future or planned land use are generally associated with Project construction rather than operation because once the ROW grant has been made by BLM and construction is completed, no further changes to future or planned land use patterns are expected. Similarly, county and municipal planning already recognize the existing ROWs that the proposed Project would occupy, thus any future planned uses would conform to these existing ROWs. No residential areas are planned within the analysis area. No planned residential subdivisions or other sensitive land uses at the final plat approval stage would be intersected by the proposed Project footprint. Thus, a land use conflict with future or planned land uses is not identified under all alternatives.

ROUTE GROUP 1 – AFTON SUBSTATION TO HIDALGO SUBSTATION

Subroute 1.1 – Proponent Preferred

Construction

Land Ownership and Management of Lands

Some of the segments under route group1 would cross areas identified in the Mimbres RMP as avoidance areas and VRM Class II. Please refer to Section 4.10, "Visual Resources," for a discussion on VRM compliance.

Non-VRM-related Mimbres RMP ROW avoidance prescriptions that route group 1 (subroutes 1.1, 1.2, and local alternatives) would cross are provided below in table 4.11-2. As described in Section 3.11.1, "Land Use," avoidance areas may allow for ROWs under special terms and conditions. The special terms and conditions have not yet been identified, but would be specified prior to a ROD. Further, each segment proposed under route group 1 that would intersect an avoidance area is located within or along existing ROWs.

The subroute would cross habitat areas for the bighorn. Bighorn sheep habitat areas are recognized as avoidance areas by the Mimbres RMP. Impacts to these habitats are not anticipated since the Project would be located along existing facilities that are already in place within these avoidance areas. Subroute 1.1 would pass near the Aden Hills OHV area and would also intersect with BLM disposal areas; this would be a negligible impact to land use. Disposal avoidance areas are not subject as exclusion areas for ROW. Impacts for operation and maintenance of this subroute would be the same as described above in "Impacts Common to all Action Alternatives."

Table 4.11-2. Route Group 1 ROW Avoidance Areas

Segments	Suitable/Occupied Desert Bighorn Sheep Habitat Avoidance Areas (miles crossed)	Butterfield Trail Avoidance Areas (miles crossed)	CDNST Avoidance Areas (miles crossed)	Grassland Restoration Avoidance Area (miles crossed)	Areas Identified as Suitable for Disposal (miles crossed)
Subroute 1.1, Proponent Preferred					
P1	0	0	0	0	0
P2	0	0	0	0	12.7
P3	0	0	0	0	0
P4a	0	0	0.5	0	0
Subroute 1.2, Proponent Alternative					
S1	0	0	0	0	0
S2	0.9	0	0	0	0
S3	0	0	0	0	0
S4	0	0	0	0	0
S5	0	0	0	0	0
S6	0	0	0	1.0	0
S7	0	0	0	1.0	0
S8	0	0	0	0	0.3

Table 4.11-2. Route Group 1 ROW Avoidance Areas (Continued)

Segments	Suitable/Occupied Desert Bighorn Sheep Habitat Avoidance Areas (miles crossed)	Butterfield Trail Avoidance Areas (miles crossed)	CDNST Avoidance Areas (miles crossed)	Grassland Restoration Avoidance Area (miles crossed)	Areas Identified as Suitable for Disposal (miles crossed)
Route Group 1, Local Alternatives					
DN1	0	0	0	0	4.4
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D					0
Total	**0.9**	**0**	**0.5**	**2.0**	**17,4**

Table 4.11-3 describes the total land ownership of each segment within route group 1.

Table 4.11-3. Route Group 1 Land Ownership

		Land Ownership							
	Total Miles	BLM	BIA	DOD	U.S. Forest Service	Reclamation	State	County	Private
Subroute 1.1, Proponent Preferred									
P1	5.1	3.0	0.0	0.0	0.0	0.0	1.9	0.0	0.2
P2	102.0	32.8	0.0	0.0	0.0	0.0	31.2	0.0	37.9
P3	31.1	25.4	0.0	0.0	0.0	0.0	1.4	0.0	4.2
P4a	8.7	4.1	0.0	0.0	0.0	0.0	3.6	0.0	1.0
Subroute 1.2, Proponent Alternative									
S1	13.4	10.9	0.0	0.0	0.0	0.0	2.5	0.0	0.0
S2	11.1	9.8	0.0	0.0	0.0	0.0	1.0	0.0	0.3
S3	12.9	12.3	0.0	0.0	0.0	0.0	0.5	0.0	0.0
S4	10.6	10.5	0.0	0.0	0.0	0.0	0.2	0.0	0.0
S5	29.7	12.1	0.0	0.0	0.0	0.0	3.7	0.0	13.9
S6	7.4	4.4	0.0	0.0	0.0	0.0	2.4	0.0	0.5
S7	41.5	22.2	0.0	0.0	0.0	0.0	10.4	0.0	8.9
S8	14.6	0.2	0.0	0.0	0.0	0.0	5.8	0.0	8.5
Route Group 1 Local Alternatives									
DN1	42.5	6.9	0.0	0.0	0.0	0.0	29.3	0.0	6.3
A	17.5	14.7	0.0	0.0	0.0	0.0	1.1	0.0	1.8
B	12.2	9.9	0.0	0.0	0.0	0.0	2.2	0.0	0.0
C	9.0	4.0	0.0	0.0	0.0	0.0	1.6	0.0	3.4
D	22.8	6.8	0.0	0.0	0.0	0.0	2.5	0.0	13.5

Land Use Authorizations and Rights-of-way

If the proposed Project is authorized, the Project would have to conform to the terms and conditions of previously issued BLM ROWs in route group 1, if applicable (e.g., other linear ROWs). Valid existing rights of other ROW holders would remain in place, which are administered by the BLM Las Cruces District Office (refer to Appendix J, "BLM Land Use Authorizations"). There would be no impacts to BLM-designated utility corridors and other existing BLM ROWs since the Project would span all pipelines, fiber optic lines, canals, and other land use authorizations; and tower construction would avoid other facilities. Construction activities would not impact existing land use authorizations or BLM ROWs since all temporary disturbances (approximately 28.4 percent of the total subroute 1.1) within the Project footprint would avoid existing land use authorizations and BLM ROWs (i.e., preexisting authorizations would continue as permitted). Existing, authorized adjacent or intersecting linear land use facilities (transmission and utility corridors) would not be impacted during construction.

Future or Planned Land Use

Future or planned land uses within subroute 1.1 include the Tri-County RMP. The Tri-County RMP will designate land use prescriptions, potentially including utility corridors intended for ROW use, and land use authorizations. The ROD for the Tri-County RMP has not been issued as of the time of writing of this DEIS. Any future land use authorizations under the Tri-County Plan that may intersect with the proposed Project would also need to acknowledge the Project authorized ROW, if granted by the BLM. The Tri-County RMP will guide the land use of future activities. Since future or planned land uses within route group 1 are still under development, (i.e., the Tri-County RMP) the impact of the proposed Project to future or planned land uses would not conflict as the Project can be considered in the Tri-County RMP effort. Thus, a land use conflict with future or planned BLM land uses within the New Build Section of the analysis area is unknown until the Tri-County RMP is finalized.

Undeveloped State lands that would be physically occupied by towers or substation or located immediately beneath the spans by route group 1 would no longer be available for some future use, including sale or lease during both construction and operation and maintenance.

Subroute 1.1 would occur within a Section 368 designated energy corridor on 20.1 acres. The Afton Substation expansion would occur on 7.8 acres of a Section 368 designated energy corridor.

Operation and Maintenance

Land Ownership and Management of Lands

Impacts to the land ownership and the management of lands within route group 1 would be the same as described under subroute 1.1, "Construction." Operational surface disturbances include the physical occupation of the transmission line tower structures and substations, and the use of the access roads during maintenance activities (short-term, sporadic).

Land Use Authorizations and Rights-of-Way

During operation and maintenance, the proposed Project would have to conform to the terms and conditions of previously issued BLM ROWs in route group 1, if applicable (e.g., other linear ROWs). Valid existing rights of other ROW holders would remain in place, which are administered by the BLM Las Cruces District Office (refer to Appendix J, "BLM Land Use Authorizations"). There would be no impacts to BLM-designated utility corridors and other existing BLM ROWs since the Project would span all pipelines, fiber optic lines, canals and other land use authorizations; and tower construction would avoid other facilities. Operational activities of the transmission line, substations, and ancillary facilities

would not preclude existing land use authorizations or BLM ROWs since all permanent disturbances (approximately 12.6 percent of the total subroute 1.1) within the Project footprint would avoid existing land use authorizations and BLM ROWs. Existing, authorized adjacent or intersecting linear land use facilities (transmission and utility corridors) would not be impacted during operation and maintenance.

Subroute 1.2 – Proponent Alternative

Construction

Land Ownership and Management of Lands

Impacts to the land ownership and the management of lands within route group 1 would be the same as described under subroute 1.1, construction.

Land Use Authorizations and Rights-of-way

Construction activities would not impact existing land use authorizations or BLM ROWs since all temporary disturbances (approximately 28.4 percent of the total subroute 1.2) within the Project footprint would avoid existing land use authorizations and BLM ROWs (i.e., preexisting authorizations would continue as permitted). Refer to section 4.11.2 for discussions of impacts to grazing.

Future or Planned Land Use

Future or planned land uses within subroute 1.2 include the Tri-County RMP. The Tri-County RMP will designate land use prescriptions, including ROWs and land use authorizations. The ROD for the Tri-County RMP has not been issued as of the time of writing of this DEIS. Any future Tri-County land use authorizations under that Plan that may intersect the Project footprint would also need to acknowledge the Project authorized ROW, if granted by the BLM. The Tri-County RMP will guide the land use of future activities. Since future or planned land uses within route group 1 are still under development (i.e., the Tri-County RMP), the impact of the proposed Project to future or planned land uses would be minor. Thus, a land use conflict with future or planned land uses is unknown until the Tri-County RMP is finalized.

Operation and Maintenance

Land Ownership and Management of Lands

Impacts to the land ownership and the management of lands within subroute 1.2 would be the same as described under subroute 1.1, "Construction," except the distance, ROW acreage, and disturbance estimates for subroute 1.2 would differ from subroute 1.1 (see table 4.11-1). Impacts to land use authorizations, ROWs, and future or planned land use during construction would be the same as described under construction.

Local Alternatives

There are five local alternatives available for route group 1: DN1, A, B, C, and D.

Construction

Land Ownership and Management of Lands

Alternative C intersects with the grassland restoration area. Alternative D intersects with the CDNST and Section 368 designated energy corridors. Since these avoidance areas are pre-existing and would include existing utilities, impacts to these special designations from the proposed Project would be minor. Other

impacts to the land ownership and the management of lands within the local alternatives of route group 1 would be the same as described under subroute 1.1, "Construction."

Land Use Authorizations and Rights-of-Way

Construction activities would not impact existing land use authorizations or BLM ROWs since all temporary disturbances (approximately 28.6 percent of the total local alternatives) within the proposed Project would avoid existing land use authorizations and BLM ROWs (i.e., preexisting authorizations would continue as permitted). Future or planned land use in the local alternatives would be precluded by the proposed Project, but could be located parallel to the proposed Project. Refer to section 4.11.2 for discussions of impacts to grazing.

Operation and Maintenance

Land Ownership and Management of Lands

Alternative C intersects with the grassland restoration area. Alternative D intersects with the CDNST and Section 368 designated energy corridors. Other impacts to the land ownership and the management of lands within the local alternatives of route group 1 would be the same as described under subroute 1.1, "Construction." Impacts to existing land use authorizations, ROWs, and future or planned land use during construction would be the same as described under construction.

ROUTE GROUP 2 – HIDALGO SUBSTATION TO APACHE SUBSTATION

Subroute 2.1 – Proponent Preferred

Construction

Land Ownership and Management of Lands

All segments the comprise route group 2 are proposed New Build Section segments. Though that overall mileage, ROW acreage, and disturbance estimates, would be different, impacts to the land ownership and the management of lands within route group 2 would be the same as described under subroute 1.1, "Construction," except as described below.

There would be no lands identified as suitable for disposal crossed by subroute 2.1. Some of the segments under route group 2 would cross areas identified in existing RMPs as avoidance areas and VRM Class II areas. Please refer to Section 4.10, "Visual Resources," for a discussion on VRM compliance.

Non-VRM-related Mimbres RMP and Safford RMP ROW avoidance prescriptions that route group 2 (subroutes 2.1, 2.2, and local alternatives) would cross are provided below in table 4.11-4. As described in Section 3.11.1, "Land Use," avoidance areas may allow for ROWs under special terms and conditions. Further, each segment proposed under route group 2 that would intersect an avoidance area is located within or along existing ROWs.

Segment P6b would cross the Bowie Mining District; however, no mining facilities are present within the proposed Project's ROW and therefore the BLM's ability to manage the lands that encompass the Bowie Mining District would not be impacted.

Table 4.11-4. Route Group 2 ROW Avoidance Areas

Segments	Suitable/Occupied Desert Bighorn Sheep Habitat Avoidance Areas (miles crossed)	Butterfield Trail Avoidance Areas (miles crossed)	CDNST Avoidance Areas (miles crossed)	Grassland Restoration Avoidance Area (miles crossed)	Areas Identified as Suitable for Disposal (miles crossed)
Subroute 2.1, Proponent Preferred					
P5a	0	0	0	0	0
P4c	0	0	0	0	0
P5a	0	0	0	0	0
P5b	3.0	0	0	0	0
P6a	0	0	0	0	0
P6b	0	0	0	0	0
P6c	0	0	0	0	0
P7	0	0	0	0	0
P8	0	0	0	0	0
Subroute 2.2, Proponent Alternative					
D*	0	0	0.5	0	0
E	2.9	0	0	0	0
F	0	0	0	0	0
Ga	0	0	0	0	0
Gb	0	0	0	0	0
Gc	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
Route Group 2 Local Alternatives					
LD1	2.2	0	0	0	0
LD2	0	3.0	0	0	0
LD3a	0	0.5	0	0	0
LD3b	0.1	0	0	0	0
LD4	0	0	0	0	0
LD4-Option 4	0	0	0	0	0
LD4-Option 5	0	0	0	0	0
Total	**8.2**	**3.5**	**0.5**	**0**	**0**

* Alternative D would occur in both route group 1 and route group 2.

The affected land ownership of subroute 2.1 is described in table 4.11-5. Table 4.11-5 shows the land ownership that each segment of subroute 2.1 would occupy.

Table 4.11-5. Route Group 2 Land Ownership

	Total Miles	Land Ownership							
		BLM	BIA	DOD	U.S. Forest Service	Reclamation	State	County	Private
Subroute 2.1, Proponent Preferred									
P4b	14.0	0.7	0.0	0.0	0.0	0.0	9.5	0.0	3.8
P4c	1.9	0.4	0.0	0.0	0.0	0.0	1.4	0.0	0.0
P5a	9.6	6.1	0.0	0.0	0.0	0.0	1.3	0.0	2.2
P5b	21.1	17.9	0.0	0.0	0.0	0.0	1.0	0.0	2.2
P6a	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P6b	22.5	0.2	0.0	0.0	0.0	0.0	12.6	0.0	9.7
P6c	2.8	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0
P7	22.3	2.3	0.0	0.2	0.0	0.0	8.5	0.0	11.3
P8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Subroute 2.2, Proponent Alternative									
E	31.8	18.8	0.0	0.0	0.0	0.0	4.2	0.0	8.8
F	25.3	3.1	0.0	0.0	0.0	0.0	15.1	0.0	7.1
Ga	25.7	0.0	0.0	0.0	0.0	0.0	13.4	0.0	12.4
Gb	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Gc	7.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4
I	2.3	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0
J	2.3	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0
Route Group 2 Local Alternatives									
LD1	35.4	19.5	0.0	0.0	0.0	0.0	6.8	0.0	9.1
LD2	9.6	3.6	0.0	0.0	0.0	0.0	5.8	0.0	0.2
LD3a	27.9	11.3	0.0	0.0	0.0	0.0	13.3	0.0	3.4
LD3b	1.9	1.2	0.0	0.0	0.0	0.0	0.7	0.0	0.0
LD4	51.7	37.1	0.0	0.0	0.0	0.0	18.6	0.0	4.9
LD4-Option 4	6.5	19.5	0.0	0.0	0.0	0.0	6.8	0.0	9.1
LD4-Option 5	12.3	0.0	0.0	0.0	0.0	0.0	11.1	0.0	1.2
WC1	14.8	3.6	0.0	0.0	0.0	0.0	5.8	0.0	0.2

Land Use Authorizations and Rights-of-Way

If subroute 2.1 is authorized, the Project would have to conform to the terms and conditions of previously issued BLM ROWs in route group 2, if applicable (e.g., other linear ROWs). Valid existing rights of other

ROW holders would remain in place[1], which are administered by the BLM Las Cruces District Office in New Mexico and Safford Field Office in Arizona. There would be no impacts to BLM-designated utility corridors and other existing BLM ROWs since the Project would span all pipelines, and tower construction would avoid other facilities. Construction activities would not impact existing land use authorizations or BLM ROWs since all temporary disturbances (approximately 28.5 percent of the total subroute 2.1) within the proposed Project would avoid existing land use authorizations and BLM ROWs (i.e., preexisting authorizations would continue as permitted). Existing, authorized adjacent or intersecting linear land use facilities (transmission and utility corridors) would not be impacted during construction since all towers and disturbance would be located outside existing structures (i.e., the spans would cross over the existing structures without impact). Refer to section 4.11.2 for impact discussions to grazing.

Future or Planned Land Use

All future or planned land uses in Cochise and Pima counties, Arizona, would be required to conform to the terms and conditions of the proposed Project and alternatives where applicable, if a ROW is granted by the BLM.

Operation and Maintenance

Land Ownership and Management of Lands

Impacts to the land ownership and the management of lands within subroute 2.1 would be the same as described under subroute 2.1, "Construction." Impacts to existing land use authorizations, ROWs, and future or planned land during construction would be the same as described under construction.

Subroute 2.2 – Proponent Alternative

Construction

Land Ownership and Management of Lands

Impacts to the land ownership and the management of lands within route group 2 would be the same as described under subroute 2.1, "Construction." Impacts to land use authorizations, ROWs, and future or planned land use during construction would be the same as described for subroute 2.1, except as described below.

Alternative F would cross the Bowie Mining District; however, no mining facilities are present within the proposed Project's ROW and therefore the BLM's ability to manage the lands that encompass the Bowie Mining District would not be impacted.

Operation and Maintenance

Impacts to land ownership and management of lands, existing land use authorizations, ROWs, and future or planned land use during operation and maintenance would be the same as described for subroute 2.1, "Construction."

Local Alternatives

There are eight local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and 2, and WC1.

[1] A list of existing and pending ROW holders is provided in Appendix J.

Construction

Land Ownership and Management of Lands

Impacts to the land ownership and the management of lands within route group 2 would be the same as described under subroute 2.1, "Construction," except as described below.

Segment LD2 would cross the Butterfield Trail avoidance area. The Butterfield Trail travels in an east-west direction along this avoidance area, as would segment LD2. As specified in chapter 3, the Mimbres RMP prescribes the following stipulation for the Butterfield Trail avoidance area:

- Facilities will not be located parallel to the CDNST or Butterfield Trail (BLM 1991).

As such, segment LD2 would be in direct conflict with the management of the BLM lands that surround segment LD2 within the Butterfield Trail avoidance area. This would be an adverse, major, and long-term impact to land use since the proposed Project directly conflicts with the Mimbres RMP. Further, there are no existing transmission lines or pipelines along the proposed route for segment LD2.

Land Use Authorizations and Rights-of-Way

Construction activities would not impact existing land use authorizations or BLM ROWs since all temporary disturbances (approximately 28.5 percent of the total route group 2 local alternatives) within the proposed Project would avoid existing land use authorizations and BLM ROWs (i.e., preexisting authorizations would continue as permitted).

Future or Planned Land Uses

Some future or planned land use in the local alternatives Project footprint would be precluded by the proposed Project, but could be located parallel to the proposed Project. Many land uses would be compatible (recreation, grazing, etc.). Refer to section 4.11.2 for discussions of impacts to grazing.

Operation and Maintenance

Land Ownership and Management of Lands

Impacts to land ownership and management of lands, existing land use authorizations, ROWs, and future or planned land during operation and maintenance would be the same as described for subroute 2.1, "Construction."

ROUTE GROUP 3 – APACHE SUBSTATION TO PANTANO SUBSTATION

Subroute 3.1 – Proponent Preferred

Construction

Land Ownership and Management of Lands

All segments that form route group 3 are proposed Upgrade Section segments. Impacts to the land ownership and the management of lands within route group 3 would be the same as described under subroute 1.1, "Construction," except there would be no avoidance areas that would occur within route group 3.

The affected land ownership of subroute 3.1 is described below in table 4.11-6.

Table 4.11-6. Route Group 3 Land Ownership

	Total Miles	Land Ownership							
		BLM	BIA	DOD	U.S. Forest Service	Reclamation	State	County	Private
Subroute 3.1, Proponent Preferred									
U1a	16.1	0.4	0.0	0.0	0.5	0.0	8.8	0.0	6.4
U1b	2.9	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0
U2	15.8	0.0	0.0	0.0	0.0	0.0	3.3	0.0	12.5
U3a	35.6	0.2	2.9	0.0	0.0	0.2	20.7	0.0	11.6
Route Group 3 Local Alternatives									
H	19.3	0.0	0.0	0.0	0.0	0.0	15.3	0.0	4.0

Land Use Authorizations and Rights-of-Way

If subroute 3.1 is authorized, the Project would be required to conform to the terms and conditions of previously issued BLM ROWs in the route 3 group, if applicable (e.g., other linear ROWs). Valid existing rights of other ROW holders would remain in place, which are administered by the Tucson and Safford Field Offices. There would be no impacts to BLM-designated utility corridors and other existing BLM ROWs since the Project would span all pipelines, and tower construction would avoid other facilities. Construction activities would not impact existing land use authorizations or BLM ROWs since all temporary disturbances (approximately 38.5 percent of the total subroute 3.1) within the proposed Project would avoid existing land use authorizations and BLM ROWs (i.e., preexisting authorizations would continue as permitted). Existing, authorized adjacent or intersecting linear land use facilities (transmission and utility corridors) would not be impacted during construction. Refer to section 4.11.2 for discussions of impacts to grazing.

Future or Planned Land Use

All future or planned land uses in Pima County, Arizona, would be required to conform to the terms and conditions of the proposed Project and alternatives where applicable, if a ROW is granted by the BLM.

Operation and Maintenance

Impacts to land ownership and management of lands, existing land use authorizations, ROWs, and future or planned land during operation and maintenance would be the same as described for subroute 3.1, "Construction."

Local Alternatives

There is one local alternative for route group 3—local alternative H.

Construction

Land Ownership and Management of Lands

Impacts to the land ownership and the management of lands within route group 3 would be the same as described under subroute 3.1, "Construction." Impacts to land use authorizations, ROWs, and future or planned land use during construction of the local alternative for route group 3 would be the same as described for subroute 3.1, "Construction."

Operation and Maintenance

Impacts to land ownership and management of lands, existing land use authorizations, ROWs, and future or planned land use during operation would be the same as described for subroute 3.1, "Construction."

ROUTE GROUP 4 – PANTANO SUBSTATION TO SAGUARO SUBSTATION

Subroute 4.1 – Proponent Preferred

Construction

Land Ownership and Management of Lands

All segments that comprise route group 4 are proposed Upgrade Section segments. Impacts to the land ownership and the management of lands within route group 4 would be the same as described under subroute 1.1, "Construction," except there would be no avoidance areas that occur within route group 4. The affected land ownership of subroute 4.1 is described below in table 4.11-7.

Table 4.11-7. Route Group 4 Land Ownership

		Land Ownership							
	Total Miles	BLM	BIA	DOD	U.S. Forest Service	Reclamation	State	County	Private
Subroute 4.1, Proponent Preferred									
U3b	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
U3c	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
U3d	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.0
U3e	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
U3f	0.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.4
U3g	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
U3h	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
U3i	18.2	0.0	0.0	0.0	0.0	0.2	2.7	0.0	15.3
U3j	0.9	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0
U3k	16.7	0.0	0.0	0.0	0.0	0.0	10.8	0.0	5.9
U3l	1.6	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.4
U3m	0.6	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4
U4	1.9	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0

Table 4.11-7. Route Group 4 Land Ownership (Continued)

	Total Miles	Land Ownership							
		BLM	BIA	DOD	U.S. Forest Service	Reclamation	State	County	Private
Route Group 4 Local Alternatives									
MA1	1.1	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0
TH1a	1.4	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.2
TH1b	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.4
TH1c	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
TH1-Option	0.4	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
TH3-Option A	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
TH3-Option B	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
TH3-Option C	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
TH3a	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7
TH3b	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5

Land Use Authorizations and Rights-of-Way

If subroute 4.1 is authorized, the Project would be required to conform to the terms and conditions of previously issued BLM ROWs in the route 4 group, if applicable (e.g., other linear ROWs). Valid existing rights of other ROW holders would remain in place, which are administered by the Tucson Field Office. There would be no impacts to BLM-designated utility corridors and other existing BLM ROWs since the Project would span all pipelines, and tower construction would avoid other facilities. Construction activities would not impact existing land use authorizations or BLM ROWs since all temporary disturbances (approximately 38.6 percent of the total subroute 4.1) within the Project footprint would avoid existing land use authorizations and BLM ROWs (i.e., preexisting authorizations would continue as permitted). Existing, authorized adjacent or intersecting linear land use facilities (transmission and utility corridors) would not be impacted during construction. Refer to section 4.11.2 for discussions of impacts to grazing.

Future or Planned Land Use

All future or planned land uses in Pima and Pinal counties, Arizona, would be required to conform to the terms and conditions of the proposed Project and alternatives where applicable, if a ROW is granted by the BLM.

Operation and Maintenance

Impacts to land ownership and management of lands, existing land use authorizations, ROWs, and future or planned land uses during operation and maintenance would be the same as described for subroute 4.1, "Construction."

Local Alternatives

There are 10 local alternatives available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C.

Construction

Land Ownership and Management of Lands

Impacts to the land ownership and the management of lands within route group 4 would be the same as described under subroute 4.1, "Construction." Impacts to land use authorizations, ROWs, and future or planned land use during construction of the local alternative for route group 4 would be the same as described for subroute 4.1, "Construction."

Land Use Authorizations and Rights-of-Way

Impacts would be the same as described under subroute 4.1, "Construction," except the following. Reclamation administers the CAP that occurs within subroute 4.1. Specifically, local alternative MA1 would cross Reclamation-owned lands. No impacts to the land uses of these Reclamation-owned lands would occur since there are existing facilities within the Project footprint, and these existing facilities have been previously authorized by Reclamation.

Operation and Maintenance

Impacts to land ownership and management of lands, existing land use authorizations, ROWs, and future or planned land uses during operation and maintenance would be the same as described for subroute 4.1, "Construction."

AGENCY PREFERRED ALTERNATIVE

The Agency Preferred Alternative would not conflict with existing land use authorizations, and would not change any future or planned land use under route groups 1, 2, 3, and 4. The Agency Preferred Alternative would cross land owned by the following: approximately 3 miles of BIA lands; 294 miles of BLM lands; 0.2 mile of DOD lands; 0.5 mile of U.S. Forest Service lands; 0.4 mile of Reclamation lands; 141 miles of State lands; 0.4 mile of County lands; and 113 miles of private lands.

The Agency Preferred Alternative alignments included in route group 1 would not occur within ROW avoidance areas, except for segment P2 (crosses 12.7 miles of areas identified for disposal) and P4a (crosses 0.5 mile of CDNST avoidance area). As previously stated, ROW avoidance areas designated for disposal are not subject as exclusion areas for ROW locations, therefore the 12.7 miles of segment P2 that cross areas identified as suitable for disposal would be a negligible impact. The area where P4a would cross the CDNST avoidance area includes existing transmission line ROWs, access roads, and is located approximately 0.6 mile southeast of the existing Hidalgo Substation. The existing transmission lines, access roads, and general developed character dictates how these lands are currently managed, and the Agency Preferred Alternative would not require changes to how these lands area managed. Therefore, impacts of construction and operation and maintenance would be minor, and compliance with the management of these lands (i.e., CDNST avoidance areas) would not be changed. The management of the CDNST corridor would remain the same in this area. Further, the location where P4a crosses the actual CDNST is outside the CDNST avoidance area on New Mexico State land.

The Agency Preferred Alternative alignments included in route groups 2, 3, or 4 would not occur within designated ROW avoidance areas. The management of lands included in the Agency Preferred

Alternative under route groups 2, 3, and 4 would experience minor, short-term impacts, as described under "Impacts Common to All Action Alternatives."

Additional Mitigation Measures

No additional mitigation measures are suggested. Special terms and conditions may be provided per the POD in the ROW grant.

Residual Impacts

Because no additional mitigation measures are suggested, residual impacts to land use would be the same as discussed under all action alternatives.

Unavoidable Adverse Impacts

There would be no unavoidable adverse impacts to land ownership and management of lands, existing land use authorizations, ROWs, and future or planned land uses.

Short-term Uses versus Long-term Productivity

Short-term effects on land uses in the analysis area would result if a ROW were granted for the proposed Project and the subsequent encumbrance of the lands involved for any other uses such as recreational use. These short-term effects would only occur in areas where construction activities for the transmission towers or ancillary facilities physically occupy the ROW. Long-term impacts to land use would be expected for the areas in which the physical occupation of the transmission line towers, substations, and access road would preclude recreational use and grazing activities; future removal of the transmission line and ancillary facilities at the end of the life of the Project would not preclude land use form reverting to previous uses or to be converted to new uses, as allowed under managing land use plans.

Impacts to recreational and range resources would result from construction activities and physical, permanent occupancy of the transmission towers and ancillary facilities. Long-term losses in the productivity of recreational and range resources would not be expected, since forage and recreational opportunity would be restored with rehabilitation of the ROW at the end of the life of the Project.

Irreversible and Irretrievable Commitments of Resources

There would not be an irreversible commitment of land use resulting from the Project. Land use allocations and encumbrances could be reversed if the proposed Project and elements were removed in the future. There would be an irretrievable loss of BLM-managed lands open to recreational use within the Project footprint if any of the action alternatives are implemented.

4.11.2 Farmlands and Rangelands Introduction

This section describes the impacts to farmlands and rangelands associated with the construction, operation, and maintenance of the transmission line, substations, and ancillary facilities. Impacts are discussed in terms of loss of acreage of prime or unique farmlands or those of statewide importance. The analysis also considers those lands that could be farmed with adequate irrigation, or playas that would be suitable for farming when facilitated by sufficient precipitation. For rangelands, impacts are assessed based on loss of AUMs resulting from either temporary land use or permanently developed lands no longer available in grazing leases.

Methodology and Assumptions

Impacts in this section were confined to the representative ROW defined below. The ROW was compared with a GIS database to intersect unique and prime farmland, and farmland with irrigation potential to calculate temporary disturbance (structure and laydown yards) of farmland acres and acres to be impacted by permanent disturbance (access roads, substation expansion, and structure foundations). It is important to note that the NRCS classifies farmlands based on the physical, chemical, climatological, and sociological characteristics of the soils and land. The NRCS classifications do not imply that prime or unique farmlands or farmlands of statewide or local importance are currently being actively farmed or have ever been actively farmed. Therefore, it can be assumed that the calculation of acres of impacts to farmlands based on NRCS classifications will represent a larger impact to farmlands than would actually occur if the proposed transmission lines were constructed.

Due to the length of the proposed Project, the number of individual grazing leases was extensive. Therefore, rather than list each lease, the total lease acreage that intersected each segment of the action alternatives was used in the analysis. The total lease acreage was divided by the total AUMs set by the leasing entity to obtain an approximate average acreage per AUM. That number was then divided into the total temporary disturbance acres to calculate a short-term loss of AUMs. Permanent loss of AUMs was calculated by dividing the total permanent disturbance acres by the average acreage per AUM.

Limited AUM data were available for rangeland in Arizona. Based on data received on State leases, an average of one AUM per 17 acres was calculated and used for analysis on BLM lands, where AUM data were absent (represented with a dash in tables below).

ANALYSIS AREA

New Build Section

The environmental consequences for farmlands and rangelands for the New Build Section are based on a 200-foot-wide representative ROW, located along the centerline of the 2-mile-wide analysis area. The actual construction ROW would likely be configured to avoid certain environmental impacts, or for other logistical reasons. Therefore farmland and rangeland resources impacted by the representative ROW may or may not be impacted by the final construction ROW. However, use of the representative ROW allows disclosure of the approximate magnitude of impacts associated with each route group and route segment.

Environmental consequences for farmlands and rangelands may extend beyond the representative ROW in order to incorporate the potential for indirect impacts.

Upgrade Section

The environmental consequences for farmlands and rangelands for the Upgrade Section are based on a 150-foot representative ROW, located along the centerline of the 500-foot-wide analysis area. Similar to the New Build Section, indirect environmental effects may extend beyond the representative ROW into adjacent areas.

ANALYSIS ASSUMPTIONS

Estimate of AUM loss is based on the stocking rates recommended by the leasing agencies and does not reflect actual conditions. Due to the recent drought and related range decline, stocking rates may actually be considerably lower than what has been recommended. The agencies occasionally conduct range assessments so that rates can be adjusted. However, it is unclear how accurately the recommended rates

reflect the real ones. Therefore, it can be assumed that acreage per AUM is an underestimate, and that the loss in AUMs in this analysis represents an overestimate.

A similar assumption applies to farmlands, since the dry conditions may eliminate or restrict irrigation opportunities due to lack of water. Many farmers make decisions regarding whether to plant based on what they assume will be an availability of irrigation water. With pending drought, many farmers may have preferred to leave land fallow than to absorb the cost of raising crops. Consequently, farming acreages could be overestimates.

To assess the significance of impacts, total acreage of farmlands of unique or statewide importance were divided by the total acreage per subroute. This represents a very conservative approach since the final design of the transmission line, substations, and laydown areas has not been determined, and that some flexibility would be available to minimize impacts to such designated farmlands. This analysis focuses on permanent disturbance only, assuming that during construction planning an effort would be made to locate laydown areas to avoid these farmlands. At locations where laydown areas cannot avoid farmlands, the proponent would receive approval from the landowner of the farmland to lease the land required for the laydown area.

IMPACT INDICATORS

- Acres of impacts to existing NRCS prime farmlands or Farmlands of Statewide Importance
- Acres of impacts to grazing allotments on BLM, ASLD, and NMSLO lands and subsequent potential reduction in AUMs

SIGNIFICANT IMPACTS

This analysis recognizes the complexity of calculating active farming acreages or grazing AUMs in any particular year. For example, due to recent drought conditions, many areas may not currently be actively farmed and on many grazing lands stocking rates have declined as range condition has deteriorated. In addition, the AUMs are estimates based on past conditions and do not accurately reflect the present stocking rates. Most of the leases that intersect the ROW are large, in the tens or even hundreds of thousands of acres, and it would be extremely difficult to tease out the impact of a small loss in acreage from the already devastating effect of drought on farming or grazing lands. Therefore, for the purposes of this analysis, a statistically relevant measure of 10 percent loss of farmlands and rangelands was used if it were determined to result from construction, operation, and maintenance of the action alternatives. The following were considered significant impacts:

- Loss of greater than 10 percent of prime or unique farmlands;
- Loss of greater than 10 percent AUMs from local grazing leases.

Impacts Analysis Results

NO ACTION ALTERNATIVE

Under the no action alternative, the BLM would not issue a ROW grant to the Southline. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a). No farmland or rangeland would be removed from production and there would be no direct or indirect effects.

IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Construction

Construction of the transmission line would have direct effects on farmlands and rangelands by removing land acreage from productivity. Indirect effects could occur if dust and particulate matter resulting from the construction activities covered crops in a layer thick enough to impair photosynthesis and impede plant growth.

Operation and Maintenance

Except under extraordinary circumstances, all operation and maintenance activities would occur within the transmission line ROW and access roads. These activities would not directly or indirectly impact adjacent farmlands or rangelands. EMFs generated by the flow of electricity from the transmission line could potentially interfere with radio signals used in automated irrigation or fertilization systems located in close proximity to the line. However, these systems generally operate at different frequencies than the 60-hertz range of the transmission line and existing transmission lines are not known to interfere with these systems' radio signals at existing farmlands. In addition, the final siting of the transmission lines would either avoid crossing active farmlands or maximize the distance between the transmission lines and automated irrigation or fertilization systems. Therefore, EMFs from the proposed transmission lines are unlikely to cause a direct impact to automated irrigation or fertilization systems located on farms adjacent to the proposed transmission lines.

No direct effect would occur to farmlands and rangelands during the operation and maintenance phase of the Project beyond the loss of lands resulting from Project construction. Because the direct and indirect effects of operation and maintenance are the same for all action alternatives, no further discussion is included under each route group.

Route Group 1 – Afton Substation to Hidalgo Substation

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

Approximately 28 percent of the 3,567.5 acres of representative ROW in the Proponent Preferred (subroute 1.1) consists of Farmland of Statewide Importance (table 4.11-8). The construction of the transmission line would result in a direct effect by eliminating farmland from production. This represents a reduction in the NRCS farmland classification acres resulting from the Proponent Preferred alternative, but does not take into account avoidance of farmlands during completion of the final design or whether active farmlands are present. Because the proponent would avoid existing active farmlands, direct impacts to farmlands would not be considered significant.

Nearly 217 acres of rangeland in the ROW would be directly affected by the construction of the transmission line under the Proponent Preferred (subroute 1.1). However, this acreage represents less than 0.001 percent of the total lease acreage intersecting the proposed route (table 4.11-9). Based on expected stocking rates, the removal of the rangeland acres would result in a reduction of about 14 AUMs. This reduction in stocking rates is not considered significant.

Table 4.11-8. Route Group 1 Summary of Acres of Impacted Farmlands

	Total ROW Acreage	Farmland of Statewide Importance	Farmland of Unique Importance	Prime Farmland If Irrigated	Prime Farmland If Meeting Other Conditions
Subroute 1.1, Proponent Preferred					
P1	125.1	0	0	0	0
P2	2,472.0	272.4	0	0	0
P3	753.3	753.3	0	0	0
P4a	217.1	0	0	0	0
Total	**3,567.5**	**1,025.7**	**0**		
Subroute 1.2, Proponent Alternative					
S1	325.3	0	0	0	0
S2	267.7	27.2	0	0	0
S3	314.0	8	0	0	0
S4	255.2	0	0	0	0
S5	720.1	104.3	0	0	0
S6	182.1	0	0	0	0
S7	1,007.0	262	0	0	0
S8	352.8	329	0	0	0
Total	**3,424.2**	**730.5**	**0**		
Route Group 1 Local Alternatives					
DN1	1,030.5	120	0	0	0
A	422.9	0	0	0	0
B	291.5	0	0	0	0
C	215.7	0	0	0	0
D	551.1	399.7	0	68.6	0

Table 4.11-9. Route Group 1 Summary of Acres of Impacted Rangelands

	Total Representative ROW Acreage	Total Grazing Allotment Acres	Estimated AUMs	Acres Permanently Removed	Percent of Allotment Acreage Impacted	Reduction in AUMs
Subroute 1.1, Proponent Preferred						
P1	125.1	111,823.1	8,388	10.4	<0.001	0.8
P2	2,472.0	918,415.2	55,769	131.7	<0.001	8.0
P3	753.3	265,353.56	18,786	63.4	<0.001	4.5
P4a	217.1	155,185.1	12,871	11.1	<0.001	0.9

Table 4.11-9. Route Group 1 Summary of Acres of Impacted Rangelands (Continued)

	Total Representative ROW Acreage	Total Grazing Allotment Acres	Estimated AUMs	Acres Permanently Removed	Percent of Allotment Acreage Impacted	Reduction in AUMs
Subroute 1.2, Proponent Alternative						
S1	325.3	223,327.4	17,006	21.9	<0.001	1.6
S2	267.7	256,205.7	13,394	22.4	<0.001	1.2
S3	314.0	147,578.4	13,197	8.4	<0.001	0.6
S4	255.2	131,857.8	14,682	21.4	<0.001	2.6
S5	720.1	260,206.8	31,826	28.9	<0.001	3.5
S6	182.1	100,680.0	16,278	13.6	<0.001	2.2
S7	1,007.0	374,121.0	53,025	52.1	<0.001	7.4
S8	352.8	135,186.4	1,135	29.8	<0.001	2.5
Route Group 1 Local Alternatives						
DN1	1,030.5	415,285.1	12,086	92.9	<0.001	2.7
A	422.9	256,205.7	13,394	17.8	<0.001	1.0
B	291.5	131,857.8	14,682	7.2	<0.001	0.6
C	215.7	201,360.0	32,556	6.1	<0.001	1.0
D	551.1	191,671.7	10,599	28.1	<0.001	1.5

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

Approximately 21 percent of the 3,432 acres of representative ROW in the Proponent Alternative (subroute 1.2) consists of Farmland of Statewide Importance. The construction of the transmission line would result in a direct effect by eliminating farmland from production, if it cannot be avoided. This represents a reduction in the NRCS farmland classification acres resulting from the Proponent Preferred alternative, but does not take into account avoidance of farmlands during completion of the final design or whether active farmlands are present. Because the proponent would avoid existing active farmlands, direct impacts to farmlands would not be considered significant.

Approximately 199 acres of rangeland in the ROW would be directly affected by the construction of the transmission line under the Proponent Alternative (subroute 1.2). However, this acreage represents less than 0.001 percent of the total lease acreage intersecting the proposed route. Based on expected stocking rates, the removal of the rangeland acres would result in a reduction of about 22 AUMs. This reduction in stocking rates is not considered significant.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: DN1, A, B, C, and D.

Construction

Of the route group 1 local alternatives, only DN1 and D would have a direct effect on Farmland of Statewide Importance. Local alternative DN1 would affect 12 percent and local alternative D would affect 72 percent. The construction of the transmission line would result in a direct effect by eliminating this farmland from production, if it cannot be avoided. No indirect effects to farmlands are anticipated. This represents a significant reduction in the farmland acreage resulting from these two alternatives, but does not take into account avoidance of farmlands during completion of the final design.

None of the local alternatives considered would result in significant loss of rangeland acreage or AUMs.

Route Group 2 – Hidalgo Substation to Apache Substation

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

Approximately 7 percent of the 2,309 acres of representative ROW in the Proponent Preferred (subroute 2.1) consists of Farmland of Statewide or Unique Importance (table 4.11-10). The construction of the transmission line would result in a direct effect by eliminating farmland from production, if it cannot be avoided. No indirect effects to farmlands are anticipated. This does not represent a significant reduction in NRCS farmland classification acreage resulting from the Proponent Preferred. Additional efforts to avoid farmlands would be available during completion of the final design.

Nearly 119 acres of rangeland in the ROW would be directly affected by the construction of the transmission line under the Proponent Preferred (subroute 2.1). However, this acreage represents less than 0.001 percent of the total lease acreage intersecting the proposed route (table 4.11-11). Based on expected stocking rates, the removal of the rangeland acres would result in a reduction of about 12 AUMs. This reduction in stocking rates is not considered significant.

Table 4.11-10. Route Group 2 Summary of Acres of Impacted Farmlands

	Total Representative ROW Acreage	Farmland of Statewide Importance	Farmland of Unique Importance	Prime Farmland If Irrigated	Prime Farmland If Meeting Other Conditions
Subroute 2.1, Proponent Preferred					
P4b	335.8	32.3	0	0	34.9
P4c	44.9	19.0	0	0	10.6
P5a	233.5	67.4	0	0	5.3
P5b	510.9	5.6	32.7	0.9	4.1
P6a	21.3	0	0	0	21.3
P6b	545.1	0	0	176.0	53.1
P6c	68.3	0	0	0	0
P7	540.8	0	0	14.9	7.0
P8	9.0	0	0	8.2	0.8
Total	**2,309.6**	**124.3**	**32.7**		

Table 4.11-10. Route Group 2 Summary of Acres of Impacted Farmlands (Continued)

	Total Representative ROW Acreage	Farmland of Statewide Importance	Farmland of Unique Importance	Prime Farmland If Irrigated	Prime Farmland If Meeting Other Conditions
Subroute 2.2, Proponent Alternative					
E	766.6	58.3	78.7	27.3	69.5
F	611.1	0	0	139.6	12.9
Ga	622.4	0	0	200.4	146.6
Gb	25.9	0	0	0	25.9
Gc	179.6	0	0	20.9	142.2
I	55.4	0	0	0	0
J	55.6	0	0	0	0
Total	**2,316.6**	**58.3**	**78.7**		
Route Group 2 Local Alternatives					
LD1	857.5	131.8	114.4	48.9	30.6
LD2	233.2	155.6	0	21.1	0
LD3a	677.5	150.8	0	55.9	0
LD3b	46.6	10.1	0	2.3	0
LD4	1,253.1	1.2	0	89.2	43.6
LD4-Option 4	156.1	0	0	0	0
LD4-Option 5	296.8	0	0	0	0
WC1	359.1	3.6	0	75.2	19.4

Table 4.11-11. Route Group 2 Summary of Acres of Impacted Rangelands

	Total Representative ROW Acreage	Total Grazing Allotment Acres	Estimated AUMs	Acres Permanently Removed	Percent of Allotment Acreage Impacted	Reduction in AUMs
Subroute 2.1, Proponent Preferred						
P4b	335.8	148,656.5	18,756	28.2	<0.001	3.5
P4c	44.9	168,516.8	14,448	3.9	<0.001	0.3
P5a	233.5	180,805.6	29,168	11.4	<0.001	1.9
P5b	510.9	41,815.8	19,280	21.5	0.001	3.6
P6a	21.3	53,042.1	–	0.7	<0.001	0.1
P6b	545.1	91,054.0	–	25.8	<0.001	1.5
P6c	68.3	0	–	3.2	0	0
P7	540.8	99,908.3	–	23.8	<0.001	1.4
P8	9.0	0	–	0.1	0	0

Table 4.11-11. Route Group 2 Summary of Acres of Impacted Rangelands (Continued)

	Total Representative ROW Acreage	Total Grazing Allotment Acres	Estimated AUMs	Acres Permanently Removed	Percent of Allotment Acreage Impacted	Reduction in AUMs
Subroute 2.2, Proponent Alternative						
E	766.6	141,653.9	18,640	61.1	<0.001	7.9
F	611.1	53,042.1	–	32.9	<0.001	2.0
Ga	622.4	622.4	–	34.6	0.06	2.0
Gb	25.9	10,334.3	–	1.7	<0.001	0.1
Gc	179.6	7,899.7	–	7.1	<0.01	0.4
I	55.4	55.4	–	4.7	0.08	0.3
J	55.6	55.6	–	3.0	0.05	0.2
Route Group 2 Local Alternatives						
LD1	857.5	153,600.7	–	55.2	<0.001	3.2
LD2	233.2	386.1	–	20.2	0.05	1.2
LD3a	677.5	287,796.0	–	29.3	<0.001	1.7
LD3b	46.6	63.8	–	0.6	<0.001	<0.1
LD4	1,253.1	230,121.1	–	113.9	<0.001	6.7
LD4-Option 4	156.1	0	–	14.3	0	0.9
LD4-Option 5	296.8	0	–	22.2	0	1.3
WC1	359.1	0	–	28.3	0	1.7

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

Approximately 6 percent of the 2,316 acres of representative ROW in the Proponent Alternative (subroute 2.2) consists of Farmland of Statewide or Unique Importance. The construction of the transmission line would result in a minor direct effect by eliminating farmland from production, if it cannot be avoided. No indirect effects to farmlands are anticipated. This does not represent a significant reduction in the NRCS farmland classification acreage resulting from the Proponent Alternative. Additional efforts to avoid farmlands would be available during completion of the final design.

Approximately 145 acres of rangeland in the ROW would be directly affected by the construction of the transmission line under the Proponent Alternative (subroute 2.2). However, this acreage represents less than 0.001 percent of the total lease acreage intersecting the proposed route. Based on expected stocking rates, the removal of the rangeland acres would result in a reduction of about 13 AUMs. This reduction in stocking rates is not considered significant.

LOCAL ALTERNATIVES

There are eight local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1.

Construction

Four of the local alternatives—LD1, LD2, LD3a, and LD3b—would result in significant effects on Farmland of Statewide or Unique Importance. The construction of the transmission line would result in a direct effect by eliminating farmland from production, if it cannot be avoided. No indirect effects to farmlands are anticipated for either of the local alternatives.

None of the local alternatives considered would result in significant loss of acreage to rangeland or AUMs.

Route Group 3 – Apache Substation to Pantano Substation

SUBROUTE 3.1 – PROPONENT PREFERRED

Construction

No Farmlands of Statewide or Unique Importance occur in the 1,278 acres of representative ROW under the Proponent Preferred (subroute 3.1; table 4.11-12). Construction of the transmission line would not result in any direct effects to farmland. No indirect effects to farmlands are anticipated.

Approximately 97 acres of rangeland in the ROW would be directly affected by the construction of the transmission line under the Proponent Preferred (subroute 3.1). However, this acreage represents less than 0.001 percent of the total lease acreage intersecting the proposed route (table 4.11-13). Based on expected stocking rates, the removal of the rangeland acres would result in a reduction of less than one AUM. This reduction in stocking rates is not considered significant.

Table 4.11-12. Route Group 3 Summary of Acres of Impacted Farmlands

	Total Representative ROW Acreage	Farmland of Statewide Importance	Farmland of Unique Importance	Prime Farmland If Irrigated	Prime Farmland If Meeting Other Conditions	Permanent Disturbance (percent of total subroute acreage)
Subroute 3.1, Proponent Preferred						
U1a	291.9	0	0	48.7	9.9	
U1b	53.0	0	0	0	0	
U2	287.0	0	0	0	15.8	
U3a	646.7	0	0	9.4	68.1	
Total	**1,278.6**	**0**	**0**			**0**
Route Group 3 Local Alternative						
H	350.2	0	0	0	12.6	0

Table 4.11-13. Route Group 3 Summary of Acres of Impacted Rangelands

	Total Representative ROW Acreage	Total Grazing Allotment Acres	Estimated AUMs	Acres Permanently Removed	Percent of Allotment Acreage Impacted	Reduction in AUMs
Subroute 3.1, Proponent Preferred						
U1a	291.9	34,672.3	-	13.6	<0.001	0.8
U1b	53.0	0	-	2.5	0	0
U2	287.0	0	-	20.3	0	0
U3a	646.7	0	-	32.4	0	0
Route Group 3 Local Alternative						
H	350.2	0	-	28.4	0	0

LOCAL ALTERNATIVES

Construction

No Farmlands of Statewide or Unique Importance occur in the 350 acres of representative ROW for local alternative H. This alternative would not result in the loss of any farmlands.

Approximately 28 acres of rangeland in the ROW would be directly affected by the construction of the transmission line under alternative H. However, no grazing allotment acreage is included in the area represented by alternative H, and therefore no loss of AUMs would occur as a result of construction under this alternative.

Route Group 4 – Pantano Substation to Saguaro Substation

SUBROUTE 4.1 – PROPONENT PREFERRED

Construction

Approximately 3 percent of the 874.8 acres of representative ROW in the Proponent Preferred (subroute 4.1) consists of Farmland of Statewide or Unique Importance (table 4.11-14). The construction of the transmission line would result in a minor direct effect by eliminating farmland from production, if it cannot be avoided. No indirect effects to farmlands are anticipated. This does not represent a significant reduction in the NRCS farmland classification acreage resulting from the Proponent Preferred. Additional efforts to avoid farmlands would be available during completion of the final design.

Nearly 37 acres of rangeland in the ROW would be directly affected by the construction of the transmission line under the Proponent Preferred (subroute 4.1). However, no grazing allotment acreage is included (table 4.11-15). Therefore, no reduction in stocking rates would occur as a result of the Proponent Preferred.

No direct or indirect effects of rangelands are expected to occur during the Project operation.

Table 4.11-14. Route Group 4 Summary of Acres of Impacted Farmlands

	Total Representative ROW Acreage	Farmland of Statewide Importance	Farmland of Unique Importance	Prime Farmland If Irrigated	Prime Farmland If Meeting Other Conditions	Permanent Disturbance (percent of total subroute acreage)
Subroute 4.1, Proponent Preferred						
U3b	8.2	0	0	0	7.1	
U3c	17.5	0	0	0	0.6	
U3d	62.4	0	0	0	0	
U3e	16.1	0	0	0	0	
U3f	12.4	0	0	0	6.8	
U3g	16.2	0	0	0	15.1	
U3h	19.8	0	1.5	0	123.9	
U3i	331.1	0	9.5	70.7	0	
U3j	15.9	0	0	15.9	99.3	
U3k	303.6	0	14.1	148.8	0	
U3l	28.1	0	0	27.2	0	
U3m	8.9	0	0	8.8	0	
U4	34.7	0	0	0	13.8	
Total	**874.9**	**0**	**25.1**			**3%**
Route Group 4 Local Alternatives						
MA1	19.0	0	0	19.0	0	0
TH1a	25.7	0	0	0	0	0
TH1b	28.4	0	0	0	1.6	0
TH1c	4.8	0	0	0	4.8	0
TH1-Option	7.7	0	0	0	0	0
TH3-Option A	15.1	0	0	0	3.9	0
TH3-Option B	14.5	0	0	0	11.4	0
TH3-Option C	29.3	0	2.2	0	21.5	7%
TH3a	49.7	0	4.0	0	11.7	8%
TH3b	81.4	0	24.6	0	21.9	30%

Table 4.11-15. Route Group 4 Summary of Acres of Impacted Rangelands

	Total Representative ROW Acreage	Total Grazing Allotment Acres	Estimated AUMs	Acres Permanently Removed	Percent of Allotment Acreage Impacted	Reduction in AUMs
Subroute 4.1, Proponent Preferred						
U3b	8.2	0	0	0.3	0	0
U3c	17.5	0	0	0.2	0	0

Table 4.11-15. Route Group 4 Summary of Acres of Impacted Rangelands (Continued)

	Total Representative ROW Acreage	Total Grazing Allotment Acres	Estimated AUMs	Acres Permanently Removed	Percent of Allotment Acreage Impacted	Reduction in AUMs
U3d	62.4	0	0	2.5	0	0
U3e	16.1	0	0	0.7	0	0
U3f	12.4	0	0	0.5	0	0
U3g	16.2	0	0	0.4	0	0
U3h	19.8	0	0	0.2	0	0
U3i	331.1	0	0	13.1	0	0
U3j	15.9	0	0	0.7	0	0
U3k	303.6	0	0	15.6	0	0
U3l	28.1	0	0	1.0	0	0
U3m	8.9	0	0	0.2	0	0
U4	34.7	0	0	1.6	0	0
Route Group 4 Local Alternatives						
MA1	19.0	0	0	0.3	0	0
TH1a	25.7	0	0	0.3	0	0
TH1b	28.4	0	0	0.6	0	0
TH1c	4.8	0	0	0.1	0	0
TH1-Option	17.0	0	0	0.2	0	0
TH3-Option A	15.1	0	0	0.9	0	0
TH3-Option B	14.5	0	0	0.6	0	0
TH3-Option C	29.3	0	0	2.6	0	0
TH3a	49.7	0	0	2.7	0	0
TH3b	81.4	0	0	3.3	0	0

LOCAL ALTERNATIVES

There are 10 local alternatives available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C.

Construction

Only three of the local alternatives—TH3a, TH3b, and TH3-Option C—would result in minor direct effects to Farmlands of Unique Importance. The construction of the transmission line would result in a direct effect by eliminating farmland from production. This represents a reduction in the NRCS farmland classification acres resulting from the Proponent Preferred alternative, but does not take into account avoidance of farmlands during completion of the final design or whether active farmlands are present. Because the proponent would avoid existing active farmlands, direct impacts to farmlands would not be considered significant. No indirect effects to farmlands are anticipated.

Minimal acres of rangeland in the ROW would be directly affected by the construction of the transmission line under any of these local alternatives. No grazing allotment acreage is included in the

areas represented by the alternatives, and therefore no loss of AUMs would occur as a result of construction under any of these alternatives.

Agency Preferred Alternative

Construction of the Agency Preferred Alternative would have direct effects on farmlands and rangelands by removing land acreage from productivity. Approximately 1,178 acres of Farmland of Statewide Importance would be impacted under the Agency Preferred Alternative. Approximately 25 acres of Farmland of Unique Importance would be impacted under the Agency Preferred Alternative. Approximately 493 acres of Prime Farmland (irrigated) and 291 acres of Prime Farmland (other) would be impacted under the Agency Preferred Alternative. These totals would not exceed a 10% or greater loss of prime or unique farmlands, and impacts would be the same as described under "Impacts Common to All Action Alternatives." The impacts would be short-term in duration, and except in extraordinary circumstances, would cease during operation and maintenance since siting of the Agency Preferred Alternative would allow for prime and unique farmlands to be spanned by transmission line.

Approximately 478 acres of existing BLM allotment acreages would be permanently removed from existing grazing allotments under the Agency Preferred Alternative. This permanent removal would be required since the footprints of the transmission line towers would preclude grazing. The impact to rangeland would be minor since this reduction represents a less-than 0.001 percent reduction in total acres for allotments within the analysis area, but would be a long-term impact that would persist throughout the life of the proposed Project.

Additional Mitigation Measures

Laydown areas and substation development would be located on previously disturbed land, where possible, to reduce the impact to farm operations and production in active farmlands. If laydown areas cannot avoid farmlands, the proponent would receive approval from the landowner of the farmland to lease the land required for the laydown area. Temporary gates would be installed to prevent livestock from escaping rangelands and accessing roadways. Fences and gates would be repaired or replaced to their original, predisturbed condition, as required by the landowner or the BLM Authorized Officer if they are damaged or destroyed by construction activities. Cattle guards would be installed at access points to prevent livestock from exiting unsecured gates onto roadways.

Residual Impacts

The additional mitigation measures suggested above, if implemented, should address residual impacts to farmlands and rangelands. Residual impacts remaining would consist of loss of minimal acres of farm and rangeland. This loss would not exceed 10 percent of the analysis area and would not be a significant impact.

Unavoidable Adverse Impacts

Loss of productive farmland and rangeland would occur as a result of the construction of the transmission line and associated infrastructure, although the total acreage removed as a comparison to the total acres in each use would be insignificant. These impacts would reduce the amount of agriculturally productive acreage on existing farmlands, and result in small decreases in stocking rates on some grazing allotments.

Short-term Uses versus Long-term Productivity

Short-term effects on farmlands would result if laydown areas were located in active agricultural areas with permission to lease the land from the landowner. Similar effects would occur in rangelands areas, since these locations would need fencing to prohibit access from livestock during construction. However, these impacts would be minimal because laydown areas would be largely or entirely selected to be located on previously disturbed areas. As such, these areas would provide little or no forage, and would not represent a reduction in forage. Any laydown areas that are not able to be located on previously disturbed areas would revert back to productive agriculture or rangelands following termination of construction activities.

The action alternatives would result in long-term losses of agricultural and rangeland productivity where substations, roads, and other permanent disturbance would occur. Rehabilitation of the temporary rangeland disturbances in the ROW would be completed, but due to low precipitation and semi-arid conditions in the region, these areas may not be available in the short-term for livestock grazing. No long-term loss of temporarily disturbed farmlands would be expected to occur since these lands are more easily rehabilitated by planting and irrigation.

Irreversible and Irretrievable Commitments of Resources

There would be an irreversible loss of minimal acreage of productive farmland where impacts to this resource cannot be avoided. Loss of some rangeland would also occur, but the reduction in grazing acreage available would have an insignificant overall impact on stocking rates. The temporary disturbance to farmlands and rangelands would not be considered an irretrievable loss.

4.11.3 Military Operations Introduction

This section describes the impacts to military uses associated with the construction and operation and maintenance of the proposed transmission line, substations, and ancillary facilities. Impacts to military uses are discussed in terms of direct impacts on DOD-owned land, leased land, or withdrawn Federal land; military bases, bombing ranges, gunnery ranges (including EPGs), airports, and airspace; parachute drop zones; and MTRs. The analysis indicates whether the proposed Project directly or indirectly results in impacts to access to military owned, leased, or withdrawn (including EPGs) lands as a result of fencing or other physical or legal barriers necessary for construction, operation, and maintenance of the proposed Project (any of the action alternatives). The analysis indicates whether the proposed Project would conflict with, or put limitations on, existing and/or future military activities and/or missions. The impacts described in this section are based on information provided in "Southline Transmission Project Resource Report 19: Military Operations" (CH2M Hill 2013m). The contents of that report are used herein without specific reference.

Methodology and Assumptions

ANALYSIS AREA

The analysis area military operations for the both the New Build Section and Upgrade Section includes any military operation, MTRs, and military installation that may intersect with the footprint for the action alternatives. This includes a 1-mile buffer around the BSETR. The analysis area includes the proposed Project footprint total acreage (approximately 0 to 2,000 acres, depending upon alternative) as well as the intersection of the proposed Project with the 1.6 million-acre BSETR. The 1-mile buffer also accounts for potential EMF impacts along transmission lines, which according to military staff from the BSETR is up

to 1 km on either side of a transmission line. This analysis area is used to identify military operations, MTRs, and military installations that could be directly, indirectly, or cumulatively impacted by surface disturbance, above-surface facilities (i.e., towers, spans) and where construction materials, equipment, and workers may be present.

ANALYSIS ASSUMPTIONS

There are no specific analysis assumptions for military uses beyond the impact indicators and significance criteria described below.

IMPACT INDICATORS

The impact indicator is the presence of any military operation, MTRs, and military installation within the analysis area.

SIGNIFICANT IMPACTS

For the purposes of this analysis, a significant impact on military uses could result if any of the following were to occur from construction, operation, or maintenance of the Project:

- Physically conflicts with existing military uses (i.e., displacement of MTRs, increased EMF or displacement of parachute drop zones).
- Changes military air traffic patterns, including either an increase in traffic levels or a change in location that results in safety risks.
- Directly or indirectly impacts access to military owned, leased, or withdrawn (including EPGs) land as a result of fencing, or other physical or legal barriers necessary for construction, operation, and maintenance of the proposed Project and alternatives.
- Conflicts with, or puts limitations on existing and/or future military activities and/or missions.

Impacts Analysis Results

NO ACTION ALTERNATIVE

Under the no action alternative the BLM would not grant the ROW for the proposed Project. However, under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a). There would be no new impacts on military uses from the no action alternative. Current military operations would continue as they currently take place.

IMPACTS COMMON TO ALL ACTION ALTERNATIVES

Construction

Potential impacts from construction activities that would be common to all action alternatives would include temporary ground disturbance in areas where the transmission line, substations, and ancillary facilities intersect with military owned, leased, or withdrawn (including EPGs) land. The transmission lines would be constructed on lands below MTR visual routes (VRs) or in areas where training is for electronics and communications. The MTR VRs that would include construction only occur on portions of the analysis area and do not affect the entire MTR VRs. Impacts on military uses from ground disturbance would not be significant as all operations/training occurring in VRs is aerial in nature and the BSETR is used for electronics and communications testing. Further, these impacts would be below the

AGL thresholds since the areas that may intersect MTR VRs include existing transmission line facilities that are already below AGL thresholds, and the military operations have operated in conjunction with these facilities previously.

The airspace included in some VRs would be impacted since construction of the towers and spans would introduce a new/higher obstruction than previously existed. Where poles are replaced with higher height single poles and increased power transmission, this could have an effect on operations on the approach and departure end of the runway and helipads used in area of operations and could have an effect on the drop zones. The increase height and power could have an effect on radio transmissions. This airspace may be used by manned or unmanned vehicles. Since most of the construction is being performed on areas that currently already occupy airspace, most of the impacted VRs are already avoided by the military. However, construction activities (e.g., cellular phone and/or 2-way radio use) may have minor, short-term impacts to BSETR activities.

Helicopters may be used during construction and maintenance activities. To avoid conflicts with military airspace, the appropriate military scheduler(s) and the CBP representative(s) would be contacted to schedule airspace usage for any construction and maintenance activity on lands that could be used for military and/or CBP training or other flights.

Operation and Maintenance

Potential impacts from operation and maintenance that would be common to all action alternatives include physical conflicts where Project facilities penetrate the floor (minimum flight elevation) of restricted airspace. This could require changes to military air traffic patterns to increase the minimum flight elevation(s) for low-level training in MTR VRs to avoid potential collisions with transmission lines. Changes to military air traffic patterns would be a moderate impact, since flight operations would not need to be relocated, but would need to be adjusted where an intersection of military operations with the proposed Project or alternatives would occur. This moderate impact would require advanced planning and coordination amongst the military operations command and planning documents/procedures.

Other impacts would include changes to the “zero point” level for electronics and communications testing purposes on the BSETR, which would require Fort Huachuca to revise its radio frequency emitter inventory for this area to account for the new design and operation of the line. Revisions to radio frequency emitter inventories would be a moderate impact, since the inventories would not need to be relocated, but would need to be adjusted where an intersection of military operations with the proposed Project or alternatives would occur. This moderate impact would require advanced planning and coordination amongst the military operations command and planning documents/procedures. It is important to note that the existing transmission lines that are currently in operation within the analysis area are already accounted for in the existing EMF calculations.

Access road construction may increase access for OHV and other users in areas where the Project facilities occur on the BSETR. This could lead to increased levels of unauthorized use in areas that are closed to OHV and other uses, however locked gates and fencing would preclude unauthorized OHV use where prohibited. Refer to “Additional Mitigation Measures,” below.

The operational impacts to the Upgrade Section of the proposed Project and alternatives would be minor since the existing facilities are already be accounted for during military operations. These moderate impacts would require future military operations planning to account for the action alternatives (if the Project ROW is granted), thus moderately increasing the limitations for future or planned military uses.

Route Group 1 – Afton Substation to Hidalgo Substation

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

Segment P2 of Subroute 1.1 would cross MTR VR-263 (table 4.11-16). Construction impacts would be as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Segment P2 of Subroute 1.1 would cross MTR VR-263. At the crossing of VR-263 the minimum flight altitude is 100 feet AGL. Therefore, the optional structure height of 90 feet (as described in section 2.4.2) would be required at MTR VR-23 in order to prevent impacts to MTR-263. No other military installations or MTRs are present in subroute 1.1. Impacts for operation and maintenance of this subroute were described above in "Impacts Common to All Action Alternatives."

Table 4.11-16. Route Group 1 Military Uses Resource Inventory Data

	Total Miles	MTR VRs (miles)	MOAs (miles)	Willcox Playa DOD (miles)	BSETR (miles)
Subroute 1.1, Proponent Preferred					
P1	5.1	0	0	0	0
P2	102.0	0.1	0	0	0
P3	31.1	0	0	0	0
P4a	8.7	0	0	0	0
Subroute 1.2, Proponent Alternative					
S1	13.4	0	0	0	0
S2	11.1	0	0	0	0
S3	12.9	0	0	0	0
S4	10.6	0	0	0	0
S5	29.7	0	0	0	0
S6	7.4	0	0	0	0
S7	41.5	0.1	0	0	0
S8	14.6	0	0	0	0
Route Group 1 Local Alternatives					
DN1	42.5	0.1	0	0	0
A	17.5	0	0	0	0
B	12.2	0	0	0	0
C	9.0	0	0	0	0
D	22.8	0	0	0	0

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

MTR VR-263 would be crossed by segment S7 of Subroute 1.2. Construction impacts would be as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

MTR VR-263 would be crossed by segment S7 of Subroute 1.2. At the intersection of subroute 1.2 and MTR VR-263 the minimum flight altitude is 100 feet AGL. Therefore, the optional structure height of 90 feet (as described in section 2.4.2) would be required at MTR VR-263 in order to prevent impacts to MTR VR-263. Unmitigated, segment S7 would result in moderate impacts to MRT VR-263 due to the potential for airspace limitations at 100 feet AGL. No other military installations or MTRs are present within subroute 1.2. The Tombstone MOA is located approximately 3 miles south of the subroute and would not be impacted by subroute 1.2. Impacts for operation and maintenance of this subroute would be as described above in "Impacts Common to All Action Alternatives."

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: DN1, A, B, C, and D.

Construction

Local alternatives A, B, C, and D do not intersect with any military facilities or MTR VRs. Local alternative DN1 would cross MTR VR-263. Construction impacts would be as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Local alternatives A, B, C, and D do not intersect with any military facilities or MTR VRs. Local alternative DN1 would intersect with MTR VR-263. At the intersection of local alternative DN-1 and MTR VR-263, the minimum flight altitude is 100 feet AGL. Therefore, the optional structure height of 90 feet (as described in section 2.4.2) would be required at MTR VR-263 in order to prevent impacts to MTR-263. Unmitigated, DN-1 would result in moderate impacts to MRT VR-263 due to the potential for airspace limitations at 100 feet AGL. Impacts for operation and maintenance of the local alternatives were described above in "Impacts Common to All Action Alternatives."

Route Group 2 – Hidalgo Substation to Apache Substation

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

Segment P7 of Subroute 2.1 would cross the Willcox Playa, which is managed by the BSETR and is a possible site for test operations as well as MTR VR-259 and VR-260 (table 4.11-17). Construction impacts would be as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Segment P7 of subroute 2.1 would cross the Willcox Playa, which is managed by the BSETR and is a possible site for test operations. Segment P7 crosses DOD land for approximately 0.2 mile. This impact

would be minor since P7 follows an existing transmission line and the military is already avoiding this area due to the presence of the existing 230-kVtransmission line. The Proponent Preferred subroute 2.1 would lead to changes in the "zero point" level for electronics and communications testing purposes on the BSETR. Where subroute 2.1 intersects with MTR VR-259 and VR-260, the minimum flight altitudes are 700 feet AGL and 300 feet AGL, respectively, well above the proposed structure height of 90 to 170 feet, as described in section 2.4.2. Impacts for operation and maintenance of this subroute were described above in "Impacts Common to All Action Alternatives."

Table 4.11-17. Route Group 2 Military Uses Resource Inventory Data

Segment	Total Miles	MTR VRs (miles)	MOAs (miles)	Willcox Playa DOD (miles)	BSETR (miles)
Subroute 2.1, Proponent Preferred					
P4b	14.0	0	0	0	0
P4c	1.9	0	0	0	0
P5a	9.6	0	0	0	0
P5b	21.1	0	0	0	0
P6a	0.9	0	0	0	0
P6b	22.5	0.1	0	0	0
P6c	2.8	0	0	0	0
P7	22.3	0.5	0	0.2	0
P8	0.5	0	0	0	0
Subroute 2.2, Proponent Alternative					
E	31.8	0	0	0	0
F	25.3	0*	0	0	0
Ga	25.7	0	0	0	0
Gb	1.0	0	0	0	0
Gc	7.4	0.1	0	0	0
I	2.3	0	0	0	0
J	2.3	0	0	0	0
Route Group 2 Local Alternatives					
LD1	35.4	0	0	0	0
LD2	9.6	0	0	0	0
LD3a	27.9	0.1	0	0	0
LD3b	1.9	0	0	0	0
LD4	51.7	0.1	19.2	0	0
LD4-Option 4	6.5	0	0	0	0
LD4-Option 5	12.3	0	0	0	0
WC1	14.8	0	0	0	0

***** Value greater than zero but less than 0.1.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

Temporary ground disturbance would occur during construction activities where segments F and Gc would cross MTRs VR-259 and VR-260. These would result in minor impacts for subroute 2.2 as it would occur below the MTRs, which are used for aerial training, electronics, and communications testing. Additional construction impacts would be as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Segments F and GC of Subroute 2.2 would cross MTRs VR-259 and VR-260. Where VR-259 would intersect with subroute 2.2 the minimum flight altitude is 700 feet AGL. Where VR-260 would intersect the subroute the minimum flight elevation is 300 feet AGL. The impacts of these intersections would be minor since as it would occur below the MTR's AGL. Impacts for operation and maintenance of this subroute were described above in "Impacts Common to All Action Alternatives."

LOCAL ALTERNATIVES

There are eight local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1.

Construction

Local alternatives LD3a and LD4 would intersect with MTR VR-1233. LD4 would also intersect with VR-260 and the Morenci MOA. Construction impacts would be as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Local alternatives LD3a and LD4 would intersect with MTR VR-1233. LD4 would also intersect with VR-260. The minimum flight elevation at these intersections is 300 feet AGL. LD4 would also cross the Morenci MOA. The Morenci MOA occurs at an altitude between 1,500 feet AGL and 17,999 feet AMSL. As Project activities would occur approximately 200 feet AGL, it is not anticipated that the MOA would be impacted by LD4. Additional impacts for operation and maintenance of the local alternatives were described above in "Impacts Common to All Action Alternatives."

Route Group 3 – Apache Substation to Pantano Substation

SUBROUTE 3.1 – PROPONENT PREFERRED

Construction

Temporary ground disturbance would occur during construction activities where the analysis area (segments U1a, U1b, U2, and local alternative H), the Adams Tap Substation expansion, and representative staging area 10 would cross the BSETR (table 4.11-18). The substation expansion would occur on 5.6 acres and the representative staging area would occur on 19.8 acres of the BSETR. This would not be a significant impact for subroute 3.1, since it would occur in the BSETR, which is used for electronics and communications testing. Additional construction impacts would be as described above in "Impacts Common to All Action Alternatives."

Table 4.11-18. Route Group 3 Military Uses Resource Inventory Data

	Total Miles	MTR VRs (miles)	MOAs (miles)	Willcox Playa DOD (miles)	BSETR (miles)
Subroute 3.1, Proponent Preferred					
U1a	16.1	0	0	0	10.3
U1b	2.9	0	0	0	2.9
U2	15.8	0	0	0	10.0
U3a	35.6	0	0	0	0
Route Group 3 Local Alternative					
H	19.3	0	0	0	8.7

Operation and Maintenance

Segments U1a, U1b, and U2 of Subroute 3.1 would cross the BSETR. The upgrade of the existing Western 115-kV transmission line between Apache and Benson to a double-circuit 230-kV design, therefore, would require Fort Huachuca to revise its radio frequency emitter inventory for this area to account for the new design and operation of the line An upgrade of the existing line would include a higher electronic emission, however any transmission line design would use best available technology to minimize EMF, therefore upgrading the existing line could actually reduce EMF from current emissions. Thus the impacts of the Agency Preferred Alternative to military uses in the BSETR would also be negligible. Finally, the BLM and Western are working with the DOD clearinghouse, BSETR, and EPG to develop mitigation (see "Additional Mitigation Measures" below).

The Adams Tap Substation expansion and representative staging area 10 would occur within portions of the BSETR. The substation expansion would occur on 5.6 acres and the representative staging area would occur on 19.8 acres of the ETR. This would not be a significant impact for subroute 3.1, since it would occur in the BSETR, which is used for electronics and communications testing. Subroute 3.1 (Proponent Preferred) lead to ground disturbance and changes in the "zero point" level for electronics and communications testing purposes on the ETR. Approximately 13 miles of segment U1 and U1b and approximately 9 miles of segment U2 of Subroute 3.1 would intersect the BSETR.

No other military facilities are located within the analysis area for subroute 3.1. Impacts for operation and maintenance of this subroute were described above in "Impacts Common to All Action Alternatives."

LOCAL ALTERNATIVES

There is one local alternative for route group 3–local alternative H.

Construction

Temporary ground disturbance would occur during construction activities within the analysis area. Construction impacts would be as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Local alternative H would cross the BSETR for a length of approximately 8 miles. The construction of local alternative H, instead of upgrading the existing Western line along I-10, would lead to changes in

the "zero point" level for electronics and communications testing purposes on the BSETR. Implementation of local alternative H would shift the EMF impacts north away from I-10, into an area used by EPG for electronic and communications testing.

No other military facilities are located within this local alternative. Impacts for operation and maintenance of this local alternative were described above in "Impacts Common to All Action Alternatives."

Route Group 4 – Pantano Substation to Saguaro Substation

SUBROUTE 4.1 – PROPONENT PREFERRED

Construction

No military facilities are located within the analysis area in subroute 4.1 (table 4.11-19). Therefore, there would be no construction-related impacts on military uses in subroute 4.1.

Table 4.11-19. Route Group 4 Military Uses Resource Inventory Data

Segment	Total Miles	MTR VRs (miles)	MOAs (miles)	Willcox Playa DOD (miles)	BSETR (miles)
Subroute 4.1, Proponent Preferred					
U3b	0.5	0	0	0	0
U3c	1.0	0	0	0	0
U3d	3.4	0	0	0	0
U3e	0.9	0	0	0	0
U3f	0.7	0	0	0	0
U3g	0.9	0	0	0	0
U3h	1.1	0	0	0	0
U3i	18.2	0	0	0	0
U3j	0.9	0	0	0	0
U3k	16.7	0	0	0	0
U3l	1.6	0	0	0	0
U3m	0.6	0	0	0	0
U4	1.9	0	0	0	0
Route Group 4 Local Alternatives					
MA1	1.1	0	0	0	0
TH1a	1.4	0	0	0	0
TH1b	1.6	0	0	0	0
TH1c	0.3	0	0	0	0
TH1-Option	1.0	0	0	0	0
TH3-Option A	0.8	0	0	0	0
TH3-Option B	0.8	0	0	0	0
TH3-Option C	1.8	0	0	0	0
TH3a	2.7	0	0	0	0
TH3b	4.5	0	0	0	0

Operation and Maintenance

No military facilities are located within the analysis area in subroute 4.1. Davis-Monthan Air Force Base and Pinal Airpark are located 3.7 miles from the analysis area. Tucson International Airport and the Silverbell Army Heliport are located approximately 2 miles and 1 mile, respectively, from the analysis area. No impacts would occur at the Davis-Monthan Air Force Base or Tucson International Airport. Minor impacts to military operations at Pinal Airpark and Silverbell Army Heliport are anticipated from the Proponent Preferred, subroute 4.1 since the upgrades would introduce new tower heights and the increased transmission capacity may interfere with radio transmissions. Specifically, higher height single poles and increase power could have an effect on Pinal Airpark and Silver Bell Army Heliport's area of operations on the approach and departure end of the runway and helipads to the North of Pinal Airpark and Silver Bell Army Heliport's area of operations and could have an effect on the parachute drop zone from the west. The increased height and power could have an effect on Pinal Airpark and Silver Bell Army Heliport area of operation radio transmissions.

LOCAL ALTERNATIVES

There ten nine local alternatives available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C.

Construction

Local alternatives MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C would not intersect with any areas of military uses. Therefore, they are not anticipated to have any construction-related impact on military uses.

Operation and Maintenance

Local alternatives MA1, TH1a, TH1b, TH1c, TH1 Option, TH3a, TH3b, TH3-OptionA, TH3-OptionB, and TH3-OptionC would not intersect with any areas of military uses. Therefore, they are not anticipated to have any operational or maintenance-related impact on military uses.

Agency Preferred Alternative

During construction as well as operation and maintenance, the Agency Preferred Alternative would result in short-term and moderate impacts to military use of airspace along the Upgrade Section of the Agency Preferred Alternative, due to taller tower heights and an increase in power flow. The increase height and power could have an effect on radio transmissions for military uses.

The Agency Preferred Alternative was developed in coordination with the DOD clearinghouse, as well as staff from BSETR and the EPG. The Agency Preferred Alternative was identified in order to minimize impacts to military operations near Willcox Playa and to the BSETR. Though segment P7 would cross DOD-owned land on the southeast portion of the Willcox Playa, this segment would be located along an existing transmission line ROW, and would be the furthest away from the most sensitive military use areas of the Willcox Playa and BSETR.

Similarly, though upgrade of the existing Western line (segments U1a, U1b, and U2 of the Agency Preferred Alternative) crosses the BSETR, EMF from the existing line is already part of the baseline calculations within BSETR. Further, no electronic testing is currently conducted in the area of the existing Western 115-kV line because of the existing line, I-10 corridor, topography, and other interference disturbances. An upgrade of the existing line would include a higher electronic emission, however any transmission line design would use best available technology to minimize EMF, therefore upgrading the

existing line could actually reduce EMF from current emissions. Thus the impacts of the Agency Preferred Alternative to military uses in the BSETR would also be negligible. Finally, the BLM and Western are working with the DOD clearinghouse, BSETR, and EPG to develop mitigation (see "Additional Mitigation Measures" below).

Additional Mitigation Measures

The following additional mitigation measure relevant to military uses have been recommended by the Arizona Air National Guard, 162nd Fighter Wing Airspace Manager.

- Lower the transmission lines in areas intersecting MTRs VR-259, VR-260, and VR-263 to remove impacts to military training and airspace usage. Additionally, do not erect any structures exceeding 200 feet in height.

The following additional mitigation measures relevant to military operations at BSETR have been recommended by Fort Huachuca:

- The transmission line operator would work with BSETR to coordinate, and possibly limit, interconnections to the proposed Southline Project to the extent allowed by FERC;
- Southline and Western would work with BSETR to identify micro-siting opportunities during Project design. Utilize electromagnetic effects–reducing construction techniques and/or special construction to ensure minimal electromagnetic effects;
- The transmission line operator would coordinate with BSETR during the design phase of the proposed Project to limit EMI. The proposed Project would be constructed using the best available construction techniques and technology (i.e., use of grounding, selective conductor type and arrangement, and conductor surface gradients), to the extent feasible and reasonably economical, in order to minimize EMI.
- The transmission line operator would coordinate with BSETR to allow for an updated measure of the "floor value" of the proposed Project, once the proposed line is energized. Such cooperation could include provision of real-time operating and load information to the BSETR to help calibrate the floor value of EMI.
- The transmission line operator would coordinate with BSETR to develop reporting standards, for potential inclusion in the transmission line maintenance and inspection program, to the extent allowable by FERC. While normal inspection maintenance would take care of typical EMI issues, specific incidents such as storm damage or vandalism would need to be responded to outside of the normal maintenance cycle. If not detectable through transmission line monitoring, the operator would need to hear from someone experiencing interference in order to respond.
- The transmission line operator would coordinate planned outages (curtailment of power line operations for BSETR to implement testing) with BSETR to the extent feasible in order to meet necessary contractual commitments, utility mandates, laws and regulations, and power system requirements. The operator is very limited in the timing and duration of potential outages; outages stress the rest of the system which can cause system failures.

Residual Impacts

Residual impacts could include the loss of airspace along MTR VRs if mitigation to lower the transmission lines in areas intersecting the VRs is not successful in lowering the lines below the minimum flight elevations. Because flight operations would not be required to relocate, the residual loss of airspace along MRT VRs would be a moderate impact.

Unavoidable Adverse Impacts

The construction, operation and maintenance of the proposed Project would not cause unavoidable adverse impacts on military uses.

Short-term Uses versus Long-term Productivity

The construction, operation and maintenance of the proposed Project and action alternatives is unlikely to cause short-term uses of the environment that would affect the long-term productivity of military uses.

Irreversible and Irretrievable Commitments of Resources

No irreversible or irretrievable commitment of military uses resources would occur as a result of the action alternatives.

4.12 SPECIAL DESIGNATIONS

4.12.1 Introduction

This section describes the impacts to special designations associated with the construction and operation and maintenance of the transmission line, substations, and ancillary facilities. Potential impacts to special designations are discussed in terms of Project activities directly or indirectly altering, conflicting, or requiring new management prescriptions for special designations. The impacts described in this section are based on information provided in "Southline Transmission Project Resource Report 13: Special Designations" (CH2M Hill 2013n). The contents of that report are used herein without specific reference.

4.12.2 Methodology and Assumptions

The analyses for special designations include an assessment of whether Project-related actions would alter, conflict with, or require new management prescriptions and objectives, or otherwise physically or administratively affect State or federally established, designated, or reasonably foreseeable planned special use areas. All BLM special designations are intended to conserve, protect, enhance, and manage public lands for the benefit and enjoyment of present and future generations.

Analysis Area

As discussed in chapter 3, section 3.12, the special designation analysis area is the representative ROW with a 1-mile buffer on each side of the centerline for route groups 1 and 2 and a 200-foot buffer on each side of the existing 100-foot ROW for route groups 3 and 4.

Analysis Assumptions

There are no specific analysis assumptions for special designations beyond the impact indicators and significance criteria described below.

Impact Indicators

- Whether the proposed Project would conflict with the goals, objectives, and resources a particular special designation is intended to protect.

Significant Impacts

Effects on special designations would occur if construction and operation/maintenance of the Project conflicts with the objectives of the special designation. The Project could have potential effects on natural qualities, outstanding opportunities for solitude and primitive recreation, and values such as visual resources and visibility from special designations.

For the purposes of this analysis, a significant impact on special designations would occur if:

- The proposed Project would conflict with the goals, objectives, and resources a particular special designation is intended to protect.

4.12.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the BLM would not grant the ROW for the proposed Project. Analysis area conditions would likely continue at current levels and trends. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a). However, there would be no impacts on special designations within the analysis area from the no action alternative since no activities would conflict with the goals, objectives, and resources of special designations.

Impacts Common to All Action Alternatives

CONSTRUCTION

Potential impacts from construction activities that would be common to all action alternatives include direct ground disturbance and temporary increases in ambient noise levels in areas where the transmission line, substations, and ancillary facilities intersect with special designations. The only BLM special designations that would be intersected by the proposed Project would be National Trails and/or Trails Under Study for National Designation. Though other special designations may be included in the analysis area, only National Trails would be intersected by the proposed Project. Increases in ambient noise levels, the presence of equipment, and dust would be temporary and would decrease with the completion of construction activities. Impacts to special designations during construction would be minor since the activities would be short-term in nature, and would not occur within special designations; National Trails being the exception (refer to appendix F for a detailed National Trails Assessment). Substation expansions that may occur within County special designations would be constructed in areas that are already in operation and have been previously disturbed.

OPERATION AND MAINTENANCE

Potential impacts common to all action alternatives could include indirect impacts to Wilderness, WSAs, ACECs, and National Monuments, where Project facilities would be sited near these special designations. Potential indirect impacts could include changes to the natural, historic, cultural, or visual character of some special designations. Other impacts could include increased access to areas due to the presence of access roads. This could lead to increased use of areas by OHV users, which could conflict with management objectives for some special designations.

There would be no direct impacts on designated wilderness areas and WSAs, as no facilities would be sited within wilderness area or WSA boundaries. Potential indirect impacts would include loss of

outstanding opportunities for solitude or primitive and unconfined recreation as a result of changes to the visual character of the surrounding lands; these impacts are anticipated to be minor since existing facilities (e.g., transmission lines, pipelines, roads) would also be visible.

Despite potential indirect impacts on wilderness areas and WSAs from changes in the visual character of the surrounding lands, the impacts to wilderness and/or WSAs would be minor. The New Mexico Wilderness Act of 1980, the Arizona Wilderness Act of 1984, and the Arizona Desert Wilderness Act of 1990 all indicate that Congress did not intend for the designation of wilderness areas to lead to the creation of protective perimeters and buffer zones. The acts state, "The fact that nonwilderness activities or uses can be seen or heard from within the wilderness shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area." As such, while indirect visual or noise related impacts from the proposed Project could affect outstanding opportunities for solitude or primitive and unconfined recreation in wilderness areas or WSAs, these actions would not preclude the proposed Project or alternatives.

Potential impacts on trails would include direct impacts where facilities would be sited within the designated trail corridor. Potential indirect impacts could include changes to the visual character, historic, natural, or cultural qualities of the trail as well as temporary increases in ambient noise levels during maintenance activities. However, these impacts would be minor since all crossings of National Trails (including trails under study for national designation) would occur in areas that include existing transmission facilities.

Potential impacts on ACECs would not include direct impacts, as none of the proposed Project or alternatives would be sited within ACEC boundaries. Indirect impacts could include changes to the natural, historic, cultural, or visual character of the ACEC. These impacts would be minor since none of the disturbance would take place within the ACEC, and the proposed Project would be located along existing utilities in the areas where the Project would be adjacent to the ACECs.

For route groups 3 and 4, the magnitude of impacts would be reduced compared with those in route groups 1 and 2, as the existing line would be upgraded rather than a new build. Impacts to visual resource management areas are described in Sections 4.10 and 4.11.1, "Visual Resources" and "Land Use," respectively.

Route Group 1 – Afton Substation to Hidalgo Substation

Table 4.12-1 describes which segments within route group 1 would intersect special designations. Acreages are not additive and may overlap.

Table 4.12-1. Route Group 1 Special Designations Resource Inventory Data

Segment	Total Miles	Continental Divide Trail (miles)	Butterfield Trail (miles)
Subroute 1.1, Proponent Preferred			
P1	5.1	0	0
P2	102.0	0	0*
P3	31.1	0	0
P4a	8.7	0.1	0

Table 4.12-1. Route Group 1 Special Designations Resource Inventory Data (Continued)

Segment	Total Miles	Continental Divide Trail (miles)	Butterfield Trail (miles)
Subroute 1.2, Proponent Alternative			
S1	13.4	0	0
S2	11.1	0	0
S3	12.9	0	0
S4	10.6	0	0
S5	29.7	0	0
S6	7.4	0	0
S7	41.5	0	0
S8	14.6	0	0*
Route Group 1, Local Alternatives			
DN1	42.5	0	0
A	17.5	0	0
B	12.2	0	0
C	9.0	0	0
D	22.8	0*	0

* Value greater than zero but less than 0.1.

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

Segments within subroute 1.1 would cross the Butterfield Trail and the CDNST. Segments within subroute 1.1 would pass within 1 mile of the Mount Riley/West Potrillo Mountains WSAs and the Aden Hills OHV area. Construction impacts would be as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Indirect impacts on WSAs may occur where the proposed transmission line and other facilities are visible from WSAs. The proposed transmission line would pass within 5 miles of and would likely be visible from the southern and eastern portions of the Aden Lava Flow and Mount Riley/West Potrillo Mountains WSAs (refer to sections 3.10 and 4.10 for visual resources analysis).

As noted above, segments of subroute 1.1 would cross the Butterfield Trail and the CDNST. The crossing of the CDNST would occur approximately 7 miles northeast of Lordsburg. The 2009 comprehensive plan for the CDNST does not classify lands along the trail at the point of intersection. In addition, the BLM has not designated ROS classes or management prescriptions for the trail in the area of the intersection. The Mimbres RMP goals for the trail are to "manage to maintain scenic and primitive recreation values in accordance with the enabling legislation."

Because of the physical and visual proximity to rural and/or developed areas, the location where the CDNST would intersect the analysis area would be classified as rural and/or roaded natural. Both the roaded natural and rural classifications assume that the natural setting may have strong modifications, including those that are strongly dominant. The rural classification specifically anticipates the presence of utility corridors. Thus, the impact to the CDNST would be negligible. The comprehensive plan for the CDNST (CDNST Interagency Leadership Council 2009), Section 5, "Recreation Resource Management," indicates that in areas where the ROS classification would be roaded natural or rural, VRM Class III areas would be the norm. Therefore, the proposed Project would be consistent with the existing management of the CDNST in the analysis area and would result in minor, long-term impacts to the CDNST.

The Butterfield Trail does not yet have a management plan; however, the Mimbres RMP goals for the trail are to "manage to protect and interpret historical values." In the area where the subroute would cross the Butterfield Trail, there are no existing management prescriptions or ROS classes designated. Further, subroute 1.1 would intersect the Butterfield Trail on New Mexico state lands in areas that include previous disturbance. Thus, the impact to the Butterfield Trail would be negligible. Therefore, the proposed Project would be consistent with the existing management of that area. A National Trails assessment, in accordance with BLM Manual 6280 is underway, and further analysis is provided in appendix F of this DEIS.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

Subroute 1.2 would cross the Butterfield Trail. Construction impacts would be as described above in "Impacts Common to all Action Alternatives."

Operation and Maintenance

Indirect impacts on WSAs may occur where subroute 1.2 and other facilities are visible from WSAs. Segment S3 would be within 200 feet of and would be visible from portions of the Aden Lava Flow WSA and the Mount Riley/West Potrillo Mountains WSAs. This would be an indirect, minor impact to the WSAs, as discussed under "Impacts Common to all Action Alternatives."

Segments of subroute 1.2 would cross the Butterfield Trail. The Butterfield Trail does not yet have a management plan; however, the Mimbres RMP goals for the trail are to "manage to protect and interpret historical values." In the area where the subroute would cross the Butterfield Trail, there are no existing management prescriptions or ROS classes designated. Further, subroute 2.1 would intersect the Butterfield Trail on New Mexico state lands in areas that include previous disturbance. Thus, the impact to the Butterfield Trail would be negligible. The proposed Project would be consistent with the existing management of that area. Other impacts for operation/maintenance of this subroute would be as described above in "Impacts Common to all Action Alternatives."

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: DN1, A, B, C, and D.

Construction

Local alternatives A and B do not intersect with any special designations. However, alternative B does cross within 200 feet of the Mount Riley/West Potrillo Mountains WSAs and would be visible from portions of the WSAs. Construction impacts would be the same as described above in "Impacts Common to all Action Alternatives."

Operation and Maintenance

Local alternatives included in route group 1 would cross within 2 miles of the West Potrillo Mountains WSA and would be visible from portions of the WSA. Impacts on the CDNST would be similar in nature to those described above for subroute 1.1. Other impacts for operation/maintenance of the local alternatives would be as described above in "Impacts Common to all Action Alternatives."

Route Group 2 – Hidalgo Substation to Apache Substation

Table 4.12-2 describes which segments within route group 2 would intersect special designations. Acreages are not additive and may overlap.

Table 4.12-2. Route Group 2 Special Designations Resource Inventory Data

	Total Miles	Butterfield Trail (miles)
Subroute 2.1, Proponent Preferred		
P4b	14.0	0
P4c	1.9	0*
P5a	9.6	0
P5b	21.1	0*
P6a	0.9	0
P6b	22.5	0
P6c	2.8	0
P7	22.3	0
P8	0.5	0
Subroute 2.2, Proponent Alternative		
E	31.8	0.1
F	25.3	0
Ga	25.7	0
Gb	1.0	0
Gc	7.4	0
I	2.3	0
J	2.3	0
Route Group 2 Local Alternatives		
LD1	35.4	0.1
LD2	9.6	0.2
LD3a	27.9	0*
LD3b	1.9	0
LD4	51.7	0
LD4-Option 4	6.5	0
LD4-Option 5	12.3	0
WC1	14.8	0

* Value greater than zero but less than 0.1.

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

Subroute 2.1 would cross the Butterfield Trail. Subroute 2.1 would pass within one mile of the Peloncillo Mountains Wilderness Area. The proposed transmission line would be visible from portions of the wilderness area. Construction impacts to these special designations would be the same as described above in "Impacts Common to all Action Alternatives."

Operation and Maintenance

Impacts for operation/maintenance of this Subroute would be the same as described above in "Impacts Common to all Action Alternatives."

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

Subroute 2.2 would cross the Butterfield Trail. It would also cross within 5 miles of the Peloncillo Mountains Wilderness Area and would likely be visible from the wilderness area. Construction impacts would be the same as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Impacts for operation/maintenance of this subroute would be as described above in "Impacts Common to All Action Alternatives."

LOCAL ALTERNATIVES

There are seven local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, and WC1.

Construction

Local alternatives LD2, LD3a, LD3b, and LD4 would occur within 5 miles of the Peloncillo Mountains Wilderness Area and would likely be visible from portions of the wilderness area. Local alternative LD1would intersect the, Butterfield Trail. LD2 and LD3a would also cross the Butterfield Trail. Construction impacts would be the same as described above in "Impacts Common to all Action Alternatives."

Operation and Maintenance

Local alternatives LD2, LD3a, LD3b, and LD4 would occur within 5 miles of the Peloncillo Mountains Wilderness Area and would likely be visible from portions of the wilderness area. Local alternative LD1would intersect the Butterfield Trail. LD2 and LD3a would also cross the Butterfield Trail. Impacts on the Butterfield Trail would be similar to those described above for subroute 1.1. Impacts for operation/maintenance of these local alternatives would be the same as described above in "Impacts Common to All Action Alternatives."

Route Group 3 – Apache Substation to Pantano Substation

Table 4.12-3 describes which segments within route group 3 would intersect special designations. Acreages are not additive and may overlap.

Table 4.12-3. Route Group 3 Special Designations Resource Inventory Data

	Total Miles	Pima County Biological Core Management Areas (acres)	Pima County Important Riparian Areas (acres)	Pima County Multiple Use Management Areas (acres)	Las Cienegas NCA (acres)	Arizona National Scenic Trail (miles)	Butterfield Trail (miles)
Subroute 3.1, Proponent Preferred							
U1a	16.1	0	0	0	0	0	0.1
U1b	2.9	0	0	0	0	0	0
U2	15.8	16.2	0	0	0	0	0.3
U3a	35.6	298.9	15.2	41.8	91.0	0.1	0
Route Group 3 Local Alternative							
H	19.3	46.5	1.3	0	0	0	0.1

SUBROUTE 3.1 – PROPONENT PREFERRED

Construction

Subroute 3.1 would cross Pima County Biological Core Management Areas, Important Riparian Areas, and Multiple Use Management Areas. The impacts to Pima County special designations would be negligible since subroute 3.1 would occur in areas that already contain utilities, including existing Western lines. Further, the transmission line would span the important Biological Core and Important Riparian Areas and no towers would be constructed within the specially designated areas. The impact would be negligible to the Multiple Use areas since transmission lines are an allowable use for this designation, and existing Western lines are already in operation for all portions of subroute 3.1.

Subroute 3.1 would also cross the Las Cienegas NCA, the Butterfield Trail and Arizona National Scenic Trail. All of these crossings would occur in areas that already contain transmission lines and facilities; therefore the impact to special designations would be negligible since the management prescriptions for these special designations were already in place and all proposed activities would be limited to this existing ROW.

Subroute 3.1 would be constructed on approximately 9.0 acres of the Coronado National Forest. This area of the Coronado National Forest currently includes an existing Western transmission line, as well as existing access roads. There would be no impacts to special designations since no special designations are found within the analysis area of the Coronado National Forest.

Operation and Maintenance

Subroute 3.1 would cross Pima County Biological Core Management Areas, Important Riparian Areas, and Multiple Use Management Areas. Subroute 3.1 would also cross portions of the Las Cienegas NCA.

The impacts to these special designations would be negligible since these crossings would occur in areas that already contain transmission lines and facilities.

Subroute 3.1 would also cross the Butterfield Trail and the Arizona Trail. Impacts on the Butterfield Trail would be similar in nature to those described above for subroute 1.1; however, the scope of the impacts would be commensurately less since subroute 3.1 would upgrade an existing line in this area. The subroute would cross the Arizona Trail within 1 mile of I-10 and within 2 miles of Vail, Arizona. As subroute 3.1 would cross the trail along I-10 and near a developed area, there would be no change to the visual character of the trail at this location.

Operation and maintenance of subroute 3.1 on the Coronado National Forest would not impact special designations since none are located within the analysis area of the Coronado National Forest.

LOCAL ALTERNATIVES

There is one local alternative for route group 3: local alternative H.

Construction

Local alternative H would cross the Butterfield Trail and Pima County Biological Core Management Areas and Important Riparian Areas. The Butterfield Trail would be crossed by the local alternative on Arizona state land. Construction impacts would be the same as described above in "Impacts Common to All Action Alternatives."

Operation and maintenance

Local alternative H would cross the Butterfield Trail and Pima County Biological Core Management Areas and Important Riparian Areas. Impacts for operation/maintenance of this local alternative would be the same as described above in "Impacts Common to All Action Alternatives."

Route Group 4 – Pantano Substation to Saguaro Substation

Table 4.12-4 describes which segments within route group 4 would intersect special designations. Acreages are not additive and may overlap.

Table 4.12-4. Route Group 4 Special Designations Resource Inventory Data

	Total Miles	Pima County Biological Core Management Areas (acres)	Pima County Important Riparian Areas (acres)	Pima County Multiple Use Management Areas (acres)	Pima County Agricultural Inholdings (acres)	Butterfield Trail (miles)	Juan Bautista De Anza National Historic Trail (miles)
Subroute 4.1, Proponent Preferred							
U3b	0.5	0	1.3	0*	0	0	0
U3c	1.0	0	1.7	1.9	0	0	0.1

Table 4.12-4. Route Group 4 Special Designations Resource Inventory Data (Continued)

	Total Miles	Pima County Biological Core Management Areas (acres)	Pima County Important Riparian Areas (acres)	Pima County Multiple Use Management Areas (acres)	Pima County Agricultural Inholdings (acres)	Butterfield Trail (miles)	Juan Bautista De Anza National Historic Trail (miles)
U3d	3.4	0	1.3	0.5	0	0	0
U3e	0.9	0	0	16.1	0	0	0
U3f	0.7	0	0	12.4	0	0	0
U3g	0.9	0	0	1.0	0	0	0
U3h	1.1	0	1.5	0.3	0	0*	0
U3i	18.2	18.8	89.1	52.3	0	0.1	0.1
U3j	0.9	0	0	0	0	0	0
U3k	16.7	0	0	154.2	30.2	0	0*
U3l	1.6	0	0	0	0	0.1	0
U3m	0.6	0	0	0	0	0	0
U4	1.9	0	0	0	30.2	0	0
Route Group 4 Local Alternatives							
MA1	1.1	0	0	0	0	0	0
TH1a	1.4	0	0	25.7	0	0	0
TH1b	1.6	0	0	0.6	0	0	0
TH1c	0.3	0	0	0	0	0	0
TH1-Option	0.4	0	0	7.7	0	0	0
TH3-Option A	0.8	0	5.3	3.4	0	0	0
TH3-Option B	0.8	0	1.2	1.3	0	0	0*
TH3-Option C	1.8	0	8.3	14.5	0	0	0
TH3a	2.7	0	7.1	0*	0	0	0
TH3b	4.5	0	0	0	0	0*	0.2

Table 4.12-5 describes which segments within route group 4 would include special designations in terms of local and county parks. Acreages are not additive and may overlap.

Table 4.12-5. Route Group 4 Special Designations Resource Inventory Data for Local and County Parks

	Total Miles	Christopher Columbus Park (acres)	Santa Cruz River Park (acres)	Kennedy Park (acres)	Tucson Mountain Park (acres)	Joaquin Murrieta Park (acres)	Greasewood Park (acres)	Tumamoc Hill (acres)
Subroute 4.1, Proponent Preferred								
U3b	0.5	0	0	0	0	0	0	0
U3c	1.0	0	0	0	0	0	0	0

Table 4.12-5. Route Group 4 Special Designations Resource Inventory Data for Local and County Parks (Continued)

	Total Miles	Christopher Columbus Park (acres)	Santa Cruz River Park (acres)	Kennedy Park (acres)	Tucson Mountain Park (acres)	Joaquin Murrieta Park (acres)	Greasewood Park (acres)	Tumamoc Hill (acres)
U3d	3.4	0	0	7.8	8.0	0	0	0.1
U3e	0.9	0	0	0	0	0	0	14.3
U3f	0.7	0	0	0	0	0	0	0.4
U3g	0.9	0	0	0	0	0	0	0
U3h	1.1	0	0.6	0	0	5.0	0	0
U3i	18.2	20.9	1.6	0	0	0	0	0
U3j	0.9	0	0	0	0	0	0	0
U3k	16.7	0	0	0	0	0	0	0
U3l	1.6	0	0	0	0	0	0	0
U3m	0.6	0	0	0	0	0	0	0
U4	1.9	0	0	0	0	0	0	0
Route Group 4 Local Alternatives								
MA1	1.1	0	0	0	0	0	0	0
TH1a	1.4	0	0	0	0	0	0	21.7
TH1b	1.6	0	0	0	0	0	3.0	0
TH1c	0.3	0	0	0	0	0	0	0
TH1-Option	0.4	0	0	0	0	0	0	0
TH3-Option A	0.8	0	3.6	0	0	0	0	0
TH3-Option B	0.8	0	0.3	0	0	0	0	0
TH3-Option C	1.8	0	9.2	0	0	0	0	0
TH3a	2.7	0	0	0	0	0	0	0
TH3b	4.5	0	36.4	0	0	0	0	0

SUBROUTE 4.1 – PROPONENT PREFERRED

Construction

Subroute 4.1 would cross Pima County Biological Core Management Areas, Important Riparian Areas, Multiple Use Management Areas, and Agricultural Inholdings. The subroute would also cross the Butterfield Trail and Anza Trail. Impacts to these special designations would be the same as described under subroute 3.1, since existing Western lines are already in operation for all portions of subroute 4.1.

Representative staging area 13 would cross the Anza Trail for less than 0.1 mile. This area of the Anza Trail is highly disturbed, includes existing Western transmission lines and is located in an urban setting. It would also be located within Pima County Biological Core Management Areas for 0.8 acre and Pima County Important Riparian Areas for 19.5 acres. Representative staging area 11 would occur on 19.5 acres of Pima County Biological Core Management Areas. Impacts from the staging areas would be

temporary and would be within an existing ROW that already includes a Western transmission line, as well as access roads. Further, the areas would be reclaimed after the completion of construction activities, thus resulting in a short-term, minor impact to these county special designations.

The Marana Substation expansion would occur on 14.5 acres of Pima County Multiple Use Management Areas. The Pantano Substation expansion would occur on 25.0 acres of Pima County Biological Core Management Areas and 0.5 acre of Pima County Important Riparian Areas.

Subroute 4.1 would also intersect with some local and county parks. The impacts to these city special designations would be negligible since Subroute 4.1 would occur in areas that already contain utilities. Further, the transmission line would span the parks as the existing Western existing lines between the Apache and Saguaro substations currently do. It would cross Christopher Columbus Park, Santa Cruz River Park, Kennedy Park, Joaquin Murrieta Park, and Tumamoc Hill. Construction impacts would be the same as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Subroute 4.1 would cross Pima County Biological Core Management Areas, Important Riparian Areas, Multiple Use Management Areas, and Agricultural Inholdings. The subroute would also cross the Butterfield Trail and the Anza Trail. Impacts to these special designations would be the same as described under subroute 3.1.

Minor changes would occur to the visual character of the Butterfield Trail and Anza Trail in areas where the subroute would intersect with the trail. However, these impacts would be minor as the trails in this subroute would pass through the urbanized area in and around Tucson and work at the intersections would involve upgrading an already existing transmission line.

Representative staging area 13 would cross the Anza Trail for less than 0.1 mile. It would also occur within Pima County Biological Core Management Areas for 0.8 acre and Pima County Important Riparian Areas for 19.5 acres. Representative staging area 11 would occur on 19.5 acres of Pima County Biological Core Management Areas. Impacts from the staging areas would be temporary and the areas would be reclaimed after the completion of construction activities.

The Marana Substation expansion would occur on 14.5 acres of Pima County Multiple Use Management Areas. The Pantano Substation expansion would occur on 25.0 acres of Pima County Biological Core Management Areas and 0.5 acre of Pima County Important Riparian Areas.

Subroute 4.1 would also intersect with some local and county parks. It would cross Christopher Columbus Park, Santa Cruz River Park, Kennedy Park, Joaquin Murrieta Park, and Tumamoc Hill. Impacts from operations and maintenance would be the same as described above in "Impacts Common to All Action Alternatives."

LOCAL ALTERNATIVES

There are ten local alternatives are available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C. These local alternatives represent options that would enable the proposed Project to avoid Tumamoc Hill.

Construction

Local alternatives that would occur on lands managed by Pima County as Important Riparian Areas would be TH3a, TH3-Option A, TH3-Option B, and TH3-Option C. Local alternatives that would occur

on lands managed by Pima County as Multiple Use Management Areas would be TH1a, TH1b, TH1-Option, TH3a, TH3-Option A, TH3-Option B, and TH3-Option C. These impacts would be the same as described under subroute 2.1

Local alternatives TH3b and TH3-Option B would cross the Anza Trail. TH3b would also cross the Butterfield Trail. Impacts on the Butterfield and Anza Trail would be the same as described above for subroute 4.1.

Local alternatives would occur in local and county parks. Local alternatives TH3b, TH3-Option A, TH3-Option B, and TH3-Option C would occur in the Santa Cruz River Park. TH1b would occur in Greasewood Park, and TH1a would cross Tumamoc Hill. Construction impacts would be the same as described above in "Impacts Common to All Action Alternatives."

Operation and Maintenance

Local alternatives that would occur on lands managed by Pima County as Important Riparian Areas would be TH3a, TH3-Option A, TH3-Option B, and TH3-Option C. Local alternatives that would occur on lands managed by Pima County as Multiple Use Management Areas would be TH1a, TH1b, TH1-Option, TH3a, TH3-Option A, TH3-Option B, and TH3-Option C.

Local alternatives TH3b and TH3-Option B would cross the Anza Trail. TH3b would also cross the Butterfield Trail. Impacts on the Butterfield and Anza Trail would be as described above for subroute 4.1. RDEP nominated sites would be crossed by TH3a and TH3-Option C.

Local alternatives would occur in local and county parks. Local alternatives TH3b, TH3-Option A, TH3-Option B, and TH3-Option C would occur in the Santa Cruz River Park. TH1b would occur in Greasewood Park, and TH1a would cross Tumamoc Hill. Impacts from operations and maintenance would be the same as described above in "Impacts Common to All Action Alternatives."

Agency Preferred Alternative

The Agency Preferred Alternative would not conflict with the goals, objectives, or resources of special designations. Short-term, minor impacts would occur at the intersections of segments P2, P4a, U1a, U2, U3a, U3i, U3h, U3k, and U3l and National Trails during construction, as described under "Impacts Common to All Action Alternatives."

Short-term, indirect minor impacts to special designations would occur at the intersections of the Agency Preferred Alternative segments in the Upgrade Section of the Project with National Trails, Aden Hills OHV area, Bar V Ranch, Tucson Mountain Park, Tumamoc Hill, Joaquin Murrieta Park, Santa Cruz River Park, and Christopher Columbus Park during construction, as described under "Impacts Common to All Action Alternatives." These impacts would be minor due to the presence of existing transmission line ROWs at these intersections.

Additional Mitigation Measures

- No additional mitigation measures are proposed for special designations.

Residual Impacts

Residual impacts would include direct ground disturbance and temporary increases in ambient noise levels in areas where the transmission line, substations, and ancillary facilities intersect with special designations, which is limited to the following BLM special designations: CDNST, Butterfield Trail,

Arizona Trail, and the Anza Trail; county or city special designations would also be intersected but would wholly be contained in areas that already include Western transmission lines. Increases in ambient noise levels would be temporary and would decrease with the completion of construction activities. Other impacts would include changes to the natural qualities, outstanding opportunities for solitude and primitive recreation, and values such as visual resources and visibility from special designations. Because proposed Project facilities that intersect with special designations would be located adjacent to existing similar facilities, the residual impacts to special designations would be minor.

Unavoidable Adverse Impacts

The construction and operation/maintenance of the proposed Project would cause minor unavoidable adverse impacts on the city special designations as described in table 4.12-5 above.

Short-term Uses versus Long-term Productivity

The construction and operation/maintenance of the proposed Project is unlikely to cause short-term uses of the environment that would affect the long-term productivity of the BLM establishing future special designations, since most of the proposed Southline transmission line has been routed to avoid sensitive resources.

Irreversible and Irretrievable Commitments of Resources

No irreversible or irretrievable commitment of special designation resources would occur as a result of the proposed Project.

4.13 WILDERNESS CHARACTERISTICS

4.13.1 Introduction

This section describes the impacts to BLM lands that may possess wilderness characteristics associated with the construction and operation and maintenance of the transmission line, substations, and ancillary facilities. Potential impacts to wilderness characteristics are discussed in terms of Project activities directly or indirectly conflicting with one or more of the characteristics for which lands with wilderness characteristics must possess (as provided in Section 2(c) of the Wilderness Act of 1964). As described in section 3.13, there are lands possessing wilderness characteristics that would be intersected by the Project.

This DEIS describes WIUs based on the First Characteristic (size criteria) only. The initial set of WIUs are those units of BLM land that are 5,000 acres or greater, not intersected by roads that are constructed, maintained, regularly used, and not intersected by developed rights-of-way. The initial set of WIUs has been identified using a GIS desktop analysis. WIUs based on the size criteria will be further refined following a comprehensive road inventory of each unit[2]. All potential roads and developed ROWs will be identified using current aerial imagery, and will be evaluated by local BLM Field Office staff to determine if additional field verification is needed.

The FEIS will describe WIUs based on the Second, Third, and Fourth Characteristics (naturalness, outstanding opportunities for solitude or primitive, unconfined recreation, and supplemental values criterion) of determining wilderness characteristics. This evaluation will be conducted by the local BLM

[2] Naturalness (2), outstanding opportunities for solitude or primitive, unconfined recreation (3) and other supplemental values (4) determinations are ongoing and will be provided in the FEIS.

Field Office staff for incorporation into the FEIS and will begin once the final set of units based on the size criteria, and any prior wilderness characteristics inventory data is determined.

4.13.2 Methodology and Assumptions

Analysis of potential impacts to wilderness characteristics involves determining whether potential impacts of the proposed Project would result in changes to any of the four tangible qualities of wilderness that make up the description of lands managed to maintain wilderness characteristics, as discussed above in section 3.13. BLM lands that possess or are managed to maintain wilderness characteristics are not managed the same as Congressionally designated wilderness.

Effects are quantified where possible (i.e., acreages of surface disturbance under the action alternative). In the absence of quantitative data, BLM local Field Office specialists' input and best professional judgment was used. Impacts are sometimes described using a range of potential impacts or in qualitative terms, if appropriate.

Analysis Area

The wilderness characteristics analysis area is the Project ROW with a 1-mile buffer on each side of the centerline for all four route groups. A 1-mile buffer on each side of the Project centerline represents a reasonable distance for analyzing potential impacts to the four tangible qualities of a wilderness, and is commensurate with other resources that share the value of wilderness characteristics such as recreation, special designations, and visual resources.

Analysis Assumptions

There are no specific analysis assumptions for wilderness characteristics beyond the impact indicators and significance criteria described below. The impact indicators are described in the context of whether the four tangible qualities that comprise wilderness characteristics would change if the ROW was granted:

Impact Indicators

- Whether the proposed Project would reduce the size of identified and inventoried contiguous, roadless WIUs greater than 5,000 acres;
- Whether the proposed Project would decrease natural ecological conditions[3];
- Whether the proposed Project would decrease the opportunities for solitude or primitive, unconfined recreation[3]; and
- Whether the proposed Project would affect supplemental values of wilderness characteristics (i.e., ecological, geological, or other features of scientific, educational, scenic, or historic value)[3].

Significant Impacts

Effects on BLM lands possessing wilderness characteristics (WIUs) would occur if construction and operation/maintenance of the Project reduces any of the four tangible qualities that comprise wilderness characteristics.

[3] Naturalness (2), outstanding opportunities for solitude or primitive, unconfined recreation (3) and other supplemental values (4) determinations are ongoing and will be provided in the FEIS.

Changes in wilderness characteristics could result from reductions in size, decreased naturalness, and/or loss of outstanding opportunities for solitude or primitive and unconfined recreation. A reduction in size that would result in the WIU becoming less than 5,000 acres would be a major, long-term impact. A reduction in size that would not result in a WIU becoming less than 5,000 acres would be a moderate, long-term impact.

4.13.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the BLM would not grant the ROW for the proposed Project. Wilderness characteristics within the analysis area would likely continue at current levels and trends. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a). However, there would be no impacts to wilderness characteristics within the analysis area from the no action alternative, since no activities would occur that could impact one or more of the four wilderness characteristics criteria.

Impacts Common to All Action Alternatives

CONSTRUCTION

Potential impacts from construction activities that would be common to all action alternatives include direct ground disturbance and temporary increases in ambient noise levels in areas where the transmission line, substations, and ancillary facilities intersect with lands that possess wilderness characteristics. Ground disturbance would not occur across the entire Project footprint. Approximately 23 percent of the Project footprint would be disturbed throughout route groups 1 and 2. Approximately 28 percent of the Project footprint would be disturbed throughout route groups 3 and 4. Within route groups 3 and 4, the magnitude of impacts would be reduced, compared with those in route groups 1 and 2, as the existing line would be upgraded rather than a new build. Nonetheless, the transmission line towers, staging areas, and access roads would still be required along route groups 3 and 4; thus surface disturbance would still occur in the Upgrade Section. Increases in ambient noise levels would be temporary and would decrease with the completion of construction activities. This would be a short-term, minor impact to the opportunities for solitude and primitive, unconfined recreation in the immediate area. Ground disturbance and temporary increases in ambient noise levels would be a minor, short-term impact to the naturalness of the immediate area.

For construction related to all alternatives, the Project would require staging areas along the ROW. These are located on rugged terrain or road and utility crossings adjacent to the ROW to allow for additional maneuvering in difficult areas. During construction, the extra work spaces and staging areas included in the analysis area would affect the size, naturalness, opportunities for solitude or primitive and unconfined recreation, and supplemental values (if any) of a given WIU.

The proposed Project would use existing public and private roads and would construct new roads to gain access to the area during the construction period (short-term). Many of the existing access roads are presently in a condition that could accommodate construction traffic without significant modification or improvement. Some roads, however, are small, impassable, and are not currently suitable for construction traffic. Additionally, in some areas access roads may not exist, requiring new construction. The Project would improve unsuitable access roads through grading, filling, and/or widening. Following construction, roads would be returned to their preconstruction condition, unless otherwise requested in writing by the landowner or land-managing agency. It is not know specifically where all road improvements would be

required along any given road, and this information would not be available until after Southline's construction contractor identifies which roads it prefers to use and how it prefers to use the roads. Therefore, for the purposes of this analysis, it is estimated that all access roads could need to be improved over their entire length.

Creation of new roads, maintenance of existing roads, and use of access roads for construction would decrease the size, affect naturalness, and limit opportunities for solitude and/or primitive and unconfined recreation in areas with wilderness characteristics. This would be a short-term, moderate impact by introducing the presence and noise of access roads and construction equipment within sight or sound of WIU visitors. Because Southline cannot identify which roads would be used during construction, the analysis cannot calculate the effects of the sight or sound of equipment on wilderness visitors in areas with wilderness characteristics. Instead, using the noise analysis presented in section 4.3 to determine the effects on naturalness, opportunities for solitude or primitive and unconfined recreation, it is assumed that visitors to areas with wilderness characteristics within 1 mile of a transmission line or access roads used for construction may be able to hear or see equipment during the construction period, and may experience changes to naturalness, outstanding opportunities for solitude, or primitive and unconfined recreation.

OPERATION AND MAINTENANCE

Following the completion of construction, the presence of the transmission lines and ancillary facilities would be a long-term impact to wilderness characteristics in areas where they did not previously exist. The permanent ROW with access roads to provide for inspection and maintenance of the transmission lines and ancillary facilities would be constructed. As described in chapter 2 of the EIS, ROW would be cleared of trees and large brush to allow for maintenance of the transmission line and related facilities, as mandated by Federal, state, and local law. Occasional maintenance trucks would also be used along the ROW. These would be long-term but minor impacts to the naturalness, outstanding opportunities for solitude, or primitive and unconfined recreation of the areas in a given WIU within 1 mile of the proposed Project as a result of changes in the visual character of the surrounding lands and periodic maintenance activities.

Route Group 1 – Afton Substation to Hidalgo Substation

Table 4.13-1 describes which segments within route group 1 would intersect with WIUs. Acreages are not additive and may overlap. In addition, some segments may intersect more than one WIU.

Table 4.13-1. Route Group 1 Wilderness Characteristics Resource Inventory Data

Segment	Total Miles	WIU No.	WIU Name	WIU Size (acres)	Miles of Segment Intersection with WIUs
Subroute 1.1, Proponent Preferred					
P1	5.1	NM-LC-010	Black Mountain – Doña Ana	39,993	1.3
		NM-LC-011	Afton East	6,287	1.7
P2	102.0	-	-	-	-
P3	31.1	NM-LC-003			0.2
		NM-LC-004	Coyote Hill	11,972	3.8
		NM-LC-016	Eagle Nest	306,811	20.8
P4a	8.7	-	-	-	-

Table 4.13-1. Route Group 1 Wilderness Characteristics Resource Inventory Data (Continued)

Segment	Total Miles	WIU No.	WIU Name	WIU Size (acres)	Miles of Segment Intersection with WIUs
Subroute 1.2, Proponent Alternative					
S1	13.4	NM-LC-008	Rutter South 3	6,196	2.3
		NM-LC-009	Rutter South 1	6,017	0.02
		NM-LC-010	Black Mountain – Doña Ana	39,993	4.1
S2	11.1	NM-LC-005	South Doña Ana	55,790	5.2
		NM-LC-006	East Potrillo Mountains	25,182	2.7
		NM-LC-007	Rutter South 2	6,680	1.6
		NM-LC-008	Rutter South 3	6,196	0.0002
S3	12.9	-	-	-	-
S4*	10.6	NM-LC-003	Camel Mountain	11,532	6.9
S5	29.7	NM-LC-004	Coyote Hill	11,972	1.4
S6	7.4	NM-LC-015	Apache Hills-Hatchita Valley	229,889	3.0-
S7	41.5	NM-LC-001	Black Mountain –Grant	18,948	6.0
		NM-LC-015	Apache Hills-Hatchita Valley	229,889	12.7
S8	14.6	-	-	-	-
Route Group 1, Local Alternatives					
DN1	42.5	NM-LC-002	China Draw	9,813	2.1
A	17.5	NM-LC-005	South Doña Ana	55,790	5.8
		NM-LC-006	East Potrillo Mountains	25,182	1.4
		NM-LC-007	Rutter South 2	6,680	0.6
		NM-LC-008	Rutter South 3	6,196	0.5
B*	12.2	NM-LC-003	Camel Mountain	11,532	8.0
C	9.0	NM-LC-015	Apache Hills-Hatchita Valley	229,889	0.1
D†	22.8	NM-LC-013	Aberdeen Peak	17,529	2.3

*NM-LC-002, NM-LC-003, NM-LC-004, NM-LC-005, NM-LC-007, NM-LC-008, NM-LC-010 would be intersected by more than one segment.

† NM-LC-013 would intersect Alternative D in both route group 1 and route group 2.

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

Construction impacts are described in terms of impacts to size, naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, and supplemental values. Granting a ROW for construction of a transmission line and ancillary facilities as well as construction or improvement of access roads would directly affect the size, and primitive/unconfined recreation of four wilderness inventory units. This construction would reduce the size and natural character of these areas. However,

the remaining portions of the WIUs would still be greater than 5,000 acres in size, retaining their natural condition and outstanding opportunities for solitude or primitive and unconfined recreation.

One WIU, Afton East, would be reduced to less than 5,000 acres as result of construction of segment P1. This would be a moderate, long-term impact since this WIU would no longer meet the first criteria of wilderness characteristics. The Afton East WIU includes portions of citizen-proposed wilderness areas. The impact to these citizen-proposed wilderness areas would also be moderate and long-term.

Operation and Maintenance

Impacts to size would be the same as described under construction.

Indirect impacts to WIUs may occur where the proposed transmission line towers, spans, and other facilities are visible from the WIUs. Impacts to naturalness during operation and maintenance would result from the presence of the transmission line and ancillary facilities, and vegetation clearing of the ROW. Impacts include loss of vegetation, wildlife and wildlife habitat, and soil structure (including erosion potential, compaction, loss of cryptobiotic crusts, and loss of playas) and visual resources impacts.

Motorized travel along the ROW inspection, maintenance, and brush clearing of the permanent ROW in or adjacent to a given WIU would result in sound that would degrade the setting needed to support experiences of outstanding opportunities for solitude and primitive or unconfined recreation opportunities. Sound generated during operation and maintenance would be expected to occur intermittently for the life of the Project in a given WIU that would be intersected by subroute 1.1.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

Short-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different. The East Potrillo Mountains WIU includes portions of citizen-proposed wilderness areas and would be intersected by subroute 1.2. The impact to these citizen-proposed wilderness areas would also be moderate and long-term.

Project construction would affect the natural characteristics of nine WIUs.

Operation and maintenance

Long-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1: DN-1, A, B, C, and D.

Construction

Short-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different. The East Potrillo Mountains WIU includes portions of citizen-proposed wilderness areas and would be intersected

by a route group 1 local alternative. The impact to these citizen-proposed wilderness areas would also be moderate and long-term.

Project construction would affect the natural characteristics of eight WIUs.

Operation and Maintenance

Long-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different.

Route Group 2 – Hidalgo Substation to Apache Substation

Table 4.13-2 describes which segments within route group 2 would intersect with WIUs. Acreages are not additive and may overlap.

Table 4.13-2. Route Group 2 Wilderness Characteristics Resource Inventory Data

	Total Miles	WIU No.	WIU Name	WIU Size (acres)	Miles of Segment Intersection with WIUs
Subroute 2.1, Proponent Preferred					
P4b	14.0				
P4c	1.9	-	-	-	-
P5a	9.6	NM-LC-012	Lordsburg Playa South	10,784	4.0
		NM-LC-014	Lordsburg Playa North	11,846	0.3
P5b	21.1	AZ-SF-001	Peloncillo Mountains South	34,153	5.1
P6a	0.9	AZ-SF-001	Peloncillo Mountains South	34,153	0.7
P6b	22.5	-	-	-	-
P6c	2.8	-	-	-	-
P7	22.3	-	-	-	-
P8	0.5	-	-	-	-
Subroute 2.2, Proponent Alternative					
E	31.8	NM-LC-012	Lordsburg Playa South	10,784	3.7
		AZ-SF-001	Peloncillo Mountains South	34,153	3.7
F	25.3	AZ-SF-001	Peloncillo Mountains South	34,153	2.1
Ga	25.7	-	-	-	-
Gb	1.0	-	-	-	-
Gc	7.4	-	-	-	-
I	2.3	-	-	-	-
J	2.3	-	-	-	-

Table 4.13-2. Route Group 2 Wilderness Characteristics Resource Inventory Data (Continued)

	Total Miles	WIU No.	WIU Name	WIU Size (acres)	Miles of Segment Intersection with WIUs
Route Group 2 Local Alternatives					
LD1	35.4	-	-	-	-
LD2	9.6	NM-LC-014	Lordsburg Playa North	11,846	3.6
LD3a	27.9	NM-LC-014	Lordsburg Playa North	11,846	0.1
LD3b	1.9	-	-	-	-
LD4	51.7	-	-	-	-
LD4-Option 4	6.5	-	-	-	-
LD4-Option 5	12.3	-	-	-	-
WC1	14.8	-	-	-	-

* NM-LC-012 and NM-LC-014 would intersect more than one segment.
† NM-LC-013 would intersect Alternative D in both route group 1 and route group 2.

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

Short-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different.

Project construction of subroute 2.1 would affect the natural characteristics of three WIUs.

Operation and Maintenance

Long-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

Short-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different.

Project construction would affect the natural characteristics of one WIU, Lordsburg Playa North.

Operation and Maintenance

Long-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different.

LOCAL ALTERNATIVES

There are seven local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, and WC1.

Construction

Short-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different.

Operation and Maintenance

Long-term impacts to size, naturalness, and solitude and primitive/unconfined recreation would be the same as described under subroute 1.1, except the acreages of the impacts would be different.

Route Group 3 – Apache Substation to Pantano Substation and Route Group 4 – Pantano Substation to Saguaro Substation

There would be no impacts to wilderness characteristics along the Upgrade Section in route groups 3 and 4 due to absence of WIUs.

Agency Preferred Alternative

The Agency Preferred Alternative would result in moderate, long-term impacts to the wilderness characteristics of the Afton East WIU since construction, operation, and maintenance of segment P1 would reduce the size of the Afton East WIU to less than 5,000 acres. In order for a parcel of land to be considered for wilderness characteristics, it must be at least 5,000 acres in size. Segment P1 would intersect areas of the Afton East WIU that also include citizen-proposed wilderness areas; the impact to the citizen-proposed wilderness areas would also be a moderate, long-term impact.

Impacts to naturalness, opportunities for solitude or primitive, unconfined recreation, and supplemental values would be the same as described under "Impacts Common to All Action Alternatives."

Additional Mitigation Measures

Mitigation measures provided in Section 3.2 "Air Quality," Section 3.3 "Noise and Vibration," Section 3.10 "Visual Resources," and Section 3.14 "Recreation" would all service to mitigate any potential direct or indirect impacts to lands possessing wilderness characteristics. The following mitigation measures may lessen (or in some cases eliminate) the effects of transmission line construction and operation/maintenance to wilderness characteristics:

- Explore opportunities to notify WIUs users prior to visiting the affected areas by publication of the construction schedule in local media, posting the schedule at administering agency offices, posting the schedule at trailheads or other recreation access points to WIUs, or other means of reaching visitors. This notification process would alert wilderness users to the potential temporary impacts of presence and sound of construction on opportunities for experiences of solitude and primitive recreation settings, and allow visitors to decide if they want to reschedule their visit.
- Feather the edges of the shrubs and trees adjacent to the ROW when recontouring and revegetating the construction ROW in vegetation communities with a large shrub or tree component, to reduce the line or edge that would be apparent between the shrubs and trees and the grass of the reclaimed ROW.

Residual Impacts

Residual impacts would include direct ground disturbance and temporary increases in ambient noise levels in areas where the transmission line, substations, and ancillary facilities intersect with lands with

wilderness characteristics. Increases in ambient noise levels would be temporary and would decrease with the completion of construction activities. Other impacts would include changes to the natural qualities, outstanding opportunities for solitude and primitive recreation, and supplemental values such as visual resources and visibility. Because the Afton East WIU would be reduced to less than 5,000 acres as a result of segment P1, the area would no longer meet criteria for wilderness characteristics and residual impacts would be long term and moderate. Unavoidable Adverse Impacts

The construction and operation/maintenance of segment P1 of the proposed Project would result in the unavoidable loss of the minimum 5,000 acre wilderness characteristic of the Afton East WIU. Short-term Uses versus Long-term Productivity

The construction and operation of the proposed Project is unlikely to cause short-term uses of the environment that would affect the long-term productivity of wilderness characteristics, since the Project would be nearly 100 percent located along existing disturbed areas such as railroad beds, roadways, and other utility ROWs.

Irreversible and Irretrievable Commitments of Resources

Irretrievable commitment of wilderness characteristics would occur as a result of the proposed Project in areas where the Project would result in WIUs becoming less than 5,000 acres. The Afton East WIU would be irretrievably lost since it would no longer be 5,000 or more acres. However, if the Project were to be deconstructed and the area reclaimed, the area could be re-evaluated for wilderness characteristics and identified as a potential WIU.

4.14 RECREATION

4.14.1 Introduction

This section describes the potential impacts to recreation resources associated with the construction and operation and maintenance of the transmission line, substations, and ancillary facilities. Impacts to recreation resources are discussed in terms of recreation opportunities and activities, recreation settings, desired recreation experiences, and adjacent recreation areas. The impacts described in this section are based on the analysis provided in “Southline Transmission Project Resource Report 10: Recreation” (CH2M Hill 2013o). The contents of that report are used herein without specific reference.

4.14.2 Methodology and Assumptions

Analysis Area

The analysis area for recreation resources is the same for the New Build Section and the Upgrade Section and includes the proposed Project footprint. The analysis area for recreation resources does not include a continuous, equidistant buffer as with other resources, since large areas of land likely have similar existing recreation conditions and settings. Because the Project could affect adjacent areas where recreation conditions and use could intensify and vary widely, some adjacent recreation areas are included in the analysis area. Therefore, in addition to the proposed Project footprint, adjacent recreation areas that could be directly or indirectly affected by the proposed Project are also included in the analysis area.

Analysis Assumptions

The analysis to determine potential impacts to recreation is based on existing recreation resource management and data from the BLM Las Cruces District, BLM Safford and Tucson Field Offices, State, County, and local recreation resource management. Spatial/GIS information was also used in this analysis and includes designated recreation sites, special designations, transportation inventory, Coronado National Forest ROS settings, historic and recreational trails, and known cultural sites. As outlined in section 3.14, the changes (based on the proposed Project as described in chapter 2) to the resource condition indicators provide the basis for assessing impacts to recreation resources. The impact analysis is also based on review of existing literature and information provided by resource team experts in the BLM, NPS, U.S. Forest Service, and other agencies.

Impact Indicators

Recreation Opportunities/Activities:

- Assess whether a change in (loss or creation of) recreational activities would result with development of the proposed Project and improvement of access roads.
    - Specifically, assess whether the change would increase or decrease the qualities of the hunting experience

Recreation Settings:

- Assess changes in the recreation setting (e.g., undeveloped or rural settings) of the analysis area as a result of the Project. Specifically, assess whether changes in the settings that support existing OHV, hiking, camping, target shooting, or hunting opportunities would increase or decrease within the area of the proposed Project.

Desired Recreation Experiences:

- Assess the potential for diminished or loss of recreational values and quality (e.g., remoteness, quiet, or solitude) in the analysis area/region.
- Assess potential changes in recreation (opportunities/activities, settings, and experiences) on lands adjacent to the Project, if present.

Significant Impacts

For the purposes of this analysis, a significant impact on recreation resources could result if any of the following were to occur from construction or operation and maintenance of the proposed Project:

- changes that alter existing recreation opportunities and activities to levels that would conflict with existing management prescriptions;
- changes that alter existing recreation settings that have been prescribed by land managing agencies;
- changes that alter the desired recreation experiences that local users currently seek; and
- changes that alter existing recreation opportunities and activities, recreation settings, and desired recreation experiences of adjacent recreation areas.

4.14.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative no ROW would be granted for the New Build Section and the transmission line, substation, and ancillary facilities would not be constructed. The BLM land on which the New Build Section is proposed would continue to be managed as it currently exists. Much of the Project footprint would be within existing ROWs, along existing disturbance. The land in the immediate vicinity of the Project footprint and alternatives would remain primarily developed desert land available for dispersed recreation, subject to existing closures or restrictions.

Current recreational use (recreation opportunities and activities, recreation settings, desired recreation experiences, and adjacent recreation areas) in the analysis area described in Section 3.14, "Recreation," would continue under the no action alternative. The Project footprint would be available to other uses that are consistent with land management plans.

Thus, there would be no changes that would alter existing recreation opportunities and activities, settings, desired experiences, or adjacent recreation areas in the New Build Section. Impacts to recreation resources would be negligible under the no action alternative. In regards to the Upgrade Section, even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a).

Impacts Common to All Action Alternatives

CONSTRUCTION

Recreation Opportunities/Activities

Construction of the proposed Project and alternative would not occur outside of the ROW, except for site-specific substations. Some substations would be expanded upon private land; all private land would likely be pursued with in-fee purchasing. Substation expansions would nonetheless be included in all analysis. Temporary staging areas associated with construction of the transmission line and/or substation construction would not be located within the recreation areas. Construction of the Project is not expected to permanently preclude the use of or access to any existing recreation opportunities or activities, but some short-term impacts to these resources would occur during the construction phases of the Project.

Recreation users that seek opportunities for solitude commonly seek areas where they would be less likely to see other humans. Development such as transmission lines may not affect opportunities for solitude if the users don't experience opportunities for interactions with other users. However, some users value a total absence of human development for their experiences of solitude.

Dispersed recreation activities such as hiking, camping, or equestrian use would be temporarily affected since the presence of construction noises, visual disturbances, or other humans could detract from these recreation opportunities and activities. These impacts would be localized and short-term. As described in chapter 2, table 2-7, Southline would post signage for all closures and would avoid temporary closures during heavy recreational use periods (e.g., holidays or special events).

Some unauthorized OHV use could occur during construction when workers are not present (such as on weekends or in between construction phases).

Hunting

Hunting opportunities (both big- and small-game) that could be displaced by the construction of the transmission line, substations, and ancillary facilities would not represent a significant impact, since the areas within GMUs that are outside of the proposed Project footprint would remain available for hunting, subject to applicable laws and regulations. Further, the number of New Mexico and Arizona hunting permits that are issued in individual GMUs would not change as a result of construction of the Project. The availability to hunt in GMUs that are included within the Project footprint (see section 3.14) and the number of hunting permits per GMU would not be affected by the Project since the ROW, if granted, would represent less than 5 percent of the total GMU available. Further, hunter days would not change under any alternative, since hunting could persist elsewhere in the GMU.

Recreation Settings

The Mimbres, Safford, and Phoenix RMPs specify that all BLM lands, unless otherwise designated and subject to travel management rules, are open to recreational use.

Although BLM lands within the analysis area have not been classified with ROS settings, the overall recreation setting of the Project footprint can be characterized as mostly roaded natural, with areas of urban, rural, and semi-primitive motorized in site-specific areas. Motorized use in the Project footprint would be limited to existing roads and ways, as specified in land management plans. Specially designated areas and the recreational settings therein, while within the analysis area, would be outside the Project footprint.

The removal of vegetation during construction of the proposed Project would have an indirect impact on adjacent recreational users in the analysis area by altering the quality of the recreational setting. Similarly, the construction of the transmission lines could have indirect impacts to the recreation settings in areas that do not already include existing, similar structures due to the visual contrast these facilities could introduce to the existing landscape. Although the sight of transmission line facilities would not affect some recreational users (e.g., hunting or OHV driving), those seeking the features of a natural, non-motorized setting in the analysis area would see the existing landscape change to an area characterized by transmission line development as a substantial modification of the landscape (refer to Section 4.10, “Visual Resources”).

Desired Recreation Experiences

The desired recreation experiences (as specified in the Mimbres, Safford, and Phoenix RMPs) would not change under any alternative, since the ROW would only preclude recreational opportunities and experiences temporarily during construction. The desired recreation experiences in areas outside the site-specific areas where the physical occupancy of the transmission line tower, substation, or ancillary facility would be located would not change. The individual impacts of transmission line towers, substations, and ancillary facilities are discussed under each route group.

Adjacent Recreation Areas

The construction impacts to adjacent recreation areas would vary by alternative and are discussed under each route group.

OPERATION AND MAINTENANCE

Recreation Opportunities/Activities

Recreation opportunities and activities would continue during operation and maintenance since operation and maintenance would be temporary in terms of the amount of time activities would take place in a given area and the amount of time that passes between operation and maintenance activities, which may be many months to years in duration. Thus, since the potential for displacing recreation opportunity and activities may occur, there would be impacts to recreation. These impacts would be minor. Further, unless specifically closed to public access, all areas within the ROW (i.e., beneath spans) would be accessible for recreational opportunity and activities.

Dispersed recreation would continue upon construction completion within the ROW in areas that are outside of the footprints of the transmission line, substations, and ancillary facilities, subject to applicable laws such as NMAC Title 19, Chapter 31, "Hunting and Fishing," Article 10.18, and ARS Title 17, Chapter 3, "Game and Fish," Articles 17-301 and 17-309.

Intentional acts of destruction (e.g., using transmission line towers or facilities for target shooting) is discussed in Section 4.19 of this DEIS.

Following construction activities, the presence of new access roads (as described in chapter 2) that would be used for operation and maintenance of the proposed Project could permanently change the OHV use patterns in the area, subject to Federal, State, and local OHV and traffic laws and regulations. New access roads would be signed and would be closed to the public, but illegal OHV use would not be entirely preventable on the new access roads. This would result in an increased chance for "wildcat" and user-created route proliferation. An increase in "wildcat" and user-created trails would conflict with the BLM's OHV-use strategies, creating management challenges and potentially increasing user conflicts. The resultant impact from increased OHV use would be a moderate impact to recreation opportunities/activities. Mitigation of locked gates and signage indicated road status would decrease the magnitude of these impacts. However, illegal and/or unauthorized use of access roads would be enforceable by BLM law enforcement, or other local jurisdiction law enforcement (e.g., County or State).

It should be noted that recreation opportunities/activities may only be permitted on public lands. Once the ROW crosses into private land, the recreation opportunity/activity may no longer be permitted and thus, private land boundaries may also form the boundaries for allowable recreation opportunities and activities.

Recreation Settings

Impacts to recreation settings during operation and maintenance, common to all alternatives would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences during operation and maintenance, common to all alternatives would be the same as described under construction.

Adjacent Recreation Areas

The operation and maintenance impacts to adjacent recreation areas would vary by alternative and are discussed under each route group.

Route Group 1 – Afton Substation to Hidalgo Substation

SUBROUTE 1.1 – PROPONENT PREFERRED

Construction

Recreation Opportunities/Activities

Construction activities in support of subroute 1.1 would not occur within any designated recreation sites or areas. Segment P2 would pass just south of the Aden Hills OHV area and the presence of construction activities would not be in conflict with the purposes of the Aden Hills OHV area. During construction, access to the OHV area would be maintained. There could be temporary traffic delays as equipment crosses access roads, but these delays would only last as long as it would take to move equipment across the access roads and into the ROW and/or staging areas. The temporary impacts would be minor and would cease once construction is completed.

Recreation access that does not depend on vehicles, OHV use, or access roads (e.g., hiking or equestrian-based recreation) would not be impacted during construction. Similarly, dispersed recreation would only be impacted within the ROW, due to safety concerns that would preclude dispersed recreation; however, once construction activities are completed on subroute 1.1, the access to dispersed recreation would be restored.

The construction of subroute 1.1 that would cross two national trails (segments P4a and P2) would be in areas that would be comparable to a roaded-natural setting. Each of the national trail crossings of Subroute 1.1 occurs along existing dirt roads and within 5 miles of I-10. Approximately 0.12 mile of the Butterfield Trail and approximately 0.06 mile of the CDNST would be crossed by the Project within the analysis area for Subroute 1.1. During construction, access to the Butterfield Trail and CDNST would be maintained. There could be temporary delays as equipment crosses the trails, but these delays would only last as long as it would take to move equipment across the trails and into the ROW and/or staging areas. The temporary construction impacts to the Butterfield Trail and CDNST would be minor and would cease once construction is completed.

Hunting in the immediate vicinity of subroute 1.1 would be temporarily impacted by construction, as described above under “Impacts Common to All Action Alternatives.” Table 4.14-1 below provides the acreages of each GMU that would be affected by the construction of the subroutes included in route group 1. The P2 segment that would occur in GMU 23 in New Mexico would have the greatest reduction of land available for hunting during construction, at 1,101.1 acres. Since P2 is largely paralleling existing facilities, nearly all existing hunting activities in this vicinity likely already occur outside of the ROW. The reduction to land available for hunting within GMU 23 (totaling over 1 million acres) would represent a less than 0.05 percent reduction, a negligible impact.

Table 4.14-1. Route Group 1 Game Management Unit (New Mexico) Inventory Data

	Total Miles	New Mexico GMU 21B (acres)	New Mexico GMU 23 (acres)	New Mexico GMU 24 (acres)	New Mexico GMU 25 (acres)	New Mexico GMU 26 (acres)	New Mexico GMU 27 (acres)
Subroute 1.1, Proponent Preferred							
P1	5.1	–	–	–	125.1	–	–
P2	102.0	462.5	1,101.1	130.44	778.0	–	–
P3	31.1	20.9	–	–	732.4	–	–
P4a	8.7	–	217.1	–	–	–	–
Subroute 1.2, Proponent Alternative							
S1	13.4	–	–	–	325.3	–	–
S2	11.1	–	–	–	267.7	–	–
S3	12.9	–	–	–	314.0	–	–
S4	10.6	–	–	–	255.2	–	–
S5	29.7	–	–	–	720.1	–	–
S6	7.4	–	–	–	182.1	–	–
S7	41.5	–	–	–	495.8	511.2	–
S8	14.6	–	171.0	–	–	181.9	–
Route Group 1 Local Alternatives							
DN1	42.5	21.3	741.1	268.0	–	–	–
A	17.5	–	–	–	422.9	–	–
B	12.2	–	–	–	291.5	–	–
C	9.0	–	–	–	215.7	–	–
D	22.8	–	–	–	–	506.8	44.4

Recreation Settings

The recreation setting within the subroute 1.1 ROW would be slightly modified during construction. Though subroute 1.1 is new construction, it has been designed to be located along similar, existing facilities (i.e., transmission lines, pipelines, and roads). Since the construction activities would not be introducing facilities that are not similarly present amongst the recreation settings, construction impacts would be minor and short-term, and limited to temporary delays at access roads and National Trails as equipment is moved into the ROW, but these delays would only last as long as it would take to move equipment across and into the ROW and/or staging areas.

Desired Recreation Experiences

Construction of subroute 1.1 would not change the desired recreation experiences. Subroute 1.1 occurs along existing facilities such as transmission lines, pipelines, and roads. Since access would be maintained to all public, existing, and legal roads (refer to Section 4.18, “Transportation”), any vehicular-based desired recreation experiences would continue during construction. Therefore, there would be no impacts to desired recreation experiences under subroute 1.1.

Adjacent Recreation Areas

There are no recreation areas adjacent to subroute 1.1.

Operation and Maintenance

Recreation Opportunities/Activities

The overall permanent disturbance within the ROW of subroute 1.1 is approximately 8.2 percent, and would be wholly within the ROW (20 acres to operate a new substation notwithstanding). Therefore, recreation opportunities and activities would remain available in approximately 91.8 percent of the subroute 1.1 ROW throughout operation and maintenance of the proposed Project, subject to existing laws and closures. The operational impacts to recreation opportunities and activities would therefore be commensurately less than described under subroute 1.1, construction.

Recreation Settings

Impacts to the recreation settings of subroute 1.1 would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the subroute 1.1 ROW would be the same as described under construction.

Adjacent Recreation Areas

There are no recreation areas adjacent to subroute 1.1.

SUBROUTE 1.2 – PROPONENT ALTERNATIVE

Construction

Recreation Opportunities/Activities

Construction activities in support of subroute 1.2 would not occur within any designated recreation sites or areas. Segment S3 would not cross into the WSAs located along route group 1, and follows an existing road. Construction of segment S2 may preclude some flying opportunities for paragliding/parasailing, which would be a moderate, long-term impact.

Hunting in the vicinity of subroute 1.2 would be temporarily displaced during construction, as described above under “Impacts Common to All Action Alternatives.” The S7 segment that would be in GMUs 25 and 26 in New Mexico would have the greatest reduction of land available for hunting during construction, at 495.8 and 511.2 acres, respectively. Since S7 is largely paralleling existing facilities, nearly all existing hunting activities in this vicinity likely already occur outside of the ROW. The reduction to land available for hunting within GMUs 25 and 26 (comprising over 2 million acres and 1.4 million acres, respectively) would represent a less than 0.02 percent reduction to GMU 25 and a less than 0.04 percent reduction to GMU 26, a negligible impact.

Recreation Settings

Segments S1 and S2 of subroute 1.2, located east of the Aden Lava Flow WSA and Mount Riley/West Potrillo Mountains WSAs, would be constructed on undeveloped land, resulting in a moderate change to the recreation setting. There are no existing facilities that would be paralleled by segments S1 and S2.

The total temporary disturbance during construction of segment S1 and S2 would be approximately 28.4 percent and 28.6 percent of the ROW, respectively. However, none of S1 or S2 would occur within the WSAs, and would not change the recreation settings within the WSAs.

Segments S3–S7 all occur along an existing State highway in New Mexico (NM 9) and construction would not result in changes to the existing recreation setting.

Desired Recreation Experiences

Construction of subroute 1.2 would not change the desired recreation experiences.

Adjacent Recreation Areas

There are no recreation areas adjacent to subroute 1.2.

Operation and Maintenance

Recreation Opportunities/Activities

The overall permanent disturbance within the ROW of subroute 1.2 is approximately 5.5 percent, and would be wholly within the ROW (20 acres to operate a new substation notwithstanding). Therefore, recreation opportunities and activities would remain available in approximately 94.5 percent of the subroute 1.2 ROW throughout operation and maintenance of the proposed Project, subject to existing laws and closures. The operational impacts to recreation opportunities and activities would therefore be commensurately less than described under subroute 1.2, construction.

The new access roads along segments S1 and S2 could permanently change the OHV use patterns in the area, subject to Federal, State, and local OHV and traffic laws and regulations. These impacts would be the same as described under "Impacts Common to All Action Alternatives."

Recreation Settings

Impacts to the recreation settings of subroute 1.2 would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the subroute 1.2 ROW would be the same as described under construction.

Adjacent Recreation Areas

There are no recreation areas adjacent to subroute 1.2.

LOCAL ALTERNATIVES

There are five local alternatives available for route group 1. These local alternatives include DN1, A, B, C, and D.

Construction

Recreation Opportunities/Activities

Alternative B would not cross into the WSAs located along route group 1.

Hunting in the vicinity of the route group 1 local alternatives would be impacted by construction, as described above under "Impacts Common to All Action Alternatives." The alternative D segment that would occur in GMUs 26 and 27 in New Mexico would have the greatest reduction of land available for hunting during construction, at 506.8 and 44.4 acres, respectively. Since alternative D is largely paralleling existing facilities, nearly all existing hunting activities in this vicinity likely already occur outside of the ROW. The reduction to land available for hunting within GMUs 26 and 27 (comprising 1.4 million acres and 663,000 acres, respectively) would represent a less than 0.04 percent reduction to GMU 26 and a less than 0.01 percent reduction to GMU 27, a negligible impact.

Recreation Settings

Local alternative DN1 of route group 1 would be constructed on undeveloped lands and the construction impacts would be the same as described for segments S1 and S2 under subroute 1.2.

Desired Recreation Experiences

Construction of route group 1 local alternatives would not change the desired recreation experiences. In the vicinity where the local alternatives of route group 1 would cross the CDNST, existing roads and disturbed areas are amongst the landscape, resulting in a desired recreation experience that would be commensurate with the allowable uses surrounding the CDNST (see Appendix F, "National Scenic and Historic Trails Assessment").

Adjacent Recreation Areas

There are no recreation areas adjacent to the route group 1 local alternatives.

Operation and Maintenance

Recreation Opportunities/Activities

The overall permanent disturbance within the ROW of route group 1 local alternatives is approximately 4.7 percent, and would be wholly within the ROW. Therefore, recreation opportunities and activities would remain available in approximately 95.3 percent of the route group 1 local alternatives ROW throughout operation and maintenance of the proposed Project, subject to existing laws and closures. The operational impacts to recreation opportunities and activities would therefore be commensurately less than described under route group 1 local alternatives, construction.

The new access roads along segments S1 and S2 could permanently change the OHV use patterns in the area, subject to Federal, State, and local OHV and traffic laws and regulations. These impacts would be the same as described under "Impacts Common to All Action Alternatives."

Recreation Settings

Impacts to the recreation settings of route group 1 local alternatives would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the route group 1 local alternatives ROW would be the same as described under construction.

Adjacent Recreation Areas

There are no adjacent recreation areas to the route group 1 local alternatives.

Route Group 2 – Hidalgo Substation to Apache Substation

SUBROUTE 2.1 – PROPONENT PREFERRED

Construction

Recreation Opportunities/Activities

The recreation opportunities/ activities that currently exist within the subroute 2.1 analysis area would be impacted by construction in the same ways as described above under "Impacts Common to All Action Alternatives." Construction activities in support of subroute 2.1 would not occur within any designated recreation sites or areas.

Subroute 2.1 would cross sections of the CDNST and Butterfield Trail. The impacts to the CDNST and Butterfield Trail would be the same as described under route group 1, subroute 1.1, except as described below.

Segment P5b would cross the Butterfield Trail in an area that includes existing pipelines and dirt roads. Segment P4c would cross the Butterfield Tail in an area that does not include existing transmission lines, pipelines, or roads. The construction of segment P4c would result in moderate impacts to the Butterfield Trail.

Bird-watching at Willcox Playa (specifically, the intersection of segment p7 with AGFD's Willcox Wildlife Area) would be temporarily impacted during construction, as described above under "Impacts Common to All Action Alternatives."

Hunting in the vicinity of subroute 2.1 would also be temporarily impacted during construction, as described above under "Impacts Common to All Action Alternatives." Table 4.14-2 provides the acreages of each GMU that would be affected by the construction of the subroutes included in route group 2. The P6b segment that would occur in GMU 29 and 30A in Arizona would have the greatest reduction of land available for hunting during construction, at 186.3 and 358.8 acres, respectively. Since P6b is largely paralleling existing pipelines, existing hunting activities in this vicinity likely would occur within the ROW, but would be precluded if P6a were constructed. The reduction to land available for hunting within GMUs 29 and 30A (comprising 648,000 acres and 1.1 million acres, respectively) would represent a less than 0.03 percent reduction in lands available for hunting for both GMU 29 and 30, a negligible impact.

Table 4.14-2. Route Group 2 Game Management Unit (New Mexico and Arizona) Inventory Data

	Total Miles	New Mexico GMU 23 (acres)	New Mexico GMU 26 (acres)	New Mexico GMU 27 (acres)	Arizona GMU 28 (acres)	Arizona GMU 29 (acres)	Arizona GMU 30A (acres)	Arizona GMU 30B (acres)	Arizona GMU 31 (acres)	Arizona GMU 32 (acres)
Subroute 2.1, Proponent Preferred										
P4b	14.0	159.0	–	176.8	–	–	–	–	–	–
P4c	1.9	–	–	44.9	–	–	–	–	–	–
P5a	9.6	–	–	233.5	–	–	–	–	–	–

Table 4.14-2. Route Group 2 Game Management Unit (New Mexico and Arizona) Inventory Data (Continued)

	Total Miles	New Mexico GMU 23 (acres)	New Mexico GMU 26 (acres)	New Mexico GMU 27 (acres)	Arizona GMU 28 (acres)	Arizona GMU 29 (acres)	Arizona GMU 30A (acres)	Arizona GMU 30B (acres)	Arizona GMU 31 (acres)	Arizona GMU 32 (acres)
P5b	21.1	–	–	106.6	404.4	–	–	–	–	–
P6a	0.9	–	–	–	18.6	2.7	–	–	–	–
P6b	22.5	–	–	–	–	186.3	358.8	–	–	–
P6c	2.8	–	–	–	–	–	68.3	–	–	–
P7	22.3	–	–	–	–	–	530.7	10.1	–	–
P8	0.5	–	–	–	–	–	–	9.0	–	–
Subroute 2.2, Proponent Alternative										
E	31.8	–	–	346.4	420.2	–	–	–	–	–
F	25.3	–	–	–	526.0	–	–	–	85.1	–
Ga	25.7	–	–	–	–	–	1.5	–	295.1	325.8
Gb	1.0	–	–	–	–	–	22.7	3.2	–	–
Gc	7.4	–	–	–	–	–	0.6	179.0	–	–
I	2.3	–	–	–	–	–	54.6	–	0.8	–
J	2.3	–	–	–	–	–	54.0	–	1.7	–
Route Group 2 Local Alternatives										
LD1	35.4	–	129.1	290.6	–	437.9	–	–	–	–
LD2	9.6	–	–	233.2	–	–	–	–	–	–
LD3a	27.9	214.6	–	462.8	–	–	–	–	–	–
LD3b	1.9	–	–	46.6	–	–	–	–	–	–
LD4	51.7	–	–	91.7	931.9	–	–	–	419.7	24.4
LD4– Option 4	6.5	–	–	–	–	–	26.9	–	129.2	–
LD4– Option 5	12.7	–	–	–	–	–	53.9	–	242.8	–
WC1	14.8	–	–	–	–	–	359.1	–	–	–

Recreation Settings

The overall recreation setting of subroute 2.1 would not be changed since subroute 2.1 has been designed to follow existing transmission lines, pipelines, and roads. Further, much of subroute 2.1 would pass through rural areas near the town of Lordsburg, New Mexico, and the agricultural fields of the San Simon Valley, avoiding the primitive recreation settings that exist to north in the Peloncillo Mountains and to the south in the Dos Cabezas Mountains.

Segment P5b would not be constructed within the designated Peloncillo Mountains Wilderness area. Segment P5b would be located approximately 0.5 mile south of the Wilderness boundary, located along

existing pipelines, and would not detract from any of the characteristics for which the Wilderness was designated by Congress (refer to Section 4.12, "Special Designations").

Desired Recreation Experiences

The impacts of construction of subroute 2.1 would not change the desired recreation experiences and would be the same as described under route group 1, subroute 1.1.

Adjacent Recreation Areas

There are no adjacent recreation areas to subroute 2.1.

Operation and Maintenance

Recreation Opportunities/Activities

The overall permanent disturbance within the ROW of subroute 2.1 is approximately 8.4 percent, and would be wholly within the ROW (20 acres to operate a new substation notwithstanding). Therefore, recreation opportunities and activities would remain available in approximately 91.6 percent of the subroute 2.1 ROW throughout operation and maintenance of the proposed Project, subject to existing laws and closures. The operational impacts to recreation opportunities and activities would therefore be commensurately less than described under subroute 2.1, construction. However, minor but long-term impacts to bird-watching and hunting would be anticipated in the areas where subroute 2.1 crosses the Willcox Wildlife Area. Though there is an existing line already in place in this area, the addition of the proposed Southline Project may affect the sandhill crane, which is further discussed under Section 4.8.2, "Wildlife."

Recreation Settings

Impacts to the recreation settings of subroute 2.1 would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the subroute 2.1 ROW would be the same as described under construction.

Adjacent Recreation Areas

There are no recreation areas adjacent to subroute 2.1.

SUBROUTE 2.2 – PROPONENT ALTERNATIVE

Construction

Recreation Opportunities/Activities

Construction activities in support of subroute 2.2 would not occur within any designated recreation sites or areas.

Hunting in the vicinity of subroute 2.2 would be impacted by construction, as described above under "Impacts Common to All Action Alternatives." The subroute 2.2 alternative E segment that would occur in GMU 27 in New Mexico and GMU 28 in Arizona would have the greatest reduction of land available for hunting during construction, at 346.4 and 420.2 acres, respectively. Alternative E would be

constructed primarily in areas that do not currently include existing transmission lines, pipelines, or roads. The reduction to land available for hunting within GMU 27 in New Mexico and GMU 28 in Arizona (comprising 663,000 and 1.4 million acres, respectively) would represent a less than 0.05 percent reduction to GMU 27 in New Mexico and a less than 0.03 percent reduction to GMU 28 in Arizona, a negligible impact.

Recreation Settings

Segment E of subroute 2.2, would be constructed on undeveloped land from the Lordsburg Playa west to the San Simon Creek, resulting in a moderate change to the recreation setting. There are no existing facilities that would be paralleled by segment E. The total temporary disturbance during construction of segment E would be 23.2 percent of the ROW.

Desired Recreation Experiences

Construction of subroute 2.2 would not change the desired recreation experiences.

Adjacent Recreation Areas

There are no adjacent recreation areas to subroute 2.2.

Operation and Maintenance

Recreation Opportunities/Activities

The overall permanent disturbance within the ROW of subroute 2.2 is approximately 6.8 percent, and would be wholly within the ROW (20 acres to operate a new substation notwithstanding). Therefore, recreation opportunities and activities would remain available in approximately 93.2 percent of the subroute 2.2 ROW throughout operation and maintenance of the proposed Project, subject to existing laws and closures. The operational impacts to recreation opportunities and activities would therefore be commensurately less than described under subroute 2.2, construction.

The new access roads along alternative E could permanently change the OHV use patterns in the area, subject to Federal, State, and local OHV and traffic laws and regulations. These impacts would be the same as described under “Impacts Common to All Action Alternatives.”

Recreation Settings

Impacts to the recreation settings of subroute 2.2 would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the subroute 2.2 ROW would be the same as described under construction.

Adjacent Recreation Areas

There are no recreation areas adjacent to subroute 2.2.

LOCAL ALTERNATIVES

There are 8 local alternatives available for route group 2: LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1.

Construction

Recreation Opportunities/Activities

The overall impacts to recreation opportunities and activities would be the same as described under subroute 2.2, except as described below.

Hunting in the vicinity of the route group 2 local alternatives would be impacted by construction, as described above under "Impacts Common to All Action Alternatives." The LD4 segment that would occur in GMU 27 in New Mexico and GMUs 28, 31, and 32 in Arizona would have the greatest reduction of land available for hunting during construction, at 91.7, 931.9, 419.7, and 24.4 acres, respectively. LD4 would not parallel existing facilities for the majority of the segment. Therefore the reduction to land available for hunting within GMU 27 in New Mexico and GMUs 28, 31, and 32 in Arizona (comprising 663,000, 1.4 million, 776,000, and 981,000 acres, respectively) would represent a less than 0.01 percent reduction to GMU 27 in New Mexico, and a less than 0.06 percent, 0.05 percent, and 0.01 percent reduction to GMUs 28, 31, and 32 in Arizona, respectively, a negligible impact.

Recreation Settings

LD3a could have minor indirect impacts to the recreation setting of the Peloncillo Mountain WSA in New Mexico, since the LD3a segment would not follow existing transmission lines, pipelines, or roads. The impact would be minor since LD3a would be located approximately 0.25 mile to the east of the WSA boundary, and the laws establishing WSAs specifically mandate that "The fact that nonwilderness activities or uses can be seen or heard from within the wilderness shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area" (Public Law: New Mexico Wilderness Act 1980, Arizona Wilderness Act 1984, Arizona Desert Wilderness Act 1990).

LD1 would cross the Butterfield Trail in an area that is heavily disturbed with existing agricultural fields and transmission lines, and would not change the existing recreation setting.

LD2 would cross the Butterfield Trail at the Lordsburg Playa. Since LD2 would be constructed in an area that does not include existing transmission lines or pipelines, there would be a moderate impact to the Butterfield Trail recreational setting. Similarly, LD3a would also cross the Butterfield Trail just west of the Lordsburg Playa in an area that does not include existing transmission lines or pipelines.

Alternative E would cross the Butterfield Trail and would be constructed in an area that does not include existing transmission lines or pipelines, resulting in a moderate impact to the Butterfield Trail recreational setting (see Appendix F, "National Scenic and Historic Trails Assessment").

Desired Recreation Experiences

Construction of route group 2 local alternatives would not change the desired recreation experiences. In the vicinity where the local alternatives of route group 2 would cross the Butterfield Trail, existing roads and disturbed areas are amongst the landscape, resulting in a desired recreation experience that would be commensurate with the allowable uses surrounding the Butterfield Trail.

Adjacent Recreation Areas

The Hot Well Dunes Recreation SRMA is located approximately 0.5 mile north of the route group 2 local alternative LD4. The primary recreation activities are camping and OHV driving, and the Hot Well Dunes area is designated as "open" to vehicles, permitting cross-country travel. The recreation setting of Hot Well Dunes SRMA would experience minor impacts to the existing recreation setting during construction of LD4. Construction could result in the temporary access restrictions described under "Impacts Common

to All Action Alternatives," but these delays would be temporary, minor impacts and would not persist once construction is complete. The impact would be minor due to the general compatibility of OHV driving and transmission line construction as not having an impact to the OHV driving experience.

Operation and Maintenance

Recreation Opportunities/Activities

The overall permanent disturbance within the ROW of route group 2 local alternatives is approximately 7 percent, and would be wholly within the ROW. Therefore, recreation opportunities and activities would remain available in approximately 93 percent of the route group 2 local alternatives ROW throughout operation and maintenance of the proposed Project, subject to existing laws and closures. The operational impacts to recreation opportunities and activities would therefore be commensurately less than described under route group 2 local alternatives, construction.

Recreation Settings

Impacts to the recreation settings of route group 2 local alternatives would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the route group 2 local alternatives ROW would be the same as described under construction.

Adjacent Recreation Areas

Operation and maintenance activities to LD4 would not impact the Hot Well Dunes SRMA, and the footprint of the transmission towers, substations, and ancillary facilities would be outside of the SRMA, therefore not eliminating any BLM lands "open" to vehicles.

Route Group 3 – Apache Substation to Pantano Substation

SUBROUTE 3.1 – PROPONENT PREFERRED

Construction

Recreation Opportunities/Activities

Since subroute 3.1 is an upgrade to an existing line, there would be no changes to the existing recreation and activities, except as described below.

Subroute 3.1 would cross sections of the Butterfield Trail. The impacts to the Butterfield Trail would be the same as described under route group 1, subroute 1.1, except as described below under "Recreation Settings."

Hunting in the vicinity of subroute 3.1 would be temporarily impacted during construction, as described above under "Impacts Common to All Action Alternatives." Table 4.14-3 below provides the acreages of each GMU that would be affected by the construction of the subroutes included in route group 3. The U3a segment that would occur in GMUs 34B and 38M in Arizona would have the greatest reduction of land available for hunting during construction, at 246.0 and 400.7 acres, respectively. Since U3a parallels existing transmission lines and crosses I-10 multiple times, existing hunting activities in this vicinity likely would not occur within the ROW since the existing facilities could already preclude

hunting. The reduction to land available for hunting within GMUs 34B and 38M in Arizona (comprising 319,400 acres and 565,000 acres, respectively) would represent a less than 0.07 percent reduction in lands available for hunting for both GMU 29 and 30, a negligible impact. Further, much of GMU 38M occurs within the municipal limits of the greater Tucson area, precluding hunting anywhere within 0.25 mile of an occupied structure.

U3a would cross the Las Cienegas NCA Sonoita Valley Acquisition Planning District. Segment U3a follows an existing transmission line the entire distance that would cross the Sonoita Valley Acquisition Planning District. Therefore, there would be no impacts to the recreation opportunities and activities within the Sonoita Valley Acquisition Planning District. Similarly, U3a would cross through the Bar V Ranch, paralleling existing transmission lines. The recreation opportunities and activities in Bar V Ranch would not change during construction.

Table 4.14-3. Route Group 3 Game Management Unit (Arizona) Inventory Data

	Total Miles	Arizona GMU 30B (acres)	Arizona GMU 32 (acres)	Arizona GMU 33 (acres)	Arizona GMU 34B (acres)	Arizona GMU 38M (acres)
Subroute 3.1, Proponent Preferred						
U1a	16.1	291.9	–	–	–	–
U1b	2.9	2.9	50.1	–	–	–
U2	15.8	–	82.8	189.6	14.6	–
U3a	35.6	–	–	–	246.0	400.7
Route Group 3 Local Alternative						
H	19.3	–	120.8	223.0	6.3	–

Recreation Settings

Segment U1a would cross the Butterfield Trail in an area that includes existing transmission lines, pipelines, dirt roads, and rural residential homes. Segment U2 would cross the Butterfield Tail in an area that includes existing transmission lines and roads. The construction of segments U1a and U2 would result in negligible impacts to the recreation setting of the Butterfield Trail.[4]

Segment U1a would cross approximately 0.5 mile of semi-primitive motorized lands within the Coronado National Forest. U1a follows an existing transmission line the entire segment, and would not be in conflict with the semi-primitive motorized ROS setting that is designated under the 1988 Coronado National Forest Plan.

Desired Recreation Experiences

The impacts of construction of subroute 3.1 would not change the desired recreation experiences and would be the same as described under route group 1, subroute 1.1, except as described below.

The semi-primitive motorized ROS setting establishes desired recreation experiences of a mostly natural landscape not dominated by roads or structures. Construction of U1a would result in moderate impacts to

[4] A National Trails assessment in accordance with BLM Manual 6250 (BLM 2012c) – National Scenic and Historic Trails Administration (Public) and BLM Manual 6280 (BLM 2012d) – Management of National Scenic and Historic Trials and Trails Under Study or Recommended as Suitable for Congressional Designation (Public) is provided in Appendix F.

the desired recreation experience of the Coronado National Forest in a localized manner since the construction of transmission towers and access roads would dominate the areas within the ROW, detracting from a semi-primitive recreation experience. These impacts would be short-term and would include moderate impacts from construction noise, potential fugitive dust, and the visible contrast to the existing landscape. The impacts would be moderate due to the presence of the existing transmission line that U1a would parallel.

Adjacent Recreation Areas

There are no adjacent recreation areas to subroute 3.1.

Operation and Maintenance

Recreation Opportunities/Activities

Hikers, birders, and other users would continue their activities as they existing prior to construction since subroute 3.1 would be an upgrade to pre-existing facilities that already precluded some recreation opportunity and activity. The overall permanent disturbance within the ROW of subroute 3.1 is approximately 10.9 percent, and would be wholly within the ROW (there would be no substations located outside of the ROW under subroute 3.1), a minor impact. Therefore, recreation opportunities and activities would remain available in approximately 89.1 percent of the subroute 3.1 ROW throughout operation and maintenance of the proposed Project, subject to existing laws and closures. The operational impacts to recreation opportunities and activities would therefore be commensurately less than described under subroute 3.1, construction.

Recreation Settings

Impacts to the recreation settings of subroute 3.1 would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the subroute 3.1 ROW would be the same as described under construction.

The operation and maintenance of U1a would have negligible effects to the desired recreation experience of the Coronado National Forest, since U1a would be located parallel to an existing transmission line.

Adjacent Recreation Areas

There are no recreation areas adjacent to subroute 3.1.

LOCAL ALTERNATIVES

There is one local alternative for route group 3–local alternative H.

Construction

Recreation Opportunities/Activities

The construction of alternative H would not change the existing recreation opportunities or activities since it would be an upgrade to an existing transmission line for the entire segment. The overall impacts to recreation opportunities and activities would be the same as described under subroute 3.1, except as described below.

Hunting in the vicinity of alternative H would result in minor impacts from construction, as described above under "Impacts Common to All Action Alternatives." The alternative H segment that would occur in GMUs 32, 33, and 34B in Arizona would result in reductions of 120.8, 223.0, and 6.3 acres to lands available for hunting, respectively. Alternative H would not parallel existing transmission lines for the entire segment. Therefore the reduction to land available for hunting within GMUs 32, 33, and 34B in Arizona (comprising 981,000, 661,000, and 319,000 acres, respectively) would represent a less than 0.01 percent reduction to GMU 32, a less than 0.03 percent reduction to GMU 33, and a less than 0.01 percent reduction to GMU 34B in Arizona, a negligible impact.

Recreation Settings

Alternative H would cross the Butterfield Trail in an area that includes an existing pipeline and dirt roads. Therefore, the recreation setting would not change from existing conditions as a result of the construction of alternative H.

Desired Recreation Experiences

Construction of alternative H would not change the desired recreation experiences. In the vicinity where alternative H would cross the Butterfield Trail, existing roads and disturbed areas are amongst the landscape. Construction would result in a desired recreation experience that would be commensurate with the allowable uses surrounding the Butterfield Trail.

Adjacent Recreation Areas

There are no recreation areas adjacent to subroute 3.1.

Operation and Maintenance

Recreation Opportunities/Activities

The overall permanent disturbance within the ROW of alternative H is 13.4 percent, and would be wholly within the ROW. Therefore, recreation opportunities and activities would remain available in approximately 86.6 percent of the alternative H ROW throughout operation and maintenance of the proposed Project, subject to existing laws and closures. The operational impacts to recreation opportunities and activities would therefore be commensurately less than described under alternative H, construction.

Recreation Settings

Impacts to the recreation settings within the route group 3 local alternatives ROW would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the route group 3 local alternatives ROW would be the same as described under construction.

Adjacent Recreation Areas

There are no adjacent recreation areas to subroute 3.1.

Route Group 4 – Pantano Substation to Saguaro Substation

SUBROUTE 4.1 – PROPONENT PREFERRED

Construction

Recreation Opportunities/Activities

The recreation opportunities and activities in the area of subroute 4.1 are unique among the proposed Project segments, in that subroute 4.1 would be located in rural areas in greater frequency than in undeveloped areas. Subroute 4.1 would not be limited to rural areas and also includes undeveloped areas.

Hikers, birders, and other users would continue their activities as they existing prior to construction since subroute 4.1 would be an upgrade to pre-existing facilities that already precluded some recreation opportunity and activity. Multiple recreation areas, preserves, parks, and golf courses are present along subroute 4.1 (refer to Section 3.14, "Recreation"). Since subroute 4.1 is an upgrade to an existing line, there would be no changes to the existing recreation and activities except as described below.

Hunting in the vicinity of subroute 4.1 would be temporarily impacted during construction, as described above under "Impacts Common to All Action Alternatives." Table 4.14-4 provides the acreages of each GMU that would be affected by the construction of the subroutes included in route group 4. The U3a segment that would occur in GMUs 34B and 38M in Arizona would have the greatest reduction of land available for hunting during construction, at 400.7 and 246.0 acres, respectively. Since U3a parallels existing transmission lines and crosses I-10 multiple times, existing hunting activities in this vicinity likely would not occur within the ROW since the existing facilities could already preclude hunting. The reduction to land available for hunting within GMUs 34B and 38M in Arizona (composed of 319,400 acres and 565,000 acres, respectively) would represent a less than 0.07 percent reduction in lands available for hunting for both GMU 34B and 38M, a negligible impact. Further, much of GMU 38M occurs within the municipal limits of the greater Tucson area, precluding hunting anywhere within 0.25 mile of an occupied structure.

The Arizona Trail and the Anza Trail would be crossed by U3a under subroute 4.1. The recreation opportunities and activities of the Arizona Trail and the Anza Trail would not change during construction of subroute 4.1.

Table 4.14-4. Route Group 4 Game Management Unit (Arizona) Inventory Data

	Total Miles	Arizona GMU 37A (acres)	Arizona GMU 38M (acres)
Subroute 4.1, Proponent Preferred			
U3a	35.6	400.7	246.0
U3b	0.5	–	
U3c	1.0	–	
U3d	3.4	–	
U3e	0.9	–	
U3f	0.7	–	
U3g	0.9	–	
U3h	1.1	–	
U3i	18.2	6.1	325.0

Table 4.14-4. Route Group 4 Game Management Unit (Arizona) Inventory Data (Continued)

	Total Miles	Arizona GMU 37A (acres)	Arizona GMU 38M (acres)
U3j	0.9	15.9	–
U3k	16.7	303.6	–
U3l	1.6	28.1	–
U3m	0.6	8.9	–
U4	1.9	–	34.7
Route Group 4 Local Alternatives			
MA1	1.1	19.0	–
TH1a	1.4	–	25.7
TH1b	1.6	–	28.4
TH1c	0.3	–	4.8
TH1-Option	1.0	–	7.7
TH3-Option A	0.8	–	15.1
TH3-Option B	0.8	–	14.5
TH3-Option C	1.8	–	29.3
TH3a	2.7	–	49.7
TH3b	4.5	–	81.4

Recreation Settings

Segment U3a would cross the Arizona Trail and the Anza Trail in areas that include existing transmission lines and dirt roads. The construction of segment U3a would result in negligible impacts to the recreation setting of the Arizona Trail and the Anza Trail (see Appendix F, "National Scenic and Historic Trails Assessment").

Desired Recreation Experiences

The impacts of construction of subroute 4.1 would not change the desired recreation experiences and would be the same as described under route group 1, subroute 1.1, except as described below.

Adjacent Recreation Areas

Saguaro National Park is located approximately 0.5 mile west of segment U3i. The recreation opportunities and activities, recreation settings, and desired recreation experiences would not change if subroute 4.1 were constructed, since all construction activities would upgrade existing facilities and would not preclude the existing recreation conditions. Short-term access interruptions (as described under "Impacts Common to All Action Alternatives") could occur but would be localized and minor.

IFNM is also located approximately 0.5 mile west of segment U3i near the town of Marana. The recreation opportunities and activities, recreation settings, and desired recreation experiences would not change if subroute 4.1 were constructed, since all construction activities would upgrade existing facilities and would not preclude the existing recreation conditions. Short-term access (as described under "Impacts Common to All Action Alternatives") could occur but would be localized and minor.

Operation and Maintenance

Recreation Opportunities/Activities

Impacts to the recreation opportunities and activities within the subroute 4.1 ROW would be the same as described under construction.

Recreation Settings

Impacts to the recreation settings of subroute 4.1 would be the same as described under construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the subroute 4.1 ROW would be the same as described under construction.

Adjacent Recreation Areas

The impacts of operation and maintenance of subroute 4.1 to Saguaro National Park would be the same as described under construction.

LOCAL ALTERNATIVES

There are 10 local alternatives available for route group 4: MA1, TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C.

Construction

Recreation Opportunities/Activities

The construction of these local alternatives would not change the existing recreation opportunities or activities since it would be an upgrade to an existing transmission line for the entire segment. The overall impacts to recreation opportunities and activities would be the same as described under subroute 4.1, except as described below.

Hunting is not legally permitted along the route group 4 local alternatives since all segments would be within urban areas that occur within the city limits of Tucson.

Recreation Settings

The recreation settings of the route group 4 local alternatives would not change since the proposed Project would include upgrades to existing facilities.

Desired Recreation Experiences

The desired recreation experiences of the route group 4 local alternatives would not change since the proposed Project would include upgrades to existing facilities.

Adjacent Recreation Areas

Impacts to adjacent recreation areas within the route group 4 local alternatives would be the same as described under subroute 4.1, construction.

Operation and Maintenance

Recreation Opportunities/Activities

The overall permanent disturbance within the ROW of route group 4 local alternatives is 2.2 percent, and would be wholly within the ROW. Therefore, recreation opportunities and activities would remain available in approximately 97.8 percent of the route group 4 local alternatives ROW throughout operation and maintenance of the proposed Project, subject to existing laws and closures. The operational impacts to recreation opportunities and activities would therefore be commensurately less than described under route group 4 local alternatives, construction.

Recreation Settings

Impacts to the recreation settings within the route group 4 local alternatives would be the same as described under route group 4 local alternatives, construction.

Desired Recreation Experiences

Impacts to desired recreation experiences within the route group 4 local alternatives ROW would be the same as described under construction.

Adjacent Recreation Areas

Impacts to adjacent recreation areas within the route group 4 local alternatives would be the same as described under route group 4 local alternatives, construction.

Agency Preferred Alternative

The Agency Preferred Alternative would not change the recreation opportunities/activities and impacts would be the same as described under "Impacts Common to All Action Alternatives."

The Agency Preferred Alternative segments included in route group 1 would result in negligible changes to the recreation setting and desired recreation experiences during construction. The changes would be negligible because all segments that comprise the Agency Preferred Alternative in route group 1 would follow existing facilities, and thus the recreation setting and desired recreation experiences would already include/anticipate the presence of transmission lines.

The Agency Preferred Alternative included in route group 2 would result in moderate changes to the recreation setting and desired recreation experiences during construction, as well as operation and maintenance. The changes would be moderate because segment LD4 would not follow existing facilities, and thus the recreation setting and desired recreation experiences would change from the existing conditions of undeveloped landscape to a developed landscape. This change to the recreation setting is not anticipated to preclude any desired recreation experiences since recreational opportunity for all recreational pursuits in the area would still be available everywhere within the analysis area for LD4 except the footprints of the transmission line towers.

Short-term, minor impacts to the existing recreation settings would occur in route groups 3 and 4 at the intersections of the Agency Preferred Alternative segments with National Trails, Aden Hills OHV area, Bar V Ranch, Tucson Mountain Park, Tumamoc Hill, Joaquin Murrieta Park, Santa Cruz River Park, and Christopher Columbus Park during construction, as described under "Impacts Common to All Action Alternatives." These impacts would be minor due to the presence of existing transmission line ROWs at theses intersections, and would only occur during construction, when activities may change certain

recreation settings. These short-term changes to the recreation setting would result from the presence construction equipment, increased noise, and fugitive dust.

Additional Mitigation Measures

Construction could be limited to certain areas of the ROW during hunting seasons, in accordance with NMDGF and AGFD hunting regulations.

If the Arizona National Scenic Trail must be temporarily closed during construction, an alternate route should be provided during that time. The ASLD allows trail users to be within the 15-foot trail easement without a State Land recreation permit. If it is necessary for trail users to leave the easement on a detour during Project implementation, an exception should be obtained from the ASLD.

Residual Impacts

No residual impacts to recreation resources are identified.

Unavoidable Adverse Impacts

Dispersed recreation opportunities and activities would be lost permanently (for the life of the proposed Project) in areas that would be physically occupied by the transmission line towers, substations, and ancillary facilities. However, dispersed recreation would still occur in the immediate area surrounding the tower, substation or ancillary facility. In addition, users may simply go around, or even through (if the structure is steel lattice) the area that may be physically occupied by the Project. Thus, unavoidable adverse impacts would be a negligible impact. The overall loss of BLM land available for dispersed recreation would represent far less than 1 percent of the Las Cruces District and Safford FO, respectively.

Short-term Uses versus Long-term Productivity

Construction and operation and maintenance of the proposed Project would result in use of land and other resources for energy transmission and would preclude recreation in areas occupied by the transmission line towers, substations, and ancillary facilities. Implementation of the Project would not eliminate recreational access and activities in these areas in the long-term. The temporary and negligible impacts to recreation are not anticipated to be long-term changes in hunting, hiking, and motorized vehicle use patterns because construction of the proposed Project would not significantly decrease (or in the case of new access roads, increase) the areas available for dispersed recreation. Implementation of the proposed Project may create long-term disruptions of the visual quality due to the contrast that transmission facilities create upon the existing landscape, but these impacts would not affect all users. There would be no maintenance or enhancement of recreational resources, but all existing access to recreation areas would be maintained during construction and operation and maintenance. However, due to the nature of the Project occurring in areas that largely already experience these types of impacts (e.g., vehicle use patterns, desired recreation setting) the impact is negligible since the proposed Project would not eliminate recreation use.

Irreversible and Irretrievable Commitments of Resources

There would not be an irreversible commitment to recreation resulting from the Project. Existing recreation opportunities and activities, recreation settings, desired recreation experiences, and adjacent recreation areas could be restored to existing conditions if the proposed Project and facilities were removed in the future.

In addition, it could take years before the Project footprint is no longer visible, if it were restored to existing conditions after the life of the Project. Even when vegetation is established during reclamation efforts, the composition of plant species in the recovery area is often different than the original vegetation community. Typically, grasses establish early on, whereas shrubs take much longer to reestablish. The Project footprint could visibly persist for years beyond restoration.

4.15 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

4.15.1 Introduction

This section describes the impacts to socioeconomics and environmental justice communities associated with the construction and operation and maintenance of the transmission line, substations, and ancillary facilities. Impacts to socioeconomics are discussed in terms of effects on the economy, population, housing, tax revenues, public services, property values, the tourism- and recreation-related economy, and social impacts. The impacts described in this section are based on regional economic modeling incorporating projected construction and operation and maintenance activities, prior experience and analyses in other locations, and the other resource assessments provided in this DEIS.

4.15.2 Methodology and Assumptions

This section describes the analysis area for socioeconomics, key assumptions and methods, impact indicators, and thresholds for determining significant impacts.

Analysis Area

As discussed in chapter 3, section 3.15, the analysis area for socioeconomics is based on the counties the Project alternatives traverse and where Project impacts are most likely to occur; these counties include Doña Ana County, Grant County, Hidalgo County, and Luna County in New Mexico, and Cochise County, Pima County, Pinal County, Graham County, and Greenlee County in Arizona. The New Build Section of the Project would generally be located within the four counties in New Mexico and Cochise County, Arizona. Under one New Build Section local alternative, the line would also cross Graham County and Greenlee County in Arizona. The Upgrade Section of the Project would be located in Cochise County, Pima County, and Pinal County in Arizona.

Given the large geographic area encompassing the proposed Project, and the limited availability of economic data for geographic areas smaller than counties, the socioeconomic impact analysis generally focuses on evaluating impacts for the two subareas within the overall analysis area—the New Build Section and the Upgrade Section—as a whole.

The analysis area for environmental justice includes census tracts that fall within a 2-mile buffer of the Project alternatives within the New Build Section of the Project and a 500-foot buffer within the Upgrade Section of the Project. All of the census tracts within the analysis area for environmental justice were analyzed for low-income and minority populations (see section 3.15).

Analysis Assumptions

DEFINITIONS

Direct socioeconomic impacts include effects that would be caused by the proposed Project and would occur at the same time. Indirect impacts include effects that would also be caused by the proposed Project, but would occur later in time or farther removed in distance. For socioeconomic resources, one example of a potential indirect effect would include any "multiplier" effects on the economy resulting from the recirculation of money spent by Southline for construction worker salaries or the purchase of construction goods and services within the analysis area.

Short-term effects include effects that would occur during construction. Long-term effects include effects that would continue to occur during operation and maintenance of the proposed Project.

ECONOMIC AND FISCAL EFFECTS

Economic effects from the proposed Project, and most fiscal effects, were estimated using IMPLAN regional economic models. IMPLAN is an input/output modeling system originally developed for the U.S. Forest Service and is widely used by both private-sector and public-sector economists for impact analyses throughout the United States. The IMPLAN models incorporated 2010 data for the analysis area.

Construction of the proposed Project would produce three types of revenue streams that would stimulate the local economy—procurement of locally sourced goods and materials, wages paid to local construction workers, and the local expenditures of non-local construction workers during the period in which they are located in the analysis area. Each of these revenue streams was incorporated in the IMPLAN analysis.

Even though the majority of the construction workforce would be temporary workers who would not permanently reside in the analysis area, they would still contribute to the overall economic impacts of the Project. Given that the non-local labor force would reside in the local community for the duration of the Project, they would inevitably spend a portion of their income in the local economy. These local expenditures would likely primarily include housing, food, and entertainment. For this analysis we have assumed that 50 percent of the non-local labor force's wages would be spent in the analysis area. The 50 percent estimate is uncertain, but reflects both professional judgment and the assumptions incorporated in previous IMPLAN studies involving large, transient labor forces. For example, a recent economic impact study of the Marcellus Shale in Pennsylvania bounded local spending to 50 percent of wages for transient workers (Marcellus Shale Education & Training Center 2011).

Although the IMPLAN model provides information on the tax revenues that would be produced by construction or operation and maintenance activities, it does not account for the ongoing property tax revenues that could accrue from the value of the constructed transmission line. For that purpose, several assumptions were made: the "market value" of the completed line was assumed to be equivalent to the full cost of construction, and the value of the line was assumed to be distributed across the analysis area (by county) based on the proportion of the line that would be located in each county.

POPULATION AND HOUSING EFFECTS

The economic effects of the Project could also lead to impacts on the population levels in the analysis area. Approximately 75 percent of the construction workforce is expected to consist of non-local employees who will reside in the analysis area during the construction period (CH2M Hill 2013p). Given the short-term and migratory nature of this Project, very few of these employees are expected to be accompanied by their families. In other recent environmental impact studies for proposed transmission

lines, the proportion of non-local construction workers who would be accompanied by their families has been projected to be essentially zero (BLM 2013a) or up to 10 percent (BLM 2013p). To ensure this analysis does not inadvertently understate potential population-related impacts, the has analysis assumes that 10 percent of the non-local construction workforce would be accompanied by a spouse and a school-aged child.

The local economic opportunities that result from construction-related payroll and construction expenditures for local goods and services could also lead to additional migration to the analysis area. The IMPLAN model provides estimates of the number of indirect jobs that would be created due to these expenditures. The extent to which these indirect jobs would be filled by existing residents in the analysis area, versus people drawn to the area by these new employment opportunities, is unknown. For purposes of estimating potential impacts on population, this analysis provides a range of potential population effects from the alternatives. At the low end, the indirect jobs are assumed to be filled entirely by local residents and estimates of population effects include only the direct Project construction workers and families. At the high end, all indirect jobs are assumed to be filled by workers who migrate to the analysis area. The composition of these workers' households is assumed to mirror the current average of 2.6 persons per household average within the analysis area (Census Bureau 2011).

Non-local workers, direct or indirect, will require housing in the analysis area. For purposes of considering potential effects on housing conditions, the number of projected non-local workers is compared to the estimated availability of rental housing, motel/hotel rooms, and RV sites within the analysis area.

SOCIAL EFFECTS

Rapid development and the presence of large numbers of temporary workers in rural areas can lead to impacts on social conditions. Sociologists and others have written extensively on social issues associated with rapid development in rural areas since the 1980s. Analysts have focused on past energy development campaigns in the western United States and impacts to the social well-being in host communities (BLM 2012k).

Prior studies have found mixed results in terms of social effects from rapid development in rural areas. Key areas of concern include the potential for changes in the "density of acquaintanceship;"[5] declines in local identity, solidarity, and trust in other community members; increased fear of crime; less control of deviant behavior, reduced respect for law and order, and less effective socialization of youth; and diminished community satisfaction and reduced attachment to the community. Whether these effects occur, and the degree to which they occur, appears to vary based on both the nature of the resource activity, the stage or phase of activity, and the characteristics of the affected communities (Montana Board of Crime Control 2013).

Social effects cannot be directly quantified except by surveys of affected community members. For purposes of this analysis, the rate of projected population change that could result from the proposed Project, relative to the existing population size of potentially affected communities, is considered to represent an indicator of the potential for adverse social effects.

ENVIRONMENTAL JUSTICE EFFECTS

Evaluation of environmental justice effects involves assessment of the potential for disproportionately high and adverse effects on minority or low-income populations. Minority and low-income populations in

[5] This may sometimes be expressed in statements like "we used to know everyone, now there are a lot of strangers in our community."

proximity to the ROW for the proposed Project and the alternatives were identified in chapter 3, on the basis of Census data at the Census tract level. Census tracts typically include 2,500 to 8,000 people and, in rural areas, can be quite large in geographic area. For purposes of this assessment the population in closest proximity to the ROW for the proposed Project and alternatives was assumed to have the same characteristics (e.g., minority or low-income status) as the overall Census tract in which it is located.

Impact Indicators

Impact indicators were developed for key socioeconomic and environmental justice attributes. The attributes and impact indicators are:

- Regional economy – change in employment, labor earnings, and regional output
- Fiscal conditions – changes in local government tax revenues
- Demographic conditions – changes in total population
- Housing conditions – changes in demand for housing relative to available supply
- Social conditions – rate of population change, expressed as percent change per year
- Environmental justice – anticipated high and disproportionate adverse socioeconomic or environmental effects on environmental justice communities relative to effects across the analysis area as a whole

Significant Impacts

For the purposes of this analysis, a significant impact on socioeconomics or environmental justice could result if any of the following were to occur from construction or operation and maintenance of the proposed Project:

- A short-term or long-term change (positive or negative) of 1 percent or more in employment, labor earnings, or regional output compared to current conditions.
- A short-term or long-term change (positive or negative) of 1 percent or more in tax revenues received by local governments
- A short-term change of 1 percent or more in the population residing in the analysis area or within individual counties within the analysis area
- Short-term demand for accommodations during construction exceeding one-third of the estimated available supply
- High and disproportionate adverse effects on environmental justice communities

4.15.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, Southline would not construct and operate the new section of transmission line in the New Build Section. Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a). In the short term, there would be no socioeconomic effects under the no action alternative.

In the long term, the no action alternative would not meet the purpose and need objectives of improving reliability of the electrical grid in southern New Mexico and southern Arizona, increasing the ability of the grid to meet demand growth in the region, or facilitating potential renewable generation development in the region. Adequate and reliable electricity supply, like other key infrastructure, is an important requirement for economic development. Absent alternative projects to upgrade electricity supplies in southern New Mexico and southern Arizona, the no action alternative could result in significant long-term adverse impacts on the economy, local utilities and residents in the analysis area.

Impacts Common to All Action Alternatives

Each of the action alternatives would involve the construction and operation and maintenance of a new transmission line and appurtenant facilities, including electrical substations, in the New Build Section, and the upgrade and operation of similar existing facilities in the Upgrade Section.

During a projected construction period of approximately 24 months, Southline would hire a number of local workers and bring in a larger number of non-local workers to complete the Project. They would also spend money on materials and services for construction, with the majority of those expenditures going to suppliers outside the analysis area.

Southline has developed and provided estimates of the required workforce—and anticipated expenditures for labor, supplies, and materials—for the proposed Project. Comparable estimates of labor requirements and costs are not available for the other action alternatives, but the magnitude of the workforce and expenditures would likely be comparable to those anticipated for the proposed Project.

Overall, the action alternatives would facilitate future economic development and long-term job growth in the region by improving reliability of the electrical grid and increasing the ability of the grid to meet the demand of future growth.

NEW BUILD SECTION

Economic Effects

Construction

Based on information provided by Southline, an average of 325 workers would be required to complete the New Build Section over the 2-year construction period, at a projected cost of $28.5 million per year. Seventy-nine of these workers are expected to be hired from the local workforce at an annual cost of $5.7 million. Southline would spend a projected average of $117.85 during each of the 2 years for materials and supplies, with approximately 5 percent ($5.9 million per year) of these expenditures accruing to local suppliers (CH2M Hill 2013p).

This information was incorporated into a regional IMPLAN economic model that included Doña Ana County, Grant County, Hidalgo County, and Luna County in New Mexico, and Cochise County in Arizona. As shown in table 4.15-1, construction of the proposed Project is projected to support approximately 235 short-term jobs in the New Build Section. This total includes the projected 79 direct jobs (local hires) associated with construction, as well as 156 indirect jobs that would be supported by local purchases of supplies and materials for construction, household expenditures by the locally hired workers, and local expenditures by non-local workers during the construction period. This employment total does not count the estimated 246 non-local workers anticipated to be hired for construction.

Table 4.15-1. Projected Annual Employment Impact from Construction of New Build Section

Construction Expenditures	Direct Employment	Indirect Employment	Total Employment
Local materials	0	65	65
Local labor	79	30	109
Non-local labor	0	61	61
Total	**79**	**156**	**235**

In addition to the $5.7 million in annual compensation anticipated to be paid to locally hired construction workers, construction of the New Build Section is projected to indirectly produce an additional $5.7 million in annual labor earnings during the 2-year construction period. This information is summarized in table 4.15-2. The projected total labor earnings impact in the New Build Section of approximately $11.4 million per year does not include the projected $22.8 million per year expected to be paid to non-local construction workers.

Table 4.15-2. Projected Annual Labor Earnings Impact from Construction of New Build Section

Construction Expenditures	Direct Labor Earnings	Indirect Labor Earnings	Total Labor Earnings
Local materials	$0	$2.7	$2.7
Local labor	$5.7	$1.0	$6.7
Non-local labor	$0	$2.0	$2.0
Total	**$5.7**	**$5.7**	**$11.4**

Note: Labor earnings reflect total compensation, including worker benefits, in millions of 2013 U.S. dollars.

Overall, construction of the New Build Section is projected to produce a short-term, annual increase in regional output of $24.8 million during the 2-year construction period. This total includes the projected $5.9 million increase in direct output due to the purchase of locally sourced construction goods and materials, along with $18.9 million in additional regional output due to recirculation of the wages paid to construction workers. This information is summarized in table 4.15-3. As noted previously, non-local workers were assumed to spend 50 percent of their disposable income within the analysis area during the construction period.

Table 4.15-3. Projected Annual Impact on Regional Output from Construction of New Build Section

Construction Expenditures	Direct Output	Indirect Output	Total Output
Local materials	$5.9	$8.8	$14.7
Local labor	$0	$3.3	$3.3
Non-local labor	$0	$6.7	$6.7
Total	**$5.9**	**$18.9**	**$24.8**

Note: Output is in millions of 2013 U.S. dollars; numbers may not add up due to rounding.

Operation and Maintenance

In contrast to the large workforce and expenditures required for construction, ongoing operations and maintenance would require few workers and have relatively little direct economic impact in the New Build Section. Ground inspections of the transmission line facilities could require up to three crew members and would be anticipated every 1 to 2 years. Insulator washing would occur no more than twice per year and would require approximately 30 minutes per transmission structure. Vegetation removal might be required in some locations on an annual basis. Repairs and replacements of transmission line components would be performed as needed. Substations would be unmanned and controlled remotely. Routine substation operations would require a monthly visit by a crew of one to two workers and a major maintenance once per year requiring up to 15 personnel over a 1- to 3-week period. These types of activities would have minimal effects on the local economy, and regional economic impacts from operations have not been estimated (Southline 2013).

In contrast to the no action alternative, however, each of the action alternatives would meet the purpose and need for the proposed Project in improving reliability of the electrical grid in southern New Mexico and southern Arizona, increasing the ability of the grid to meet demand growth in the region, or facilitating potential renewable generation development in the region. The long-term economic impacts from these improvements have not been estimated, but could be significant.

Tax Revenue Effects

Construction

Construction-related economic activity would also generate additional tax revenues for local governments in the New Build Section. The largest sources of new state and local revenues would be sales taxes[6] and property taxes. Based on the IMPLAN analysis of regional economic effects, construction of the proposed Project would produce approximately $462,000 per year in additional state and local sales taxes and approximately $219,000 per year in additional state and local property taxes.

In both Arizona and New Mexico, the state receives approximately two-thirds of all gross receipts tax revenues, while approximately one-third of these revenues are distributed to local governments. Local governments in the two states (including school districts) receive about 95 percent of the property tax revenues and the states receive about 5 percent of these revenues. Based on these generalized proportions, local governments in the New Build Section could expect to receive about $150,000 per year in additional sales tax revenues and about $210,000 per year in additional property tax revenues during the 2-year construction period. Comparison of these estimated local government tax revenues with the baseline tax receipts shown in table 3.15-17 indicates construction-related sales and property taxes would represent an increase of about 0.1 percent in total sales and property tax revenues for local governments in the New Build Section.

Operation and Maintenance

Depending on the ultimate ownership of the proposed Project,[7] the transmission line and appurtenant facilities could produce more substantial property tax revenues for local governments once fully constructed. Based on an estimated taxable value of approximately $138 million for the New Build Section, the transmission line could initially produce about $4.2 million per year in property tax revenues for local governments. This total would represent a 1.5 percent increase in total local government

[6] Sales taxes are termed gross receipts taxes in New Mexico and Transaction Privilege taxes in Arizona.
[7] Under private ownership, the transmission line and appurtenant facilities would likely be subject to State and local property taxes. To the extent that Western owns parts or all of the facilities, they may not be subject to property taxes.

property tax revenues in the New Build Section. Property tax revenues would decrease over time during the period of operations due to depreciation in the value of the facilities.

Population Effects

Construction

Construction of the proposed Project is expected to require approximately 246 non-local workers who would reside within the New Build Section during the 2-year construction period. Construction-related economic activity is also anticipated to support approximately 156 indirect jobs in the area. Although no more than 10 percent of the non-local construction workers are expected to be accompanied by their families, migrants to the area to fill the indirect jobs resulting from local construction-related expenditures might more closely resemble typical households within the area.

Table 4.15-4 depicts the potential short-term population effects associated with construction of the proposed Project. If all of the indirect jobs are filled by existing residents of the area, the proposed Project could result in a short-term increase in the population of the New Build Section of about 271 adults and 25 children. The maximum potential short-term population effect, if all of the indirect jobs were filled by individuals moving to the area, would be about 583 adults and 119 children.

Table 4.15-4. Potential Population Effects from Construction of New Build Section

		Family Members		Potential Population Increase	
Source	**Workers**	**Adults**	**Children**	**Adults**	**Children**
Direct jobs	325				
Local hires	79				
Imported workers	246	25	25	271	25
Indirect jobs	156	156	94	312	94
Maximum potential population increase				**583**	**119**

These projected population effects would represent an increase of between 0.07 percent and 0.16 percent in the total population of the New Build Section. However, the construction workforce would not be evenly distributed across the area throughout the construction period. Instead, much of that workforce is expected to move across the New Build Section as construction proceeds. In the sparsely populated western portion of the New Build Section, the relative magnitude of the population increase could be more substantial. In the most extreme example, if all of the non-local construction workers temporarily reside in Hidalgo County, this workforce would represent about 5 percent of the total county population. These localized effects, however, would occur for only a portion of the 2-year construction period.

Operation and Maintenance

As noted previously, ongoing operations and maintenance would require relatively few workers. The proposed Project would have minimal long-term effects on the population of the New Build Section.

Housing Effects

Construction

The non-local construction workers, any family members they bring with them, and any workers and families who migrate to the area to fill indirect jobs resulting from construction would place additional demands on rental housing and short-term accommodations in the analysis area. Based on the population effects analysis described previously, between 246 and 402 rental or short-term housing units could be required during construction in the New Build Section.

Although this projected housing requirement represents a small portion of the approximately 5,700 rental housing units available in the New Build Section (see table 3.15-3), the available rental housing stock is dominated by the large number of units available in the Las Cruces area (at the extreme eastern end of the New Build Section) and in the southern portion of Cochise County—a considerable distance from the proposed alignment. The biggest challenge in housing the temporary workforce within the New Build Section is likely to occur when construction proceeds to the western portions of the New Build Section, including Hidalgo County and northeastern Cochise County.

Table 3.15-3 shows that Hidalgo County has approximately 80 available rental housing units. The number of rental units in northeastern Cochise County is not known, but is likely to also be small, based on the sparse population in that area. As noted in chapter 3, there are approximately 400 to 500 hotel/motel units in Lordsburg (in Hidalgo County). Although hotel/motel accommodations in northeastern Cochise County are much more limited, that area has a relatively large number of RV/mobile home parks.

Overall, while it should be possible to accommodate the temporary construction workforce, the proposed Project could lead to short-term shortages of housing and temporary accommodations in the western portions of the New Build Section. It is possible that at least a portion of the construction workforce could be housed in temporary “man camps.” Such camps can create issues and concerns for local governments and residents if they are not carefully managed and monitored.

Operation and Maintenance

The proposed Project would have minimal long-term effects on housing within the New Build Section.

Effects on Public Services

Construction

In addition to the temporary increase in demand for housing just described, the non-local construction workforce and any non-local workers and families who migrate to the area to fill indirect employment opportunities, would also create additional short-term demands for public services such as police and fire protection, education, and medical services. Much like the housing situation, these added demands are unlikely to create substantial challenges in the eastern portion of the New Build Section, but could create short-term challenges in the western portion of the proposed Project, where existing services are much more limited.

Operation and Maintenance

The proposed Project would have minimal long-term effects on most public services within the New Build Section. However, to the extent the proposed Project improves reliability of the electrical grid in

southern New Mexico and southern Arizona, and increases the ability of the grid to meet demand growth in the region, it could provide long-term improvements for the area in terms of electric utility service.

Effects on Property Values

Construction

To construct the New Build Section of the proposed Project, a 200-foot-wide ROW along the 240-mile-long route would be acquired. The new ROW would be obtained through a combination of grants and easements negotiated with government and private landowners (Southline 2013). Landowners along the ROW would be compensated for the disruption and the encumbrance of the required easement based on market land and easement values. Note that private landowners would lease the use of their land for the ROW, but would retain their ownership of the lands along the ROW.

Operation and Maintenance

The concern that transmission lines may cause long-term decreases in property values has led to extensive research on the subject. Studies have used both quantitative analyses of market data and survey methods to investigate how land values are impacted. However, despite the large volume of available literature, the conclusions are not clear or consistent. Instead the research indicates that the effects of transmission lines on property values appear to differ depending on the situation.

Prior to the 1990s, research generally concluded that there were no negative impacts of transmission lines on property values. However, more recent studies have indicated there may be property value effects, though in most studies the decreases in land values are relatively small and seldom exceed 15 percent. The impacts also generally decrease dramatically with distance from the transmission line (Colwell 1990; Delaney and Timmons 1992; Hamilton and Schwann 1995). The properties most likely to be affected are those that are directly adjacent to the transmission lines. One empirical study found that while the adjacent properties experienced a 6.3 percent decrease in value, the properties that were in close proximity but were not directly adjacent experienced only a 1 percent decrease in value (Hamilton and Schwann 1995). One study, conducted in the Montreal area, found that properties located one or two lots away from transmission lines actually increased in value due to the benefit of the open space created by the transmission line ROW (Des Rosiers 2002). Negative impacts have also been found to diminish over time as well as distance (Colwell 1990).

Other studies have found that it is primarily the visibility of the transmission lines that impacts property values. A survey of experienced appraisers found that on average, transmission lines decreased property values by 10.2 percent. Impacts attributed to the visibility of the infrastructure, particularly of the permanent towers, did not noticeably dissipate over time (Delaney and Timmons 1992). Other studies have found that the major cause of diminished property values was the encumbrance of the transmission line easement placed on the land (Chalmers et al. 2009; Colwell 1990).

The majority of the existing literature has focused on urban residential properties in densely populated northern regions. This, in conjunction with the inconsistent results, makes it difficult to directly apply the findings to the largely rural setting for both the New Build and Upgrade Sections. However, there is evidence that property values in less densely populated areas are less sensitive to transmission lines (Chalmers 2012; Delaney and Timmons 1992). For agricultural lands in Montana, there was no evidence of market impacts from transmission lines. When interviewed, property owners did express that the lines were a nuisance, but did not impact their decision to purchase the property or how much they paid for it. However, rural lands with recreation attributes may experience slightly diminished property values, particularly when the recreation is related to the rural scenery. Rural residential properties also have the propensity to be impacted by transmission lines. In tight housing markets there have not been noticeable

effects. However, when there are many suitable substitutes for housing, those closer to transmission lines have taken longer to sell and have sold for comparatively less. The size of the rural property, both for residential and non-residential uses, evidently plays a large role in determining the magnitude of the impacts from transmission projects. Larger properties diffuse the impacts of the transmission line and therefore minimize the effects compared to those on smaller properties (Chalmers 2012).

In summary, prior research suggests that properties immediately adjacent to transmission lines may suffer a reduction in value due to the encumbrance the line places on the use of the land, the visual impact of the line, or both. In more densely developed areas, reductions in immediately adjacent property values of between 5 and 15 percent would be consistent with findings from previous studies. Homes located farther away from the transmission line are unlikely to experience significant impacts to their values. The values of larger properties in more sparsely populated rural areas are likely to be affected less than properties in more densely populated areas. Impacts on property values may diminish over time.

As noted previously, property owners allowing the use of a portion of their property for the transmission line ROW would be compensated by Southline for the encumbrance the line creates upon their land.

Effects on Tourism and Recreation-related Economy

Construction

Based on the recreation impact analysis provided earlier in this chapter, existing recreation opportunities and activities would not be permanently affected by construction of the action alternatives, though some impacts to access could occur on a localized and short-term basis. Dispersed recreation activities, such as hiking and equestrian activities, might also be temporarily affected in some locations for short periods of time. These short-term, localized impacts are unlikely to result in a discernible impact to the tourism- and recreation-related economy in the New Build Section.

As noted earlier in the housing discussion, a relatively large number of non-local construction workers may use hotels/motels and RV/mobile home parks for temporary accommodations during the construction period. In the western portions of the New Build Section, where such accommodations are in relatively short supply, this workforce could occupy many of the available short-term accommodations during the period of time that construction is focused in this area. Shortages of available hotel/motel rooms and RV spaces could have an impact on the local tourism-related economy during this period.

Operation and Maintenance

Ongoing operations and maintenance should have little or no long-term effect on the tourism- and recreation-related economy in the New Build Section.

Social Effects

Construction

As discussed earlier in this section, the presence of large, transient populations of short-term construction workers can have impacts on social conditions in rural communities. Whether these effects occur, and the magnitude of the effects, appears to partly depend on the size of the non-local construction workforce relative to the size of the existing communities.

Overall, the projected non-local workforce is relatively small compared to the existing population in the eastern portions of the New Build Section. As the workforce migrates to the western portions of the area, there is the possibility of some short-term social impacts on communities such as Lordsburg, New

Mexico; Willcox, Arizona; and Benson, Arizona. Given the relatively short duration of the proposed construction period, and the even shorter period of time in which activity could be concentrated in these areas, any adverse social impacts would be relatively brief in duration.

Operation and Maintenance

Ongoing operations and maintenance would have little or no effect on social conditions in the New Build Section.

UPGRADE SECTION

Economic Effects

Construction

Based on information provided by Southline, an average of 175 workers would be required to complete the Upgrade Section at a projected cost of $15.3 million per year over the 2-year construction period. Forty-three of these workers are expected to be hired from the local workforce at an annual cost of $3.1 million. Southline would spend a projected average of $67.8 million during each of the 2 years for materials and supplies, with approximately 5 percent ($3.4 million per year) of these expenditures accruing to local suppliers (CH2M Hill 2013p).

This information was incorporated into a regional IMPLAN economic model that included Cochise County, Pima County, and Pinal County in Arizona. As shown in table 4.15-5, construction of the proposed Project is projected to support approximately 138 short-term jobs in the Upgrade Section. This total includes the projected 43 direct jobs (local hires) associated with construction, as well as 95 indirect jobs that would be supported by local purchases of supplies and materials for construction, household expenditures by the locally hired workers, and local expenditures by non-local workers during the construction period. This employment total does not count the estimated 132 non-local workers anticipated to be hired for construction.

Table 4.15-5. Projected Annual Employment Impact from Construction of Upgrade Section

Construction Expenditures	Direct Employment	Indirect Employment	Total Employment
Local materials	0	38	38
Local labor	43	19	62
Non-local labor	0	38	38
Total	**43**	**95**	**138**

In addition to the $3.1 million in annual compensation anticipated to be paid to locally hired construction workers, construction of the Upgrade Section is projected to indirectly produce an additional $3.8 million in annual labor earnings during the 2-year construction period. This information is summarized in table 4.15-6. The projected total labor earnings impact in the Upgrade Section of approximately $6.9 million per year does not include the projected $12.2 million per year expected to be paid to non-local construction workers.

Table 4.15-6. Projected Annual Labor Earnings Impact from Construction of Upgrade Section

Construction Expenditures	Direct Labor Earnings	Indirect Labor Earnings	Total Labor Earnings
Local materials	$0	$1.7	$1.7
Local labor	$3.1	$0.7	$3.7
Non-local labor	$0	$1.4	$1.4
Total	**$3.1**	**$3.8**	**$6.8**

Note: Labor earnings reflect total compensation, including worker benefits, in millions of 2013 U.S. dollars.

Overall, construction of the Upgrade Section is projected to produce a short-term, annual increase in regional output of $15.4 million during the 2-year construction period. This total includes the projected $3.4 million increase in direct output due to the purchase of locally sourced construction goods and materials, along with $12.0 million in additional regional output due to recirculation of the wages paid to local and non-local construction workers (table 4.15-7). As noted previously, non-local workers were assumed to spend 50 percent of their disposable income within the analysis area during the construction period.

Table 4.15-7. Projected Annual Impact on Regional Output from Construction of Upgrade Section

Construction Expenditures	Direct Output	Indirect Output	Total Output
Local materials	$3.4	$5.5	$8.9
Local labor	$0	$2.2	$2.2
Non-local labor	$0	$4.3	$4.3
Total	**$3.4**	**$12.0**	**$15.4**

Note: Output is in millions of 2013 U.S. dollars.

Operation and Maintenance

As discussed previously for the New Build Section, ongoing operations and maintenance would require few workers and have relatively little direct economic impact in the Upgrade Section. By meeting the purpose and need for the proposed Project in improving reliability of the electrical grid in southern New Mexico and southern Arizona, increasing the ability of the grid to meet demand growth in the region, or facilitating potential renewable generation development in the region, each of the alternatives would offer longer-term economic benefits to the region. The economic impacts from these improvements have not been estimated, but could be significant.

Tax Revenue Effects

Construction

Construction-related economic activity would also generate additional tax revenues for local governments in the Upgrade Section. The largest sources of new state and local revenues would be sales taxes[8] and property taxes. Based on the IMPLAN analysis of regional economic effects, construction of the proposed Project would produce approximately $309,000 per year in additional state and local sales taxes, and approximately $214,000 per year in additional state and local property taxes.

[8] Sales taxes are termed Transaction Privilege taxes in Arizona.

In Arizona, the state receives approximately two-thirds of all gross receipts tax revenues, while approximately one-third of these revenues are distributed to local governments. Local governments (including school districts) receive about 95 percent of the property tax revenues and the state receives about 5 percent of these revenues. Based on these generalized proportions, local governments in the Upgrade Section could expect to receive about $206,000 per year in additional sales tax revenues and about $200,000 per year in additional property tax revenues during the 2-year construction period. Comparison of these estimated local government tax revenues with the baseline tax receipts shown in table 3.15-17 indicates construction-related sales and property taxes would represent an increase of about 0.1 percent in total sales tax revenues, and less than 0.01 percent in property tax revenues for local governments in the Upgrade Section.

Operation and Maintenance

As noted previously in the discussion regarding the New Build Section, the transmission line and appurtenant facilities could produce more substantial property tax revenues for local governments once fully constructed. Based on an estimated increase in the taxable value of the transmission line in the Upgrade Section of approximately $52 million, the transmission line could initially produce about $4.3 million per year in property tax revenues for local governments. This total would represent a 0.3 percent increase in total local government property tax revenues in the Upgrade Section. Property tax revenues would decrease over time during the period of operations due to depreciation in the value of the facilities.

Population Effects

Construction

Construction of the proposed Project is expected to require approximately 132 non-local workers who would reside within the Upgrade Section during the 2-year construction period. Construction-related economic activity is also anticipated to support approximately 95 indirect jobs in the area. Although no more than 10 percent of the non-local construction workers are expected to be accompanied by their families, migrants to the area who fill the indirect jobs resulting from local construction-related expenditures might more closely resemble typical households within the area.

Table 4.15-8 depicts the potential short-term population effects associated with construction of the proposed Project. If all of the indirect jobs are filled by existing residents of the area, the proposed Project could result in a short-term increase in the population of the Upgrade Section of about 145 adults and 13 children. The maximum potential short-term population effect, if all of the indirect jobs were filled by individuals moving to the area, would be about 335 adults and 70 children.

Table 4.15-8. Potential Population Effects from Construction of Upgrade Section

		Family Members		Potential Population Increase	
Source	**Workers**	**Adults**	**Children**	**Adults**	**Children**
Direct jobs	175				
Local hires	43				
Imported workers	132	13	13	145	13
Indirect jobs	95	95	57	190	57
Maximum potential population increase				**335**	**70**

These projected population effects would represent an increase of between 0.01 percent and 0.04 percent in the total population of the Upgrade Section. As the construction workforce moves across the Upgrade Section during construction, the relative magnitude of the population increase in the more sparsely populated eastern portion of the Upgrade Section (northern Cochise County) could be more substantial. These localized effects, however, would occur for only a portion of the 2-year construction period.

Operation and Maintenance

As noted previously, ongoing operations and maintenance would require relatively few workers. The proposed Project would have minimal long-term effects on the population of the Upgrade Section.

Housing Effects

Construction

Non-local construction workers, any workers who migrate to the area to fill indirect jobs resulting from construction, and family members would place additional demands on rental housing and short-term accommodations in the analysis area. Based on the population effects analysis described previously, between 132 and 227 rental or short-term housing units could be required during construction in the Upgrade Section.

This projected housing requirement represents a small portion of the approximately 24,500 rental housing units available in the Upgrade Section (see table 3.15-4), the available rental housing stock is dominated by the large number of units available in Pima County and Pinal County (at the western end of the Upgrade Section). Most of the potentially available rental units in Cochise County would be located in the southern portion of the county (in the larger communities such as Sierra Vista)—a considerable distance from the proposed alignment. The biggest challenge in housing the temporary workforce within the Upgrade Section is likely to occur when construction is focused in the eastern portions of the Upgrade Section, in northeastern Cochise County.

The number of rental units in northeastern Cochise County is not known, but is likely to be small based on the sparse population in that area. As noted in chapter 3, hotel/motel accommodations in northeastern Cochise County are also very limited, but the area has a relatively large number of RV/mobile home parks.

Overall, while it should be possible to accommodate the temporary construction workforce, the proposed Project could lead to housing challenges in the eastern portion of the Upgrade Section. It is possible that at least a portion of the construction workforce could be housed in temporary “man camps.” Such camps can create issues and concerns for local governments and residents if they are not carefully managed and monitored.

Operation and Maintenance

The proposed Project would have minimal long-term effects on housing within the Upgrade Section.

Effects on Public Services

Construction

In addition to the temporary increase in demand for housing just described, the non-local construction workforce and any non-local workers and families who migrate to the area to fill indirect employment opportunities, would also create additional short-term demands for public services such as police and fire protection, education, and medical services. Much like the housing situation, these added demands are

unlikely to create substantial challenges in the western portion of the Upgrade Section, but could create short-term challenges in the eastern portion of the proposed Project where existing services are much more limited.

Operation and Maintenance

The proposed Project would have minimal long-term effects on most public services within the Upgrade Section. However, to the extent the proposed Project improves reliability of the electrical grid in southern Arizona, and increases the ability of the grid to meet demand growth in the region, it could provide long-term improvements for the area in terms of electric utility service.

Effects on Property Values

Construction

Western already has a 100-foot-wide easement under its existing transmission line. Where room permits, Western or Southline would obtain a new 150-foot easement 50 feet to one side of the centerline of the existing easement, so as to have room to operate the existing line while constructing the new one. Once completed, the old line would be removed. In the end, 75 feet of the existing ROW would be reoccupied, 75 feet of new ROW would be obtained, and 25 feet of old ROW would be abandoned. The additional ROW required to construct and maintain the upgraded transmission line would be obtained through a combination of grants and easements negotiated with government and private landowners (Southline 2013). Landowners along the ROW would be compensated for the disruption and the encumbrance of the required easement based on market land and easement values.

Operation and Maintenance

As discussed earlier for the New Build Section, there has been considerable research into the concern that transmission lines may cause long-term decreases in property values. Recent studies have generally concluded that immediately adjacent property values may be reduced by between 5 and 15 percent, though effects on large landholdings in rural areas appear to be less than in more urbanized areas. Impacts decrease quickly with distance and appear to diminish over time.

Compared to the New Build Section, portions of the Upgrade Section are located in more densely developed urban areas, particularly in and near the City of Tucson. The upgraded transmission line would largely follow alignments used by existing transmission lines, which would reduce the potential for impact on property values. Nonetheless, property owners along the ROW would be affected by the expanded easement required for the upgraded line and the increased size of the structures required for the 230-kV line. The new, double-circuit line would be supported by tubular steel structures, 100 to 140 feet in height. Between 5 and 8 support structures (towers) will be required per mile, depending on the terrain (Southline 2013).

Effects on Tourism and Recreation-related Economy

Construction

Existing recreation opportunities and activities would not be permanently affected by construction of the action alternatives, though some impacts to access could occur on a localized and short-term basis. Dispersed recreation activities might also be temporarily affected in some locations for short periods of time. These short-term, localized impacts are unlikely to result in a discernible impact to the tourism- and recreation-related economy in the Upgrade Section.

A relatively large number of non-local construction workers may use hotels/motels and RV/mobile home parks for temporary accommodations during the construction period. In the eastern portion of the Upgrade Section, where such accommodations are in relatively short supply, this workforce could occupy many of the available short-term accommodations during the period of time that construction is focused in this area. Shortages of available hotel/motel rooms and RV spaces could have an impact on the local tourism-related economy during this period.

Operation and Maintenance

Ongoing operations and maintenance should have little or no long-term effect on the tourism- and recreation-related economy in the Upgrade Section.

Social Effects

Construction

The presence of large, transient populations of short-term construction workers can have impacts on social conditions in rural communities. Whether these effects occur, and the magnitude of the effects, appears to partly depend on the size of the non-local construction workforce relative to the size of the existing communities.

Overall, the projected non-local workforce is relatively small compared to the existing population in the western portions of the Upgrade Section. During the period of time that work is concentrated in the eastern portions of the area, there is the possibility of some short-term social impacts on communities such as Willcox and Benson, in northeastern Cochise County. Given the relatively short duration of the proposed construction period, and the even shorter period of time in which activity could be concentrated in these areas, any adverse social impacts would be relatively brief in duration.

Operation and Maintenance

Ongoing operations and maintenance would have little or no effect on social conditions in the Upgrade Section.

Alternative Impacts in New Build Section

There are two major transmission route alternatives in the New Build Section, and several local alternatives for portions of each of the major route alternatives.

SUBROUTES 1.1 AND 2.1 – PROPONENT PREFERRED

The Proponent Preferred alternative (subroutes 1.1 and 2.1) would follow the more northern, 242-mile-long-route across the New Build Section. The route would proceed west-northwest from the Afton Substation south of Las Cruces, New Mexico, reaching I-10 east of Deming in eastern Luna County. The route would include a 31-mile-long spur, at this point, that would proceed directly south to a substation in southern Luna County, just north of the international border with Mexico. The main route would continue west, paralleling I-10, head north around Deming, and then diverge from the route followed by the Interstate to head more directly west to the Lordsburg area in Hidalgo County. The route would then bypass Lordsburg to the north and west, and continue in a westerly direction to the Willcox area in northeastern Cochise County, Arizona. The route would bypass Willcox to the south and head south and southeast to the Apache Substation, located south of I-10 between Willcox and Benson.

Economic Effects

Construction

The estimated effects of construction on the regional economy in the New Build Section would be as described previously under the impacts common to all action alternatives. Over the anticipated 2-year construction period, construction-related expenditures would support an estimated 235 direct and indirect jobs in the New Build Section, not counting the projected 246 non-local workers that would be hired for the Project. Construction activity would produce an estimated $11.4 million in annual labor earnings over the 2-year period, again excluding the earnings of non-local workers. Annual regional economic output is projected to increase by approximately $24.8 million over the 2-year construction period due to the construction activity. All of these estimates represent between a 0.1 percent and 0.2 percent increase relative to current economic activity in the New Build Section. While these effects would not be considered significant from a regional perspective, they could be significant for some communities in the New Build Section during the construction period.

Operation and Maintenance

As discussed under the impacts common to all action alternatives, ongoing operations and maintenance activity for the proposed Project would include modest labor and expenditure requirements that would not have a discernible effect on the regional economy. The additional electrical transmission capacity and reliability that the proposed Project would provide could have a significant longer-term effect on the economy relative to the no action alternative.

Tax Revenue Effects

Construction

Effects of construction on local tax revenues would again be as described under the impacts common to all action alternatives. Construction-related economic activity would produce an estimated $462,000 per year in state and local sales tax revenues and about $219,000 in state and local property tax revenues. The local shares of these tax revenues are estimated at approximately $150,000 and $210,000, respectively. These additional tax revenues would not be considered significant from a regional perspective, but could be significant for some communities in the New Build Section during the construction period.

Operation and Maintenance

If the proposed transmission line is fully subject to state and local property taxes, completion of the proposed Project could initially produce about $4.2 million per year in new property tax revenues for local governments in the New Build Section. This would represent about a 1.5 percent increase in local property tax revenues relative to current conditions and would be a significant, positive socioeconomic effect based on the impact indicators and criteria for significant effects described at the beginning of this section. The property tax revenues would decline over time as the transmission line depreciates.

Population Effects

Construction

As described under the impacts common to all action alternatives, construction of the proposed Project could lead to a short-term increase in population in the New Build Section of between 296 and 702 people, including 25 to 119 children. While this potential population increase would be insignificant from

a regional perspective, construction could lead to a significant population increase in the western portion of the New Build Section during the time when activity is focused in areas such as Hidalgo County.

Operation and Maintenance

Ongoing operations and maintenance activities for the proposed Project would not have a measurable impact on local or regional populations.

Housing Effects

Construction

The estimated housing requirements for proposed Project construction workers, indirect workers, and families in the New Build Section, described under the impacts common to all action alternatives, would not be a significant concern from the standpoint of the region as a whole. Given the very limited numbers of rental housing units available in the western portions of the New Build Section, non-local construction workers (and any other indirect workers who migrate to the area) would likely have to rely on hotel/motel accommodations and mobile/home RV parks in this area. The proposed Project could lead to significant, temporary shortages of accommodations in the western portion of the New Build Section. Operation and Maintenance

Ongoing operations and maintenance activities for the proposed Project would not have a measurable impact on housing in the New Build Section.

Effects on Public Services

Construction

Effects on public services from construction of the proposed Project would essentially mirror the effects and potential concerns for housing described above. From a regional standpoint, these effects would not be significant. However, construction in the western portions of the New Build Section could tax available police, fire, and medical services in that area during the time period when activity is focused in those locations.

Operation and Maintenance

Ongoing operations and maintenance activities for the proposed Project would not have a discernible impact on public services in the New Build Section.

Effects on Property Values

Construction

As noted under the impacts common to all action alternatives, ROW needed would be acquired for the proposed Project from public and private landowners. Approximately 68 miles of the 242-mile-long-route in the New Build Section (28 percent) would be located on private lands. Landowners along the ROW would be compensated for the disruption and the encumbrance of the required easement based on market land and easement values.

Operation and Maintenance

Once constructed, the transmission line and substations included in the proposed Project could have ongoing effects on property values in very close proximity to these features. Existing research, described

under the impacts common to all action alternatives, is somewhat inconsistent regarding these effects, but does indicate that larger parcels in rural areas (like most private landholdings along the proposed Project in the New Build Section) are likely to experience modest impacts, if any.

Effects on Tourism and Recreation-related Economy

Construction

The anticipated demand for hotel/motel rooms and RV park spaces in the Lordsburg area during construction of western portions of the New Build Section under the Proponent Preferred alternative, could create temporary shortages of available accommodations for tourists and other travelers in that area. This could impact tourism-related businesses in that area, though many of those businesses (such as motels and restaurants) would also benefit from expenditures by the construction workers.

Operation and Maintenance

Ongoing operations and maintenance of the proposed Project should have little or no long-term effect on the tourism- and recreation-related economy in the New Build Section.

Social Effects

Construction

As discussed in the impacts common to all action alternatives, the presence of large, transient populations of short-term construction workers can have impacts on social conditions in rural communities. Whether these effects occur, and the magnitude of the effects, appears to partly depend on the size of the non-local construction workforce relative to the size of the existing communities.

During the period of time that proposed Project construction work would be concentrated in the western portions of the New Build Section, there is the possibility of some short-term social impacts on communities such as Lordsburg. Given the relatively short duration of the proposed construction period, and the even shorter period of time in which activity could be concentrated in this area, any adverse social impacts would be relatively brief in duration.

Operation and Maintenance

Ongoing operations and maintenance of the proposed Project would have little or no effect on social conditions in the New Build Section.

SUBROUTES 1.2 AND 2.2 – PROPONENT ALTERNATIVE

The Proponent Alternative would follow a more southern, 237 mile-long-route across the New Build Section. The route would proceed south-southwest from the Afton Substation to a point near the international border in southwestern Doña Ana County. The route would then proceed west, along a corridor about 5 to 10 miles north of the border, through southern Luna County before heading northwest through southern Grant County to the Lordsburg area in Hidalgo County. Unlike the Proponent Preferred alternative, the Proponent Alternative would bypass Lordsburg to the south. The Proponent Alternative would then head west, along a route proximate to that used for the Proponent Preferred alternative, into northeastern Cochise County in Arizona. The Proponent Alternative would bypass Willcox on the north side. Like the Proponent Preferred alternative, the New Build Section of the Proponent Alternative would terminate at the Apache Substation between Willcox and Benson.

Economic Effects

Construction

The regional economic effects from constructing the Proponent Alternative would be similar to the effects from construction of the proposed Project, described under impacts common to all action alternatives. At a more detailed geographic level, construction of the Proponent Alternative might provide localized economic benefits to the Village of Columbus, in the southern part of Luna County, and fewer economic benefits to the City of Deming on I-10 between Las Cruces and Lordsburg.

Operation and Maintenance

Ongoing operations and maintenance activity for the Proponent Alternative would include modest labor and expenditure requirements that would not have a discernible effect on the regional economy. The additional electrical transmission capacity and reliability that the Proponent Alternative would provide could have a significant longer-term effect on the economy, relative to the no action alternative.

Tax Revenue Effects

Construction

Construction of the Proponent Alternative would provide the same type and magnitude of new tax revenues for local governments in the New Build Section as construction of proposed Project.

Operation and Maintenance

The completed transmission line under the Proponent Alternative would also provide similar longer-term property tax revenues to the proposed Project. The distribution of these revenues among the counties and cities in the New Build Section would likely differ somewhat based on the different route.

Population Effects

Construction

Construction of the Proponent Alternative would have similar short-term effects on the regional population to the proposed Project—as more fully described under the impacts common to all action alternatives. The more southern alignment under the Proponent Alternative could shift some of these short-term population effects away from the City of Deming and onto the much smaller Village of Columbus in the southern portion of Luna County.

Operation and Maintenance

Ongoing operations and maintenance activities for the Proponent Alternative would not have a measurable impact on local or regional populations.

Housing Effects

Construction

Housing requirements for Proponent Alternative construction workers, indirect workers, and families in the New Build Section would not be a significant concern for the region as a whole. Like the Proponent Preferred alternative, the western portions of the New Build Section in Hidalgo County could be an area of concern from a housing standpoint. The more southern alignment could also shift housing pressure

away from the relatively large community of Deming to the much smaller Village of Columbus. The Proponent Alternative could lead to significant, temporary shortages of accommodations in both the western portion of the New Build Section and in southern Luna County.

Operation and Maintenance

Ongoing operations and maintenance activities for the proposed Project would not have a measurable impact on housing in the New Build Section.

Effects on Public Services

Construction

From a regional standpoint, the Proponent Alternative would not have significant impacts on public services effects in the New Build Section. However, construction in the western portions of the New Build Section and in southern Luna County could tax available police, fire, and medical services during the time period when activity is focused in those locations.

Operation and Maintenance

Ongoing operations and maintenance activities for the Proponent Alternative would not have a discernible impact on public services in the New Build Section.

Effects on Property Values

Construction

Approximately 69 miles of the 237-mile-long-route of the Proponent Alternative in the New Build Section (29 percent) would be located on private lands. Landowners along the ROW would be compensated for the disruption and the encumbrance of the required easement based on market land and easement values.

Operation and Maintenance

Like the proposed Project, the transmission line and substations included in the Proponent Alternative could have ongoing effects on property values in very close proximity to these features. Given that most of the private lands would consist of large-parcel, rural landholdings, any such impacts are likely to be modest.

Effects on Tourism and Recreation-related Economy

Construction

Similar to the Proponent Preferred alternative, the anticipated demand for hotel/motel rooms and RV park spaces in the Lordsburg area during construction of western portions of the New Build Section under the Proponent Alternative could create significant, temporary shortages of available accommodations for tourists and other travelers. This could impact tourism-related businesses in that area, though many of those businesses (such as motels and restaurants) would also benefit from expenditures by the construction workers.

Operation and Maintenance

Ongoing operations and maintenance of the Proponent Alternative should have little or no long-term effect on the tourism- and recreation-related economy in the New Build Section.

Social Effects

Construction

During the period of time that Proponent Alternative construction work would be concentrated in the western portions of the New Build Section and in southern Luna County, there is the possibility of some short-term social impacts on communities such as Lordsburg and Columbus. Given the relatively short duration of the proposed construction period, and the even shorter period of time in which activity could be concentrated in these areas, any adverse social impacts would be relatively brief in duration.

Operation and Maintenance

Ongoing operations and maintenance of the Proponent Alternative would have little or no effect on social conditions in the New Build Section.

LOCAL ALTERNATIVES

There are 12 local alternatives available for route group 1 and route group 2, which together comprise the New Build Section. Local alternatives between the eastern end of the transmission line at the Afton Substation and the Lordsburg area include DN1 (for the Proponent Preferred alternative) and A, B, C, and D (for the Proponent Alternative). Between the Lordsburg area and the western end of the New Build Section between Willcox and Benson, local alternatives include LD1 (for the Proponent Alternative) and LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1 (for the Proponent Preferred alternative).

The selection of any or all of the local alternatives in the New Build Section would not result in economic, tax revenue, population, housing, public service, tourism, or social impacts that would appreciably differ from the effects described under the impacts common to all action alternatives at the regional level. At the local level, these local alternatives would affect different properties and individuals than the corresponding route segments included in the Proponent Preferred alternative and the Proponent Alternative.

Potential, localized socioeconomic differences associated with the local alternatives could include the following:

- Alternative DN1 would co-locate a 43-mile-long section of the Proponent Preferred alternative transmission line in Luna County (west of Deming) with the proposed SunZia Project. While co-location means that fewer private property owners might be affected, it would also result in a minimum combined 800-foot-wide ROW. This could result in greater disruption for the properties along this section of the line, though only 6 of the 42 miles in this segment are privately owned.
- Alternative LD4 would also co-locate a portion of the line with the proposed SunZia Project. In this case, the affected area would be in southern Greenlee County and Graham County, Arizona. LD4 would replace a section of the Proponent Preferred alternative located in northeastern Cochise County, east of Willcox. Like DN1, LD4 would require a very wide ROW for the two transmission lines, though none of the 52-mile length of this segment is privately owned.

- Local alternatives LD1, LD2, LD3a, and LD3b were developed to avoid crossing the Lordsburg Playa. Adoption of these alternatives could result in less impact on recreation and tourism than the corresponding route segments under the Proponent Preferred alternative.

Alternative Impacts in Upgrade Section

There is one major transmission route alternative in the New Build Section (the Proponent Preferred), and several local alternatives for portions of that alternative.

SUBROUTES 3.1 AND 4.1 – PROPONENT PREFERRED

The Proponent Preferred alternative (subroutes 3.1 and 4.1) would use the ROW of the existing Western 115-kV line across the Upgrade Section. The route would proceed west-southwest across western Cochise County, Arizona, into Pima County. The route would then turn more to the northwest, roughly paralleling I-10 and intersect with I-19 south of Tucson. The route would cross I-19, then proceed north through the southwestern portions of Tucson to intersect I-10 just northwest of downtown Tucson. The route would finish by roughly paralleling I-10 to the northwest until it reaches the Saguaro Substation endpoint in southern Pinal County, Arizona.

Economic Effects

Construction

The estimated effects of the proposed Project construction on the regional economy in the Upgrade Section would be as described previously under the impacts common to all action alternatives. Over the anticipated 2-year construction period, construction-related expenditures would support an estimated 138 direct and indirect jobs in the Upgrade Section, not counting the projected 132 non-local workers that would be hired for the Project. Construction activity would produce an estimated $6.8 million in annual labor earnings over the 2-year period, again excluding the earnings of non-local workers. Annual regional economic output is projected to increase by approximately $15.4 million over the 2-year construction period due to the construction activity. All of these estimates represent less than a 0.1 percent increase relative to current economic activity in the Upgrade Section and would not be significant from a regional perspective. These short-term economic benefits could, however, be significant for some communities in the Upgrade Section during the construction period.

Operation and Maintenance

As discussed under the impacts common to all action alternatives, ongoing operations and maintenance activity for the proposed Project would include modest labor and expenditure requirements that would not have a discernible effect on the regional economy. The additional electrical transmission capacity and reliability that the proposed Project would provide could have a significant longer-term effect on the economy relative to the no action alternative.

Tax Revenue Effects

Construction

Effects of the proposed Project construction on local tax revenues in the Upgrade Section would also be as described under the impacts common to all action alternatives. Construction-related economic activity would produce an estimated $309,000 per year in state and local sales tax revenues and about $214,000 in state and local property tax revenues. The local shares of these tax revenues are estimated at approximately $206,000 and $200,000, respectively. These additional tax revenues would not be

considered significant from a regional perspective, but could be significant for some communities in the Upgrade Section during the construction period.

Operation and Maintenance

If the upgraded transmission line is fully subject to state and local property taxes, completion of the proposed Project could initially produce about $4.3 million per year in new property tax revenues for local governments in the Upgrade Section. This would represent about a 0.3 percent increase in local property tax revenues relative to current conditions, which would not be significant from a regional perspective. The property tax revenues would decline over time as the transmission line is depreciated.

Population Effects

Construction

As described under the impacts common to all action alternatives, construction of the proposed Project could lead to a short-term increase in population in the Upgrade Section of between 158 and 405 people, including 13 to 57 children. While this potential population increase would be insignificant from a regional perspective, construction could lead to a significant temporary population increase in the eastern portion of the Upgrade Section (northeastern Cochise County) during the time when activity is focused in that area—particularly if construction on the Upgrade Section in this area occurs at the same time as construction of the New Build Section.

Operation and Maintenance

Ongoing operations and maintenance activities for the proposed Project would not have a measurable impact on local or regional populations in the Upgrade Section.

Housing Effects

Construction

The estimated housing requirements for proposed Project construction workers, indirect workers, and families in the Upgrade Section, described under the impacts common to all action alternatives, would not be a significant concern from the standpoint of the region as a whole. Given the very limited numbers of rental housing units and motel rooms available in northeastern Cochise County, non-local construction workers (and any other indirect workers who migrate to the area) would likely have to rely on RV parks in this area. The proposed Project could lead to significant, temporary shortages of accommodations in northeastern Cochise County which could be exacerbated if construction is also occurring at the same time on the New Build Section in this area.

Operation and Maintenance

Ongoing operations and maintenance activities for the proposed Project would not have a measurable impact on housing in the Upgrade Section.

Effects on Public Services

Construction

Effects on public services from construction of the proposed Project would essentially mirror the effects and potential concerns for housing described above. From a regional standpoint, these effects would not

be significant. However, construction in northeastern Cochise County could tax available police, fire, and medical services during the time period when activity is focused in this area.

Operation and Maintenance

Ongoing operations and maintenance activities for the proposed Project would not have a discernible impact on public services in the Upgrade Section.

Effects on Property Values

Construction

The ROW needed for the proposed Project would be acquired from public and private landowners. Approximately 60 miles of the 119-mile-long route in the Upgrade Section (51 percent) would be located on private lands. As noted under the impacts common to all action alternatives, Western already has a 100-foot-wide easement under its existing transmission line. Where room permits, Western or Southline would obtain a new 150-foot easement 50 feet to one side of the centerline of the existing easement, so as to have room to operate the existing line while constructing the new one. Once completed, the old line would be removed. In the end, 75 feet of the existing ROW would be reoccupied, 75 feet of new ROW would be obtained, and 25 feet of old ROW would be abandoned. The additional ROW required to construct and maintain the upgraded transmission line would be obtained through a combination of grants and easements negotiated with government and private landowners (Southline 2013). Landowners along the ROW would be compensated for the disruption and the encumbrance of the required easement based on market land and easement values.

Operation and Maintenance

Once constructed, the transmission line and substations included in the proposed Project could have ongoing effects on property values in very close proximity to these features. Existing research, described under the impacts common to all action alternatives, is somewhat inconsistent regarding these effects, but appears to indicate that effects on values may be greater in denser, more urbanized areas than in rural areas with larger parcels.

Impacts to property values are most likely to be of potential concern for the portions of the Proponent Preferred route that cross through Tucson. However, because the Proponent Preferred alternative involves upgrading an existing transmission line, any property value effects are likely to be less than could be associated with development of a new transmission line in a new ROW in the same area. Nonetheless, property owners along the ROW would be affected by the expanded easement required for the upgraded line and the increased size of the structures required for the 230-kV line. The new, double-circuit line would be supported by tubular steel structures, 100 to 140 feet in height. Between 5 and 8 support structures (towers) will be required per mile, depending on the terrain (Southline 2013).

Effects on Tourism and Recreation-related Economy

Construction

The anticipated demand for RV park spaces in northeastern Cochise County during construction of eastern portions of the Upgrade Section under the Proponent Preferred alternative could temporarily limit available accommodations for tourists and other travelers in that area. This could impact tourism-related businesses in that area, though many of those businesses (such as motels and restaurants) would also benefit from expenditures by the construction workers.

Operation and Maintenance

Ongoing operations and maintenance of the proposed Project should have little or no long-term effect on the tourism and recreation-related economy in the Upgrade Section.

Social Effects

Construction

As discussed in the impacts common to all action alternatives, the presence of large, transient populations of short-term construction workers can have impacts on social conditions in rural communities. Whether these effects occur, and the magnitude of the effects, appears to partly depend on the size of the non-local construction workforce relative to the size of the existing communities.

During the period of time that proposed Project construction work would be concentrated in the eastern portion of the Upgrade Section (northeastern Cochise County), there is the possibility of some short-term social impacts on communities such as Benson and Willcox. Given the relatively short duration of the proposed construction period, and the even shorter period of time in which activity could be concentrated in this area, any adverse social impacts would be relatively brief in duration.

Operation and Maintenance

Ongoing operations and maintenance of the proposed Project would have little or no effect on social conditions in the Upgrade Section.

LOCAL ALTERNATIVES

Eleven local alternatives have been developed for the Upgrade Section. In the eastern portion of the Upgrade Section, there is one local alternative (H), whereas 9 of the other 10 local alternatives (TH1a, TH1b, TH1c, TH1-Option, TH3-Option A, TH3-Option B, TH3-Option C, TH3a and TH3b) would be located in the Tucson area. Local alternative MA1 is near Marana, northwest of Tucson.

The selection of any or all of the local alternatives in the Upgrade Section would not result in economic, tax revenue, population, housing, public service, tourism, or social impacts that would appreciably differ from the effects described under the impacts common to all action alternatives at the regional level. At the local level, these local alternatives would affect different properties and individuals than the corresponding route segments included in the Proponent Preferred or Alternative routes.

Potential, localized socioeconomic differences associated with the local alternatives could include the following:

- Alternative H would replace a 15- to 20-mile-long section of the Proponent Preferred alternative through the Benson area in Cochise County. This local alternative was designed to avoid conflicts with potential future residential development north of Benson and with the Benson Airport. Relative to the Proponent Preferred alternative, this alternative could offer fewer land use conflicts in the future and improved economic development opportunities in that area.
- The nine local alternatives in the Tucson area were all designed, at least in part, to replace the portion of the existing Western line that crosses Tumamoc Hill in Tucson. Tumamoc Hill is a prominent feature west of downtown Tucson, a popular area for hiking and other outdoor activities, and an area with considerable cultural history. Tumamoc Hill is an important biological corridor from an environmental and wildlife perspective and is the home of the University of Arizona's Desert Laboratory. It is also a National Historic Landmark, listed on the NRHP, a

National Environmental Study Site, and an Arizona State Scientific and Educational Study Site. It is reportedly also a sacred site for the Tohono O'odham Nation and is believed to encompass archeological sites that have not been fully recorded. By replacing the existing line, these alternatives would likely offer recreational, cultural and other benefits for Tucson area residents and visitors (though relocating the line would then affect other landowners that do not currently have a transmission line proximate to their properties).

- Alternative MA1 was designed to avoid an area of potential future expansion for the Marana Regional Airport. This alternative could offer fewer conflicts with future land uses and improved economic development opportunities in that area.

Environmental Justice

The following discussion provides an assessment of the potential for disproportionately high and adverse effects on low income or minority populations.

ENVIRONMENTAL JUSTICE IMPACTS IN THE NEW BUILD SECTION

As discussed in chapter 3, section 3.15, all of the Census tracts in the New Build Section that could be crossed by any of the action alternatives can be defined as environmental justice communities because they either have a proportion of minority residents that is greater than average for the state in which they are located, they have a greater proportion of individuals or families that are living below the poverty level, or both. Most of the potential adverse effects associated with construction and operation and maintenance of the proposed transmission line and associated facilities would be localized in nature, including noise and other types of disruption during construction, and visual and property value effects during ongoing operation and maintenance. Potential adverse effects on local housing conditions and the demand for public services during construction, discussed earlier in this section, would be somewhat more dispersed.

Given these characteristics of the area and the proposed Project, low-income and minority populations in the New Build Section would be disproportionately affected by the proposed Project. This would likely be true, however, regardless of where the transmission line was located in the New Build Section given the prevalence of low-income and minority populations throughout the area. The analysis of effects by resource area provided in this chapter indicates that few, if any, of these effects would be "high." Construction effects would occur over a relatively short duration. Visual effects are expected to be low to moderate and effects on property values, would be localized and primarily or entirely affect landowners who would also receive compensation for easements on their properties.

Low-income and minority populations may also be positively affected by the benefits of the Project, including the short-term economic stimulus from construction activities and expenditures, short-term and longer-term increases in tax revenues, and added capacity and reduced congestion for electricity transmission. Because these benefits are likely to be more geographically dispersed than the localized adverse effects, however, it is uncertain whether or not low-income and minority populations would receive disproportionate benefits from the proposed Project.

ENVIRONMENTAL JUSTICE IMPACTS IN THE UPGRADE SECTION

In the Upgrade Section, 26 of the 38 Census tracts that could be crossed by any of the action alternatives can be defined as potential environmental justice communities. As in the New Build Section, potential adverse effects associated with construction and operation/maintenance would be largely localized in nature.

Given these characteristics of the area and the proposed Project, low-income and minority populations in the Upgrade Section would likely be disproportionately affected by the proposed Project. As in the New Build Section, few, if any, of these adverse effects would be "high" and, given the prevalence of low-income and minority residents throughout the area, disproportionate impacts on these groups are likely inevitable from any feasible transmission line alignment. As noted above for the New Build Section, low-income and minority populations may also receive positive effects from the proposed Project.

Agency Preferred Alternative

The socioeconomic impacts of the Agency Preferred Alternative are generally indistinguishable from those resulting from the other action alternatives, including the Proponent Preferred alternative. Most socioeconomic impacts, including temporary and permanent employment, changes in tax revenues and requirements for housing and public services to meet demands of the construction workforce are not sensitive to the precise line locations.

Localized impacts on properties and property owners in closest proximity to the proposed transmission line would be similar, regardless of the specific line location, though different individual property owners would be affected. Likewise, the environmental justice assessment is essentially the same for the preferred alternative as for the other action alternatives.

Additional Mitigation Measures

Based on the anticipated socioeconomic effects of construction and operation and maintenance of the proposed Project, the following mitigation measures are recommended:

- Southline should maximize local hiring, to the extent feasible, during construction. Local hiring could both maximize local economic benefits from the proposed Project, and help reduce potential housing issues and new public service demands.
- Southline should develop plans for housing the temporary construction workforce during the periods of time when construction will focus on the western portions of the New Build Section (e.g., Hidalgo County) and the eastern portion of the Upgrade Section (e.g., northeastern Cochise County). If the Proponent Alternative is selected, housing planning should also include southern Luna County. The plan should be developed with input and review from local authorities in those areas to both minimize potential impacts on housing and public services and inform the communities of potential challenges associated with construction.

Residual Impacts

Development of the proposed new transmission line in the New Build Section and improvements to the existing line in the Upgrade Section that involve larger towers and facilities may have some residual impacts on property values in close proximity to the line. While property owners directly affected by the ROW would be compensated, closely proximate neighbors would not. Any impacts would be expected to be modest, based on the existing literature, due to the predominantly low-density rural setting in the New Build Section and the presence of an existing transmission line in the Upgrade Section.

Unavoidable Adverse Impacts

Construction of the proposed Project would have unavoidable adverse short-term impacts on the availability and cost of housing and the demand for some types of public services in the least populated portions of the analysis area (e.g., law enforcement, fire, and emergency response). However, the

additional demand for public services would be offset by increases in local government revenues during the construction period.

Low-income or minority populations (environmental justice populations) would likely experience disproportionate adverse effects on a localized basis from construction and operation and maintenance of the proposed Project. As discussed previously, these adverse effects are all expected to be low to moderate, at most. Since all of the Census tracts in the New Build Section and approximately two-thirds of the Census tracts in the Upgrade Section that could be crossed by any of the alternatives comprise environmental justice populations, this appears to be an unavoidable adverse impact.

Short-term Uses versus Long-term Productivity

The proposed Project does not involve trade-offs between short-term uses and long-term productivity from a socioeconomic standpoint.

Irreversible and Irretrievable Commitments of Resources

The Project would not result in irreversible or irretrievable commitments of socioeconomic resources.

4.16 PUBLIC HEALTH AND SAFETY

4.16.1 Introduction

This section describes the impacts to public health and safety that could be caused by the construction and operation and maintenance of the transmission line, substations, and ancillary facilities, such as electrocution risks and EMFs. This section also describes the impacts that the proposed Project could have in connection with existing environmental hazards such as severe weather and fire hazards. For analysis of impacts from hazardous materials, transportation conflicts, noise hazards, and potential sabotage and terrorism hazards, see the "Hazardous Materials and Hazardous and Solid Waste," "Transportation," "Noise and Vibration," and "Intentional Acts of Destruction" sections of this DEIS, respectively.

The impacts described in this section are based on the analysis provided in "Southline Transmission Project Resource Report 6: Human Health and Safety" (CH2M Hill 2013q). The contents of that report are used herein without specific reference.

4.16.2 Methodology and Assumptions

Occupational Safety

The types of data and information collected include national statistics on injury rates for utility and construction workers from the BLS (2012b). Data collected were evaluated to identify whether the proposed Project could directly or indirectly affect national injury rates for utility and construction workers and subsequently cause associated health and safety impacts.

Wind, Earthquake, Fire, and Other Severe Weather Hazards

The types of data and information collected include national statistics on large blackouts and transmission/generation failures due to extreme weather events, from published studies and extreme

weather data from the National Oceanic and Atmospheric Association. Data collected were evaluated to identify whether the proposed Project could directly or indirectly be affected by extreme weather and subsequently cause associated health and safety impacts.

Electromagnetic Hazards

The ENVIRO program was used to model the EMFs that the New Build and Upgrade Sections would create. The model produced lateral profiles of the EMF out to 1,000 feet on each side of the centerline. These profiles were then plotted to produce the data and figures that are presented below. The analysis results are compared to the recommended limits for EMF based on the ICNIRP guidelines, published in 1998. No EMF limit levels are established in Arizona or New Mexico. Technical details of the modeling inputs, calculations, and scenarios used by the ENVIRO program for this proposed Project are provided in "Southline Transmission Project Resource Report 6: Human Health and Safety" (CH2M Hill 2013q).

Analysis Area

NEW BUILD SECTION

The analysis area for impacts regarding public health and safety within the proposed New Build Section is based on a 200-foot-wide representative ROW, located along the centerline of the 2-mile-wide analysis area. The actual construction ROW would likely be configured to avoid certain environmental impacts, or for other logistical reasons. The representative ROW is used to identify natural and manmade hazards that could be directly impacted by construction, operations, and maintenance of the proposed Project and the action alternatives.

UPGRADE SECTION

The analysis area for impacts in the Upgrade Section is based on a 150-foot representative ROW, located along the centerline of the 500-foot-wide analysis area.

Analysis Assumptions

No assumptions are made for the analysis of impacts to occupational safety and impacts from severe weather events.

ELECTROMAGNETIC FIELDS

The accuracy of the modeling is dependent on the accuracy of the input data (i.e., if the average phase current is higher than what was modeled, then the resulting magnetic fields would also be higher). The resulting EMF plots are within a few percent of the true value for the conditions modeled. The electrical power flows entered into the ENVIRO program for this modeling are based on peak ratings from load flow models and common ampacity rating methodology for that size of conductor. These electrical power flows are likely much higher than the electrical power flows that would flow in the line during most of the year; therefore, typical magnetic fields are expected to be much lower than those modeled here.

Impact Indicators

The following indicators were considered when analyzing potential impacts to public health and safety:

- Amounts and types of hazardous materials; number of workers and sensitive receptors within analysis area.

- Number of predicted severe occupational accidents/deaths annually and over life of Project from transmission line accidents, including electrocution. Number of predicted non-occupational electrocutions annually from contact with transmission lines per mile of transmission line (if possible).
- Severe weather, fire, and lightning strike statistics; transmission line failure rate per mile.
- Amounts and types of potentially fire-causing activities or equipment.

Significant Impacts

For the purposes of this analysis, a significant impact on public health and safety could result if any of the following were to occur from construction or operation and maintenance of the proposed Project:

- Construction, operation, and maintenance of the proposed transmission lines, substations, and ancillary facilities would create an unsafe working environment that cannot be mitigated through the use of BMPs and other required safety measures. Injuries or fatalities during construction would be expected to be above the industry averages.
- Construction, operation, and maintenance of the proposed transmission lines, substations, and ancillary facilities would increase the risk of fire.
- Severe weather events would cause frequent transmission failures.
- EMF generated by the proposed transmission lines, substations, and ancillary facilities would expose the public to EMFs that are greater than guidelines proposed by the ICNIRP, the IEEE, and the ACGIH.

4.16.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the proposed New Build Section would not be constructed; therefore, there would not be an increased risk to occupational safety from the construction and operation/maintenance of the transmission line, nor would there be an increased risk of fire from potential fire-causing activities. Severe weather events would continue to potentially impact the existing transmission infrastructure. The public would not benefit from an increase in reliability in electric service that the proposed infrastructure would provide should a severe weather or other disruptive event occur that causes a disruption in service from damage to the existing infrastructure. In regards to the Upgrade Section, even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a).

Impacts Common to All Action Alternatives

CONSTRUCTION

Occupational Safety

The New Build Section of the proposed Project would require construction of the transmission line and associated facilities. Potential risks associated with construction activities include, but are not limited to, electrocution, exposure to extreme weather, falling, exposure to hazardous materials, and injury from equipment and materials. Site-specific risks such as difficult or remote terrain or highway crossings would exist throughout the New Build Section. Construction requirements including workers and types of

equipment and materials are included in the POD for the proposed Project. Specific mitigation measures and safety procedures are also included in the POD. The construction of the proposed Project is temporary and would be confined to the footprint of the facilities, access roads, and staging areas. Implementation of the proposed Project mitigation would help to limit the frequency and magnitude of potential health and safety risks to construction workers. Construction safety requirements and mitigation measures would meet the OSHA standards and site specific occupational safety measures (such as a smoking ban in fire prone areas) would be developed as appropriate. Construction of the proposed transmission line and associated facilities would not be expected to generate injury or fatality rates that are higher than industry averages. The implementation of OSHA safety requirements through the use of BMPs, mitigation measures, and other safety requirements would minimize the chance that an accident could occur. Therefore, short-term impacts to occupational safety would be considered negligible.

Severe Weather Hazards

A severe weather event during construction such as high wind, excessive heat, or excessive cold could pose a danger to construction workers during construction of the proposed transmission line and associated facilities; however, this risk could be minimized by appropriate BMPs to stop, limit, or delay construction until it is safe to continue with construction. Should a severe weather event occur during construction, the impact would be temporary and limited to the construction site. The general public would not be affected by this impact because the proposed transmission line would not be operating.

Potentially fire-causing activities (such as welding or the use of combustion engines) would occur during construction of the proposed transmission line and associated facilities in areas known for extreme fire danger during the dry season. The implementation of PPMs and mitigation measures would reduce the potential for health and safety impacts that could result from fires associated with construction and/or operation and maintenance of the proposed Project. Therefore, impacts from severe weather hazards and potential fire-causing activities during construction would be considered negligible.

Electromagnetic Fields

EMFs during construction would not occur in the New Build Section because the proposed transmission line and associated facilities that would be constructed would not be transmitting electricity. The existing transmission infrastructure in the Upgrade Section does not pose a risk to the public for EMFs because the EMFs are below proposed cautionary levels outside of the ROW. EMFs would potentially impact workers constructing the proposed transmission line and associated facilities in the Upgrade Section, specifically in areas within the ROW where EMF levels are above acceptable exposure guidelines. However, this would not be likely to occur for two reasons: (1) to the extent possible, the proposed new transmission facilities in the Upgrade Section would be constructed parallel to the existing transmission facilities and out of the range of proposed cautionary levels of EMFs, and (2) in highly congested areas, such as metropolitan Tucson, where it is impossible to construct parallel facilities within the ROW, the existing transmission facilities would be turned off prior to deconstructing the existing facilities and reconstructing the upgraded facilities. Therefore, impacts from electromagnetic fields would be considered negligible.

OPERATION AND MAINTENANCE

Occupational Safety

The number of workers that would be required for operation and maintenance of the proposed Project would be much smaller than would be required for construction. All operations and maintenance staff would be required to be fully trained to safely perform their duties in full compliance with OSHA and all other safety requirements. Although more workers would be required to operate and maintain the

transmission lines, substations, and ancillary facilities, there would not be an increased risk to occupational safety as a result of the construction of any of the action alternatives. Therefore, impacts to occupational safety during operation and maintenance would be considered negligible.

Severe Weather Hazards

A severe weather event would have the potential to increase the risk to public health and safety by causing downed transmission lines and increased potential for lightning strikes to occur at transmission towers. In the New Build Section, the risk of downed transmission lines and increased lightning strikes would be greater than in the Upgrade Section because these would be new risks in the New Build Section. It is not anticipated that severe weather events would cause more frequent transmission failures than currently occur, or increase the risk of more frequent transmission failures than currently exists. The proposed transmission facilities would expand and improve transmission infrastructure in southern New Mexico and Arizona, therefore improving distribution reliability during severe weather events should such a disruptive event occur. Therefore, the proposed transmission line would have a long-term beneficial impact by improving reliability of electricity transmission.

Potentially fire-causing activities would typically not occur during maintenance and operation of the proposed transmission line and associated facilities. However, the construction of transmission towers would increase the chance of lightning strikes because the towers would most likely be the tallest features throughout most of the analysis area. Lightning strikes are among the most common causes of fire in the arid Southwest and can also cause power outages. The construction of any of the action alternatives would include the industry standard of lightning mitigation on the towers and other facilities, in order to minimize the effects that a lightning strike could have. This includes grounding wires on the transmission lines that divert the lightning charge to grounding rods that safely discharges the current to the ground. The grounding system protects the transmission line from damage and reduces the chance of fire ignition. It is not anticipated that the action alternatives would increase the risk of a fire occurring as a result of a lightning strike to a transmission facility over levels that currently exist. Therefore, the potential impact from lightning strikes would be considered negligible.

Electromagnetic Fields

New EMFs in the New Build Section would be introduced in sparsely populated areas where no other transmission lines are currently located. In the Upgrade Section, the transmission lines would be built parallel to existing lines within the ROW, or existing lines would be upgraded. As stated in chapter 3, the EMFs currently created by the existing transmission infrastructure do not exceed EMF exposure guidelines within the ROW. Subsequently, the existing transmission infrastructure is not impacting public health and safety. The upgraded lines would generate higher EMF levels within the ROW. Therefore, the risk of increased public exposure to electromagnetic fields would be considered negligible.

The ENVIRO program was used to model the EMFs that would occur as a result of implementation of any of the action alternatives under various design and alignment scenarios that could occur from the action alternatives. The ENVIRO model's findings predict that proposed public safety guidelines for exposure to EMFs would be met at the ROW of the proposed transmission lines for all design and alignment scenarios. The following figures are samples of the ENVIRO findings for scenarios applicable to the New Build and Upgrade Sections.

Figures 4.16-1 and 4.16-2 show the electric field and magnetic field, respectively, that would be produced by the proposed transmission lines in the New Build Section, should the transmission line be constructed by itself (not parallel to other transmission infrastructure). The dotted lines in the figure represent the ROW and demonstrate that EMFs e generated by this design would not exceed safety guidelines proposed by the ICNIRP, the IEEE, and the ACGIH.

Figure 4.16-1. Electric field of New Build Section 345-kV double-circuit tubular steel pole.

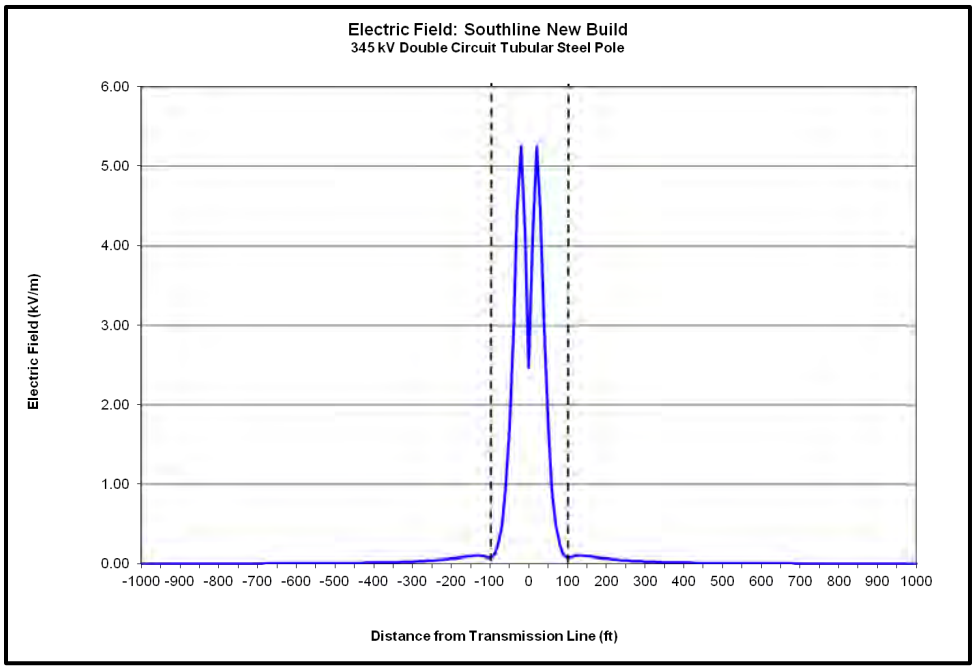
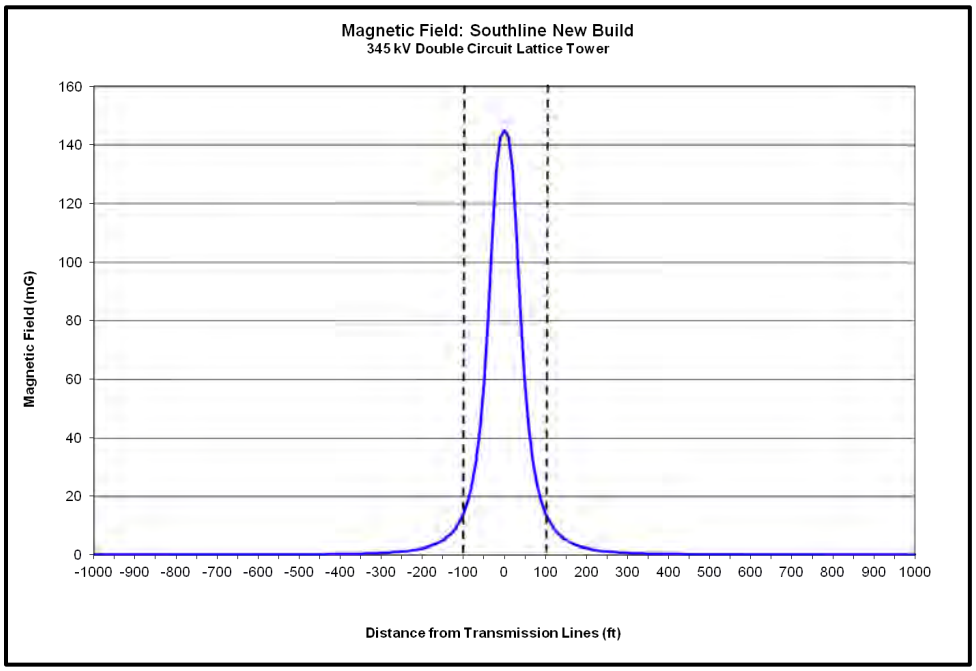


Figure 4.16-2. Magnetic field of New Build Section 345-kV double-circuit tubular steel pole.



Figures 4.16-3 and 4.16-4 show the electric field and magnetic field, respectively, that would be produced by the proposed transmission lines in the Upgrade Section, should the transmission line reconstruct the existing transmission infrastructure. The ROW in this section is 100 feet wide. EMFs emitted by this design would not exceed exposure guidelines proposed by the ICNIRP, the IEEE, and the ACGIH.

Figure 4.16-3. Electric field of Upgrade Section replacement of existing 115-kV line with 230-kV line.

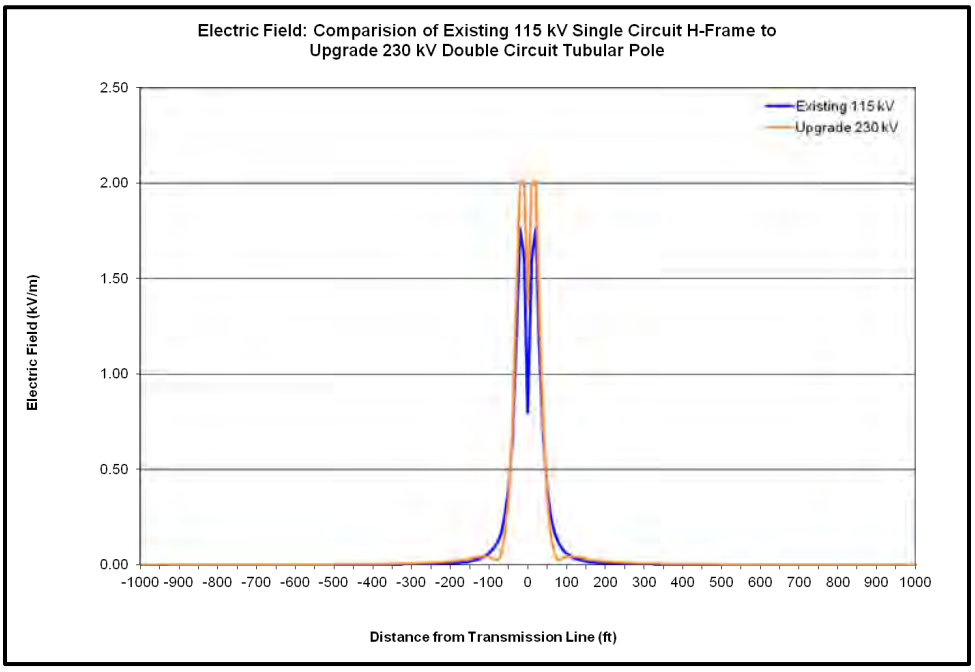
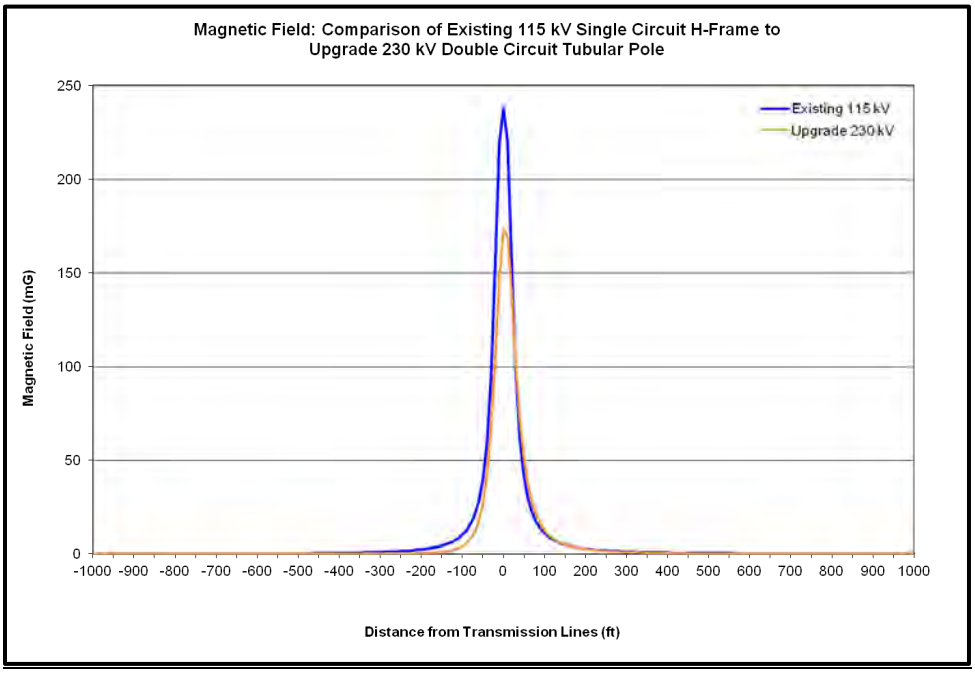


Figure 4.16-4. Magnetic field of Upgrade Section replacement of existing 115-kV line with 230-kV line.



Figures 4.16-5 and 4.16-6 show the electric field and magnetic field, respectively, that would be produced by the proposed transmission lines in the Upgrade Section should the transmission line be constructed parallel to other existing transmission infrastructure. The dotted lines in the figure represent the ROW and demonstrate that EMFs emitted by this design would not exceed safety guidelines proposed by the ICNIRP, the IEEE, and the ACGIH.

Figure 4.16-5. Electric field of Upgrade Section 230-kV line parallel to existing 345-kV line.

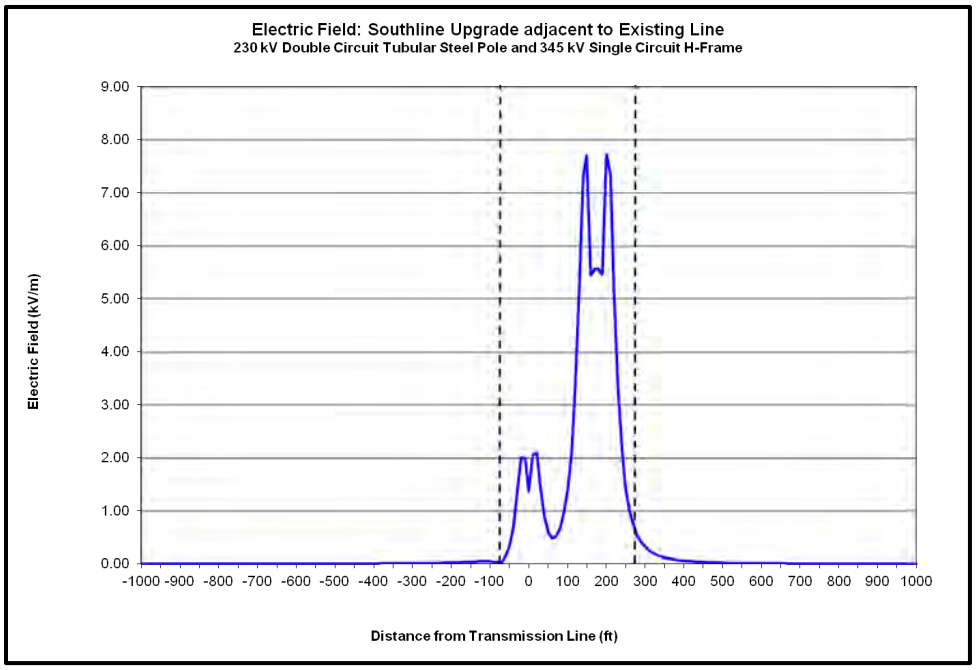
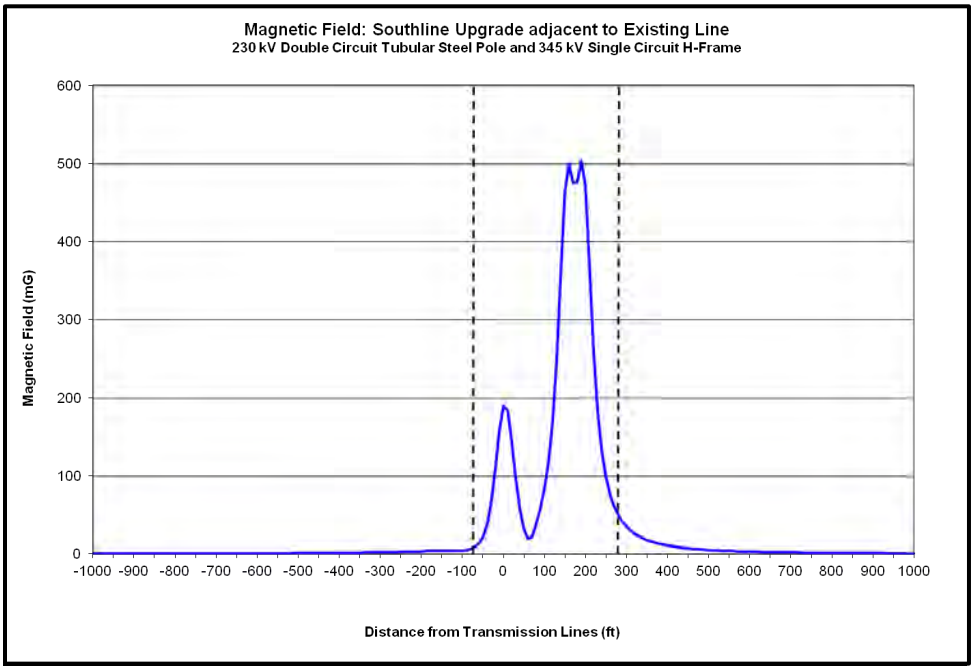


Figure 4.16-6. Magnetic field of Upgrade Section 230-kV line parallel to existing 345-kV line.



Additional Mitigation Measures

Implementation of the proposed Project would require that Southline comply with all applicable safety and design regulations and BMPs set by the NERC, NESC, OSHA, and local permitting agencies as listed in the POD. The POD would also include PPMs that are intended to avoid, minimize, or reduce impacts to public health and safety. These PPMs include the presence of a safety representative at all times with the construction crews, first aid kits stored in each construction vehicle, a worker trained in first aid included in each work group during construction, and the development and implementation of a Health and Safety Plan. The Health and Safety plan would communicate potential safety hazards during construction, operation and maintenance activities and implement appropriate work practices prior to construction that would minimize the chance that an accident could occur. These work practices include spill prevention, emergency response measures, accident prevention, use of protective equipment, medical care of injured employees, safety education, and fire protection.

Agency Preferred Alternative

Impacts to public health and safety (occupational safety, severe weather hazards, and electromagnetic fields) under the Preferred Alternative for both the New Build and Upgrade Sections would be similar to the other action alternatives as described under "Impacts Common to All Action Alternatives." Impacts to occupational safety would be more likely to occur during the construction phase than during the maintenance and operation phase. Potential risks associated with construction activities include, but are not limited to, electrocution, exposure to extreme weather, falling, exposure to hazardous materials, and injury from equipment and materials. The implementation of OSHA safety requirements through the use of BMPs, mitigation measures, and other safety requirements would minimize the chance that an accident could occur. Therefore, the Agency Preferred Alternative for both the New Build and Upgrade Sections would have short-term, negligible impacts on occupational safety.

Impacts from severe weather hazards, including lightning, and potential fire-causing activities during construction of the Agency Preferred Alternative would also be considered negligible after the application of mitigation measures. Long-term beneficial impacts would occur after the Preferred Alternative is constructed because the transmission facilities would expand transmission infrastructure in southern New Mexico and Arizona and would improve reliability during severe weather events, should a disruptive event occur.

The potential for increased public exposure to EMFs would occur under the preferred alternative for both of the New Build and Upgrade Sections. In the New Build Section, transmission lines would be built in areas where no current transmission lines exist and therefore create the potential for public exposure to EMFs where they did not previously occur. In the Upgrade Section, the proposed transmission lines would be built parallel to existing lines within the ROW, or existing lines would be upgraded. However, EMF exposure guidelines would be met within the ROW for both the New Build Section and Upgrade Section of the Agency Preferred Alternative. Therefore, the risk of increased public exposure to EMFs would be considered negligible for the Agency Preferred Alternative and similar to the impacts of the other action alternatives.

Residual Impacts

The proposed Project would have both negative and beneficial long-term impacts to public health and safety. Potential long-term negative impacts would occur as a result of increase of EMFs in areas where they do not currently occur. However, with implementation of the mitigation measures, BMPs, and PPMs, the impacts to public health and safety would be expected to be negligible. Implementation of the proposed transmission infrastructure would also have a long-term beneficial impact to public health and

safety by improving the reliability of electricity transmission to areas that would be served by the proposed infrastructure. In the Upgrade section, the new facilities would be constructed to modern design standards including modern hardware and grounding systems. These new facilities would require less frequent and less intensive maintenance work than the older facilities resulting in decreased potential for occupational accidents to occur.

Unavoidable Adverse Impacts

Unavoidable adverse impacts caused by the proposed Project include:

- Increased potential for occupational risks to occur.
- Increased potential for fire risks to occur.
- Increased potential for public exposure to EMFs.

As discussed above, the increased potential for these risks to occur would be minimal after the application of all mitigation measures, BMPs, and PPMs.

Short-term Uses versus Long-term Productivity

There would be no short-term uses versus long-term productivity conflicts to public health and safety as a result of the implementation of the proposed Project or action alternatives.

Irreversible and Irretrievable Commitments of Resources

All impacts described above would not be considered irreversible or irretrievable commitments of resources because the impacts to public health and safety no longer exist should the proposed transmission infrastructure be removed.

4.17 HAZARDOUS MATERIALS AND HAZARDOUS AND SOLID WASTE

4.17.1 Introduction

Certain chemicals and materials that would be used during the construction, operation, and maintenance of the Project are characterized as hazardous materials. Hazardous materials, wastes, and regulated, nonhazardous solid wastes are governed by the laws, regulations, and policies discussed in chapter 3. This section describes the potential impacts to human health and the environment from preexisting hazardous materials that may be present along the Project footprint and from hazardous materials generated during construction or operation and maintenance of the Project. For the purposes of this chapter, the term hazardous materials includes petroleum products and other contaminants. Because the primary impact from the use of hazardous materials during construction would be from potential leaks and spills and potential contamination of surrounding soils, surface waters, and groundwater, potential impacts are discussed in terms of which hazardous materials are or would be present, whether their presence creates dangerous conditions, and how potential dangers would be mitigated. The extent to which the Project could result in adverse conditions related to hazardous materials is addressed, and the potential effects are evaluated. The impacts described in this section are based on data available in “Southline Transmission Project Resource Report 5: Hazardous Materials and Waste” (CH2M Hill 2013r). The contents of that report are used herein without specific reference.

4.17.2 Methodology and Assumptions

This section describes analysis area for determining the presence and effects of hazardous materials, how effects are measured, the assumptions used when evaluating the effects, and what criteria must be met for an impact to be considered significant.

Analysis Area

The analysis area for hazardous materials and solid waste for the New Build Section is a 2-mile corridor, 1 mile on either side of the centerline of alternatives carried forward, and any substations or access roads outside that corridor. As described in chapter 3, this satisfies the search distances specified in ASTM Standard E 1527-05 (ASTM 2005). The ASTM has determined that these search distances are appropriate distances in which to search for potential sources of contamination that could affect the analysis area. The analysis area for the Upgrade Section of the Project is a 500-foot corridor, which is 200 feet on either side of the centerline of the existing 100-foot corridor. The analysis area described here is sufficient to identify hazardous materials sites that could impact, or be directly impacted by, construction, or operation and maintenance of the Project.

Analysis Assumptions

The following factors were assumed when identifying hazardous materials sites that could impact or be directly impacted by the Project, hazardous materials potentially used or stored during construction and operation/maintenance of the Project, and the effects of those elements on human health and the environment. It should be noted that many of these elements are required by law, and the plans merely collect the requirements into a plan structure. The distinction is important, as legal requirements are mandatory and enforceable by regulatory agencies. They are also not mitigation, as they are legal requirements.

- A Project-specific hazardous materials and hazardous waste management program would be developed prior to construction. The program would outline proper hazardous materials use, storage, and transport requirements, as well as applicable handling procedures. The program would identify the types of hazardous materials to be used during the Project and the types of hazardous wastes that are expected to be generated. All debris generated during Project-related demolition of structures, buildings, asphalt, or concrete-paved surface areas would be managed in a manner that would minimize risks to workers, the public, and the environment. Waste materials determined to be hazardous waste would be recycled or disposed of at a permitted hazardous waste management facility. Used oil would be sent offsite for recycling, reuse, or proper disposal. Containers used to store hazardous would be properly labeled and maintained in good condition. Construction and operations and maintenance personnel would be provided with Project-specific training to safely manage hazardous materials and hazardous wastes. In addition to training, each work crew would have basic hazmat cleanup materials onsite for immediate use.
- New or expanded substation locations that involve the purchase or long-term leasing of land, purchased transmission line ROWs, and any other property to be acquired would be screened for environmental liabilities to determine the probability of contaminants of concern or other environmental impairment. An ASTM Standard E 1527-05 (or equivalent) Phase I Environmental Site Assessment would be conducted if necessary. Additional actions may include further assessment, characterization, remediation, or selection of alternative property.
- A soil management plan would be prepared to provide guidance for the proper handling, onsite management, and disposal of impacted soil that might be encountered during construction activities. If backfill material to be used is derived from a site that is suspected to have

contamination, it would be sampled and determined to be free of regulated contaminants before it is used to fill excavations.

- An SPCC Plan would be developed and implemented prior to construction of the Project, to ensure safe handling, storage, and use of hazardous materials and to minimize, avoid, and/or clean up unforeseen spills during construction and operation/maintenance.
- Service and refueling procedures would not be conducted within 500 feet of a seep, wash, or other water body. All vehicles and equipment used would be maintained in good working order and maintained to avoid fluid leaks.
- A SWPPP would also address such aspects as proper storage and spill containment for hazardous materials, fuels, and lubricants used during construction.
- A number of BMPs are recommended to prevent hazardous materials from coming in contact with the environment. BMPs would be detailed in the SWPPP and SPCC Plan. These plans would detail BMPs such as retaining sediments on the construction site via soil erosion and sediment control practices, and proper refueling and maintenance procedures for equipment.
- Applicants, contractors, and operators will adhere to the hazardous materials–related laws, ordinances, regulations, and standards described in chapter 3.
- Existing hazardous waste sites and other locations pertinent to this analysis have been accurately mapped.

Impact Indicators

The following indicators were considered when analyzing the potential effects of hazardous materials:

- The presence of known hazardous materials sites within the analysis area and the type, nature, status, and proximity to the Project of those sites.
- The presence, transportation, storage, use, and disposal of hazardous materials during construction and operation/maintenance of the Project.

Although these indicators are by nature more qualitative than quantitative, they will be considered with regard to the risk they would pose to human health or the environment during construction and operation/maintenance of the Project.

Significant Impacts

For the purposes of this analysis, a significant impact related to hazardous materials could result if any of the following were to occur during construction or operation/maintenance of proposed Project:

- An activity regarding handling, transport, use, containment, or disposal of hazardous materials that would violate any local, State, or Federal regulations or create a long-term risk to human health or the environment.
- Improper storage or disposal of hazardous materials generated by the Project that would pose a threat to human health or the environment in the Project vicinity.
- Spills or releases of hazardous materials at or above reportable quantities within the analysis area that would pose a threat to public health and the environment in the Project vicinity.
- Impaired implementation of, or physical interference with, an adopted emergency hazardous materials spills response plan or emergency evacuation plan.

- The presence of preexisting unmitigated hazardous materials within the analysis area that would pose a threat to human health or the environment with respect to the Project.

4.17.3 Impacts Analysis Results

No Action Alternative

Under the no action alternative, the BLM would not issue a ROW and impacts form hazardous materials from construction and operation/maintenance of the Project would not occur. Current activities in the area, such as livestock grazing, agriculture, and dispersed recreational use, would not result in the generation, use, or disposal of large quantities of hazardous materials and hazardous and solid waste within the Project footprint.

Even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a). While new hazardous materials sites in addition to those described in chapter 3 could be discovered or created, or existing sites could be cleaned up, the status of existing hazardous materials sites described in chapter 3 would likely remain unchanged. SF_6 and transformer oil would continue to be used at existing substations, and quantities of those would likely increase for the upgrade of existing lines. Much of the New Build Section is vacant land, and land in the immediate vicinity of the proposed Project and alternatives would remain primarily undeveloped desert land under the no action alternative.

Impacts Common to All Action Alternatives

Many of the potential impacts discussed in chapter 3 would universally apply to all action alternatives. Potential impacts common to all alternatives are discussed below as they each relate to construction, operation, and maintenance of the proposed Project.

The implementation of any of the action alternatives would result in the use of hazardous materials and creation of solid waste during construction. The specific chemicals and materials, and their quantities, have not yet been determined. Potential hazardous materials associated with construction activity could include solvents, metals, petroleum products (fuels and lubricants, oils, gasoline, degreaser, etc.), plated products, hazardous substances, paint, wood-treated products, and other products typically associated with construction sites. Hazardous materials may also include pesticides (insecticides, fungicides, herbicides, rodenticides, etc.) and other construction chemicals such as concrete products, sealants, and wash water associated with these products. Solid wastes may include paper, wood, metal, and general trash. With adherence to laws, ordinances, regulations, and standards and the implementation of the proponent-committed environmental protection measures described in chapter 2 and in "Analysis Assumptions" above, there would be no impacts from construction-related hazardous materials.

Transformers are filled with insulating mineral oil. PCBs are no longer used in transformers. Containment structures are required to prevent equipment oil from getting into the ground or water bodies in the event of a rupture or leak. An oil spill prevention preparedness plan would be developed for the Project in conjunction with the operating utility as required. With adherence to laws, ordinances, regulations, and standards and the implementation of the proponent-committed environmental protection measures described in chapter 2 and in "Analysis Assumptions" above, there would be no impacts from the use of oil-filled transformers.

SF_6 under pressure is used as an insulator in gas-insulated switches. Though it is nontoxic and largely inert, it is considered to be an extremely potent greenhouse gas. Small amounts of SF_6 could leak over time, resulting in emissions of this gas. Southline would follow BMPs to reduce the potential for

greenhouse gas emissions, including 1) ensuring that only knowledgeable personnel handle SF_6, and 2) implementing SF_6 recovery and recycling. Because the gas is nontoxic and inert, and because BMPs would be implemented, the potentially small amount of gas leaked over time would have no measurable impact on human health or the environment.

A number of permitted facilities exist in the vicinity of the Project footprint. However, a permitted facility does not imply contamination. None of the facilities listed as permitted were listed in databases indicating contamination, and none are located within the ROW. Therefore, permitted facilities would not have an effect on construction or operation and maintenance of any of the Project alternatives.

A number of USTs exist in the vicinity of the Project footprint, some of which are leaking or have leaked in the past. However, none of these are located within the ROW, and because groundwater is generally deep along the Project footprint (see Sections 3.7 and 4.7, "Water Resources"), the relatively shallow excavations for tower footings are unlikely to intersect with any potential groundwater plumes. Therefore, USTs would not have an effect on construction or operation and maintenance of any of the Project alternatives.

The Project would not impair or impede implementation of, or physically interfere with, an adopted emergency hazardous materials spill response plan or emergency evacuation plan. Towers would not be located in roadways or block transportation routes. Therefore, no impacts to adopted emergency hazardous materials spill response plans or emergency evacuation plans are anticipated.

With adherence to the laws, ordinances, regulations, and standards described in chapter 3, implementation of the proponent-committed environmental protection measures described in chapter 2, and implementation of safety-related plans and programs to ensure safe handling, storage, and use of hazardous materials, none of the significant impacts described above would occur during construction and operation/maintenance of the Project. No violations of local, State, or Federal regulations or long-term risks to human health or the environment are anticipated from handling, transport, use, containment, or disposal of hazardous materials during construction and operation/maintenance of the Project. The mitigation measures described above would be implemented to prevent spills and leaks of hazardous materials and provide for adequate containment and cleanup if spills and leaks do occur.

Route Group 1 – Afton Substation to Hidalgo Substation

As described in chapter 3, publicly available databases were searched to gather information regarding known sites of potential environmental concern within the analysis area. Sites of potential environmental concern include permitted facilities and UST/LUST sites (both are discussed above in "Impacts Common to All Action Alternatives"), and CERCLIS (or "Superfund") sites. Segment P2 of the Proponent Preferred alternative passes within 1 mile of the Peru Hill Mill (Site ID NMD097119986) and American Smelting and Refining Deming Mill and Tailings (Site ID NMD980749220) CERCLIS sites. Segment D of the route group 1 local alternatives passes within 1 mile of the Shakespeare Mining District (Site ID NMD986684256) CERCLIS site. The Peru Hill Mill site is listed as fully remediated. The American Smelting and Refining Deming Mill and Tailings site and the Shakespeare Mining District site have been archived. This means the EPA has determined that the assessment has been completed and that no further remedial action is planned at this time. Because neither of these sites overlaps the ROW and because of their current status, no impacts to construction or operation and maintenance of the Project from these sites would occur.

The Hachita Landfill is located near the town of Hachita, New Mexico, within the analysis area of Segment S7 of the New Build Section of the Proponent Alternative. However, the landfill is located outside the representative ROW. Limited information is available for this site. According to NMED, the

landfill is currently closed. No facility containing the term Hachita or located in Hachita is listed in the CERCLIS database; therefore, it is unlikely that this is an actual CERCLIS site. It is also not mapped on the NMED eGIS Mapper database. Because it is located outside the ROW and is not thought to be a CERCLIS site, no impacts to construction or operation/maintenance of the Project are expected from this facility.

Route Group 2 – Hidalgo Substation to Apache Substation

It initially appeared that Segment P4b of the Proponent Preferred alternative passed within 1 mile of the Fannie Hill Mine and Mill (Site ID NMD981147192) CERCLIS site. This site is listed as archived. However, the coordinates of this site appear to be incorrect, and available information from the NMED database states that this facility is located in Catron County, well north of the proposed Project. Based on this additional information, this facility is not located within the analysis area or the ROW. Because this site does not overlap the ROW, because of its current status, and because it is not thought to be located within the analysis area, no impacts to construction or operation/maintenance of the Project are expected from this facility.

Route Group 3 – Apache Substation to Pantano Substation

A search of the publicly available data did not identify any hazardous materials sites, LUSTs, or any other potential concerns related to hazardous materials in this route group. Therefore, no impacts are anticipated from preexisting hazardous materials or the use of hazardous materials under any of the route group 3 action alternatives.

Route Group 4 – Pantano Substation to Saguaro Substation

A search of the publicly available data did not identify any hazardous materials sites, LUSTs, or any other potential concerns related to hazardous materials in this route group, except for the Silverbell Landfill Water Quality Assurance Revolving Fund site (also known as the Silverbell Jail Annex Landfill). The ADEQ Water Quality Assurance Revolving Fund program is also known as State Superfund. The ROW of Segment U3i of the Proponent Preferred alternative overlaps the contamination plume of this site.

Groundwater at the Silverbell Landfill site is contaminated with tetrachloroethene (PCE) and trichloroethene (TCE), which exceed regulatory limits. Depth to groundwater at the site is approximately 145 feet bgs. The Arizona Department of Health Services completed a “Draft Baseline Human Health Risk Assessment” for the site in November 1993. Even though no significant health risks were identified, the risk assessment expressed concern for possible exposure routes for PCE and TCE through privately owned wells (ADEQ 2012a, 2012b). Although the Project ROW crosses over the underground plume of the Silverbell Landfill site, the groundwater is approximately 145 feet bgs, and the plume is deep enough that transmission line foundations would not be affected. Therefore, no effects on the Project are anticipated from the Silverbell Landfill site.

Agency Preferred Alternative

With regards to hazardous materials and hazardous and solid waste, impacts under the Agency Preferred Alternative would be as described under “Impacts Common to All Action Alternatives.” No impacts are anticipated from preexisting hazardous materials or the use of hazardous materials under any of the alternatives previously described. Therefore, no impacts are anticipated from preexisting hazardous materials or the use of hazardous materials under the Agency Preferred Alternative.

Additional Mitigation Measures

With adherence to laws, ordinances, regulations, and standards, implementation of the proponent-committed environmental protection measures described in chapter 2, and implementation of safety-related plans and programs to ensure safe handling, storage, and use of hazardous materials, no effects are anticipated from preexisting hazardous materials or the use of hazardous materials under any of the action alternatives. None of the significant impacts described above would occur during construction and operation/maintenance of the Project. The mitigation measures described above would be implemented to prevent spills and leaks of hazardous materials and provide for adequate containment and cleanup if spills and leaks do occur. However, as with all projects that include excavation, if a petroleum hydrocarbon odor or any suspicious odor or appearance of contaminated soil is detected during the course of excavation or construction activities, excavation in that area would cease immediately until environmental monitoring and mitigation are completed.

Residual Impacts

With adherence to laws, ordinances, regulations, and standards, implementation of the proponent-committed environmental protection measures described in chapter 2, and implementation of safety-related plans and programs to ensure safe handling, storage, and use of hazardous materials, no residual impacts are anticipated from preexisting hazardous materials or the use of hazardous materials under any of the action alternatives. None of the significant impacts described above would occur during construction and operation/maintenance of the Project. The mitigation measures described above are implemented to prevent spills and leaks of hazardous materials and provide for adequate containment and cleanup if spills and leaks do occur.

Unavoidable Adverse Impacts

With adherence to laws, ordinances, regulations, and standards and the implementation of the proponent-committed environmental protection measures described in chapter 2 and in "Analysis Assumptions" above, no unavoidable adverse impacts are anticipated from preexisting hazardous materials or the use of hazardous materials under any of the action alternatives. None of the significant impacts described above would occur during construction and operation/maintenance of the Project. The mitigation measures described above are implemented to prevent spills and leaks of hazardous materials and provide for adequate containment and cleanup if spills and leaks do occur.

Short-term Uses versus Long-term Productivity

With adherence to laws, ordinances, regulations, and standards and the implementation of the proponent-committed environmental protection measures described in chapter 2 and in "Analysis Assumptions" above, the productivity of the ROW would not be affected by the use of hazardous materials. The mitigation measures described above are implemented to prevent spills and leaks of hazardous materials and provide for adequate containment and cleanup if spills and leaks do occur.

Irreversible and Irretrievable Commitments of Resources

With adherence to laws, ordinances, regulations, and standards and the implementation of the proponent-committed environmental protection measures described in chapter 2 and in "Analysis Assumptions" above, there would be no irreversible commitment of resources caused by the use of hazardous materials. The mitigation measures described above are implemented to prevent spills and leaks of hazardous materials and provide for adequate containment and cleanup if spills and leaks do occur.

4.18 TRANSPORTATION

4.18.1 Introduction

This section describes the impacts to transportation associated with the construction and operation and maintenance of the transmission line, substations, and ancillary facilities. Impacts to transportation are discussed in terms of changes in vehicular traffic on primary roads, changes in traffic and access to BLM roads and lands, consistency with Federal, State, and local transportation plans, and changes in air traffic patterns at airports. The impacts described in this section are based on the analysis in "Southline Transmission Project Resource Report 14: Transportation" (CH2M Hill 2013s). The contents of that report are used herein without specific reference.

4.18.2 Methodology and Assumptions

Traffic Impacts on Primary Roads

As defined in chapter 3, Interstates, U.S. highways, and State highways are considered primary roads. Impact analysis of traffic generated by the construction and operation and maintenance of the proposed Project and action alternatives uses the v/c ratio analysis to determine whether the primary roads level of service would change.

Impacts to BLM Roads and Access to BLM Roadless Areas

BLM Roadless Areas are a land designation not shared by State, or private land. Because "BLM Roadless Areas" are a BLM official land designation, this designation is analyzed in this DEIS. Analysis of access impacts to roadless state or private lands is not included in the analysis.

BLM road and lands information was collected from data provided by the BLM Safford and Las Cruces Field Offices. A GIS overlay of the collected BLM lands data with the proposed Project components was prepared to evaluate geographic location in relation to the proposed Project and alternatives.

To estimate the impacts on BLM lands by the proposed Project and alternatives, the proposed location of each segment relative to BLM lands was first designated as (1) through (the proposed Project would be located on BLM lands), (2) adjacent (the proposed Project would be located next to BLM lands) or (3) none (the proposed Project would not be on or adjacent to BLM lands). If two or more of these designations are applicable to one segment, the most invasive designation was assumed. Next, the percentage of new access roads that would be required for each segment was noted from the Terrain and Access table prepared by the Southline Engineering Team (Southline 2012b), and then compared with the invasiveness of the proposed transmission line location within each segment.

Consistency with Federal, State, and Local Transportation Plans

A review of Federal, State, and local transportation plans was conducted to identify potential inconsistencies between corridor planning and road widening projects and the proposed Project and the action alternatives.

Impacts to Airports, Flight Patterns, and Airport Plans

The airport analysis methodology compares the proximity of the proposed Project and alternatives to existing and planned airport facilities. These comparisons provide insight into the potential for impacts that could dictate the requirement for an airspace obstruction analysis by the FAA.

Analysis Area

NEW BUILD SECTION

The analysis area for transportation infrastructure resources within the proposed New Build Section is a 10-mile-wide corridor; that is, 5 miles to either side of the centerline of the alternatives carried forward. The analysis area is used to identify existing and proposed transportation infrastructure that could be directly impacted by ground disturbance during construction, delivery of construction equipment, construction worker access, maintenance access, and potential conflicts with flight paths at airports. A 10-mile-wide corridor is necessary in order to allow for some flexibility of Project routing and design, and also to allow for errors or ambiguities in the recorded locations and boundaries of some resources.

UPGRADE SECTION

The analysis area for transportation infrastructure within the proposed Upgrade Section is the same as identified above for the New Build Section.

Analysis Assumptions

TRAFFIC IMPACTS TO PRIMARY ROADS

The methodology for traffic analysis assumes that high volume-to-capacity ratios at peak hours suggest that the segment is experiencing a low level of service. For example, a higher v/c ratio on a particular segment of a primary roadway suggests higher levels of traffic demand on the segment and a lower level of service. Levels of service ratings run from a rating of A, for the highest or best level of service, to F, the lowest or worst level of service. A v/c ratio above 0.90 indicates the demand nearly equals the design capacity of the roadway, and a level of service rating of E or F can be assumed. In general, intermittent temporary delays during peak traffic hours would be assumed to not increase the v/c ratio of a primary roadway. Consistent long-term delays during peak traffic hours would be assumed to increase the v/c ratio of a primary roadway.

IMPACTS TO BLM ROADS AND ACCESS TO BLM ROADLESS AREAS

The methodology for identifying impacts to BLM lands assumes that if the transmission line were to cross through BLM lands and new access roads were required for construction, operation, and maintenance in the same area, the potential would exist for the proposed Project and alternatives to open access to lands previously inaccessible by roads. It is assumed that where a higher percentage of new access roads would be required, an increase in access would occur on BLM lands previously inaccessible by roads.

CONSISTENCY WITH FEDERAL, STATE, AND LOCAL TRANSPORTATION PLANS

No assumptions are necessary for analyzing consistency with Federal, State, and local transportation plans.

IMPACTS TO AIRPORTS, FLIGHT PATTERNS, AND AIRPORT PLANS

No assumptions are necessary for analyzing impacts to airports, flight patterns, and airport plans.

Impact Indicators

TRAFFIC IMPACTS TO PRIMARY ROADS

Traffic from construction, operation, and maintenance of the proposed Project and action alternatives would increase the primary roads' v/c ratio, and subsequently lower the roads' level of service.

IMPACTS TO BLM ROADS AND ACCESS TO BLM ROADLESS AREAS

Indicators for this impact would be the number of new access roads that would be required by the proposed Project and action alternatives, and acres of BLM lands that are currently inaccessible by road that would become accessible from the construction of new access roads.

CONSISTENCY WITH FEDERAL, STATE, AND LOCAL TRANSPORTATION PLANS

Indicators for this impact would be the number of transportation plans that are inconsistent with the proposed Project and action alternatives. These plans are identified in section 3.18.

IMPACTS TO AIRPORTS, FLIGHT PATTERNS, AND AIRPORT PLANS

Indicators for this impact would be the number of existing and planned airports that are within the analysis areas for the proposed Project and action alternatives.

Significant Impacts

For the purposes of this analysis, a significant impact on transportation could result if any of the following were to occur from construction or operation and maintenance of the proposed Project (see below).

TRAFFIC IMPACTS TO PRIMARY ROADS

- The proposed Project and alternatives were to increase traffic that exceeds levels of service established by a State Department of Transportation or a County transportation agency or City/Town transportation department.
- The proposed Project and alternatives were to cause traffic delays on a primary transportation corridor.
- The proposed Project and alternatives were to create road dust and/or severe road damage at levels that create hazardous situations for motorists and pedestrians.
- The proposed Project and alternatives were to increase dust, noise, light, and litter pollution due to construction activities (see Section 3.2, "Air Quality," and Section 3.3, "Noise and Vibration").

CONSISTENCY WITH FEDERAL, STATE, AND LOCAL TRANSPORTATION PLANS

- The proposed Project and alternatives would be inconsistent with regional, State, and local transportation plans such as corridor planning, and road widening.

IMPACTS TO BLM ROADS AND ACCESS TO BLM ROADLESS AREAS

- The proposed Project and alternatives would increase opportunities for illegal access to roads/areas currently closed to public access.
- The proposed Project and alternatives were to have impacts to the BLM roadway system including improved access by the general public into remote or designated roadless or wilderness areas.

IMPACTS TO AIRPORTS, FLIGHT PATTERNS, AND AIRPORT PLANS

- Change in air traffic patterns as a result of new transmission lines near airports. The unit to measure change for airports includes alterations of flight paths and operations.
- Potential inconsistencies with Federal, regional, State, and local airport plans. The unit to measure change is consistency with future airport plans.

4.18.3 Impacts Analysis Results

No Action Alternative

There would be no impact to transportation under the no action alternative for the New Build Section. Traffic volumes on primary roadways and BLM roads would continue to increase due to population growth. Demand for access to BLM lands and other lands would be expected to increase due to population growth as well. In regards to the Upgrade Section, even under the no action alternative, Western still plans to upgrade the existing lines between the Apache and Saguaro substations within the next 10 years, per Western's 10-year capital improvement plan (Western 2012a).

Impacts Common to All Action Alternatives

The only measurable difference that the action alternatives would have on the impact indicators would be the number of access roads that would be required for each alternative. The action alternatives would all have common impacts on the other impact indicators: primary roads, Federal, State, and local transportation plans, and impacts to airports and air traffic patterns. Although each alternative would differ in the amount of new access roads that would be required, increasing access to BLM roadless areas would also be the same for all action alternatives. These impacts are disclosed in this section, followed by an analysis of alternative-specific impacts to BLM roads.

TRAFFIC IMPACTS TO PRIMARY ROADS

Construction

During the construction phase, traffic would be generated by the following activities: surveying, geotech investigation, access road construction, foundation installation, laydown yard/receiving, structure hauling, structure assembly, structure erection, wire stringing, restoration, and clean-up. There are seven to eight primary roads within the New Build Section and seven primary roads within the Upgrade Section. Under a maximum-case trip scenario (one crew shift each day, every worker drives alone on the same access route, and all crew types work simultaneously), an estimated total of 192 additional personal vehicles would be added to the primary roadway network before and after each shift. Deliveries would be spread throughout the day and would not contribute to a noticeable volume increase on the roadway networks. The cumulative additional volume would represent a volume increase of 1 percent or less on various segments of I-10 in the New Build and Upgrade Sections. On other primary roads within the analysis

area, the addition of up to a maximum of 192 vehicles per shift change and intermittent deliveries would not increase the v/c ratio for the primary roads, including the two primary roads in the Tucson metropolitan area already experiencing a high v/c ratio. Construction traffic would not create consistent long-term delays on the primary roadways. Therefore a temporary decrease in level of service for the primary roads would not occur as a result of the construction activities.

Temporary short-term traffic delays during construction could occur at locations where transmission lines cross roads or where improvements might be needed at local roads, intersections, and bridges to accommodate overweight or oversize delivery vehicles. Because traffic generated by construction would be short-term, deterioration of primary roads would not be anticipated. However, the design capacity of the construction routes would need to be verified with the proper agencies prior to construction, to determine if they would accommodate oversized vehicles and not deteriorate by bearing the weight of oversize/overweight vehicles. As identified in the POD, if any existing roads were to be damaged by construction activities and/or truck traffic they would be repaired.

Operation and Maintenance

After construction of any of the action alternatives, traffic generated by operation and maintenance activities would be intermittent, only require a small number of vehicles, and deliveries would not regularly occur. Operation and maintenance traffic would not increase v/c ratio on primary roads, and, subsequently, would not decrease the level of service for any primary roads.

IMPACTS TO BLM ROADLESS LANDS

The proposed alignments within the New Build Section would cross the most amount of BLM land. GIS roadway data indicate that there is an extensive network of existing rural roads and trails (that may or may not be on BLM land) throughout the New Build Section. The alignments for each action alternative appear to have roads or trails through them. Thus, with minimal potential to open access to land areas where access is not currently available, no large expanses of land that are currently inaccessible would become available if any of the action alternatives were to be built.

The BLM land area in the vicinity of the action alternatives would be minimal in the Upgrade Section compared with the BLM land area in the more rural New Build Section. Two segments in the Upgrade Section (U1a and U3a along the proposed route) run through BLM lands. However there is no potential to open new access points to BLM lands in these segments, because they would not require new access roads.

CONSISTENCY WITH FEDERAL, STATE, AND LOCAL TRANSPORTATION PLANS

Federal, State, and local transportation plans are identified in Section 3.18, “Transportation.” The planned roadway improvements by the ADOT and the NMDOT in the New Build and Upgrade Sections analysis areas primarily involve widening and reconstructing existing roads and structures. The planned improvements would not involve construction of new roads or relocation of existing roads (a northerly extension of SR 90 has been discussed for some time, but is not currently a planned improvement documented in the Statewide Transportation Improvement Program). Known road projects in the New Build Section would not be a factor in deciding on the location of the transmission line or access routes. The Upgrade Section would have two road projects that would require consideration during the design process and coordination with ADOT: widening I-19 between SR 86 and San Xavier Road and reconstructing North Silverbell Road to add travel lanes with curbs and a raised landscaped median.

IMPACTS TO AIRPORTS, FLIGHT PATTERNS, AND AIRPORT PLANS

The analysis areas for the action alternatives are within the influence area for some of the airports identified in Section 3.18, "Transportation." Given the location of the proposed Project, it appears likely that the height of the proposed transmission structures (approximately 134 feet) would be below the runway approach surface elevations for all airports in both the New Build and Upgrade Sections. This height is below the 200-foot criterion and would meet or exceed the 100:1 or 50:1 slope criteria, which are among the criteria that require submission of a proposal to the FAA for an evaluation. Therefore, a change in flight patterns at airports within the analysis areas would be required as a result of implementation of any of the action alternatives.

A review of Federal, regional, State, and local airport plans identified two airport improvement plans within the New Build Section and four airport improvement plans within the Upgrade Section. Given the distances of the alternative alignments to these airports, the proponent would be required to work with airport staff during the permitting phase to ensure compliance with applicable zoning and airspace plan regulations during the preliminary design process to avoid, minimize, and/or mitigate conflicts.

Alternative Specific Impacts to BLM Roads

The proposed Project and alternatives would include new roads to accommodate construction and operations- and maintenance-related activities in some of the segments. In other segments, existing public and private roads would be used to access the construction and representative staging areas. The five types of new access roads that would be required are defined as follows:

- **Access Type A** – Access from adequate private roads. This type of access would be used when there is no existing road adjacent and parallel to the alignment, but where there is a patchwork of existing roads in the area that could be used to get close to the structure locations. Grading between the existing roads and each structure location would only be conducted where necessary and depending upon site conditions. Grading and other improvements may not be necessary depending on site conditions.
- **Access Type B** – Parallel to maintained public roads. This type of access would be used when the alignment roughly parallels a nearby public road that is either paved or has gravel surfacing. Spur roads would be graded between the existing roads and each structure location. Except in rare cases, the existing roads would not be upgraded.
- **Access Type C** – Parallel to existing utility roads. This type of access would be used when the alignment roughly parallels an existing utility that already has an existing access road. Spur roads would be graded between the existing utility roads and each structure location. Generally, the existing utility roads would be improved. At a minimum, it is anticipated a road grader would be used to ensure a smooth surface for construction activities. Roads with a travel surface width less than 12 feet would be widened to approximately 12 feet. Typically, the overall disturbance would be limited to 16 feet (approximately 2 feet on either side of the road surface).
- **Access Type D** – Needs new down-line primary access. This type of access would only be used when access types A–C are not feasible. It would consist of a 16-foot-wide road (12-foot travel surface plus 2 feet on either side for berms/ditches). As much as possible, new access would be entirely within the ROW. Typically, new down-line access would be used if any parallel roads are more than 700 feet from the alignment. This access type would normally be used for alignments that parallel interstate highways and railroads because the owners of those facilities generally place restrictions on the use of their facilities that do not allow for the addition of spur roads.
- **Access Type E –** Spur Roads–improved and unimproved access. Spur roads would be used at select access points for permanent access to the proposed ROW where existing or new roads are

not adequate. Spur roads would be a combination of improved (bladed) and unimproved (two-track) roads, with an average of one new spur road per mile. Where spur roads would be improved, the roads would be bladed and 10 to 12 feet wide. Spur roads would not be improved in areas with flat terrain and within grassland, desertscrub, sand scrub, and sand dune vegetation communities. Unimproved spur (two-track) roads would be used to crush vegetation by driving, but not crop or blade. This would avoid removal of root mass and organics in the soil (no surface soil is removed). The purpose of unimproved spur roads would be to preserve the maximum amount of native vegetation and minimize overall disturbance.

The mileage proposed for each of the four primary types of access roads is identified in table 4.18-1.

Table 4.18-1. Miles of Proposed New Access Roads on BLM Lands by Type of Access Road

Subroute	Access Road Type on BLM lands (miles)				
	A	**B**	**C**	**D**	**E**
New Build Route Group 1: Afton Substation to Hidalgo Substation					
Subroute 1.1					
P1	0.0	0.0	0.0	5.1	0.0
P2	4.9	0.0	98.1	0.0	26.3
P3	0.0	0.0	0.0	31.1	0.0
P4a	0.0	0.0	8.8	0.0	1.9
Total	**4.9**	**0.0**	**106.9**	**36.2**	**28.2**
Subroute 1.2					
S1	0.0	0.0	4.3	9.1	0.6
S2	0.0	0.0	0.0	11.0	0.0
S3	0.0	12.9	0.0	0.0	4.9
S4	0.0	0.0	0.0	10.5	0.0
S5	3.7	13.9	5.3	7.4	4.9
S6	1.0	0.0	0.0	6.4	0.3
S7	0.0	21.0	1.0	19.4	6.4
S8	0.0	0.0	0.0	14.6	0.0
Total	**4.7**	**47.8**	**10.6**	**78.4**	**17.1**
Route Group 1 Local Alternatives					
DN1	0.0	0.0	0.0	42.5	4.3
A	0.0	8.1	8.4	1.2	3.8
B	0.0	12.0	0.0	0.0	4.1
C	0.3	7.7	0.0	1.2	2.0
D	0.0	0.0	13.1	9.6	0.6

Table 4.18-1. Miles of Proposed New Access Roads on BLM Lands by Type of Access Road (Continued)

Subroute	Access Road Type on BLM lands (miles) A	B	C	D	E
New Build Route Group 2: Hidalgo Substation to Apache Substation					
Subroute 2.1					
P4b	0.0	0.0	0.0	13.8	0.0
P4c	0.0	0.0	0.0	1.9	0.0
P5a	0.0	0.0	9.6	0.0	1.6
P5b	0.0	0.0	21.2	0.0	2.7
P6a	0.0	0.0	0.7	0.0	0.1
P6b	0.0	0.0	20.8	2.3	2.7
P6c	0.0	0.0	2.8	0.0	0.4
P7	0.0	0.5	22.1	0.0	3.8
P8	0.5	0.0	0.0	0.0	0.0
Total	**0.5**	**0.5**	**77.2**	**18.0**	**11.3**
Subroute 2.2					
E	2.5	0.0	0.0	29.2	0.9
F	6.8	0.0	7.5	12.0	2.4
Ga	5.2	0.9	8.6	11.5	1.7
Gb	0.2	0.0	0.0	0.8	0.0
Gc	1.2	3.8	2.4	0.0	1.2
I	0.0	0.0	0.0	2.3	0.0
J	0.0	0.0	2.3	0.0	0.4
Total	**15.9**	**4.7**	**20.8**	**55.8**	**6.6**
Route Group 2 Local Alternatives					
LD1	6.1	0.0	10.8	19.0	4.8
LD2	0.0	0.0	0.0	9.9	0.0
LD3a	0.0	8.5	17.3	2.8	4.4
LD3b	0.0	2.0	0.0	0.0	0.3
LD4	0.0	0.0	0.0	51.5	6.1
LD4-Option 4	0.0	0.0	0.0	6.5	0.7
LD4-Option 5	0.0	0.0	9.9	0.0	1.2
WC1	0.0	0.0	2.4	12.5	0.4

Table 4.18-1. Miles of Proposed New Access Roads on BLM Lands by Type of Access Road (Continued)

Subroute	Access Road Type on BLM lands (miles) A	B	C	D	E
Upgrade Group 3: Apache Substation to Pantano Substation					
Subroute 3.1					
U1a	4.9	0.0	11.9	0.0	3.3
U1b	0.0	0.0	2.7	0.0	0.1
U2	1.5	0.0	21.0	0.0	1.6
U3a	0.8	0.0	36.2	0.0	3.9
Total	**7.2**	**0.0**	**71.8**	**0.0**	**8.9**
Route Group 3 Local Alternative					
H	0.0	0.0	23.1	1.0	6.5
Upgrade Route Group 4: Pantano Substation to Saguaro Substation					
Subroute Group 4.1					
U3b	0.2	0.0	0.2	0.0	0.1
U3c	0.7	0.0	0.0	0.0	0.1
U3d	3.1	0.0	1.8	0.0	0.8
U3e	0.0	0.0	0.9	0.0	0.0
U3f	0.0	0.0	0.7	0.0	0.0
U3g	0.9	0.0	0.3	0.0	0.1
U3h	0.9	0.0	0.0	0.0	0.1
U3i	7.4	0.0	12.8	0.0	1.4
U3j	1.6	0.0	0.0	0.0	0.5
U3k	3.3	0.0	15.1	0.0	1.8
U3l	0.6	0.0	0.4	0.2	0.2
U3m	0.4	0.0	0.0	0.0	0.1
U4	0.0	0.0	1.8	0.0	0.5
Total	**19.1**	**0.0**	**34.0**	**0.2**	**5.7**
Route Group 4 Local Alternatives					
MA1	1.0	0.0	0.0	0.0	0.2
TH1a	0.0	1.5	0.0	0.0	0.2
TH1b	0.2	1.7	0.0	0.0	0.4
TH1c	0.4	0.0	0.0	0.0	0.1
TH1-Option	0.0	0.9	0.0	0.0	0.1

Table 4.18-1. Miles of Proposed New Access Roads on BLM Lands by Type of Access Road (Continued)

Subroute	Access Road Type on BLM lands (miles)				
	A	B	C	D	E
TH3-Option A	1.8	0.0	0.0	0.0	0.6
TH3-Option B	0.4	0.4	0.4	0.0	0.2
TH3-Option C	0.0	0.0	1.1	0.0	0.3
TH3a	3.0	0.0	1.1	0.0	1.2
TH3b	2.7	0.6	1.6	0.0	1.3

The construction of access road types A, B, and C would not increase access to other roads or adjacent lands because these types of access roads would only improve existing roads or consist of short spur roads that dead-end at the transmission line. The construction of access road type D and E would have the potential to increase accessibility to other roads and adjacent lands, including BLM roads and lands, because this type of access road would be a new road, connect to other existing roads, and would be an addition to the existing network of roads.

In the New Build Section route group 1, subroute 1.2 (95.5 miles of access road types D and E) would have the highest potential to increase access to other BLM roads and adjacent BLM lands when compared to Subroute 1.1 (64.4 miles of access road types D and E). Of the New Build Section route group 1 local alternatives, the DN1 would have the highest potential to increase access to other BLM roads and adjacent BLM lands by constructing 46.8 miles of new roads (access road types D and E).

In the New Build Section route group 2, subroute 2.2 (62.4 miles of access road types D and E) would have the highest potential to increase access to other BLM roads and adjacent BLM lands when compared to Subroute 2.1 (29.3 miles of access road types D and E). Of the New Build Section route group 2 local alternatives, the LD4 would have the highest potential to increase access to other BLM roads and adjacent BLM lands by constructing 57.6 miles of new roads.

Because the alternatives in the Upgrade Section would use existing transmission line alignments, only a minimal number of miles of access road types D and E would be constructed. In Upgrade Section route group 3, 8.9 miles of access road type E would be constructed, and 7.5 miles of access road types D and E would be constructed under local alternative H (1 mile). In Upgrade Section route group 4, 5.9 miles of access road types D and E would be constructed. Local alternatives in the Upgrade Section route group 4 would include the construction of up to 1.3 miles of access road type E under alternative TH3b.

As stated above, the construction of the new roads would increase the potential for the public to access existing BLM roads and adjacent BLM lands, including roads and lands that are not currently accessible by the public. However, GIS data and local maps show that the analysis areas for the New Build Section have an extensive network of existing rural roads and trails (that may or may not be on BLM land) throughout the New Build Section. Thus, with minimal potential to open access to land areas where it is not currently available, no large expanses of land that are currently inaccessible would become available if any of the action alternatives were to be built. The impact of increasing access to BLM roadless areas would be considered minor.

Agency Preferred Alternative

NEW BUILD SECTION

Under the Agency Preferred Alternative for the New Build Section, impacts to traffic on primary access roads, consistency with Federal, State, and local transportation plans, and impacts to airports, flight patterns, and airport plans would be the same as described under "Impacts Common to All Action Alternatives." In general, the Agency Preferred Alternative for the New Build Section would cross a sparsely populated rural area. Traffic would be generated primarily during the construction, but also minimally during the maintenance and operation phases. However, given the existing low level of traffic on primary roadways within the New Build Section and the low level of anticipated traffic during construction, only short-term minor impacts to traffic on primary roads would be anticipated. Continued coordination with federal, state, and local transportation agencies would ensure the preferred alternative would not impact transportation plans. Continued coordination with airports would ensure that the preferred alternative would not interfere with flight paths or airport plans.

The Agency Preferred Alternative for the New Build Section would have impacts to BLM Roads and Roadless Areas by increasing opportunities for illegal access to roads/areas currently closed to public access. This impact would most likely occur from the construction of new access roads, Type D and Type E. Under the preferred alternative, 39 miles of new access roads Type D would be constructed and 37.6 miles of new access roads Type E would be constructed in the New Build Section. However, GIS data and local maps show that the analysis areas for the preferred alternative have an extensive network of existing rural roads and trails (that may or may not be on BLM land) throughout the New Build Section. Thus, with minimal potential to open access to land areas where it is not currently available, no large expanses of land that are currently inaccessible would become available if any of the action alternatives were to be built. The impact of increasing access to BLM roads and BLM roadless areas would be considered minor and similar to the impacts of the other action alternatives.

UPGRADE SECTION

Under the Agency Preferred Alternative for the Upgrade Section, impacts to traffic on primary access roads, consistency with Federal, State, and local transportation plans, and impacts to airports, flight patterns, and airport plans would be the same as described under "Impacts Common to All Action Alternatives." In general, the preferred alternative for the Upgrade Section is in a sparsely populated rural and natural setting, with the exception of the Tucson metropolitan area. Traffic would be generated during the construction, maintenance, and operation phases, of which the relatively greatest level of traffic from the preferred alternative would occur during the construction phase. However, given the low level of anticipated traffic generated by the preferred alternative during construction and the mitigation measures proposed to minimize impacts during peak traffic hours, only short-term minor impacts to traffic on primary roads would be anticipated. Continued coordination with federal, state, and local transportation agencies would ensure the preferred alternative would not impact transportation plans. Continued coordination with airports would ensure that the preferred alternative would not interfere with flight paths or airport plans.

The Agency Preferred Alternative for the Upgrade Section would have impacts to BLM Roads and Roadless Areas by increasing opportunities for illegal access to roads/areas currently closed to public access. This impact would most likely occur from the construction of new access roads, Type D and Type E. Because the alternatives in the Upgrade Section would use existing transmission line alignments, only a minimal number of miles of access road types D and E would be constructed. Under the preferred alternative 0.2 mile of new access roads Type D would be constructed and 14.4 miles of new access roads Type E would be constructed. However, GIS data and local maps show that the analysis areas for the

preferred alternative have an extensive network of existing rural and urban roads and trails (that may or may not be on BLM land) throughout the Upgrade Section. Thus, with minimal potential to open access to land areas where it is not currently available, no large expanses of land that are currently inaccessible would become available if any of the action alternatives were to be built. The impact of increasing access to BLM roads and BLM roadless areas would be considered minor and similar to the impacts of the other action alternatives.

Additional Mitigation Measures

TRAFFIC IMPACTS TO PRIMARY ROADS

In order to mitigate traffic impacts on primary roads, shift changes for construction crews would not occur during the peak hours for the road during construction. Oversize or overweight vehicle movements would be restricted to nighttime hours or those specified in permitting regulations in order to minimize traffic disruptions.

IMPACTS TO BLM ROADS AND ACCESS TO BLM ROADLESS AREAS

In order to reduce public access to BLM roads and adjacent lands that are not currently accessible by the public, the proponent would fence off or place restricted access signage at new access roads, where appropriate.

CONSISTENCY WITH FEDERAL, STATE, AND LOCAL TRANSPORTATION PLANS

Throughout the permitting and design phase, the proponent would correspond with Federal, State, and local transportation agencies in order to avoid Project inconsistencies with current and future transportation plans.

IMPACTS TO AIRPORTS, FLIGHT PATTERNS, AND AIRPORT PLANS

Throughout the permitting and design phase, the proponent would correspond with Federal, State, and local airports in order to ensure that the FAA criteria for structures near airports are met, and to avoid Project inconsistencies with current and future airport plans.

Residual Impacts

TRAFFIC IMPACTS TO PRIMARY ROADS

The mitigation measures proposed to reduce traffic impacts on primary roadways would minimize the potential that traffic during construction would increase the v/c ratio on primary roads and reduce the potential for traffic disturbances during construction of facilities and oversize and overweight vehicle deliveries. Although these mitigation measures would be applied, temporary short-term minor traffic disruptions (usually less than a few hours) would be likely to occur during construction.

IMPACTS TO BLM ROADS AND ACCESS TO BLM ROADLESS AREAS

Placing fencing and restrictive access signage on new access roads where they connect to BLM roads that are currently inaccessible by the public would minimize the potential for the public to access these BLM roads. These mitigation measures would also minimize the potential for BLM lands currently inaccessible to public access to become accessible by the public.

CONSISTENCY WITH FEDERAL, STATE, AND LOCAL TRANSPORTATION PLANS

Correspondence with Federal, State, and local transportation agencies during the permitting and design phases would avoid the proposed Project from becoming inconsistent with future transportation plans.

IMPACTS TO AIRPORTS, FLIGHT PATTERNS, AND AIRPORT PLANS

Correspondence with Federal, State, and local airports during the permitting and design phases would avoid the proposed Project from requiring flight pattern changes at airports and becoming inconsistent with future airport plans.

Unavoidable Adverse Impacts

Implementation of the proposed Project would create temporary, short-term minor impacts to traffic on primary roads during construction, as a result of construction traffic and oversize and overweight vehicle deliveries.

Although mitigation measures would minimize the potential for the public to be able to access BLM roads and lands that are currently inaccessible by the public, the construction of new access roads would increase the potential for this to occur. Therefore, the increase in access to BLM roads and lands that are currently inaccessible by the public would be considered minor.

Short-term Uses versus Long-term Productivity

The proposed Project would generate short-term uses of existing transportation facilities by increasing traffic on primary roads and causing temporary traffic disruptions during construction. However, these short-term uses would not affect the long-term productivity of the primary roads.

Irreversible and Irretrievable Commitments of Resources

The proposed Project would constitute a small irretrievable impact to traffic on primary roads during construction; however, construction-related impacts to traffic on primary roads would cease following construction.

The potential for the public to access BLM roads and lands that are currently not accessible to the public by the construction of new access roads would constitute an irreversible impact to BLM roads and BLM roadless areas.

4.19 INTENTIONAL ACTS OF DESTRUCTION

4.19.1 Introduction

This section describes the potential impacts that intentional acts of destruction on the transmission line, substations, and ancillary facilities could have on public health and safety. Intentional destructive acts include acts of sabotage, terrorism, vandalism, and theft, which sometimes occur during construction and operation and maintenance of power facilities. Vandalism and thefts are the most common intentional destructive act, especially theft of metal and other materials that can be sold when the price of construction materials is high on the salvage market. It is important to note that acts of sabotage or terrorism on electrical facilities are rare.

4.19.2 Methodology and Assumptions

It is not possible to predict with certainty whether the transmission line, substations, and ancillary facilities would be the target of an intentional act of destruction and what type of intentional act of destruction would occur. Whereas individual acts of vandalism and theft (i.e., metal theft from a substation) could most likely cause a localized temporary impact to the proponent, acts of sabotage and terrorism could most likely cause a larger and longer-term impact to the general public. This section analyzes the potential effects that an act of sabotage or terrorism would have on the adjacent areas of the electrical facilities and the potentially impaired critical services that would receive electricity from the action alternatives. Therefore, this analysis assumes that an intentional act of sabotage or terrorism would result in potential damage to adjacent areas and disruption of service to the public.

Analysis Area

NEW BUILD SECTION

Based on the height of the proposed transmission line support structures, the analysis area for intentional acts of destruction on the transmission lines and substations is 200 feet from the edge of the ROW corridor for the transmission lines. Critical facilities (e.g., hospitals, emergency response services) that would receive power from the proposed transmission lines are also analyzed.

UPGRADE SECTION

The analysis area for intentional acts of destruction within the Upgrade Section is the same as identified above for the New Build Section.

Analysis Assumptions

This analysis assumes that an intentional act of destruction from vandalism and theft would not pose a threat to public health and safety, and is therefore not analyzed. Acts of sabotage or terrorism could potentially damage areas adjacent to the transmission line, substations, and ancillary facilities and could potentially disrupt service to the public, including critical services such as emergency response, hospitals, communications, and water supply.

Impact Indicators

It is not possible to predict whether an intentional act of destruction would occur, what kind of intentional act of destruction would occur, or the magnitude of damage that an intentional act of destruction on the existing and proposed electrical infrastructure could have. Therefore, no impact indicators are appropriate for the analysis of intentional acts of destruction. Instead, the following analysis describes the potentially affected areas and critical services that could be directly and indirectly impacted by an act of sabotage or terrorism on the electrical facilities, should one occur.

Significant Impacts

For the purposes of this analysis, a significant impact from an act of sabotage or terrorism could result if any of the following were to occur during the construction or operation and maintenance of the proposed Project:

- Indirect damage to areas immediately adjacent to the transmission line, substations, and/or ancillary facilities where an act of sabotage or terrorism has occurred; and

- Disruption of service to the general public and critical services.

4.19.3 Impacts Analysis Results

No Action Alternative

As described in chapter 3, acts of sabotage and terrorism on electrical facilities have been rare; however, threats to the existing electricity infrastructure from sabotage and terrorism would continue to be a possibility under the no action alternative. Because of the generally rural setting of the majority of the analysis area for the New Build and Upgrade Sections, an act of sabotage or terrorism on existing electricity infrastructure would have a negligible impact to adjacent land. However, urban areas adjacent to electrical infrastructure in the Upgrade Section (i.e., Tucson) would continue to have a threat of being impacted by an act of sabotage or terrorism.

With regard to the disruption of service to the general public and critical services, an act of sabotage or terrorism on the existing electricity infrastructure could potentially have a greater chance of disrupting power to the general public and critical services because the proposed Project would not be in place to potentially provide an alternative source of electricity.

Impacts Common to All Action Alternatives

An intentional act of destruction from sabotage or terrorism on the electrical infrastructure of all action alternatives would have the same direct and indirect impacts on public health and safety. In general, the electricity infrastructure proposed by all of the action alternatives could potentially be targets of an act of sabotage or terrorism. However, the addition of transmission lines and associated facilities generally strengthens the reliability of delivering electricity to the general public, because if one line is affected by an intentional act of destruction or any other disruption, other lines would be available to continue the delivery of electricity.

Lands immediately adjacent to the proposed transmission line, substations, and ancillary facilities could be indirectly impacted by an act of sabotage or terrorism, should the unlikely event occur. In the rural areas of the New Build Section and Upgrade Section analysis areas, the indirect effect on adjacent land would be negligible because of the lack of development adjacent to the proposed routes. In urban areas within the Upgrade Section of the analysis area, the indirect effect of an act of sabotage or terrorism would be the same as the existing condition, because the proposed lines would follow existing alignments. If an act of sabotage or terrorism occurred at facilities adjacent to urban areas, there would be a greater chance that public health and safety would be indirectly impacted.

Should an act of sabotage or terrorism occur on the proposed transmission line, substations, and ancillary facilities, public health and safety could be affected by a disruption of service. The general public and the critical services identified in chapter 3 could be potentially directly impacted. However, the risk of this happening is low, considering that acts of sabotage and terrorism on electricity infrastructure are rare. Existing lines not affected by the act of sabotage or terrorism would be able to continue to deliver electricity to the affected areas, and most critical services are required to have backup generators to provide electricity when service through transmission lines is interrupted. Therefore, the unlikely impacts of acts of sabotage or terrorism would be minor and would not be considered significant, as defined above.

Agency Preferred Alternative

Under the Agency Preferred Alternatives, impacts from intentional acts of destruction would be considered similar to the other action alternatives as described under "Impacts Common to All Action Alternatives." Predicting the occurrence of intentional acts of sabotage or terrorism or the potential damage from these acts is not possible. By constructing and operating new transmission lines, saboteurs and terrorists would have a new potential target to carry out their acts. Historically, acts of sabotage and terrorism on transmission infrastructure have been rare and the effects of events that have occurred have not had a significant impact to adjacent lands and public health and safety. Moreover, the addition of transmission lines and associated facilities generally strengthens the reliability of delivering electricity to the general public, because if one line is affected by an intentional act of destruction or any other disruption, other lines would be available to continue the delivery of electricity. Therefore, the potential impacts from the unlikely event of an act of terrorism or sabotage from the Agency Preferred Alternatives would be considered minor and similar to the other action alternatives.

Additional Mitigation Measures

Final alignment of the proposed transmission lines would generally avoid locating the lines immediately adjacent to development, including residential, commercial, and industrial areas. In urban areas in the Upgrade Section where this is not possible, the transmission lines would be within existing utility ROW and at the regulatory required distance from adjacent land uses. In addition to alignment, the transmission line, substations, and ancillary facilities would employ the industry standards for security, including fencing, warning signage, security cameras, and other means of restricting access. Several of the security features for the substations are identified in the POD, such as fencing and security systems. Each substation would be constructed with a 7-foot-tall chain-link perimeter fence with steel posts and 1 foot of barbed wire installed at the top of the fence. Remotely monitored security systems would include fire detection in the control building and infrared cameras within the fenced areas to provide visual observation of disturbances at the fence line to the system operator. Lastly, utilities normally keep a certain number of spare structure components on hand in order to respond to natural events such as ice storms, high winds, tornadoes, etc. These maintenance spares can quickly be mobilized in response to a destructive act.

Residual Impacts

Alignment of the transmission lines away from developed areas would reduce the potential indirect impact that an act of sabotage or terrorism would have public health and safety by buffering the distance between the lines and developed areas. Industry standard security measures would deter unauthorized personnel from accessing the transmission line, substations, and ancillary facilities and carrying out an act of sabotage or terrorism. However, no mitigation measure could wholly prevent an act of sabotage or terrorism. Therefore, the risk of a potential act of sabotage or terrorism directly and/or indirectly impacting land adjacent to the proposed Project facilities and disrupting electrical service to the general public and critical services would not be fully mitigated.

Unavoidable Adverse Impacts

No unavoidable adverse impacts would occur as a result of an intentional act of destruction to the proposed electricity infrastructure.

Short-term Uses versus Long-term Productivity

"Short-term uses versus long-term productivity" is not applicable to the analysis of impacts from intentional acts of destruction, because intentional acts of destruction are not a natural or socioeconomic resource.

Irreversible and Irretrievable Commitments of Resources

Analysis of irreversible and irretrievable commitments of resources is not applicable because intentional acts of destruction are not a natural or socioeconomic resource.

4.20 IMPACTS OF DRAFT RESOURCE MANAGEMENT PLAN AMENDMENTS

4.20.1 Introduction

Direct and indirect effects of the proposed Project have been described in the preceding sections. This section describes the potential environmental impacts of potential land use plan amendments. The proposed Project would cross federal lands managed by the BLM. Actions that occur on these lands, including the granting of ROWs under Title V of FLPMA, are guided by decisions recorded in the applicable RMP. The BLM has determined that the seven Project segments in New Mexico would not conform to certain aspects of the Mimbres RMP. Approval of a Project-specific proposal that is inconsistent with the existing land use plan requires that a land use plan amendment be completed (BLM Land Use Planning Handbook H-1601-1 (BLM 2008a)).

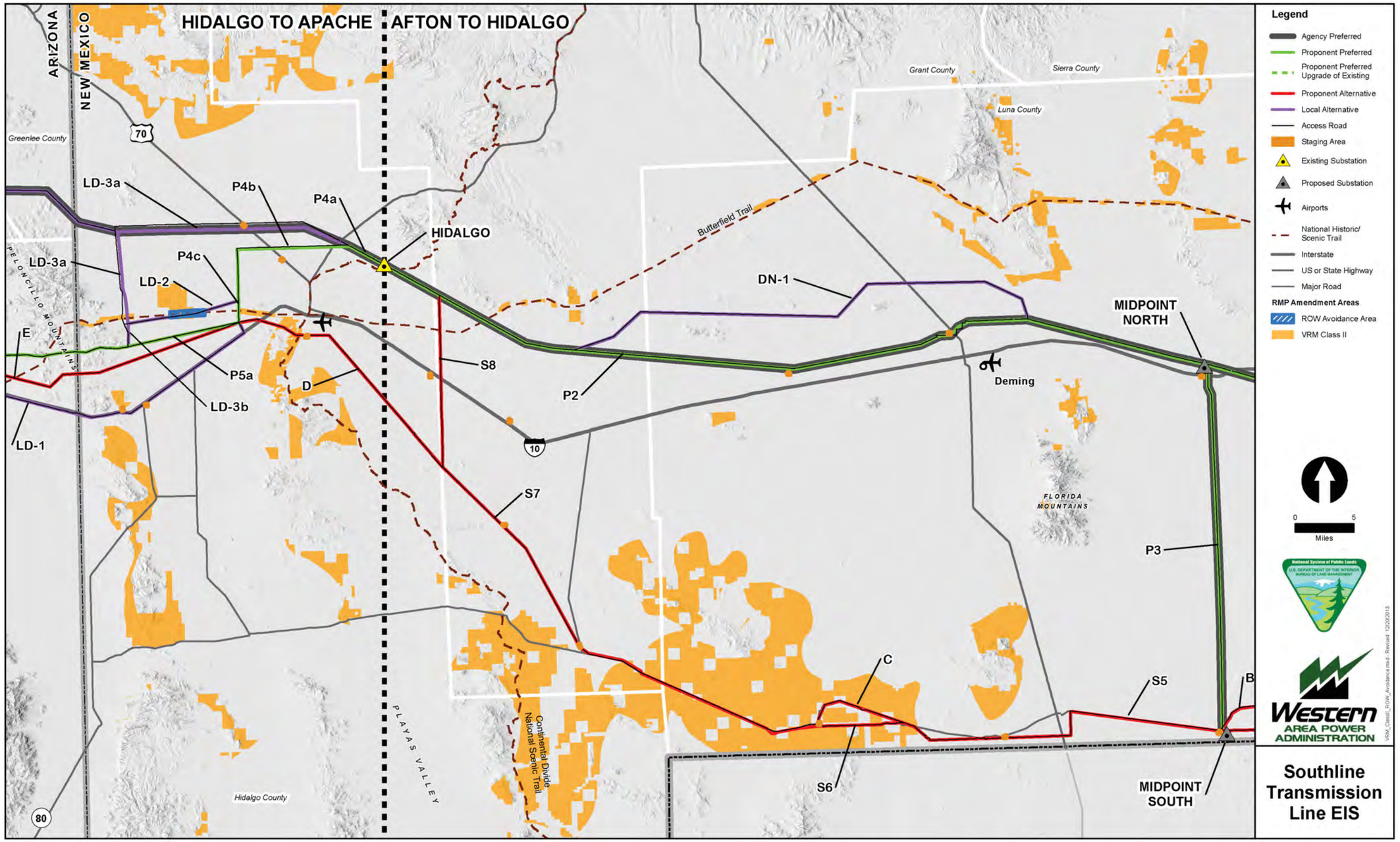
The planning action is to consider amending one BLM land use management plan as a part of this DEIS. This action is being considered under the BLM 1600 manual guidance (BLM Land Use Planning Handbook H-1601-1), New Mexico and Arizona State BLM instruction memoranda, and the planning regulations published as Title 43 CFR (including 1610.5-5, Amendments).

A report (Southline Transmission Proposal: Mimbres RMP Conformance Review (BLM 2013q)) was compiled by the BLM Las Cruces District Office to document compliance with the Mimbres RMP (BLM 1991). From this analysis, needs for potential amendments were identified and analyzed based on planning issues and criteria. As discussed in chapter 2, a plan amendment for the Mimbres RMP would be required for the portion of the alternative route segment (local alternative LD2 near the Lordsburg Playa) that parallels an avoidance area designated for the Butterfield Trail. A plan amendment would also be required for the Mimbres RMP that would change the VRM Class II to VRM Class III or IV for seven Project segments within the New Build Section that intersect VRM Class II lands (table 4.20-1, figure 4.20-1).

Table 4.20-1. Draft RMP Amendment Areas

Segments/Local Alternatives	Miles of Segments Crossing VRM Class II	Miles of Segments Crossing ROW Avoidance Area–Butterfield Trail
S5	1.2	0
S6	4.4	0
S7	13.7	0
C	3.7	0
D	1.8	0
LD2	3.1	9.1
LD3a	0.5	0

Figure 4.20-1. Areas of noncomformance in the Mimbres RMP.



This page intentionally left blank.

Four plan amendment alternatives have been identified for the Mimbres RMP. These options include (1) the no action, (2) modifying VRM Class II to Class III, (3) modifying VRM Class II to Class IV, and (4) allowing a ROW to parallel the Butterfield Trail in a ROW avoidance area.

- **No Action:** If no action is taken, then the ROW for the proposed Project would not be granted and no amendment to the Mimbres RMP would be necessary.
- **Modify VRM Class II to Class III:** Under this plan amendment option, where the proposed 200-foot Project ROW crosses VRM Class II lands, the VRM class would be modified and reclassified to VRM Class III.
- **Modify VRM Class II to Class IV:** Under this plan amendment option, where the proposed 200-foot Project ROW crosses VRM Class II lands, the VRM class would be modified and reclassified to VRM Class IV.
- **Modify ROW Avoidance Area Stipulation:** Under this plan amendment option, where the proposed 200-foot Project ROW would parallel the Butterfield Trail along local alternative LD2, the ROW avoidance area would be modified. The special stipulations for ROWs in the Mimbres RMP would be modified from "Facilities will not be located parallel to the Continental Divide National Scenic Trail or Butterfield Trail" to "facilities will not be located parallel to the Continental Divide National Scenic Trail or Butterfield Trail, except for a 9.1-mile-long linear transmission ROW at the Lordsburg Playa."

Amending Mimbres RMP to change a ROW avoidance area stipulation or change the VRM classification would not involve any ground-disturbing activities, but would allow for ground-disturbing activities to occur. Because the plan amendment modifications would be limited to the proposed Southline ROW, direct and indirect impacts are therefore expected to be limited to those that would result from the construction, operation, maintenance, and decommissioning activities from the proposed Southline Project. Thus, impacts that may result from amending the plan would be limited to land use, special designations, and visual resources. These impacts are discussed under the corresponding sections below.

Because amending the Mimbres RMP as described would not immediately involve ground disturbance or development, this action would not directly or indirectly impact the remaining resources beyond the direct and indirect impacts described in sections 4.2 through 4.19 (air quality; noise and vibration; geology and mineral resources; soil resources; paleontological resources; water resources; biological resources including vegetation and wildlife; cultural resources; farm and range resources; military operations; wilderness characteristics; recreation; socioeconomics and environmental justice; public health and safety; hazardous materials and hazardous and solid waste; transportation; or intentional acts of destruction).

The Agency Preferred Alternative would not require an amendment to the Mimbres RMP.

4.20.2 Land Use

No Action

Under the no action alternative, the BLM would not grant the ROW for the proposed Project and no plan amendment would be required. Therefore there would be no impacts to land use from the no action alternative for RMP amendments. Under the no action alternative, the BLM may update its RMP as part of the normal land use planning process, which may include changes to current ROW avoidance areas.

Modify Right-of-Way Avoidance Area Stipulation

As noted previously, avoidance areas are to be avoided by major ROWs, but may be available for location of major ROWs with the application of plan amendments, special stipulations, design features, and/or mitigation measures.

Under this plan amendment alternative, where the proposed 200-foot Project ROW would parallel the Butterfield Trail along local alternative LD2 for 9.1 miles, the stipulation for the ROW avoidance area would be modified. The special stipulations for ROWs in the Mimbres RMP would be modified from "Facilities will not be located parallel to the Continental Divide National Scenic Trail or Butterfield Trail" to "facilities will not be located parallel to the Continental Divide National Scenic Trail or Butterfield Trail, except for a 9.1-mile-long linear transmission ROW at the Lordsburg Playa."

This would allow a 200-foot-wide by 9.1-mile-long segment (approximately 220 acres) of the proposed Southline Project (local alternative LD2) to parallel the Butterfield Trail in the ROW avoidance area near Lordsburg Playa. In terms of land use, this would have minor, long-term impact by amending the RMP. The impact would be minor since land uses surrounding the 220 acres would not change, but would be long-term since the change would persist throughout the life of the planning document and the proposed Project.

4.20.3 Special Designations

No Action

Under the no action alternative, the BLM would not grant the ROW for the proposed Project and no plan amendment would be required. Therefore there would be no impacts to special designations from the no action alternative for RMP amendments. Under the no action alternative, the BLM may update its RMP as part of the normal land use planning process, which may include changes to current special designations classifications in the area.

Modify Right-of-Way Avoidance Area Stipulation

The Butterfield Trail is managed by the BLM as a special designation under the Mimbres RMP. Under this plan amendment option, where the proposed 200-foot Project ROW would parallel the Butterfield Trail along local alternative LD2 for 9.1 miles, the ROW avoidance area would be modified. The special stipulations for ROWs in the Mimbres RMP would be modified from "Facilities will not be located parallel to the Continental Divide National Scenic Trail or Butterfield Trail" to "facilities will not be located parallel to the Continental Divide National Scenic Trail or Butterfield Trail, except for a 9.1-mile-long linear transmission ROW at the Lordsburg Playa."

As noted above in land use, implementation of this plan amendment alternative would allow a 200-foot wide by 9.1-mile-long segment (approximately 220 acres) of the proposed Southline Project to parallel the Butterfield Trail in the ROW avoidance area near Lordsburg Playa. Appendix F of this DEIS analyzes the impacts of the proposed Project on trails, including the Butterfield Trail. The goals in the Mimbres RMP outlined for the Butterfield Trail are to manage to protect and interpret historical values. An amendment of the Mimbres RMP to modify the ROW stipulation as described above, would have a long-term, moderate impact on special designations, specifically the Butterfield Trail. The impact would be moderate since the recreational setting for approximately 220 acres of the Butterfield Trail corridor would change, and the impact would be long-term since the change would persist throughout the life of the planning document and the proposed Project.

4.20.4 Visual Resources

No Action

Under the no action alternative, the BLM would not grant the ROW for the proposed Project and no plan amendment would be required. Therefore there would be no impacts to visual resources from the no action alternative for RMP amendments. Under the no action alternative, the BLM may update its RMP as part of the normal land use planning process, which may include changes to current VRM classifications in the area.

Modify Visual Resource Management Class II to Class III

VRM Class III objectives are established in areas where the level of change to the existing character of the landscape should be moderate. Plan amendments to address conformance issues with VRM classification would only occur in association with the following segments. The remaining segments have been determined to be in conformance with applicable BLM land use plans or do not cross BLM-managed lands.

SUBROUTE 1.2 PROPONENT ALTERNATIVE

Under this alternative, segments S5, S6, and S7 cross VRM Class II BLM-managed lands. The proposed plan amendment would result in the reclassification of 468.5 acres of VRM Class II lands to VRM Class III lands. Impacts to scenic quality and viewer sensitivity from the selection of segments S5, S6, and S7 were determined to be moderate, and so would be in compliance with a VRM III classification. Because this amendment would only include the 200-foot-wide Project ROW along route segments S5, S6, and S7, the effects of the plan amendment on visual resources are expected to be the same as those described under the direct and indirect effects for segments S5, S6, and S7.

SUBROUTE 1.2 LOCAL ALTERNATIVES

Under this alternative, segments C and D cross VRM Class II BLM-managed lands. The proposed plan amendment would result in the reclassification of 130.6 acres of VRM Class II lands to VRM Class III lands. Impacts to scenic quality and viewer sensitivity from the selection of segments C and D were determined to be moderate, and so would be in compliance with a VRM III classification. Because this amendment would only include the 200-foot-wide Project ROW along route segments C and D, the effects of the plan amendment on visual resources are expected to be the same as those described under the direct and indirect effects for segments C and D.

ROUTE GROUP 2 LOCAL ALTERNATIVES

Under this alternative, segments LD2 and LD3a cross VRM Class II BLM-managed lands. The proposed plan amendment would result in the reclassification of 86.1 acres of VRM Class II lands to VRM Class III lands. These sections of VRM Class II were designated to follow the route of the Butterfield Trail historic trail where it crosses BLM land. Impacts to scenic quality and viewer sensitivity from the selection of segments LD2 and LD3A were determined to be low, and so would be in compliance with a VRM III classification. Because this amendment would only include the 200-foot-wide Project ROW along those two route segments, the effects of the plan amendment on visual resources are expected to be the same as those described under the direct and indirect effects for segments LD2 and LD3a. Similarly, the effect of the plan amendment to change VRM classes would not change the overall land use management of the Mimbres RMP, as described under the direct and indirect effects of land use resources.

Modify Visual Resource Management Class II to Class IV

VRM Class IV objectives are set for landscapes that BLM manages for uses that will result in substantial landscape changes. Plan amendments to address conformance issues with VRM classification would only occur in association with the following segments. The remaining segments have been determined to be in conformance with applicable BLM land use plans, or do not cross BLM-managed lands.

SUBROUTE 1.2 PROPONENT ALTERNATIVE

Under this alternative, segments S5, S6, and S7 cross VRM Class II BLM-managed lands. The proposed plan amendment would result in the reclassification of 468.5 acres of VRM Class II lands to VRM Class IV lands. Because this amendment would only include the 200-foot-wide Project ROW along route segments S5, S6, and S7, the effects of the plan amendment on visual resources are expected to be the same as those described under the direct and indirect effects for segments S5, S6, and S7.

SUBROUTE 1.2 LOCAL ALTERNATIVES

Under this alternative, segments C and D cross VRM Class II BLM-managed lands. The proposed plan amendment would result in the reclassification of 130.6 acres of VRM Class II lands to VRM Class IV lands. Because this amendment would only include the 200-foot-wide Project ROW along route segments C and D, the effects of the plan amendment on visual resources are expected to be the same as those described under the direct and indirect effects for segments C and D.

ROUTE GROUP 2 LOCAL ALTERNATIVES

Under this alternative, segments LD2 and LD3a cross VRM Class II BLM-managed lands. The proposed plan amendment would result in the reclassification of 86.1 acres of VRM Class II lands to VRM Class IV lands. Because this amendment would only include the 200-foot-wide Project ROW along those two route segments, the effects of the plan amendment on visual resources are expected to be the same as those described under the direct and indirect effects for segments LD2 and LD3a.

4.21 CUMULATIVE IMPACTS

4.21.1 Introduction

This section addresses the cumulative effects of the proposed Project that would result when combined with other past, present, and reasonably foreseeable actions. CEQ regulations for implementing NEPA define cumulative impacts as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). Further, BLM’s NEPA Handbook states that the purpose of the cumulative effects analysis is to ensure the decision makers consider the full range of the consequences of the Project and alternatives, including the no action alternative (BLM 2008a).

The following sections discuss the analysis parameters including the geographic cumulative effects analysis area (CEAA) and the timeframe for the analysis, the methodology and then the effects by resource. The analysis of cumulative effects by resource considers the proposed Project’s contribution to the environmental impacts of other past, present and future actions and whether the cumulative effects are significant.

4.21.2 Analysis Parameters

Land uses described as "past" or "present" are considered in the baseline conditions in chapter 3 (see Section 3.11, "Land Use"). Past and present activities include agriculture, grazing, mining, residential, commercial and industrial development, linear transportation and utility corridors, parks and open space, and military installations.

The geographic CEAA may vary by resource (see section 4.21.4), however the following CEAA was used to identify past, present, and reasonably foreseeable future projects that may have a cumulative impact when considered with the proposed Southline Project. For the New Build Section of the proposed Project, the CEAA encompasses the geographic area between the Afton Substation near Las Cruces, New Mexico, and the existing Apache Substation near Willcox, Arizona. The New Build Section CEAA generally measures 40 miles north-south, all within the boundaries of New Mexico and Arizona (does not extend outside the United States). The Upgrade Section CEAA extends between the Apache Substation near Willcox to the existing Saguaro Substation north of Tucson, Arizona. The Upgrade Section CEAA is not as wide as the New Build Section CEAA because the cumulative effects of upgrading the existing line are generally expected to be more localized.

Table 4.21-1 summarizes the past, present, and future actions and uses considered in this assessment; see also figures 4.21-1 and 4.21-2 for a depiction of actions considered in this analysis. In general, projects that could result in similar cumulative effects include linear projects such as railroads, transmission lines, and pipelines. Forty-one projects have been identified that when combined with the proposed Southline Project may result in cumulative impacts. These projects span the entire extent of the proposed Southline Project and nearby region, and they range in proximity to the proposed Project.

In terms of timeframe, the cumulative effects analysis is considered over a 50-year time period—the estimated lifespan of the Project. Although the cumulative effects analysis is considered over a 50-year period, only those projects which are "reasonably foreseeable" are considered in the analysis. For the purpose of this analysis, "reasonably foreseeable" actions are considered where there is an existing decision (i.e., record of decision or issued permit), a commitment of resources or funding, a formal proposal (i.e., a permit request). Actions that are highly probable based on known opportunities or trends (i.e., residential development in urban areas) are also considered. Speculative future developments (i.e., enabling access to unknown renewable energy projects) are not considered.

4.21.3 Methodology

The following analyses consider (1) the CEAA for each resource, (2) a description of those past, present, and reasonably foreseeable actions that are similar in kind and effect as the proposed Project, or would have considerable impact to the environmental resources to which the proposed Project's effects would cumulatively contribute, and (3) evaluate the potential effects of those actions and consider the significance of those cumulative effects.

Where data were available to do so, cumulative effects are quantified. Where reliable quantitative data could not be found, qualitative data were used to best assess the cumulative effects of the proposed Project.

Table 4.21-1. List of Projects (Past, Present, and Reasonably Foreseeable Future) Considered in the Cumulative Impacts Analysis

Project/Action Name	Project Size in the CEAA	Project/Action Location	Project/Action Description	Anticipated Project/Action Schedule
New Build Section, Past and Present Projects				
Existing distribution lines less than 230-kV*	381 miles	Doña Ana, Hidalgo, Luna, and Grant counties, New Mexico	Existing transmission distribution lines below 230 kV (69 and 115 kV): 381 miles	Existing distribution lines less than 230 kV are anticipated to continue their current operation for the life of the Project.
Existing transmission lines 230-kV and greater)*	303 miles	Doña Ana, Hidalgo, Luna, and Grant counties, New Mexico	Between 231 and 344 kV: 38 miles Between 345 and 499 kV: 265 miles Above 500 kV: none	Existing distribution lines greater than 230kV are anticipated to continue their current operation for the life of the Project.
Existing gas pipelines*	1,245 miles	Doña Ana, Hidalgo, Luna, and Grant counties, New Mexico	El Paso Natural Gas: 1,190 miles Las Cruces Municipal Gas: 16 miles Public Service Company of New Mexico: 14 miles Southwest Gas Corporation: 15 miles Unknown: 10 miles	All existing pipelines are anticipated to continue their current operation for the life of the Project.
Existing railroads*	428 miles	Doña Ana, Hidalgo, Luna, and Grant counties, New Mexico	Atchison Topeka Santa Fe:11 miles Freeport McMoran Industrial Railroad: 26 miles Southern Pacific Company Railroad: 13 miles Southern Pacific Railroad: 97 miles Unidentified: 148 miles Abandoned Railroads: 134 miles	Unknown
New Build Section, Reasonably Foreseeable Future Projects				
Proposed Organ Mountains Desert Peaks National Monument*	54,800 acres	Doña Ana County, New Mexico	Approximately 54,800 acres of BLM lands in the mountains surrounding Las Cruces, New Mexico proposed for National Monument designation. Proximity: proposed Southline Project does not cross any area of the proposed Organ Mountains Desert Peaks Nation Monument. Segment S2 of the Proponent Alternative is the closest in proximity southeast of the East Potrillo Mountains.	Legislation introduced to the U.S. House of Representatives in March 2013. Consultation and development of a management plan will occur over the next 3 years.

Table 4.21-1. List of Projects (Past, Present, and Reasonably Foreseeable Future) Considered in the Cumulative Impacts Analysis (Continued)

Project/Action Name	Project Size in the CEAA	Project/Action Location	Project/Action Description	Anticipated Project/Action Schedule
Potential network upgrades	5 acres per substation	El Paso County, Texas and Doña Ana County, New Mexico	Upgrades within existing substations at Newman Substation southeast of Afton Substation and in Doña Ana Substation located on the northwest side of Las Cruces, New Mexico. Potential Network Upgrades would occur completely within existing substations fence lines. Existing access to the substations would be used for construction, operation, and maintenance of the Potential Network Upgrade project. Upgrades at Newman Substation would include converting the existing 345kV ring bus to a breaker-and-a-half arrangement and expanding to accommodate an additional 345/115kV transformer bank. Upgrades at Doña Ana Substation would include modifying the existing 115kV line in from Picacho Substation to include the addition of series line reactors.	Timing unknown
SunZia Transmission Line (agency preferred alternative, FEIS)*[9]	515 miles	Within Lincoln, Socorro, Sierra, Luna, Grant, Hidalgo, and/or Torrance counties in New Mexico, and Graham, Greenlee, Cochise, Pinal, and/or Pima counties in Arizona	Planned transmission project with up to 4,500 MW of new capacity with multiple substations, and two 500-kV transmission lines Southline Local Alternatives DN1, LD4 were developed to collocate with the SunZia Transmission Line agency preferred alternative. Southline DN1 would parallel SunZia for 42.5 miles, and LD4 would parallel SunZia for 51.7 miles.	According to the SunZia EIS timeline (BLM 2013a), ROW is expected to be issued in 2013, with project construction taking place in 2014 and 2015, and operations beginning in 2016. Currently obtaining preconstruction licenses and permits. On June 14, 2013, the BLM released the SunZia EIS for public review and comment.
New Solar Ventures/Solar Torx*	Unknown	Luna County, New Mexico	Planned 300-MW photovoltaic solar power plant. Project would be less than 1 mile from subroute 1.1 in the New Build Section in Luna County, New Mexico.	Schedule not identified. In 2006, Solar Torx signed a lease with the State of New Mexico to hold land for use as the project site. The project was targeted to come on line in 2011, but does not currently appear to be under active development.
Sapphire Energy Algae Facility*	300 acres	Luna County, New Mexico	Partial 300-acre “green crude” demonstration farm with the capacity for 1.5 million gallons of biofuel. The facility would be located within the CEAA in the New Build Section of subroute 1.2 near the town of Columbus.	The first 100-acre segment was recently finished, and the entire project is scheduled to be complete by 2014. The other two pond segments, each of which is about 1 mile in length, will be constructed later in 2012 and in 2013.

[9] The SunZia Transmission Line route considered in this analysis is based upon the June 14, 2013 FEIS/RMP Amendment. The future ROD may result in changes to the route when released.

Table 4.21-1. List of Projects (Past, Present, and Reasonably Foreseeable Future) Considered in the Cumulative Impacts Analysis (Continued)

Project/Action Name	Project Size in the CEAA	Project/Action Location	Project/Action Description	Anticipated Project/Action Schedule
Solar Reserve, LLC-1*	5,296 acres federal land	Hidalgo County, New Mexico	Planned 100-MW solar power plant	The project schedule is unknown.
Lordsburg Mesa, Iberdrola Renewables*	24,320 acres federal land	Doña Ana County, New Mexico	Planned 1,500-MW solar power plant, within 10.94 miles of the route group 2 local alternatives in the New Build Section.	An application was received by the BLM on March 25, 2008, for the use of 24,320 acres of Federal land for the project. The project does not appear to be under active development. The project schedule is unknown.
Lightning Dock Geothermal Power Plant Project*	Unknown	Lordsburg, Hidalgo County, New Mexico	Planned 10-MW geothermal project within 11 miles of the route group 2 local alternatives in the New Build Section.	Construction is anticipated in fall or winter 2012, with commercial startup expected in late 2014.
Planned Residential Development Projects New Mexico	Unknown	Doña Ana, Hidalgo, Luna, and Grant counties, New Mexico	Both the City of Deming and City of Lordsburg plan for amendments to their municipal zoning and planned-unit development ordinances are anticipated to expand their municipal boundaries to private and State lands in order to facilitate planned residential development.	Construction for new apartment complexes and detached single-family homes is underway, some to be completed in 2014. Planned residential development projects are anticipated to continue throughout the life of the project, as communities require extending boundaries through annexation.
Safford Solar Energy*	22,891 acres	San Simon, Graham County, Arizona	Planned 250-MW solar project adjacent to subroute 2.2 in the New Build Section	Identified as pending on list of BLM solar projects for Arizona. However, currently at a standstill due to the lack of a power transmission connection agreement.
Bowie Power Station*	Unknown	Cochise County, Arizona	Planned 1,000-MW natural gas-fired power station within 0.89 mile of subroute 2.2 in the New Build Section	To be constructed in two phases of up to 500 MW each. Each project phase is expected to require approximately 3-4 years to completion. Commercial operation is anticipated in 2016. Permits have been granted, including zoning and air permits and a CEC.
Bowie Power 345-kV Transmission Line	Unknown	Cochise and Graham counties, Arizona	Planned 345-kV generation tie-in between the proposed Bowie Power Plant and the proposed 345-kV Willow substation within 0.65 mile of route group 2 local alternatives.	Currently expected to begin commercial operation in 2016. An Interconnection Request with TEP, the Initial System Impact Study, and a System Impact Study Re-Study are all complete. TEP was expected to issue a Final Report by July 30, 2012, and the Facilities Study was scheduled to be updated by August 1, 2012.

Table 4.21-1. List of Projects (Past, Present, and Reasonably Foreseeable Future) Considered in the Cumulative Impacts Analysis (Continued)

Project/Action Name	Project Size in the CEAA	Project/Action Location	Project/Action Description	Anticipated Project/Action Schedule
Willow 345-kV Substation*	Unknown	Graham County, Arizona	Planned 345-kV substation with up to two 500/345-kV transformers to be located in Graham County, Arizona, approximately 7 miles from the route group 2 local alternatives.	Unknown at this time.
BrightSource Energy	14,100 acres	Hidalgo and Luna counties, New Mexico	Planned solar project Proximity to Project: unavailable	In 2008, BrightSource signed two 5-year option agreements to secure lands for the proposed solar facility, including 6,574 acres in Hidalgo County and 7,520 acres in Luna County. An option agreement was signed in 2011 that allows BrightSource 2 years to conduct studies and negotiate power purchase and interconnect agreements.
NextLight Renewable Power	7,301 acres	Luna, Hidalgo, and Valencia counties, New Mexico	Planned solar project Proximity to Project: unavailable	In 2008, NextLight signed three 5-year option agreements to secure 2,722 acres in Luna County, 3,714 acres in Hidalgo County, and 865 acres in Valencia County for the proposed solar facility. An option agreement was signed in 2011 that allows NextLight 2 years to conduct studies and negotiate power purchase and interconnect agreements.
High Plains Express Transmission Project	1,300 miles	Wyoming, Colorado, New Mexico, and Arizona	Planned 1,300-mile, four-state, 500-kV AC transmission line. Proximity to Project: not yet determined	The feasibility study is complete, with evaluation corridor engineering design and permitting currently ongoing. Commissioning is proposed between 2020 and 2025.
Upgrade Section, Past and Present Projects				
Existing distribution lines less than 230-kV*	394 miles	Cochise, Pima, and Pinal counties, Arizona	Existing transmission distribution lines below 230 kV (69 and 115kV): 394 miles	Existing distribution lines less than 230kV are anticipated to continue their current operation for the life of the project.
Existing transmission lines (230-kV and greater)*	200 miles	Cochise, Pima, and Pinal counties, Arizona	Between 230 and 344 kV: 105 miles Between 345 and 499 kV: 90 miles Above 500 kV: 5 miles	Existing distribution lines greater than 230kV are anticipated to continue their current operation for the life of the project.
Existing gas pipelines *	222 miles	Cochise, Pima, and Pinal counties, Arizona	El Paso Natural Gas: 209 miles Southwest Gas Corporation: 13 miles	Existing pipelines are anticipated to continue their current operation for the life of the project.

Table 4.21-1. List of Projects (Past, Present, and Reasonably Foreseeable Future) Considered in the Cumulative Impacts Analysis (Continued)

Project/Action Name	Project Size in the CEAA	Project/Action Location	Project/Action Description	Anticipated Project/Action Schedule
Existing railroads*	93 miles	Cochise, Pima, and Pinal counties, Arizona	P Railroad: 4 miles Southern Pacific Company Railroad: 32 miles Southern Pacific Railroad: 25 miles SP Railroad : 29 miles Unidentified : 2 miles	Unknown
Buffalo Soldier Electronic Testing Range (BSETR)*	1.6 million acres	Cochise, Pima, and Santa Cruz counties, Arizona.	A Fort Huachuca facility that is the principal Army Test Center for testing of command, control, communications, computer, and intelligence equipment and systems in real, virtual, and constructive environments. The facility spans several counties in southern Arizona and includes the Wilcox Dry Lake (Playa). Segments of the proposed Southline Project (subroute 3.1–segments U1a, U1b, and U2 requiring upgrade or local alternative H) cross the BSETR. Lengths of the crossings range from 2.9 miles to 10.3 miles.	Existing facility
Upgrade Section, Reasonably Foreseeable Future Projects				
Whetstone Ranch Solar Project*	1,600 acres	Cochise County, Arizona	Planned 80-MW solar farm, four stages of 20 MW each, located approximately 6.5 miles south of segment U2 of subroute 3.1.	The Benson Planning and Zoning Commission approved a conditional use permit in March 2012 for the proposed solar project. It is currently in the construction permitting stage.
Red Horse 2 Wind Farm	5,800 acres	Cochise County, Arizona	Proposed 51-MW wind farm located approximately 21 miles west of Willcox, Arizona. Project would be located within the BSETR.	The Cochise County Planning and Zoning Commission approved a conditional use permit in 2013 for the proposed wind project. It is currently in the planning and permitting stage.
Rosemont Copper Mine*	4,285 acres	Pima County, Arizona	New open-pit copper mine and copper recovery facilities located more than 10 miles south of segment U3a of subroute 3.1.	Rosemont Copper Company submitted a proposal to extract locatable minerals such as copper, molybdenum, and silver from an approximate 955-acre open-pit mine. It is currently in the permitting process. The Arizona Corporation Commission approved an associated 13-mile transmission line. A construction schedule was not identified.

Table 4.21-1. List of Projects (Past, Present, and Reasonably Foreseeable Future) Considered in the Cumulative Impacts Analysis (Continued)

Project/Action Name	Project Size in the CEAA	Project/Action Location	Project/Action Description	Anticipated Project/Action Schedule
UA Tech Park Thermal Storage/Bell Independent Power Corporation*	200 acres	Pima County, Arizona	Planned 5-MW CSP project utilizing parabolic trough technology located approximately 1 mile from segment U4 of subroute 4.1 within the Upgrade Section.	Construction and operation schedule for the project is unclear at this time.
Sasabe Lateral Project*	60 miles	Pima County, Arizona	Approximately 60 miles of planned 36-inch-diameter, high-pressure pipeline and associated measurement facilities to be located approximately 8.8 miles west of segment U3d of subroute 4.1.	Project is in permitting stage with FERC; El Paso Natural Gas proposes to begin construction in January 2014 with an in-service date of September 2014.
Silverbell Road Improvements*	8 miles	Pinal County, Arizona	Planned road improvement project by the City of Tucson to widen and install a median to the existing road that would be intersected by segment U3i of subroute 4.1 within the Upgrade Section.	First segment – construction between 2012 and 2016. Second segment – construction between 2022 and 2026.
Fotowatio Renewable Ventures*	305 acres	Pima County, Arizona	Planned 25-MW solar photovoltaic energy facility located approximately 2 miles west of the proposed route in the Upgrade Section.	The facility was originally scheduled to be completed by April 2012, but is currently pending. A current completion date has not yet been identified.
Avra Valley Solar Project/NRG Solar*	300 acres	Pima County, Arizona	Planned 25-MW solar photovoltaic energy facility to be located approximately 3.6 miles west of segment U3j of subroute 4.1 within the Upgrade Section	NRG and First Solar have agreed to construct the project in 2012. Permitting appears to be complete. Anticipated groundbreaking, completion of construction, and operation in 2012.
Pinal Central to Tortolita 500-kV Transmission Line	40 miles	Pinal County, Arizona	Planned single-circuit 500-kV transmission line; 40 miles of new line between Pinal Central substation and Tortolita substation. The Proponent Preferred (subroute 4.1) interconnects at Tortolita substation	TEP filed a CEC application with ACC in April 2012 and public hearings were conducted in May 2012. Anticipated start of construction in 2012; in service in 2014.
Pinal Central Substation	200 acres	Pinal County, Arizona	Planned 500-kV substation to be located approximately 26.2 miles northwest of segment U3l of subroute 4.1.	Permitting of the Pinal Central Substation may be complete at this time; it will be developed as determined by resource need.
Electrical District 5 – Palo Verde Hub Project	109 miles	Maricopa and Pinal counties, Arizona	Planned 109-mile transmission line and the expansion of three existing substations to be located approximately 26.2 miles northwest of segment U3l of subroute 4.1.	Project approval was issued in August 2011; the project is planned to be constructed over a period of 24 to 30 months beginning in 2012, with a scheduled completion in 2015.

Table 4.21-1. List of Projects (Past, Present, and Reasonably Foreseeable Future) Considered in the Cumulative Impacts Analysis (Continued)

Project/Action Name	Project Size in the CEAA	Project/Action Location	Project/Action Description	Anticipated Project/Action Schedule
Vail-to-Valencia 115-kV to 137-kV Upgrade Transmission Line	45 miles	Pima and Santa Cruz counties, Arizona	138-kV link between TEP's Vail substation and UES' Valencia substation in Nogales. The Proponent Preferred (subroute 4.1) would interconnect to the Vail substation and run west and south to the Nogales substation, ranging from less than 200 feet near the Vail substation to approximately 45 miles at the Valencia substation in Nogales	The project is planned to be constructed over a period of 24 months beginning in 2012, with a scheduled completion in 2015.
Tucson-Apache Pole Replacement Project*	80 miles	Pima and Cochise counties, Arizona	Western is proposing to conduct pole replacement, access road improvements, and vegetation management along portions of their Tucson to Apache 115-kV transmission line. 149 wood H-frame structures have been selected for in-kind replacement and vegetation management is proposed near the San Pedro River in Benson, Arizona. All project-related access will be along existing access roads, however about 20 non-contiguous miles of access road will require improvement. The entire length of the Tucson-Apache Pole Replacement Project would be upgraded by the proposed Southline Project, if approved.	Work was proposed to begin in 2013 and would be completed in phases over a period of 2 years.
Abandonment and Removal of existing Western Line Saguaro-Tucson and Tucson-Apache *	120 miles	Cochise, Pima, and Pinal counties, Arizona	If the proposed Southline Project were to be approved the existing s transmission line in the Western ROW would be abandoned and removed once the new Southline transmission line is complete.	Upon completion of the proposed Southline Project.
Planned Residential Development Projects Arizona	Unknown	Cochise and Pima counties	The Cities of Willcox, Benson, Vail, Tucson, and Marana plan for amendments to their municipal zoning and planned-unit development ordinances are anticipated to expand their municipal boundaries to private and State lands in order to facilitate planned residential development.	Construction for new apartment complexes and detached single-family homes are ongoing, mostly on State and private lands. Planned residential development projects are anticipated to continue throughout the life of the project, as communities require extending their boundaries through annexation in order to facilitate planned residential development.
High Plains Express Transmission Project	1,300 miles	Wyoming, Colorado, New Mexico, and Arizona	Planned 1,300-mile, four-state, 500-kV AC transmission line. Proximity to Project: unavailable	The feasibility study is complete, with evaluation corridor engineering design and permitting currently ongoing. Commissioning is proposed between 2020 and 2025.

Source: CH2MHill Southline Transmission Project Resource Report 20: cumulative. April 10, 2013 (CH2MHill 2013t)
* Indicates the cumulative action is illustrated on figures 4.21-1 and 4.21-2

Figure 4.21-1. New Build Section cumulative effects analysis area.

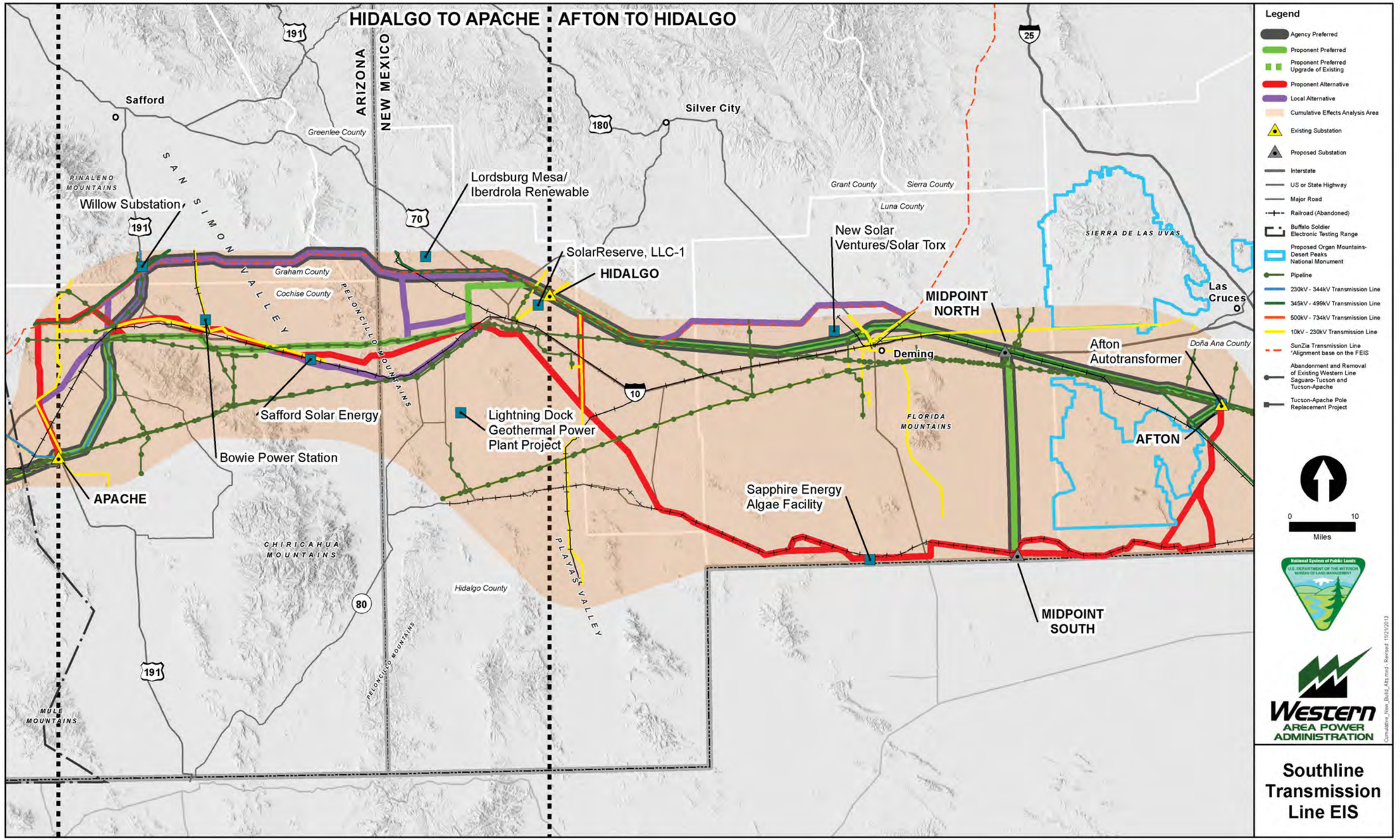
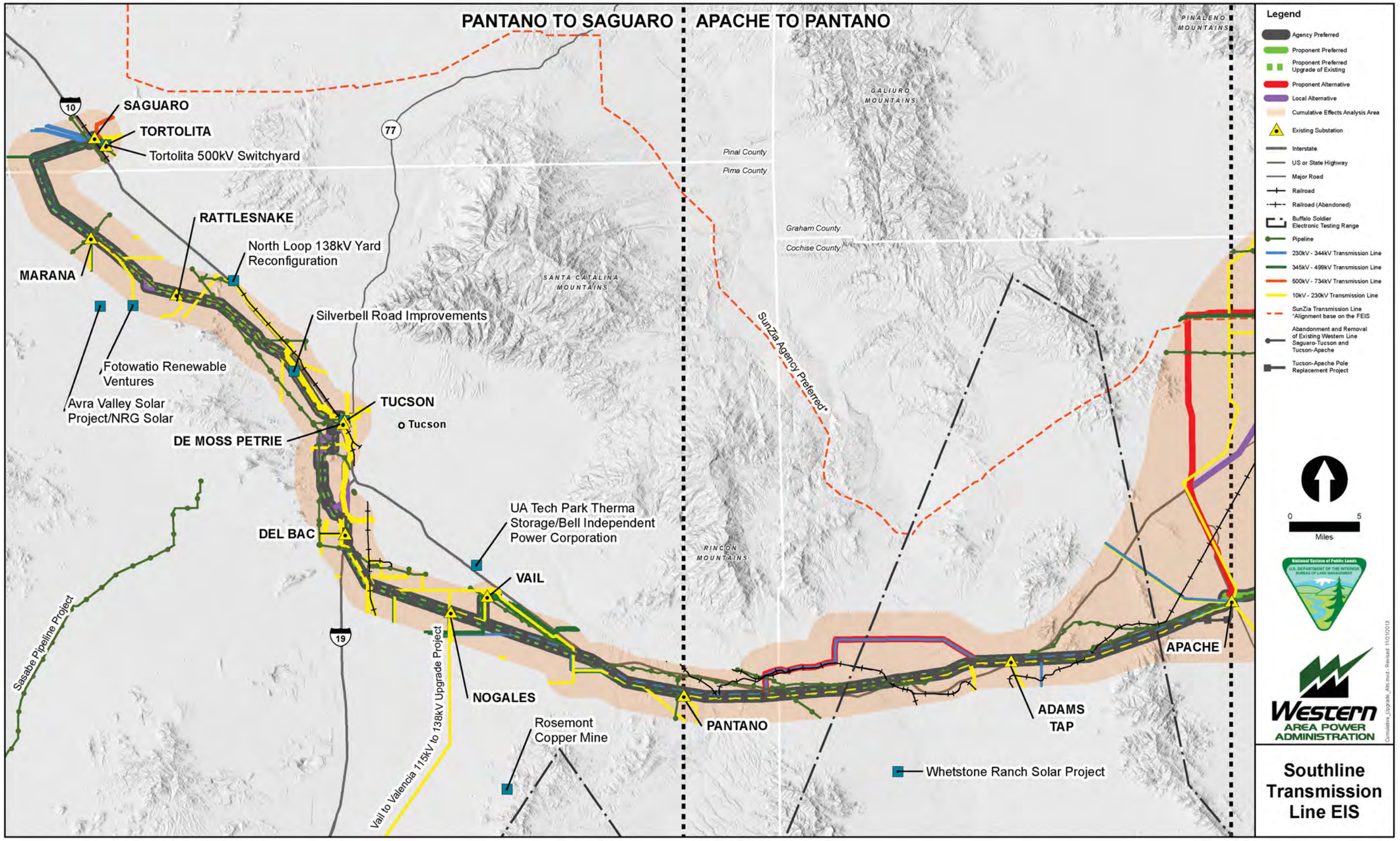


Figure 4.21-2. Upgrade Section cumulative effects analysis area.



Like the direct and indirect effects described in sections 4.1–4.19, the cumulative effects of the proposed Project in combination with other past, present, and reasonably foreseeable future actions are also considered in the context of magnitude and significance. As described in section 4.1.3, use of the term *significant* when referring to resource impacts indicates that some threshold was exceeded for a particular impact indicator. The following categories of magnitude and duration are presented to define relative levels of effects and to provide a common language when describing effects (table 4.21-2).

Table 4.21-2. Standard Resource Impact Descriptions for Magnitude and Duration

	Description Relative to Resource
Magnitude	
No Impact	Would not produce obvious changes in baseline condition of the resource.
Minor/ Negligible	Impacts would occur, but resource would retain existing character and overall baseline conditions.
Moderate	Impacts would occur, but resource would partially retain existing character. Some baseline conditions would remain unchanged.
Major	Impacts would occur that would create a high degree of change within the existing resource character and overall condition of resource.
Duration	
Short term	During construction and up to 5 years (from when ground-disturbing activities begin, through reclamation when vegetation has been reestablished in construction areas).
Long term	More than 5 years, life of the Project.

4.21.4 Cumulative Effects by Resource

Air Quality and Climate Change

The CEAA for the air quality and climate change effects is consistent with the 31-mile radius used to analyze proposed Project impacts and includes portions of Doña Ana, Grant, Hidalgo, and Luna counties in New Mexico, and Cochise, Greenlee, Graham, Pima, and Pinal counties in Arizona. This CEAA for analyzing potential cumulative impacts to air quality and climate change represents a reasonable region in which existing air quality, when assessed in combination with other cumulative actions, would be impacted if the proposed Project or action alternatives were implemented. The temporal scope of the cumulative effects analysis is for the life of the Project, which is 50 years. Cumulative actions discussed herein are based on the existing conditions of the air quality resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

CONSTRUCTION

As discussed in chapters 3 and 4, current and past air emission sources have impacted air quality in the analysis area to varying degrees. Current and past impacts to air quality are captured by the network of ambient air quality monitoring stations and emissions of pollutants are quantified annually state-wide in emission inventories. As discussed in chapter 3, the proposed Project would cross the Rillito PM_{10} nonattainment area and the Tucson CO maintenance area, both located in Pima County, Arizona. Several other nonattainment and maintenance areas are potentially located within the analysis area; however, with the exception of the Rillito PM_{10} nonattainment area and the Tucson CO maintenance area, the boundaries of the proposed Project and/or alternatives would not be within any of the other nonattainment or maintenance areas identified in chapters 3 and 4.

As discussed in section 4.2, the Project would emit criteria pollutants, HAPs, and GHG emissions during construction. During transmission line and substation construction activities, air pollutant emissions would be generated from earthmoving, vehicle/equipment exhaust, vehicle travel on paved and unpaved surfaces, and the construction and operation of concrete batch plants. Air quality impacts associated with these activities are not expected to exceed any general conformity threshold levels or Federal, State, or local ambient air quality standards, and would be temporary and localized in nature.

Several new major and PSD sources of air pollutants have been proposed within the air quality CEAA, such as new or expanded power generation facilities (e.g., the 1,000-MW, natural gas–fired Bowie Power Station), roadways, manufacturing facilities, and mines (e.g., Rosemont Copper Mine). These reasonably foreseeable actions could cumulatively impact air quality, potentially resulting in further increases to pollutant concentrations in non-attainment areas, further increases to concentrations of other air pollutants, and/or exceedances of the NAAQS within the Project air quality analysis area. However, due to the short-term, intermittent nature of Project construction activities, there would be little overlap between Project construction activities and the activities of other proposed projects located within the air quality CEAA. Additionally, all proposed projects would be regulated by the appropriate regulatory authority (local, state, and/or federal), with emissions minimized thereby. Therefore, any cumulative effects on air quality from construction activities for the proposed Project and construction emissions of other proposed sources of air pollutants within the air quality CEAA would be expected to be minor and short-term in nature.

OPERATION AND MAINTENANCE

During operation and maintenance of the transmission lines and substations, impacts would be qualitatively similar to those described above for construction. However, impacts would be much lower than construction-phase emissions and impacts. In contrast to proposed Project construction emissions, emissions from the operation and maintenance of the proposed Project would likely overlap with future development of air pollutant sources. Since the proposed Project potentially crosses two areas that have been or are not in compliance with the NAAQS for PM_{10} and CO (the Rillito PM_{10} nonattainment area and the Tucson CO maintenance area), the cumulative impact from past, present, and reasonably foreseeable future air pollution emission sources could result in further degradation of these non-attainment/maintenance areas. Therefore, the incremental contribution of the effects of the proposed Project and action alternatives when added to the effect of other past, present, and reasonably foreseeable future actions would result in a moderate and long-term cumulative effect. However, based on the small amount of proposed Project operational emissions, the contribution of the Project to the cumulative air quality in the CEAA would be negligible.

GLOBAL CLIMATE CHANGE

In terms of global climate change, anthropogenic activities have clearly increased the concentration of CO_2 in the atmosphere.

Global temperatures are projected to continue to rise over this century; by how much and for how long depends on a number of factors, including the amount of heat-trapping gas emissions and how sensitive the climate is to those emissions. In the United States, average temperature has risen more than 2 ºF over the past 50 years and is projected to rise more in the future (U.S. Global Change 2009).

For the Southwest particularly, there has been and will likely continue to be an increase in mean annual temperature. This will result in a more frequent drought cycle due to increased evapotranspiration. The number of extremely hot days is also projected to rise during the first 100 years of the 21st century.

By the end of the century, parts of the Southwest are projected to face summer heat waves lasting 2 weeks longer than those occurring in recent decades (IPCC 2007).

Projections of future precipitation generally indicate that northern areas will become wetter, and southern areas, particularly in the West, will become drier. Precipitation is projected to drop by 5 percent by 2100 for much of Arizona and New Mexico. A 10 percent decline could be in store for the southern half of Arizona based on these estimates (U.S. Forest Service 2010).

In the Southwest, winter precipitation has been reduced in the past two decades and the prediction is that this trend will continue. This decrease in winter precipitation will likely result in reduced snowpack and earlier snowmelt. There is less confidence in the potential changes to summer monsoonal rainfall patterns. There is evidence that monsoonal rains have been occurring earlier in the season, although there is considerable uncertainty in predicting this will continue.

The occurrence of abrupt changes in climate becomes increasingly likely as the human disturbance of the climate system grows. Globally, many types of extreme weather events, such as heat waves and regional droughts, have become more frequent and intense during the past 40 to 50 years (U.S. Global Change 2009). Ancient climate records suggest that in the United States, the Southwest may be at greatest risk for this kind of change. This would include increased frequency of drought, as well as increased frequency of heavy rains and flooding.

Construction (and, to a lesser extent, operation and maintenance) activities would result in GHG emissions, as discussed and quantified in section 4.2, well below the CEQ threshold of 25,000 metric tons of GHGs requiring a GHG emissions analysis of alternatives. As also described in section 4.2, a small amount of SF_6 could potentially be emitted from circuit breakers during substation operations. On a CO_2e basis the estimated amount of SF_6 emitted from all Project substations would be approximately 7,124 tonnes per year. This amount would be approximately the same under all action alternatives, and represents approximately 0.004 percent of annual energy-related emissions in New Mexico and Arizona combined (CCS 2005, 2006).

Therefore, the cumulative effect of climate change in the air quality CEAA would be major and long-term; however, the contribution of the proposed Project and alternatives to this change would be negligible, and, to the extent the proposed Project allows displacement of fossil fuel generation with renewable energy sources, the proposed Project would have a beneficial contribution to anthropogenic climate change.

Noise

In general, noise impacts would typically be localized, with noise levels associated with the construction and especially operations of transmission lines returning to ambient conditions within a relatively short distance. For this reason, cumulative impacts for noise would be limited to other projects in close proximity to the proposed Project. The geographic analysis area for cumulative impacts to noise is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years.

Existing noise conditions in and around the proposed Project and alternatives are discussed in section 3.3. The majority of the area surrounding the proposed Project is desert open space, which typically sees ambient noise levels in the range of 8 to 45 dBA. The Project would pass by one major city (Tucson) and several small and medium-sized towns that would provide elevated noise levels. The proposed Project would also pass or cross several highways, including two Interstate highways, as well as various large and small airports, all of which typically have noise levels elevated above what might typically be seen in the surrounding area.

As discussed in section 4.3, noise impacts from the construction of the proposed Project and alternatives could be major, but short-term, temporary, and intermittent in nature. Maintenance activities associated with substations and transmission lines would be similar in noise level to construction-related activities, but would be anticipated to occur less frequently, include fewer individual noise point sources such as pieces of equipment and vehicles, and would be of shorter duration. Corona noise from transmission line and substation operation would be expected to be below regulatory thresholds. Therefore, impacts to noise for operation and maintenance activities would be minor and long-term.

Construction noise from reasonably foreseeable actions in the analysis area that, when combined with the proposed Project construction and operation and maintenance, may cumulatively impact noise include the proposed SunZia Transmission Line Project, small (<100 MW) and large-scale (>100 MW) solar projects, substation expansions, maintenance and upgrades to existing distribution and transmission lines (ranging from less than 230 kV to greater than 500 kV lines), and the future expansion of the communities and roadways (i.e., planned residential development) within the analysis area (e.g., Tucson) (see table 4.21-1). The potential for effects of the proposed Project and alternatives to combine with the effects of reasonably foreseeable actions within the CEAA is minimal. Several planned projects have potentially overlapping construction schedules with the proposed Project and alternatives, which may cause localized noise increases if both projects are under construction at the same time. However, cumulative noise impacts from overlapping construction projects should be minimal and temporary.

Geology and Minerals

The geographic analysis area for cumulative impacts to geology and mineral resources is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. This CEAA for analyzing potential cumulative impacts to geology and mineral resources represents a reasonable region in which existing geological and mineral resources, when assessed in combination with other cumulative actions, would be impacted if the proposed Project or action alternatives were implemented. Cumulative actions discussed herein are based on the existing conditions of the geological and mineral resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1).

A number of proposed projects have been previously identified, which, when combined with the proposed Project, may potentially result in cumulative impacts. Notwithstanding the proposed Rosemont Copper Mine, any of these projects, if they overlap with mining districts, would further reduce the area available for mining in those districts. However, because only some mining districts are active, because active mining encompasses only a small fraction of those mining districts, and because the projects are likely to cover only a fraction of the mining districts they cross (and assuming that active mines are avoided in a similar fashion as this Project), there would be no obvious changes in the baseline conditions of local geology or access to mineral resources. Therefore, there would be no cumulative impacts to geology and mineral resources.

Soils

The geographic analysis area for cumulative impacts to soil resources is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. Cumulative actions discussed herein are based on the existing conditions of the soil resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

CONSTRUCTION

The past uses in the CEAA have had a direct effect on the soils, as described in chapters 3 and 4. The historic use of land through such activities such as mining and ranching and the associated roads, solar projects, transmission lines, oil and gas development, and OHV use have all shaped the current state of the soil resources. The impacts of present actions in the CEAA would be very similar to the past actions. In general, construction activities from the proposed Project would contribute to the modification of the soil resource. However, since the proposed Project is largely routed to follow existing ROWs and disturbed areas, the construction activities are only anticipated to have minor, short-term impacts which would be a result of the surface disturbance activities.

Reasonably foreseeable actions in the CEAA that, when combined with the proposed Project construction, may have cumulative impacts to the soil resources including increased wind and water erosion rates in areas where ground surface disturbance occurs. The foreseeable actions within the CEAA include the proposed SunZia Transmission Line Project, small (<100 MW) and large-scale (>100 MW) solar projects, substation construction and expansions, maintenance and upgrades to existing distribution and transmission lines (ranging from less than 230 kV to greater than 500 kV lines), and the future expansion of the communities and roadways (i.e., planned residential development) within the CEAA (e.g., Tucson) (see table 4.21-1).

OPERATION AND MAINTENANCE

During operation and maintenance, the interaction of the actions within the CEAA and the proposed Project, or action alternatives, would be a beneficial, minor, and short-term cumulative effect for the soil resources. During this phase roads would be maintained resulting in less wind and water erosion of soils. However when the operation and maintenance for the proposed Project is combined with future development, a minor cumulative effect would occur. Since the majority of the proposed Project utilizes existing ROWs and disturbed areas, this would result in a minor impact that would be long-term and for the life of the proposed Project, which includes the loss of soil resources due to sites occupied by facilities or unauthorized off-road vehicle use from construction on any of the cumulative projects identified with inadequate access control. Further, operation and maintenance activities of the proposed Project would result in minor cumulative effects, since the Project would already be constructed and standard operation and maintenance activities would be so periodic as to not affect soil resources after they have recovered from construction restoration. Decommissioning and reclamation can recover some of the soil productivity, but is not 100 percent effective. The implementation of BMPs and reclamation on any of these projects would minimize soil impacts; therefore, both the short- and long-term cumulative impacts of the proposed Project would be negligible.

Cultural Resources

The geographic analysis area for cumulative impacts to cultural resources is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. This CEAA for analyzing potential cumulative impacts to cultural resources represents a reasonable region in which cultural resources with similar characteristics (as well as similar temporal and cultural affiliation) as those within the Project ROW and, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented. Cumulative actions discussed herein are based on the existing conditions of the cultural resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1. In addition, existing highways (i.e., I-10, U.S. 70, U.S. 191, and SR 80) are considered for the cumulative impacts analysis for cultural resources.

CONSTRUCTION

Past construction in the CEAA has occurred in areas with important cultural resources along the New Build and Upgrade Sections. The construction of existing pipelines, railroads, and highways would have had the greatest effect on cultural resources through ground disturbance; transmission lines are more flexible and can be designed to avoid resources, as well as have less ground disturbance. For example, I-10 follows a similar alignment to the proposed Project in places and has a large "footprint" overall for ground disturbance. However, for many of these past projects adverse effects to cultural resources would have been mitigated under Section 106 of the NHPA, which would serve to reduce the adverse effects of construction. Mitigation for most cultural resources would have involved data recovery which would contribute to our knowledge of prehistoric and historic peoples. In the Tucson Basin especially, data recovery projects conducted in compliance with Section 106 have greatly expanded our understanding of early agriculture and other important developments.

Past construction of transmission lines has contributed to visual impacts to historic trails by altering the setting of the trails. Several existing transmission lines cross or run near the Anza Trail corridor and the Butterfield Trail which have impacted their setting. In addition, because the route followed by the Butterfield Trail through southwestern New Mexico and Arizona is a logical travel and routing corridor, several existing highways (e.g., I-10), pipelines, and railroads also run near or cross the trail and likely have impacted any physical signs of the trail. Some of these projected were constructed prior to the implementation of the NHPA, so adverse impacts may not have been mitigated, which contributes to cumulative impacts.

Reasonable foreseeable actions, when combined with past actions and the proposed Project, that may contribute to cumulative effects include the SunZia Transmission Line (515 miles), proposed energy generation facilities including several small (<100 MW) and large (>100MW) solar facilities, residential developments, road improvements, and upgrades and maintenance to existing transmission lines. Ground disturbance associated with these projects would contribute to cumulative impacts if cultural resources are present; however, these projects are subject to applicable State and Federal laws and regulations, and adverse impacts would be reduced through mitigation in accordance with those State and Federal laws and regulations. If data recovery is conducted as mitigation, these projects have the potential to contribute to our knowledge of the past and may result in a moderate, long-term positive effect.

The construction phase of the proposed Project may contribute to cumulative impacts to cultural resources, but most impacts would be avoided according to Southline's POD. Direct impacts to cultural resources from ground disturbance during construction range from minor to major through the route of the proposed Project. The New Build Section ranges from moderate to major impacts; the Upgrade Section ranges from minor to moderate. Although there is a potential for impacts from ground disturbance to cultural resources from construction, as stated in section 4.9, adverse impacts to cultural resources would be mitigated in accordance with all applicable regulations, guidelines, and Southline's POD. As stated in the POD, avoidance of resources during the final design stage would be the preferred form of mitigation. Because avoidance would be the primary form of mitigation used, little to no direct cumulative impacts are expected from the proposed Project. Additionally, the proposed Project is primarily routed following existing ROWs and other disturbed areas, for which impacts to cultural resources may have already been mitigated.

Some cumulative visual impacts to trails and historic properties for which setting is an important characteristic are expected from the proposed Project. For example, in places where the proposed transmission line would cross or run near the Butterfield Trail, the setting would be altered by the presence of the structures and lines of the proposed Project.

OPERATION

The operation and maintenance of existing projects, the proposed Project, and reasonably foreseeable projects would have minor, long-term impacts; however, is not expected to contribute to cumulative effects to cultural resources. The operation of the proposed Project or other projects is not likely to result in any additional ground disturbance. As discussed above, the presence of the transmission line would impact the setting of some historic trails and historic properties, but the operation of the line would not involve any further alterations to setting after construction is complete. Maintenance activities may encounter unexpected cultural resources; however, maintenance activities would be subject to the applicable State and Federal laws and regulations and adverse impacts to those resources would be mitigated in accordance with those regulations.

Water Resources

The geographic analysis area for cumulative impacts to water resources is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. With respect to water resources, impacts can be cumulative if they occur nearby in the same watershed or on the same water body. This CEAA for analyzing potential cumulative impacts to water resources includes the immediate drainage area associated with water bodies and floodplains that are also crossed by the proposed Project. Drainage areas affected include the Mimbres, San Simon, and Willcox Playa subbasins in the New Build Section of the CEAA and the Upper Santa Cruz and Lower Santa Cruz subbasins in the Upgrade Section of the CEAA.

Cumulative actions are based on the existing conditions of the water resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1. Future actions that could contribute to cumulative effects to water resources include the proposed SunZia and High Plains Express projects, five proposed energy projects (Sappharie, New Solar Ventures, Bright Source, NextLight, and Safford Solar energy), the proposed UA Tech Park Thermal Storage, and proposed Silverbell Road improvements. Other reasonably foreseeable projects would likely be mitigated by avoidance or implementation of BMPs. The proposed Organ Mountains Desert Peaks National Monument is likely to improve watershed conditions overall. Reasonably foreseeable actions that impact the drainage areas would, in combination with impacts from the proposed Project, result in minor to negligible cumulative impacts to water resources in the Mimbres, Willcox Playa, and Upper Santa Cruz subbasins, and minor to moderate cumulative impacts to water resources in the San Simon Subbasin.

Biological Resources

VEGETATION

The geographic analysis area for cumulative impacts (CEAA) to vegetation coincides with the study corridor for the affected environment; for the New Build Section of the Project this includes 1 mile on either side of the centerline of alternatives carried forward and any substation or access roads outside that corridor; for the Upgrade Section of the Project this includes a 500-foot corridor (200 feet off of existing 100-foot corridor) of each alternative. In addition to this analysis area, projects that are adjacent to the Southline CEAA and have the potential to cumulatively impact vegetation are also assessed (table 4.21-3). This analysis area is more restricted than the larger CEAA discussed in section 4.21.2 because vegetation is relatively non-mobile (minus seed dispersal) and vegetation resources are more sensitive to local impacts in the immediate proximity of vegetation rather than broader regional impacts. Broader-scale potential impacts such as noxious weed dispersal and wildfire spread are addressed on a per-project basis below, relative to the affected environment study corridors. The temporal scope is for the life of the Project, which is 50 years. This CEAA for analyzing potential cumulative impacts to vegetation

represents a reasonable region in which existing vegetation, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented. Cumulative actions discussed herein are based on the existing conditions of the vegetation resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

Of the 41 projects identified within the Southline CEAA, three proposed projects are identified that will have portions located inside the analysis area selected for vegetation resources: the proposed SunZia project, Sapphire Energy Algae Facility, and the Bowie Power 345 kV Transmission Line. Potential direct cumulative impacts from these three projects are discussed below. In addition, 28 other projects are within approximately 10 miles of the vegetation CEAA, including some existing transmission lines that parallel routing for the proposed Southline Project and might generate indirect cumulative impacts such as reductions in acreages of particular native plant communities in the region, shared watershed impacts, and point sources for exotic invasive weeds and wildfire that might spread via wind across greater landscapes to the CEAA. Potential cumulative impacts from those 28 projects are presented below.

Discrete portions of the proposed SunZia Transmission Line project are located within portions of the CEAA. The BLM preferred alternative in the SunZia FEIS route is parallel and adjacent to portions of the proposed Southline New Build Section from a point northeast of Deming, New Mexico, to a point west of Willcox, Arizona. Local alternatives DN1 and LD4 were developed to collocate or parallel the proposed SunZia project agency preferred alternative. Local alternative DN1 would parallel the proposed SunZia project for 42.5 miles, and LD4 would parallel SunZia for 50 miles. The proposed SunZia route diverges far away from the Upgrade Section. The proposed SunZia project would likely result in similar linear disturbance to native vegetation as the proposed Southline Project and therefore contribute to cumulative loss of native vegetation in the region of the New Build Section routes. Associated infrastructure for the proposed SunZia project would also add to cumulative fragmentation of native plant communities, but also along the same corridor as the proposed Southline project. In areas where the proposed SunZia project are parallel, overall new disturbance to vegetation would be reduced since construction activities for both projects would occur in the same areas. Seventeen SWReGAP vegetation community types along with developed agricultural lands will be impacted by the proposed SunZia project, but the primary vegetation types that would be cumulatively impacted are the widespread Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub, and Chihuahuan Sandy Plains Semi-Desert Grassland, Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub vegetation types. No rare or sensitive vegetation types would be cumulatively impacted by the proposed Southline and SunZia projects and given that the vegetation types that would be impacted are common and widespread, cumulative impacts to vegetation communities would be minor. Special status plant species that may be cumulatively impacted include dune pricklypear, Gregg night-blooming cereus, Parish’s alkali grass, Chihuahuan scurf pea, devilhorn hedgehog cactus, San Carlos wild-buckwheat, slender needle corycactus, Wilcox pincushion cactus, varied fishhook cactus, button cactus, playa spider plant, and needle-spined pineapple cactus. Noxious and other invasive exotic weeds are already present along this route including African rue, starthistle, tamarisk, hoary cress, Russian thistle, filaree, and mustards. Cumulative impacts from increased introduction and spread of noxious weeds and increased potential for wildfire are likely to be minor because of the shared route corridors through the greater landscapes.

The Sapphire Energy Algae Facility is a “green crude” demonstration farm and production project consisting of a 300-acre algae farm with the capacity to produce 1.5 million gallons of biofuel annually. The proposed algae facility is located inside the CEAA near the Proponent Alternative (New Build Section, subroute 1.2), near the town of Columbus. The project footprint for the algae farm would result in direct permanent disturbance to vegetation and therefore contribute to cumulative loss of native vegetation in the region. The farm and pond segments would also add to cumulative fragmentation of native plant communities. The Sapphire Energy Algae Facility is located along an abandoned railroad

line, in an area of existing agricultural disturbance. Much of the area to the west and north of the algae facility is already developed as agricultural fields. Existing SWReGAP vegetation communities in that area include about equal amounts of Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub, and Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, with smaller amounts of Apacherian-Chihuahuan Mesquite Upland Scrub. Those three vegetation community types are common and geographically widespread, and any specific cumulative impacts from the algae facility and proposed Southline Project will be minor to those widespread vegetation types. Special status species that may be present in the area include: dune pricklypear, Gregg night-blooming cereus, Parish's alkali grass, and the Chihuahua scurfpea. Since there already is considerable disturbance in the immediate area from agricultural fields to the west, noxious and other exotic invasive weeds are likely present in the area, so further increases in the spread of noxious weeds from the cumulative impacts of the algae facility and the proposed Southline Project would be minor. Possible noxious weeds in the area include African rue and starthistles, along with other exotic invasive weeds that are not classified as noxious, such as Russian thistle, kochia, filaree, and mustards.

The Bowie Power 345-kV Transmission Line would connect the proposed Bowie Power Plant, a natural gas–fired power plant planned for southeastern Arizona near the community of Bowie in Cochise County, and the proposed 345-kV Willow Substation located within 0.65 mile of route group 2 local alternatives, especially LD4. The primary SWReGAP vegetation community types that occur in the area are Apacherian-Chihuahuan Mesquite Upland Scrub, Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub, Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe. These are widespread vegetation types in the region. No rare or sensitive vegetation communities would be cumulatively impacted by the proposed Southline Project and the Bowie Transmission Line and given that the vegetation types that would be impacted are common and widespread, cumulative impacts to vegetation communities would be minor. Agricultural development is considerable just east of this area in the northwestern portion of the San Simon Valley. Special status plant species that may be affected include Gregg night-blooming cereus, devilhorn hedgehog cactus, San Carlos wild-buckwheat, slender needle corycactus, Wilcox pincushion cactus, varied fishhook cactus, button cactus, playa spider plant, and needle-spined pineapple cactus. Cumulative impacts on special status species would be potentially greater from both projects in the region. Noxious and other invasive exotic weeds including tamarisk, hoary cress, Russian thistle, filaree, and mustards occur in the area. Cumulative impacts from the potential introduction and spread of noxious weeds and increased potential for wildfire would be increased slightly in the area due to the additive disturbances from both transmission lines, and such cumulative impacts would be minor to moderate given the relatively small footprint of this proposed Project.

A network of existing transmission lines, natural gas pipelines, and railroads occurs throughout the Southline CEAA that will contribute to cumulative impacts to vegetation. However, most of those are located outside of the vegetation analysis area corridors, and as existing features will contribute minor impacts, or are located far enough away from the proposed Southline Project as to be negligible. Various other past, present, and future projects are located adjacent to the analysis area and may potentially impact vegetation within the Southline CEAA. These projects and their potential cumulative impacts are described in table 4.21-3.

In addition to identified projects, dispersed recreation, non-Project-related vehicle traffic, and other uses also impact vegetation throughout the ROW and adjacent areas. Domestic livestock grazing, for example, is a land use throughout the Project region, especially on BLM lands, that has historically impacted vegetation communities, and is presently and for the foreseeable future, an ongoing land use that would continue to affect vegetation. OHV activity often increases along ROW roads throughout a project region, especially closed and restored or unimproved access roads. OHV activity may further impact vegetation directly by crushing plants, and indirectly be creating soil disturbance and erosion, producing environments favorable for the colonization of noxious weeds and other invasive exotic plant species.

OHV use may also cause increased wildfire threats. Any additional impacts are expected to be minimal if activities are restricted to existing road surfaces. Private landowners also have wide latitude to conduct activities on their properties that would impact vegetation communities. These activities are, however, difficult to predict in time or space and their impacts are therefore not quantifiable.

Table 4.21-3 lists the projects that fall outside of the CEAA for vegetation resources but due to their location adjacent to the proposed Southline Project have the potential to cumulatively impact vegetation. See text above for the three projects that fall within the analysis area.

Table 4.21-3. Projects Outside the CEAA for Vegetation Resources

Project Name	Project Description	SWReGAP Vegetation Community Type	Cumulative Impacts
New Build Section, Past and Present Projects			
Existing distribution lines less than 230-kV	Doña Ana, Hidalgo, Luna, and Grant counties, New Mexico. 381 miles of disturbance Variable distance from Southline ROW Existing distribution lines less than 230-kV are anticipated to continue their current operation for the life of the project.	Variety of desert grassland and scrub communities	In collocated areas this project contributes to cumulative linear disturbance. Additional existing loss of vegetation, community fragmentation, introduction and spread of noxious species and potential loss of special status species. Significance of cumulative impacts varies depending on proximity of Southline to individual transmission lines and potential for shared corridor impacts versus new additional impact acreages imposed by Southline. Generally, these cumulative impacts will be relatively insignificant given that Southline does not impact any particularly sensitive or small localized plant communities in this region.
Existing transmission lines 230-kV and greater)	Doña Ana, Hidalgo, Luna, and Grant counties, New Mexico. 303 miles of disturbance Variable distance from Southline ROW Existing distribution lines greater than 230-kV are anticipated to continue their current operation for the life of the project.	Variety of desert grassland and scrub communities	In collocated areas this project contributes to cumulative linear disturbance. Additional existing loss of vegetation, community fragmentation, introduction and spread of noxious species and potential loss of special status species. Significance of cumulative impacts varies depending on proximity of Southline to individual transmission lines and potential for shared corridor impacts versus new additional impact acreages imposed by Southline. Generally, these cumulative impacts will be relatively insignificant given that Southline does not impact any particularly sensitive or small localized plant communities in this region.
Existing Gas Pipelines	Doña Ana, Hidalgo, Luna, and Grant counties, New Mexico. 1,245 miles of disturbance Variable distance from Southline ROW All existing pipelines are anticipated to continue their current operation for the life of the project.	Variety of desert grassland and scrub communities	In collocated areas this project contributes to cumulative linear disturbance. Additional existing loss of vegetation, community fragmentation, introduction and spread of noxious species and potential loss of special status species. Significance of cumulative impacts varies depending on proximity of Southline to individual pipelines and potential for shared corridor impacts versus new additional impact acreages imposed by Southline. Generally, these cumulative impacts will be relatively insignificant given that Southline does not impact any particularly sensitive or small localized plant communities in this region.

Table 4.21-3. Projects Outside the CEAA for Vegetation Resources (Continued)

Project Name	Project Description	SWReGAP Vegetation Community Type	Cumulative Impacts
Existing Railroads	Doña Ana, Hidalgo, Luna, and Grant counties, New Mexico. 428 miles of disturbance Variable distance from Southline ROW	Variety of desert grassland and scrub communities	In collocated areas this project contributes to cumulative linear disturbance. Additional existing loss of vegetation, community fragmentation, introduction and spread of noxious species and potential loss of special status species. Significance of cumulative impacts varies depending on proximity of Southline to individual rail lines and potential for shared corridor impacts versus new additional impact acreages imposed by Southline. Generally, these cumulative impacts will be relatively insignificant given that Southline does not impact any particularly sensitive or small localized plant communities in this region.
New Build Section, Reasonably Foreseeable Future Projects			
Potential Network Upgrades	El Paso County, Texas and Doña Ana County, New Mexico Variable distance from Southline ROW Upgrades within existing substations at Newman Substation southeast of Afton Substation and in Doña Ana Substation located on the northwest side of Las Cruces, New Mexico. Potential Network Upgrades would occur completely within existing substations fence lines. Existing access to the substations would be used for construction, operation, and maintenance of the Potential Network Upgrade project.	Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub Apacherian-Chihuahuan Mesquite Upland Scrub	Not likely to contribute to cumulative disturbance because activities will be limited to existing footprints and access routes.
New Solar Ventures/Solar Torx	Planned 300-MW photovoltaic solar power plant. Project would be less than a mile from subroute 1.1 in the New Build Section in Luna County, New Mexico. No schedule identified. Not currently under active development.	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	If developed could potentially directly impact vegetation under project footprint. Disturbance acreage unknown. Is in an area with minimal existing disturbance; however vegetation community types are common and geographically widespread. Would contribute to cumulative loss of vegetation communities across the region and potential impacts to special status species and noxious weeds. Significance of impacts unknown due to undetermined acreage.

Table 4.21-3. Projects Outside the CEAA for Vegetation Resources (Continued)

Project Name	Project Description	SWReGAP Vegetation Community Type	Cumulative Impacts
Solar Reserve, LLC-1	Planned 100-MW solar power plant. Project schedule unknown. Within 5 miles of Proponent Preferred Alternative and Proponent Alternative	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	If developed could potentially directly impact vegetation under project footprint. Disturbance could remove 5,296 acres of vegetation. Project is close to Lordsburg and within a mile of scattered residences so would impact an area of already preexisting disturbance. Would contribute to cumulative loss of vegetation communities across the region and potential impacts to special status species and noxious weeds. Due to acreage of disturbance impacts to vegetation communities and potential special status species could be moderate and long-term (over the life of the project), however the community types are common and geographically widespread, and the project is located in an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.
Lordsburg Mesa, Iberdrola Renewables	Planned 1,500-MW solar power plant, within 10.94 miles of the route group 2 Local Alternatives in the New Build Section. Project schedule unknown.	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub North American Warm Desert Wash Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	If developed could potentially directly impact vegetation under project footprint. Disturbance could remove 24,320 acres of vegetation. Project is in an undisturbed area but less than a half mile from a road. Would contribute to cumulative loss of vegetation communities across the region and potential impacts to special status species and noxious weeds. Due to acreage of disturbance, impacts to vegetation communities and potential special status species could be moderate and long-term (over the life of the project) however the community types are common and geographically widespread, and the project is located close to an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.
Planned Residential Development Projects New Mexico	Both the City of Deming and City of Lordsburg plan for amendments to their municipal zoning and planned-unit development ordinances are anticipated to expand their municipal boundaries to private and State lands in order to facilitate planned residential development. Variable distance from Southline ROW	Locations unknown. Impacts likely to various desert grassland scrub communities	Additional expansion of residential and commercial development into undisturbed land would further directly impact vegetation communities and contribute to cumulative loss of native species and impacts to special status species and noxious weeds. Since the location and extent of development is unknown, exact impacts cannot be assessed at this time.
Safford Solar Energy	Planned 250-MW solar project adjacent to subroute 2.2 in the New Build Section. Project currently at a standstill due to lack of power transmission connection agreement.	Apacherian-Chihuahuan Mesquite Upland Scrub Chihuahuan Mixed Salt Desert Scrub Developed, Medium - High Intensity	If developed could potentially directly impact vegetation under project footprint. Disturbance could remove 22,891 acres of vegetation. Is on the edge of a residential area of San Simon and within an area of existing disturbance. Is close to existing pipeline, transmission line routes and other rural development. Would contribute to cumulative loss of vegetation communities across the region and potential impacts to special status species and noxious weeds. Due to acreage of disturbance, impacts to vegetation communities and potential special status species could be moderate and long-term (over the life of the project) however the community types are common and geographically widespread, and the project is located close to an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.

Table 4.21-3. Projects Outside the CEAA for Vegetation Resources (Continued)

Project Name	Project Description	SWReGAP Vegetation Community Type	Cumulative Impacts
Bowie Power Station	Planned 1,000-MW natural gas-fired power station within 0.89 mile of subroute 2.2 in the New Build Section	Agriculture Apacherian-Chihuahuan Mesquite Upland Scrub Chihuahuan Mixed Salt Desert Scrub	If developed could potentially directly impact vegetation under project footprint. Actual disturbance acreage is unknown. Is close to existing pipeline, transmission line routes and other urban development. Would contribute to cumulative loss of vegetation communities across the region and potential impacts to special status species and noxious weeds. Significance of impacts unknown due to undetermined acreage.
New Build Section, Future Projects			
BrightSource Energy	Planned solar project. including 6,574 acres in Hidalgo County and 7,520 acres in Luna County. Exact location unknown.	Variety of desert grassland and scrub communities	If developed could potentially directly impact vegetation under project footprint. Disturbance could remove 14,100 acres of vegetation. Would contribute to cumulative loss of vegetation communities across the region and potential impacts to special status species and noxious weeds. Exact location of disturbance is unknown therefore significance of impacts to vegetation cannot be assessed at this time.
NextLight Renewable Power	Planned solar project including 2,722 acres in Luna County and 3,714 acres in Hidalgo County. Exact location unknown.	Variety of desert grassland and scrub communities	If developed could potentially directly impact vegetation under project footprint. Disturbance could remove 7,301 acres of vegetation. Would contribute to cumulative loss of vegetation communities across the region and potential impacts to special status species and noxious weeds. Exact location of disturbance is unknown therefore significance of impacts to vegetation cannot be assessed at this time.
Upgrade Section, Past and Present Projects			
Existing distribution lines less than 230-kV	Cochise, Pima, and Pinal counties, Arizona 394 miles of disturbance Existing distribution lines less than 230-kV are anticipated to continue their current operation for the life of the project. Variable distance from Southline ROW	Variety of desert grassland and scrub communities	In collocated areas this project contributes to cumulative linear disturbance. Additional existing loss of vegetation, community fragmentation, introduction and spread of noxious species and potential loss of special status species. Significance of cumulative impacts varies depending on proximity of Southline to individual transmission lines and potential for shared corridor impacts versus new additional impact acreages imposed by Southline. Generally, these cumulative impacts will be relatively insignificant given that Southline does not impact any particularly sensitive or small localized plant communities in this region.
Existing transmission lines (230-kV and greater)	Cochise, Pima, and Pinal counties, Arizona 200 miles of disturbance Existing distribution lines greater than 230-kV are anticipated to continue their current operation for the life of the project. Variable distance from Southline ROW	Variety of desert grassland and scrub communities	In collocated areas this project contributes to cumulative linear disturbance. Additional existing loss of vegetation, community fragmentation, introduction and spread of noxious species and potential loss of special status species. Significance of cumulative impacts varies depending on proximity of Southline to individual transmission lines and potential for shared corridor impacts versus new additional impact acreages imposed by Southline. Generally, these cumulative impacts will be relatively insignificant given that Southline does not impact any particularly sensitive or small localized plant communities in this region.

Table 4.21-3. Projects Outside the CEAA for Vegetation Resources (Continued)

Project Name	Project Description	SWReGAP Vegetation Community Type	Cumulative Impacts
Existing Gas Pipelines	Cochise, Pima, and Pinal counties, Arizona 222 miles of disturbance Existing pipelines are anticipated to continue their current operation for the life of the project. Variable distance from Southline ROW	Variety of desert grassland and scrub communities	In collocated areas this project contributes to cumulative linear disturbance. Additional existing loss of vegetation, community fragmentation, introduction and spread of noxious species and potential loss of special status species. Significance of cumulative impacts varies depending on proximity of Southline to individual pipelines and potential for shared corridor impacts versus new additional impact acreages imposed by Southline. Generally, these cumulative impacts will be relatively insignificant given that Southline does not impact any particularly sensitive or small localized plant communities in this region.
Existing Railroads	Cochise, Pima, and Pinal counties, Arizona 93 miles of disturbance Variable distance from Southline ROW	Variety of desert grassland scrub communities	In collocated areas this project contributes to cumulative linear disturbance. Additional existing loss of vegetation, community fragmentation, introduction and spread of noxious species and potential loss of special status species. Significance of cumulative impacts varies depending on proximity of Southline to individual rail lines and potential for shared corridor impacts versus new additional impact acreages imposed by Southline. Generally, these cumulative impacts will be relatively insignificant given that Southline does not impact any particularly sensitive or small localized plant communities in this region.
Buffalo Soldier Electronic Testing Range (BSETR)	A Fort Huachuca facility that is the principal Army Test Center for testing of command, control, communications, computer, and intelligence equipment and systems in real, virtual, and constructive environments. 1.6 million acres of disturbance Segments of the proposed Southline Project (subroute 3.1–segments U1a, U1b, and U2 requiring upgrade or local alternative H) cross the BSETR. Variable distance from Southline ROW	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe Apacherian-Chihuahuan Mesquite Upland Scrub Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub Agriculture Developed, Medium - High Intensity Madrean Encinal Madrean Pine-Oak Forest and Woodland	The exact locations of vegetation disturbance related to BSETR operations are unknown so impact analysis cannot be completed at this time. Cumulative impacts of the Southline project within the BSETR however would contribute linear disturbance impacts to vegetation communities, increased fragmentation of native species, and impacts to special status species and noxious species. The dominant vegetation communities within the BSETR area and the Southline segments are common and geographically widespread therefore any cumulative impacts to vegetation communities resulting from construction and operation of the Southline project are expected to be negligible/minimal and short-term.

Table 4.21-3. Projects Outside the CEAA for Vegetation Resources (Continued)

Project Name	Project Description	SWReGAP Vegetation Community Type	Cumulative Impacts
Upgrade Section, Reasonably Foreseeable Future Projects			
UA Tech Park Thermal Storage/Bell Independent Power Corporation	Planned 5-MW CSP project utilizing parabolic trough technology located approximately 1 mile from segment U4 of subroute 4.1 within the Upgrade Section.	Sonoran Paloverde-Mixed Cacti Desert Scrub Developed, Open Space - Low Intensity Developed, Medium - High Intensity Sonora-Mojave Creosotebush-White Bursage Desert Scrub Sonoran Mid-Elevation Desert Scrub	If developed could potentially directly impact 200 acres of vegetation. The project is located in an area of heavy commercial/industrial disturbance. Would contribute to cumulative loss of vegetation communities across the region and potential impacts to special status species and noxious weeds. Impacts to vegetation communities and potential special status species could be long-term (over the life of the project) however the community types are common and geographically widespread, and the disturbance acreage relatively small; furthermore the project is located close to an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.
Silverbell Road Improvements	Planned road improvement project by the City of Tucson to widen and install a median to the existing road that would be intersected by segment U3i of subroute 4.1 within the Upgrade Section.	Sonoran Paloverde-Mixed Cacti Desert Scrub Developed, Open Space - Low Intensity	Would create 8 miles of linear disturbance in an already disturbed area of existing roadway and residential and industrial urban development. Would result in negligible cumulative loss of vegetation communities and special status species in the region Impacts to vegetation communities and potential special status species could be long-term (over the life of the project) however the community types are common and geographically widespread, and the disturbance acreage relatively small; furthermore the project is located close to an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.
Fotowatio Renewable Ventures	Planned 25-MW solar photovoltaic energy facility located approximately 2 miles west of the proposed route in the Upgrade Section.	Sonoran Paloverde-Mixed Cacti Desert Scrub Agriculture Sonora-Mojave Creosotebush-White Bursage Desert Scrub North American Warm Desert Riparian Mesquite Bosque Developed, Open Space - Low Intensity Barren Lands, Non-specific	If developed could potentially directly impact vegetation under project footprint. Disturbance could remove 305 acres of vegetation. Project is in an area close to existing disturbance, residential industrial, and agricultural lands. Would result in negligible cumulative loss of vegetation communities and special status species in the region. Impacts to vegetation communities and potential special status species could be long-term (over the life of the project) however the community types are common and geographically widespread, and the disturbance acreage relatively small; furthermore the project is located close to an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.
Avra Valley Solar Project/NRG Solar	Planned 25-MW solar photovoltaic energy facility to be located approximately 3.6 miles west of segment U3j of subroute 4.1 within the Upgrade Section.	Sonoran Paloverde-Mixed Cacti Desert Scrub Agriculture Sonora-Mojave Creosotebush-White Bursage Desert Scrub North American Warm Desert Riparian Mesquite Bosque Developed, Open Space - Low Intensity Barren Lands, Non-specific	If developed could potentially directly impact vegetation under project footprint. Disturbance could remove 300 acres of vegetation. Project is in an area close to existing disturbance, residential, industrial, and agricultural lands. Would result in negligible cumulative loss of vegetation communities and special status species in the region. Impacts to vegetation communities and potential special status species could be long-term (over the life of the project) however the community types are common and geographically widespread, and the disturbance acreage relatively small; furthermore the project is located close to an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.

Table 4.21-3. Projects Outside the CEAA for Vegetation Resources (Continued)

Project Name	Project Description	SWReGAP Vegetation Community Type	Cumulative Impacts
Pinal Central to Tortolita 500-kV Transmission Line	Planned single-circuit 500-kV transmission line; 40 miles of new line between Pinal Central substation and Tortolita substation. The Proponent Preferred (subroute 4.1) interconnects at Tortolita substation.	Sonoran Paloverde-Mixed Cacti Desert Scrub Agriculture Sonora-Mojave Creosotebush-White Bursage Desert Scrub North American Warm Desert Riparian Mesquite Bosque Developed, Open Space - Low Intensity Barren Lands, Non-specific	If developed could potentially result in 40 linear miles of disturbance. Project is collocated with existing transmission lines along some of its length. Would contribute to cumulative loss and fragmentation of vegetation communities across the region and impacts to special status species and noxious species. The vegetation communities impacted however are common and geographically widespread, and the project is located close to an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.
Vail-to-Valencia 115-kV to 137-kV Upgrade Transmission Line	38-kV link between Tucson Electric Power's Vail substation and UES' Valencia substation in Nogales. The Proponent Preferred (subroute 4.1) would interconnect to the Vail substation and run west and south to the Nogales substation, ranging from less than 200 feet near the Vail substation to approximately 45 miles at the Valencia substation in Nogales.	Sonoran Paloverde-Mixed Cacti Desert Scrub Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub Agriculture Sonora-Mojave Creosotebush-White Bursage Desert Scrub North American Warm Desert Riparian Mesquite Bosque Developed, Open Space - Low Intensity Barren Lands, Non-specific	If developed could potentially result in 45 linear miles of disturbance. Project is collocated with existing transmission lines along some of its length. Would contribute to cumulative loss and fragmentation of vegetation communities across the region and impacts to special status species and noxious species. The vegetation communities impacted however are common and geographically widespread, and the project is located close to an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.
Upgrade Section, Future Projects			
Tucson-Apache Pole Replacement Project	Western is proposing to conduct pole replacement, access road improvements, and vegetation management along portions of their Tucson to Apache 115-kV transmission line. 149 wood H-frame structures have been selected for in-kind replacement and vegetation management is proposed near the San Pedro River in Benson, Arizona. All project-related access will be along existing access roads, however about 20 non-contiguous miles of access road will require improvement.	Sonoran Paloverde-Mixed Cacti Desert Scrub Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub Agriculture Sonora-Mojave Creosotebush-White Bursage Desert Scrub North American Warm Desert Riparian Mesquite Bosque Developed, Open Space - Low Intensity Barren Lands, Non-specific	If implemented could potentially result in 80 linear miles of disturbance within a preexisting ROW. The greatest impacts would be related to upgrade of 20 miles of access roads. Would contribute to cumulative loss and fragmentation of vegetation communities across the region and impacts to special status species and noxious species. The vegetation communities impacted however are common and geographically widespread, and the project is located within an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.

Table 4.21-3. Projects Outside the CEAA for Vegetation Resources (Continued)

Project Name	Project Description	SWReGAP Vegetation Community Type	Cumulative Impacts
Abandonment and Removal of existing Western Line Saguaro-Tucson and Tucson-Apache	If the proposed Southline Project were to be approved the existing s transmission line in the Western ROW would be abandoned and removed once the new Southline transmission line is complete.	Sonoran Paloverde-Mixed Cacti Desert Scrub Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub Agriculture Sonora-Mojave Creosotebush-White Bursage Desert Scrub North American Warm Desert Riparian Mesquite Bosque Developed, Open Space - Low Intensity Barren Lands, Non-specific	If implemented could potentially result in 120 linear miles of disturbance within a preexisting ROW. Would contribute to cumulative loss and fragmentation of vegetation communities across the region and impacts to special status species and noxious species. The vegetation communities impacted however are common and geographically widespread, and the project is located within an area of existing disturbance and therefore cumulative impacts are unlikely to be significant.
Planned Residential Development Projects Arizona	The City of Willcox, Benson, Vail, Tucson, and Marana plan for amendments to their municipal zoning and planned-unit development ordinances are anticipated to expand their municipal boundaries to private and State lands in order to facilitate planned residential development.	Locations unknown. Impacts likely to various desert grassland scrub communities.	Additional expansion of residential and commercial development into undisturbed land would further directly impact vegetation communities and contribute to cumulative loss of native species and impacts to special status species and noxious weeds. Since the location and extent of development is unknown, exact impacts cannot be assessed at this time.

Cumulative effects as a result of past, present, and reasonably foreseeable future actions (including the proposed Project) would be long-term removal and degradation of natural vegetative communities.

Direct cumulative effects to vegetation resources would be additive and proportional to the amount of ground disturbance for each individual project, determined by the width of the construction zone for the linear projects vs. the width of the permanent ROW, the vegetative associations and special status species present, and the extent of permanent facilities associated with each project. In addition, the quality of the vegetation resource in neighboring areas would be indirectly impacted by surface disturbance, dust, wind dispersal of exotic invasive weed seeds and wildfire, and other off-site intrusions. A distinction can be made between the cumulative temporary loss of vegetation that is removed over the active life of project activities but can be reclaimed after project activities have been completed, and permanent loss of vegetation that remains indefinitely at the end of project activities and after the project sites are closed. Both direct and indirect, and temporary and permanent, cumulative impacts result from the existing and reasonably foreseeable projects identified. Projects that impact large acreages of landscape not already disturbed, such as solar array projects that will result in thousands of acres of new impacts, are likely to contribute to cumulative impacts more so than linear transmission or pipeline projects that may share already disturbed acreages or other indirect impacts with the proposed Southline Project.

CONSTRUCTION

Construction impacts are those impacts associated with initial ground disturbance or upgrade activities and access for construction vehicles.

Vegetation Communities

Native vegetation communities predominate within the analysis area and the foreseeable future actions identified within the analysis area. Many areas are already disturbed by agriculture, grazing, transmission lines, pipelines, and a variety of roads. Domestic livestock grazing has historically changed the composition of most plant communities throughout the region, and the impacts of livestock grazing continue currently and for the foreseeable future. The impacts of domestic livestock grazing are particularly evident at the plant community level, where changes in species composition result. Historically, poorly managed livestock grazing changed many desert grassland areas of southern New Mexico and southeastern Arizona to shrub-dominated areas with little and/or different perennial grass species.

The majority of the vegetation communities are composed of native shrub and grassland with variable recovery times after disturbance. Direct loss of vegetation cover through ground-disturbing construction activities is expected, and infrastructure, including transmission lines, substations, access roads, etc., associated with the proposed Project, as well as other foreseeable projects within the analysis area, is likely to cause fragmentation of the vegetation communities. Future developments in the region could also contribute to overall habitat loss and fragmentation of vegetation communities and habitats, although this is mitigated through locating actions within previously disturbed areas. Most proposed actions usually avoid highly sensitive habitats in order to minimize impacts to vegetation communities that would take long periods to recover or that comprise rare or sensitive plant species.

Indirect cumulative effects associated with the proposed Project and foreseeable future actions include change in vegetation in disturbed areas from native to non-native (and potentially noxious) species. Each additional ground disturbance in the area provides increased opportunity for introduction and invasion by noxious weeds beyond the initial disturbance area.

Special Status Species

As discussed in Chapter 3, “Affected Environment,” multiple species of special status plants were observed or predicted to occur within the analysis area, including a large number of FWS special status species and BLM sensitive species. A cumulative, incremental loss of habitat would result for both sensitive plant species and common plants which occur in the areas disturbed by one or more of the identified projects in the cumulative effects analysis area. It is expected that both the proposed Project and identified cumulative effects projects within or adjacent to the Southline analysis area and/or ROW would obtain detailed information about the presence, if any, of special status species prior to construction, and would take appropriate measures to avoid or minimize adverse effects on those species. The BLM is likely to require that any foreseeable actions within or adjacent to the Southline analysis area and/or ROW carry out similar surveys for special status species. If identified, special status species would be, wherever possible, avoided on Federal lands that are subject to BLM ROW grant stipulations. Because of the high density of projects in the region, however, and in some cases the approval of more than one project within a single ROW, total avoidance of special status species may not be possible. As a result of overlap with the Project, some foreseeable actions (the proposed SunZia project, Sapphire Energy Algae Facility, Safford Solar Energy Center, and the Silverbell Road Improvements) might cumulatively impact some special status species, depending on the coordination of BMPs across all projects. Ideally, all special status species impacts would be avoided or mitigated.

Individual projects are required to implement measures to mitigate impacts to special status species, which reduces the potential for both individual and cumulative impacts to vegetation. Because of the implementation of Project-specific mitigation measures and requirements for restoration and remediation on a Project-specific basis, cumulative effects associated with loss of vegetation are expected to be

minimized. The cumulative effects of the identified cumulative projects and uses on vegetation resources would be short-term and minor, and therefore below the level of significance.

Other impacts to special status plant species include the direct and indirect effects of domestic livestock grazing and OHV use. Livestock might directly trample or consume such plants, or indirectly alter the habitats by increasing noxious weeds and other invasive exotic plant species, increasing plant to plant competition for resources and increasing the potential for wildfire. OHVs also may crush individual plants and alter habitats to favor noxious weeds and other invasive exotic plant species, and increase the potential for wildfire.

Noxious Weeds

Ground disturbance–associated actions analyzed in the CEAA could also increase the potential for the introduction and spread of noxious weeds. It is assumed the potential for establishment of invasive plants would be a negative cumulative effect on reestablishment of native communities following construction. The extent one or more invasive plant species could negatively affect reestablishment of native vegetation is speculative; adherence of specific projects to control measures identified in invasive plant management plans (or equivalent) and measures identified by the BLM would minimize the introduction and spread of noxious weeds during and following construction. Domestic livestock grazing and OHV activities both create soil and vegetation disturbance that favor noxious weeds and other invasive exotic plant species. Adherence to PPMs for all cumulative actions in the analysis area that mitigate the introduction and spread of noxious species, would result in only short-term and minor cumulative impacts to noxious weeds.

Operation and Maintenance

Impacts associated with operation and maintenance include the continued existence of facilities on the landscape, the associated maintenance activities, and the presence of access roads. The location of multiple projects in the same ROW or analysis area minimizes impacts to vegetation, since multiple projects can be served by the same access routes and the direct and indirect effects of disturbance are contained within a smaller area.

Vegetation Communities

Direct impacts associated with operation and maintenance of the proposed Project and other foreseeable actions in and adjacent to the analysis area are primarily those that relate to fragmentation of plant communities. Since large portions of the proposed Project are collocated with existing projects or areas of planned disturbance, the overall cumulative impact is expected to be lessened and would result in only short-term and minor impacts to vegetation communities.

Special Status Species

Direct impacts associated with operation and maintenance of the proposed Project and other foreseeable actions in and adjacent to the analysis area are primarily those that relate to fragmentation of vegetative communities that contain special status plant species.

Individual projects are required to implement measures to mitigate impacts to special status species, which reduces the potential for both individual and cumulative impacts to vegetation. Because of the implementation of Project-specific mitigation measures and requirements for restoration and remediation on a Project-specific basis, cumulative effects associated with loss of vegetation or fragmentation are expected to be minimized. The overall cumulative effects of the identified cumulative projects and uses on special status species would therefore be short-term and minor and below the level of significance.

Noxious Weeds

The operation/maintenance period would include maintenance activities that could contribute to the ongoing spread of noxious weeds from outside of the analysis area and between the disturbance areas of other foreseeable actions. Adherence of specific projects to control measures identified in invasive plant management plans (or equivalent) and measures identified by the BLM would minimize the introduction and spread of noxious weeds during Project operation and maintenance. The overall cumulative effects of the identified cumulative projects and uses on noxious weed species would therefore be short-term and minor and below the level of significance.

Summary

Development of the proposed Project, in conjunction with other foreseeable future projects, would contribute to the ongoing fragmentation and loss of natural habitats in the Southwest. All Project subroute alternatives, including the proposed Project, would have similar cumulative impacts. Cumulative impacts would be reduced in most cases when linear utilities, including the proposed Project, are collocated. Other types of future developments, particularly urban expansion and large-scale solar or wind energy development which have significant disturbance footprints, are expected to contribute the greatest loss of natural habitat in the region. Overall the past, present, and reasonably foreseeable future actions in the proposed Southline Project footprint are expected to lead to short-term and only minor cumulative impacts.

Cumulative disturbance to special status plant populations from multiple projects within the Project footprint would be minimized through surveys and design and engineering to avoid individuals and populations. BMPs and PPMs, including limited surface travel, erosion controls, invasive species management, etc., would likely be required for all foreseeable transmission lines and other foreseeable projects in order to minimize and prevent indirect impacts to these species. For those areas where avoidance is difficult, loss of some sensitive plants is inevitable. The exact location and extent of this loss cannot be ascertained until ROW locations have been determined.

WILDLIFE CUMULATIVE IMPACTS

The geographic analysis area for cumulative impacts on wildlife resources could extend to the entire range of any wildlife species population that could be impacted by the proposed Project. The range of some of the migratory bird species occurs from North America to South America. As the area of potential cumulative impacts could cover such an enormous area, it is necessary to limit discussion of past, present, and reasonably foreseeable future actions to a smaller area. For wildlife resources the CEAA described in section 4.21.2 was utilized as the area of potential cumulative effects. The temporal scope is for the life of the proposed Project, which would be 50 years. This CEAA represents a reasonable area in which past, present, and reasonably foreseeable future projects when assessed in combination with the proposed Project would impact wildlife resources and allow for meaningful impact analysis. Cumulative actions discussed are based on the existing conditions of wildlife resources described in chapter 3 and the relevant projects presented in table 4.21-1.

Construction

Past actions in the CEAA have had direct and indirect effects on wildlife resources. Historic livestock grazing, proliferation of roadways and developments, electrical transmission lines, pipelines, energy generation projects, water impoundment projects, groundwater pumping, mining, degradation of water quality, conversion of land for agricultural uses, and the introduction and spread of non-native plant and wildlife species have affected wildlife resources. The effects of these past actions include habitat loss, fragmentation, and degradation; a decrease in the numbers and range of some species; increased

mortality; decreased reproductive success; and decreased genetic interchange between isolated populations. Cumulative impacts vary depending on the species considered.

Historic grazing has in some areas led to habitat changes including the introduction and spread of non-native plant species. The presence of non-native plant species has modified the historic fire regime, especially in desert habitats. Fires in areas dominated by non-native species can be more frequent and more intense and lead to long-term and permanent changes to wildlife habitat. This is especially important in areas of desertscrub where the native vegetation is not adapted to fire and fires create a positive feedback loop where non-native plant species burn more often and at a higher intensity than the native plants. Post-fire, the non-native vegetation further increases in burned areas thereby leading to more frequent and intense fires. This process can lead to the conversion of native habitats to non-native grasslands and other vegetation types that do not support the same numbers or assemblages of wildlife species as the native vegetation.

Roadways, development, pipelines, electrical transmission lines, mining, energy generation projects, and conversion of land for agriculture have all contributed to wildlife habitat loss, fragmentation, and degradation and have created barriers to species movement and genetic interchange for some species.

Groundwater pumping and water impoundments have modified and degraded large portions of the aquatic and riparian habitats in the region. Water impoundment has changed the timing, frequency, and intensity of floods which decreases native vegetation recruitment and favors non-native species establishment and spread. Groundwater pumping has reduced or eliminated flows in many aquatic and riparian habitats which led to the loss, fragmentation, and degradation of these habitats.

Other past actions that have contributed to the protection of wildlife and special status species and their habitats have also occurred; these include the establishment of National Monuments, National Parks, Wilderness Areas, National Conservation Areas, designation of critical habitat, and other preserves, parks, and special management areas.

Impacts on wildlife and special status wildlife species from present actions would be similar to those described for past actions in the CEAA. Ongoing actions including livestock grazing, roadways and developments, electrical transmission lines, energy generation projects, mining projects, water impoundments, groundwater pumping, and the introduction and spread of non-native plant and wildlife species would contribute to impacts. Impacts from present actions would be similar to those described for past actions.

In general, impacts on wildlife and special status species from construction of the proposed Project would incrementally contribute to habitat loss, degradation, and fragmentation as well as increased mortality for some species. Increased mortality during construction would be greatest for burrowing and non-mobile species. As stated in Section 4.8.2 “Wildlife”, overall impacts from construction of the proposed Project would be minor/negligible for some species and moderate for others. Habitat disturbance would be a long-term impact with construction-related noise and potential for wildlife mortality from construction equipment would be short-term. Species that utilize riparian and aquatic habitats would experience minor/negligible short-term impacts from the proposed Project, since no ground disturbance would occur in those areas. Species that utilize terrestrial habitats would experience moderate, adverse impact levels from habitat loss and direct mortality.

Reasonably foreseeable and future projects in the CEAA when combined with the proposed Project construction would have incremental, cumulative impacts to wildlife resources. Projects that would contribute to cumulative impacts would include the proposed SunZia Transmission Line Project; other electrical transmission projects; solar, wind, biofuel, and geothermal energy generation projects; pipelines; substation construction and expansions; planned residential developments; Rosemont Copper

Mine; and the proposed Organ Mountains Desert Peaks National Monument (see table 4.21-1). With the exception of the proposed Organ Mountains Desert Peaks National Monument, which would protect wildlife resources on approximately 54,800 acres, the other reasonably foreseeable and future projects would adversely impact wildlife resources.

Planned roadways, developments, pipelines, electrical transmission lines, mining, and energy generation projects will all continue to contribute to wildlife habitat loss, fragmentation, and degradation and create barriers to species movement and genetic interchange for some species.

Future projects, including the proposed SunZia project, would add an additional 789 miles of electrical transmission lines plus additional lines for the High Plains Express Transmission Project. An additional 220 acres for substation expansions would be disturbed.

Within the CEAA, an additional 60 miles of pipelines would occur in the future. Approximately 4,285 acres of habitat would be impacted by the Rosemont Copper Mine. Residential developments would impact an unknown number of acres.

Future energy generation projects for which approximate impacts were known total approximately 59,522 acres within the CEAA. Additional projects of unknown size would increase the number of acres impacted.

The reasonably foreseeable and future projects above would contribute to impacts on wildlife resources. These impacts would include habitat loss, degradation, and fragmentation; increased mortality for some wildlife species; increased non-native plant introduction and spread; and increased noise/vibration levels during construction activities. The magnitude of areas to be impacted is estimated in table 4.21-1 and would be most intensive if the projects were to occur in previously undeveloped areas. As future development occurs the CEAA would have reduced quality and quantity of wildlife resources. Habitat would be lost to ground-disturbing activities and would be fragmented by additional linear features. Co-location of facilities could reduce the overall habitat impacts in the CEAA.

Depending on the wildlife species, the interaction of the combined effects (past, present, and reasonably foreseeable future actions) for construction of the proposed Project would generally result in major, adverse cumulative impacts. Those species that are habitat generalists and are readily adaptable to human activities could see beneficial cumulative effects. Those species with limited ranges, specialized habitats, and especially species that utilize riparian and aquatic habitats could experience major, adverse, long-term cumulative impacts.

During construction, the interaction of the proposed Project and other actions within the CEAA would be a major, long-term cumulative effect on wildlife resources and wildlife habitat.

Operation and Maintenance

The cumulative impacts on wildlife resources from construction would be greatly reduced during the operation and maintenance of the proposed Project. The cumulative effects of operation and maintenance would be minor/negligible and long-term.

Ongoing operation of existing and future projects would continue to impact wildlife resources. The presence of linear features such as roads and railways would continue to fragment habitat, provide barriers to movement and genetic interchange. Wildlife species attempting to cross these linear features would be subject to the potential for mortality from vehicle/train strikes. Migratory birds would continue to be impacted by existing transmission lines due to birds striking lines or towers/poles.

Existing and future developments and energy generation projects would continue to fragment habitat and provide barriers to wildlife species movement and genetic interchange. During operation the interaction of the proposed Project and other actions within the CEAA would have a moderate, long-term impact on wildlife resources.

Summary

Development of the proposed Project, in conjunction with other foreseeable future projects, would contribute incrementally to ongoing wildlife habitat loss, degradation, and fragmentation; increased mortality for some wildlife species; increased non-native plant introduction and spread; and increased noise/vibration levels during construction activities. Impacts from each of the Project alternatives would have similar cumulative impacts. Proponent-committed measures and additional mitigation measures would avoid or minimize impacts to wildlife resources. Cumulative impacts would be reduced in cases when linear facilities are collocated. Other future developments would add an additional 789 miles of electrical transmission lines, 60 additional miles of pipelines, 220 acres of substation expansions, and 59,522 acres of disturbance for electrical generation projects. Future projects would also protect wildlife habitat on 54,800 acres from the designation of the Organ Mountains Desert Peaks National Monument.

Cumulative impacts on wildlife resources would be minimized through surveys, design, and engineering as well as mitigation measures. These measures would likely be required for most future projects. In areas where avoidance or mitigation is difficult the loss of some individuals of wildlife species as well as habitat would occur. Measures to minimize impacts would reduce impacts on wildlife resources. However, the cumulative impact of the construction and operation of the proposed Project would be moderate to major and long-term.

Paleontological Resources

The geographic analysis area for cumulative impacts to paleontological resources is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. This CEAA for analyzing potential cumulative impacts to paleontological resources represents a reasonable region in which the same or similar geological formations as those within the Project right-of-way, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented. Cumulative actions discussed herein are based on the existing conditions of the paleontological resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

Types of reasonably foreseeable future projects include transmission lines, an alternative energy generation facility, natural gas power plants, a natural gas pipeline, substations, a copper mine, and road improvements. Cumulative impacts to paleontological resources are only expected for projects or phases of projects with ground disturbance where fossils are present. If no ground disturbance is expected or fossils are present, there would be no direct cumulative effects. Mitigation measures appropriate to each Project would reduce or minimize impacts to paleontological resources and therefore would also minimize cumulative effects.

CONSTRUCTION

The past uses of the CEAA have had no direct or indirect effects on paleontological resources. Construction activities associated with the past uses of the CEAA have not encountered any important fossils and no known fossils localities have been recorded within the CEAA.

For the proposed Project, no cumulative effects on paleontological resources due to construction are expected in the Upgrade Section because almost no formations with the potential to be fossiliferous are to

be impacted by the proposed Project. As discussed in chapter 3, the majority of geological formations in the CEAA are of low or very low potential for paleontological resources (PFYC 1 or 2). In the CEAA for the New Build Section, most of the geological formations are classified as very low to low potential (PFYC 1 or 2) with some moderate or unknown (PFYC 3) and high (PFYC 4) potential. Moderate to major direct impacts and minor indirect impacts to paleontological resources may occur during construction of the proposed Project in the New Build Section if fossils are present in those geological formations with the potential to be fossiliferous which are crossed by the proposed Project. Direct effects may be negative, such as the loss of important fossils, or positive, such as the inadvertent discovery of scientifically important fossils; indirect negative impacts would be due to loss of access to scientifically important fossils if present during construction. However, negative effects will be mitigated according to applicable regulations and the POD, so no cumulative effects are anticipated from construction of the proposed Project.

Future development in Arizona within the CEAA is not expected to impact paleontological resources because of the lack of potentially fossiliferous geological formations in the CEAA. In New Mexico, all but one reasonably foreseeable project with a known location is planned for areas with very low potential for paleontological resources (PFYC 1). The New Ventures/Solar Torx solar power plant, Solar Reserve, LLC, Sapphire Energy Algae Facility, Lordsburg Mesa Iberdrola Renewables project, and the Lightning Dock Geothermal Power Plant project are all located in areas with a PFYC of 1 and are not expected to contribute to cumulative effects. The potential network upgrades and New Mexico residential projects are also not expected to contribute to cumulative effects.

The proposed SunZia Transmission Line project would consist of two new 500-kV transmission lines running from central New Mexico to central Arizona. In New Mexico, the proposed SunZia project would cross some areas with high potential for paleontological resources (PFYC 4) and therefore could contribute to cumulative effects if those geological formations are fossiliferous. Like the proposed Project, if project construction results in adverse effects to paleontological resources, the adverse effects would be mitigated and would not contribute to cumulative effects.

OPERATION AND MAINTENANCE

Operation and maintenance associated with past and present uses of the CEAA have had no direct or indirect effects on paleontological resources because no known fossils localities have been recorded in the CEAA. No direct or indirect impacts are expected from the operation and maintenance of the proposed Project, as little ground disturbance is anticipated and areas with the potential for importance fossils can be avoided. However, if maintenance could result in adverse effects to paleontological resources, adverse effects would be mitigated, so no contribution to cumulative effects is expected. As with construction, future projects in Arizona are not expected to contribute to cumulative effects to paleontological resources because geological formations in the Arizona portion of the CEAA generally have a very low or low potential for paleontological resources (PFYC 1 or 2). In New Mexico, only the proposed SunZia project has the potential to affect paleontological resources but the operation and maintenance of the line is not expected to contribute to cumulative effects for the same reasons the proposed Project is not expected to contribute.

Visual Resources

The geographic analysis area for cumulative impacts to visual resources is a 10-mile corridor centered on the subroute or segment centerline, the same analysis area discussed in chapter 4. The temporal scope is for the life of the Project, which is 50 years. Cumulative visual effects would result from the incremental modification of scenic quality associated with the existing landscape as described in chapter 3and disruptions to sensitive viewer viewsheds and KOPs as a result of the construction, operation, and

maintenance of the Project in combination with other past, present, and reasonably foreseeable future actions presented in table 4.21-1.

NEW BUILD SECTION – ROUTE GROUPS 1 AND 2

Past and present uses in the CEAA for visual resources have had a direct effect on the landscape and sensitive viewers as described in chapters 3 and 4. Transmission lines and structures, gas pipelines, residential and industrial developments, dirt surface roads and paved roads have all contributed to changes to the existing scenic quality and landscape in the area. Reasonably foreseeable future developments in the proposed Project vicinity also have the potential to result in cumulative effects on visual resources. Reasonably foreseeable future actions that are likely to have direct cumulative effects to visual resources along the 242.4 miles of route groups 1 and 2 of the New Build Section of the Project include development of new transmission lines and substations, development of renewable energy generation facilities, a natural gas energy generation facility, and new substation development. These developments, when added to the direct effects of the proposed Project, would incrementally convert the scenic quality of the natural landscapes into a more developed and industrialized landscape that would adversely affect scenery, and sensitive viewers over time. Specific identified cumulative projects (see table 4.21-1) that would alter landscape scenic quality and sensitive viewsheds within the analysis area include the proposed SunZia project, Bowie Power 345-kV Transmission Line and substation, Bowie Natural Gas Power Plant, Safford Solar Energy 250-MW photovoltaic solar power plant, Solar Reserve, LLC-1 100-MW concentrating solar power/structure facility, and the Sapphire Energy Algae Facility.

Because the proposed SunZia project would be potentially constructed along a similar alignment and timeline as the proposed Southline Project, they are likely to result in the greatest cumulative impact to visual resources—in the long term from the introduction of transmission line structures and substation expansions into the landscape; and in the short term from the removal of vegetation to construct and maintain the transmission lines, construction of temporary and permanent access roads, construction of temporary construction laydown yards, and any landform modifications necessary to prepare the ROW for construction. Modification to the natural landscape would occur along the entire 242.4 miles of the New Build Section proposed routes. Where applicable, implementation of BMPs and mitigation measures included in the proposed Project and reasonably foreseeable projects would reduce or eliminate the potential for incremental effects resulting from the proposed Project. In addition, because local alternative DN1 parallels the proposed SunZia project preferred alignment, the same access and temporary construction laydown yards may be used for that segment, further reducing the cumulative construction impacts.

Solar energy projects typically require disturbance of large blocks of land, which would result in adverse effects to existing, undeveloped landscapes as a result of vegetation removal and the introduction of strong linear and geometrical shapes on the landscape. The impacts of the proposed Project when taken in context with these other reasonably foreseeable future renewable energy developments would have a cumulative effect on viewers from both recreation areas and travel routes in the analysis area.

The Tri-County RMP is a reasonably foreseeable future action and is expected to result in changes to the VRM classification of BLM lands in Doña Ana County that are currently managed under the Mimbres RMP. As a result of these potential changes, there are portions of the New Build Section that would not be in conformance with VRM objectives under the current BLM preferred alternative for the Tri-County RMP. Under the subroute 1.2 (the proponent's alternative); 0.6 mile of segment S2, 6.5 miles of segment S3, and 0.6 mile of segment S4 would cross VRM Class II lands and would not conform to the Tri-County RMP preferred alternative. Additionally, local alternative B would cross 0.7 mile of VRM class II and would not conform to the Tri-County RMP preferred alternative.

Other past, present, and reasonably foreseeable future projects in the analysis area are minimal and restricted primarily to incremental growth in residential and commercial areas associated with the cities of Deming and Lordsburg. The level of overall development in the region, especially for residential and commercial activities, has slowed significantly since about 2008. Residential, agricultural, and transportation development within the cumulative effects analysis area is generally low and is anticipated to remain so. Additionally, because the proposed Project and alternative alignments would be located within new and existing transmission corridors, visual effects are likely to either be prominent enough or isolated enough so that they would not substantially contribute to cumulative effects in concert with these other developments.

UPGRADE SECTION – ROUTE GROUPS 3 AND 4

Reasonably foreseeable future developments in the vicinity of the Upgrade Section of the proposed Project have the potential to result in cumulative effects on visual resources. Reasonably foreseeable future actions that are likely have direct cumulative effects to visual resources along the 118.6 miles of route groups 3 and 4 of the Upgrade Section of the proposed Project include development of new transmission lines, development of renewable energy generation facilities, a natural gas pipeline, and major road improvements. These developments, when added to the direct effects of the proposed Project, would incrementally convert the scenic quality of the existing landscape into a more developed and industrialized landscape that would adversely affect scenery, and sensitive viewers over time. Specific identified cumulative projects that would alter landscape scenic quality and sensitive viewsheds within the analysis area include the Pinal Central to Tortolita 500-kV Transmission Line, UniSource Energy Services 115 kV to 138 kV Uprate, Whetstone Ranch 80-MW Solar Project, UA Tech Park 5-MW Thermal Storage/Concentrating Solar Project, Fotowatio 25-MW Photovoltaic Solar Project, the Sasabe Lateral Project, and the Silverbell Road Improvements project.

Other past and present actions in the CEAA have converted larger portions of the Upgrade Section analysis area to residential, commercial, and industrial development associated largely with the city of Tucson and surrounding lands. Because the proposed Upgrade Section would be located along existing transmission corridors, visual effects are likely to blend in with existing development and associated visual impacts and not substantially contribute to cumulative effects in concert with these other developments.

Land Use, Including Farm and Range Resources, and Military Operations

LAND USE

The geographic scope for the land use CEAA is the RMP planning area (Mimbres RMP, Safford, RMP, and Phoenix RMP) that would be crossed by the proposed Project (i.e., the entire planning area, regardless of land ownership). For lands other than BLM-managed lands (e.g., County, municipal, or U.S. Forest Service land), the analysis area is the county, municipality, and Douglas Ranger District that would be crossed by the proposed Project and alternatives. Planning areas, or the level at which land use regulations, plans, or authorizations are in effect, is the rationale for designating the analysis area for land use. The temporal scope for the analysis area is the life of the Project (50 years). The CEAA for analyzing potential cumulative impacts to land use represents a reasonable region in which existing land uses, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented.

Construction

The past and present land uses in the CEAA have had a direct effect on the conversion of lands from one use to another (i.e., undeveloped land that is converted to residential subdivision, or vice versa, a former mining area that has been closed, rehabilitated and natural conditions reclaimed) and on the ability to access certain areas, as described in chapters 3 and 4. How an agency manages their land depends upon the purpose of the land (e.g., Federal land, state land, or private land). Land in the CEAA located outside designated ROWs is largely undeveloped and is characterized by vacant desert, agricultural lands, and by areas used for grazing, transportation corridors, utilities, recreation, and widely dispersed, low-density residential development.

Reasonably foreseeable actions in the CEAA that, when combined with the proposed Project, may have cumulative impacts include the Tri-County RMP, the proposed SunZia project, small (<100 MW) and large-scale (>100 MW) solar projects, substation construction and expansions, and the future expansion of the communities and roadways within the analysis area (e.g., Tucson). These projects would enable future residential, commercial, or industrial development and would result in further changes to the types of land uses similar to the proposed Project. However, the overall cumulative impact of these developments is consistent with the long-term management planning tools such as the WWEC PEIS.

The WWEC PEIS designates energy corridors (i.e., oil, gas, and hydrogen pipelines; electricity transmission; and electricity distribution) on Federal lands within 11 Western States, including New Mexico and Arizona. One corridor identified in the WWEC PEIS is included in the analysis area, in New Mexico near Lordsburg proceeding west into Arizona (81-213). The incremental impact of this corridor designation, when combined with the construction of the proposed Project, would result in a minor cumulative impact, since the WWEC PEIS designation has been identified to maximize targeted areas suitable for ROW development.

Construction of the proposed Project would have moderate, short-term cumulative impacts to the management of lands and future or planned land uses since the proposed Project would preclude non-compatible future or planned land uses such as other transmission lines or pipelines from being located within the same footprint as the proposed Southline Project. Similarly, construction of the proposed Project may temporarily affect the management of lands (e.g., legal recreation users within the ROW may be forced to recreate outside the ROW during construction yet remain within the planning area, despite the local RMP permitting such uses), but would return to existing conditions following construction.

In general, an increase in reasonably foreseeable future developments in the CEAA would contribute to the modification of the character of land use in the analysis area. As development occurs, the rural environment would become increasingly more residential, commercial, and industrial. Linear ROW projects such as the proposed Southline Project are sited to avoid impacting sensitive resources to the greatest extent practicable. As more reasonably foreseeable actions are constructed, the possible paths that can be taken to avoid sensitive resources can become limited. Construction of the proposed Project would preclude other future transmission lines from being located within the same ROW footprint.

Avoidance areas proposed in the Tri-County RMP for aplomado falcon would be cumulatively impacted by the preferred alternative when combined with other reasonably foreseeable projects such as the proposed SunZia and solar projects. For the New Build Section, construction of the proposed Project would convert the total ROW existing land use from predominantly undeveloped desert land into a utility corridor. For the Upgrade Section, construction of the proposed Project would not convert the total ROW since the transmission line is already in place. Opportunities for recreation land uses (recreation on public, county, or city land) may have access to increased opportunities available as a result of the proposed Project and new access roads. Other future developments (as described in the preceding 3 paragraphs) that

involve access road construction would also likely be closed to the public except where authorized, and when combined with this project would not affect land use since these roads would not affect land ownership, land management, land use authorizations, or ROWs for future or planned land uses.

Operation

During operation of the proposed Project, if populations of communities (particularly in urban areas) increase as a result of community developments, the recreational use of public land within the CEAA could increase. In addition, the quality of the recreational settings on public lands adjacent to urban areas could be degraded by the loss of undeveloped landscape character and visual intrusion on the landscape. However, existing land uses would only be precluded in site-specific areas where a transmission tower or ancillary facility physically occupies the land; the remaining land within the ROW would not preclude existing land uses. Therefore, the cumulative impacts of past, present, and reasonably foreseeable projects to land use would be minor in the rural portions of the analysis area, but would be moderate in the more urbanized portions. However, the proposed Project would contribute negligibly to this overall cumulative effect.

FARMLANDS AND RANGELANDS

The geographic analysis area for cumulative impacts to public farmlands and rangelands is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. This CEAA for analyzing potential cumulative impacts to farmlands and rangelands represents a reasonable region in which acres of Farmland of Statewide or Local Importance and acres of grazing allotments when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented. Cumulative actions discussed herein are based on the existing conditions of the recreation resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

Past and present actions have had adverse impacts on farmlands and rangelands. Construction and operation of linear projects such as roads, railroads, transmission lines, and pipelines, and the expansion of other land uses (residential, commercial, and industrial) have occurred throughout the analysis area. These past and present actions have converted farmlands to non-agricultural uses and have removed forage habitat on rangelands permitted for grazing.

Reasonably foreseeable actions in the analysis area that have the potential to result in cumulative impacts to farmlands and rangelands by converting farmlands to non-agricultural land use and removing forage habitat from lands permitted for grazing. These projects include the Tri-County RMP, the proposed SunZia project, small (<100 MW) and large-scale (>100 MW) solar projects, substation construction and expansions, and the future expansion of the communities and roadways within the analysis area (e.g., Tucson). Like the action alternatives, these projects would likely avoid directly impacting existing active farmlands by converting them to non-agricultural land uses. Therefore no cumulative impact would be expected to occur to farmlands. The development of these projects, however, would remove areas from active grazing and create a long-term adverse cumulative impact on available rangeland. The cumulative impact on rangeland would be considered minor because of the vast amount of land currently available for grazing and the relatively small portion of grazing habitat that the proposed Project and reasonably foreseeable future actions would remove.

MILITARY OPERATIONS

The geographic scope for analyzing cumulative effects to military operations is the Project footprint in addition to the MTRs, MOAs, and the BSETR that would be intersected by the Project. The temporal

scope is for the life of the Project, which is 50 years. The CEAA for analyzing potential cumulative impacts to military represents a reasonable region in which existing military operations, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented.

Past and present actions considered for military operations include the establishment of DOD land, operations at Fort Huachuca, and the BSETR. In addition, community development (particularly those that offer large-scale airports) and transportation infrastructure also are considered as past and present cumulative actions that have impacted military operations, both in the establishment and the function of such operations.

Construction

Reasonably foreseeable and future projects that could affect military uses in the analysis area during construction include the proposed SunZia project, proposed Red Horse 2 Wind project, the Whetstone Ranch Solar Project, the Sasabe lateral Project and the 5-MW solar power generation project. These projects could impact military uses by limiting existing and/or future military activities.

The proposed SunZia project would cross several MTRs, including VR-259, VR-260, VR-263, and VR-1233. The minimum training altitude for these MTRs ranges from 100 to 700 feet AGL. The construction of the SunZia project could alter use of the MTRs, since aircraft could be required to increase the minimum flight altitude for low-level training to avoid collisions with transmission line facilities.

The Sasabe Lateral Project, an approximately 60-mile-long, high-pressure natural gas pipeline, crosses the Tombstone MOA. Cumulative impacts during construction of the proposed Southline Project with the Sasabe project on the use of the MOA would be minimal as most project facilities would be located belowground and military use of this area is for aerial training and maneuvers.

Operations

The proposed Southline Project would intersect the BSETR, MTRs, and MOAs within the military operations cumulative effects analysis area, furthering the likelihood of requiring the military to acknowledge potential shifts in AGL of existing MTRs as well as the need to revise its radio frequency emitter inventories.

The proposed Southline Project includes upgrading the existing Western 115-kV line across the BSETR; the EMI from the existing Western line is already part of the baseline calculations for EMI. Further, no electronic testing is conducted in the area of the existing Western line currently because of the existing Western line, I-10 corridor, topography, and other interference disturbances. The proposed SunZia project would also cross the BSETR and two renewable energy projects (Red Horse Wind 2 and Whetstone Ranch Solar Project) would be located within the BSETR. Each time a new source of interference is introduced into the BSETR, it minimizes the test space because “mitigation” for the BSETR is basically to avoid the source of interference (i.e., transmission line, solar or wind farm, etc.). In other words, the BSETR test footprint shrinks. Additionally, the BSETR would have to revise its radio frequency emitter inventory for testing area to account for the new interferences. In 2012, the U.S. Army conducted a seven-month quantitative analysis of the impacts of transmission lines on the electromagnetic spectrum of 500-kV lines. This study found that it is reasonable to expect EMI to occur along a power line corridor for up to 1 km on either side of the transmission lines.

Therefore, while the existing Western line already introduces EMI that is accounted for in the baseline measurements, upgrading the line could produce slightly more EMI (higher voltage line). However, the proposed Southline Project would include EMI dampers on the conductors to minimize EMI.

EMI from the upgrade of the Western line in combination with the proposed SunZia and renewable energy projects noted above, could have a cumulative impact to, and limit, the testing operations at BSETR. Southline has been consulting with Fort Huachuca in accordance with State Bill 1387. These consultations have resulted in identified mitigation measures (e.g., EMI dampers) since the beginning of Project development. Thus, the incremental impact of the SunZia and renewable energy project in BSETR, along with the proposed Southline Project is anticipated to result in minor cumulative impacts to the BSETR's military operations.

Some reasonably foreseeable future actions may not provide EMI mitigation. If the BSETR were to become limited in capabilities due to reasonably foreseeable future actions such as SunZia and other yet-to-be proposed linear ROW projects, Fort Huachuca may suspend certain operations on the BSETR. As the BSETR is a vital asset to Cochise County, many services, tax incentives, development incentives, and military agreements may not occur. The overall cumulative effect of limiting or suspending operations at the BSETR would result in major, long-term impacts to military operations.

Special Designations

The geographic analysis area for cumulative impacts to special designations is the CEAA described in section 4.21.2. The temporal scope is for the life of the proposed Project, which is 50 years. This CEAA for analyzing potential cumulative impacts to special designations represents a reasonable region in which existing or proposed special designations, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented. Cumulative actions discussed herein are based on the existing conditions of the special designations affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

CONSTRUCTION

The past uses in the CEAA have had a direct effect on the establishment of special designations, as described in chapters 3 and 4. Recognition by various agencies of a landscape's unique and valuable resources led to protective measures enacted by federal, Tribal, and local governments. FLPMA is the primary legislation used to protect special designations, although several other enabling legislative actions may also prescribe special designations, as stated in chapter 3. Construction of the proposed Project, when combined with the past and present actions, would not likely have a cumulative effect to special designations since most special designations preclude the types of uses included in the proposed Southline Project. Therefore, the cumulative impact of the past and present uses, when combined with the proposed Southline Project would be minor.

Since the proposed Project is largely routed to follow existing ROWs and disturbed areas, the likelihood that a special designation occurs within the Project footprint is very low; therefore no cumulative impacts are anticipated. Similarly, the likelihood that users of special designations (i.e., hiking, nature study, or photography) will be seeking special designations proximate to the other past, present, and reasonably foreseeable actions within the CEAA during construction is also unlikely, since the existence of these actions would likely already dictate whether or not the area has been specially designated. Some users of the special designations may experience indirect impacts (i.e., noise, visual intrusions); however, these would cease once construction is completed. Cumulative impacts during construction would be minor and short-term.

OPERATION AND MAINTENANCE

For the same reasons described under construction, special designations would be avoided by the proposed Southline Project. Similarly, the reasonably foreseeable future actions described in table 4.21-1

also must avoid special designations. Therefore, in general, the cumulative impacts of the proposed Project, when combined with reasonably foreseeable future actions would be minor, but would be long-term and occur throughout the life of the Project. Reasonably foreseeable and future projects that could affect special designations in the analysis area are discussed below. Potential impacts from these projects could affect special designations by indirectly changing the natural, historic, cultural, or visual character of some special designations or by conflicting with management objectives.

The proposed SunZia project pass nearby (within 5 miles) of the Peloncillo Mountains Wilderness Area, in a similar layout as is proposed by Southline. Portion of the proposed Southline Project (DN1, LD4) would potentially be constructed in the same corridor as the proposed SunZia project, and therefore would contribute to the modification of special designations' scenic resources (setting) associated with the analysis area. Although construction of these projects would not occur at the same time, the introduction of these reasonably foreseeable actions (linear projects) would increase dominance along the Project analysis area and would affect scenic resources and recreation viewers. If these projects are consolidated, then construction disturbance would be focused within a specific area, rather than multiple projects occurring at intermittent locations. Cumulative effects would be greater where they are not consolidated because more trail-related resources, qualities, values, and associated settings may be affected by these actions. Where these projects may be consolidated, cumulative effects during construction could be further reduced if structure spans were matched (where feasible), potential ROW distance minimized, and restoration of temporary construction areas (i.e., access roads) occurred.

Cumulative impacts to trails would occur in areas where linear ROW proliferation may detract the trails recreational setting, particularly around the Hidalgo substation where the CDNST crosses the proposed Southline Project. These impacts would occur primarily on privately-owned lands since the CDNST trail corridor would preclude many activities that would detract from the Trail Corridor's setting. The cumulative impact would be moderate and long-term.

The incremental impact of this action when combined with the proposed Southline Project would nonetheless be minor since these projects would be located along an existing ROW among other existing linear features; however, the cumulative impact would be long-term.

Wilderness Characteristics

The geographic scope of the analysis area for assessing potential cumulative effects to wilderness characteristics is the Project footprint and all WIUs that intersect a 1-mile corridor on either side of the proposed Project and alternatives' centerlines. The total acreage for geographic analysis area is approximately 585,000 acres. The temporal scope of the analysis area is the life of the Project (50 years). As shown on figure 3.13-1, the WIUs that are within the analysis area all occur in the New Build Section.

CONSTRUCTION

A number of areas with wilderness characteristics occur within the analysis area, as described in section 3.13. In addition, many of the cumulative actions listed in table 4.21-1 would have similar impacts to areas with wilderness characteristics as the proposed Southline Project. Construction of the proposed Project, when considered in combination with the actions listed in table 4.21-1 are linear features (such as pipelines and transmission lines) that have the potential to impact areas with wilderness characteristics directly by reducing the size (5,000 acres or more of undeveloped and unroaded lands), the naturalness condition (reduction of vegetation, wildlife, recreation, or other natural resources), or any supplemental values identified for those lands. Construction of the proposed Southline Project and the cumulative action projects can also affect areas with wilderness characteristics by reducing opportunities for solitude and/or primitive recreation.

OPERATION AND MAINTENANCE

The cumulative impacts from operation and maintenance of the proposed Project and placement of other linear features and human-made structures on the landscape would further decrease the amount of undeveloped landscapes (areas with wilderness characteristics) along the transmission line route. Areas with wilderness characteristics directly affected by the Project and any reasonably foreseeable present or future actions identified above could split areas with wilderness characteristics into separate parcels or reduce them in size below the 5,000-acre requirement by placement of human structures and roads.

The cumulative effects of operation and maintenance of the proposed Project with other reasonably foreseeable projects could also reduce naturalness in areas with wilderness characteristics by introducing unnatural or human-made objects to the landscape, and affecting or reducing the amount of soils, vegetation, or natural habitats in the region.

Finally, the cumulative effects of operation and maintenance of the proposed Project with other reasonably foreseeable projects could alter the setting required to support opportunities for solitude and/or primitive recreation for visitors to areas with wilderness characteristics. It would be more difficult for visitors to find opportunities for solitude and/or primitive recreation throughout the region because fewer parcels would be out of sight or sound of modern human devices. Therefore, the cumulative effect of operation and maintenance of the proposed Project with other reasonably foreseeable projects could further reduce the availability of undeveloped areas with wilderness characteristics within the New Build Section analysis area. This would result in an overall minor effect since all of the WIUs (Afton East being the sole exception) would maintain the size criteria.

There would be no cumulative effects to wilderness characteristics within the Upgrade Section analysis area since no WIUs are present.

Recreation

The geographic analysis area for cumulative impacts to recreation is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. This CEAA for analyzing potential cumulative impacts to recreation represents a reasonable region in which existing recreation opportunities and activities, recreation settings, desired recreation experiences, and adjacent recreation areas, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented. Cumulative actions discussed herein are based on the existing conditions of the recreation resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

CONSTRUCTION

The past uses in the CEAA have had a direct effect on the recreation settings, as described in chapters 3 and 4. Historic proliferation of mining and ranching roads, the establishment of Federal, state, and private lands, and community development have all shaped the recreation opportunities, settings, and desired experiences in the CEAA. Land in the analysis area is largely undeveloped and is characterized by both developed (i.e., utility ROWs) and undeveloped desert, agricultural lands, and by areas used for grazing, transportation corridors, utilities, recreation, and widely dispersed, low-density residential development. As described in chapter 3, past actions drive the locations and intensity for many of the current recreational opportunities of the CEAA (i.e., hunting in areas where existing road networks from past mining or ranching activities have created hunting access road networks). However, these same past activities may also detract the locations and intensity for other current recreational opportunities of the CEAA (i.e., outstanding opportunities for solitude and primitive or unconfined recreation). The present

actions in the CEAA would be very similar to the past actions. In general, construction activities from the proposed Project in would contribute to the modification of the character of the recreation setting, which would contribute to potentially detracting from desired recreation experiences. Construction activities are not anticipated to detract the recreational opportunities since construction would be phased along the alignment (i.e., recreational opportunity would continue in areas not being actively constructed), recreational opportunity would not be lost permanently (i.e., construction activities may only take a few days) and no recreational opportunities would be completely precluded, even during construction at any time since all recreation opportunities identified within the CEAA are able to be pursued in adjacent and similar areas.

As stated in chapter 4 (Section 4.14, "Recreation"), minor, short-term impacts to recreation resources would occur during construction. This is due to the presence of machinery, surface disturbing activities (i.e., ground blading, vegetation clearing), and noise. As noted previously, most areas of the ROW would still be available for lawful use.

Reasonably foreseeable actions in the analysis area that, when combined with the proposed Project construction, may have cumulative impacts to recreation resources include the completion of the Tri-County RMP, the proposed SunZia Transmission Line Project, small (<100 MW) and large-scale (>100 MW) solar projects, substation construction and expansions, maintenance and upgrades to existing distribution and transmission lines (ranging from less than 230 kV to greater than 500 kV lines), and the future expansion of the communities and roadways (i.e., planned residential development) within the analysis area (e.g., Tucson) (see table 4.21-1).

Since the proposed Project is largely routed to follow existing ROWs and disturbed areas, the likelihood that primitive or unconfined recreational settings and desired are currently being pursued is low, therefore no cumulative impacts are anticipated. Similarly, the likelihood that users will be seeking primitive and unconfined recreational opportunities (i.e., backpacking, nature study) proximate to the other past, present, and reasonably foreseeable actions within the CEAA during construction is also unlikely, since the existence of these actions would likely already dictate which recreational opportunities can be successfully pursued.

Depending upon the recreation opportunity, setting, or desired experience, the interaction of the combined effects (past, present, and reasonably foreseeable future actions) for construction of the proposed Project and alternatives would generally result either a beneficial contribution to (i.e., additive) or adverse and detracting (i.e., countervailing) cumulative effect to recreation. These two scenarios are dependent upon the type of recreational opportunity that is being pursued because certain recreation settings and experiences are maximized in developed settings such as ROWs with access roads, and certain recreation settings may be severely detracted by developed settings such as ROWs with access roads.

During construction, the interaction of the actions within the CEAA and the proposed Project would be a beneficial, minor and short-term cumulative effect for recreational settings and experiences that promote or utilize access roads, OHV activity, or even hunting. Recreational settings that include existing or new access roads that may comprise the cumulative actions or proposed Project are attractive to OHV users and hunting because users would be able to legally access areas of land (where lawful) that may be remote or isolated without having to hike or walk long distances. These types of activities tend to be concentrated around more urbanized areas. Conversely, the interaction of the actions within the CEAA and the proposed Project would be an adverse, moderate cumulative effect for recreational setting and experiences that require undeveloped, natural settings. These types of activities tend to be concentrated in rural, undeveloped areas. However, as stated previously, due to the current occupancy of facilities and previously-disturbed setting of the cumulative actions and the proposed Project, recreational opportunities in undeveloped, natural settings are not actively pursued currently, and would not likely be sought during

construction since the existing conditions already dictate which recreational opportunities can be successfully pursued.

The quality of the recreational setting and desired experiences could be degraded by the loss of undeveloped landscape character and visual intrusion on the landscape as a result of the cumulative impact of the proposed Project construction and the past, present, and reasonably foreseeable actions described above. However, as the proposed Southline Project would follow existing ROWs that have been previously developed, the level of degradation would not eliminate existing recreation opportunities, and would only temporarily alter the recreation setting and desired recreation experiences. The cumulative impact of this temporary alteration of the recreation setting would be minor since recreation settings would be available in adjacent settings, other cumulative actions would be far-removed and would not affect adjacent lands along the entire ROW, and would be returned to existing settings following construction. Therefore the cumulative impacts of past and present projects to recreation, when combined with the proposed Project and alternatives construction would be minor and short-term in both the rural portions of the CEAA and the more urbanized portions.

OPERATION AND MAINTENANCE

The cumulative impacts to recreation resources, from construction would largely dissipate during operation and maintenance of the proposed Project, since recreation activities would not be precluded in the majority of the ROW and the short-term disturbances associated with construction would cease.

The cumulative effect to recreation during operation and maintenance would remain minor but shift to long-term since maintenance, emergency, or repair activities could occur at any time during operation.

As future development (renewable energy projects, proposed transmission lines, etc.) within the CEAA occurs, the rural environment may become increasingly more residential, commercial, and industrial; resulting in cumulative changes to the recreation setting and experiences, and certain recreation opportunities and activities to be pushed further from development, increasing visitation to areas that formerly received low levels of recreational use. Operation and maintenance for the proposed Project, when combined with future development would contribute only a minor cumulative effect since the majority of the proposed Project utilizes existing ROWs and disturbed areas. This minor impact would be long-term and for the life of the proposed Project. Further, operation and maintenance activities of the proposed Project would result in minor cumulative effects, since the proposed Project would already be constructed and standard operation and maintenance activities would be so periodic as to not affect recreation opportunities, experiences, or desired settings.

As more reasonably foreseeable actions are constructed such as additional transmission lines, solar energy development, and residential development, the possible alignments that future ROWs can be taken to avoid recreation resources can become limited. OHV use is on BLM lands within the CEAA is considered light. OHV users may have increased opportunities available as a result of the operation and maintenance included under proposed Project via new access roads constructed and/or maintained for the Project. The incremental contribution of the effects of the proposed Project when added to the effect of other past, present, and reasonably foreseeable future actions would result in a minor and long-term cumulative effect. Table 4.21-6 at the end of this section provides a summary of the direct, indirect, and cumulative effects to recreation resources.

Socioeconomics and Environmental Justice

SOCIOECONOMICS

The geographic analysis area for cumulative impacts to socioeconomics is the socioeconomic analysis area described in section 3.15.1, which consists of four counties in southern New Mexico and five counties in southern Arizona. This analysis area (which is larger than the CEAA used for most other resources) reflects the fact that socioeconomic effects such as changes in employment or the demand for local services are not confined to the land area immediately proximate to the transmission line right of way. The temporal scope is for the life of the Project, which is 50 years. Cumulative actions discussed herein are based on the existing conditions of the socioeconomic and environmental justice resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

Past and present projects and activities have largely defined the socioeconomic setting described in chapter 3. Historic and current activities, such as mining, ranching, trading and tourism led to the development of communities in the analysis area. Availability of private land and locations of key infrastructure such as railroads, highways and water systems have helped define where population and economic growth has occurred throughout the area. With the exceptions of the Tucson and Las Cruces metropolitan areas located on the western and eastern ends of the socioeconomic analysis area, and the Sierra Vista metropolitan area located south of the proposed transmission line right of way in Cochise County, low population density has also tended to limit the economic development opportunities in the area. Long distances to larger markets and relatively small labor forces, along with other factors, make it challenging to attract and support projects that would substantially increase employment, earnings and other economic activity in much of the analysis area.

As presented in table 4.21-1, 32 reasonably foreseeable future activities (RFFAs) have been identified for the cumulative effects analysis, 16 of these activities are in the New Build Section and 16 are in the Upgrade Section. These RFFAs include 10 solar energy projects, 9 transmission line projects (including removal of portions of the existing Western transmission line in the Upgrade Segment if the proposed Southline Project is developed), 3 substation upgrade projects, 3 non-solar renewable energy projects, 2 conventional energy development projects, a proposed copper mine, designation of a new National Monument near Las Cruces, major road improvements in the Tucson area and general residential and commercial development in portions of both the Upgrade Section and the New Build Section.

A number of these projects have documented construction or operation and maintenance activities that may overlap with the anticipated schedule for the Project (Southline 2013a). Among that group, the following proposed projects could be especially relevant from the standpoint of cumulative socioeconomic impacts:

- The proposed SunZia project would be proximate to the proposed Southline Project in parts of the New Build Section (DN1 and LD4). As noted earlier, some local alternatives for the proposed Southline Project might co-locate in the same ROW with portions of the proposed SunZia project line.
- The proposed High Plains Express Transmission Project is a proposed 1,300-mile transmission line in Wyoming, Colorado, New Mexico, and Arizona, and is anticipated to come on line between 2020 and 2025. No routing or siting information has been finalized.
- The Sapphire Energy Algae Facility may be expanded. This facility is located near Columbus, in Luna County, an area of potential concern in regard to possible housing and public service impacts if the Proponent Alternative is selected for the proposed Southline Project.

- The proposed Lightning Dock Geothermal Power Plant Project would be located about 20 miles southwest of Lordsburg, in Hidalgo County. This is also an area of potential concern in regards to housing and public services for the proposed Southline Project. Commercial startup is anticipated by late 2014, so construction may be complete prior to Southline construction.
- The planned Safford Solar Energy Project would construct a 250-MW power plant in northeastern Cochise County, another area of potential concern in regard to availability of short-term housing and public services.
- The proposed Bowie Power Station natural gas electrical generating facility and the proposed Bowie Power 345-kV Transmission Line would also be located in northeastern Cochise County, east of Willcox.
- The proposed Whetstone Ranch Solar Project would be located near Benson, in northeastern Cochise County (Southline 2013a).

Whether these proposed projects, or the other reasonably foreseeable activities identified in table 4.21-1 would proceed to actual development, and whether construction would occur during the same time period as construction of the proposed Southline Project, is uncertain. If construction of some or all of the projects identified above does overlap with the proposed Southline Project, these activities would likely place additional stress on the available housing options and public service providers in the western portions of the New Build Section and the eastern portions of the Upgrade Section. Depending on the overlapping activities and their location, simultaneous construction activity in the more sparsely populated western portion of the New Build Section or eastern portion of the Upgrade Section could result in significant, though short-term, impacts on housing and the demand for public services. The possibility for overlapping major construction projects in these areas emphasizes the need for advance planning and coordination with local authorities, as discussed earlier under additional mitigation measures. Other reasonably foreseeable activities with defined construction timelines are located in Pima County, Arizona. Simultaneous construction of these projects and the proposed Southline Project could be more easily accommodated due to the greater housing and public services capacity available in the Tucson area.

As noted in section 4.15, the longer-term socioeconomic effects from operation of the proposed Southline Project would include improved capability of the electrical transmission system to meet long-term economic and population growth in the area, facilitation of the development of renewable energy projects and additional property tax revenues for local governments. The other reasonably foreseeable transmission and substation upgrade projects would further add to these benefits. The relatively large number of proposed renewable energy projects among the RFFAs could provide significant additional economic benefits in the region (in terms of employment, tax revenues and other metrics) and would be facilitated by development of the proposed Southline Project and/or the other proposed transmission lines in the area.

ENVIRONMENTAL JUSTICE

The geographic analysis area for cumulative impacts to environmental justice (CEAA) consists of the communities most proximate to the proposed Southline transmission line as defined in section 3.15.10. This analysis area is intended to capture the populations most likely to be disproportionately affected by construction, operations and maintenance of the proposed transmission line. The environmental justice analysis area was defined based on the census tracts traversed by the Project alternatives and consists of 52 census tracts, including 9 census tracts in New Mexico and 43 census tracts in Arizona.

Like most proposed transmission lines, the proposed routes for the Southline Project, under the various alternatives, would use the corridors of existing linear features (such as transmission lines, roads,

pipelines and railroads) as much as possible. Co-locating with existing linear infrastructure tends to minimize environmental and social impacts, and by avoiding relatively undisturbed areas.

Co-locating a new transmission line in an area that already has existing transmission facilities or other linear infrastructure would add to any existing impacts from that infrastructure on visual resources, quality of life, property values and other aspects of nearby properties. It is likely, however, that the incremental impact of adding an additional transmission line in areas that already have linear infrastructure in place would not be a significant adverse effect, and that co-location would result in less impact than adding a new transmission line in an area without existing linear facilities.

Table 4.21-4 shows the census tracts in the New Build Section that would be traversed by the proposed Southline Project alternatives and identifies the basis(es) for classifying the population in each tract as an environmental justice community. As noted in section 3.15, all of the census tracts traversed by the proposed Project in the New Build Section are environmental justice communities. The table also indicates whether there is existing linear infrastructure (transmission lines or gas pipelines) located in each tract, and whether or not any of the reasonably foreseeable future linear infrastructure projects would be located in the tract. In some cases, the RFFA involves the removal/replacement or upgrading of existing transmission facilities (rather than the development of a new transmission line) – these instances are coded as "Remove/replace" in table 4.21-4. It is important to recognize that the RFFAs shown in table 4.21-4 do not include non-linear projects, such as proposed renewable energy facilities. These proposed projects do not have sufficient geographic specificity at this time to identify the census tracts in which they would be located.

Table 4.21-4. Existing Infrastructure and RFFAs in Census Tracts Traversed by Proposed Southline Alternatives for the New Build Section

County/ Census Tract	Total Population	Environmental Justice Community?/ Basis	Existing Linear Infrastructure*	RFFAs*
Arizona				
Cochise	131,346			
100	1,971	Poverty	No	No
2.01	3,747	Minority	Transmission/Gas	New Transmission
2.02	3,982	Minority/Poverty	Transmission/Gas	No
2.03	2,740	Poverty	Transmission/Gas	Remove/Replace
Graham	37,220			
9615	4,449	Poverty	Transmission/Gas	New Transmission
9616	3,161	Minority/Poverty	Transmission/Gas	New Transmission
Greenlee	8,437			
9603	2,588	Poverty	Transmission/Gas	New Transmission
New Mexico				
Doña Ana	209,233			
15	6,119	Minority	Transmission/Gas	No
16	2,910	Minority/Poverty	Transmission/Gas	No
17.01	5,842	Minority/Poverty	Transmission/Gas	No
17.02	1,692	Minority/Poverty	Transmission/Gas	No

Table 4.21-4. Existing Infrastructure and RFFAs in Census Tracts Traversed by Proposed Southline Alternatives for the New Build Section (Continued)

County/ Census Tract	Total Population	Environmental Justice Community?/ Basis	Existing Linear Infrastructure*	RFFAs*
Grant	29,514			
9648	1,764	Minority	Transmission/Gas	New Transmission
Hidalgo	4,894			
9700	2,195	Poverty	Transmission/Gas	New Transmission
9702	2,699	Minority/Poverty	Transmission/Gas	No
Luna	25,095			
4	5,936	Minority/Poverty	Transmission/Gas	Remove/Replace
5	4,338	Minority	Transmission/Gas	New Transmission

Source: Census Bureau (2011).

*Geographic data for existing linear features included locations of transmission lines and gas pipelines. Geographic data for location of new projects only included linear features with known, proposed locations. Other projects, such as proposed renewable energy facilities, do not have sufficient information available at this time to precisely identify their future locations.

As shown in figure 4.21-1, almost all of the Census tracts in the New Build Section that would be traversed by the proposed Southline alternatives already have existing transmission lines and gas pipelines. Seven of the 16 tracts that would be traversed by the proposed Southline alternatives are also anticipated to experience the development of another new transmission line—primarily as part of the proposed SunZia project.

Table 4.21-5 shows the census tracts in the Upgrade Section that would be traversed by the proposed Southline Project alternatives and indicates whether the tract is an environmental justice community. Like the previous table for the New Build Section, table 4.21-5 also shows the presence of existing linear infrastructure and whether or not any of the reasonably foreseeable future linear infrastructure projects (would be located in the tract).

All but one of the census tracts in the Upgrade Section that would be traversed by the proposed Southline alternatives already have existing transmission lines. Most also have gas pipelines in place. In most cases, linear RFFAs in these areas involve the removal or replacement of existing transmission lines (primarily the existing Western line in the Upgrade Section and/or the Tucson-Apache Pole Replacement Project). Five of the census tracts, including two which are environmental justice communities, are anticipated to experience the development of another new transmission line (the proposed SunZia project).

Table 4.21-5. Existing Infrastructure and RFFAs in Census Tracts Traversed by Proposed Southline Alternatives for the Upgrade Section

2010 Census Tract	Total Population	Environmental Justice Community?/ Basis	Existing Linear Infrastructure*	RFFAs*
Arizona				
Cochise	131,346			
2.01	3,747	Minority	Transmission/Gas	New Transmission
2.03	2,740	Poverty	Transmission/Gas	Remove/Replace
3.01	4,212	Poverty	Transmission/Gas	No
3.02	4,851	No	Transmission/Gas	Remove/Replace

Table 4.21-5. Existing Infrastructure and RFFAs in Census Tracts Traversed by Proposed Southline Alternatives for the Upgrade Section (Continued)

2010 Census Tract	Total Population	Environmental Justice Community?/ Basis	Existing Linear Infrastructure*	RFFAs*
3.03	3,457	No	Transmission/Gas	New Transmission
4	2,206	Poverty	Transmission/Gas	Remove/Replace
Pinal	375,770			
8.02	4,154	No	Transmission/Gas	New Transmission
21.03	5,143	No	Transmission/Gas	Remove/Replace
Pima	980,263			
2	4,409	Minority/Poverty	Transmission/Gas	No
1	514	Poverty	Transmission/Gas	No
11	2,900	Minority/Poverty	Transmission/Gas	New Transmission
12	3,791	Minority/Poverty	Transmission/Gas	Remove/Replace
25.01	6,213	Minority	Transmission/Gas	No
25.03	4,153	Minority/Poverty	Transmission	No
25.04	5,825	Minority/Poverty	Transmission	Remove/Replace
25.05	6,534	Minority/Poverty	Transmission	Remove/Replace
39.01	2,095	Minority/Poverty	Transmission	Remove/Replace
39.02	2,701	Minority/Poverty	Transmission	Remove/Replace
39.03	3,232	Minority	Transmission/Gas	Remove/Replace
40.61	4,821	No	Transmission/Gas	New Transmission
41.09	5,304	No	Transmission/Gas	Remove/Replace
41.14	5,424	Minority/Poverty	Transmission	Remove/Replace
43.1	2,084	Minority	Transmission/Gas	Remove/Replace
44.11	7,085	Poverty	Transmission/Gas	No
44.14	3,194	Minority	Gas	No
44.15	1,622	Minority/Poverty	Transmission/Gas	Remove/Replace
44.18	3,348	No	Transmission/Gas	Remove/Replace
44.19	6,287	Poverty	Transmission/Gas	Remove/Replace
44.22	5,312	Minority	Transmission/Gas	Remove/Replace
44.23	4,324	No	Transmission/Gas	Remove/Replace
44.25	6,166	No	Transmission/Gas	Remove/Replace
44.27	8,138	No	Transmission/Gas	Remove/Replace
44.29	7,398	No	Transmission/Gas	Remove/Replace
44.3	2,454	Poverty	Transmission/Gas	Remove/Replace
44.31	3,903	No	Transmission/Gas	Remove/Replace
45.04	7,131	Minority/Poverty	Transmission/Gas	Remove/Replace
4105.02	6,243	Minority	Transmission/Gas	Remove/Replace
9409	1,885	Minority/Poverty	Transmission/Gas	Remove/Replace

Source: Census Bureau (2011).

*Geographic data for existing linear features included locations of transmission lines and gas pipelines. Geographic data for location of new projects only included linear features with known, proposed locations. Other projects, such as proposed renewable energy facilities, do not have sufficient information available at this time to precisely identify their future locations.

As the preceding tables indicate, almost all of the environmental justice communities that could be affected by construction and operation of the proposed Southline alternatives already have existing transmission lines in place. Development of a new transmission line in these areas would likely have a smaller cumulative impact than in areas without such existing linear features. In many cases, cumulative impacts would also be reduced by the anticipated future removal of an existing transmission line (primarily the existing Western line that would be replaced by the proposed Southline Project).

Table 4.21-6 summarizes direct, indirect, and cumulative effects of the proposed Southline Project on socioeconomics and environmental justice.

Public Health and Safety

The geographic analysis area for cumulative impacts to public health and safety is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. This CEAA for analyzing potential cumulative impacts to public health and safety represents a reasonable region in which occupational risks, severe weather and fire risks, and potential exposure to EMFs, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented. Cumulative actions discussed herein are based on the existing conditions of the recreation resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

Past and present actions have had a negligible impact on public health and safety. Construction of linear projects such as roads, railroads, transmission lines, and pipelines has occurred throughout the analysis area, with negligible impact on public health and safety. EMFs from the existing transmission lines are not impacting public health and safety.

Reasonably foreseeable actions are in the analysis area that have the potential to result in cumulative impacts to human health and safety by increasing the potential for occupational and fire risks, and generating EMFs where they previously did not exist. These projects include the proposed SunZia project, small (<100 MW) and large-scale (>100 MW) solar projects, substation construction and expansions, and the future expansion of the communities and roadways within the analysis area (e.g., Tucson). Construction of these projects would have a short-term minor impact to public health and safety by temporarily increasing occupational risks and fire risks. However, because construction of these projects would be unlikely to occur at the same time and location as construction of the proposed Project, there would not be a cumulative impact. Future transmission projects that would occur within the analysis area would increase the potential for public exposure to EMFs; however, this impact would be considered negligible because they would not exceed EMF exposure guidelines outside of the transmission line ROW.

Hazardous Materials and Hazardous and Solid Waste

The geographic analysis area for cumulative impacts from hazardous materials and hazardous and solid waste is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. This CEAA for analyzing potential cumulative impacts from hazardous materials and hazardous and solid waste represents a reasonable region in which existing conditions, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented. Cumulative actions discussed herein are based on the existing conditions of the hazardous materials and hazardous and solid waste affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

None of the actions identified in the list of cumulative actions, when combined with the proposed Project, would contribute to a cumulative effect on the generation of hazardous materials and solid waste in the

analysis area. This proposed Project and the other actions identified would not produce any obvious changes to the health and safety of humans or the environment as they relate to the use of hazardous materials. The potential projects would result in additional use of hazardous materials and increased quantities of waste generated during their construction and operation, within their respective project locations. However, it should be noted that like the proposed Southline Project, these other projects are also required to adhere to Federal, State, and local laws, ordinances, and regulations, and implement safety-related plans and programs to ensure safe handling, storage, and use of hazardous materials. Therefore, implementation of proper mitigation measures and compliance with Federal, State, and local laws, ordinances, and regulations would provide sufficient mitigation to minimize or completely eliminate direct or indirect impacts from the use of hazardous materials by these activities.

Transportation

The geographic analysis area for cumulative impacts to transportation is the CEAA described in section 4.21.2. The temporal scope is for the life of the Project, which is 50 years. This CEAA for analyzing potential cumulative impacts to transportation represents a reasonable region in which traffic impacts on primary roads, impacts to BLM roads and roadless areas, consistency with transportation plans, and impacts to airports, when assessed in combination with other cumulative actions, would be impacted if the proposed Project were implemented. Cumulative actions discussed herein are based on the existing conditions of the recreation resources affected environment described in chapter 3 and the relevant projects presented in table 4.21-1.

Past and present actions have had negligible to beneficial impact on transportation. Construction of linear projects such as roads and transmission lines has occurred throughout the analysis area, with negligible impact on primary roadway traffic. Once constructed, new roads have had a beneficial impact on primary roadway traffic by improving the transportation network and conforming to long-term transportation plans. The construction of roads on or near BLM lands has increased public accessibility to BLM roads and roadless areas.

Reasonably foreseeable actions are in the analysis area that have the potential to result in cumulative impacts on the transportation system. These actions include various future transmission and generation projects, minor improvements to existing transportation facilities, and the City of Tucson's Silverbell Road Improvement project. The construction of these future projects would generate minor short-term traffic on primary roadways; however it is unlikely that construction would occur at the same time and location as construction of the proposed Project. These projects would be expected to be in conformity with future transportation plans. Any project that is within the vicinity of an airport would be expected to consult with the airport to ensure conformity with airport operations and plans. Therefore, there would not be a cumulative impact to traffic on primary roadways, future transportation plans, and airports.

When combined with the new access roads that would be constructed for the proposed Project, the construction of new roads to facilitate access to other new transmission lines and generation projects would be expected to increase public access to BLM roads and roadless areas. However, there would be minimal potential to open access to land areas where it is not currently available and no large expanses of land that are currently inaccessible would become available because of the existing network of roads and trails, Therefore, the cumulative impact of new access roads constructed as part of the proposed Project and reasonably foreseeable actions would be considered a long-term, minor impact.

Intentional Acts of Destruction

In general, past acts of sabotage and terrorism on transmission lines have been rare and the resulting damage has been minimal. Future acts of sabotage and terrorism are impossible to predict and the

magnitude of damage that these acts may have is impossible to calculate. Because predicting an act of sabotage or terrorism and the magnitude of the potential damage on the proposed Project and other transmission lines would be purely speculative, a cumulative effects analysis on intentional acts of destruction is not possible.

4.21.5 Summary

A summary of cumulative impacts by resource is presented in table 4.21-6.

Table 4.21-6. Summary of Direct, Indirect, and Cumulative Effects

	Past Actions	Present Actions	Proposed Project	Future Actions	Cumulative Effect
Air Quality	Past and current emission sources include power plants, mines, and manufacturing facilities (see table 3.2-5 in section 3.2 for list of past and current major air pollutant emission sources). Pollutant PM_{10} non-attainment area (Rillito, AZ) and CO maintenance area (Tucson, AZ).	Air quality anticipated to remain the same as currently measured by existing ambient air quality monitors.	Minor, short-term construction emissions; minor, long-term operation and maintenance emissions	Potential construction of new air emissions sources (e.g., electric utilities, mines, manufacturing facilities) and potential expansion of existing ones.	Minor impact to air quality during construction and moderate impact to air quality during operations and maintenance; however, proposed Project contribution to any air quality degradation would be negligible.
Noise	Residential and commercial development, including one urban area (Tucson) and several small- and medium-sized towns; roadways, including where the proposed Project would pass near Interstate highways; multiple airports.	Noise levels anticipated to remain the same as currently existing ambient noise levels.	Major but short-term, temporary, and intermittent increase in noise levels during construction activities. During operation and maintenance, noise levels would be anticipated to remain at current levels.	Potentially major, but short-term, temporary, and intermittent increases to noise levels from construction activities associated with future development. Minor impact to noise levels from on-going maintenance and operations of reasonably foreseeable future projects.	Minor cumulative effect from proposed Project and past, present, and reasonably foreseeable future activities.
Geology and Minerals	No Impact	No Impact	No Impact	No Impact	No Impact
Soils	Any ground-disturbing activities from existing pipelines, transmission lines, and railroads	Existing pipelines, transmission lines, and railroads would remain in operation through the life of the proposed Project. No additional ground disturbance or impacts to soil resources are likely from continued operations	Minor, temporary decrease in soil production during construction. Avoidance and implementation of BMPs mitigates most potential impacts	Minor, temporary short-term impacts to soil resources and functioning due to construction activities and operation of facilities where collocated	Minor negligible cumulative effect during construction and operation.

Table 4.21-6. Summary of Direct, Indirect, and Cumulative Effects (Continued)

	Past Actions	Present Actions	Proposed Project	Future Actions	Cumulative Effect
Cultural Resources	The construction of existing transmission lines, gas pipelines, and railroads likely adversely affected cultural resources; however, adverse impacts would have been mitigated primarily through avoidance and data recovery. Many past linear projects following travel corridors where historic trails are found and alter the setting of these trails, as well as some historic properties.	Current operations of existing transmission lines, pipelines, and railroads have little impact on cultural resources. Some ground disturbance may occur during maintenance activities which may impact resources. Alterations to setting of historic trails and historic properties continue.	Impacts to cultural resources by the proposed Project would primarily come from construction. Direct impacts range from minor to major; however, adverse effects would be mitigated with the primary form of mitigation being avoidance. Some visual effects through alteration of setting are expected for historic trails and some historic properties.	Impacts to cultural resources would primarily come from construction phases of future projects; however, for the majority of those projects, adverse effects to cultural resources would be mitigated.	Adverse direct effects of past actions, the proposed Project, and future actions would be mitigated; therefore, there are no cumulative direct effects. Because many of the past linear projects, the proposed Project, and future linear projects follow historic travel corridors, cumulative visual impacts to historic trails are expected from alterations to their settings.
Water Resources (Mimbres Subbasin)	Ground disturbance within same watersheds from existing pipelines, transmission lines, and railroads. Any impacts to water quality and water quantity from these past actions are already reflected in the description of existing conditions.	Existing pipelines, transmission lines, and railroads would remain in operation through the life of the proposed Project. No additional ground disturbance or impacts to water quality or quantity are likely from continued operations.	Avoidance and implementation of BMPs mitigates most potential impacts. Significant impacts exist for Proposed Midpoint substation (permanent structures within floodplains).	Fifty-eight miles of proposed SunZia and High Plains Express route lie within same watershed as Proposed Midpoint substation; placement of permanent pole structures in floodplains are unlikely to cause significant impacts. An additional 54,800 acres of the proposed Organ Mountains Desert Peaks National Monument is partially within the same watershed; management as a national monument is likely to improve watershed conditions overall. Four energy projects (Sapphire, New Solar Ventures, Brightsource, NextLight) are also located within the same watershed, but insufficient detail is known to determine impacts. Impacts from residential development likely mitigated by municipal stormwater systems.	Proposed projects are unlikely to result in significant impacts to the same floodplains within which the Proposed Midpoint substation is located, and therefore are unlikely to result in cumulative impacts to floodplain resources. Energy projects have large footprints, and these projects could potentially result in cumulative impacts.

Table 4.21-6. Summary of Direct, Indirect, and Cumulative Effects (Continued)

	Past Actions	Present Actions	Proposed Project	Future Actions	Cumulative Effect
Water Resources (Willcox Playa Subbasin)	Same as above	Same as above	Avoidance and implementation of BMPs mitigates most potential impacts. Significant impacts exist for Willcox Playa (unavoidable WUS or wetlands).	Twenty-one miles of proposed SunZia and High Plains Express route lie within same watershed as Willcox Playa; avoidance and implementation of BMPs mitigates most potential impacts. In addition, proposed route is located over 10 miles north of Willcox Playa. Buffalo Soldier Range overlies this watershed but is unlikely to have surface disturbance. Impacts from projects on existing utility lines likely mitigated by avoidance and implementation of BMPs.	Proposed projects are unlikely to result in significant impacts and are not located near Willcox Playa, and therefore are unlikely to cause cumulative losses of WUS or wetlands associated with Willcox Playa.
Water Resources (San Simon Subbasin)	Same as above	Same as above	Avoidance and implementation of BMPs mitigates most potential impacts. Significant impacts exist for Stein's Creek (unavoidable WUS or wetlands).	Thirty-six miles of proposed SunZia and High Plains Express route lie within same watershed as Stein's Creek; avoidance and implementation of BMPs mitigates most potential impacts. An additional 22,891 acres of disturbance for proposed Safford Solar Energy project, and unspecified acreage for work between Bowie Power Station and Willow Substation also occur within same watershed. Impacts to WUS unlikely to be avoided from large footprint of project.	Both proposed Project and proposed ground-disturbing projects have likelihood of unavoidably impacting WUS and/or wetlands within the same watershed. Cumulative impacts to downstream waters on the main stem of the San Simon River could include incremental degradation of water quality and changes in water flow amount, frequency, or flooding severity.
Water Resources (Upper Santa Cruz Subbasin)	Same as above	Same as above	Avoidance and implementation of BMPs mitigates most potential impacts. Significant impacts exist for Santa Cruz River (unavoidable WUS or wetlands).	Approximately 200 acres of ground disturbance from the UA Tech Park Thermal Storage project and 8 miles of Silverbell Road improvements lie within same watershed as the Santa Cruz River; avoidance and implementation of BMPs mitigates most potential impacts. Impacts from projects on existing utility lines likely mitigated by avoidance and implementation of BMPs. Impacts from residential development likely mitigated by municipal stormwater systems.	Proposed projects are unlikely to result in significant impacts, and are therefore unlikely to cause cumulative impacts on the main stem of the Santa Cruz River downstream from potential unavoidable impacts to WUS and/or wetlands from the proposed Project.

Table 4.21-6. Summary of Direct, Indirect, and Cumulative Effects (Continued)

	Past Actions	Present Actions	Proposed Project	Future Actions	Cumulative Effect
Water Resources (Lower Santa Cruz Subbasin)	Same as above	Same as above	Avoidance and implementation of BMPs mitigates most potential impacts. Significant impacts exist for proposed Marana substation (permanent structures within floodplains).	Ten miles of proposed SunZia and High Plains Express route lie within same watershed as Proposed Marana substation; placement of permanent pole structures in floodplains are unlikely to cause significant impacts. Impacts from projects on existing utility lines unlikely to cause additional impacts to floodplains. Impacts from residential development unlikely to be located within floodplains.	Proposed projects are unlikely to result in significant impacts to the same floodplains within which the Proposed Marana substation is located, and therefore are unlikely to result in cumulative impacts to floodplain resources.
Vegetation	Many areas are already disturbed by agriculture, grazing, transmission lines, pipelines, and a variety of roads.	Current activities and impacts to vegetation communities are expected to remain at current levels, however because the area is subject to existing disturbance and collocated facilities there is likely to be continued expansion particularly of linear transmission lines and pipeline facilities.	Minor short-term impacts to vegetation due to construction activities and operation of facilities.	Minor short-term impacts to vegetation due to construction activities and operation of facilities where collocated. Projects that impact large acreages of landscape not already disturbed, such as solar array projects that will result in thousands of acres of new impacts, are likely to contribute to Southline cumulative impacts more so than linear transmission or pipeline projects that may share already disturbed acreages or other indirect impacts with Southline.	Minor, negligible cumulative effect during construction and operation. Collocated facilities reduce overall impacts to vegetation communities and application of PPMs mitigate impacts. Most vegetation communities impacted by cumulative actions are common and widespread geographically. Cumulative impacts to vegetation communities would therefore result in only short-term, minor impacts to vegetation communities, special status species, and noxious weeds.
Wildlife	Major, long-term impacts from livestock grazing; roadways and developments; electrical transmission and generation; mining; water impoundment and groundwater pumping; conversion of land to agricultural uses; and introduction and spread of non-native species.	Moderate, long-term impacts from livestock grazing; roadways and developments; electrical transmission and generation; mining; water impoundment and groundwater pumping; conversion of land to agricultural uses; and introduction and spread of non-native species.	Minor/Negligible to Moderate habitat loss, disturbance and direct mortality from construction equipment during construction. Minor/negligible to Moderate operational/maintenance impacts to migratory bird species from collisions with transmission lines/towers.	Moderate, short-term to long-term habitat loss, degradation, fragmentation and species mortality during construction only. Increased non-native plant introduction and spread. Minor/negligible, long-term operational impacts including impacts to migratory bird species from collisions with transmission lines and other man-made structures.	Major to moderate, long-term cumulative effect during construction and moderate, long-term effects from operation.

Table 4.21-6. Summary of Direct, Indirect, and Cumulative Effects (Continued)

	Past Actions	Present Actions	Proposed Project	Future Actions	Cumulative Effect
Paleontological	No fossil localities encountered as a result of past development such as transmission lines, pipelines, railroads, urban development, or agriculture.	Current operations of existing transmission lines, pipelines, railroads, and other facility have no impact to paleontological resources.	Potential major to moderate impacts to paleontological resources due to ground disturbance if fossils are present for the New Build Section. Minor/negligible or no impact for the Upgrade Section. Adverse impacts would be mitigated according to the appropriate regulation.	New Build: Proposed new National Monument would positivity effect paleontological resources through protection. Majority of projects near New Build Section are in areas of low PFYC, so no negative effects are anticipated. One project, the SunZia Transmission Line has the potential to negatively impact paleontological resources; however, adverse impacts would be mitigated according to appropriate regulation. The potential for the discovery of new important fossils during development may also be positive. Upgrade: No impacts anticipated for Upgrade Section.	No impacts from past or present projects and any negative impacts from the proposed Project or future projects would be mitigated; therefore, no cumulative impacts are anticipated.
Visual Resources	Transmission lines, structures, gas pipelines, residential and industrial developments, dirt surface roads and paved roads have all contributed to changes to the existing scenic quality and landscape in the area	Present actions in the CEAA are minimal and consist of incremental growth in residential and commercial development near Deming, Lordsburg, and throughout the city of Tucson. Impacts to landscape and scenic quality are similar to existing conditions.	The proposed Project would result in changes to the existing landscape and scenic quality.	Future actions including additional transmission projects, renewable energy projects would contribute to changes to the existing landscape.	Past, present, and reasonably foreseeable future actions when combined with impacts of the proposed Project would incrementally convert the scenic quality of the natural landscapes into a more developed and industrialized landscape that would adversely affect scenery, and sensitive viewers over time.
Land Use	Establishment of Federal, Tribal, state, and private lands; establishment of allowable land uses.	Land Ownership, management of lands (i.e., Comprehensive, General, Resource Management or Forest Plans), land use authorizations and future or planned land uses occur CEAA-wide.	No impacts to land ownership, moderate impacts to management of lands, minor impact to land use authorizations, moderate impact to future or planned land uses.	Moderate but temporary impacts to management of lands during construction.	Moderate cumulative effects during construction and operation.

Table 4.21-6. Summary of Direct, Indirect, and Cumulative Effects (Continued)

	Past Actions	Present Actions	Proposed Project	Future Actions	Cumulative Effect
Farmlands and Rangelands	Establishment of Federal, state, and private lands; community and agricultural development, construction of linear projects such as roads and transmission lines.	Continued operations and maintenance of transportation and transmission infrastructure.	The proposed Project would avoid existing active farmlands, therefore it would only have short-term minor adverse impacts to farmland should a laydown area be required in farmland. A long-term minor adverse impact would occur to rangeland as a result of removing forage habitat on lands permitted for grazing.	Construction and operation of future transmission, generation, and transportation projects would potentially have short-term to long-term minor adverse impacts to farmland and rangeland as a result of converting farmland or removing forage habitat on lands permitted for grazing.	No cumulative impact on farmland because proposed Project would not convert existing active farmlands. Long-term minor adverse impacts to rangeland would occur by removing forage habitat on lands permitted for grazing.
Military	Community settlement, transportation infrastructure, Fort Huachuca and BSETR established.	BSETR activities, DOD operations, transmission line operation, community development	Minor, short-term impacts to military operations, MTRs, and military installations	Major, long-term impacts to military operations, MTRs, and military installations if the BSETR becomes limited or certain activities are suspended.	Moderate cumulative effect to military installations (BSETR).
Special Designations	Prehistoric and Historic use of natural features or routes, Establishment of Federal, state, and tribal special designations; road, ranching, and mineral development	Use of special designations are anticipated to remain at current seasonal levels; there is a noticeable increase in activities during summer and hunting seasons.	Minor, temporary impact to special designations during construction only.	Moderate impact if Organ Mountains – Desert Peaks National Monument is designated.	Minor cumulative effect since the proposed Southline project and all future cumulative actions must conform to the prescriptions of special designations
Wilderness Characteristics	Development around roads, towns, and water sources. Lands far removed from these features tend to possess wilderness characteristics more than lands proximate to these features.	Establishment of lands managed to maintain wilderness characteristics via RMP amendment and in accordance with FLPMA.	Moderate, long-term impact to Afton east WIU since the size would be reduced to less than 5,000 acres.	Minor, long-term impacts if future actions reduce size, naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, or supplemental values.	Minor, long-term effect. The Afton East WIU would be further reduced by other linear ROW projects.

Table 4.21-6. Summary of Direct, Indirect, and Cumulative Effects (Continued)

	Past Actions	Present Actions	Proposed Project	Future Actions	Cumulative Effect
Recreation	Proliferation of mining and ranching roads; establishment of Federal, state, and private lands; community development.	Recreation activity anticipated to remain at current seasonal levels; there is a noticeable increase in recreational activities during summer and hunting seasons.	Minor, temporary decrease in recreational setting and desired experiences during construction only. During operation and maintenance, recreational activity would be anticipated to remain at current levels.	Minor, temporary decrease in recreational activities during construction only. Some large-scale energy production projects would preclude all recreation during construction and operation.	Minor/negligible cumulative effect during construction and operation.
Socioeconomics	Historic economic activities (mining, ranching, tourism, trade, etc.) Availability of private land and locations of key infrastructure such as railroads, highways and water systems	Low density development in central portions of analysis area. Economic development constrained by distance to markets and modest labor force availability.	Short-term economic benefits from construction activity. Potential short-term adverse impacts on housing and local services in more remote areas during construction. Long-term negative impacts on immediately adjacent property values. Long-term significant benefits in tax revenues for some communities and improved electrical service quality and capacity to meet demand from new growth.	Other proposed transmission lines, renewable energy facilities, and other projects.	Southline could facilitate development of new renewable energy projects. Such projects could offer significant economic and fiscal benefits to local communities.
Environmental Justice	Numerous environmental justice communities located in analysis area.	Many of these communities already proximate to existing linear infrastructure such as transmission lines, gas pipelines, highways and railroads	Minor, incremental adverse effect son communities where linear infrastructure is already present.	Removal of some existing linear infrastructure (existing Western line). Other proposed transmission lines (primarily SunZia).	Removal of existing linear infrastructure would reduce impacts on environmental justice communities. Other proposed transmission lines (could add to incremental adverse effects for some environmental justice communities.

Table 4.21-6. Summary of Direct, Indirect, and Cumulative Effects (Continued)

	Past Actions	Present Actions	Proposed Project	Future Actions	Cumulative Effect
Public Health and Safety	Establishment of Federal, state, and private lands; community development, construction of transmission lines.	Continued operations and maintenance of existing transmission infrastructure.	Negligible increase potential for occupational risks to occur during construction; negligible increase of potential for fire risks to occur during construction; negligible increase in potential for public exposure to EMFs during operation.	Linear projects such as roads and transmission lines would be constructed in the vicinity of proposed transmission lines, temporarily increasing the potential for occupational risks and fire risks to occur during construction. Long-term increase in potential for public exposure to EMFs during operation of future transmission lines.	No cumulative impact to occupational risks, or fire risks. Negligible increased risk of public exposure to EMFs when combined with other future transmission projects
Hazardous Materials and Solid Waste	No Impact	No Impact	No Impact	No Impact	No Impact
Transportation	Establishment of Federal, state, and private lands; community development, construction and operation of roads.	Continued operations and maintenance of existing transportation infrastructure.	Temporary, short-term minor adverse impacts to traffic on primary roadways. Long-term, minor adverse impacts of increasing accessibility to areas currently not accessible by the public. No impact to future transportation plans and airports.	Future transmission, generation, and transportation projects would generate short-term minor adverse impacts to traffic on primary roadways, conform to transportation plans, not impact airports, and have the potential to increase access to BLM roads and roadless areas.	No cumulative impact to traffic on primary roadways because construction would not likely occur at the same time and location as future actions. No impact to future transportation plans and airports. Long-term minor adverse impact to increasing accessibility to BLM roads and roadless areas.
Intentional Acts of Destruction			Not applicable	Not applicable	Not applicable

Chapter 5

CONSULTATION AND COORDINATION

5.1 INTRODUCTION

BLM and Western conducted consultation and coordination activities as required by CEQ regulations (40 CFR 1500–1508) regarding NEPA and applicable Federal laws, such as requirements to afford Federal and intergovernmental agencies, tribes, stakeholders, organizations, and the public with meaningful opportunities to provide input and identify concerns regarding the EIS.

The purpose of the scoping process is to identify important issues, concerns, and potential impacts that require analysis in the EIS and to eliminate insignificant issues and alternatives from detailed analysis. Public involvement is a vital component of NEPA for vesting the public in the decision-making process and allowing for full environmental disclosure. The list of stakeholders and other interested parties is also updated and generally expanded during the scoping process.

This chapter summarizes specific consultation and coordination efforts carried out by the BLM and Western throughout the development of the EIS. Though not a part of the NEPA process, this chapter also summarizes Southline's public involvement efforts conducted prior to their filing of the formal ROW application.

5.2 PUBLIC INVOLVEMENT

5.2.1 Southline's Pre-NEPA Public Coordination

Early in the process, and prior to filling out the ROW application, Southline embarked on a public engagement program that was designed to identify stakeholders and to work closely with these stakeholders. As discussed in chapter 1, Southline conducted a series of over 25 stakeholder meetings and workshops New Mexico and Arizona throughout July, August, and September 2011 (see table 1-6). The goals of the meetings were to give the public early notification of the proposed Project and to begin work on Project routes with interested stakeholders, such as land management agencies, local jurisdictions, community organizations, and landowners.

Pre-NEPA public meetings were hosted in Deming and Lordsburg, New Mexico (September 21–22, 2011); in Willcox, Tucson, and Marana, Arizona (September 27–29, 2011); and in Benson, Arizona (November 10, 2011). Routing workshops were hosted in Deming (September 22, 2011) and Tucson (September 28, 2011). Southline also met with county commissioners and supervisors from Hidalgo and Luna counties in New Mexico, from Cochise and Pima counties in Arizona, and city administrators from Deming, Columbus, Willcox, and Tucson.

Because of Southline's early public outreach efforts, the public was informed about the proposed Project and was familiar with the goals of the proposed Project prior to the formal agency public scoping process. Stakeholders had participated in the preliminary routing process, leading to a better public understanding about Southline's approach to routing, Southline used the input generated from this early public involvement to develop Project routes as proposed in their ROW application, and this initial public outreach formed the foundation for the proposed Project's NEPA public process.

5.2.2 NEPA Public Scoping Period

The public was informed about the formal application for the Project and public scoping period by an NOI published in the Federal Register on April 4, 2012. This initiated the NEPA process for the Project and began a 60-day public scoping period, during which the public had the opportunity to provide input on potential issues to be addressed in the EIS.

As a result of public requests for an extension of the 60-day scoping comment period (ending on June 5, 2012), the scoping comment period was extended by 30 days (ending on July 5, 2012). Notification of the 30-day extension was disseminated via Internet news release and email. NEPA scoping was particularly effective since agencies and the public were already familiar with the proposed Project and had actively been engaged in formulating routing alternatives during Southline's pre-NEPA public outreach. The comments received became part of the administrative record and are included in the EIS analysis.

Members of the public had several methods for providing comments during the scoping period:

- Comments could be handwritten on comment forms at the scoping meetings. Comment forms were provided to all meeting attendees and were also available throughout the meeting room, where attendees could write and submit comments during the meeting.
- Emailed comments could be sent to a dedicated email address: BLM_NM_Southline@blm.gov.
- Individual letters and comment forms could be mailed via U.S. Postal Service to the BLM Las Cruces District Office.

All comments were given equal consideration, regardless of method of transmittal.

5.2.3 Scoping Meetings

BLM and Western held a total of six public and two agency scoping meetings for the proposed Project: one agency meeting and three public meetings in New Mexico, and one agency and three public meetings in Arizona. As much as possible, public scoping meeting were held in locations intended to provide more immediate and easier access for potential environmental justice communities. The scoping meetings were advertised in a variety of formats, beginning at least 2 weeks prior to their scheduled dates. Table 5-1 identifies the meeting notification methods and dates.

Table 5-1. Meeting Notification Methods and Dates

Publicity Item	Venue and Date
NOI	Federal Register – April 4, 2012
Newspaper ads	Las Cruces Sun-News – April 20 and May 4, 2012 The Deming Headlight – April 20 and 27, 2012 Hidalgo County Herald – April 19 and May 3, 2012 San Pedro Valley News-Sun – April 19 and May 3, 2012 Arizona Daily Star – April 20 and May 7, 2012 Arizona Range News – April 25 and May 2, 2012 The Eastern Arizona Courier – April 29 and May 9, 2012 The Explorer – May 9, 2012
Email distribution	Email to BLM Stakeholder List – April 27, 2012 – Agency and public scoping notification (653 recipients) June 4, 2012 – Notification of extended comment period (790 recipients) June 28, 2012 – Notification of scoping comment period end date (788 recipients)

Table 5-1. Meeting Notification Methods and Dates (Continued)

Publicity Item	Venue and Date
Postcard distribution	U.S. Postal Service (Public and agency recipients) – April 23, 2012 – Agency and public postcard notice (626 recipients) April 25, 2012 – Agency and public postcard notice (64 recipients) May 1, 2012 – Notification to permittees (206 recipients)
BLM web site	http://www.blm.gov/nm/st/en/prog/more/lands_realty/southline_transmission.html Posting of the meetings at least 15 days prior to the meetings

Table 5-2 gives the dates, times, and locations of the public and agency scoping meetings, as well as the number of attendees.

The meetings were conducted in an open-house format, with a PowerPoint presentation and question-and-answer period following the presentation. The open-house format and presentation were designed to allow attendees to view informational displays and hear a presentation of the proposed Project and summary of the NEPA process, as well as to allow members of the public to ask agency staff about the proposed Project and the EIS process and submit written or verbal comments onsite.

Table 5-2. Public and Agency Scoping Meetings

Date	Time	City/State	Address	No. of Attendees
Public Meetings				
May 8, 2012	5:30 p.m.	Las Cruces, New Mexico	Mesilla Valley Days Inn and Suites 901 Avenida de Mesilla	22
May 9, 2012	5:30 p.m.	Deming, New Mexico	Mimbres Valley Special Events Center 2300 East Pine Street	30
May 10, 2012	5:30 p.m.	Lordsburg, New Mexico	Dugan-Tarango Middle School 1352 Hardin	20
May 15, 2012	5:30 p.m.	Willcox, Arizona	Quality Inn 1100 West Rex Allen Drive	20
May 16, 2012	5:30 p.m.	Benson, Arizona	Benson Unified High School 360 South Patagonia Street	22
May 17, 2012	5:30 p.m.	Tucson, Arizona	Palo Verde High Magnet School 1302 South Avenida Vega	31
Agency Meetings				
May 8, 2012	10:00 a.m.	Las Cruces, New Mexico	Mesilla Valley Days Inn and Suites 901 Avenida de Mesilla	18
May 17, 2012	10:00 a.m.	Tucson, Arizona	National Advanced Fire and Resource Institute 3265 East Universal Way	31

Meeting attendees were asked to sign in upon entering, at which time they were provided with handouts and informed of the meeting format and how to comment at the meeting. The handouts (i.e., comment form, newsletter, and contact business card) and informational displays provided information about the following:

- NEPA and the EIS process;
- Agency purpose and need;

- Project background;
- Location maps;
- Similarities and differences between the Southline Project and the SunZia project;
- Potentially affected resources and issues to be analyzed in the EIS;
- Planning process and potential amendments to RMP(s); and
- How to provide comments to the BLM and Western.

Additionally, an interactive GIS mapping station was available for meeting attendees to view the proposed Project to aid them in providing comments about specific locations within the analysis area.

These meetings served to provide information on Project planning activities to date, and to give agency personnel and members of the public the opportunity to ask questions or make comments. Presentations were given at each meeting by the BLM National Project Manager and a representative of Southline. Western staff members were also available at the meetings for questions, as were staff members from BLM's Las Cruces, Safford, and Tucson Field Offices, and staff members from Southline. Meeting attendees were encouraged to ask questions and were allowed to provide oral comments after the presentation. However, BLM asked attendees to submit their comments in writing, as no court reporter was present and the meetings were not recorded.

5.2.4 Scoping Comments

Scoping comments were submitted in a variety of formats (i.e., U.S. Postal Service, email, and comment form). All comments and corresponding information (e.g., exhibits, photographs, and maps) were entered into the comment database. Comments were coded to reflect the subject matter of concern, sorted, and summarized for consideration in the development of the EIS. Table 5-3 gives the number of comments received by source.

Table 5-3. Number of Scoping Comments Received by Source

Source	Comments Received
U.S. Postal Service	39
Email	68
Comment Form	26
Total	**133**

Note: Scoping comments received May 8 through August 1, 2012.

During public and agency scoping, 109 non-duplicative comments were submitted, and 24 comments were received from the same person or organization, for a total of 133 comments received. Comments often addressed multiple issues and included input on several issue categories, which when broken out totaled 576 comments. Table 5-4 shows the comments categorized by issue.

A more detailed description of the scoping process, preliminary issues, and scoping comment analysis is contained in the "Scoping Summary Report" (BLM and Western 2012). The "Scoping Summary Report" is available at the BLM Project website: http://www.blm.gov/nm/st/en/prog/more/lands_realty/southline_transmission.html.

Table 5-4. Summary of Scoping Comments Received by Issue

Issue Category	Comments Received	Percentage of Total
Air Quality	8	1.4%
Biological Resources	109	18.9%
Cultural Resources	29	5.0%
Hazardous Materials	1	0.2%
Intentional Destructive Acts	1	0.2%
Lands	23	4.0%
Noise	1	0.2%
Military	8	1.4%
Reclamation	1	0.2%
Public Health and Safety	7	1.2%
Recreation	13	2.3%
Request	47	8.2%
Socioeconomics	37	6.4%
Soils and Geology	5	0.9%
Transportation	14	2.4%
Visual Resources	27	4.7%
Water Resources	19	3.3%
Wilderness	4	0.7%
Miscellaneous	23	4.0%
NEPA/Process	199	34.5%
Total	**576**	

Note: All comments were received by August 1, 2012.
Comments received may have included input on several issue categories.

5.2.5 Project Status

The Project website as well as email was used to provide information regarding Project status to agencies, stakeholders, and other interested parties. There were no direct mailings; however, a copy of the Project newsletter with flyers advertising scoping meetings was sent to libraries, community centers, city and town halls, and senior centers, as well as to the BLM State, District, and Field Offices.

In addition, there is a toll-free information line (800-356-0805) that is provided on written Project material. The information line is maintained and updated by BLM with deadlines, important comment dates, and publication notification information. Also included are meeting details when meetings are announced, and Project contacts.

5.2.6 Draft Environmental Impact Statement Distribution

The DEIS will be made available for public review and posted on the Project website. The notice of availability (NOA) of the DEIS will be announced in the Federal Register, and posted on the Project website. The NOA will also be advertised in the local and regional media and announced via newsletters, postcards, and emails. Everyone on the most current mailing list will receive notification of the release of

the DEIS via mailing with a detachable postcard that can be returned to request a copy of the DEIS on CD. Hard copies will be available for public viewing at BLM offices (New Mexico State Office, Las Cruces District Office, Arizona State Office, Safford Field Office, and Tucson Field Office).

Public comments will be accepted for 90 days, during which public meetings or hearings will be held to receive comments on the DEIS. The BLM and Western will review and consider all comments received on the DEIS. The document will be modified as appropriate based on public comments; all substantive comments and responses will be incorporated into the FEIS.

5.2.7 Final Environmental Impact Statement Distribution

NOA of the FEIS will be announced in the Federal Register, and posted on the Project website. The NOA will also be advertised in local and regional media and announced via newsletters, postcards, and emails. Notification will be made to those on the most current mailing list and hard copies of the FEIS will be made available as described above. A ROD selecting the alternative to be implemented will be made by the DOI no sooner than 30 days after the date the NOA of the FEIS is published in the Federal Register.

5.2.8 Record of Decision

Once a ROD is issued, it will be distributed to cooperating agencies, tribes, interested organizations, and individuals, published in the Federal Register, and advertised in the newspapers listed above in table 5-1. It will also be made available to everyone who requested a copy of the FEIS and posted on the Project website. If a plan amendment were required, the public may protest the proposed RMP Amendments during a 30-day protest period following the publication of the final EIS, and the BLM would resolve protests prior to issuing a ROD. A plan amendment would also require a 60-day Governor's consistency review to allow the Governor of New Mexico to ensure consistency with state and local plans, policies, and programs.

A separate ROD would not be issued by Western, but instead, if Western decides to allow Southline to upgrade its existing facilities and to use its existing transmission easements as part of the proposed Project, Western and Southline would enter into a joint project agreement.

5.3 CRITERIA AND METHODS USED TO EVALUATE PUBLIC INPUT

All scoping comments and corresponding information, exhibits, photographs, and maps were entered into the comment database. Comments were coded to reflect the subject matter of concern, sorted, and summarized for consideration in the development of the EIS. Comments that were received after the scoping comment period end date (July 5, 2012) were reviewed to determine whether new issues were raised that need to be included in the EIS.

5.4 AGENCY CONSULTATION AND COORDINATION

As defined by CEQ regulations, a cooperating agency, or cooperator, is an agency (other than the lead agency) that has special expertise with respect to an environmental issue and/or has jurisdiction by law. Federal, State, and local agencies that have clear jurisdiction over portions of the proposed Project routes were invited via formal letter to become a cooperator in the preparation of the EIS. Tribal governments

were also invited to participate in the Project as a cooperating agency and to provide special expertise with respect to environmental issues.

The role of a cooperator is to participate in the process and provide leadership, expertise, guidance, and review, as well as to offer information related to the agency's authority. Cooperators were asked to submit a signed memorandum of agreement that identifies the agreed-upon responsibilities for preparing and participating in the EIS, including activities outlined in 40 CFR 1501.6(b). A cooperator could be a Federal, State, tribal, or local agency with jurisdiction by law or special expertise with respect to an environmental issue. An invitation letter was sent to potential cooperators listed below.

Agencies invited included:

- Arizona Air National Guard
- ADOT
- AGFD
- ASLD
- City of Sierra Vista, AZ
- Cochise County, AZ
- Doña Ana County, NM
- Graham County, AZ
- Grant County, NM
- Greenlee County, AZ
- Hidalgo County, NM
- Luna County, NM
- NMDGF
- NMDOT
- NMSLO
- Pima County, AZ
- Pima County Department of Environmental Quality
- Pinal County, AZ
- U.S. Air Force Davis-Monthan Air Force Base
- USACE
- U.S. Army Fort Huachuca
- U.S. Border Patrol
- BIA
- Reclamation
- DOD
- EPA
- FAA
- FHWA
- FRA
- FWS
- U.S. Forest Service
- NPS
- Ak-Chin Indian Community
- Comanche Nation
- Fort Sill Apache Tribe of Oklahoma
- Gila River Indian Community
- Kiowa Tribe of Oklahoma
- Mescalero Apache Tribe
- Navajo Nation
- Pascua Yaqui Tribe
- Pueblo of Acoma
- Pueblo of Isleta
- Pueblo of Laguna
- Pueblo of Tesuque
- Pueblo of Zuni
- Salt River Pima-Maricopa Indian Community
- San Carlos Apache Tribe
- The Hopi Tribe
- Tohono O'odham Nation
- Tonto Apache Tribe
- White Mountain Apache Tribe
- Yavapai-Apache Nation
- Ysleta del Sur Pueblo

Sixteen agencies accepted invitations to participate; the following Federal, State, and local agencies have signed on and have been consulted as cooperating agencies during preparation of the EIS:

- USACE (Albuquerque District)
- Reclamation (Phoenix Area Office)
- DOD Clearinghouse
- EPA
- DOD Fort Huachuca
- NPS
- U.S. Forest Service (Coronado National Forest)
- FWS (Region 2)
- AGFD
- ASLD
- NMDGF
- NMSLO
- Cochise County, Arizona
- Greenlee County, Arizona
- Graham County, Arizona
- City of Sierra Vista, Arizona

On October 4, 2012 and December 12, 2012, BLM and Western conducted webinars for the cooperating agencies to participate in alternatives development process for the proposed Project. The agency alternatives developed, as presented in section 2.7 of this DEIS, were based in part on input from cooperating agency staff attending these webinars.

On August 24, 2012 and April 13, 2013, BLM and Western conducted Tumamoc Hill outreach meetings in Tucson, Arizona. A follow-up webinar was hosted by BLM and Western on November 7, 2013 to update workshop attendees on proposed Project alternatives and present visual simulations of the proposed Project alternatives around Tumamoc Hill. These meetings and webinars were stakeholder workshops designed to gain input on proposed Project alignments and resource sensitivities around the sensitive Tumamoc Hill area. Attendees at these workshops included agencies and local officials. Coordination with Tucson Ward 1 and their participation in these meetings specifically reached out to potential environmental justice populations in neighborhoods surrounding Tumamoc Hill.

Additionally, on June 13, 2013, BLM and Western met with representatives from DOD Fort Huachuca to discuss potential issues with potential alignment alternatives. Representatives from Fort Huachuca expressed concerns regarding impacts from the proposed Project on the BSETR. Meeting notes are included as a part of the administrative record.

5.5 SECTION 106 AND TRIBAL CONSULTATION AND COORDINATION

Federal agencies are required to consult with American Indian tribes as part of the ACHP regulations, "Protection of Historic Properties" (36 CFR 800), implementing Section 106 of the NHPA. Accordingly, the NHPA outlines when Federal agencies must consult with tribes and the issues and other factors this consultation must address. In addition, pursuant to EO 13175, executive departments and agencies are charged with engaging in regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications and are responsible for strengthening the government-to-government relationship between the United States and Indian tribes.

The BLM serves as the lead agency for compliance with Section 106 of the NHPA. Federal agencies are required to consult with the public and tribes on the identification of historic properties and the impact that the agencies' undertaking may have on these properties. Western participates with the BLM in this consultation. BLM's consultation with the tribes is conducted on a government-to-government basis, as

prescribed by EOs and legislation, including the AIRFA, ARPA, NEPA, and EO 13007. Government-to-government consultation is conducted in accordance with guidance provided in BLM Manual 8120. Consultation efforts are coordinated by the Project lead for tribal and Section 106. All records of coordination and consultation efforts, including logistical support for meetings and preparation of materials, are part of the administrative record. Although the BLM and Western are responsible for government-to-government consultation with regard to the proposed Project, other cooperating Federal agencies may elect to engage in separate government-to-government consultation with regard to issuance of permits and/or impacts on cultural resources on lands within their jurisdiction. The BLM and Western area also using the NEPA scoping process to satisfy the public involvement process for Section 106 of the NHPA (16 U.S.C. 470f), as provided for in 36 CFR 800.2(d)(3).

In addition to the American Indian tribes mentioned in the following section, additional groups have been identified as consulting parties for the Project: ACHP, National Trust, Archaeology Southwest, Arizona and New Mexico SHPOs, ASLD, NMSLO, USACE (Albuquerque Office), NPS, FS (Coronado National Forest), University of Arizona Desert Laboratory on Tumamoc Hill, Arizona State Museum, Pima County, and City of Tucson. Section 106 kick-off meetings were held in Albuquerque, New Mexico on August 8, 2013 and in Tucson, Arizona on August 15, 2013; a GoTo Meeting/Conference call for those who wish to participate but cannot attend in person. Consultation with American Indian tribes is being conducted in accordance with applicable policies; tribal concerns, including the impact on Indian Trust Assets, are given due consideration.

In 2012, the BLM contacted the following federally recognized tribes:

- Ak-Chin Indian Community
- Comanche Nation
- Fort Sill Apache Tribe of Oklahoma
- Gila River Indian Community
- The Hopi Tribe
- Kiowa Tribe of Oklahoma
- The Navajo Nation
- Mescalero Apache Tribe
- Pascua Yaqui Tribe
- Pueblo of Acoma
- Pueblo of Isleta
- Pueblo of Laguna
- Pueblo of Tesuque
- Pueblo of Zuni
- Salt River Pima-Maricopa Indian Community
- San Carlos Apache Tribe
- Tohono O'odham Nation
- Tonto Apache Tribe
- White Mountain Apache Tribe
- Yavapai-Apache Nation
- Ysleta del Sur Pueblo

Tribes listed above were contacted to notify them of the proposed Project, initiate government-to-government consultation, invite them to participate as a cooperating agency in the preparation of the EIS, and to participate in Section 106 consultations. On October 30, 2013, a draft Programmatic Agreement (PA) was circulated to the Section 106 consulting parties for their review and comment. A copy of the draft PA, in working form, is provided in appendix L.

Table 5-5 is a summary of the in-person meetings that have taken place thus far.

Table 5-5. In-Person Meetings with Native American Tribe/Tribal Organizations

Date	Native American Tribe/ Tribal Organization	Description
10/4/2011	San Carlos Apache Tribe	BLM meeting with San Carlos Apache and White Mountain Apache which included an overview of the Project. BLM staff present: Jane Childress, Connie Stone, Dan McGrew, Amy Sobiech, Joan Galanis, Mike Johnson, and Tom Dabbs. San Carlos Apache Tribe attendees: Vernelda Grant, Tribal Historic Preservation Office; Harold Hofchissey, Recreation and Wildlife; Daniel Juan, Recreation and Wildlife. Vernelda Grant expressed concern about springs and plant resources near Lordsburg and wondered if there were plans to establish a utility corridor in the area.
10/4/2011	White Mountain Apache Tribe	BLM meeting with San Carlos Apache and White Mountain Apache which included an overview of the Project. BLM staff present: Jane Childress, Connie Stone, Dan McGrew, Amy Sobiech, Joan Galanis, Mike Johnson, and Tom Dabbs. White Mountain Apache Tribe attendees: Mark Altaha and Mae Burnette, Tribal Historic Preservation Office.
7/18/2012	Tohono O'odham Nation	Meeting at San Xavier with San Xavier District Tohono O'odham. Project overview and discussion with handouts of Project presentation, maps, and timeline. Tribal concerns with ROW across their lands.
7/20/2012	Four Southern Tribes	Meeting with BLM and Four Southern Tribes. Project update and presentation.
8/28/2012	Pueblo of Zuni	Introductory presentation on the Project, including PowerPoint presentation.
10/15/2012	Ysleta del Sur Pueblo	Introductory presentation on the Project, including PowerPoint presentation and handouts of Project map.
10/18/2012	San Carlos Apache Tribe	Introductory presentation on the Project, including PowerPoint presentation and handouts of Project map.
11/9/2012	Ysleta del Sur Pueblo	Introductory presentation on the Project, including PowerPoint presentation and handouts of Project map.
4/23/2013	Tohono O'odham Nation	Meeting to discuss issues related to Tumamoc Hill. Tribal representatives expressed concerns regarding any routing of the proposed Project that includes Tumamoc Hill.

5.6 FORMAL CONSULTATION

The BLM and Western are required to prepare the EIS in coordination with any studies or analyses that are required under the ESA (16 U.S.C. 1531 et seq.) and the NHPA, as amended (16 U.S.C. 470 et seq.).

5.6.1 Section 7 of the Endangered Species Act

Section 7 of the ESA requires Federal agencies to ensure that their actions do not jeopardize the continued existence of threatened or endangered species or result in the destruction of their designated critical habitat. It may also require consultation with the FWS in making this determination.

A letter from BLM inviting FWS to participate in the scoping of the Project was sent on April 23, 2012. The FWS provided a written response on June 4, 2012 with comments and recommendations on specific species to evaluate for potential effects as well as suggested mitigation measures. FWS was also consulted on the development of species specific mitigation used in this DEIS. FWS comments and recommendations are addressed in Sections 3.8 and 4.8, "Biological Resources," and consultation is ongoing.

5.6.2 Section 106 of the National Historic Preservation Act

Section 106 of the NHPA requires Federal agencies to consider the effects of their actions on historic properties (including archaeological sites) that are listed, or are considered eligible for listing on the NRHP (a historic property is an eligible site). In so doing, the lead agency must consult with Indian tribes, ACHP, interested members of the public, and the appropriate SHPO. The ultimate goal of consultation is to identify and resolve any adverse effects of an undertaking on historic properties.

BLM initiated consultation with the New Mexico and Arizona SHPOs via letter on April 23, 2012. A list of consultation activities is given below in table 5-6.

Table 5-6. Section 106 Consultation Activities

Date	Agency	Contact Type	Description
4/23/2012	Arizona SHPO, State Historic Preservation Officer	Letter from BLM	Invitation to agency scoping meetings. Map attached.
4/23/2012	Arizona SHPO, Public Archaeology Programs Manager	Letter from BLM	Invitation to agency scoping meetings. Map attached.
4/23/2012	New Mexico SHPO, State Historic Preservation Officer	Letter from BLM	Invitation to agency scoping meetings. Map attached.
4/23/2012	New Mexico SHPO, Archaeologist	Letter from BLM	Invitation to agency scoping meetings. Map attached.
5/14/2012	Arizona SHPO, Public Archaeology Programs Manager	Letter to BLM	Handwritten comment on copy of 4/23/2012 agency scoping meeting invitation indicating that Arizona SHPO looks forward to Section 106 consultation on the Project. SHPO also asked whether BLM or Western would be taking the lead on the Section 106 consultation.
11/14/2012	Arizona SHPO, Director	Letter from BLM	Project notification letter to Arizona SHPO. Map and Project newsletter attached. Copy to Nancy Brown, ACHP.
11/14/2012	New Mexico SHPO, Director	Letter from BLM	Project notification letter to Arizona SHPO. Map and Project newsletter attached. Copy to Nancy Brown, ACHP.
3/1/2013	ACHP, Director	Letter from BLM	Notification letter to ACHP that the Southline Project would have an adverse effect on historic properties in New Mexico and Arizona and invitation to participate in the Project.
3/19/2013	ACHP, Executive Director	Letter to BLM	Letter advising BLM that ACHP has decided to participate in consultation for the Southline Project.
8/8/2013	Consulting parties	In-person meeting	Kick-off meeting hosted by BLM and Western in Albuquerque, New Mexico. GoTo Meeting conference call was available for those who could not attend.
8/15/2013	Consulting parties	In-person meeting	Kick-off meeting hosted by BLM and Western in Tucson, Arizona. GoTo Meeting conference call was available for those who could not attend.
12/4/2013	Consulting parties	Webinar	Webinar hosted by BLM and Western for resource sensitivity and draft PA review.

5.7 LIST OF PREPARERS AND REVIEWERS

This EIS was prepared and reviewed by a team from the BLM. A team associated with SWCA Environmental Consultants assisted the BLM in conducting research, gathering data, and preparing the EIS and supporting documents. Table 5-7 identifies BLM team members and their roles.

1 **Table 5-7.** BLM and Western Preparers and Contributors

Name	Title	Involvement (Section(s) of EIS)	Office
Mark Mackiewicz	Senior National Project Manager	BLM Project Manager	Washington, DC
Mark Wieringa	NEPA Document Manager	Western Project Manager	Western Natural Resources Office
Eddie Arreola	RECO Manager	Military	Arizona State Office
Matt Basham	Archaeologist	Cultural Resources	Arizona State Office RECO
Steve Blazek	NEPA Compliance Officer	Project initiation	Department of Energy Golden Field Office
Donald Byron	Project Management Team Lead	Engineering Point of Contact	Western Desert Southwest Region
Bill Childress	Las Cruces District Manager	Authorized Officer	Las Cruces District Office
Jane Childress	Cultural and Tribal Lead	Project cultural and tribal Point of Contact	National Transmission Support Team
Jeff Conn	Natural Resource Specialist	Wildlife	Safford Field Office
Johnida Dockens	Environmental Protection Specialist	Local Office Point of Contact	Western Desert Southwest Region
Claire Douthit	Attorney/Advisor	Legal	Office of General Counsel
Kristen Duarte	Range Management Specialist	Vegetation Farmlands and Rangeland	Tucson Field Office
Vanessa Duncan	Safety & Occupational Health Specialist	Hazardous Materials	Las Cruces District Office
Linda Dunlavey	Realty Specialist	Lands	Tucson Field Office
R.J. Estes	Rangeland Management Specialist	Farmlands and Rangeland/Grazing Vegetation	Safford Field Office
Dennis Godfrey	Public Affairs Officer	Public Affairs	Arizona State Office, RECO
Oswaldo Gomez	Outdoor Recreation Planner	Visual	Las Cruces District Office
Stacey Harris	Public Utilities Specialist	TIP Office Point of Contact	Western Corporate Services Office
Becky Heick	Branch Chief, Minerals and Lands	Minerals	Arizona State Office
Ray Hewitt	Geographer/GIS	GIS Data	Las Cruces District Office
Christopher Horyza	Planning and Environmental Coordinator	Wilderness Characteristics	Arizona State Office
Michael Johnson	Sun Zone Social Scientist	Socioeconomics	Arizona State Office
Craig Knoell	TIP Office Manager	TIP Office Point of Contact (retired)	Western Corporate Services Office
Debby Lucero	Lead Realty Specialist	Land Use	New Mexico State Office
Frank Lupo	Attorney Advisor	Legal	Office of the Solicitor
Dan McGrew	Archaeologist	Cultural Resources (Arizona)	Safford Field Office
Kenneth Mahoney	Program Lead: National Monuments, National Conservation Areas, Wilderness, Wild & Scenic Rivers	Wilderness Characteristics	Arizona State Office
Linda Marianito	Environmental Division Manager	Local Office Point of Contact	Western Desert Southwest Region

2

Table 5-7. BLM and Western Preparers and Contributors (Continued)

Name	Title	Involvement (Section(s) of EIS)	Office
Frances Martinez	Realty Specialist	Land Use Special Designations	Las Cruces District Office
Mark Massar	Wildlife Biologist	Wildlife	National Transmission Support Team
Lisa Meiman	Public Affairs Team Lead	Public Affairs	Western Natural Resources Office
Francisco Mendoza	Outdoor Recreation Planner	Recreation Visual	Tucson Field Office
Lisa Meyer	Cultural Resources Lead	Western Cultural Point of Contact	Western Corporate Services Office
Jennifer Montoya	Planning and Environmental Specialist	BLM NEPA point of contact	Las Cruces District Office
Daniel Moore	Geologist	Air Quality Minerals (in Geology) Paleontological Resources	Tucson Field Office
Patrick Moran	Geologist	Minerals (in Geology) Paleontological Resources	Las Cruces District Office
Mohammad Nash	Hydrologist	Air Quality Noise Soils Water Resources (Surface and Ground)	Las Cruces District Office
Jackie Neckels	Environmental Coordinator	Military	Arizona State Office, Renewable Energy Coordination Office
Ron Peru	Realty Specialist	Land Use Special Designations Visual	Safford Field Office
Tom Phillips	Acting State Recreation Lead-New Mexico State Office	Wilderness Characteristics	Working from Las Cruces District Office
Todd Rhoades	Project Management	Engineering Point of Contact	Western Desert Southwest Region
Lynn Richardson	TIP Liaison	TIP Point of Contact	Western Consultant
Dana Robinson	GIS Specialist	GIS Data	Arizona State Office
Karla Rogers	Visual Resources Field Coordinator	Lead Visual Resources	National Operations Center
Jose Sanchez	Natural Resources Specialist	Recreation	Las Cruces District Office
Pam Shields		Project Initiation	Western Desert Southwest Region
Phil Smith	Range Specialist	Farmlands and Rangeland/Grazing Vegetation	Las Cruces District Office
Darrell Tersey	Natural Resource Specialist	Wildlife	Tucson Field Office
Larry Thrasher	Geologist	Minerals (in Geology) Paleontological Resources	Safford Field Office
Steven Torrez	Wildlife Biologist	Wildlife	Las Cruces District Office
Steve Tromly	Native American Liaison	Tribal, Cultural Point of Contact	Western Corporate Services Office
Melissa Warren	RECO Project Manager (former)	Military	Arizona State Office (former)
Scott Whitesides	Planning and Environmental Coordinator	Land Use	National Transmission Support Team

5.8 THIRD-PARTY CONTRACTOR—SWCA ENVIRONMENTAL CONSULTANTS

A team associated with SWCA assisted the BLM and Western in conducting research, gathering data, and preparing the EIS and supporting documents. Table 5-8 identifies SWCA team members and their roles.

Table 5-8. SWCA Preparers and Contributors

Name	Involvement (Role or Section(s) of EIS)
Ken Houser Cara Bellavia DeAnne Rietz David Brown Charles Coyle	Project Management, NEPA Adequacy
Brad Sohm Dan Whitley Daniel Sloat	Air Quality Climate Change Noise
Matt Bandy Adrienne Tremblay	Cultural Resources Paleontological Resources
Peter David	Farmlands and Rangeland/Grazing
Ryan Rausch Jeffery Johnson	Farmlands and Rangeland/Grazing Land Use Special Designations Military
David Lightfoot Vicki Amato	Farmlands and Rangeland/Grazing Vegetation
Steve O'Brien	Geology Minerals (in Geology) Wastes and Hazardous Materials
DeAnne Rietz	Wastes and Hazardous Materials
Jonathan Rigg	Electrical Characteristics (EMF) Transportation Human Health and Safety Intentional Destructive Acts
Doug Jeavons (BBC Research)	Socioeconomics and Environmental Justice
Cody Stopki	Soils
Eleanor Gladding Russell Waldron Jeffery Johnson Lara Dickson	Noxious Weeds Wildlife
Pam Cecere Steve Leslie	Visual
Chris Garrett	Water Resources (Surface and Ground)
Matt McMillan	Water Resources (Wetlands) Wildlife
Jean-Luc Cartron	Migratory Birds
Chris Query Glenn Dunno Allen Stutz	GIS Cartography

5.8.1 Contract Disclosure Statement

SWCA Environmental Consultants is the contractor assisting the BLM and Western in preparing the draft EIS for the proposed Southline Transmission Line project. BLM and Western are responsible for reviewing and evaluating the information and determining the appropriateness and adequacy of incorporating any data, analyses, or results in the EIS. BLM and Western determine the scope and content of the EIS and supporting documents and have and will furnish direction to SWCA, as appropriate, in preparing these documents.

The CEQ's regulations (40 CFR 1506.5 (c)), require contractors who prepare an EIS to execute a disclosure statement specifying they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for the purposes of this disclosure is defined in the March 23, 1981, "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 *Federal Register* 18026-18028 at Questions 17a and 17b. Financial or other interest in the outcome of the project includes "any financial benefit such as promise of future construction or design work on the project, as well as indirect benefits the consultant is aware of (e.g. if the project would aid proposals sponsored by the firm's other clients)" (46 *Federal Register* 18026-18038 and 10831).

In accordance with these regulations, SWCA hereby certifies that it has no financial or other interest in the outcome of the Project.

Certified by:

Signature

Ken Houser
Name

Principal, Southwest Operations
Title

January 5, 2014
Date

5.9 RECIPIENTS OF THE ENVIRONMENTAL IMPACT STATEMENT

BLM and Western will circulate copies of the EIS to any agencies that have jurisdiction and special expertise, those authorized to develop and/or enforce environmental standards, and any agencies or individuals requesting a copy of the document. Copies will also be made available at BLM State, District, and Field Offices, as well as at libraries and on the Project website.

Tribes and cooperating agencies listed in section 5.4 will receive copies of the DEIS; cooperating agencies also participated in the finalization of the DEIS. Everyone on the most current mailing list will receive notification of the release of the DEIS via mailing with a detachable postcard that can be returned to request a copy of the DEIS on CD. Hard copies will be available for public viewing at BLM offices

(New Mexico State Office, Las Cruces District Office, Arizona State Office, Safford Field Office, and Tucson Field Office). An electronic copy of the DEIS will also be available via BLM's Southline Project website.

A number of organizations and special interest groups have been notified and coordinated with for this Project and have been placed on the Project mailing list. A list of these organizations is provided in table 5-9.

Table 5-9. Organizations and Special Interest Groups Notified

Advisory Council on Historic Preservation
American Wind Energy Association
Anglers United
Animas Foundation
Archaeological Conservancy
Archaeology Southwest
Arizona Association for Environmental Education
Arizona Audubon Society
Arizona Cattle Growers Associations
Arizona Dude Ranch Association
Arizona Farm Bureau
Arizona Land and Water Trust
Arizona League of Conservation Voters
Arizona Mining Association
Arizona Natural Resource Conservation Districts
Arizona Off-Highway Vehicle Coalition
Arizona Power Authority
Arizona Public Service
Arizona Riparian Council
Arizona Society of Range Management
Arizona Solar Energy Association
Arizona Trails Association
Arizona Wilderness Coalition
Arizona Wildlife Federation
Audubon New Mexico
Avra Valley Coalition
Back Country Horsemen of America
Cascabel Working Group
Center for Biological Diversity
Center of Excellence for Hazardous Materials Management
Central Arizona Land Trust
Coalition for Sonoran Desert Protection
Coalition of Renewable Energy Landowners Association
Cochise County Farm Bureau
Community Watershed Alliance
Continental Divide Trail Alliance
Defenders of Wildlife
Desert Foothills Land Trust
Desert Laboratory on Tumamoc Hill
Doña Ana County Farm Bureau
Drylands Institute
Ecology and Evolutionary Biology Department, University of Arizona

Table 5-9. Organizations and Special Interest Groups Notified (Continued)

Empire-Fagan Coalition
Environmental Arizona
Freedom to Roam
Friends of Agua Fria National Monument
Friends of Ironwood Forest
Friends of Sonoita Creek
Friends of the Santa Cruz River
Gila Conservation Coalition
Gila Watershed Partnership of Arizona
Graham County Farm Bureau
Grand Canyon Wildlands Council
Grant County Farm Bureau
Greenlee County Farm Bureau
Hidalgo County Farm Bureau
Huachuca Audubon
International Brotherhood of Electrical Workers 611
International Society for the Protection of Mustangs and Burros
Interstate Stream Commission
Las Cruces 4-Wheel Drive Club
Luna County Farm Bureau
Mountain Bike Association of Arizona
National Parks Conservation Association
National Tribal Environmental Council
National Trust for Historic Preservation
National Trust for Historical Conservation
National Wildlife Federation
Natural Resources Defense Council
The Nature Conservancy
The Nature Conservancy of New Mexico
The Nature Conservancy, New Mexico Field Office
New Mexico Cattle Grower's Association
New Mexico Conservation Voters
New Mexico Environmental Law Center
New Mexico Farm and Livestock Bureau
New Mexico Farm and Livestock Bureau, Collegiate Farm Bureau
New Mexico Federal Lands Council
New Mexico Land Conservancy
New Mexico Natural History Institute
New Mexico Off Highway Vehicle Alliance
New Mexico Off Highway Vehicle Association
New Mexico Solar Energy Association
New Mexico Wilderness Alliance
New Mexico Wildlife Federation
New Mexico Wind Working Group
New Mexico Wool Growers
Pima County Farm Bureau
Pinal County Farm Bureau
Public Lands Foundation
Public Lands Interpretive Association
Redington Natural Resource Conservation District

Table 5-9. Organizations and Special Interest Groups Notified (Continued)

Rocky Mountain Bird Observatory
San Pedro Natural Resource Conservation District
Shooting Roundtable
Sierra Club
Sierra Club, El Paso Group
Sierra Club Rincon Chapter
Sierra Club Rio Grande Chapter
Sky Island Alliance
Solar Reserve
Sonoran Institute
Southern Arizona Buffelgrass Coordination Center
Southern Arizona Leadership Council
Southwest Environmental Center
Southwest Natural Resources
Southwest New Mexico Grazing Association
Southwest Regional Conservation Committee
Southwestern Power Administration
Tonopah Area Coalition
Trust for Public Land
Tucson Audubon
Tucson Mountains Association
Union of Concerned Scientists
Upper Gila Watershed Alliance
Upper San Pedro Partnership
Western Environmental Law Center
Western Governors' Association
Western Interstate Energy Board
Western Regional Partnership
Western Resource Advocates
Western Watersheds Project
WildEarth Guardians
Wilderness Land Trust
The Wilderness Society
The Wilderness Society / BLM Action Center
Wings Over Willcox

Chapter 6

LITERATURE CITED

Agenbroad, L.D. 1970. Cultural Implications from the Statistical Analysis of a Prehistoric Lithic Site in Arizona. M.A. thesis, University of Arizona, Tucson.

Air Nav, LLC. 2012. Airport Information. Available at: http://airnav.com/airports/. Accessed April 3, 2012.

American Conference of Governmental Industrial Hygienists (ACGIH). 2001. Threshold Limit Values and Biological Exposure Indices. 7th ed. American Conference of Governmental Industrial Hygienists. Cincinnati, Ohio.

American Society for Testing and Materials (ASTM). 2005. Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. Document No. E 1527-05.

Ames, C.R. 1977. Along the Mexican Border–Then and Now. The Journal of Arizona History Vol. 18, pp. 431–446.

Amsden, M. 1928. Archaeological Reconnaissance in Sonora. Southwest Museum Papers. No. 1. Los Angeles.

Arizona Corporation Commission (ACC). 2008. Fifth Biennial Transmission Assessment 2008-2017 [Appendix B]. Docket No. E-00000D-07-0376. December 3.

———. 2009. Final Report of the Arizona Renewable Resource and Transmission Identification Subcommittee. September 2009.

———. 2013. Arizona Power Plant and Transmission Line Siting Committee. Available at: http://www.azcc.gov/divisions/utilities/electric/linesiting-faqs.asp. Accessed July 2013

Arizona Department of Administration (ADOA). 2013. Online population statistics. Available at: http://www.workforce.az.gov/population-projections.aspx. Accessed May 7 and June 26, 2013.

Arizona Department of Agriculture (ADA). 2013a. Arizona's native plants administrative rules and laws. Available at: http://www.azda.gov/ESD/DepartmentStatutes.aspx. Accessed July 18, 2013.

———. 2013b. Department statutes. Available at: http://www.azda.gov/ESD/DepartmentStatutes.aspx. Accessed July 18, 2013.

———. 2013c. Protected Native Plants by Categories. Available at: http://www.azda.gov/ESD/protplantlst.htm. Accessed July 18, 2013.

———. 2013d. Prohibited, Regulated and Restricted Noxious Weeds. Available at: http://www.azda.gov/PSD/quarantine5.htm Accessed July 18, 2013.

Arizona Department of Environmental Quality (ADEQ). 2008. Final State Implementation Plan Rillito PM10 Nonattainment Area. Arizona Department of Environmental Quality, Air Quality Division. June 2008.

———. 2010. Technical Support Document for Concrete Batch Plants. 2010. Arizona Department of Environmental Quality, Air Quality Division. Arizona Department of Revenue. 2012 Annual Report. Available at: http://www.azdor.gov/ReportsResearch/AnnualReports.aspx. Accessed July 16, 2013.

———. 2012a. Silverbell Landfill Water Quality Assurance Revolving Fund (WQARF) Site. Available at: http://www.azdeq.gov/environ/waste/sps/download/tucson/silverbell_narr.pdf. Accessed July 27, 2013.

———. 2012b. Silverbell Landfill Water Quality Assurance Revolving Fund (WQARF) Site - Tucson, Arizona. Map of contaminant plume boundaries. Available at: http://www.azdeq.gov/environ/waste/sps/download/tucson/silverbellmap.pdf. Accessed July 27, 2013.

Arizona Department of Transportation (ADOT). 2003. Corridor Management Plan for the Patagonia-Sonoita Scenic Road. Available at: http://azdot.gov/docs/default-source/scenic-routes/cmp_patagonia_text.pdf?sfvrsn=2. Accessed July 2013.

———. 2006. Arizona's Wildlife Linkages Assessment. Available at: http://www.azdot.gov/inside_adot/OES/AZ_WildLife_Linkages/assessment.asp. Accessed July 2013.

———. 2008. Encroachment Permits Policies Guidelines and procedures Manual. February 1.

———. 2009. Policy for Accommodating Utilities on Highway Rights-of-Way. December 2009.

———.2010. Hazardous Materials Transportation in Arizona – Final Report 624. Prepared by HDR Engineering. March. mpd.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ624.pdf

———. 2012. 2013-2017 Five-Year Transportation Facilities Construction Program. Airport Capital Improvement Program.

Arizona Department of Water Resources (ADWR). 2010a. Arizona Water Atlas, Section 3.7 Duncan Valley Basin. Available at: http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/default.htm. Accessed July 4, 2013.

———. 2010b. Arizona Water Atlas, Section 3.10 Safford Basin. Available at: http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/default.htm. Accessed July 4, 2013.

———. 2010c. Arizona Water Atlas, Section 3.14 Willcox Basin. Available at: http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/default.htm. Accessed July 4, 2013.

———. 2010d. Arizona Water Atlas, Section 3.13 Upper San Pedro Basin. Available at: http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/default.htm. Accessed July 4, 2013.

———. 2010e. Arizona Water Atlas, Section 3.3 Cienega Creek Basin. Available at: http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/default.htm. Accessed July 4, 2013.

———. 2010f. Arizona Water Atlas, Section 8.5 Tucson AMA. Available at: http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/default.htm. Accessed July 4, 2013.

———. 2011a. Groundwater Site Inventory database, Groundwater Levels for Duncan Valley Basin.

———. 2011b. Groundwater Site Inventory database, Groundwater Quality for Duncan Valley Basin.

———. 2011c. Groundwater Site Inventory database, Groundwater Levels for Safford Basin.

———. 2011d. Groundwater Site Inventory database, Groundwater Quality for Safford Basin.

———. 2011e. Groundwater Site Inventory database, Groundwater Levels for Willcox Basin.

———. 2011f. Groundwater Site Inventory database, Groundwater Quality for Willcox Basin.

———. 2011g. Groundwater Site Inventory database, Groundwater Levels for Upper San Pedro Basin.

———. 2011h. Groundwater Site Inventory database, Groundwater Quality for Upper San Pedro Basin.

———. 2011i. Groundwater Site Inventory database, Groundwater Levels for Cienega Creek Basin.

———. 2011j. Groundwater Site Inventory database, Groundwater Quality for Cienega Creek Basin.

———. 2011k. Groundwater Site Inventory database, Groundwater Levels for Tucson AMA.

———. 2013. Land subsidence in Arizona. Available at: http://www.azwater.gov/AzDWR/Hydrology/Geophysics/LandSubsidenceInArizona.htm. ADWR Hydrology Division.

Arizona Game and Fish Department (AGFD). 2002. Eumops perotis californicus. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix.

———. 2003. Corynorhinus townsendii pallescens. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix.

———. 2004. Cynomys ludovicianus. Unpublished species abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix. Available at: http://www.azgfd.gov/w_c/edits/documents/Cynoludo.fi_001.pdf. Accessed July 18, 2013.

———. 2006. Arizona's Comprehensive Wildlife Conservation Strategy: 2005-2015. Arizona Game and Fish Department, Phoenix.

———. 2012a. Arizona's State Wildlife Action Plan: 2012–2022. Arizona Game and Fish Department, Phoenix.

———. 2012b. Pima County Wildlife Connectivity Assessment: Report on Stakeholder Input. Arizona Game and Fish Department, Phoenix. Available at: http://www.azgfd.gov/w_c/documents/PimaCountyWildlifeConnectivityAssessment.pdf. Accessed on July 2013.

———. 2012c. Willcox Playa. Available at: http://www.azgfd.gov/outdoor_recreation/wildlife_area_wilcox_playa.shtml. Accessed September 2012.

———. 2012d. Game Management Units. Available at: http://www.azgfd.gov/h_f/hunting_units.shtml. Accessed October 2012.2013a. Special status species occurrences within 3 miles of project vicinity – new build area. Habitat Data Management System (HDMS), on-line environmental review tool. Accessed July 18, 2013.

———. 2013b. Special status species occurrences within 2 miles of project vicinity – upgrade area. Habitat Data Management System (HDMS), on-line environmental review tool. Accessed July 18, 2013.

Arizona Geological Survey (AZGS). 1993. Land Subsidence and Earth Fissures in Arizona.

———. 2000. Geological map of Arizona. Available at: http://www.azgs.az.gov/services_azgeomap.shtml. Accessed July 1, 2013.

———. 2013. Interactive earth fissure map. Available at: http://services.azgs.az.gov/OnlineMaps/fissures.html. Accessed July 8, 2013.

Arizona Oil and Gas Conservation Commission. 1987. State of Arizona Well Location Map 4. Phoenix.

Arizona State Parks. 2003. Economic Importance of Off-Highway Vehicle Recreation to Arizona. Available at: http://www.azparks.gov/OHV/downloads/OHV_Economic.pdf. Accessed February 12, 2013.

Arizona Trail Association. 2010. Arizona National Scenic Trail Strategic Plan 2011-2016. Available at: http://www.aztrail.org/StrategicPlan.pdf. Accessed July 2013.

Avian Power Line Interaction Committee (APLIC). 2005. Avian Power Line interaction committee and US Fish and Wildlife services. 2005. Avian Protection Plan Guidelines. April.

———. 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, California.

———. 2012. Reducing avian collisions with power lines: The state of the art in 2012. Washington, D.C.: Edison Electric Institute and Avian Powerline Interaction Committee.

Basehart, H.W. 1959. Chiricahua Apache Subsistence and Socio-Political Organization: A Report of the Mescalero-Chiricahua Land Claims Project. Contract Research No. 290–154. Albuquerque: University of New Mexico.

Beckett, P.H., and T.L. Corbett. 1992. Indian Cultural Diversity in Southern New Mexico, a.d. 1598–1988. In Current Research on the Late Prehistory and Early History of New Mexico, edited by Bradley J. Vierra, pp. 3–9. Albuquerque: New Mexico Archaeological Council.

Beier, P., D. Majka, and T. Bayless. 2006. Arizona Missing Linkages: Rincon-Santa Rita-Whetstone Linkage Design. Report to Arizona Game and Fish Department. Flagstaff, Arizona: Northern Arizona University School of Forestry.

Boldurian, Anthony T. and John L. Carter. 1999. Clovis Revisited: New Perspectives on Paleoindian Adaptations from Blackwater Draw, New Mexico. University of Pennsylvania Press, Philadelphia.

Bolton, Herbert. 1964. Coronado, Knight of Pueblo and Plains. Albuquerque: University of New Mexico Press.

Bonnichsen, Robson and Karen L. Turnmire (eds.). 1991. Clovis Origins and Adaptations. Peopling of the Americas Publications, Center for the Study of the First Americans, Oregon State University, Corvallis.

Brown, D.E. (ed.). 1982. Biotic Communities of the American Southwest – United States and Mexico. Desert Plants (Special Issue) Vol. 4, Nos. 1–4.

Brown, D.E., and C.H. Lowe. 1980. Biotic Communities of the Southwest. Fort Collins, Colorado: U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station. August 1980.

Bryan, K., and J.W. Gidley. 1926. Vertebrate fossils and their enclosing deposits from the shore of Pleistocene Lake Cochise, Arizona. American Journal of Science Series 5(11):477–488.

Bureau of Economic Analysis (BEA). 2012a. Local Area Personal Income & Employment - Table CA25N Total full-time and part-time employment by NAICS industry. Available at: http://www.bea.gov/regional/index.htm/. Accessed March 27, 2012.

———. 2012b. Local Area Personal Income & Employment - Table CA05N Personal income by major source and earnings by NAICS industry. Available at: http://www.bea.gov/regional/index.htm/. Accessed March 27, 2012.

———. 2012c. Local Area Personal Income & Employment - Table CA1-3 Personal income summary. Available at: http://www.bea.gov/regional/index.htm/. Accessed March 27, 2012.

———. 2013a. Local Area Personal Income & Employment – Table Compensation of employees by NAICS Industry. Available at: http://www.bea.gov/regional/index.htm/. Accessed July 15, 2013.

———. 2013b. Local Area Personal Income & Employment - Table CA04 Personal income and employment summary. Available at: http://www.bea.gov/regional/index.htm/. Accessed July 15, 2013.

Bureau of Indian Affairs. 2012. Available at: http://www.bia.gov/WhatWeDo/index.htm. Accessed July 2013.

Bureau of Land Management (BLM). 1978. Upper Gila – San Simon EIS.

———. 1986a. Visual Resource Inventory, BLM Manual Handbook 8410-1. January.

———. 1986b. Eastern Arizona Grazing Final EIS. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/library/grazing.Par.99238.File.dat/EasternAzGrazingFEIS.pdf. Accessed July 2013.

———. 1988. Proposed Phoenix Resource Management Plan and Final Environmental Impact Statement. December 1988. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/library/resource_management.Par.88909.File.dat/PhoenixRMP-FEIS-complete.pdf. Accessed July 2013.

———. 1988b. Areas of Critical Environmental Concern, BLM Manual Handbook 1613. September.

———. 1991. Final Safford District Resource Management Plan and Environmental Impact Statement. August 1991. Available at: http://www.blm.gov/az/st/en/info/nepa/environmental_library/arizona_resource_management.html. Accessed July 2012.

———. 1993. Mimbres Resource Management Plan. Las Cruces: Department of the Interior, Bureau of Land Management, Las Cruces District Office. December. Available at: www.blm.gov/pgdata/etc/medialib/blm/nm/field_offices/las_cruces/las_cruces_planning/mimbres.Par.30034.File.dat/a_MimbresRMP.pdf. Accessed July 2013.

———. 1994. Safford Field Office. Visual Resources Inventory. July 1994

———. 1995. Peloncillo Mountains Wilderness Management Plan, Environmental Assessment, and Decision Record. Available at: http://www.blm.gov/az/st/en/prog/blm_special_areas/wildareas/peloncillo.print.html Accessed July 2012.

———. 1997. Arizona Standards for Rangeland Health and Guidelines for Grazing Administration. http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/3809.Par.41426.File.dat/AZS_n_G.pdf. Accessed June 22, 2013.

———. 1998a. Paleontological Resource Management Handbook. Handbook H 8270. Washington, D.C.: U.S. Department of the Interior.

———. 1998b. General Procedural Guidance for Paleontological Resource Management. Handbook H 8270-1. Washington, D.C.: U.S. Department of the Interior.

———. 2000a. Final EIS for Riparian and Aquatic Habitat Management in the Las Cruces Field Office – New Mexico – Volume 2. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/nm/field_offices/las_cruces/las_cruces_planning/lcdo_eas.Par.53780.File.dat/RiparianEIS_v2.PDF. Accessed July 18, 2013.

———. 2000b. New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/nm/field_offices/nmso/nmso_planning/nmso_misc_planning.Par.47309.File.dat/memo-RMPA.pdf. Accessed July 2013.

———. 2003. Approved Las Cienegas Resource Management Plan and Record of Decision. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/library/resource_management.Par.73866.File.dat/LCROD-WEB.pdf. Accessed July 2013.

———. 2004a. Cultural Resources Requirements for a Class III Intensive Field Survey Handbook. 8110. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management.

———. 2004b. MS-8100: The Foundation for Managing Cultural Resources. Washington D.C.: Bureau of Land Management.

———. 2004c. MS-8110: Identifying and Evaluating Cultural Resources. Washington D.C.: Bureau of Land Management.

———. 2004d. MS-8120: Tribal Consultation under Cultural Resources. Washington D.C.: Bureau of Land Management.

———. 2004e. MS-8140: Protecting Cultural Resources. Washington D.C.: Bureau of Land Management.

———. 2005a. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. FES 05-11. June 2005.

———. 2005b. Land Use Planning Handbook H-1601-1. U.S. Department of the Interior, Bureau of Land Management. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/ak/aktest/planning/planning_general.Par.65225.File.dat/blm_lup_handbook.pdf. Accessed December 1, 2012.

———.2006, Visual Resource Management National Training Center Course book. Course Number 8400-05, Santa Fe, NM, Sept. 25–29, 2006.

———. 2008a. Integrated Vegetation Management Handbook. H1740-02. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management.

———. 2008b. BLM National Environmental Policy Act Handbook. H1790-1. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management.

———. 2008c. Potential Fossil Yield Classification System for Paleontological Resources on Public Lands. Instructional Memorandum 2008-009. Washington, D.C.: U.S. Department of the Interior.

———. 2008d. BLM National Environmental Policy Act Handbook H1790-1. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management

———. 2008e. 9100–Engineering Manual (public). June 2008. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.80761.File.dat/9100.pdf. Accessed July 2013.

———. 2008f. Potential Fossil Yield Classification System for Paleontological Resources on Public Lands. Instructional Memorandum 2008-009. Washington, D.C.: U.S. Department of the Interior.

———. 2009a. Incorporating Climate Change into BLM Planning and NEPA Processes. Presentation at BLM National Land Use Planning Conference, Keeping Pace with Change, Portland, Oregon, March 2009. Slides by A. Zahniser, J. Cossa, and S. Stewart.

———. 2009b. Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources. Instructional Memorandum IM 2009-011. Washington, D.C.: U.S. Department of the Interior.

———. 2009c. 4100 Grazing Administration information. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.95933.File.dat/MS-4100.pdf. Accessed October, 2012.

———. 2009d. 1703 – Hazard Management and Resource Restoration (public). September 8.

———. 2010. Arizona Sensitive Species List - December 22, 2010. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/efoia/2011IM_IB.Par.64105.File.dat/IMAZ-2011-005.pdf. Accessed July 18, 2013.

———. 2011. BLM Manual 8320 – Planning for Recreation and Visitor Services. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.82237.File.dat/8320.pdf. Accessed July 2013.

———. 2012a. Renewable Arizona: Restoration Design Energy Project Final Environmental Impact Statement. Phoenix: U.S. Bureau of Land Management, Arizona State Office. October 2012. Available at: http://www.blm.gov/az/st/en/prog/energy/arra_solar.html. Accessed May 2012.

———. 2012b. Bureau of Land Management's Land and Mineral Legacy Rehost 2000 System – LR2000. Available at: http://www.blm.gov/lr2000/. Accessed July 8, 2013.———. 2013. Final EIS and Proposed Resource Management Plan Amendments for the SunZia Southwest Transmission Project. June 13.

———. 2012c. BLM Manual 6250 – National Scenic and Historic Trail Administration. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.63382.File.dat/M6250%20NSHT%20Administration%20Final_091312.pdf. Accessed July 2013.

———. 2012d. BLM Manual 6280 – Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.1039.File.dat/M6280%20NSHT%20Management_Final_091212%20(2).pdf. Accessed July 2013.

———. 2012e. Afton Solar Energy Zone Information. Available at: http://solareis.anl.gov/sez/afton/index.cfm. Accessed July 2013.

———. 2012f. Grazing data GIS shape files received from the Tucson, Safford and Las Cruses field offices to Jeremy Quan at CH2M Hill. Received March 2012.

———. 2012g. Grazing data GIS shape files received from the Safford and Las Cruses field offices to Jeremy Quan at CH2M Hill. Received March 2012.

———. 2012h. Information on the Taylor Grazing Act of 1934. Available at: http://www.blm.gov/wy/st/en/field_offices/Casper/range/taylor.1.html. Accessed October 2012.

———. 2012i. Peloncillo Mountains Wilderness Area. Available at: http://www.blm.gov/az/st/en/prog/blm_special_areas/wildareas/peloncillo.html. Accessed September 2012.

———. 2012j. BLM Manual 6310. Conducting Wilderness Characteristics Inventory on BLM lands. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.38337.File.dat/6310.pdf. Accessed July 2013.

———. 2012k. White River Draft RMPA EIS. 2012

.———. 2013a. SunZia Southwest Transmission Project Draft EIS.

———. 2013b. Las Cruces District Office. Visual Resources Inventory. April 2013.

———. 2013c. Ironwood Forest National Monument Resource Management Plan. Available at: http://www.blm.gov/az/st/en/prog/planning/ironwood/reports.html#rod. Accessed July 2013.

———. 2013d. Solar Energy Development in Six Southwestern States. Available at: http://solareis.anl.gov/sez/index.cfm. Washington D.C.: Bureau of Land Management. Accessed July 2013.

———. 2013e. Draft Tri-County Resource Management Plan and Environmental Impact Statement. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/nm/field_offices/las_cruces/las_cruces_planning/tricounty_rmp.Par.40632.File.dat/TRICOUNTY_DRAFT_RMPEIS_APRIL.Vol_1JES.pdf. Accessed July 2013.

———. 2013f. List of Land Use Authorizations intersected by the Proposed Southline Project – Las Cruces Field Office, New Mexico. On file. Accessed November 2013.

———. 2013g. List of Land Use Authorizations intersected by the Proposed Southline Project – Safford Field Office, Arizona. On file. Accessed November 2013.

———. 2013h. List of Land Use Authorizations intersected by the Proposed Southline Project – Tucson Field Office, Arizona. On file. Accessed November 2013.

———. 2013i. Ironwood Forest National Monument. Available at: www.blm.gov/az/st/en/prog/blm_special_areas/natmon/ironwood.html. Accessed July 2013.

———. 2013j. Aden Lava Flow WSA. Available at: http://www.blm.gov/nm/st/en/prog/wilderness/wilderness_study_areas/Aden_Lava_Flow.html. Accessed July 2013.

———. 2013k. West Potrillo Mountains WSA. Available at: http://www.blm.gov/nm/st/en/prog/wilderness/wilderness_study_areas/west_potrillo_mountains.html. Accessed July 2013.

———. 2013l. Peloncillo Mountains WSA. Available at: http://www.blm.gov/nm/st/en/prog/wilderness/wilderness_study_areas/Peloncillo_Mountains_WSA.html. Accessed July 2013.

———. 2013m. Hot Wells Dunes Special Recreation Management Area. Available at: http://www.blm.gov/az/st/en/prog/recreation/camping/hot_well.html. Accessed July 2013.

———. 2013n Transwest Express Environmental Impact Statement. June 2013

———. 2013o. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands. Bureau of Land Management. Cheyenne, Wyoming. 342 pp. April

———. 2013p. Gateway West Transmission Line Draft EIS.

———. 2013q. Las Cruces District Office. Southline Transmission proposal: Mimbres RMP Conformance Review. November 2013.

Bureau of Land Management (BLM) and Office of the Solicitor (eds.). 2001. The Federal Land Policy and Management Act, as amended. U.S. Department of the Interior, Bureau of Land Management Office of Public Affairs, Washington. D.C. 69 pp.

Bureau of Land Management (BLM) and U.S. Department of Energy (DOE). 2012. Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States (Arizona, California, Colorado, Nevada, New Mexico, and Utah) (FES 12-24; DOE/EIS-0403). Washington, D.C. July 2012.

Carrasco, M.A., B.P. Kraatz, E.B. Davis, and A.D. Barnosky. 2005. Miocene Mammal Mapping Project (MIOMAP). University of California Museum of Paleontology. Available at: http://www.ucmp.berkeley.edu/miomap/. Accessed March 23 and May 25, 2012.

Cartron, J.-L.E. (ed.). 2010. Raptors of New Mexico. Albuquerque: University of New Mexico Press.

Center for Climate Strategies (CCS). 2005. Final Arizona Greenhouse Gas Inventory and Reference Case Projections 1990–2020. Arizona Department of Environmental Quality and Center for Climate Strategies.

———. 2006. New Mexico Greenhouse Gas Inventory and Reference Case Projections. Prepared for New Mexico Environment Department.

Chalmers, J.A. 2012. High-voltage transmission lines and rural, western real estate value. The Appraisal Journal Winter 2012.

Chalmers, J.A., and F.A. Voorvaasrt 2009. High voltage transmission lines: proximity, visibility, and encumbrance effects. The Appraisal Journal, Summer 2009.

Childress, Jane/Archaeologist, Bureau of Land Management, National Transmission Support Team. 2013. NRHP-Eligibility of the El Paso and Southern Railroad from Jane Childress (BLM). Phone Conversation. December 19.

CH2M Hill. 2013a. Southline Transmission Project Resource Report 01: Air Quality and Climate Change (V2 Report). April 22, 2013.

———. 2013b. Southline Transmission Project Resource Report 08: Noise (V2 Report). April 22, 2013

———. 2013c. Southline Transmission Project Resource Report 04: Geology and Minerals (V2 Report). April 2, 2013.

———. 2013d. Southline Transmission Project Resource Report 12: Soils (V2 Report). March 28, 2013

———. 2013e. Southline Transmission Project Resource Report 09: Paleontology (V2 Report). March 28, 2013.

———.2013f. Southline Transmission Project Resource Report 17: Water Resources (V2 Report). March 28, 2013.

———. 2013g. Southline Transmission Project Resource Report 15: Vegetation (V2 Report). May 31, 2013.

———. 2013h. Southline Transmission Project Resource Report 18: Wildlife (V2 Report). June 3, 2013

———. 2013i. Southline Transmission Project Resource Report 02: Cultural Resources (V2 Report). May 28, 2013.

———. 2013j. Draft Southline Transmission Project Resource Report 16: Visual Resources (V2 Report). May 17, 2013.

———. 2013k. Southline Transmission Project Resource Report 07: Land Use (V2 Report). March 28, 2013.

———. 2013l. Southline Transmission Project Resource Report 03: Farmlands and Rangeland. March 27, 2013.

———.2013m. Southline Transmission Project Resource Report 19: Military Operations (V2 Report). March 28, 2013.

———. 2013n. Southline Transmission Project Resource Report 13: Special Designations. March 28, 2013.

———. 2013o. Southline Transmission Project Resource Report 10: Recreation (V2 Report). March 28, 2013.

———. 2013p. Southline Transmission Project Resource Report 11: Socioeconomics and Environmental Justice (V2 Report). April 22, 2013.

———. 2013q. Southline Transmission Project Resource Report 06: Health and Human Safety (V2 Report). May 16, 2013.

———. 2013r. Southline Transmission Project Resource Report 05: Hazardous Materials and Waste (V2 Report). March 28, 2013.

———. 2013s. Southline Transmission Project Resource Report 14: Transportation (V2 Report). April 2, 2013.

———. 2013t. Southline Transmission Project Resource Report 20: Cumulative (V2 Report). April 10, 2013.

City of Benson. 1990. Airport Site Selection and Master Plan Study. Available at: http://www.azdot.gov/planning/airportdevelopment/airports. Accessed July 2013.

———. 2002a. General Development Plan. Adopted October 2002.

———. 2002b. Zoning Regulations Adopted 2002.

City of Deming. 2006. “Extra Territorial Zoning Regulations. October 2006.

———. 2010. Comprehensive Plan Update. Final Plan, July 2010.

City of Lordsburg. 2011. City of Lordsburg Comprehensive Plan Update. Available at: http://swnmcog.org/images/City_of_Lordsburg_Comp_Plan_Update_2011lr.pdf. Accessed July 2013.

City of Sierra Vista. 2009. Sierra Vista Comprehensive Plan.

City of Tucson. 1995. City of Tucson Land Use Code. Combined Ordinances.

———. 2001. City of Tucson General Plan Final Plan Adopted December 2001.

———. 2004. Water Plan: 2000-2050/ Tucson, Arizona. Available at: http://cms3.tucsonaz.gov/files/water/docs/waterplan.pdf. Accessed July 2013.

———. 2012. Tucson Parks. Available at: http://cms3.tucsonaz.gov/parksandrec/parkmap#map. Accessed September 2012.

City of Willcox. 2009. City of Willcox General Plan Update. Adopted March 2009.

Clark, J.J. 2001.Tracking Prehistoric Migrations: Pueblo Settlers among Tonto Basin Hohokam. Anthropological Papers No. 65. Tucson: University of Arizona Press.

Clemensen, B.A. 1987. Cattle, Copper, and Cactus: The History of Saguaro National Monument, Arizona. U.S. Department of the Interior, National Park Service, Washington, D.C.

Cochise County. 1984 (amended through 2006). Cochise County Comprehensive Plan.

———. 1997. Cochise County Airport. Airport master Plan Final Report. December.

———. 2000. Cochise County Land Clearing Ordinance. Ordinance No. 00-030. Adopted July 17, 2000.

———. 2006. County of Cochise Comprehensive Plan. Amended 2006.

Collins, M.J. 2006. A new theropod locality at the Jurassic recreation red beds, Tucson Mountains, Arizona. Arizona Geological Survey Contributed Report CR-06-B.

Colwell, P.F. 1990. Power lines and land value. Journal of Real Estate Research 5(1):117–127.

Continental Divide National Scenic Trail Interagency Leadership Council. 2009. The 2009 Continental Divide National Scenic Trail Comprehensive Plan. Available at: http://www.fs.fed.us/cdt/main/cdnst_comprehensive_plan_final_092809.pdf. Accessed July 26, 2013.

Cordell, L.S. 1984. Prehistory of the Southwest. Orlando: Academic Press.

CorridorDesign. 2013. Wildlife Linkage Planning in Arizona. Available at: http://corridordesign.org/linkages/arizona. Accessed July 2013.

Council on Environmental Quality (CEQ). 1981. Forty most asked questions concerning National Environmental Policy Act regulations. Federal Register 46:18026

———. 2010. Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions. Available at: http://www.whitehouse.gov/sites/default/files/microsites/ceq/20100218-nepa-consideration-effects-ghg-draft-guidance.pdf. Accessed July 26, 2013.

———. 2012. National Environmental Policy Act (NEPA). 2012. Available at: http://ceq.hss.doe.gov/. Accessed July 24, 2013.

Coffman Associates Airport Consultants. 2007. Airport Master Plan for Marana Regional Airport, Marana, Arizona. Prepared with Z&H Engineering for Town of Marana, Arizona.

Couchman, D.H. 1990. Cooke's Peak—Pasarón Por Aquí: A Focus on United States History in Southwestern New Mexico. Cultural Resources Report No. 7. Santa Fe: New Mexico Bureau of Land Management.

Crown, P.L., and W.J. Judge (eds.). 1991. Chaco and Hohokam: Prehistoric Regional Systems in the American Southwest. Santa Fe: School of American Research Press.

Czaplicki, J.S., and J.C. Ravesloot (eds.) 1989. Hohokam Archaeology along Phase B of the Tucson Aqueduct, Central Arizona Project, Vol. 3: Excavations at Water World (AZ AA:16:94), a Rillito Phase Ballcourt Village in Avra Valley. Archaeological Series No. 178. Tucson: Arizona State Museum, University of Arizona.

Daniel B. Stephens and Associates, Inc. 2005. Region 4 – Southwest New Mexico Regional Water Plan in Regional Water Plans. Section 5. Prepared for the New Mexico Office of the State Engineer. Available at: http://www.ose.state.nm.us/isc_regional_plans.html. Accessed July 4, 2013.

Dean Runyan. 2012. Arizona Travel Impacts: 1998-2011p. Prepared for the Arizona Office of Tourism. On file, Arizona Game and Fish Department Region VI. June.

Delaney, C.J., and D. Timmons. 1992. High voltage power lines: Do they affect residential property value? Journal of Real Estate Research 7(3):315–329.

DeRosiers, F. 2002. Power lines, Visual Encumbrance and House Values: a microspatial approach to impact measurement. Journal of Real Estate Research 23 (3): 275-3011.

Di Peso, C.C. 1958. The Reeve Ruin of Southeastern Arizona: A Study of Western Pueblo Migration into the Middle San Pedro Valley. Publication No. 8. Dragoon, Arizona: Amerind Foundation.

Dobyns, H.F. 1976. Native American Historical Demography. Bloomington: Indiana University Press.

Dockens, Johinda/BLM Environmental Protection Specialist. 2013. Personal communication with Cara Bellavia/SWCA. October 3.

Doelle, W.H. 1984. The Tucson Basin during the Protohistoric Period. The Kiva 49(3–4):195–211.

Doelle, W.H., and H.D. Wallace. 1991. The Changing Role of the Tucson Basin in the Hohokam Regional System. In Exploring the Hohokam: Prehistoric Desert Peoples of the American Southwest, edited by G. J. Gumerman, pp. 279–345. Amerind Foundation New World Studies Series No. 1. Albuquerque: University of New Mexico Press.

Dõna Ana County. 1994. Comprehensive Plan. Final Plan, November 1994.

———. 2000. Doña Ana County Erosion Control Regulations. Ordinance No. 194-2000. Effective date January 19, 2001.

———. 2011. One Valley, One Vision 2040 – Doña Ana County, New Mexico Regional Plan (Adopted 2012). Available at: http://www.las-cruces.org/code/vision_2040/documents/plan.pdf. Accessed August 22, 2013.

Downum, C.E. 1993. Between Desert and River: Hohokam Settlement and Land Use in the Los Robles Community. Anthropological Papers No. 57. University of Arizona Press, Tucson.

DuBois, S.M., and A.W. Smith. 1980. Earthquakes Causing Damage in Arizona. Arizona Bureau of Geology and Mineral Technology.

Ducks Unlimited. 2013. Homepage. Available at: http://www.ducks.org. Accessed July 2013.

Easton Black, S. n.d. [2000s]. Mormon Battalion. Utah History Encyclopedia. Available at: http://historytogo.utah.gov/utah_chapters/trappers,_traders,_and_explorers/mormonbattalion.html . Accessed July 1, 2013.

Effland, R.W. and M. Green. 1985. A Cultural Resource Assessment: The Western Area Power Administration Saguaro to Tucson 115kV Transmission Line. Archaeological Consulting Services Report No. 29. Archaeological Consulting Services Ltd., Tempe.

Ellis, R.N. 1971. New Mexico Past and Present: A Historical Reader. Albuquerque: University of New Mexico Press.

Energy Policy Act (EPAct of 2005). 2005. Public Law 109-58. 109th Congress. Energy Policy Act of 2005. August 8. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-109publ58/pdf/PLAW-109publ58.pdf. Accessed May 7, 2013.

Fish, P.R., S.K. Fish, and G. Christopherson. 2007. Early occupations on Tumamoc Hill. Archaeology Southwest 21(3). Tucson: University of Arizona Press.

Federal Aviation Administration (FAA). 2007. Advisory Circular AC 70/7460-1K. Obstruction Marking and Lighting. February 1.

———. 2012. Procedures for Handling Airspace Matters. Order JO 7400.2J, Chapter 25 Military Operations Areas. February 19.

———.2013. Aeronautical Information Manual. Official Guide to Basic Flight Information and Air Traffic Control Procedures: Chapter 3, Airspace. Available at: http://www.faa.gov/air_traffic/publications/ATpubs/AIM/index.htm. Accessed December 2013.

Federal Energy Regulatory Commission (FERC). 2011. Docket No. EL-11-24-000. Available at: http://www.ferc.gov/whats-new/comm-meet/2011/051911/E-14.pdf. Accessed May 7, 2013.

Federal Energy Regulatory Commission (FERC) and North American Electric Reliability Corporation (NERC). 2011. Report on Outages and Curtailments During the Southwest Cold Weather Event of February 1–5, 2011.

Fenneman, N.M. 1931. Physiography of the Western United States. 1st ed. New York: McGraw-Hill Book Company.

FireScape. 2013 Chiricahua - Dragoons - Dos Cabezas Analysis Area. Available at: http://www.azfirescape.org/chiricahua/chiricahua-dragoons-dos-cabezas-analysis-area. Accessed August 13, 2013.

Forbes, J.D. 1960. Apache, Navaho, and Spaniard. Norman: University of Oklahoma Press.

Gilman, P.A. 1997. Wandering Villagers: Pit Structures, Mobility and Agriculture in Southeastern Arizona. Anthropological Research Paper No. 49. Tempe: Arizona State University.

———. 2011. Between Mimbres and Hohokam: The San Simon Basin during the Pit Structure Period. Kiva 76(3):277–295.

Goldstein, B. 2008. Draft Class III Cultural Resources Survey Report Tucson-Apache 115-kV Transmission Line Project Pima and Cochise Counties, Arizona Transcon Environmental, Inc., Mesa, Arizona.

Golf Nation. 2012. El Rio Trini Alvarez Municipal Golf Course. Available at: http://tucson.golfnation.org/course157/el-rio-trini-alvarez-municipal-golf-course. Accessed October 2012.

Golfnow. 2012. Silverbell Municipal Golf Course. Available at: http://www.arizonagolf.com/courses/tucson/silverbell-municipal-golf-course. Accessed October 2012.

Gough, P.L. 2012. Juan Bautista de Anza National Historic Trail Historic Resource Study. Ms. prepared for the National Park Service. Las Vegas: Department of History, University of Nevada.

Graham County. 1996. Land Use and Resource Policy Plan. July.

———. 2002. Graham County Comprehensive Plan. Available at: http://www.graham.az.gov/wp-content/uploads/zoningordmarch11.pdf. Accessed September 2013.

Grant County. 2012. Grant County Economic Development Master Plan. Available at: http://www.grantcountynm.com/economic_development/Grant%20County%20Market%20Assessment%20FINAL.pdf. Accessed August 22, 2013.

Greenlee County. 2003. 2003 Greenlee County Comprehensive Plan. Adopted March 4, 2003.

Greenwood, E., F.E. Kottlowski, and S. Thompson, III. 1977. Petroleum potential and stratigraphy of the Pedregosa Basin: Comparison with Permian and Orogrande Basins. American Association of Petroleum Geologists Bulletin 61:1448–1469.

Gutierrez, Anthony/County of Grant Planning Director. 2011. Personal communication with Corinne Lytle Bonine/CH2M Hill. August 9.

Hall, L.B., and D.M. Coerver. 1990. Revolution on the Border: The United States and Mexico, 1910–1920. Albuquerque: University of New Mexico Press.

Hamilton, S., and G. Schwann. 1995. Do high voltage electric transmission lines affect property value? Land Economics 71(4):436–444.

Hammond, G.P., and A. Rey. 1929. Expedition into New Mexico made by Antonio de Espejo. Los Angeles: Quivera Society.

———. 1940. Narratives of the Coronado Expeditions, 1540–1542. Albuquerque: University of New Mexico Press.

Harry, K.G. 1993. Cultural Chronology. In On the Bajada: Archaeological Studies at Davis-Monthan Air Force Base, Tucson, Arizona, compiled by J. H. Altschul and S. Lindsay, pp. 3-6–3-22. Technical Series No. 41. Tucson: Statistical Research, Inc..

———. 1997. Ceramic Production, Distribution, and Consumption in Two Classic Period Hohokam Communities. Unpublished Ph.D. dissertation, Department of Anthropology, University of Arizona, Tucson.

Harry, K., and R.S. Ciolek-Torrello. 1992. Farming the Floodplain: A Look at Prehistoric and Historic Land-Use along the Rillito Test Excavations and National Register Evaluations of Eight Prehistoric and Historic Sites along the Rillito River, Pima County, Arizona. Technical Series No. 35. Tucson: Statistical Research, Inc.

Hart, T. 2012. Class III Cultural Resources Inventory for the Western Area Power Administration Tucson–Apache 115-kV Transmission Line Access Road Maintenance and Pole Replacement Project, Pima and Cochise Counties, Arizona. LSD Technical Report No. 125144. Logan Simpson Design, Tempe.

Haury, E.W., E.B. Sayles, W.W. and Wasley. 1959. The Lehner Mammoth Site, Southeastern Arizona. American Antiquity 25(1):2–30.

Haynes, C.V. 1973. Exploration of a Mammoth-Kill Site in Arizona. National Geographic Society Research Reports 1966:125–126.

Haynes, C.V., and B.B. Huckell. 2007. Murray Springs, A Clovis Site with Multiple Activity Areas in the San Pedro Valley, Arizona. Anthropological Papers of the University of Arizona No. 71, University of Arizona Press, Tucson.

Heilen, M., P. Leckman, A. Byrd, J. Homburg, and R. Heckman. 2012. Archaeological sensitivity modeling in southern New Mexico: Automated tools and models for planning and management. Denver: Prepared for Bureau of Land Management.

Hidalgo County. 2011. Hidalgo County Comprehensive Plan Update 2011. Available at: http://swnmcog.org/images/Hidalgo_Comp_Plan_Dec_2011.pdf. Accessed August 22, 2013.

Huckell, B.B. 1984. The Paleo-Indian and Archaic Occupation of the Tucson Basin: An Overview. The Kiva 49:188–145.

Huckell, B.B., and L.W. Huckell. 1984. Excavations at Milagro, a Late Archaic Site in the Eastern Tucson Basin. Ms. on file, Tucson: Arizona State Museum, University of Arizona.

Huckell, B.B., L.W. Huckell, and S.K. Fish. 1995. Investigations at Milagro, a Late Preceramic Site in the Eastern Tucson Basin. Technical Report No. 94-5. Tucson: Center for Desert Archaeology.

Idaho National Engineering Laboratory. 2003. New Mexico geothermal resources map. Available at: http://geothermal.inl.gov/maps/nm.jpg. Accessed July 8, 2013.

Institute of Electrical and Electronics Engineers (IEEE). 2002. Institute for Electrical and Electronics Engineers, C95. IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0–3 kHz. October 2002. New York: IEEE.

———. 2007. Proceedings of the IEEE 2007 International Interconnect Technology Conference. Burlingame, CA. June, 4-6.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate change 2007: synthesis report. Available at: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf. Accessed June 5, 2012.

International Commission on Non-Ionizing Radiation Protection (ICNIRP). 1998. ICNIRP Guidelines for Limiting Exposure to Time Varying Electric, Magnetic and Electromagnetic Fields (Up to 300 GHz). Health Physics 74(4):494–522.

International Organization for Standardization (ISO). 1996. Acoustics: Attenuation of sound during propagation outdoors. ISO.9613-2. December 15, 1996.

Irwin-Williams, C., and C.V. Haynes. 1970. Climatic Change and Early Population Dynamics in the Southwestern United States. Quaternary Research 1:59–71.

Jones & Jones. 1976. Measuring the Visibility of H.V. Transmission Facilities in the Pacific Northwest. Final Report to the Bonneville Power Administration, United States Department of Interior. November 30.

Kappus, E.J., S.G. Lucas, A.P. Hunt, A.B. Heckert, and M.G. Lockley. 2003. Dinosaur footprints from the lower cretaceous Sarten Member of the Mojado Formation at Cerro de Cristo Rey, Doña Ana County, New Mexico. Ichnos 10:263–267.

Kimball, S.B. 1979. The Mormon Battalion March, 1846–47. https://www.lds.org/ensign/1979/07/the-mormon-battalion-march-184647?lang=eng (Accessed on July 1, 2013).

Krapu, G.L., D.E. Facey, E.K. Fritzell, and D.H. Johnson. 1984. Habitat use by migrant sandhill cranes in Nebraska. Journal of Wildlife Management 48:407–417.

Laurenzi, A., M.A. Peeples, and W.H. Doelle. 2013. Cultural Resources Priority Area Planning in Sub-Mogollon Arizona and New Mexico. Advances in Archaeological Practice 2. Society of American Archaeology.

LeBlanc, S.A., and M.E. Whalen. 1980. An Archaeological Synthesis of South-central and Southwestern New Mexico. Albuquerque: University of New Mexico, Office of Contract Archaeology.

Lekson, S.H. 1985. Archaeological Reconnaissance of the Rio Grande Valley, Sierra County, New Mexico. Santa Fe: New Mexico State Historic Preservation Division.

———. 1992. Archaeological Overview of Southwestern New Mexico. Tularosa: Human Systems Research Inc.

Lindsay, E.H. 1984. Windows to the Past: Fossils of the San Pedro Valley. Field Notes from the Arizona Bureau of Geology and Mineral Technology, Earth Sciences and Mineral Resources, Arizona 14(4).

Little, B., E.M. Seibert, J. Townsend, J.H. Sprinkle, Jr., and J. Knoerl. 2000. Guidelines for Evaluating and Registering Archaeological Properties. National Register Bulletin No. 36. Washington D.C.: U.S. Department of the Interior, National Park Service.

Lowry, J.H, Jr., R.D. Ramsey, K. Boykin, D. Bradford, P. Comer, S. Falzarano, W. Kepner, J. Kirby, L. Langs, J. Prior-Magee, G. Manis, L. O'Brien, T. Sajwaj, K.A. Thomas, W. Rieth, S. Schrader, D. Schrupp, K. Schulz, B. Thompson, C. Velasquez, C. Wallace, E. Waller, and B. Wolk. 2005. Southwest Regional Gap Analysis Project: Final Report on Land Cover Mapping Methods. Logan, Utah: RS/GIS Laboratory, Utah State University.

Lucas, S.G., and A.B. Heckert. 2005. Distribution, age and correlation of cretaceous fossil vertebrates from Arizona. New Mexico Museum of Natural History and Science Bulletin 29:105–110.

Lucas, S.G., B.S. Kues, S.N. Hayden, B.D. Allen, K.K. Kietzke, T.E. Williamson, P. Sealey, and R. Pence. 1988. Cretaceous stratigraphy and biostratigraphy, Cookes Range, Luna County, New Mexico. New Mexico Geological Society Guidebook, 39th Field Conference, Southwestern New Mexico.

Lucas, S.G., C. Lewis, W.R. Dickinson, and A.B. Heckert. 2005. The Late Cretaceous Tucson Mountains Dinosaur. New Mexico Museum of Natural History and Science Bulletin 29:111–113.

Luna County. 1994. Ordinance Establishing the Luna County Natural Resources Planning and Review Process.

———. 1999. Comprehensive Plan for Luna County, New Mexico 2000 – 2020. Available at: http://lunacountynm.us/News%20Flyers/Binder1.pdf. Accessed August 22, 2013.

———. 2010. Luna County Building Code. Ordinance Number 75. Adopted August 12, 2010.

MacNeish, R.S., and Patrick H.B. 1987. The Archaic Chihuahua Tradition of South-central New Mexico and Chihuahua, Mexico. Monograph No. 7. Las Cruces: COAS Publishing and Research.

Madsen, J.H. 2012. Lost Spanish Trails: The Expedition of Don José de Zuñiga. Web Exhibition, Arizona State Museum, Tucson. Available at: http://www.statemuseum.arizona.edu/exhibits/lostspanishtrails/index.shtml. Accessed May 31, 2012.

Marcellus Shale Education & Training Center. 2011. Economic Impacts of Marcellus Shale in Pennsylvania: Employment and Income in 2009. Marcellus Shale Education & Training Center. August 2011.

Maricopa Association of Governments (MAG). 2009. MAG Eight-hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area. February 2009.

Martin, Maria/Galileo Project LLC. 2013. Personal communication with Donna Morey/SWCA Incorporated. Comments on Cultural Team notes. October 3.

Masse, W.B. 1981. A Reappraisal of the Protohistoric Sobaipuri Indians of Southeastern Arizona. In The Protohistoric Period in the North American Southwest, a.d. 1450-1700, edited by D.R. Wilcox and W.B. Masse, pp. 28–56. Anthropological Research Papers No. 24. Tempe: Arizona State University.

McGann and Associates. 1994. Cienega Creek Natural Preserve Management Plan. Prepared for the Pima County Regional Flood Control District. Available at: http://rfcd.pima.gov/wrd/landmgt/cienegapreserve/. Accessed July 2013.

McLemore, V.T. 1998. A summary of the Mineral Resources in Dona Ana County, New Mexico. New Mexico Bureau of Mines and Mineral Resources. Available at: http://nmgs.nmt.edu/publications/guidebooks/downloads/49/49_p0299_p0307.pdf. Accessed July 19, 2013.

McLemore, V.T., D.M. Stuphin, D.R. Hack, and T.C. Pease. 1996. Mining History and Mineral Resources of the Mimbres Resource Area, Dona Ana, Luna, Hidalgo, and Grant Counties, New Mexico. Open-file Report OF-424. New Mexico Bureau of Mines and Mineral Resources. Socorro, NM. Available at: http://geoinfo.nmt.edu/publications/openfile/downloads/ofr400-499/400-425/424/ofr_424.pdf. Accessed July 19, 2013.

McLemore, V.T., G.K. Hoffman, M. Mansell, G.R. Jones, C.B. Krueger, and M. Wilks. 2005. Mining Districts in New Mexico. Open-file Report 494. New Mexico Bureau of Geology and Mineral Resources. Socorro: New Mexico Institute of Mining and Technology.

Menke, K. 2008. Locating Potential Cougar (Puma concolor) Corridors in New Mexico Using a Least-Cost Path Corridor GIS Analysis. Prepared for New Mexico Department of Game and Fish. May.

Mesilla Valley Economic Development Alliance. 2013. Available at: http://www.mveda.com/. Accessed July, 17, 2013.

Minnis, P. 1980. The Archaic in Southern New Mexico. In An Archaeological Synthesis of South-central and Southern New Mexico (draft), edited by S. LeBlanc and M. Whalen, pp. 64–102. Albuquerque: University of New Mexico, Office of Contract Archaeology.

Mitchusson, T. 2003. Long-Range Plan for the Management of Sandhill Cranes in New Mexico 2003-2007. New Mexico Department of Game and Fish. Available at: http://www.wildlife.state.nm.us/conservation/waterfowl_aerial_survey/documents/sandhill_crane_plan.pdf. Accessed July 2013.

Montana Board of Crime Control. 2013. Social Impacts of Oil and Gas Development on Eastern Montana Communities. July 2013.

Moore, D. 2012. Geologist, Bureau of Land Management. Personal communication with Levi Pratt, CH2M Hill. October 16.

Morgan, G.S., and S.G. Lucas. 2003. Mammalian biochronology of Blancan and Irvingtonian (Pliocene and Early Pleistocene) faunas from New Mexico. Bulletin of the American Museum of Natural History 270:269–320.

Morgan, G.S., and R.S. White, Jr. 2005. Miocene and pliocene vertebrates from Arizona. In Vertebrate Paleontology in Arizona, edited by A.B. Heckert and S.G. Lucas, pp. 115–136. New Mexico Museum of Natural History and Science Bulletin 29.

Mueller, J.W. 1974. The Use of Sampling in Archaeological Survey. Memoirs of the Society for American Archaeology, No. 28. American Antiquity 39(2) Part 2.

Myrick, D.F. 1975. Railroads of Arizona Volume I. The Southern Roads. Berkeley: Howell-North Books.

———. 1990. New Mexico's Railroads: A Historical Survey. University of New Mexico Press, Albuquerque. National Audubon Society. 2013. Site Profile: Wilcox Playa / Cochise Lakes. Available at: http://netapp.audubon.org/IBA/Reports/2294. Accessed August 2013.

National Institute of Invasive Species Science (NIISS). 2013. Invasive species website with maps. Available at: http://www.niiss.org/cwis438/Browse/BrowseData.php?WebSiteID=1. Accessed July 18, 2013.

National Land Cover Database. 2006. National land cover data and category definitions. Available at: http://www.mrlc.gov/. Accessed September 20, 2012.

National Park Service (NPS). 1996. Juan Bautista de Anza National Historic Trail Comprehensive Management and Use Plan. Available at: http://www.nps.gov/juba/parkmgmt/juba-cmp.htm. Accessed July 2013.

———. 1997. National Register Bulletin: How to Apply the National Register Criteria for Evaluation. Washington D.C.: National Park Service.

———. 2002. Determination of eligibility notification: Mt. Graham (NRHP). Washington D.C.:

———. 2006. Juan Bautista de Anza National Historic Trail Comprehensive Management and Use Plan. Washington D.C.: National Park Service.

———. 2008. Saguaro National Park. Available at: http://www.nps.gov/sagu/parkmgmt/upload/SAGU_Abbrev_WEB_part1.pdf. Accessed July 2013.

———. 2010a. National Trails System. Available at: www.nps.gov/nts. Accessed July 2013.

———. 2010b. Desert Network Air Quality Monitoring Brief. 2010. Available at: http://science.nature.nps.gov/im/units/sodn/assets/docs/Briefs/Brief_AQ_SAGU_V_2010.pdf. Accessed July 26, 2013.

———. 2012. Willcox Playa. Available at: http://nature.nps.gov/nnl/site.cfm?Site=WIPL-AZ. Accessed September 2012.

———. 2013. Butterfield Overland Trail Special Resource Study/Environmental Assessment. Available at: http://parkplanning.nps.gov/projectHome.cfm?projectID=33568. Accessed January 2013.

National Renewable Energy Laboratory (NREL). 2011. Transmission Planning Process and Opportunities for Utility-Scale Solar Engagement within the Western Electricity Coordinating Council (WECC). Technical Report NREL/TP-5500-51279. Golden, Colorado. November 2011.

National Research Council. 1994. Rangeland Health: New Methods to Classify, Inventory, and Monitor Rangelands. National Research Council. Available at: www.nap.edu/catalog/2212.html.

National Wildfire Coordinating Group. 2007. Pocket card data. Bureau of Land Management, Stafford Field Office. Available at: http://fam.nwcg.gov/fam-web/pocketcards/pocketcards.htm#. Accessed. July 2013.

Nations, J.D., D.J. Brennan, and R.A. Ybarra. 1989. Oil and gas in Arizona. In Geologic Evolution of Arizona: Arizona Geological Society Digest 17, edited by J.P. Jenney and S.J. Reynolds, pp. 795–815.

Natural Resources Conservation Service (NRCS). 2003a. National Range and Pasture Handbook. U.S. Department of Agriculture, Natural Resources Conservation Service. Available at: www.nrcs.usda.gov/Internet/fse_documents/stelprdb1043055.pdf. Accessed October 15, 2013 via a Google-cached version of the webpage.

———. 2003b. New Mexico State-Listed Noxious Weeds. Available at: http://plants.usda.gov/java/noxious?rptType=State&statefips=35. Accessed July 18, 2013.

———. 2006. Arizona State-Listed Noxious Weeds. Available at: http://plants.usda.gov/java/noxious?rptType=State&statefips=04. Accessed July 18, 2013.

———. 2012a. NRCS Soil Survey Geographic (SSURGO) database and GIS shape files. Available at: http://soildatamart.nrcs.usda.gov/. Accessed March 2012.

———. 2012b. Farmland Protection Policy Act. Information on their Farmland Conversion Impact Rating Form. Available at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/fppa/?&cid=nrcs143_008275 Accessed October 2012.

———. 2013a. Soil Survey Geographic (SSURGO) Database for [Survey Area, State]. Available at: http://soildatamart.nrcs.usda.gov. Accessed July 28, 2011.

———. 2013b. U.S. General Soil Map (STATSGO2). Available at: http://soildatamart.nrcs.usda.gov. Accessed April 24, 2012.

———. 2013c. National soil survey handbook, title 430-VI. amended September, 2013. U.S. Department of Agriculture, Natural Resources Conservation Service. Available at: http://soils.usda.gov/technical/handbook. Accessed October 15, 2013.

———. 2013d. The PLANTS Database. Available at: http://plants.usda.gov/java/. Accessed July 18, 2013.

Nelson, M.C. 1980. Paleo-Indian. In An Archaeological Synthesis of South-central and Southern New Mexico (draft), by Steven LeBlanc and Michael Whalen, pp. 36–62. Albuquerque: University of New Mexico, Office of Contract Archaeology.

New Mexico Department of Agriculture. 2009. Noxious weed list. Available at: http://nmdaweb.nmsu.edu/quick-reference/New%20Mexico%20Noxious%20Weed%20List%20Update.html. Accessed July 18, 2013.

———. 2013. Noxious Weed Control Act. Available at: http://www.nmda.nmsu.edu/wp-content/uploads/2012/04/Noxious-Weed-Control-Act.pdf. Accessed July 18, 2013.

New Mexico Department of Finance and Administration. 2013. Budget and Finance Bureau: Property Taxes and Annual Reports. Available at: http://nmdfa.state.nm.us/Certificate_of_Property_Tax.aspx. Accessed July 17, 2013.

New Mexico Department of Game and Fish (NMDGF). 2006. Comprehensive Wildlife Conservation Strategy for New Mexico. Santa Fe, New Mexico.

———. 2007. Guidelines and Recommendations for Burrowing Owl Surveys and Mitigation. July 2007. Available at: http://www.wildlife.state.nm.us/conservation/habitat_handbook/documents/2007burrowingowlfinalfinal.pdf. Accessed December 10, 2013.

———. 2010. Biotic Information System of New Mexico (BISON-M). Species abstract: squirrel, ground, spotted (Spermophilus spilosoma). Available at: http://www.bison-m.org/booklet.aspx?id=050795. Accessed July 18, 2013.

———. 2013. New Mexico Hunting Rules and Information, License year 2013-2014.

New Mexico Energy, Minerals, and Natural Resources Department (EMNRD). 1995. Title 19, Chapter 21, Part 2; Endangered Plants. Available at: http://www.emnrd.state.nm.us/SFD/ForestMgt/documents/19212NMACCleanIntegrated.pdf. Accessed July 18, 2013.

New Mexico Environmental Department (NMED). 2004. Air Quality Bureau Dona Ana County, New Mexico. Available at: http://www.nmenv.state.nm.us/aqb/Control_Strat/sip/dona_ana_county_new_mexico.html. Accessed July 2013.

———. 2013. Hazardous Waste Bureau. Available at: http://www.nmenv.state.nm.us/HWB/. Accessed June 21, 2013.

New Mexico Museum of Natural History and Science Paleontology Web-based Paleo-database (NMMNH). 2012. Locality search. Available at: http://www.nmfossils.org/. Accessed March 23, May 25, and June 6, 2012.

New Mexico Office of the State Engineer (NMOSE). 2013a. New Mexico Water Rights Reporting System, Lower Rio Grande Basin. Available at: http://nmwrrs.ose.state.nm.us/nmwrrs/disclaimer.html. Accessed July 4, 2013.

———. 2013b. New Mexico Water Rights Reporting System, Mimbres Basin. Available at: http://nmwrrs.ose.state.nm.us/nmwrrs/disclaimer.html. Accessed July 4, 2013.

———. 2013c. New Mexico Water Rights Reporting System, Hatchita Basin. Available at: http://nmwrrs.ose.state.nm.us/nmwrrs/disclaimer.html. Accessed July 4, 2013.

———. 2013d. New Mexico Water Rights Reporting System, Animas Basin. Available at: http://nmwrrs.ose.state.nm.us/nmwrrs/disclaimer.html. Accessed July 4, 2013.

New Mexico Public Regulation Commission. 2013. New Mexico Transmission Siting Information. Available at: http://www.westgov.org/wieb/transmission/state-province/New_Mexico.pdf. Accessed July 2013.

New Mexico Rare Plant Technical Council (NMRPTC). 2013. Agency status of New Mexico rare plants. Available at: http://nmrareplants.unm.edu/agency.php. Accessed July 18, 2013.

New Mexico Taxation and Revenue Department. 2013. Monthly Local Government Distribution Reports (RP-500). Available at: http://www.tax.newmexico.gov/Tax-Library/Economic-and-Statistical-Information/Pages/Monthly-Local-Government-Distribution-Reports-RP-500.aspx. Accessed July 17, 2013.

New Mexico Workforce Connection. 2013. Available at: https://www.jobs.state.nm.us/vosnet/Default.aspx. Accessed July 17, 2013.

Norris, F. 2013. Butterfield Overland Trail (proposed National Historic Trail) Significance Statement (draft). Paper presented by the National Park Service's National Trails Intermountain Region to the Landmarks Committee of the National Park Service Advisory Board.

North American Electric Reliability Corporation (NERC). 2006. Standards. Available at: http://www.nerc.com/page.php?cid=2|247. Accessed November 2012.

Northern Arizona University. 2011a. Arizona Heritage Waters. Available at: http://www.azheritagewaters.nau.edu. Accessed July 2013.

———. 2011b. Arizona Heritage Waters—Willcox Playa. Available at: http://www.azheritagewaters.nau.edu/loc_wilcox_playa.html. Accessed July 2013.

Occupational Safety and Health Administration (OSHA). 2012. General fact sheet. Available at: http://www.osha.gov/OshDoc/data_General_Facts/factsheet-jobrelated.pdf. Accessed November 2012.

Opler, M.E. 1983. The Apachean Culture Pattern and its Origins. In Southwest, edited by Alfonso Ortiz, pp. 368–392. Handbook of North American Indians, Vol. 10, William G. Sturtevant, general editor. Washington, D.C.: Smithsonian Institution.

Pailes, R.A. 1978. The Rio Sonora Culture in Prehistoric Trade. In Across the Chichimec Sea, edited by Carroll L. Riley and Basil C. Hedrick, pp. 134–143. Carbondale: Southern Illinois University Press.

PaleoBiology Database (Paleobiology). 2012. Locality search. Available at: http://paleodb.org/. Accessed June 6, 2012.

Parker, P.L., and T.F. King. 1998. Guidelines for Evaluating and Documenting Traditional Cultural Properties. National Register Bulletin No. 38. Washington, D.C.: U.S. Department of the Interior, National Park Service.

Pearthree, P.A., C.A. Ferguson, W.G. Gilbert, and S.J. Skotnicki. 2000. Geologic map and geologic hazards of the Three Points quadrangle, Pima County, Arizona. Arizona Geological Survey Digital Geologic Map 4.

Peirce, H.W. 1982. The search for petroleum in Arizona. Tucson: Arizona Bureau of Geology and Mineral Technology. Fieldnotes 12(2):1–5.

Pima Association of Governments. 2012. 2040 Regional Transportation Plan.

Pima County Regional Flood Control District. 2010. Floodplain and Erosion Hazard Management Ordinance.

Pima County. 1992 (amended through 2009). Pima County Comprehensive Plan.

———. 2006. An Ordinance of the Board of Supervisors of Pinal County, Arizona, to be known as the Pinal County Excessive Noise Ordinance. Ordinance No. 050306-ENO.

———. 2008. Natural Resources, Parks, and Recreation Department. Tucson Mountain Park Management Plan Report. May 2008.

———. 2009. Sonoran Desert Conservation Plan—A Long Term Vision for Protecting the Heritage and Natural Resources of the West. Available at: http://www.pima.gov/cmo/sdcp/index.html. Accessed June 26, 2013.

———. 2010. Multi-Species Conservation Plan: Administrative Draft. Submitted to the U.S. Fish and Wildlife Service. Tucson.

———. 2011. Protecting Our Land, Water, and Heritage: Pima County's Voter-Supported Conservation Efforts. Tucson. Available at: http://www.pima.gov/cmo/admin/Reports/ConservationReport/PDF/POL_sm.pdf. Accessed July 2013.

———. 2012a. Sonoran Desert Conservation Plan Supplement. Available at: http://www.pima.gov/CMO/SDCP/ . Accessed July 2013.

———. 2012b. Protecting Our Land, Water, and Heritage: Pima County's Voter-Supported Conservation Efforts, Bar V Ranch. Available at: http://www.pima.gov/cmo/admin/Reports/ConservationReport/PDF/Chapters/Reserves/Bar%20V%20Ranch.pdf. Accessed July 2013.

———. 2013. Title 17, Pima County Code, Chapter 17.12. Permits and Permit Revisions. Accessed June 18, 2013.

Pinal County. 1991. Pinal Airpark Master Plan. Available at: http://www.azdot.gov/planning/airportdevelopment/airports. Accessed July 2013.

———. 2007. "Open Space and Trails Plan." Amended 2007. Available at: http://pinalcountyaz.gov/DEPARTMENTS/PLANNINGDEVELOPMENT/Pages/TrailsPlan.asp. Accessed July 2013.

———. 2010a. Pinal County Comprehensive Plan. March.

———. 2010b. Pinal County Air Quality Control District. Dust Control Fact Sheet. June 2010.

———. 2011. "Pinal County Zoning Ordinance." Combined Ordinances, October 2011.

Pipeline and Hazardous Materials Safety Administration (PHMSA). 2012. Regulations. Available at: http://phmsa.dot.gov/regulations. Accessed June 21, 2013.

Plog, S. 1976. Relative Efficiencies of Sampling Techniques for Archaeological Surveys. In The Early Mesoamerican Village, edited by K.V. Flannery. New York: Academic Press.

Plog, S., F. Plog, and W. Wait. 1978. Decision Making in Modern Surveys. In Advances in Archaeological Method and Theory 1:383–421.

Potter, E.W., and B.M. Boland. 1992. Guidelines for Evaluating and Registering Cemeteries and Burial Places. National Register Bulletin No. 41. Washington, D.C.: U.S. Department of the Interior, National Park Service.

Public Law 96-550: New Mexico Wilderness Act of 1980. Section 105. 96th Congress; enacted December 19, 1980. Available at: http://www.gpo.gov/fdsys/granule/STATUTE-94/STATUTE-94-Pg3221/content-detail.html. Accessed August 2013.

Public Law 98-406: Arizona Wilderness Act of 1984. Section 101 (d). 98th Congress; enacted August 28, 1984. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nlcs/anza.Par.13363.File.dat/pl-98-406-az-wild-summary.pdf. Accessed August 2013.

Public Law 101-628: Arizona Desert Wilderness Act of 1990. Section 101 (d). 101st Congress; enacted November 28, 1990. Available at: http://www.azgfd.gov/pdfs/w_c/bhsheep/PL101-628_az_desert_wild_act.pdf. Accessed August 2013.

Ratkevich, R. 2012. Fossils of Arizona. Available at: http://www.t-rat.com/Pages/WhereToFindFossils.html. Accessed May 25, 2012.

Rauzi, S. 2012. Oil and Gas Administrator, Arizona Geological Survey. Personal communication with Levi Pratt, CH2M Hill. October 12.

Rauzi, S.L. 2001. Arizona has oil and gas potential! Arizona Geological Survey Circular 29.

Reff, D.T. 1981. The Location of Corazones and Senora: Archaeological Evidence from the Rio Sonora Valley, Mexico. In The Protohistoric Period in the North American Southwest, AD 1450-1700, edited by David R. Wilcox and W. Bruce Masse, pp. 94–112. Anthropological Research Paper No. 24. Tempe: Arizona State University.

Regional Plan Policy 6 Environmental Element. 2005. Conservation Land System: Regional Plan Policy 6 Environmental Element. Available at: http://www.pimaxpress.com/Planning/ComprehensivePlan/PDF/CLS/CLS_Adopted_Policy.pdf. Accessed July 2013.

Richard, S.M., S.J. Reynolds, J.E. Spencer, and P.A. Pearthree. 2000. Geologic map of Arizona: Arizona Geological Survey Map 35. Scale 1:1,000,000.

Richter, D.H., D.P. Klein, and V.A. Lawrence. 1982. Mineral resource potential of the Gila-San Francisco Wilderness Study Area, Graham and Greenlee Counties, Arizona. U.S. Geological Survey Miscellaneous Field Studies Map MF-1315-B with pamphlet.

Roxberry, T. 2013. Director, USA Electronic proving Ground. Personal communication with Doug Patterson, Black Forest Partners. March 1.

Salazar, John/County of Hidalgo County Manager, 2011. Personal communication with Corinne Lytle Bonine/CH2M Hill. August 9.

San Pedro Golf Course. 2012. Personal communication with Beth Storelli/CH2M Hill. September 28.

Sauer, C.O., and D. Brand. 1930. Pueblo Sites in Southeastern Arizona. University of California Publications in Geography 3(6):339–414.

Sayles, E.B., and E. Antevs. 1941. The Cochise Culture. Medallion Papers No. 29. Globe, Arizona: Gila Pueblo.

Schiffer, M.B., A.P. Sullivan, and T.C. Klinger, 1978. The Design of Archaeological Surveys. World Archaeology 10(1):1–28.

Scholle, P.A. 2003. Geologic map of New Mexico. Scale 1:500,000. New Mexico Bureau of Geology and Mineral Resources.

Schuman, H.H., and R.B. Guinaldi. 1986. Land subsidence, earth fissures, and water-level change in southern Arizona. Arizona Bureau of Geology and Mineral Technology, Open-File Report 86-14. Scale 1:500,000.

Seymour, D.J. 2007. An Archaeological Perspective on the Hohokam-Pima Continuum. Old Pueblo Archaeology Bulletin No. 51 (December 2007):1–7.

———. 2011a. Where the Earth and Sky are Sewn Together: Sobaipuri-O'odham Contexts of Contact and Colonialism. Salt Lake City: University of Utah Press.

———. 2011b. 1762 On the San Pedro: Reevaluating Sobaípuri-O'odham Abandonment and New Apache Raiding Corridors. The Journal of Arizona History 52(2):169–188.

Silverbell Municipal Golf Course. 2012. Personal communication with Beth Storelli/CH2M Hill. September 28.

Silver City. 2004. A History of the Santa Rita Mine. Silver City: Grant County-Chamber of Commerce.

Slaughter, M.C., and H. Roberts (eds.) 1996. Excavations at the Gibbon Springs Site: A Classic Period Village in the Northeastern Tucson Basin. Archaeological Report No. 94-87. Tucson: SWCA Environmental Consultants.

Smith, M. 2012. Geologist, Bureau of Land Management. Personal communication with Levi Pratt, CH2M Hill. October 12.

Society of Vertebrate Paleontology. 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontological Resources: Standard Guidelines. Society of Vertebrate Paleontology News Bulletin 163:22–27.

———. 2008. Best Practices from the Ethics Education Committee Regarding Research, Publication, and Museum Work. Available at: http://vertpaleo.org/PDFS/59/59432f7a-fe38-40b7-a118-cb56012ba32d.pdf. Accessed July 1, 2013.

South East Arizona Governmental Organization. 2013. Available at: http://www.azdot.gov/projects/southeast/arizona-sonora-border-master-plan/overview. Accessed July 2013.

Southline Transmission, LLC (Southline). 2012a. Southline Transmission Project Routing Report. April 2012.

———. 2012b. Unpublished terrain and access table. Southline Engineering Team. October 8, 2012

———. 2013. Amended Plan of Development for the Southline Transmission Project. July 2013.

Southwest New Mexico Council of Governments. 2007. Long Range Transportation Plan.

Southwestern Regional Gap Analysis Project (SWReGAP). 2013. Provisional landcover and related datasets. Available at: http://earth.gis.usu.edu/swgap/. Accessed July 18, 2013.

Stuart, D.E., and R.P. Gauthier. 1981. Prehistoric New Mexico: Background for Survey. Santa Fe: Historic Preservation Division.

SWCA Environmental Consultants (SWCA). 2012. Proposed Southline Transmission Line Project Environmental Impact Statement Scoping Summary. Phoenix. Available at: http://www.blm.gov/nm/st/en/prog/more/lands_realty/southline_ transmission.html.

Talbot, D. 2002 [1992]. A Historical Guide to the Mormon Battalion and Butterfield Trail. Westernlore Press, Tucson.

Tainter, J.A., and F. Levine. 1987. Cultural Resources Overview, Central New Mexico. Albuquerque: U.S. Forest Service; Santa Fe: Bureau of Land Management.

Tegowski, B.J., and R.S. White. 2000. Proboscidean Fossils from the San Simon River Valley, Graham and Cochise Counties, Arizona. In Southwest Paleontological Symposium, Proceedings 2000, McCord, R.D., and D. Boaz (Eds.) pp. 101–111, Mesa Southwest Museum Bulletin Number 7.

Terracon. 2003. The New Mexico Lower Rio Grande Regional Water Plan. Final report prepared for The Lower Rio Grande Water Users Organization. December.

Thrapp, D.L. 1974. The Conquest of Apacheria. Norman: University of Oklahoma Press.

Thrasher, L. 2013. Bureau of Land Management. Personal communication. Comments on the CH2M Hill resource report. May 13, 2013.

Town of Marana. 2007. Airport Master Plan. Available at: http://www.azdot.gov/planning/airportdevelopment/airports. Accessed July 2013.

———. 2010. "Marana General Plan." Adopted 2010.

Trapp, R.A., and S.J. Reynolds. 1995. Map showing names and outlines of physiographic areas in Arizona. Arizona Geological Survey Open File Report 95-02a. Scale 1:1,000,000.

Tucson Airport Authority (TAA). 2013. Available at: http://www.tiamasterplan.com/. Accessed July 2013.

Tucson Audubon Society. 2013. Priority IBA – Lower San Pedro River. Potential for conservation and protection in southern Arizona Available at: http://tucsonaudobon.org/what-we-do/conservation/aziba/145.html. Accessed December 2013.

Tucson Regional Economic Opportunities. 2013. Available at: http://www.treoaz.org/index.aspx. Accessed July 17, 2013.

U.S. Bureau of Reclamation (Reclamation). 2103. Lower Colorado River Region. Available at: http://www.usbr.gov/lc/phoenix/programs/progdescon.html. Accessed July 2013.

U.S. Census Bureau (Census Bureau). 2000. Census 2000 Summary File (SF 3) 100 percent data. Available at: http://www.census.gov/main/www/cen2000.html. Accessed June 26, 2013.

———. 2010a. Census 2010 Summary File (SF 3) 100 percent data. Available at: http://factfinder2.census.gov. Accessed June 26, 2013.

———. 2010b. Census 2010 Summary File (SF 1) 100 percent data. Available at: http://factfinder2.census.gov. Accessed July 15, 2013.

———. 2010c. American Community Survey (ACS) 2006-2010. Available at: http://www.census.gov/acs/www/. Accessed August 12, 2013.

———. 2011. American Community Survey (ACS) 2007-2011. Available at: http://www.census.gov/acs/www/. Accessed June 26, 2013.

———. 2012. Poverty Thresholds. Available at: http://www.census.gov/hhes/www/poverty/data/threshld/index.html. Accessed September 1, 2012.

———. 2013a. American FactFinder 2000 and 2010 Census Summary File. Available at: http://factfinder2.census.gov/rest/dnldController/deliver?_ts=386014989538. Accessed May 7, 2013.

———. 2013b. State and County Quick Facts, Tucson Arizona. Available at: http://quickfacts.census.gov/qfd/states/04/0477000.html. Accessed August 22, 2013.

U.S. Department of Commerce, National Telecommunications and Information Administration. 2013. Manual of Regulations and Procedures for Federal Radio Frequency Management. Available at: http://www.ntia.doc.gov/page/2011/manual-regulations-and-procedures-federal-radio-frequency-management-redbook. Accessed August 2013.

U.S. Department of Energy (DOE). 2006. National Electric Transmission Congestion Study. August 2006.

———. 2009. National Electric Transmission Congestion Study. December 2009.

———. 2013a. Database of State Incentives for Renewables & Efficiency (DSIRE). 2013. Available at http://dsireusa.org/rpsdata/index.cfm. Accessed September 30, 2013.

———. 2013b. Written correspondence Memorandum on Southline Project. November 13, 2013.

U.S. Department of Energy (DOE) and Bureau of Land Management (BLM). 2008. Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States (DOE/EIS-0386). Washington, D.C. November 2008. Available at: http://corridoreis.anl.gov/news/index.cfm

U.S. Department of Labor, Bureau of Labor Statistics (BLS). 2012a. Industries at a Glance: Construction: NAICS 23. Available at: http://www.bls.gov/iag/tgs/iag23.htm. Accessed July 2013.

———. 2012b. Injuries, Illnesses and Fatalities Program. Available at: http://www.bls.gov/iif/. Accessed November 2012.

U.S. Department of State: Office of the Historian. 2013. Gadsden Purchase. Available at: http://history.state.gov/ milestones/1830-1860/GadsdenPurchase. Accessed July 17, 2013.

U.S. Department of Transportation (USDOT), Federal Highway Administration. 1985. National Scenic Byway Program: Patagonia-Sonoita Scenic Road. Available at: http://byways.org/explore/byways/11288/. Accessed July 2013.

U.S. Department of Transportation (USDOT), Federal Railroad Administration. 2005. High-Speed Ground Transportation Noise and Vibration Impact Assessment. October, 2005.

U.S. Department of Transportation (USDOT), Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. April. Available at: http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf. Accessed June 2013.

U.S. Environmental Protection Agency (EPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, EPA-550/9-74-004. March.

———. 1994. Federal actions to address environmental justice in minority populations and low-income populations. Federal Register 59(32):7629–7633. February 11.

———. 1995. Designation of area for air quality planning purposes; New Mexico; designation of Sunland Park ozone nonattainment area. Federal Register June 12, 1995.

———. 1999. Regional Haze Regulations; Final Rule. FRL-6353-4 40 CFR Part 51. July 1,1999. Available at: http://www.epa.gov/ttn/oarpg/t1/fr_notices/rhfedreg.pdf. Accessed June 2013.

———. 2000. Tucson meets carbon monoxide national health standard. April 24, 2000. Available at: http://yosemite.epa.gov/opa/admpress.nsf/8b75cea4165024c685257359003f022e/b289229eaf0f5e46852570d8005e13be!OpenDocument. Accessed June 2013.

———. 2003. Guidance for Estimating Natural Visibility Conditions under the Regional Haze Rule. EPA-454/B-03005. September. 2004.

———. 2008. Approval and promulgation of air quality implementation plans; designation of areas for air quality planning purposes; Arizona; San Manuel sulfur dioxide state implementation plan and request for redesignation to attainment. Federal Register January 18, 2008.

———. 2012a. Climate change basics. Available at: http://www.epa.gov/climatechange/basics/#responsible. Accessed June 6, 2012.

———. 2012b. Federal Register: Determination of Attainment for the Paul Spur/Douglas PM10 Nonattainment Area, Arizona; Determination Regarding Applicability of Clean Air Act Requirements. August 2, 2012.

———. 2013a. National Ambient Air Quality Standards (NAAQS). Available at: http://www.epa.gov/air/criteria.html. Accessed June 11, 2013

U.S. Fish and Wildlife Service (FWS). 2008. Memorandum: Expectations for Consultations on Actions that Would Emit Greenhouse Gases. May 14, 2008.

———. 2011. Guidance on Bird and Bird and Bat Conservation Strategies.

———. 2013a. Arizona Ecological Services. Threatened and Endangered species (by county). Available at: http://www.fws.gov/southwest/es/arizona/Threatened.htm. Accessed July 18, 2013.

———. 2013b. New Mexico Listed and Sensitive species lists (by county). Available at: http://www.fws.gov/southwest/es/newmexico/SBC_intro.cfm. Accessed July 18, 2013.

U.S. Forest Service. 1982. Wildlife and fish. In Analysis of the Management Situation for the Coronado National Forest Plan, pp. 83–101. On file, Coronado National Forest, Tucson.

———.1986a. Coronado National Forest Land and Resource Management Plan. Tucson: U.S. Forest Service, Southwestern Region. Available at: http://www.fs.fed.us/r3/coronado/forest/documents/cnfplan/cnf_lrmp_with_2005_amendments_current05212007-optimized.pdf. Accessed July 2013.

———. 1986b. Recreation Opportunity Spectrum Field Guide. Available at: http://www.fs.fed.us/cdt/carrying_capacity/rosfieldguide/ros_primer_and_field_guide.htm. Accessed July 2013. ———. 1991. Forest Service Manual 2620.5—Wildlife, Fish, and Sensitive Plant Habitat Management. Washington, D.C.

———. 2005. Forest Service Manual 2670.12—Threatened, Endangered and Sensitive Plants and Animals. Washington, D.C.

———. 2007. Sensitive Plants (9/21/07). Available at: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_021246.pdf. Accessed July 18, 2013.

———. 2009. Continental Divide National Scenic Trail Comprehensive Plan. Available at: http://www.fs.fed.us/cdt/. Accessed July 2013.

———. 2010. Southwestern region climate change trends and forest planning: a guide for addressing climate change in forest plan revisions for Southwestern National Forests and Grasslands. Available at: http://www.fs.fed.us/rm/pubs_other/rmrs_2009_periman_r001.pdf. Accessed July 26, 2013.

———. 2012. USFS Rangeland Laws, Regulations, and Policies. Available at: http://www.fs.fed.us/rangelands/whoweare/lawsregs.shtml. Accessed October 2012.

U.S. Geological Survey (USGS). 2003. A tapestry of time and terrain. Available at: http://nationalatlas.gov/tapestry/physiogr/physio.html. Accessed August 2, 2013.

———. 2012a. Quaternary Fault and Fold database. Available at: http://earthquake.usgs.gov/hazards/qfaults/. Accessed October 17, 2012.

———. 2012b. New Mexico Earthquake History. Available at: http://earthquake.usgs.gov/earthquakes/states/new_mexico/history.php. Accessed October 17, 2012.

———. 2012c. Earthquake Hazards Program. Available at: http://earthquake.usgs.gov/earthquakes/states. Accessed October 17, 2012.

———. 2012d. Volcano Hazards Program. Available at: http://volcanos.usgs.gov. Accessed October 17, 2012.

———. 2013a. Mineral resources on-line spatial data – geologic maps of U.S. States. Available at: http://tin.er.usgs.gov/geology/state. Accessed July 11, 2013.

———. 2013b. National Water Information System, Mimbres River near Spalding, USGS Gage 08477530. Available at: http://waterdata.usgs.gov/nwis. Accessed July 4, 2013.

———. 2013c. National Water Information System, Mimbres River below Wamel Canal, USGS Gage 08478400. Available at: http://waterdata.usgs.gov/nwis. Accessed July 4, 2013.

———. 2013d. National Water Information System, San Simon River near San Simon, USGS Gage 09456000. Available at: http://waterdata.usgs.gov/nwis. Accessed July 4, 2013.

———. 2013e. National Water Information System, San Simon River near Bowie, USGS Gage 09456200. Available at: http://waterdata.usgs.gov/nwis. Accessed July 4, 2013.

———. 2013f. National Water Information System, San Pedro River near Benson, USGS Gage 09471800. Available at: http://waterdata.usgs.gov/nwis. Accessed July 4, 2013.

———. 2013g. National Water Information System, Cienega Creek near Pantano, USGS Gage 09484560. Available at: http://waterdata.usgs.gov/nwis. Accessed July 4, 2013.

———. 2013h. National Water Information System, Santa Cruz River near Continental, USGS Gage 09482000. Available at: http://waterdata.usgs.gov/nwis. Accessed July 4, 2013.

———. 2013i. National Water Information System, Santa Cruz River near Cortaro, USGS Gage 09486500. Available at: http://waterdata.usgs.gov/nwis. Accessed July 4, 2013.

U.S. Global Change Research Program. 2009. Global Climate Change Impacts in the United States. 2009.

Union Pacific Railroad (UPRR). 2012. Procedures for Encroachments. Available at: http://www.uprr.com/reus/wireline/procedur.shtml. Accessed October 16, 2012.

University of Arizona. 2008. Tumamoc Hill Cultural Resources Policy and Management Plan. Tucson: University of Arizona. September.

———. 2012. Arizona Standards for Rangeland Health and Guidelines for Grazing Administration. Available at: http://rangelandswest.arid.arizona.edu/rangelandswest/jsp/hottopics/legal/policy/azstandards/azstandardscontents.jsp. Accessed March 2012.

———. 2013. Tumamoc Hill. Website: http://www.tumamoc.org/ Accessed: August 1, 2013

University of California, Berkeley, Museum of Paleontology (UCMP). 2012. About the UCMP Collections Catalog. Available at: http://ucmpdb.berkeley.edu/about.shtml. Accessed March 23 and May 25, 2012.

University of New Mexico. 2013. Bureau of Business and Economic Research, Population Estimates and Projections. Available at: http://bber.unm.edu/demograp2.htm. Accessed June 26, 2013.

Upham, S. 1984. Adaptive diversity and southwestern abandonment. Journal of Anthropological Research 40:235–256.

Valentine, P., M. Weller, and J. Floyd. 2012. 500 kVa Power Line Radiated Emissions Study. United States Army Electronic Proving Grounds.

Wallace, H.D. 1995. Initial Archaeological Assessment of a Portion of the Knapp Parcel SE of the Confluence of the Rillito and Santa Cruz Rivers, Tucson, Arizona. Technical Report No. 95-111. Tucson: Desert Archaeology, Inc.

Waters, M.R. 1989. Late Quaternary Lacustrine History and Paleoclimatic Significance of Pluvial Lake Cochise, Southeastern Arizona. Quaternary Research 32: 1-12.

Weber, R.H. 1973. Geology of Mockingbird Gap Site in Central New Mexico. Paper presented to the Geological Society of America, Dallas.

———. 1997. Geology of Mockingbird Gap Site in Central New Mexico. Layers of Time, Papers in Honor of Robert H. Weber, edited by Meliha S. Duran and David T. Kirkpatrick, pp. 123–127. Albuquerque: The Archaeological Society of New Mexico.

Wengerd, S.A. 1970. Petroleum prospects in southwesternmost New Mexico. In Guidebook of the New Mexico Geological Society Twenty-first Field Conference, edited by L.A. Woodward, pp. 91–104. New Mexico Geological Society Twenty-first Field Conference, October 29, 30, and 31, 1970.

WestConnect. 2012a. WestConnect TTC/ATC Workshop. August 22 presentation.

———. 2012b. About WestConnect. Available at: http://www.westconnect.com/aboutwc.php. Accessed August 20, 2012.

Western Area Power Administration (Western). 2004. Environmental Management System Handbook. April.

———. 2008. Order DOE O 450.1A Environmental Protection Program. Available at: https://www.directives.doe.gov/directives/0450.1-BOrder-a/view. Accessed October 12, 2012.

———. 2012a. FY13 Ten-Year Capital Program. November 2012.

———. 2012b. Pollution Prevention Program. Available at: http://ww2.wapa.gov/sites/western/CorpSrvs/environment/Pages/envpoll.aspx. Accessed October 12, 2012.

———. 2013a. Western Area Power Administration Narrative Explanation of Zero ATC. Available at: http://www.oasis.oati.com/EPE/EPEdocs/Narrative_Explanation_for_Zero_ATC.pdf. Accessed July 2013.

Western Electricity Coordinating Council (WECC). 2011. SunZia Southwest Transmission Project WECC Accepted Path Rating Phase 2 Study Report. February 22

———. 2013. Interconnection-Wide Plan - Plan Summary. September 19.

Western Governors Association. 2010. Western Renewable Energy Zones. Available at: http://www.westgov.org/rtep/219. Accessed July 2013

West-wide Energy Corridor Programmatic EIS Information Center. 2012. Available at: http://corridoreis.anl.gov/index.cfm.

Wieringa, Mark/Western NEPA Document Manager. 2013. Personal communication of comments on ID Team EIS Review/BLM. September 25.

Wilderness Society. 2012. Factsheet on West-wide Energy Corridors: A new way forward. Available at: http://wilderness.org/resource/factsheet-west-wide-energy-corridors-new-way-forward. Accessed July 2013.

Wilcox, D.R. 1991. Hohokam Social Complexity. In Chaco and Hohokam: Prehistoric Regional Systems in the American Southwest, edited by P.L. Crown and W.J. Judge, pp. 253–275. Santa Fe: School of American Research Press.

Willey, G.R. 1966. An Introduction to American Archaeology: North and Middle America Vol. 1. Englewood Cliffs: Prentice-Hall.

Wilson, C., S. Hordes, and H. Walt. 1989. The South Central New Mexico Regional Overview: History, Historic Archaeology, Architecture, and Historic Preservation. Santa Fe: Historic Preservation Division.

Wilson, J.P. 1975. Historical Profile of Southwestern New Mexico. Report No. 21. Las Cruces: New Mexico State University, Cultural Resources Management Division.

———. 1996. Black Gold in the San Simon: Exploring for Oil in Southeastern Arizona, 1927–1931. John P. Wilson Report No. 75. Las Cruces, New Mexico. 22 pp.

Wings over Willcox. 2013. Species List. Available at: https://www.wingsoverwillcox.com/species.asp. Accessed July 18, 2013.

Witcher, J.C. 1979. A preliminary report on the geothermal energy potential of the Safford Basin southeastern Arizona. In Geothermal Reservoir Site Analysis in Arizona, edited by W.R. Hahman, Sr. Tucson: Arizona Bureau of Geology and Mineral Technology. 157 pp.

Witcher, J.C., C. Stone, and W.R. Hahman, Sr. 1982. Geothermal resources of Arizona. Map. University of Arizona, Bureau of Geology and Mineral Technology. Scale 1:500,000 with text

Woodson, K. 1999. Migrations in Late Anasazi Prehistory: The Evidence from the Goat Hill Site. Kiva 65:63–84.

Wright, G.D., T.J. Smith, R.K. Murphy, J.T. Runge, and R.R. Harms. 2009. Mortality of cranes (Gruidae) associated with powerlines over a major roost on the Platte River, Nebraska. Prairie Naturalist 41:116–120.

Yong, W., and D.M. Finch. 2002. Stopover Ecology of Landbirds Migrating Along the Middle Rio Grande in Spring and Fall. General Technical Report RMRS-GTR-99. Fort Collins, Colorado: U.S. Forest Service, Rocky Mountain Research Station.

This page intentionally left blank.

Chapter 7

INDEX

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

Z