# United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Farmington District Office
6251 College Blvd., Suite A
Farmington, New Mexico 87402
www.blm.gov/nm

NMNM 122352
2920 (21240-mr)

Dear Reader:

Enclosed for your review and comment is the Draft Environmental Impact Statement (Draft EIS) for the proposed San Juan Basin Energy Connect Project (Project). The Bureau of Land Management (BLM) prepared a Draft EIS in consultation with cooperating agencies and in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended; Council on Environmental Quality (CEQ); and the Department of the Interior regulations implementing NEPA (40 CFR parts 1500-1508 for CEQ, 43 CFR part 46 for the BLM); and BLM NEPA Handbook (H-1790-1). This Draft EIS analyzes the effects of authorizing the Tri-State Generation and Transmission Association (Tri-State), the applicant, to construct, operate and maintain a new 230 kV overhead electric transmission line. The BLM Farmington Field Office is the lead for this Project.

Tri-State is requesting a right-of-way grant to authorize use of specific public lands from the Farmington Field Office; Southern Ute Indian Tribe (Southern Ute), Tribal lands from the Southern Ute, Bureau of Indian Affairs; and state lands from the New Mexico State Land Office. Tri-State is also requesting approval from La Plata County, Colorado, for the operation and construction of the transmission line on private properties located in La Plata County.

This Draft EIS analyzes a No Action Alternative and two action alternatives: the Preferred Alternative and the Proposed Action. The action alternatives were developed from a comprehensive process that considered a wide range of electrical system and transmission line route alternatives. The alternatives development process is described in Chapter 2 of Draft EIS and supporting appendices to the Draft EIS.

Both action alternatives are approximately 65 miles long. Both action alternatives would originate from Western's Shiprock Substation and would interconnect to a new 345 kV to 230 kV substation, the Three Rivers Substation. From the new Three Rivers Substation, the transmission lines would extend to a new 230 kV substation, the Kiffen Canyon Substation, located just north of the City of Farmington's existing Glade Tap Substation. The action alternatives would continue northeast and would terminate at the existing Iron Horse Substation near Ignacio, Colorado. The action alternatives also include constructing access roads by building new unpaved roads, improving existing access roads, and using existing roads in their current state. The action alternatives differ in their proposed alignment for the transmission line and the supporting access road network.

The Draft EIS is not a decision document. Its purpose is to inform the public and interested parties of impacts associated with implementing the Tri-State's proposal as associated with granting a right-of-way to construct, operate, and maintain the transmission line and associated facilities across Federal lands. This Draft EIS also provides information to other regulatory agencies for use in their decision-making processes for other permits required for implementation of the Project.

The Draft EIS is now available for public review. To be considered in the Final EIS, written comments on the Draft EIS must be received by 5:00 pm on Monday, April 28, 2014. The BLM will consider timely filed substantive comments and respond to them in the Final EIS. The BLM will host public meetings to discuss the Draft EIS and take comments on the proposed Project and the Draft EIS.

Dates, times and locations of these meetings are as follows:

**Tuesday, April 8, 2014**
4 pm to 7 pm
Sky Ute Casino
Event Center Room C
14324 US Highway 172 N
Ignacio, CO 81137

**Wednesday, April 9, 2014**
4 pm to 7 pm
Farmington Civic Center
Exhibition Hall 1
200 W. Arrington Street
Farmington, NM 87401

These locations are also posted on the BLM project website at: http://www.blm.gov/nm/sjbec.

Substantive comments received during the 45-day period following publication of the NOA will be considered prior to a decision. Comments on the Draft EIS should be as specific as possible. It is also helpful if the comments refer to chapters, headings, and pages on the Draft EIS. Comments may address the adequacy of specific analyses in the Draft EIS and the merits of the alternatives formulated and discussed in the document (refer to CEQ regulations at 40 CFR 1503.3).

The Draft EIS and supporting documents are available electronically on the BLM project website, and are also available for public review during normal business hours at the following locations:

- Bureau of Land Management, Farmington Field Office, 6251 College Blvd, Farmington, NM 87402
- Farmington Public Library, Adult Services Dept., 2101 Farmington Ave., Farmington, NM 87401
- Aztec Public Library, 319 S. Ash Street, Aztec, NM 87410
- Durango Public Library, 1900 East 3rd Avenue, Durango, CO 81301
- Ignacio Community Library, 470 Goddard Avenue, Ignacio, CO 81137

A limited number of copies of the document will be available, as supplies last. To request a copy, contact Marcy Romero, Project Manager, Farmington Field Office, 6251 College Blvd., Farmington, NM 87402.

Written comments may be submitted by the following methods:

E-Mailbox: blm_nm_ffo_comments@blm.gov

Mail, Courier or Hand Deliver: Bureau of Land Management, Farmington Field Office, re: San Juan Basin Energy Connect Project, 6251 College Blvd., Farmington, NM 87402

Before including your address, phone number, e-mail address, or any other personal identifying information in your comment, you should be aware that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can request in your comment that your personal identifying information be withheld from public review, the BLM cannot guarantee that it will be able to do so.

If you have any questions regarding the NEPA process used to prepare the Draft EIS or need additional information regarding the Project, please contact Marcy Romero, Project Manager, Bureau of Land Management, Farmington Field Office, 6251 College Blvd., Farmington, NM 87402 or by telephone at (505) 564-7600. Any persons wishing to be added to a mailing list of interested parties may write or call the Project Manager at this address or phone number.

Sincerely,

Torres

Gary Torres
Field Manager

# San Juan Basin Energy Connect Project

## Draft Environmental Impact Statement

March 2014 | BLM/NM/PL-13-06-2850




U.S. Department of the Interior
Bureau of Land Management
Farmington Field Office
6251 College Blvd, Suite A
Farmington, NM 87402

BLM

## LEAD AGENCY

U.S. DEPARTMENT OF INTERIOR (DOI)
BUREAU OF LAND MANAGEMENT (BLM)

## COOPERATING AGENCIES

BUREAU OF INDIAN AFFAIRS (BIA)

NAVAJO NATION

LA PLATA COUNTY

SOUTHERN UTE INDIAN TRIBE (SUIT)

NEW MEXICO STATE LAND OFFICE

WESTERN AREA POWER ADMINISTRATION

THE UNITED STATES DEPARTMENT OF AGRICULTURE RURAL UTILITIES SERVICE (RUS)

# Draft Environmental Impact Statement
# San Juan Energy Connect Project

**LEAD AGENCY:** US Department of Interior (DOI), Bureau of Land Management (BLM)

**COOPERATING AGENCIES:** Bureau of Indian Affairs (BIA), Rural Utilities Service (RUS), Western Area Power Administration (Western), Southern Ute Indian Tribe (SUIT), the New Mexico State Land Office, LaPlata County, and the Navajo Nation

**LOCATION:** Near Shiprock, New Mexico to Ignacio, Colorado

**TYPE OF ACTION:** Proposed 230 kV transmission line and supporting facilities originating near the existing Shiprock Substation in New Mexico, and terminating at an expanded Iron Horse Substation in Ignacio, Colorado.

**CONTACTS:** Requests for additional information or copies of the document:
Marcy Romero, Project Manager, 505.564.7727

**ABSTRACT:** Tri-State Generation and Transmission Association Inc. (Tri-State) filed a preliminary application for a right-of-way grant with the BLM Farmington Field Office (FFO) for the construction, operation, and maintenance of a new 230 kilovolt (kV) overhead electric transmission line, access roads, two new substations, and expansion of an existing substation. The proposed 65-mile transmission line would run from near Shiprock, New Mexico to Ignacio, Colorado and much of the new transmission line would be located adjacent to existing transmission lines. It would deliver electricity generated at existing facilities to improve reliability of the transmission system and meet increasing demand in the San Juan Basin.

The BLM prepared this Environmental Impact Statement (EIS) to evaluate the potential impacts to the human environment in accordance with the National Environmental Policy Act of 1969 (NEPA), BLM guidance (H-1790-1), and other applicable regulations and guidance.

Comments on this Draft EIS will be accepted for 45 calendar days following the date the US Environmental Protection Agency publishes its Notice of Availability in the Federal Register.

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# Acronyms and Key Terms

| | |
|---|---|
| AADT | Annual Average Daily Traffic |
| ACEC | Area of Critical Environmental Concern |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| AMP | Allotment Management Plan |
| ANSI | American National Standards Institute |
| AUMs | animal unit months |
| BBER | Bureau of Business and Economic Research |
| BEA | Bureau of Economic Analysis |
| BIA | Bureau of Indian Affairs |
| BLM | Bureau of Land Management |
| BLS | United States Department of Labor, Bureau of Labor Statistics |
| CCR | Code of Colorado Regulations |
| CDOT | Colorado Department of Transportation |
| CDPHE | Colorado Department of Public Health and Environment |
| CEQ | Council on Environmental Quality's |
| CFR | Code of Federal Regulations |
| CO | carbon monoxide |
| $CO_2$ | carbon dioxide |
| CPCN | Certificate of Public Convenience and Necessity |
| CPW | Colorado Parks & Wildlife |
| CRS | Colorado Revised Statute |
| CWA | Clean Water Act |
| dB | Decibel |
| dBA | A-weighted decibel |
| dBA Leq [1 hour] | one-hour average noise level |
| dBA Lmax | maximum dBA level |
| DM | Department Manual |
| DOE | US Department of Energy |
| DOI | Department of the Interior |
| EA | Environmental Assessment |

| | |
|---|---|
| EIS | Environmental Impact Statement |
| EMF | Electromagnetic fields |
| EO | Executive Order |
| EPA | US Environmental Protection Agency |
| EPMs | environmental protection measures |
| EPS | Economic and Planning Systems, Inc. |
| ESA | Endangered Species Act |
| et seq. | and the following |
| FAA | Federal Aviation Administration |
| FEMA | Federal Emergency Management Agency |
| FFO | Farmington Field Office |
| FHWA | Federal Highway Administration |
| FINDS | Facility Index System |
| FLPMA | Federal Land Policy and Management Act |
| FR | Federal Register |
| ICNIRP | International Commission on Non-Ionizing Radiation Protection |
| IEEE | Institute of Electrical and Electronics Engineers |
| IPCC | Intergovernmental Panel on Climate Change |
| kV | kilovolt |
| kV/m | kilovolts per meter |
| Leq | A-weighted average noise level measured in decibels |
| LPEA | La Plata Electric Association |
| LTANKS | Leaking Storage Tank |
| LUST | Leaking Underground Storage Tank |
| MBTA | Migratory Bird Treaty Act |
| mG | milligauss |
| MOA | Memorandum of Agreement |
| mph | miles per hour |
| NAAQS | National Ambient Air Quality Standards |
| NAGPRA | Native American Graves Protection and Repatriation Act |
| NEPA | National Environmental Policy Act |
| NERC | North American Electric Reliability Corporation |
| NHPA | National Historic Preservation Act |
| NMAC | New Mexico Administrative Code |
| NMDOT | New Mexico Department of Transportation |
| NMED | New Mexico Environment Department |
| NMGFD | New Mexico Game and Fish Department |
| NMSA | New Mexico Statues Annotated |

| | |
|---|---|
| NOx | nitrogen oxides |
| NPDES | National Pollutant Discharge Elimination System |
| NPS | National Park Service |
| NRCS | US Natural Resources Conservation Service |
| NSR | New Source Review |
| OPS | Office of Pipeline Safety |
| OSTA | Old Spanish Trail Association |
| PILT | Payments in Lieu of taxes |
| PL | Public Law |
| $PM_{10}$ | particulate matter between 2.5 and 10 micrometers in diameter |
| $PM_{2.5}$ | particulate matter less than 2.5 micrometers in diameter |
| PNM | Public Service Company of New Mexico’s |
| POD | Plan of Development |
| PSD | Prevention of Significant Deterioration |
| PUC | Public Utilities Commission |
| RCRA-CESQG | Resource Conservation and Recovery Act-Conditionally Exempt Small Quantity Generators |
| RIMS II | regional economic multiplier |
| RMP | Resource Management Plan |
| ROD | Record of Decision |
| ROW | right-of-way |
| RUS | Rural Utilities Service |
| SCAQMD | South Coast Air Quality Management District |
| SCCT | simple cycle combustion turbines |
| SHPOs | state historic preservation officers |
| SJBEC Project | San Juan Basin Energy Connect Project |
| SMPA | San Miguel Power Association |
| SOx | sulfur oxide |
| SPCC | Spill Prevention Control and Countermeasure |
| SUIT | Southern Ute Indian Tribe |
| SWPPP | Stormwater Pollution Prevention Plan |
| TES | threatened, endangered, and sensitive |
| Tri-State | Tri-State Generation and Transmission Association Inc. |
| US | United States |
| USACE | US Army Corps of Engineers |
| USBR | US Bureau of Reclamation |
| USC | United States Code |
| USDA NRCS | US Department of Agriculture Natural Resources Conservation Service |
| USFWS | US Fish and Wildlife Service |

| | |
|---|---|
| USGS | United States Geological Survey |
| UST | Underground Storage Tanks |
| V | groundborne vibration velocity |
| V/m | volts per meter |
| VdB | vibration decibels |
| VOC | volatile organic compounds |
| VRI | visual resource inventory |
| VRM | visual resource management |
| WECC | Western Electricity Coordinating Council |
| Western | Western Area Power Administration |

# Summary

# Summary

*This section summarizes the San Juan Basin Energy Connect Project EIS and discusses key findings and conclusions.*

## S.1 Introduction

On November 5, 2008, Tri-State Generation and Transmission Association Inc. (Tri-State) filed a preliminary application for a right-of-way grant with the United States (US) Department of the Interior (DOI) Bureau of Land Management (BLM) Farmington Field Office (FFO). The preliminary right-of-way application is for the construction, operation, and maintenance of a new 230-kilovolt (kV) overhead electric transmission line, two new substations, expansion of an existing substation, and access roads. The proposed approximately 65-mile transmission line, called the San Juan Basin Energy Connect Project (SJBEC Project), would run from near Shiprock, New Mexico, to Ignacio, Colorado, across federal, state, tribal, and private lands. It would improve reliability of the transmission system and deliver electricity generated at existing facilities to meet increasing demand in the San Juan Basin.

Tri-State is a wholesale electric power supplier owned by the 44 electric cooperatives that it serves. Tri-State generates and transmits electricity to its member systems throughout a 200,000-square-mile service territory across Colorado, Nebraska, New Mexico, and Wyoming. Tri-State's mission is to provide its member-owners a reliable, cost-based supply of electricity while maintaining a sound financial position through effective utilization of human, capital, and physical resources in accordance with cooperative principles.

Increasing electric load growth in the San Juan Basin region of Colorado and New Mexico, in commercial, residential, and industrial sectors, has put a strain on the existing electrical system. Tri-State is proposing to construct a 230 kV transmission line from the Farmington area in northwest New Mexico to Ignacio, Colorado. Tri-State is pursuing the SJBEC Project to:

- Improve electric system reliability with a high voltage transmission path from Colorado into northern New Mexico.
- Provide electric system capacity to support the La Plata Electric Association's (LPEA) requested transmission capacity.
- Directly improve the load-serving capability and reliability of the electric system serving LPEA, Empire Electric Association (EEA), and San Miguel Power Association.

**Chapter 1, Introduction**

Chapter 1 of the EIS introduces the project, describes its purpose, and explains why the project is needed. It identifies the agencies involved with the project and the decisions that need to be made. It identifies relevant land use plans, laws, and policies, and also summarizes major federal, state, and local permitting requirements. Finally, Chapter 1 describes the NEPA Scoping Process and summarizes issues identified during EIS scoping.

Tri-State is requesting right-of-way grants to authorize use of specific public lands from the BLM FFO; Southern Ute Indian Tribe (SUIT) tribal lands from the Bureau of Indian Affairs (BIA); and state lands from the New Mexico State Land Office. Tri-State is also requesting approval from La Plata County for the operation and construction of the transmission line on private properties located in La Plata County. Tri-State is requesting financial assistance from the US Department of Agriculture's Rural Utilities Service (RUS). Tri-State is requesting approval from the Western Area Power Administration (Western) to interconnect its proposed 230 kV transmission line to Western's Shiprock Substation and also to locate the new Three Rivers Substation on Western's reserved area within BLM lands.

Prior to making a decision, federal agencies, including the BLM, BIA, RUS, and Western, are required to conduct environmental review under the National Environmental Policy Act (NEPA) of 1969, Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and Section 7 of the Endangered Species Act (ESA) of 1973 in accordance with federal agency policies and procedures. The BLM is the lead federal agency for NEPA, NHPA, and ESA review and compliance. Environmental Impact Statement (EIS) preparation is a joint process between the BLM and cooperating agencies. Cooperating agencies include the BIA, RUS, Western, SUIT, La Plata County, the New Mexico State Land Office, and the Navajo Nation.

## S.2 BLM's Purpose and Need for Action

The purpose of BLM's action is to respond to Tri-State's application to construct, operate, and maintain a proposed 230 kV transmission line and associated substations and access roads by either granting a right-of-way on public lands, granting a right-of-way with conditions, or denying the application. The need for BLM's action to respond to Tri-State's right-of-way application for the SJBEC Project arises from the Federal Land Policy and Management Act (FLPMA). The FLPMA establishes a multiple-use mandate for managing federal lands, which includes transmission facilities as outlined in Title V.

Pursuant to 43 CFR §2801.2, it is BLM's objective to grant right-of-way and to control its use on public land in a manner that (a) protects the natural resources associated with public land and adjacent land, whether private or administered by a government entity; (b) prevents unnecessary or undue degradation to public land; (c) promotes the use of right-of-way in common considering engineering and technological compatibility, national security, and land use plans; and (d) coordinates, to the fullest extent possible, all BLM actions under the regulations in this part with state and local governments, interested individuals, and appropriate quasi-public entities.

## S.3 Western's Purpose and Need

Pursuant to the Federal Power Act, Western must consider and respond to Tri-State's request to interconnect with the Shiprock Substation and to construct the Three Rivers Substation on Western's reserved lands. Western's purpose and need is to consider the interconnection request in accordance with Western's General Requirements for Interconnection.

## S.4 Proponent's Project Objectives

Tri-State's objective is to obtain authorization to construct, maintain, and operate a new 230 kV transmission line as described above under Section S.1.

Electricity demand in the San Juan Basin region of Colorado and New Mexico in the industrial, commercial, and residential sectors has put a strain on the existing regional transmission system. As shown in Exhibit S-1, Tri-State's Coincident Peak Load, the coincident peak load is approximately 300 megawatts (MW) and is forecast to increase substantially. Although the existing generation resources throughout the region are adequate to meet near-term moderate increases in demand, additional transmission facilities are needed to ensure that electricity can be reliably delivered as loads grow over the next several years.

**Exhibit S-1**

**Tri-State's Coincident Peak Load (MW)**

| | December Actual | | | | Tri-State 2012 Base Economic Forecast<br>December Projected | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2012 | 2014 | 2017 | 2020 | 2025 | 2030 |
| La Plata Electric Association | 169.1 | 174.9 | 155.8 | 150.1 | 163.4 | 172.3 | 182.8 | 200.3 | 217.2 |
| Empire Electric Association | 89.3 | 88.1 | 87.8 | 89.5 | 101.4 | 102.0 | 102.3 | 108.3 | 116.0 |
| San Miguel Power Association[1] | 36.4 | 38.8 | 32.8 | 45.4 | 36.8 | 38.7 | 40.3 | 42.9 | 45.7 |
| **Total Tri-State Southwest Colorado Load MW** | **294.8** | **301.8** | **276.4** | **285.0** | **301.6** | **313.1** | **325.4** | **351.5** | **378.9** |

[1] *Excludes the San Miguel Power Association) Dalls Creek Substation which is normally supplied north of TOT 2A.*

Tri-State, its member co-operative LPEA, and other regional utilities have been continuously making improvements and additions to the electrical system in the San Juan Basin to maintain reliability. Most of the infrastructure in the region was originally built in the 1950s, and over the years aging equipment has been replaced and upgraded. Numerous investments have been made in the transmission system and at substations throughout the region to improve reliability by building in redundant systems, installing voltage support mechanisms, and increasing capacity. Nevertheless, the transmission path in the region is still constrained and Tri-State must ensure it meets the needs of its member systems, as well as comply with numerous mandatory federal reliability standards.

## S.5 Issues Raised During Scoping

The BLM has engaged the public since the SJBEC Project began in 2008. The BLM originally initiated an environmental assessment (EA) to determine the appropriate level of documentation to comply with NEPA. Public scoping for the SJBEC Project EA occurred from September 17 through November 9, 2009. Scoping meetings were held with the public and local, state, and federal agencies on October 7 and 8, 2009, in Farmington, New Mexico, and Ignacio, Colorado.

A total of 82 individuals signed in as attendees to the EA scoping meetings. Comments were received from 91 individuals. Issues of primary concern identified by the public during the scoping period were:

- Proximity of the transmission line to residences
- Land use issues
- Impacts to visual resources
- Health and safety concerns
- Impacts related to noise

Public input received during the scoping period suggested that an EIS-level analysis would be more appropriate than the proposed EA. As a result, the BLM decided in December 2009 to prepare an EIS instead of an EA.

**NEPA Scoping**

Sections 1.8 and 1.9 of this EIS provide additional information about NEPA scoping and issues raised during scoping.

The EIS scoping process began when the BLM published the Notice of Intent in the Federal Register on January 25, 2011, and continued to April 1, 2011. Three public scoping meetings and one agency scoping meeting were held on March 16 and 17, 2011, in Farmington and Aztec, New Mexico, and Ignacio, Colorado, to solicit comments on the scope of the EIS.

A total of 140 individuals signed in as attendees to the three public scoping meetings. A total of 71 individuals, agencies, and non-governmental organizations submitted comments on the SJBEC Project. Comments were received regarding a wide variety of issues, but largely fell into the following categories:

- Land use
- Effects on resources and resource use
- Public health and safety
- Socioeconomics and environmental justice
- Alternatives
- Mitigation measures

## S.6 Alternatives Evaluated in this EIS

A collaborative and comprehensive process was used to develop and consider a range of alternatives for the SJBEC Project as described in Section 2.3, Alternatives Considered but Eliminated, of this EIS. Based on the outcome of the alternatives development process, this EIS evaluates the No Action Alternative and two action alternatives: the Preferred Alternative and the Proposed Action.

**Chapter 2, Alternatives**

Chapter 2 describes the alternatives evaluated in this EIS, identifies actions common to all action alternatives, and explains what alternatives were considered, but eliminated from detailed analysis in this EIS.

The Proposed Action was submitted by Tri-State as part of their right-of-way application. The Proposed Action was developed in coordination with the BLM through comprehensive public outreach effort. Based on agency coordination, scoping, and analysis, a second alternative was developed. This alternative was selected as the preferred alternative because it would meet the purpose and need and minimize effects to the built and natural environment to a greater extent than the Proposed Action. The action alternatives are described below. The No Action Alternative is also discussed.

### S.6.1 No Action Alternative

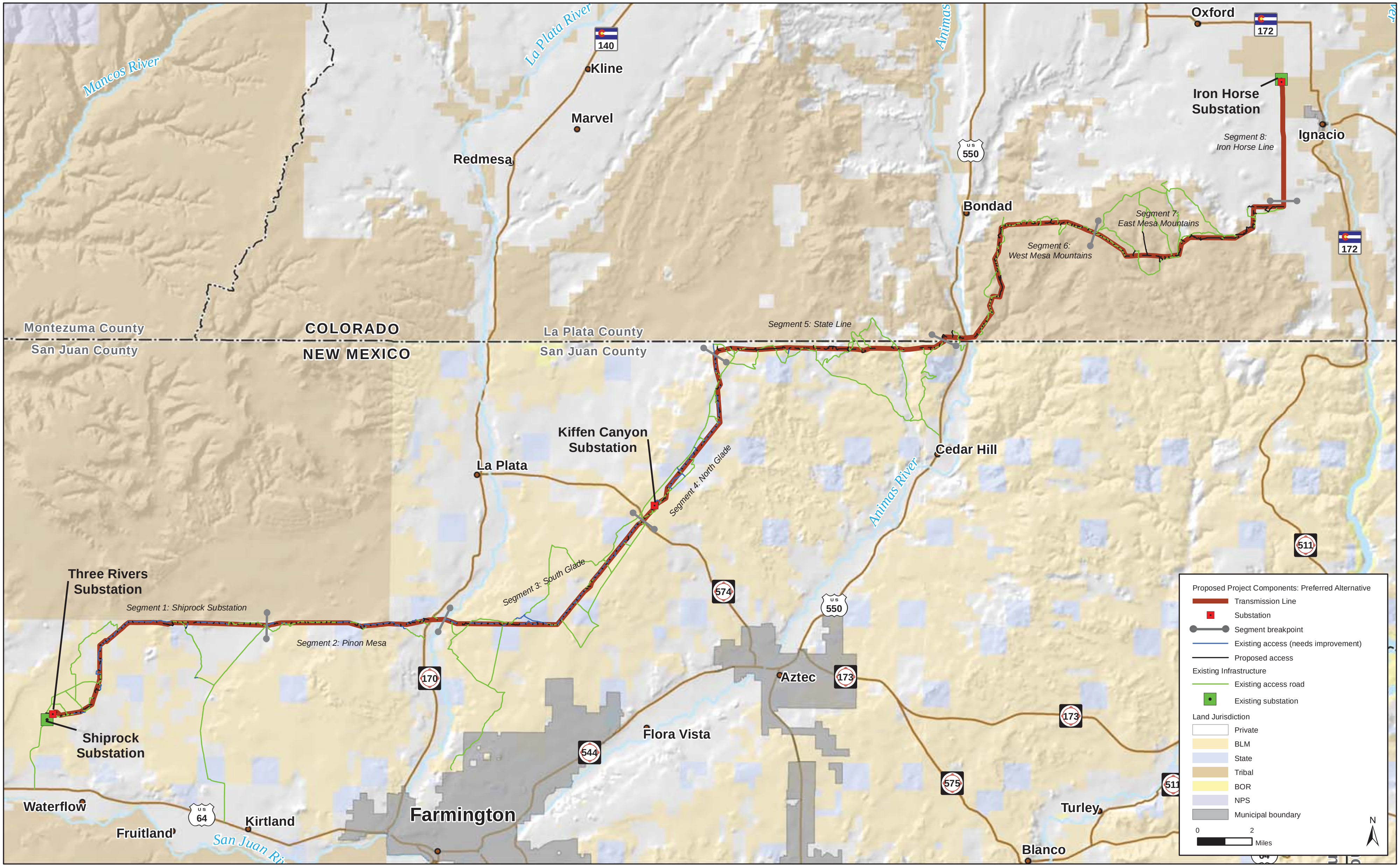
With the No Action Alternative, the SJBEC Project would not be constructed. The objectives of the SJBEC Project, which include improving electric reliability and increasing load-serving capabilities, would not be met.

### S.6.2 Preferred Alternative

The Preferred Alternative includes a 230 kV transmission line that is approximately 64.3 miles long and is shown in Exhibit S-2, Preferred Alternative. The new 230 kV transmission line would originate at Western's existing Shiprock Substation and would end at the Iron Horse Substation located near Ignacio, Colorado. The Preferred Alternative would include the following components:

- A new 345 kV to 230 kV substation (Three Rivers Substation) near Western's existing Shiprock Substation. The new Three Rivers Substation would connect to the existing Shiprock Substation.

- Approximately 33.1 miles of new double-circuit-capable 230 kV transmission line from the new Three Rivers Substation to the area north of the proposed Kiffen Canyon Substation to Segment 5 (shown in Exhibit S-2) where the transmission line would turn east and parallel the New Mexico/Colorado state line.




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

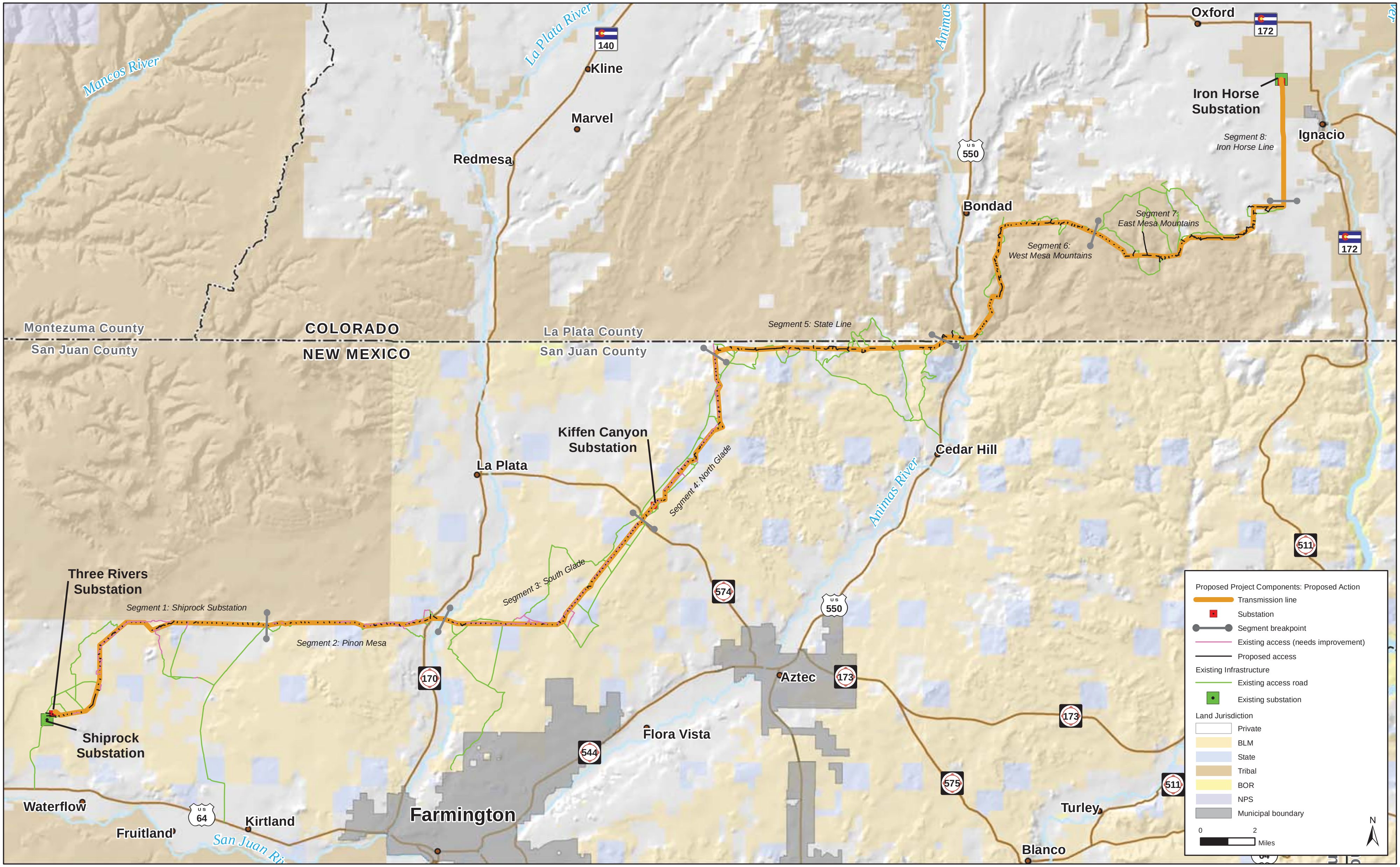
**Exhibit S-2 Preferred Alternative**

- A new 230 kV substation (Kiffen Canyon Substation) near the existing City of Farmington 115 kV Glade Tap Substation.
- Approximately 31.2 miles of new single-circuit 230 kV transmission line between Segment 5 to the existing Iron Horse Substation. Approximately 4.5 miles south of the existing Iron Horse Substation, the new single-circuit 230 kV transmission line would be strung on existing poles that connect to the existing Iron Horse Substation.
- An expansion of the Iron Horse Substation.
- Access roads, which will include a combination of new unpaved access roads, improvements to existing access roads, and the use of existing roads in their current state.
- Overhead ground wire for the entire 230 kV transmission line. Overhead ground wire protects the transmission line from lightning strikes, and contains fiber optics in the wire to transmit data and serve as a communication system.

### S.6.3 Proposed Action

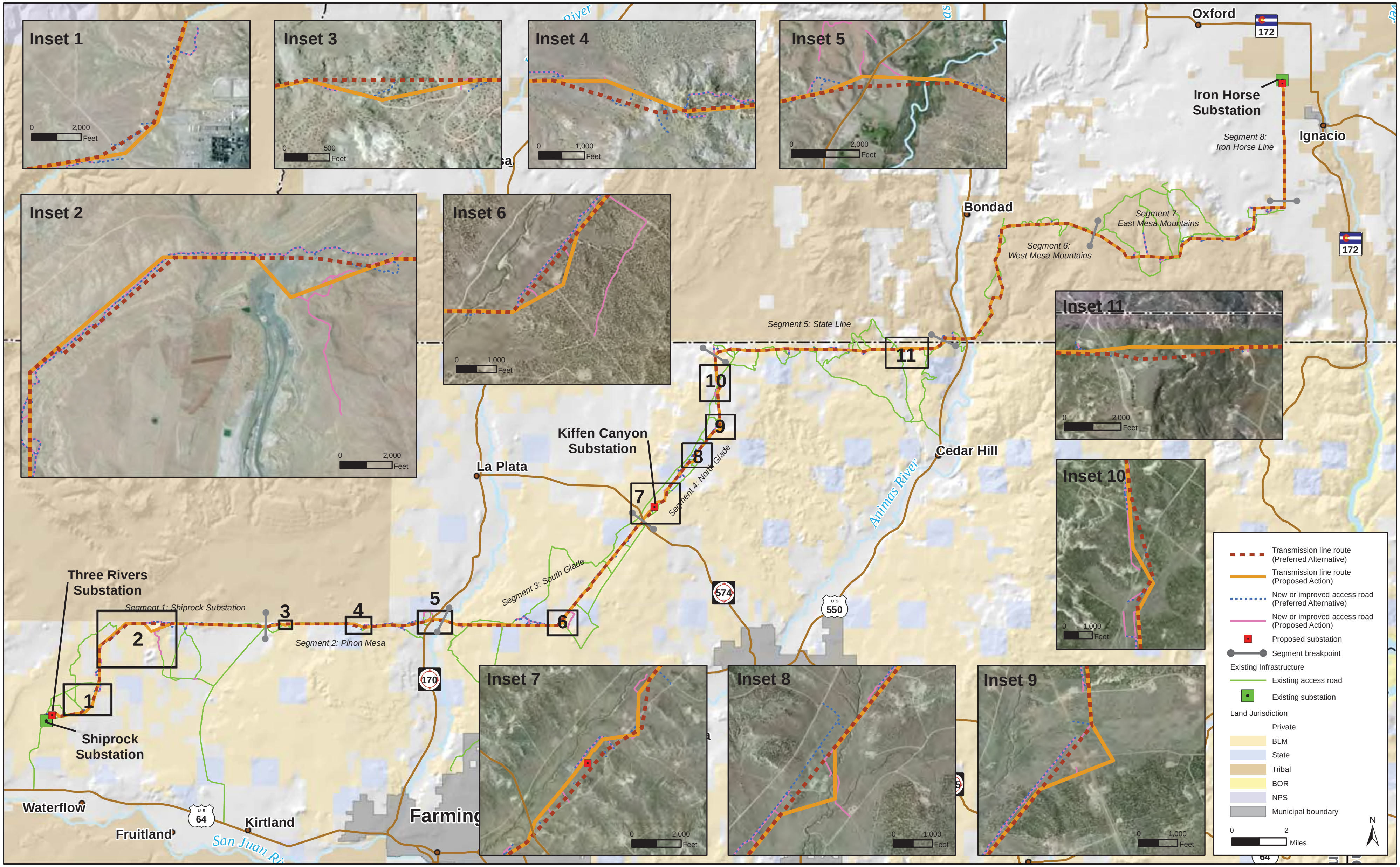
The Proposed Action includes a 230 kV transmission line that is approximately 64.9 miles long and is shown in Exhibit S-3, Proposed Action. The Proposed Action would follow a slightly different alignment and would have a different access road network than what is proposed for the Preferred Alternative as shown in Exhibit S-4, Differences Between the Preferred Alternative and the Proposed Action. The Proposed Action would have similar components as described for the Preferred Alternative that are summarized below:

- A new 345 kV to 230 kV substation (Three Rivers Substation) near Western’s existing Shiprock Substation. The new Three Rivers Substation would connect to the existing Shiprock Substation.
- Approximately 33.7 miles of new double-circuit-capable 230 kV transmission line from the new Three Rivers Substation to the New Mexico/Colorado state line. A new 230 kV substation (Kiffen Canyon Substation) near the existing City of Farmington 115 kV Glade Tap Substation.




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

**Exhibit S-3 Proposed Action**




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

**Exhibit S-4 Differences Between the Preferred Alternative and the Proposed Action**

- Approximately 31.2 miles of new single-circuit 230 kV transmission line between the proposed New Mexico/Colorado state line and the existing Iron Horse Substation. Approximately 4.5 miles south of the existing Iron Horse Substation, the new single-circuit 230 kV transmission line would be strung on existing poles that connect to the existing Iron Horse Substation.
- An expansion of the Iron Horse Substation.
- Access roads, which will include a combination of new unpaved access roads, improvements to existing access roads, and the use of existing roads in their current state.
- Overhead ground wire for the entire 230 kV transmission line. Overhead ground wire protects the transmission line from lightning strikes, and contains fiber optics in the wire to transmit data and serve as a communication system.

## S.7 Alternatives Comparison

No effects are expected with the No Action Alternative, since it assumes the SJBEC Project would not be built. For purposes of the permanent effects analysis, the area of land permanently affected by ground-disturbing activities for transmission line structures, substations, and access roads is estimated at 182 acres for the Preferred Alternative and 183 acres for the Proposed Action.

**Chapter 3, Affected Environment and Environmental Effects**

Chapter 3 describes the affected environment and identifies the environmental effects of the No Action Alternative, Preferred Alternative, and the Proposed Action

For purposes of the temporary effects analysis, the area of land temporarily affected by ground-disturbing activities for transmission line structures, substations, and access roads is estimated at 800 acres for the Preferred Alternative and approximately 827 acres for the Proposed Action.

Environmental Protection Measures (EPMs) listed in Exhibit 2-23, Environmental Protection Measures, are part of the Preferred Alternative and the Proposed Action and were considered before arriving at effects. The estimated area of effects includes constructing new access roads or improving existing access roads. Proposed access roads for the Preferred Alternative and the Proposed Action are provided below in Exhibit S-5, Estimate of New and Improved Access Roads for the Preferred Alternative, and

Exhibit S-6, Estimate of New and Improved Access Roads for the Proposed Action.

**Exhibit S-5**

## Estimate of New and Improved Access Roads for the Preferred Alternative

| Jurisdiction | Miles of New Access Roads | Miles of Existing Roads Requiring Improvement | Total (miles) |
|---|---|---|---|
| BLM | 8.4 | 14.2 | 22.6 |
| NMSLO[1] | 1.7 | 5.2 | 6.9 |
| SUIT | 11.6 | 0 | 11.6 |
| Private | 6.9 | 6.0 | 12.9 |
| **Total** | **28.6** | **25.4** | **54.0** |

*New Mexico State Land Office*

**Exhibit S-6**

## Estimate of New and Improved Access Roads for the Proposed Action

| Jurisdiction | Miles of New Access Roads | Miles of Existing Roads Requiring Improvement | Total (miles) |
|---|---|---|---|
| BLM | 8.3 | 14.9 | 23.2 |
| NMSLO | 1.2 | 4.8 | 6.1 |
| SUIT | 11.6 | 0 | 11.6 |
| Private | 6.9 | 6.5 | 13.4 |
| **Total** | **28.0** | **26.3** | **54.2** |

A comparison of effects between the three alternatives is provided below in Exhibit S-7, Comparison of Effects.

**Exhibit S-7**

## Comparison of Effects

| | | No Action | Preferred Alternative | Proposed Action |
|---|---|---|---|---|
| **Land Ownership and Use** | Permanent | No effects | About 182 acres permanently affected. | About 183 acres permanently affected. |
| | Temporary | No effects | About 800 acres required for construction. | About 827 acres required for construction. |
| **Special Designation Lands** | Permanent | No effects | About 21.3 acres in Hogback ACEC permanently disturbed. | About 21.6 acres in Hogback ACEC permanently disturbed. |
| | Temporary | No effects | Temporary effect to an additional 1.8 acres in the Hogback ACEC for construction areas for access roads and structures. | Temporary effect to an additional 2.2 acres the Hogback ACEC for construction areas for access roads and structures. |

**Exhibit S-7**
## Comparison of Effects

| | | No Action | Preferred Alternative | Proposed Action |
|---|---|---|---|---|
| **Recreation** | Permanent | No effects | Would increase recreational access on BLM (8.4 miles) and New Mexico state lands (1.7 miles). In the Pinon Mesa Recreation Area, The Preferred Alternative would add 0.5 mile of new access roads. In the Glade Run Recreation Area, the Preferred Alternative would add 1.8 miles of access roads. | Would increase recreational access on BLM (8.3 miles) and New Mexico state lands (1.2 miles). In the Pinon Mesa Recreation Area, the Proposed Action would add 0.4 mile of new access roads. In the Glade Run Recreation Area, the Proposed Action would add 1.5 miles of access roads. |
| | Temporary | No effects | Construction may require the temporary closure of access roads to protect public safety. However, there would likely be no noticeable change for the average recreational user. | Same as the Preferred Alternative. |
| **Grazing and Livestock** | Permanent | No effects | There would be no measurable effects upon grazing capacity and no change in the authorized uses for the allotments, since acreage that would be disturbed in each allotment would be less than 1 percent of its area. | Same the Preferred Alternative. |
| | Temporary | No effects | Less than 1 percent of all allotments would be affected during construction. Disturbance at any given site would generally be limited to only a portion of the 18- to 24-month construction period. | Same as the Preferred Alternative. |
| **Visual Resources** | Permanent | No effects | Key Observation Points (KOPs) 1, 2, 4, 5, 6, 7, 8, and 9, the degree of contrast would meet VRM class objectives for BLM-managed lands.<br>KOPs 3, 10, 11, and 12, are not located on BLM-managed lands. The level of change to the landscape would be low to moderate, similar to the KOPs with representative views on BLM-managed lands. | Permanent effects would be the similar to the Preferred Alternative, with one exception - visual effects would be greater at KOP 9 because the transmission line would be located about 400 feet closer to a natural stone arch. |
| | Temporary | No effects | Temporary direct effects to visual resources would be minimal and would occur from ground-disturbing activities. | Temporary effects would be the same as the Preferred Alternative. |

**Exhibit S-7**
## Comparison of Effects

| | | No Action | Preferred Alternative | Proposed Action |
|---|---|---|---|---|
| **Transportation and Access** | Permanent | No effects | Access network would use about 197.7 miles of roads. New and improved access roads would cover about 130.4 acres. No noticeable effect to traffic on federal, state, or county roads. | Access network would use about 203.6 miles of roads. New and improved access roads would cover about 132 acres. No noticeable effect to traffic on federal, state, or county roads. |
| | Temporary | No effects | Construction would temporarily disturb about 244.4 acres for access roads. | Construction would temporarily disturb about 240.4 acres for access roads. |
| **Geology and Geologic Hazards** | Permanent and Temporary | No effects | Possible risks and effects for landslides and subsidence would be avoided or minimized by evaluating geotechnical conditions before construction. | Same as the Preferred Alternative. |
| **Paleontology** | Permanent | No effects | No permanent direct effects to paleontological resources are expected with the implementation of EPMs. Likelihood is low for possible indirect effects due to vandalism or unauthorized collection of fossils. | Same as the Preferred Alternative. |
| | Temporary | No effects | No temporary direct or indirect effects to paleontological resources are expected. | Same as the Preferred Alternative. |
| **Minerals** | Permanent | No effects | Would require a portion (about 20 square feet) of a transmission line structure to be located in the reclamation area of the former San Juan Mine.<br>Would preclude future development of surface mineral resources on 182 acres. | Transmission line would span the area of the former San Juan Mine.<br>Would preclude future development of surface mineral resources on 183 acres. |
| | Temporary | No effects | About 800 acres would be temporarily disturbed or unavailable for surface mineral resource development during construction. | About 827 acres would be temporarily disturbed or unavailable for surface mineral resource development during construction. |
| **Soils** | Permanent | No effects | About 182 acres would be permanently disturbed. Implementing EPMs would minimize permanent soil loss, erosion, soil compaction; geotechnical surveys and design would mitigate possible soil hazards for expansive clays and gypsum. | Same as the Preferred Alternative, only about 183 acres would be permanently disturbed. |

**Exhibit S-7**

## Comparison of Effects

| | | No Action | Preferred Alternative | Proposed Action |
|---|---|---|---|---|
| **Soils (Cont.)** | Temporary | No effects | About 800 acres would be temporarily disturbed. Implementing EPMs would minimize permanent soil loss, erosion, soil compaction; geotechnical surveys and design would mitigate possible soil hazards for expansive clays and gypsum. | Similar to the Preferred Alternative; however, about 827 acres would be temporarily disturbed. |
| **Farmlands** | Permanent | No effects | Permanent direct effects include the loss of potential farmlands due to the footprint of support structures, substations, and new access roads. Total area of permanent disturbance would be about 17.5 acres[1].<br>Would not cause prime or unique farmlands to be converted to non-agricultural uses. | Permanent effects would be similar to the Preferred Alternative. Total area of permanent disturbance[1] would be about 15.7 acres. |
| | Temporary | No effects | Maximum total area of temporary disturbance would be about 56.8 acres[1]. Construction effects would be temporary and would not permanently convert farmland to other uses. | Maximum total area of temporary disturbance would be about 57 acres[1]. Construction effects would be temporary and would not permanently convert farmland to other uses. |
| **Water Resources and Wetlands** | Permanent | No effects | Would intersect 48 ephemeral drainages that are potential waters of the US.<br>Would intersect with about 1.79 acres of 100-year floodplains.<br>No effects to wetlands.<br>EPMs would be implemented to mitigate possible effects to water quality from erosion, sedimentation, and possible spills. | Would intersect 49 ephemeral drainages that are potential waters of the US.<br>Would intersect with about 2.75 acres of 100-year floodplains.<br>No effects to wetlands.<br>EPMs would be implemented to mitigate possible effects to water quality from erosion, sedimentation, and possible spills. |
| | Temporary | No effects | Would intersect 48 ephemeral drainages that are potential waters of the US.<br>Would intersect with about 5.61 acres of 100-year floodplains.<br>No effects to wetlands.<br>EPMs would be implemented to mitigate possible effects to water quality from erosion, sedimentation, and possible spills. | Would intersect 49 ephemeral drainages that are potential waters of the US.<br>Would intersect with about 11.46 acres of 100-year floodplains.<br>No effects to wetlands.<br>EPMs would be implemented to mitigate possible effects to water quality from erosion, sedimentation, and possible spills. |

**Exhibit S-7**

## Comparison of Effects

| | | No Action | Preferred Alternative | Proposed Action |
|---|---|---|---|---|
| **Vegetation** | Permanent | No effects | Permanent disturbance for up to 182 acres. None of the affected habitat is rare or uncommon.<br>No effects to ESA-listed plant species are expected. | Permanent disturbance for up to 183 acres. None of the affected habitat is rare or uncommon.<br>No effects to ESA-listed plant species are expected. |
| | Temporary | No effects | Temporarily disturbance to vegetation on up to 800 acres[2]. Areas would be remediated and revegetated.<br>No effects to ESA-listed plant species are expected. | Temporarily disturbance to vegetation on up to 827 acres[2]. Areas would be remediated and revegetated.<br>No effects to ESA-listed plant species are expected. |
| **Fish and Wildlife** | Permanent | No effects | Habitat loss on about 182 acres.<br>Temporary disturbance from maintenance activities.<br>Possible increased risk of collisions for some bird species.<br>No permanent effects to ESA-listed species.<br>EPMs and mitigation measures will minimize possible effects. | Similar to the Preferred Alternative, only habitat loss would occur on about 183 acres. |
| | Temporary | No effects | Increased potential for temporary species displacement and reduced productivity on about 800 acres.<br>No temporary effects to most ESA-listed species, possible increased sediment loading could affect fish species, but EPMs would minimize potential effects. | Similar to the Preferred Alternative; however, the affected area would be about 827 acres. |
| **Cultural Resources** | Permanent | No effects | The Preferred Alternative intersects with 36 historic properties. Further investigation and consultation will occur to determine the nature of possible direct effects and appropriate mitigation.<br>Navajo Nation and Hopi Tribe have identified a number of potential TCPs. Specific avoidance, minimization, and mitigation measures would be determined during ongoing government-to-government consultation. | The Proposed Action intersects with 48 historical properties. Further investigation and consultation will occur to determine the nature of possible direct effects and appropriate mitigation.<br>Navajo Nation and Hopi Tribe have identified a number of potential TCPs. Specific avoidance, minimization, and mitigation measures would be determined during ongoing government-to-government consultation. |

**Exhibit S-7**
## Comparison of Effects

| | | No Action | Preferred Alternative | Proposed Action |
|---|---|---|---|---|
| **Cultural Resources (Continued)** | Temporary | No effects | Temporary effects would include localized and short-term increases in traffic on roadways. The diminishment of the setting from increased traffic would not affect the potential eligibility of historic properties to the NRHP under Criterion D. | Temporary effects would be the same as the Preferred Alternative. |
| **Air Quality, Climate Change, and Greenhouse Gases** | Permanent | No effects | Would not be a locally, regionally, or nationally significant source of greenhouse gases.<br>Emissions from maintenance activities would be intermittent and temporary.<br>Because the transmission line would be used to carry load from existing generation sources, operations would not result in criteria air pollutant, hazardous air pollutant, or greenhouse gas emissions. | Same as the Preferred Alternative. |
| | Temporary | No effects | Construction activities would have a temporary direct effect to air quality during the duration of the 18- to 24-month construction period. Emissions, especially fugitive dust emissions, would be localized to the area surrounding any given construction activity and would be minimized through the implementation of a fugitive dust control plan and other EPMs. | Same as the Preferred Alternative. |

**Exhibit S-7**

## Comparison of Effects

| | | No Action | Preferred Alternative | Proposed Action |
|---|---|---|---|---|
| **Noise and Vibration** | Permanent | No effects | There are four known sensitive noise receptors located 600 feet or less from the transmission line. Possible noise effects related to corona were modeled and the highest potential noise levels in all areas would be below 50 dBA, which is considered to be quiet and similar to the sound a refrigerator would make from a distance of 3 feet. The highest expected noise levels from corona would be expected to occur during nighttime precipitation events, which are infrequent, typical corona noise expected from the line would be much lower and similar to the sound of a whisper.<br>Possible short-term noise from maintenance activities would be limited to infrequent vehicle traffic.<br>There would be no direct or indirect effects from vibration. | Permanent effects would be the similar to the Preferred Alternative; the only difference is that the Proposed Action would be located within 600 feet of six receptors. In addition to the four receptors described for the Preferred Alternative, two additional receptors are located in Segment 2. |
| | Temporary | No effects | Construction activity along the transmission line route, use of access roads by construction equipment, and helicopter use would temporarily increase noise levels.<br>Construction activities could introduce infrequent and short-duration vibration; however, any increase would be minimal and likely imperceptible to sensitive receptors, which are located several hundred feet from proposed construction areas. | Same as the Preferred Alternative. |
| **Electric and Magnetic Fields** | Permanent | No effects | No adverse effects are expected from electric and magnetic fields, since electric and magnetic field exposure will be well below established guidelines to protect human health. | Same as the Preferred Alternative. |
| | Temporary | No effects | No effects | No effects |

**Exhibit S-7**
## Comparison of Effects

| | | No Action | Preferred Alternative | Proposed Action |
|---|---|---|---|---|
| **Hazardous Materials** | Permanent | No effects | Spills or minor releases of hazardous, non-hazardous, or potentially hazardous materials during maintenance activities would be avoided or minimized through the implementation of EPMs. | Same as the Preferred Alternative. |
| | Temporary | No effects | The Preferred Alternative is not expected to directly or indirectly affect known hazardous materials sites.<br>Spills or minor releases of hazardous, non-hazardous, or potentially hazardous materials during construction would be avoided or minimized through the implementation of EPMs. | Same as the Preferred Alternative. |
| **Socioeconomics** | Permanent | No effects | Minimal permanent direct effects to the local economy are anticipated. No new permanent employment would be generated.<br>Limited direct effects to local residents and property values are anticipated. About 36 acres of private land may require compensation for easements. | Similar to the Preferred Alternative, but about 37.9 acres of private land may require compensation for easements. |
| | Temporary | No effects | Little to no effect on related economics is anticipated due to the temporary and localized nature of construction activities.<br>Due to the specialized nature of construction, workers and materials are likely to be imported from other areas. | Same as the Preferred Alternative. |
| **Environmental Justice** | Permanent | No effects | No disproportionate adverse effects to low-income or minority populations. | Same as the Preferred Alternative |
| | Temporary | No effects | No disproportionate adverse effects to low-income or minority populations. | Same as the Preferred Alternative. |

1 *There may be overlapping disturbance from the structures and access roads, and actual acres of disturbance may be less.*

2 *The total area of temporary effects on vegetation would likely be less since improvements such as new roads would typically be 20-feet wide and would not encompass the entire 30- to 50-foot road right-of-way. In addition, the study area and the entire right-of-way are not completely covered in vegetation.*

## S.8 Mitigation Measures

In addition to the EPMs proposed as part of the project, several possible mitigation measures have been identified. Implementation of these mitigation measures would further reduce possible effects from the SJBEC Project. Mitigation measures have been proposed for the following resource areas and are discussed in Chapter 3 of the Draft EIS.

- Recreation
- Fish and Wildlife
- Cultural Resources

# Chapter 1 – Introduction

# 1 Introduction

*Chapter 1 introduces the project, describes its purpose, and explains why the project is needed. It identifies the agencies involved in the project and the decisions that need to be made. It identifies relevant land use plans, laws, and policies and also summarizes major federal, state, and local permitting requirements. Finally, this chapter describes the NEPA scoping process and summarizes issues identified during EIS scoping and explains how this Environmental Impact Statement (EIS) is organized.*

## 1.1 Background

On November 5, 2008, Tri-State Generation and Transmission Association Inc. (Tri-State) filed preliminary application NMNM 122352 for a right-of-way grant with the United States (US) Department of the Interior (DOI) Bureau of Land Management (BLM) Farmington Field Office (FFO). The preliminary right-of-way application is for the construction, operation, and maintenance of a new 230 kilovolt (kV) overhead electric transmission line and associated facilities.

Tri-State is a wholesale electric power supplier owned by the 44 electric cooperatives that it serves. Tri-State generates and transmits electricity to its member systems throughout a 200,000-square-mile service territory across Colorado, Nebraska, New Mexico, and Wyoming. Tri-State's mission is to provide its member-owners a reliable, cost-based supply of electricity while maintaining a sound financial position through effective utilization of human, capital, and physical resources in accordance with cooperative principles.

Increasing electric load growth in the San Juan Basin region of Colorado and New Mexico, in commercial, residential, and industrial sectors, has put a strain on the existing electrical system. Tri-State is proposing to construct a 230 kV transmission line from the Farmington area in northwest New Mexico to Ignacio, Colorado, as shown in Exhibit 1-1, Vicinity Map. The SJBEC Project would traverse a combination of BLM lands, New Mexico State lands, trust lands of the Southern Ute Indian Tribe (SUIT), and private lands.

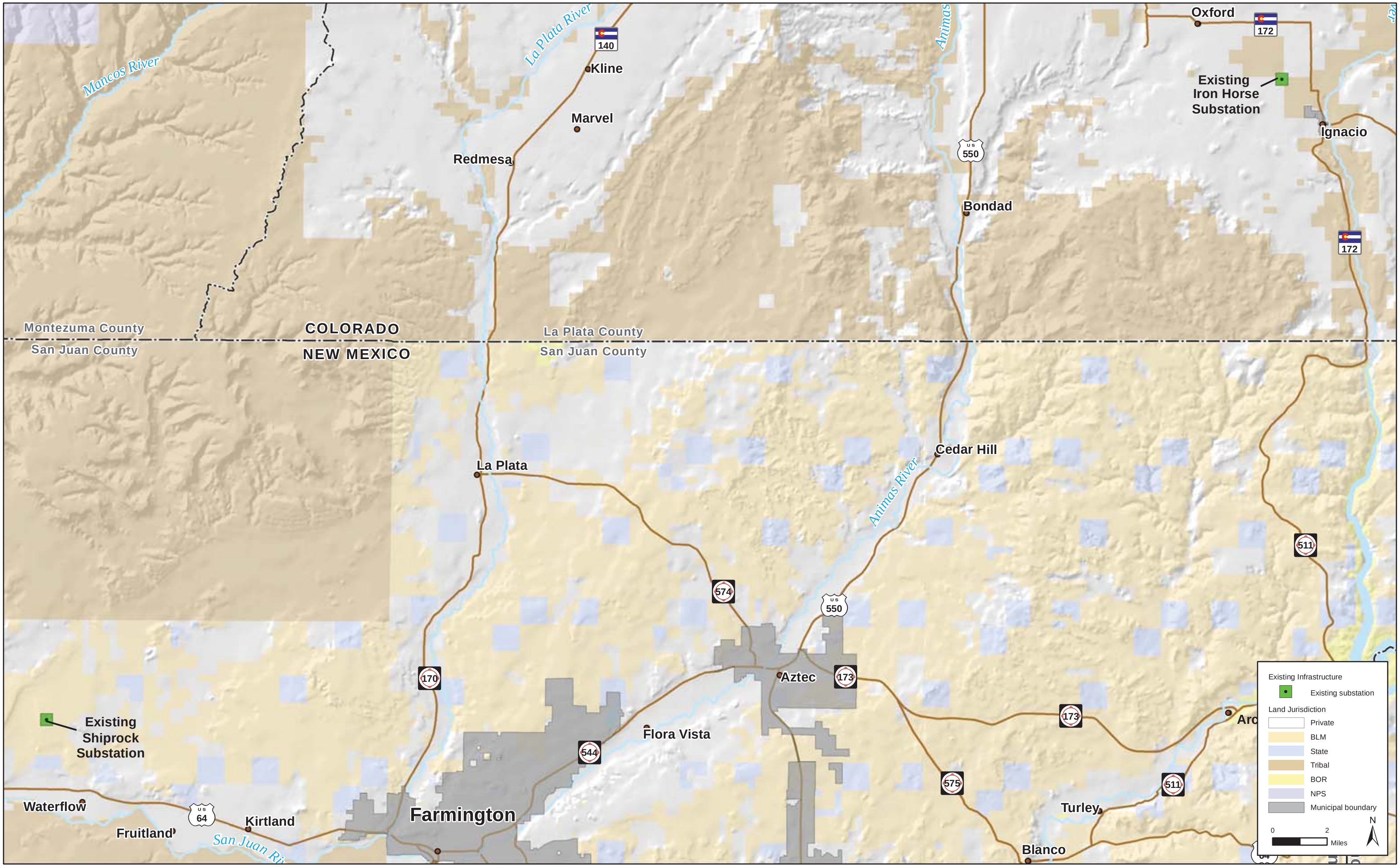
Tri-State is pursuing the SJBEC Project to:

- Improve electric system reliability by maintaining the transfer capability of a limited-capacity transmission path commonly referred to as TOT 2A. TOT 2A is a high voltage transmission path from Colorado into northern New Mexico.
- Provide electric system capacity to support the La Plata Electric Association's (LPEA) requested transmission capacity.
- Directly improve the load-serving capability and reliability of the electric system serving LPEA, Empire Electric Association (EEA), and San Miguel Power Association.

An added benefit of this new transmission line is that future renewable energy developments could more easily interconnect to the power grid.

The SJBEC Project will not require construction of new generation resources,[1] nor will it require additional generation capacity from existing facilities. The regional electric system that the SJBEC Project would connect with is capable of supporting the new transmission line without additional generation capacity. Existing generation will be used to supply the target loads via the proposed transmission line.

[1] Tri-State 2012




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

Exhibit 1-1 Vicinity Map

Existing Tri-State generation resources in Arizona, New Mexico, and Colorado provide energy to the Four Corners regional transmission system and would also provide energy to the proposed new transmission line. A full description of Tri-State's generation resources can be found at http://www.tristategt.org/AboutUs/generation.cfm. The primary Tri-State owned or purchased generation resources that will serve loads associated with the SJBEC Project include:

- Tri-State's share of San Juan Generating Unit 3 in New Mexico and Springerville Generating Station Unit 3 in Arizona
- Pyramid Generating Station in New Mexico
- Power purchases from the Western Area Power Administration (Western) that originate primarily from hydroelectric sources
- Cimarron I Solar Facility in northeast New Mexico
- Escalante Generating Station in New Mexico
- Rifle, Nucla, and Craig Generating Stations in Colorado

Tri-State's resource planning efforts include a detailed evaluation of forecast load and resource requirements in order to provide reliable and economic power to its network customers. This effort includes developing various generation options to meet resource needs in a potentially carbon-constrained future. Resource plans include the energy and demand forecast, existing resources, reserve requirements, description of the public process, scenario modeling, and analysis, and an action plan. The current Resource Plan is provided at http://www.tristategt.org/ResourcePlanning/ResourcePlanDoc.cfm.

Tri-State does not anticipate any substantive changes in the way it operates its generation fleet as a result of the SJBEC Project, nor does Tri-State anticipate any increase in generation capacity or development of any new sources of generation in order to serve member loads via the proposed SJBEC Project.

# 1.2 Purpose and Need for Action

## 1.2.1 BLM's Purpose and Need

The purpose of BLM's action is to respond to Tri-State's application to construct, operate, and maintain a proposed 230 kV transmission line and associated substations and access roads by either granting a right-of way on public lands, granting a right-of-way with conditions, or denying the application. The need for BLM's action to respond to Tri-State's right-of-way application for the SJBEC Project arises from the Federal Land Policy and Management Act (FLPMA). The FLPMA establishes a multiple-use mandate for managing federal lands, which includes transmission facilities as outlined in Title V.

Pursuant to 43 CFR §2801.2, it is BLM's objective to grant right-of-way and to control its use on public land in a manner that (a) protects the natural resources associated with public land and adjacent land, whether private or administered by a government entity; (b) prevents unnecessary or undue degradation to public land; (c) promotes the use of right-of-way in common considering engineering and technological compatibility, national security, and land use plans; and (d) coordinates, to the fullest extent possible, all BLM actions under the regulations in this part with state and local governments, interested individuals, and appropriate quasi-public entities.

## 1.2.2 Western's Purpose and Need

Pursuant to the Federal Power Act, Western must consider and respond to Tri-State's request to interconnect with the Shiprock Substation and to construct the Three Rivers Substation on Western's reserved lands. Western's purpose and need is to consider the interconnection request in accordance with Western's General Requirements for Interconnection.

## 1.3 Proponent's Project Objectives

Tri-State's objective is to obtain authorization to construct, maintain, and operate a new 230kV transmission line as described above under Section 1.1, Background.

Electricity demand in the San Juan Basin region of Colorado and New Mexico in the industrial, commercial, and residential sectors has put a strain on the existing regional transmission system. As shown in Exhibit 1-2, Tri-State's Coincident Peak Load, the coincident peak load is approximately 300 megawatts (MW) and is forecasted to increase substantially. Although the existing generation resources throughout the region are adequate to meet near-term moderate increased demand, additional transmission facilities are needed to ensure that electricity can be reliably delivered as loads grow over the next several years.

**What is "load?"**

Load is defined as the sum of power that a group of customers demand on a network.

Exhibit 1-2
**Tri-State's Coincident Peak Load (MW)**

| | | | | | Tri-State 2012 Base Economic Forecast | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | December Actual | | | | December Projected | | | | |
| | 2009 | 2010 | 2011 | 2012 | 2014 | 2017 | 2020 | 2025 | 2030 |
| La Plata Electric Association | 169.1 | 174.9 | 155.8 | 150.1 | 163.4 | 172.3 | 182.8 | 200.3 | 217.2 |
| Empire Electric Association | 89.3 | 88.1 | 87.8 | 89.5 | 101.4 | 102.0 | 102.3 | 108.3 | 116.0 |
| San Miguel Power Assocciation[1] | 36.4 | 38.8 | 32.8 | 45.4 | 36.8 | 38.7 | 40.3 | 42.9 | 45.7 |
| **Total Tri-State Southwest Colorado Load MW** | **294.8** | **301.8** | **276.4** | **285.0** | **301.6** | **313.1** | **325.4** | **351.5** | **378.9** |

[1] *Excludes the San Miguel Power Association Dallas Creek Substation which is normally supplied north of TOT 2A.*

Tri-State, its member cooperative LPEA, and other regional utilities have been making improvements and additions to the electrical system in the San Juan Basin over the years to maintain reliability. Most of the infrastructure in the region was originally built in the 1950s, and over the years aging equipment has been replaced and upgraded. Numerous investments have been made in the transmission system and at substations throughout the region to improve reliability by building in redundant systems, installing voltage support mechanisms, and increasing capacity. Nevertheless, the transmission path in the region is still constrained, and Tri-State must ensure it meets the needs of its member systems, as well as comply with numerous mandatory federal reliability standards.

The North American Electric Reliability Corporation (NERC) and the Western Electricity Coordinating Council (WECC) define a *constraint* as a limitation on one or more transmission elements that may be reached during contingency, emergency, or normal operating conditions. Generally, these limits occur when transmission equipment reaches its thermal rating or when voltage levels at substations served from the transmission equipment decline below minimum accepted levels.

The larger region contains transmission paths with formally assigned transfer capabilities based on the limits of the individual elements comprising the path. Paths in the Rocky Mountain area have been historically referred to as TOTs, which is shorthand for the *TOT*al flow on a specified grouping of transmission lines. TOT 2A is a WECC-recognized path with a defined transfer limit from north to south between western Colorado and New Mexico, as shown in Exhibit 1-3, TOTs in the Rocky Mountain Area. The allocation of this limited transfer capability of TOT 2A is divided between Western (60 percent of total capability) and the remaining 40 percent shared between Public Service Company of Colorado (also known as Xcel Energy) and Tri-State.

Tri-State, as well as other TOT 2A transmission owners, adheres to NERC/WECC reliability standards, and fines may apply if operating limits for TOT 2A are violated. This path is limited to a maximum of 690 MW (north to south), less any load in southwest Colorado. As the load in southwest Colorado increases, the amount of transmission capacity available to transmit power between western Colorado and New Mexico decreases. At a Southwestern Colorado load of 300 MW, Tri-State and Xcel's share of the transfer capability virtually disappears, and Western's share of the transfer capability becomes negatively affected.

**What is the North American Electric Reliability Corporation (NERC)?**

NERC's mission is to ensure the reliability of the North American bulk power system. NERC is the electric reliability organization certified by the Federal Energy Regulatory Commission to establish and enforce reliability standards for the bulk power system. NERC develops and enforces reliability standards; assesses adequacy annually via a 10-year forecast, and summer and winter forecasts; monitors the bulk power system; and educates, trains and certifies industry personnel.[2]

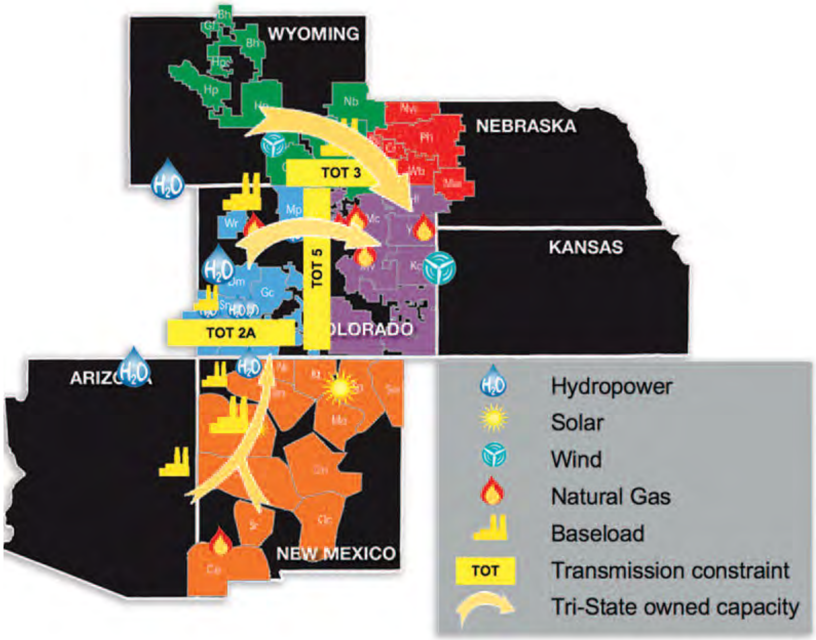
**What is the Western Electricity Coordinating Council (WECC)?**

WECC is the Regional Entity responsible for coordinating and promoting Bulk Electric System reliability in the Western Interconnection.[3]

[2] NERC 2012

[3] WECC 2012

**Exhibit 1-3**
## TOTs in the Rocky Mountain Area




*Source: Tri-State 2010*

As proposed, the SJBEC Project would be operated to remove essentially the entire LPEA load served from the existing lines that comprise TOT 2A, thus freeing up the limited transfer capability of the path. This was recognized in the *San Juan Basin Major Project TOT2A Impact Analysis* prepared by Western in April 2011.[4] The conclusions state "…The San Juan Basin Major Project is required to provide reliable service to new and existing loads in southwest Colorado. Without this project, TOT 2A transfer capability could be reduced to less than 200 MW during times of peak loading in southwest Colorado..."

In addition, Tri-State has a contractual obligation to deliver up to 100 MW of additional power to LPEA over the next several years. LPEA's load forecasts include service for industrial, commercial, and residential sectors. While the 100 MW would serve all three load sectors, the primary consumer of this power would be the oil and gas industry. Oil and gas development is an important

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[4] Western 2011a

industry in the region that creates jobs and helps drive the local economy. As many pumping and compression sites switch to electric-driven motors to reduce noise and emissions, the need to serve this additional load is compounded.

La Plata has requested the 100 MW from Tri-State to ensure they can meet their contractual obligations with their customers. Load forecasting studies have indicated that an increase in oil and gas development is likely; however, the extent and timing of that development cannot be determined at this time given existing economic uncertainties.

Electric power usage in existing locations is also increasing as homeowners install and utilize more electric devices such as air conditioners, high-definition televisions, computers, and cell phones.

## 1.4 Authorization and Agency Roles

Tri-State is requesting right-of-way grants to authorize use of specific public lands from the BLM FFO; SUIT tribal lands from the Bureau of Indian Affairs (BIA); and state lands from the New Mexico State Land Office. Tri-State is also requesting approval from La Plata County for the operation and construction of the transmission line on private properties located in La Plata County. Tri-State is requesting financial assistance for the SJBEC Project from the US Department of Agriculture's Rural Utilities Service (RUS). Tri-State is requesting approval from Western to interconnect its proposed 230 kV transmission line to Western's Shiprock Substation and also to locate the new Three Rivers Substation on Western's reserved area within BLM lands.

Prior to making a decision, federal agencies, including the BLM, BIA, RUS, and Western, are required to conduct review under the National Environmental Policy Act of 1969 (NEPA), Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), and Section 7 of the Endangered Species Act of 1973 (ESA) in accordance with federal agency policies and procedures. The BLM is the lead federal agency for NEPA, NHPA, and ESA review and compliance. The BLM published a Notice of Intent to prepare this Environmental Impact Statement (EIS) in the Federal Register on January 25, 2011.

EIS preparation is a joint process between the BLM and cooperating agencies. The Council on Environmental Quality's (CEQ) regulations implementing NEPA allow the lead agency to invite any other federal, state, tribal, or local agency that has jurisdiction by law or that has special expertise with respect to any environmental issue addressed by the NEPA analysis, to serve as cooperating agencies in EIS preparation (Title 40 Code of Federal Regulations [CFR] §§1501.6 and 1508.5). Those with jurisdiction by law can make a decision to approve or deny all or part of the SJBEC Project based on the analysis in this EIS, while those with special expertise or information will assist in developing the analysis. The BLM sent letters to 21 tribes and agencies at the federal, state, and county level inviting participation as a cooperating agency. Seven entities accepted: BIA, RUS, Western, SUIT, La Plata County, the New Mexico State Land Office, and the Navajo Nation.

## 1.5 Decisions to be Made

This EIS is an informational document for agency decision makers and the public regarding the potential environmental effects of the SJBEC Project. The specific decisions that will be made by the BLM, BIA, RUS, Western, State of New Mexico, and La Plata County based on the analysis in this EIS are described below. In addition, other agencies may also have to decide whether to grant easements, licenses, permits, or approvals for transmission lines or access roads on properties under their control. More information about review and consultation with other agencies is presented in Section 1.7, Federal, State, and Local Permits, Licenses, and Approvals.

### 1.5.1 BLM

BLM's action is to grant, grant with conditions, or deny Tri-State's application for use of public land managed by the BLM FFO to construct, operate, and maintain a new 230 kV transmission line and associated substations and access roads.

Pursuant to 43 CFR §2805.10, if BLM issues a grant to use public lands, BLM may include terms, conditions, and stipulations that BLM determines to be in the public interest. This includes modifying the proposed use or changing the route or location of the facilities on public land.

### 1.5.2 The BIA and the SUIT

The SJBEC Project will cross portions of SUIT tribal trust land in southwestern Colorado. Pursuant to 36 Stat. 1253 (March 4, 1911) as amended by 66 Stat. 95 (43 US Code [USC] §961, May 27, 1952), the BIA authorizes right-of-way grants across trust lands for electrical poles and lines for transmission and distribution of electrical power. Right-of-way granted under this act is subject to the provisions of this section, 961, as well as other pertinent sections of Part 169. Also, pursuant to 62 Stat. 17 (February 5, 1948; 25 USC §§323-328 and 25 CFR Part 169), the BIA will administer the grants of easement for right-of-way on tribal lands for the SJBEC Project. While the BIA authorizes and administers the right-of-way grant, the right-of-way grant is also subject to approval of the SUIT since the SJBEC Project would cross SUIT lands.

### 1.5.3 RUS

RUS will consider Tri-State's request for financial assistance for construction of the SJBEC Project. Under the authority of the Rural Electrification Act of 1936, the RUS Electric Program makes direct loans and loan guarantees to electric utilities serving customers in rural areas.

The loans and loan guarantees finance the construction of electric distribution, transmission, and generation facilities, including system improvements and replacement required to furnish and improve electrical service in rural areas, as well as demand-side management, energy conservation programs, and on-grid and off-grid renewable energy systems. Loans are made to corporations, states, territories and subdivisions and agencies such as municipalities, people's utility districts, and cooperative, nonprofit, limited-dividend, or mutual associations that provide retail electrical service needs to rural areas or supply the power needs of distribution borrowers in rural areas.

### 1.5.4 Western

Pursuant to the Federal Power Act, Western must consider and respond to Tri-State's request to interconnect with the Shiprock Substation and to construct the Three Rivers Substation on Western's reserved lands. Western's purpose and need is to consider the interconnection request in accordance with Western's General Requirements for Interconnection.[5] Western evaluates the interconnection request and whether it meets the reasonable needs of Tri-State. If approved, Western generally assumes responsibility to operate and maintain transmission facilities interconnected with its transmission system pursuant to the terms of the Interconnection Agreement and associated contracts.

As part of Western’s decision and action, Western will consider changes at the Shiprock Substation to accommodate additional electrical equipment. In addition, Western will determine if it will allow Tri-State to build the Three Rivers Substation on BLM lands that have been reserved for Western’s use. Tri-State and Western would complete negotiations to develop a proposal that satisfies the interests of both parties regarding Tri-State’s request to interconnect at the Shiprock Substation.

### 1.5.5 State of New Mexico

The New Mexico State Land Office administers all state lands in New Mexico. A right-of-way application is required in any location where the SJBEC Project crosses any New Mexico state land. Tri-State would file a New Mexico right-of-way easement application subject to review and approval by New Mexico State Land Office, in compliance with federal and state environmental laws and regulations.

### 1.5.6 La Plata County

Portions of the proposed transmission line and associated access would be located on private property in La Plata County, Colorado. In these private property locations, a location and extent review and various permits are required from La Plata County.

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[5] Western 2011b

## 1.6 Conformance with Land Use Plans, Laws, Regulations, and Policies

This section describes the relationship of the SJBEC Project to relevant BLM and county land use plans, laws, regulations, and policies.

### 1.6.1 Conformance with Land Use Plans

#### 1.6.1.1 Farmington Field Office Resource Management Plan

BLM must consider its existing resource management plans (RMP) in the decision to issue a right-of-way grant to authorize use of public land in accordance with 43 CFR §§1610.0-5(b). Under the FFO RMP, all right-of-way applications receive environmental review on a case-by-case basis. To the extent possible, new right-of-way is located within or parallel to existing right-of-way or right-of-way corridors to minimize resource impacts. Right-of-way corridors identified by the 2002 Western Utility Group revision of the 1992 Western Regional Corridor Study are designated for power line and pipeline use. Activities generally excluded from right-of-way corridors include mineral material sales, range and wildlife habitat improvements involving surface disturbance and facility construction, campgrounds and public recreational facilities, and other facilities that would attract public use. New oil and gas wells will be sited outside these designated right-of-way corridors.[6]

The SJBEC Project alternatives are not located within a currently designated existing or proposed BLM utility corridor. A formal corridor designation will require amendment of the BLM's FFO land use plan; however, a designated utility corridor is not required by law, policy, or regulation in order to site a proposed transmission line. Since the land affected by the proposal is generally open to right-of-way development and no additional utility demand is anticipated in the foreseeable future, no corridor designation or plan amendment is required or is being proposed as a part of this EIS process. The alternatives would conform with the

[6] BLM 2003, page 6

Farmington RMP Record of Decision dated September 2003 and updated in December 2003.

The BLM FFO seeks to meet objectives outlined in its RMPs and implement its multiple-use mission balancing land and resource management objectives to achieve healthy and productive landscapes, including the development of energy and minerals within acceptable areas in an environmentally sound manner. The Energy Policy Act of 2005 and BLM Energy and Mineral Policy (August 26, 2008) recognize that public land is an important source of the nation's energy and mineral resources, including renewable energy resources. Executive Order (EO) 3285, Renewable Energy Development by the DOI, identified as a departmental priority the production, development, and delivery of renewable energy. Public lands are important for the siting of infrastructure facilities (i.e., roads, power lines, and pipelines) to support the development of energy and mineral resources. In general, BLM's resource management objective is to meet public land use needs in a multiple-use framework while avoiding or minimizing undue and unnecessary degradation to the environment.

#### 1.6.1.2 La Plata County Code

La Plata County Code[7] provides guidelines for development and coordination with government agencies that are considered as appropriate in right-of-way authorization and transmission line development. Relevant chapters include the following:

- Chapter 74, Development Standards and Specifications, Article III Utility transmission lines – Standard permit requirements for transmission line development are included. Additional permitting requirements, including an environmental impact assessment report for all transmission line development, are specified. Analysis of the proposed transmission line through the NEPA process will satisfy analysis requirements. Additional requirements include pre-inspection meetings and site visits.

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[7] La Plata County 1998

- Chapter 82, Section 82-9, Location and Extent Review – The purpose of the location and extent review is to evaluate public uses and utilities, whether publicly or privately owned, for consistency with the comprehensive plan and to provide the planning commission and public with the opportunity to comment on such uses. Location and extent review is intended to be a review process, not a permitting process.
- Chapter 82, Section 82-14, Federal Lands District – Development on federal land can have impacts beyond the boundaries of that land, especially in regard to mining, timbering, and oil and gas development.
- Chapter 90, Section 90-122(d)(2), Land Use Coordination Standards – All minor facilities with engines or motors (excepting wellhead compressor engines) shall be electrified if, at the time of permitting, they are located within 1,320 feet of 3-phase power.

### 1.6.2 Conformance with Federal Laws, Regulations, and Policies

The FLPMA is the primary legal basis for authorizing a right-of-way grant on BLM land. This EIS is being prepared by the BLM FFO in compliance with NEPA; CEQ regulations for implementing NEPA; FLPMA; and DOI and BLM policies and manuals, including the BLM NEPA Handbook.[8] Other applicable regulations and guidelines are listed in Exhibit 1-4, Summary of Major Federal Authorizing Laws, Regulations, and Guidelines.

## 1.7 Federal, State, and Local Permits, Licenses, and Approvals

Major potential federal, state, and local permitting requirements for the SJBEC Project are described in Exhibit 1-5, Summary of Permits, Approvals, and Authorizations.

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[8] BLM 2008

**Exhibit 1-4**

## Summary of Major Federal Authorizing Laws, Regulations, and Guidelines

| Laws, Regulations, and Guidelines | Reference |
|---|---|
| American Indian Religious Freedom Act of 1978 | 42 USC §1996 |
| Archaeological Resources Protection Act, as amended | PL 96-95, 16 USC §470aa-mm, 43 CFR Part 7 |
| Bald and Golden Eagle Protection Act | 16 USC §§668-668d, as amended; 50 CFR Parts 10 and 22 |
| BLM NEPA Handbook H-1790-1 (2008) | BLM Manual Rel. 1-1710 |
| BLM Planning Handbook H-1601-1 (2005) | BLM Manual Rel. 1-1693 |
| BLM Planning Regulations | 43 CFR Part 1600 |
| BLM Right-of-Way Regulations | 43 CFR Part 1600 *et seq.* |
| Clean Air Act | 42 USC §7401 *et seq.*, 40 CFR Part 51, Subpart W and 40 CFR Part 93, Subpart B |
| Clean Water Act | 42 USC §1251 *et seq.* |
| Comprehensive Environmental Response Compensation and Liability Act | 42 USC §§9601-9675 |
| Consultation and Coordination with Indian Tribal Governments | EO 13084, EO 13175 |
| Departmental Responsibilities for Indian Trust Resources | 512 DM 2.1 |
| Endangered Species Act | 16 USC §1531 *et seq.* |
| Environmental Justice | EO 12898 |
| Farmland Protection Policy Act | PL 97-98, as amended; 7 USC §4201 *et seq.* |
| Federal Compliance with Pollution Control Standards | EO 12088 |
| Federal Land Policy and Management Act | PL 94-579 |
| Fish and Wildlife Coordination Act | PL 85-624, as amended; 16 USC §661 *et seq.* |
| Floodplain Management | 42 USC §4321, EO 11988 |
| Historic Sites Act | PL 74-292, as amended; 16 USC §§461-467 |
| Indian Sacred Sites | EO 13007 |
| Memorandum for the Heads of Executive Departments and Agencies on Government-to-Government Relations with Native American Tribal Governments of 1994 | Signed by President Clinton on April 29, 1994 |

**Exhibit 1-4**
## Summary of Major Federal Authorizing Laws, Regulations, and Guidelines

| Laws, Regulations, and Guidelines | Reference |
|---|---|
| Migratory Bird Treaty Act (MBTA) | 16 USC §§703-712, 50 CFR Parts 10 and 21, EO 13186 |
| National Environmental Policy Act of 1969, Protection and Enhancement of Environmental Quality | 42 USC §4321 *et seq.*, 40 CFR Parts 1500-1508 |
| National Historic Preservation Executive Order | EO 11593 |
| National Historic Preservation Act of 1966, as amended | PL 89-665, as amended; 16 USC §470; 36 CFR Part 800 |
| National Natural Landmarks Program | PL 74-292, as amended; 16 USC §§461-467; 36 CFR Part 62 |
| Native American Graves Protection and Repatriation Act of 1990 | PL 101-601, 25 USC §300 *et seq.*, 43 CFR Part 10 |
| Noise Control Act of 1972, as amended | 42 USC §4901 *et seq.* |
| Noxious Weeds and Invasive Species | EO 13112 |
| Occupational Safety and Health Act of 1970 | 29 USC §651 *et seq.* |
| Objects Affecting Navigable Airspace | 14 CFR Part 77 |
| Paleontological Resources Preservation Act | 16 USC §470aaa *et seq.* |
| Pollution Prevention Act of 1990 | 42 USC §13101 *et seq.* |
| Prime and Unique Farmlands | 7 CFR Part 657, 7 CFR Part 658 |
| Protection of Wetlands | 42 USC §4321, EO 11990 |
| Resource Conservation and Recovery Act | 42 USC §§6901-6992k |
| Responsibilities and the Endangered Species Act | Secretarial Order 3206, June 5, 1997 |
| RUS NEPA Procedures and Implementing Regulations | NEPA procedures are codified at 7 CFR Part 1794, and implementing regulations (36 CFR Part 800) |
| Safe Drinking Water Act of 1974 | 42 USC §300f *et seq.* |
| US Department of Energy, NEPA Implementing Procedures | 10 CFR Part 1021 |
| US Department of Energy, Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements | Second Edition |
| US Department of the Interior, Bureau of Indian Affairs, Rights-of-Way Over Indian Lands | 25 CFR Part 169 |

**Exhibit 1-4**

## Summary of Major Federal Authorizing Laws, Regulations, and Guidelines

| Laws, Regulations, and Guidelines | Reference |
|---|---|
| US Department of the Interior, Bureau of Indian Affairs | 42 USC §7401 *et seq.* |
| US Department of the Interior, NEPA implementing procedures and proposed revisions | 73 FR 200 |
| US Department of the Interior requirements | DM 516 |

*CFR – Code of Federal Regulations*
*DM – Department Manual*
*EO – Executive Order*
*et seq. – and the following*
*FR – Federal Register*
*PL – Public Law*
*USC – United States Code*

**Exhibit 1-5**

## Summary of Permits, Approvals, and Authorizations

| Issue | Action Requiring Permit, Approval, or Review | Agency | Permit, License, Compliance, or Review | Relevant Laws and Regulations |
|---|---|---|---|---|
| **Federal** | | | | |
| Air traffic | Location of towers in relation to airport facilities and airspace | Federal Aviation Administration (FAA) | A “No-hazard Declaration” required if structures are more than 200 ft. tall; Section 1101 Airspace Permit for airspace construction clearance | FAA Act of 1958 (PL 85-726, 14 CFR Part 77) |
| Bald and golden eagles | Protection of bald and golden eagles | USFWS | Bald and Golden Eagle Protection Act compliance | Bald and Golden Eagle Protection Act of 1972 (MBTA) (16 USC §668a - 668d, as amended; 50 CFR Parts 10 and 22) |
| Cultural resources | Excavation of archaeological resources and investigation of cultural resources | BLM/BIA | Permits to excavate and remove archaeological resources on federal lands; American Indian tribes with interests in resources must be consulted prior to issuance of permits | Archaeological Resources Protection Act of 1979 (PL 96-95, 16 USC §470aa-mm, 43 CFR Part 7) |
| Cultural resources | Potential conflicts with freedom to practice traditional American Indian religions | BLM/BIA | Consultation with affected American Indians | American Indian Religious Freedom Act (42 USC §1996) and Executive Order 13007 |
| Cultural resources | Disturbance of graves, associated funerary objects, sacred objects, and items of cultural patrimony | BLM/BIA | Consultation with affected Native American group regarding treatment of remains and objects | Native American Graves Protection and Repatriation Act (NAGPRA) (PL 101-601, 25 USC §§300 *et seq.*, 43 CFR Part 10) |
| Cultural resources | Protection of segments, sites, and features related to national trails | Affected land managing agencies | National Trails System Act Compliance | National Trails System Act (PL 90-543, 16 USC §§1241 to 1249) |

**Exhibit 1-5**

## Summary of Permits, Approvals, and Authorizations

| Issue | Action Requiring Permit, Approval, or Review | Agency | Permit, License, Compliance, or Review | Relevant Laws and Regulations |
|---|---|---|---|---|
| **Federal (Continued)** | | | | |
| Environmental policies and procedures | RUS Action: To grant financial assistance for SJBEC Project | RUS | EIS and ROD | 7 CFR Part 1794 |
| ESA, listed species | Protection of listed species and/or critical habitat | US Fish and Wildlife Service (USFWS) | ESA compliance | ESA (PL 93-205, as amended; 16 USC §1536[a]-[d]) |
| Migratory birds | Protection of migratory birds | USFWS | Migratory Bird Treaty Act compliance | Migratory Bird Treaty Act of 1918 (16 USC §§703-712, 50 CFR Parts 10 and 21, EO 13186) |
| NEPA compliance | Federal Action: To grant right-of-way across land under federal jurisdiction | Lead agency; cooperating agencies | EIS and ROD | The National Environmental Policy Act of 1969 (PL 91-190) (42 USC §4321); CEQ (40 CFR Parts 1500-1508); US Department of Energy (DOE) NEPA implementing Regulations (10 CFR Part 1021) |
| Paleontological resources | Ground disturbance on federal land | BLM | Requires that vertebrate fossils and other rare and scientifically significant fossils be collected only by qualified permitted researchers. | Paleontological Resources Preservation Act (16 USC §470aaa *et seq.*) |
| Paleontological resources | Ground disturbance on federal land | BLM | Compliance with BLM mitigation and planning standards for paleontological resources on public lands | FLPMA (43 USC §§1701-1771) |

**Exhibit 1-5**

## Summary of Permits, Approvals, and Authorizations

| Issue | Action Requiring Permit, Approval, or Review | Agency | Permit, License, Compliance, or Review | Relevant Laws and Regulations |
|---|---|---|---|---|
| **Federal (Continued)** | | | | |
| Right-of-way across land under federal management | Pre-construction surveys; construction, operation, maintenance, and abandonment | BLM, BIA | Right-of-way grant and temporary use permit (BLM); right-of-way grant across American Indian lands (BIA) | The Federal Land Policy and Management Act of 1976 (PL 94-579); 43 USC §§1761 to 1771; 43 CFR Part 2800; 25 CFR Part 169 |
| Water quality | Construction, maintenance, repair and removal of utility lines and associated facilities in waters of the US | USACE (US Army Corp of Engineers) | Section 404 Permit; Nationwide Permit 3, 12 | Clean Water Act (CWA) (33 USC §1344) |
| Water quality | Construction across water resources | USACE | General easement | 10 USC §§2668 to 2669 |
| Water quality | Construction in or modification of floodplains | Federal lead agency | Compliance with EO 11988, Floodplains | 42 USC §4321; EO 11988, Floodplains |
| Water quality | Construction in or modification of wetlands | Federal lead agency | Compliance with EO 11990, Wetlands | 42 USC §4321; EO 11990, Wetlands |
| Water quality | Potential pollutant discharge during construction, operation, and maintenance | US Environmental Protection Agency (EPA) | Spill Prevention Control and Countermeasure (SPCC) Plan for substations | Oil Pollution Act of 1990 (40 CFR Part 112) |
| **Southern Ute Indian Tribe** | | | | |
| Scientific research on tribal lands | Scientific investigations on SUIT lands needed for project impact assessments | SUIT Department of Natural Resources/Wildlife Division | Scientific Collection Permit | SUIT Crossing Permit Policy |
| Tribal land access | Crossing SUIT lands for commercial-oriented purposes | SUIT Department of Natural Resources/ Lands Division | Commercial Crossing Permit | SUIT Crossing Permit Policy |

**Exhibit 1-5**

## Summary of Permits, Approvals, and Authorizations

| Issue | Action Requiring Permit, Approval, or Review | Agency | Permit, License, Compliance, or Review | Relevant Laws and Regulations |
|---|---|---|---|---|
| **State of New Mexico** | | | | |
| Air quality | Sources with a potential emission rate greater than 10 pounds per hour, or 25 tons per year, of criteria pollutants | New Mexico Air Quality Bureau | Pre-Construction and New Source Review (NSR) Permit | New Mexico Administrative Code (NMAC), Title 20, Chapter 2 |
| Biological resources | Disturbance of state-protected species | New Mexico Game and Fish Department (NMGFD) | Wildlife Conservation Act compliance | Wildlife Conservation Act (New Mexico Statues Annotated [NMSA] §17-2-42) |
| Cultural resources | Disturbance of historic properties | New Mexico Historic Preservation Division | Cultural Properties Act and Cultural Properties Protection Act compliance | Cultural Properties Act (NMSA, §§18-6-1 to 18-6-27) and Cultural Properties Protection Act (NMSA §§18-6A-1 to 18-6A-6) |
| Right-of-way easement | Electric line easement/right-of-way application to cross State Land Office lands. | New Mexico State Land Office | Application to Install Electrical Facilities on New Mexico State Trust Lands | NMSA §19-2-10 |
| Right-of-way encroachment | Encroachment into state roadway right-of-way | New Mexico Department of Transportation (NMDOT) | Permit to Install Utility Facilities within Public right-of-Way | NMSA §§67-8-13 and 69-8-14 |
| Right-of-way width | Right-of-way is wider than 100 feet | New Mexico Public Regulation Commission | Determination of right-of-way Width | NMSA §62-9-3 |
| Transmission line siting | Transmission line siting, primary permitting authority | New Mexico Public Regulation Commission | Certificate of Public Convenience and Necessity (CPCN); Location Permit | NMSA 1978 Compilation, §62-9-3 |
| Water quality | Construction sites with greater than 5 acres of land disturbed | New Mexico Surface Water Quality Bureau | Section 402 National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Construction Activities; Stormwater Pollution Prevention Plan (SWPPP) | CWA (33 USC §1342) |

**Exhibit 1-5**
## Summary of Permits, Approvals, and Authorizations

| Issue | Action Requiring Permit, Approval, or Review | Agency | Permit, License, Compliance, or Review | Relevant Laws and Regulations |
|---|---|---|---|---|
| **State of New Mexico (Continued)** | | | | |
| Water quality | Potential discharge into waters of the state (including wetlands and washes) | New Mexico Surface Water Quality Bureau | Section 401 permit | CWA (33 USC §1342) |
| **San Juan County** | | | | |
| None required. | | | | |
| **State of Colorado** | | | | |
| Biological resources | Disturbance of state-protected species | Colorado Division of Wildlife (Now called Colorado Parks and Wildlife) | Colorado Nongame, Endangered, or Threatened Species Conservation Act compliance | Colorado Nongame, Endangered, or Threatened Species Conservation Act (CRS 33-2-101) |
| Cultural resources | Disturbance of historic properties | Colorado Office of Archaeology & Historic Preservation | Historical, Prehistorical, and Archaeological Resources Act, and Colorado Register of Historic Places Act compliance | Historical, Prehistorical, and Archaeological Resources Act, (CRS 24-80-401ff, 24-80-1301ff) Colorado Register of Historic Places Act (CRS 24-80.1ff) |
| Right-of-way encroachment | Encroachment into state roadway right-of-way | Colorado Department of Transportation (CDOT) | Utility Permit | 2 CCR 601-18 |
| Transmission line siting | Transmission line siting, primary permitting authority | Colorado Public Utilities Commission | CPCN | 4 Code of Colorado Regulations (CCR) 723-3 |
| Water quality | Construction sites with greater than five acres of land disturbed | CDPHE | Section 402 NPDES General Permit for Stormwater Discharges from Construction Activities; SWPPP | CWA (33 USC §1342) |
| Water quality | Potential discharge into waters of the state (including wetlands and washes) | CDPHE | Section 401 permit | CWA (33 USC §1342) |

**Exhibit 1-5**
## Summary of Permits, Approvals, and Authorizations

| Issue | Action Requiring Permit, Approval, or Review | Agency | Permit, License, Compliance, or Review | Relevant Laws and Regulations |
|---|---|---|---|---|
| **La Plata County** | | | | |
| Access | New, upgraded, or changed access | La Plata County, Colorado | Access permit | La Plata County Code, Chapter 82 and Chapter 74 |
| Land use | Construction of substations | La Plata County, Colorado | Building permit; Location and Extent Review or review pursuant to CRS 29-20-108 | La Plata County Code, Chapter 18 |
| Land use | Construction and operation of transmission line | La Plata County, Colorado | Utility permit | La Plata County Code, Chapter 74 |
| Land use | Construction and operation of transmission line | La Plata County, Colorado | Location and Extent Review or review pursuant to CRS 29-20-108 | La Plata County Code, Chapter 82 |

*CCR – Code of Colorado Regulations*
*CFR – Code of Federal Regulations*
*CRS – Colorado Revised Statute*
*DM – Department Manual*
*EO – Executive Order*
*et seq. – and the following*
*FR – Federal Register*
*NMAC – New Mexico Administrative Code*
*NMSA – New Mexico Statutes Annotated*
*PL – Public Law*
*ROD – Record of Decision*
*USC – United States Code*

## 1.8 NEPA Scoping Process Overview

### 1.8.1 EA Scoping

The SJBEC Project was initiated in 2008 when Tri-State submitted an application for right-of-way to the BLM. When the SJBEC Project began, the BLM initiated an Environmental Assessment (EA) to determine the appropriate level of documentation to comply with NEPA. Public scoping for the SJBEC Project EA occurred from September 17 through November 9, 2009. Scoping meetings were held with the public and local, state, and federal agencies on October 7 and 8, 2009, in Farmington, New Mexico, and Ignacio, Colorado. The meetings were used to gather input on issues for consideration in the SJBEC Project EA. In addition to information regarding the federal environmental process, general project information and information about preliminary transmission line corridors were also available for review and comment at the scoping meetings.

**2009 EA Scoping Report**

The 2009 EA Scoping Report is incorporated by reference and is located at:

http://www.blm.gov/nm/st/en/prog/more/lands_realty/san_juan_basin_energy.html

A total of 82 individuals signed in as attendees to the EA scoping meetings. Comments were received from 91 individuals. Issues of primary concern identified by the public during the scoping period were:

- Proximity of the transmission line to residences
- Land use issues
- Impacts to visual resources
- Health and safety concerns
- Impacts related to noise

Public input received during the scoping period suggested that an EIS-level analysis would be more appropriate than the proposed EA. As a result, the BLM decided in December 2009 to prepare an EIS instead of an EA.

### 1.8.2 EIS Scoping

The EIS scoping process began when the BLM published the Notice of Intent in the Federal Register on January 25, 2011, and continued to April 1, 2011. Three public scoping meetings and one agency scoping meeting were held on March 16 and 17, 2011, in Farmington and Aztec, New Mexico, and Ignacio, Colorado, to solicit comments on the scope of the EIS.

**2011 EIS Scoping Report**

The 2011 EIS Scoping Report is incorporated by reference and is located at:

http://www.blm.gov/nm/st/en/prog/more/lands_realty/san_juan_basin_energy.html

A total of 140 individuals signed in as attendees to the three public scoping meetings. A total of 71 individuals, agencies, and non-governmental organizations submitted comments on the SJBEC Project. Comments were received regarding a wide variety of issues, but largely fell into the following categories:

- Land use
- Effects on resources and resource use
- Public health and safety
- Socioeconomics and environmental justice
- Alternatives
- Mitigation measures

## 1.9 Issues Raised During Scoping

The BLM categorized and summarized the issues identified in scoping comments into broad categories of project issues. The project issues identified below encapsulate the specific issues and questions raised by the public and agencies during the scoping process. Additional information about the scoping process is provided in Chapter 5, Public Coordination, of this Draft EIS. Information contained in Chapters 3 and 4 of this Draft EIS explain the methods, effects, and proposed mitigation measures identified to respond to the issues raised during scoping.

**Lands and Realty:** How will the BLM analyze and mitigate impacts to private landowners associated with the alternatives? Specific concerns include:

- Residences and landowners
- Property values
- Land use
- Continued access for maintenance

**Effects on Resources and Resource Uses:** How will the Project impact and minimize the impacts of transmission line and substation development on resources and resource uses? Specific concerns include:

- Visual resources
- Water and wetlands
- Air quality
- Cultural resources
- Wildlife, vegetation, and threatened and endangered species
- Noise and vibration
- Recreation
- Transportation
- Farmlands
- Grazing and livestock
- Geology and soils
- Paleontology
- Minerals
- Hazardous materials

**Public Health and Safety:** How will the BLM ensure that the Project is constructed and operated in a manner that protects public health and safety? Specific concerns include:

- Effects from electric and magnetic fields on humans, wildlife, and livestock
- Safety concerns from building a transmission line over gas pipelines
- Effects associated with increased traffic
- Construction in close proximity to oil-field operations

**Socioeconomics and Environmental Justice:** How can the Project be implemented in a way that strengthens state and local socioeconomic conditions, provides local access to energy, and ensures environmental justice? Specific concerns include:

- Contribution to economic growth
- Creation of new jobs in the region
- Economic benefits
- Utilization of existing disturbance to lower construction cost

**Route Identification:** How will the BLM determine the transmission line route while balancing the need to protect resources? Specific concerns include:

- Comparison of route impacts
- Justification regarding identification of the preferred route

**Mitigation Measures:** What measures will be implemented to protect and minimize impacts to resources and resource uses? Specific concerns include:

- Mitigation of impacts from project construction and maintenance
- Mitigation of impacts to wildlife and threatened and endangered species
- Mitigation of impacts to televisions and cellular phones
- Minimization of pollution resulting from construction and maintenance

**Cumulative Impacts:** How will the BLM address cumulative impacts of constructing the transmission line and its associated infrastructure on a landscape scale? Specific concerns include:

- Existing and future oil and gas wells
- Existing transmission and pipeline infrastructure
- Electrification of oil and gas wells in the region
- Changes to VRM classifications

## 1.10 Organization of the EIS

This EIS is organized as follows:

- Summary – Provides a summary of the Draft EIS and discusses key findings.
- Chapter 1 Introduction – Discusses the project background, purpose and need, and relevant federal, state, and local regulations, and summarizes the NEPA scoping process.
- Chapter 2 Alternatives – Describes the alternatives evaluated in this EIS, identifies actions common to all action alternatives, and explains what alternatives were considered, but eliminated from detailed analysis.
- Chapter 3 Affected Environment and Environmental Effects – Describes existing conditions and environmental effects for alternatives analyzed in this EIS.
- Chapter 4 Cumulative Effects – Describes cumulative effects.
- Chapter 5 Public Coordination – Discusses public involvement (including scoping) activities and involvement of and coordination with other federal, state, local, and tribal governments. It also includes a list of preparers and list of individuals who were sent copies of the EIS.
- Chapter 6 References – Lists sources used in preparing this EIS.
- Index
- Appendices

# Chapter 2 – Alternatives

# 2 Alternatives

*Chapter 2 describes the alternatives evaluated in this EIS, identifies actions common to all action alternatives, and explains what alternatives were considered, but eliminated from detailed analysis in this EIS.*

## 2.1 Alternatives Overview

This EIS evaluates the No Action Alternative and two action alternatives in detail: the Preferred Alternative and the Proposed Action. The Proposed Action was submitted by Tri-State as part of their right-of-way application. The Proposed Action was developed in coordination with the BLM through comprehensive public outreach effort. Based on agency coordination, scoping, and analysis, a second alternative was developed. This alternative was selected as the preferred alternative because it would meet the purpose and need and minimize effects to the built and natural environment to a greater extent than the Proposed Action. The action alternatives are described below, along with the actions common to both. The No Action Alternative is also discussed.

Additional action alternatives were considered and evaluated as part of the alternatives development process. Some were dropped from detailed study early in the process while others were eliminated as analysis progressed. All are discussed in this chapter.

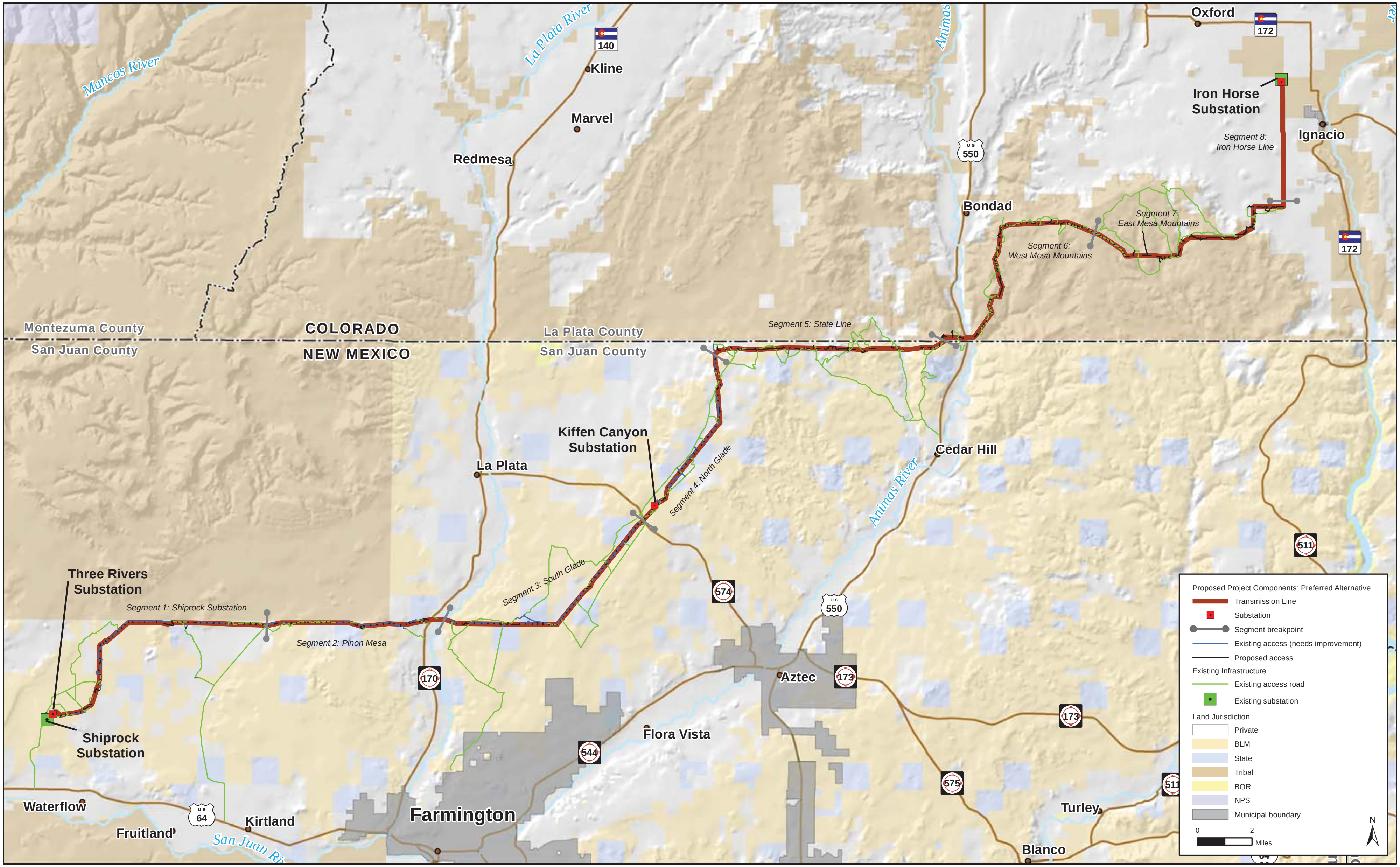
### 2.1.1 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be constructed. The objectives of the SJBEC Project, which include improving electric reliability and increasing load-serving capabilities, would not be met.

### 2.1.2 Preferred Alternative

The Preferred Alternative includes a 230 kV transmission line that is approximately 64.3 miles long and is shown in Exhibit 2-1, Preferred Alternative. The new 230 kV transmission line would originate at Western's existing Shiprock Substation and would end at the Iron Horse Substation located near Ignacio, Colorado. The Preferred Alternative would include the following components:

- A new 345 kV to 230 kV substation (Three Rivers Substation) near Western's existing Shiprock Substation. The new Three Rivers Substation would connect to the existing Shiprock Substation.
- Approximately 33.1 miles of new double-circuit-capable 230 kV transmission line from the new Three Rivers Substation to the area north of the proposed Kiffen Canyon Substation to Segment 5 (shown in Exhibit 2-1) where the transmission line would turn east and parallel the New Mexico/Colorado state line.
- A new 230 kV substation (Kiffen Canyon Substation) near the existing City of Farmington 115 kV Glade Tap Substation.
- Approximately 31.2 miles of new single-circuit 230 kV transmission line from Segment 5 to the existing Iron Horse Substation. Approximately 4.5 miles south of the existing Iron Horse Substation, the new single-circuit 230 kV transmission line would be strung on existing poles that connect to the existing Iron Horse Substation.
- An expansion of the Iron Horse Substation.
- Access roads, which will include a combination of new unpaved access roads, improvements to existing access roads, and the use of existing roads in their current state.
- Overhead ground wire for the entire 230 kV transmission line. Overhead ground wire protects the transmission line from lightning strikes and contains fiber optics in the wire to transmit data and serve as a communication system.




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

**Exhibit 2-1 Preferred Alternative**

Highlights of Preferred Alternative are summarized below in Exhibit 2-2, Preferred Alternative Highlights.

Exhibit 2-2
## Preferred Alternative Highlights

| | Characteristic | Miles |
|---|---|---|
| **Total Length of Preferred Alternative** | | **64.3** |
| Jurisdiction | Length Crossing BLM-managed Land | 25.4 |
| | Length Crossing Southern Ute Indian Tribal Trust Land | 15.6 |
| | Length Crossing State of New Mexico–owned Land | 3.6 |
| | Length Crossing privately owned Land | 19.7 |

Land required for operation of the Preferred Alternative is shown below in Exhibit 2-3, Summary of Land Required for the Operation of the Preferred Alternative. Temporary disturbance areas during construction are shown in Exhibit 2-4, Summary of Land Required for Construction of the Preferred Alternative.

Exhibit 2-3
## Summary of Land Required for Operation of the Preferred Alternative (Permanent Effects)[1]

| Description | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Lattice Tower Tangent | 2.306 | 0.422 | – | 0.956 | **3.684** |
| Lattice Tower Angle | 0.404 | 0.060 | – | 0.147 | **0.611** |
| Lattice Tower Deadend | 0.511 | – | – | 0.325 | **0.836** |
| Mono-Pole Tangent | 0.001 | – | – | – | **0.001** |
| Mono-Pole Deadend | 0.006 | – | – | – | **0.006** |
| 3-Pole Self-Supporting Deadend or Angle | 0.011 | – | 0.016 | 0.011 | **0.038** |
| Wood H-Frame Tangent | 0.014 | – | 0.044 | 0.014 | **0.072** |
| Wood 3-Pole Deadend or Angle | 0.013 | – | 0.023 | 0.007 | **0.043** |
| Three Rivers Substation | 20.000 | – | – | – | **20.000** |
| Kiffen Canyon Substation | 23.000 | – | – | – | **23.000** |
| Iron Horse Expansion | 0.000 | – | – | 3.500 | **3.500** |
| Access Roads | 54.749 | 16.577 | 28.018 | 31.086 | **130.429** |
| **Total** | **101.015** | **17.059** | **28.101** | **36.045** | **182.220** |

[1] *The purpose of this table is to provide an estimate of the area that would be permanently affected by the SJBEC Project. These areas may change as final design progresses. Areas were determined using assumptions from Exhibit 2-14, Typical Design Characteristics – 230 kV Transmission Line.*

**Exhibit 2-4**

## Summary of Land Required for Construction of the Preferred Alternative (Temporary Effects)[1]

| Description | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Structure Work Area | 103.600 | 11.900 | 70.700 | 70.000 | **256.200** |
| Wire-Pulling for Conductor and Shield Wire | 25.389 | 4.557 | 15.624 | 19.530 | **65.100** |
| Wire Pulling for Optical Ground Wire | 16.380 | 2.940 | 10.080 | 12.600 | **42.000** |
| Construction Staging Areas | – | – | – | 100.000 | **100.000** |
| Helicopter Fly Yard | 20.000 | – | – | – | **20.000** |
| Helicopter Staging Areas | 13.000 | 2.000 | – | 10.000 | **25.000** |
| Guard Structures | 0.312 | 0.056 | 0.192 | 0.240 | **0.800** |
| Three Rivers Substation | 20.000 | – | – | – | **20.000** |
| Kiffen Canyon Substation | 23.000 | – | – | – | **23.000** |
| Iron Horse Expansion | – | – | – | 3.500 | **3.500** |
| Access Roads, 30-Foot Right-of-Way | 54.329 | 19.596 | 17.755 | 30.873 | **122.553** |
| Access Roads, 50-Foot Right-of Way | 46.323 | 8.782 | 40.453 | 26.261 | **121.819** |
| **Total** | **322.333** | **49.831** | **154.804** | **273.004** | **799.972** |

*[1] This exhibit provides an estimate of the area that would be temporarily affected by construction activities for the SJBEC Project. These areas may change as final design progresses. Areas were determined using assumptions from Exhibit 2-14. The area for substations is included both as a permanent and temporary effect, since areas where substations are proposed would be affected by constructing the substations.*

The miles of new access roads and existing access roads requiring improvements for the Preferred Alternative are shown below in Exhibit 2-5, Estimate of New and Improved Access Roads for the Preferred Alternative.

**Exhibit 2-5**

## Estimate of New and Improved Access Roads for the Preferred Alternative

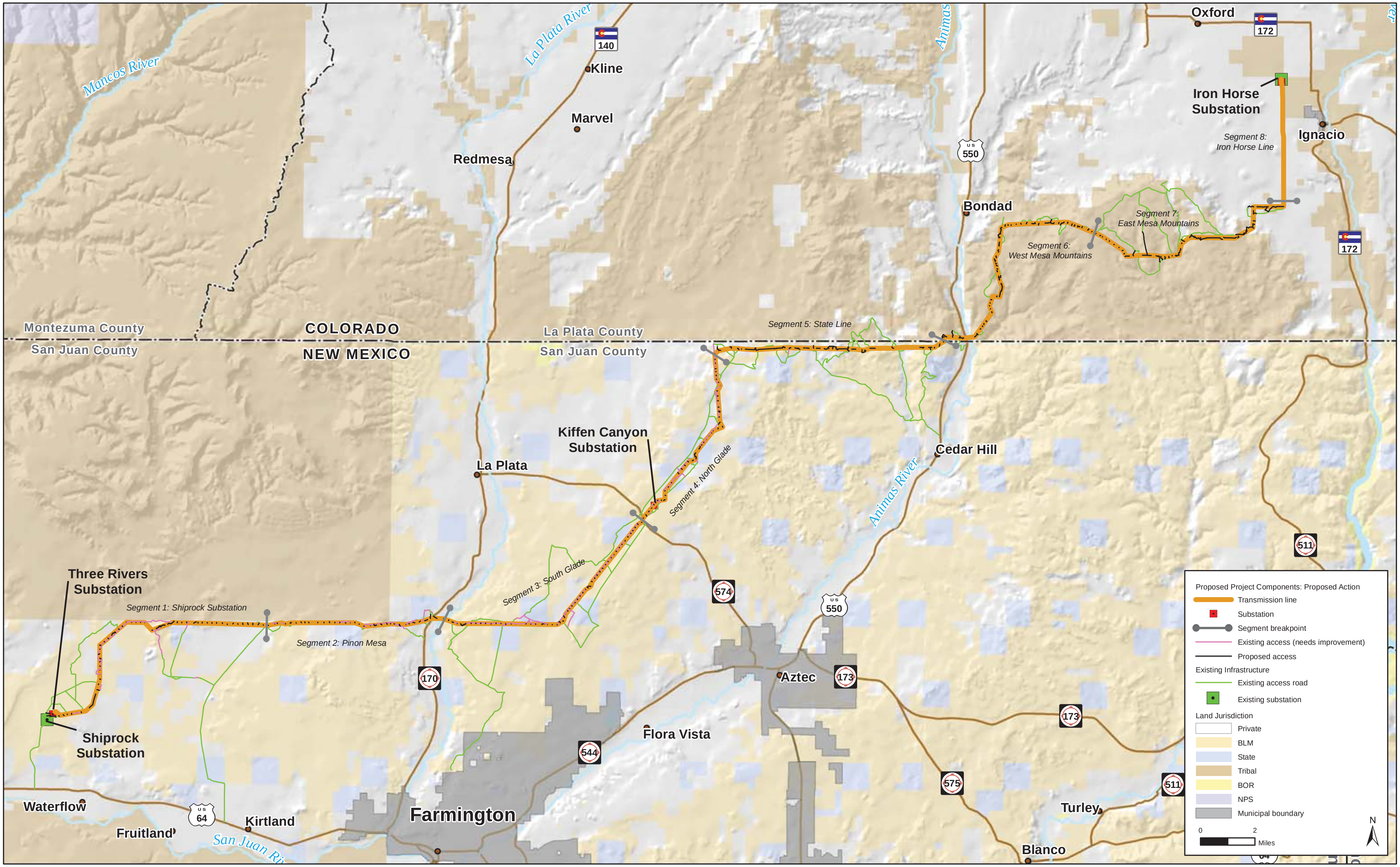
| Jurisdiction | Miles of New Access Roads | Miles of Existing Roads Requiring Improvement | Total (miles) |
|---|---|---|---|
| BLM | 8.4 | 14.2 | 22.6 |
| NMSLO[1] | 1.7 | 5.2 | 6.9 |
| SUIT | 11.6 | 0 | 11.6 |
| Private | 6.9 | 6.0 | 12.9 |
| **Total** | **28.6** | **25.4** | **54.0** |

*NMSLO – New Mexico State Land Office*

### 2.1.3 Proposed Action

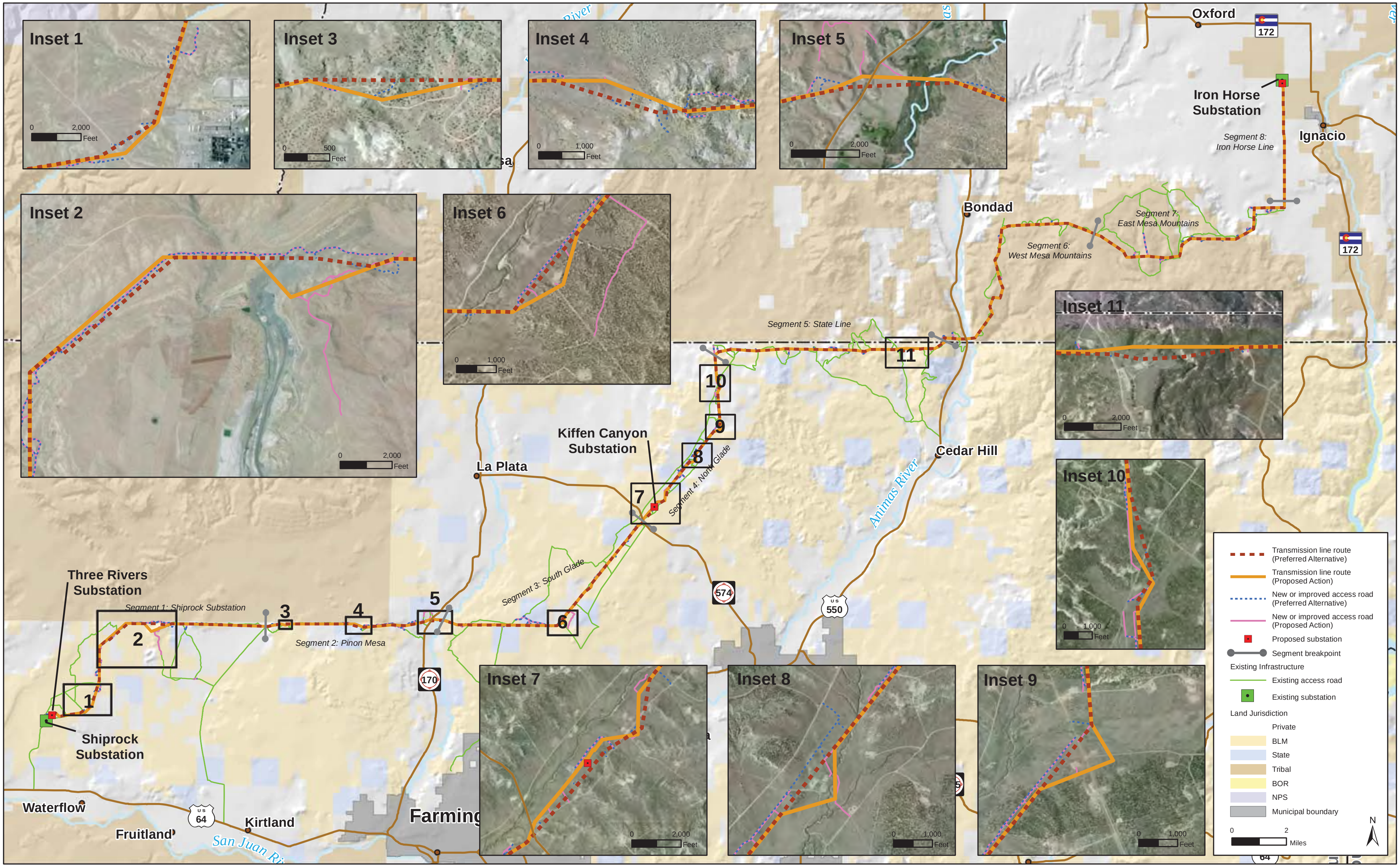
The Proposed Action includes a 230 kV transmission line that is approximately 64.9 miles long and is shown in Exhibit 2-6, Proposed Action. The Proposed Action would follow a slightly different alignment and would have a different access road network than what is proposed for the Preferred Alternative as shown in Exhibit 2-7, Differences Between the Preferred Alternative and the Proposed Action. The Proposed Action would have similar components as described for Preferred Alternative. The Proposed Action includes:

- A new 345 kV to 230 kV substation (Three Rivers Substation) near Western's existing Shiprock Substation. The new Three Rivers Substation would connect to the existing Shiprock Substation.
- Approximately 33.7 miles of new double-circuit-capable 230 kV transmission line from the new Three Rivers Substation to the New Mexico/Colorado state line.
- A new 230 kV substation (Kiffen Canyon Substation) near the existing City of Farmington 115 kV Glade Tap Substation.
- Approximately 31.2 miles of new single-circuit 230 kV transmission line between the proposed New Mexico/Colorado state line and the existing Iron Horse Substation.
- Approximately 4.5 miles south of the existing Iron Horse Substation, the new single-circuit 230 kV transmission line would be strung on existing poles that connect to the existing Iron Horse Substation.
- An expansion of the Iron Horse Substation.
- Access roads, which will include a combination of new unpaved access roads, improvements to existing access roads, and the use of existing roads in their current state.
- Overhead ground wire for the entire 230 kV transmission line. Overhead ground wire protects the transmission line from lightning strikes, and contains fiber optics in the wire to transmit data and serve as a communication system.




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

**Exhibit 2-6 Proposed Action**




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

**Exhibit 2-7 Differences Between the Preferred Alternative and the Proposed Action**

Highlights of Proposed Action are summarized below in Exhibit 2-8, Proposed Action Highlights.

**Exhibit 2-8**

## Proposed Action Highlights

| | Characteristic | Miles |
|---|---|---|
| **Total Length of Proposed Action** | | **64.9** |
| Jurisdiction | Length Crossing BLM-managed Land | 25.5 |
| | Length Crossing Southern Ute Indian Tribal Trust Land | 15.6 |
| | Length Crossing State of New Mexico-owned Land | 4.4 |
| | Length Crossing privately owned Land | 19.4 |

Land required for operation of the Proposed Action is shown below in Exhibit 2-9, Summary of Land Required for Operation of the Proposed Action. Temporary disturbance areas during construction are shown in Exhibit 2-10, Summary of Land Required for Construction of the Proposed Action.

**Exhibit 2-9**

## Summary of Land Required for Operation the Proposed Action (Permanent Effects)[1]

| Description | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Lattice Tower Tangent | 1.90 | 0.50 | – | 1.0 | **3.400** |
| Lattice Tower Angle | 0.24 | – | – | 0.09 | **0.330** |
| Lattice Tower Deadend | 0.72 | 0.04 | – | 0.12 | **0.880** |
| Mono-Pole Tangent | 0.002 | – | – | – | **0.002** |
| Mono-Pole Deadend | 0.009 | – | – | – | **0.009** |
| 3-Pole Self-Supporting Deadend or Angle | 0.01 | – | 0.01 | – | **0.020** |
| Wood H-Frame Tangent | 0.02 | – | 0.05 | 0.01 | **0.080** |
| Wood 3-Pole Deadend or Angle | 0.02 | – | 0.02 | 0.01 | **0.050** |
| Three Rivers Substation | 20.00 | – | – | – | **20.000** |
| Kiffen Canyon Substation | 23.00 | – | – | – | **23.000** |
| Iron Horse Expansion | 0.00 | – | – | 3.5 | **3.500** |
| Access Roads | 56.60 | 14.8 | 27.40 | 33.1 | **132.000** |
| **Total** | **102.50** | **15.3** | **27.50** | **37.9** | **183.2** |

[1] *The purpose of this table is to provide an estimate of the area that would be permanently affected by the SJBEC Project. These areas may change as final design progresses. Areas were determined using assumptions from Exhibit 2-14, Typical Design Characteristics – 230 kV Transmission Line.*

**Exhibit 2-10**

## Summary of Land Required for Construction of the Proposed Action (Temporary Effects)[1]

| Description | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Structure Work Area | 119.7 | 19.6 | 70.7 | 77.7 | **287.70** |
| Wire-Pulling for Conductor and Shield Wire | 25.4 | 4.6 | 15.6 | 19.5 | **65.10** |
| Wire Pulling for Optical Ground Wire | 16.4 | 2.9 | 10.1 | 12.6 | **42.00** |
| Construction Staging Areas | – | – | – | 100.0 | **100.00** |
| Helicopter Fly Yard | 20.0 | – | – | – | **20.00** |
| Helicopter Staging Areas | 13.0 | 2 | – | 10.0 | **25.00** |
| Guard Structures | 0.2 | 0.04 | 0.1 | 0.2 | **0.06** |
| Three Rivers Substation | 20.0 | – | – | – | **20.00** |
| Kiffen Canyon Substation | 23.0 | – | – | – | **23.00** |
| Iron Horse Expansion | – | – | – | 3.5 | **3.50** |
| Access Roads, 30-Foot Right-of-Way | 63.8 | 21.2 | 16.9 | 32.5 | **134.40** |
| Access Roads, 50-Foot Right-of Way | 35.2 | 1.6 | 40.5 | 28.7 | **106.00** |
| **Total** | **336.7** | **51.9** | **153.8** | **284.7** | **827.2** |

[1] *This exhibit provides an estimate of the area that would be temporarily affected by construction activities for the SJBEC Project. These areas may change as final design progresses. Areas were determined using assumptions from Exhibit 2-14. The area for substations is included both as a permanent and temporary effect, since areas where substations are proposed would be affected by constructing the substations.*

The miles of new access roads and existing access roads requiring improvements for the Proposed Action are shown below in Exhibit 2-11, Estimate of New and Improved Access Roads for the Proposed Action.

**Exhibit 2-11**

## Estimate of New and Improved Access Roads for the Proposed Action

| Jurisdiction | Miles of New Access Roads | Miles of Existing Roads Requiring Improvement | Total (miles) |
|---|---|---|---|
| BLM | 8.3 | 14.9 | 23.2 |
| NMSLO | 1.2 | 4.8 | 6.1 |
| SUIT | 11.6 | 0 | 11.6 |
| Private | 6.9 | 6.5 | 13.4 |
| **Total** | **28.0** | **26.3** | **54.2** |

## 2.2 Actions Common to All Action Alternatives

Key features, construction activities, operations and maintenance activities, and Environmental Protection Measures (EPMs) common to both the Preferred Alternative and the Proposed Action are described in greater detail below.

### 2.2.1 230 kV Transmission Line

The proposed 230 kV transmission line would be approximately 65 miles long and includes both double-circuit and single-circuit sections. A 230 kV and 345 kV line would originate at Western's existing Shiprock Substation and interconnect to a new substation to be built nearby, called the Three Rivers Substation. From the Three Rivers Substation, the new 230 kV transmission line would be built as a double-circuit line, though only one circuit would be built. The double-circuit transmission line would parallel Western's existing 345 kV transmission line north for approximately 4 miles and then east for approximately 17 miles. In this section, the double-circuit transmission line would cross the La Plata River at a location parallel to the existing 345 kV transmission line. Exhibit 2-12, Existing Transmission Lines, shows the location of existing transmission lines located near the proposed transmission line route.

**Transmission Line Highlights**

The proposed transmission line is about 65 miles long and would:

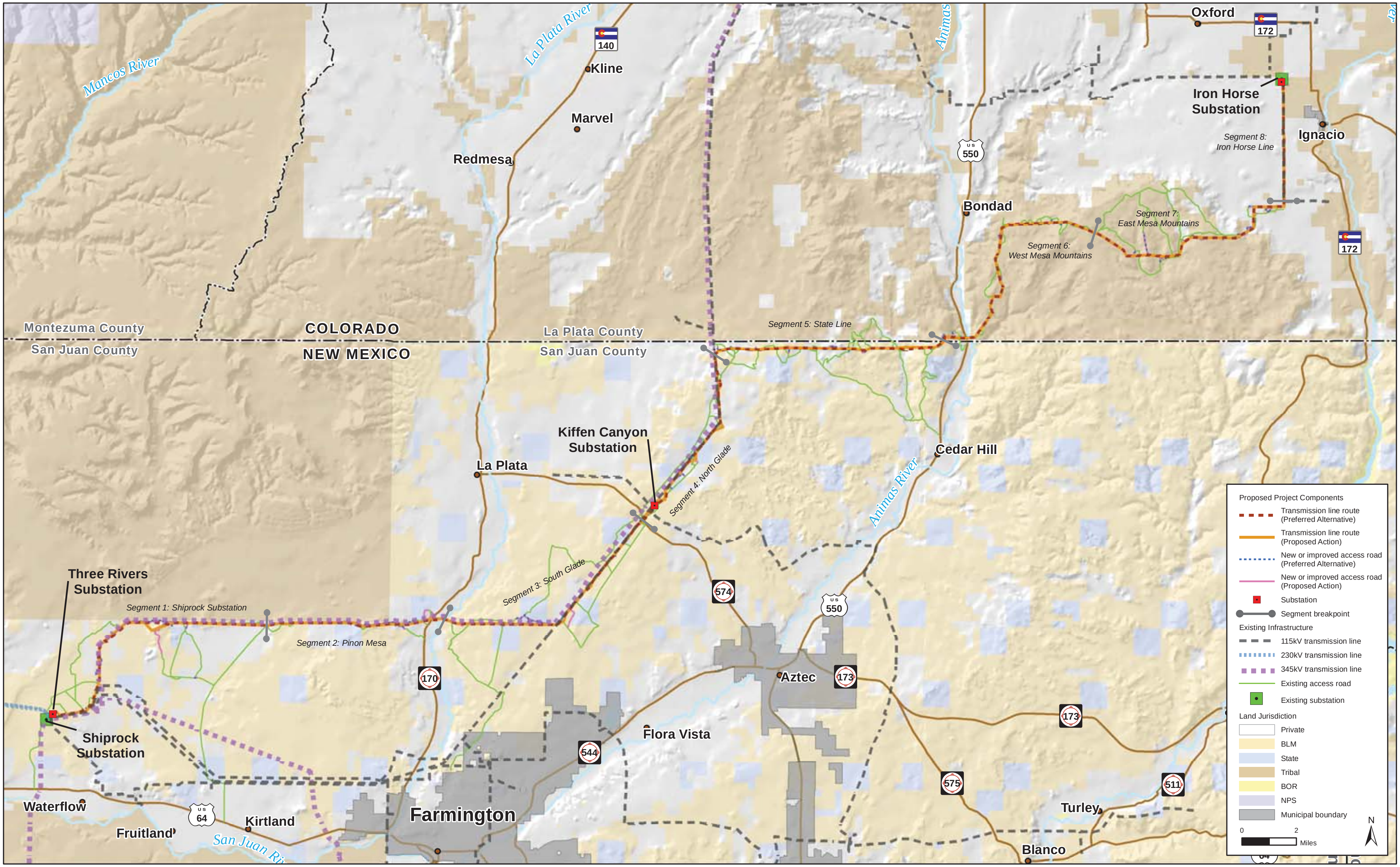
- parallel existing transmission lines for 31 miles.
- be co-located with an existing transmission line for 4.5 miles.

Approximately 4 miles east of the La Plata River crossing, the double-circuit transmission line would travel northeast for approximately 12 miles and would continue to parallel Western's 345 kV transmission line and the City of Farmington's 115 kV transmission line. It would continue through the BLM-managed Glade Run Recreation Area to the proposed location for the Kiffen Canyon Substation.

From the Kiffen Canyon Substation, the double-circuit transmission line would continue northeast towards the Colorado-New Mexico state line, where the double-circuit configuration would change to a single-circuit configuration. Approximately 0.25 mile south of the state line, the proposed single-circuit transmission line would deviate from the 115 kV and 345 kV transmission lines and, to the greatest extent feasible, would follow existing oil and gas well access roads along the state line for approximately 10 miles to the Animas River. The proposed single-circuit transmission line would continue across SUIT tribal trust lands across the Animas River and US 550 with one span just north of the state line. From this point, the proposed single-circuit transmission line would follow existing oil and gas well access roads and pipeline corridors on SUIT lands north and east for approximately 15 miles.

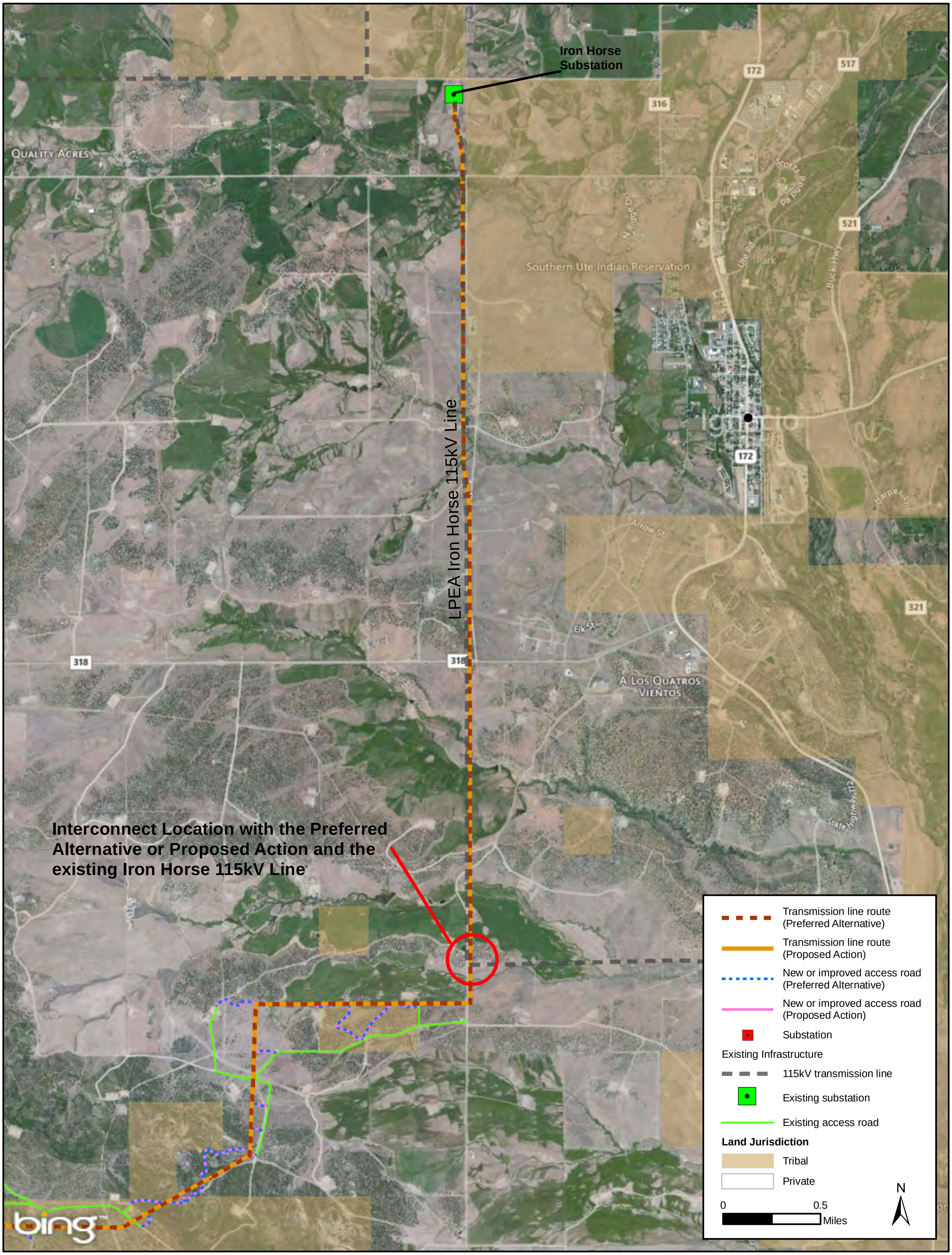
After exiting SUIT trust land, the single-circuit transmission line would continue east for approximately 2 miles where it would intersect with the existing La Plata 115 kV transmission line along County Road 319 as shown in Exhibit 2-13, Proposed Routes and the Existing Iron Horse Line. At this point, the transmission line would share structures with the existing 115 kV Iron Horse to Salvador line for approximately 4.5 miles and travel north on private land to the interconnection point with the Iron Horse Substation. In this 4.5-mile section, Tri-State's new 230 kV line would be strung on the existing structures that carry the existing 115 kV Iron Horse line, which would change this section from a single-circuit transmission line to a double-circuit transmission line.

The transmission line components include structures, foundations, conductors, insulators and associated hardware, and overhead ground wire. Exhibit 2-14, Typical Design Characteristics – 230 kV Transmission Line, summarizes typical design characteristics.




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013, GIS Tri-State 2008

**Exhibit 2-12 Existing Transmission Lines**




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013, GIS Tri-State 2008

**Exhibit 2-13 Proposed Routes and the Existing Iron Horse Line**

**Exhibit 2-14**

## Typical Design Characteristics – 230 kV Transmission Line

| Feature | Double-Circuit 230 kV<br>Steel Lattice Structure | Single- or Double-Circuit 230 kV<br>Steel Mono-Pole or 3-Pole Structure | Single-Circuit 230 kV<br>Wood Structure |
|---|---|---|---|
| **Physical Properties** | | | |
| Typical right-of-way width | 150 feet | 150 feet | 150 feet |
| Typical distance between structures | 600–1,500 feet | 600–1,500 feet | 600–1,200 feet |
| Typical structure height | 112–162 feet | 70–130 feet | 65–100 feet |
| Typical structures per mile | 4–6 | 4–6 | 4–7 |
| Ground clearance (beneath conductor under maximum operating conditions) | 28 feet | 28 feet | 28 feet |
| Minimum clearance of equipment to energized conductor | 14 feet | 14 feet | 14 feet |
| **Land Temporarily Disturbed** | | | |
| Structure work area | Right-of-way width x 200 feet per structure (assembly, erection, and crane pads). | | |
| Wire-pulling, tensioning, and splicing sites | Right-of-way width x 600 feet for mid-span and deadend structure conductor, shield wire, and optical ground wire pulling sites. | | |
| Construction yards and staging areas | 5 locations, approximately 20 acres in size. Sites would be located in previously disturbed areas close to improved roads. | | |
| Helicopter fly yard | 1 location, approximately 10 to 20 acres in size.<br>25 temporary 1-acre locations for setting down and refueling the helicopter while stringing the line. Sites would be adjacent to access roads. | | |
| Batch plant sites | Most concrete would be purchased from local ready-mix vendors. If a batch plant were necessary then the batch plant (approximately 1–3 acres) would be located within the construction yards and staging areas. | | |
| Guard structures | Structures measuring 10 x 50 feet, located at road and existing electrical distribution line crossings. | | |
| **Land Permanently Required** | | | |
| Structure Base - Preferred Alternative | Steel lattice tower (tangent): 1,225 square feet (35- x 35-foot tower base).<br>Steel lattice tower (angle): 1,600 square feet (40- x 40-foot tower base).<br>Steel lattice tower (deadend): 2,025 square feet (45- x 45-foot tower base). | Steel tubular mono-pole structure (tangent): 29 square feet (6-foot-diameter foundation).<br>Steel tubular mono-pole structure (deadend): 64 square feet (9-foot-diameter foundation).<br>Steel 3-pole self-supporting structure (deadend or angle): 236 square feet (3 poles x 8- to 10-foot-diameter foundations). | Wood H-frame (tangent): 25 square feet (2 poles x a 4-foot-diameter hole at each pole).<br>Wood 3-pole (angle or deadend): 48 square feet (3 poles x a 4-foot-diameter hole for each pole plus 10 square feet for 4 to 14 anchors). |

**Exhibit 2-14**

## Typical Design Characteristics – 230 kV Transmission Line

| | | | |
|---|---|---|---|
| **Land Permanently Required (Continued)** | | | |
| Structure Base - Proposed Action | Steel lattice tower (tangent):<br>900 square feet<br>(30- x 30-foot tower base).<br>Steel lattice tower (angle):<br>1,225 square feet<br>(35- x 35-foot tower base).<br>Steel lattice tower (deadend):<br>1,600 square feet<br>(40- x 40-foot tower base). | Steel tubular mono-pole structure (tangent):<br>40 square feet (6-foot-diameter foundation).<br>Steel tubular mono-pole structure (deadend):<br>64 square feet<br>(9-foot-diameter foundation).<br>Steel 3-pole self-supporting structure (deadend or angle):<br>150 square feet<br>(3 poles x 8- to 10-foot-diameter foundations). | Wood H-frame (tangent): 24 square feet (2 poles x a 4-foot-diameter hole at each pole).<br>Wood 3-pole (angle or deadend):<br>46 square feet<br>(3 poles x a 4-foot-diameter hole for each pole plus 10 square feet for 4 to 14 anchors). |
| **Access Roads** | | | |
| Permanent access right-of-way requirements | The right-of-way width for construction, maintenance, and operation of the line depends on improvement level required. The minimum right-of-way width is 30 feet and maximum right-of-way width is 50 feet. The permanent road surface will be approximately 20 feet wide. The remaining area in the right-of-way (either 10 or 30 feet) may be temporarily affected due to cut and fill and associated drainage features. Areas outside of the 30-foot area will be reseeded and reclaimed following construction. | | |
| **Electrical Properties** | | | |
| Nominal voltage | +/- 230,000 volts AC | | |
| Circuit configuration | Single-circuit line: 3-phase horizontal configuration with one shield wire and one optical ground wire<br>Double-circuit line: 3-phase vertical configuration with one shield wire and one optical ground wire | | |
| Conductor size | Single conductor per phase of 1272 “Bittern” (1.345-inch diameter) ACSR | | |
| Ground clearance of conductor | 28 feet minimum at a conductor temperature of 212 degrees Fahrenheit (100 degrees Celsius) | | |
| Phase-to-phase conductor clearance | Single-Circuit Line: 19.5 feet (horizontal configuration)<br>Double-Circuit Line: 19.5 feet (vertical configuration) | | |

#### 2.2.1.1 Structures

The transmission line would be constructed of steel lattice structures, wood H-frame structures, wood 3-pole structures, or steel mono-poles (shown in Exhibit 2-15, Typical 230 kV Double-Circuit Steel Lattice Structure; Exhibit 2-16, Typical 230 kV Single-Circuit Wood H-Frame Structure; Exhibit 2-17, Typical 230 kV 3-Pole Wood Large Angle Deadend Structure; and Exhibit 2-18, Typical 230 kV Double-Circuit Steel Mono-Pole Structure) or steel or wood three-pole structures. The choice of structure type would be based on voltage, number of circuits, location, and design conditions. Structure configuration and design would be refined as project development progresses. Transmission structure heights would vary from 52 feet to 162 feet depending upon the structure type, terrain, span, and line crossings. The distance between structures would typically range from 600 to 1,500 feet depending upon topography.

Double-circuit construction would be accomplished using steel lattice or steel mono-pole structures. Single-circuit construction would be accomplished using two-pole wood H-frame structures for tangent structures. Three-pole guyed wood structures or three-pole self-supporting steel structures would be used for single-circuit line angles and deadends. The double-circuit steel lattice and steel mono-poles are designed to support six conductors (three per circuit), with the conductors arranged in a vertical configuration and the individual circuits on opposite sides of the structure. The H-frame structures are designed to support three conductors in a horizontal configuration. Overhead ground wires would be installed at the top of all structures.

#### 2.2.1.2 Structure Foundations

Depending on soil and loads, the foundations would be installed either on drilled pier foundations or they would be directly embedded into the ground. Each structure location would be evaluated individually during final engineering to determine the exact foundation dimensions. Anchors needed for single-circuit guyed structures would either be plate or rock anchors depending on soil conditions. Refer to Exhibit 2-14 under the category structure base for typical foundation characteristics.

#### 2.2.1.3 Conductors

Conductor phase-to-phase and phase-to-ground clearance parameters are determined in accordance with the National Electrical Safety Code ANSI C2 produced by the American National Standards Institute (ANSI). This code provides the basic clearances between the conductors and ground; crossing points of other lines, the transmission support structure, and other conductors; and the basic working clearances for personnel during energized operation and maintenance activities.[1] The configuration of the conductor would be designed to provide adequate current carrying capacity and minimize audible noise interference to radio operations.

Phase-to-phase conductor clearance for the single-circuit lines is expected to be 19.5 feet in a horizontal configuration as shown in Exhibit 2-16. For the new double-circuit line, phase-to-phase conductor clearance is expected to be 19.5 feet in a vertical configuration, as shown in Exhibit 2-15. Typically, the clearance of conductors above ground would be a minimum of 28 feet for the 230 kV transmission line. During detailed design, clearances may be increased to account for localized conditions.

#### 2.2.1.4 Insulators and Associated Hardware

Insulators would be lightweight, non-reflective light gray polymer rubber. Ground rods would be installed next to structure foundations and would be bonded to the structure. Lattice steel structures would be grounded to the rebar steel in each of the concrete pier foundations. Double-circuit mono-pole and single-circuit steel structures would be grounded either to the rebar steel in the concrete pier foundation or to direct embedded structures using a ground rod. Single-circuit wood pole structures would be grounded using a stapled and wrapped ground wire for each wood pole. Supplemental grounding, in the form of ground rods, would be selectively placed next to structures throughout the length of the transmission line, as needed, for reliable operation of the transmission line.

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[1] IEEE 2007

**Exhibit 2-15**

# Typical 230 kV Double-Circuit Steel Lattice Structure

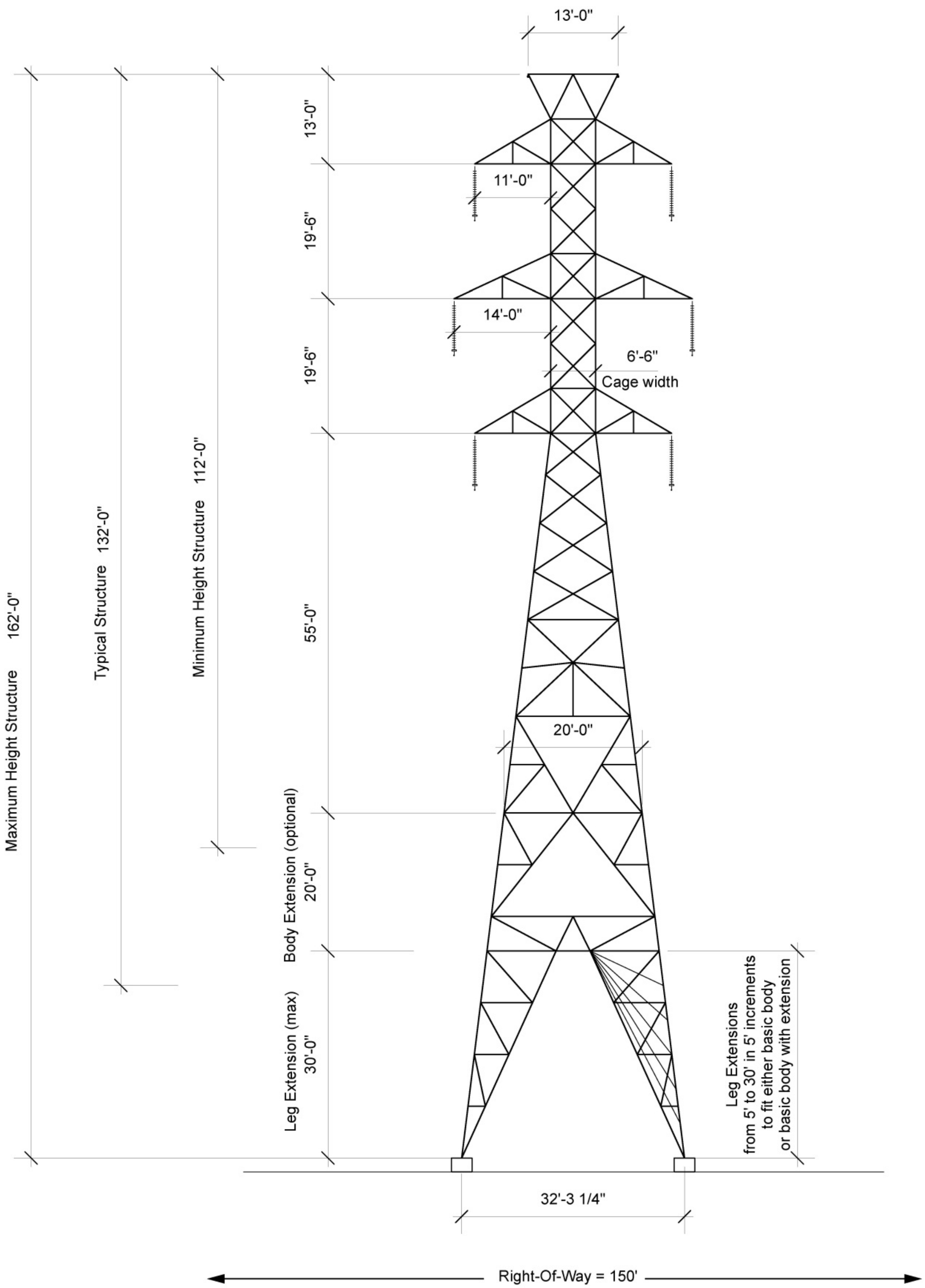


**Exhibit 2-16**
## Typical 230 kV Single-Circuit Wood H-Frame Structure

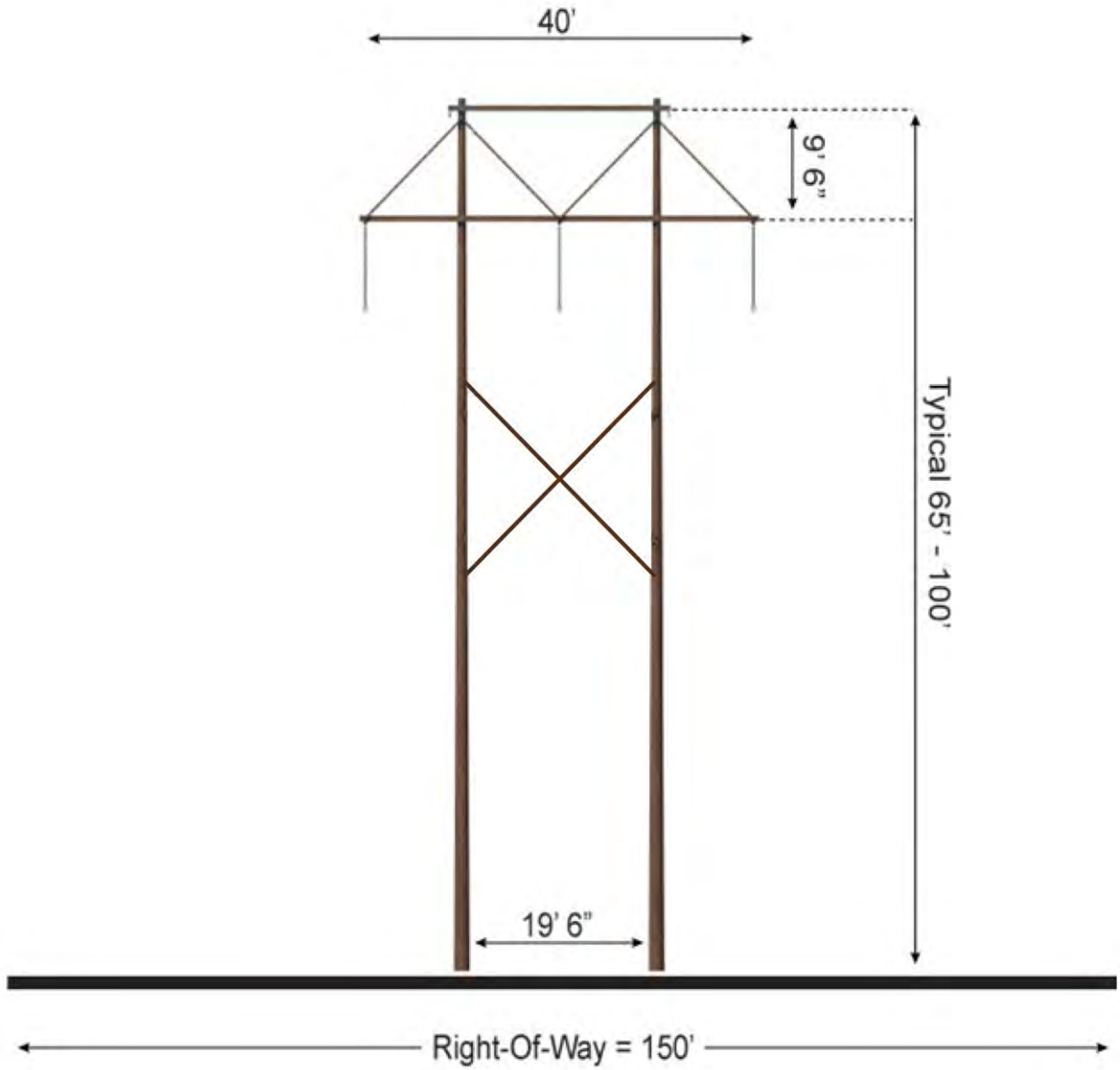


**Exhibit 2-17**
## Typical 230 kV 3-Pole Wood Large Angle Deadend Structure

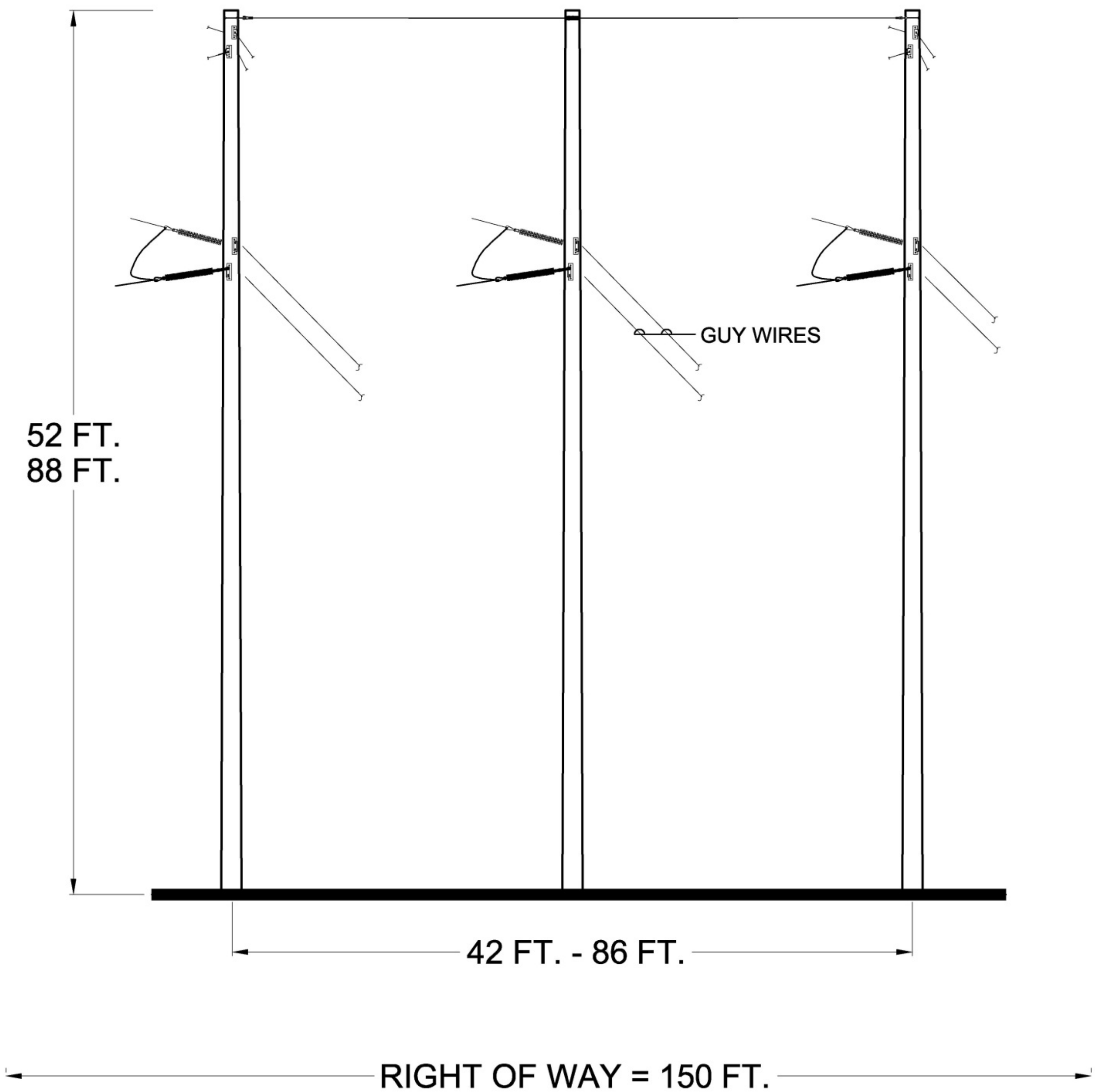
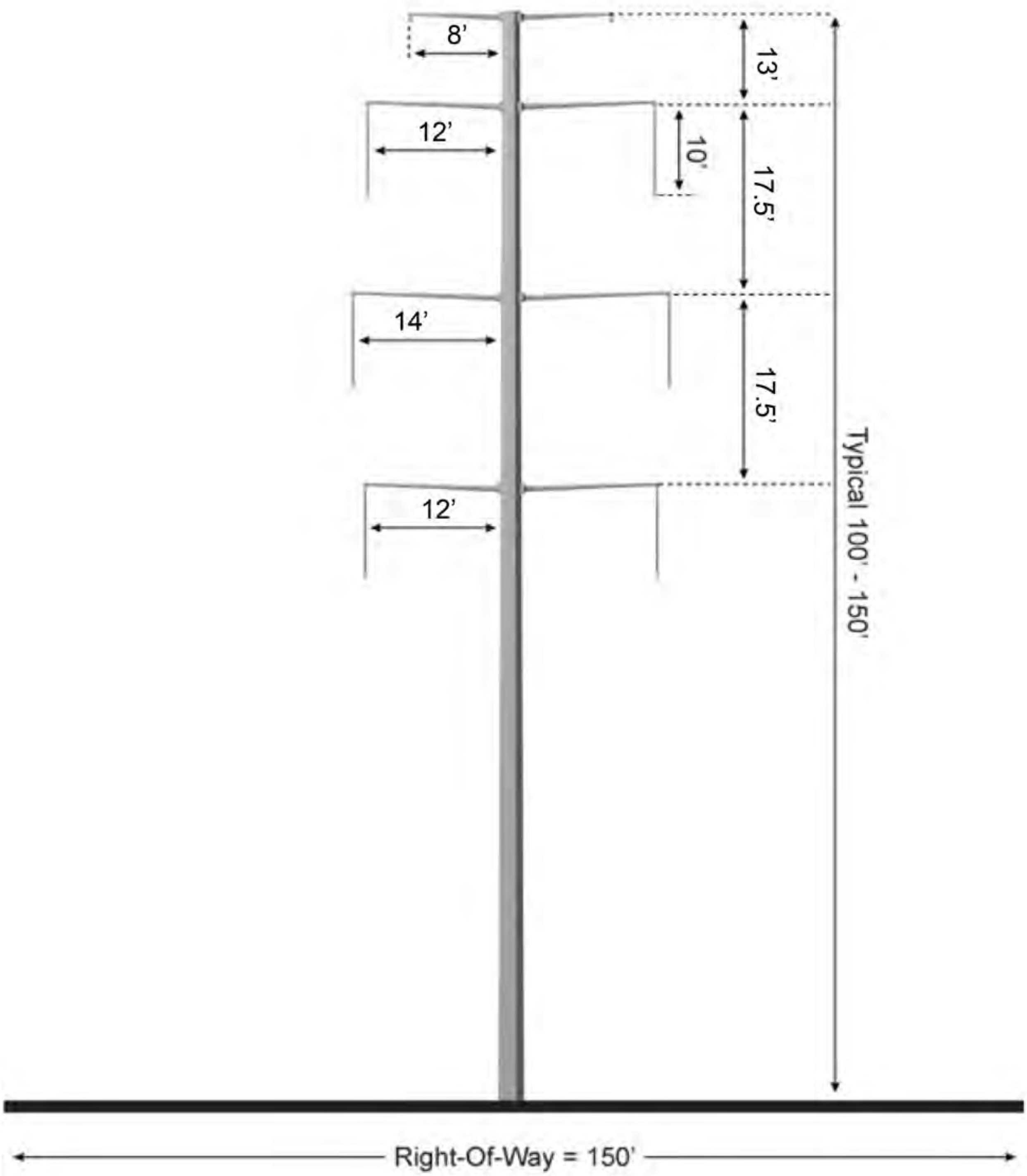


**Exhibit 2-18**

## Typical 230 kV Double-Circuit Steel Mono-Pole Structure



Depending on the proximity of the structures to airports and the structure heights, aerial marker balls or aircraft warning lighting may be required for the shield wires or structures per Federal Aviation Administration (FAA) regulations. In addition, bird diverters would be installed on the transmission line where the route crosses the La Plata and Animas Rivers.

#### 2.2.1.5 Overhead Ground Wires

Overhead ground wires would be installed to protect the 230 kV transmission line from lightning strikes. Current from lightning strikes is transferred from the overhead ground wires into the ground. The overhead ground wire system would contain two wires. The wires would be installed on top of the structures to protect the transmission line below. One of the wires, called an optical ground wire, includes optics in the wire that serve as a communication system to transfer information between Tri-State's facilities along the fiber path. The information transferred is required for system control, monitoring, and operation. The second wire is called a shield wire. The shield wire protects the transmission line from lightning strikes, but does not provide a communications function.

**What are overhead ground wires?**

Overhead ground wires protect the transmission line from lightning strikes. The overhead ground wire system for the SJBEC Project would contain one or two wires, depending on the structure type. The wires are installed on the top of the structures to protect the transmission line below.

### 2.2.2 Substations

Substations and associated equipment would be built as part of the proposed SJBEC Project. The SJBEC Project includes building two new substations and expanding the existing Iron Horse Substation. Descriptions of the proposed substations are provided below.

#### 2.2.2.1 Three Rivers Substation (near the Shiprock Substation)

Western's existing Shiprock Substation is located approximately 12 miles west of Farmington, near the town of Waterflow, New Mexico, just off of US 64. It is located on a section of BLM land near the San Juan Generating Station. Construction of the new Three Rivers Substation would take place just outside and northeast of the existing Shiprock Substation. The Three Rivers Substation would be built on BLM land that is reserved for Western's use.

The Three Rivers Substation would include 345 kV and 230 kV line connections with the Shiprock Substation, a 345 kV to 230 kV transformer, 345 kV and 230 kV breakers and switches, and associated electrical and communications equipment. Site preparation would include grading, fencing, grounding, and construction of foundations. Exhibit 2-19, Typical 230-kV Substation, shows a typical 230 kV substation with multiple line connections.

The following equipment would be installed at Western's existing Shiprock Substation so it could be connected to the Three Rivers Substation:  a 345 kV and a 230 kV power circuit breaker, one 230 kV disconnect switch, and associated control equipment.

Exhibit 2-19
**Typical 230 kV Substation**

The existing Shiprock Substation is situated on 26 acres. The proposed Three Rivers Substation would be built near the Shiprock Substation on 20 acres.

### 2.2.2.2 Kiffen Canyon Substation

A new transmission substation would be constructed on BLM-managed land north of the existing City of Farmington Glade Tap Substation, just north of New Mexico Highway 574. The substation would include a phase-shifting 230 kV transformer, 230 kV breakers, switches, and associated electrical and communications equipment. Site preparation would include grading, fencing, grounding, and construction of foundations. The proposed Kiffen Canyon Substation would be 23 acres.

### 2.2.2.3 Iron Horse Substation

The LPEA-operated Iron Horse Substation (located approximately one mile west of Colorado Highway 172 near Ignacio) would be expanded to accommodate equipment for the new 230 kV transmission line terminus. Project-related construction at the Iron Horse Substation would include expanding the substation footprint to connect the new 230 kV transmission line to this substation. The substation would be expanded to include a 230 kV to 115 kV transformer, 230 kV breakers, switches, and associated electrical and communications equipment. The existing access road would be used to reach the site.

The existing Iron Horse Substation is situated on 2.5 acres. The existing Iron Horse substation would be expanded to include an additional 3.5 acres, bringing the total substation size to 6 acres.

### 2.2.3 Access Roads

Roads enable access to the right-of-way and structure sites for both construction and long-term maintenance of the transmission line and substations. Because access roads must bear the weight of and endure heavy construction vehicle use, existing access roads may need to be upgraded to ensure adequate and safe access for construction and maintenance activities. Relevant road construction criteria for the affected agencies and landowners will be outlined in the Final Plan of Development (POD). The Final POD will document plans for the construction, rehabilitation, and maintenance of the access roads, including general locations of access roads and construction methods based on site-specific conditions.

**What is a Plan of Development (POD)?**

A POD provides engineering, design, and Environmental Protection Measures (EPMs) associated with a proposed transmission line project. A POD also serves as the foundation for the right-of-way grant and covers requirements for right-of-way authorization under the Federal Land Policy and Management Act. The POD will be updated to reflect final project design, EPMs, and requirements identified through NEPA and permitting processes.

The SJBEC Project would use existing access routes wherever available and practical to keep new road construction to a minimum. To the extent possible, existing roads and two-track trails would be used in their present condition without improvements. New or improved access roads would be widened or constructed to a roadway width of 20 feet and a right-of-way width of 30 feet required for construction and long-term operation of the transmission line. Exceptions could be made in areas with sensitive resources where the right-of-way could be less than 30 feet. Sometimes additional right-of-way would be required because of conditions such as challenging topography or drainages. In these cases, access road right-of-way could reach a maximum width of 50 feet, though the footprint of the roadway surface would be 20 feet.

Tri-State maintains an improvement classification for all access roads in its system. These improvement levels are as follows:

- Existing roads (roads that require no improvement)
- Improvement Level I (overland access)
- Improvement Level II (minor grading)
- Improvement Level III (moderate to heavy grading)
- Surface water crossings

Tri-State is requesting the right-of-way grant include access for future maintenance and operation of the transmission line. Access roads would be required on private land, BLM-managed land, state land, and SUIT lands. In certain areas, it could be necessary to block roads after construction to restrict future access for the general public and other undesired uses. Such areas would be identified through negotiations with the affected agencies or private landowners. Methods for road closure or management may include installing locking gates or obstructing the path with earthen berms or boulders. Blocked access routes would have the ability to be reopened, when necessary, for maintenance and emergency repairs.

### 2.2.4 Proposed Right-of-Way

Tri-State is requesting a transmission right-of-way width of 150 feet from various public and private land owners. Increased right-of-way width may be required in a small number of locations to accommodate rough terrain or engineering requirements. In addition, Tri-State will request right-of-way for areas where substations or access roads are proposed. The right-of-way width for access roads depends on the improvement level required. The minimum right-of-way width for access roads is 30 feet and maximum right-of-way width is 50 feet, though exceptions could be made in areas with sensitive resources. The permanent road surface will be approximately 20 feet. The remaining area in the right-of-way (either 10 or 30 feet) may be temporarily affected due to cut and fill and associated drainage features.

Tri-State would additionally acquire temporary use permits for construction activities occurring on federal, state, and tribal lands both within and outside the areas permitted under the right-of-way grant. Temporary work areas would include staging areas, material storage areas, a helicopter fly yard, helicopter staging areas, pulling and splicing sites, work areas at each structure site, and guard structures.

During construction, temporary permission would be required from affected agencies or private landowners for staging areas and material storage. During operation, SJBEC Project maintenance activities would be restricted to the permitted rights-of-way on private and public lands (this includes the transmission line corridor, access roads outside of the right-of-way, substations, and communication facilities).

#### 2.2.4.1 Line Crossings

The SJBEC Project will require crossing other electrical transmission and distribution lines, pipelines, US and state highways, and local and tribal roads. The location of existing transmission and other linear facilities relative to the final transmission route, topographical constraints, and any utility corridor buffer constraints that may exist would dictate the number and location of crossings. The proposed line crossings will be coordinated with each facility owner or manager, and Tri-State will obtain the required licenses, permits, or agreements and will comply with owner requirements to cross these facilities in a manner that avoids or minimizes effects.

### 2.2.5 Preconstruction Activities

Preconstruction activities for the SJBEC Project are described below. These include contractor and agency coordination, preconstruction surveys, and geotechnical investigation.

#### 2.2.5.1 Contractor and Agency Coordination

Before construction begins, a preconstruction kickoff meeting will be conducted to introduce the contractors and their field representatives, discuss schedules, and identify each agency’s point of contact and responsibilities. All supervisory construction personnel will be instructed on sensitive environmental resources, Environmental Protection Measures (EPMs), and mitigation measures.

#### 2.2.5.2 Preconstruction Surveys

Ground survey and staking would be performed to locate structure centers, structure references, right-of-way boundaries, new access routes, and temporary work areas. In addition, required preconstruction cultural, paleontological, and biological resource surveys would be conducted.

#### 2.2.5.3 Geologic Investigation

Detailed geologic evaluation and geotechnical investigations would be performed as part of preconstruction activities in conjunction with final engineering. These investigations would be done to evaluate potential geologic and geotechnical hazards (such as ground conditions, soil types, depth to bedrock, depth to water, and soil strength properties) and determine specific requirements for foundation design and construction.

For these investigations, the engineering geologist would evaluate fault lines, landslide-prone areas, steep slopes, and unstable soils to identify potential hazards, primarily at structure sites. Geologic review and evaluation would also be performed in the immediate vicinity of the proposed structure sites. The geotechnical engineer and geologist would prepare a report that includes recommendations that may alter the final design or identify construction methods to stabilize the site or off-site areas to avoid hazards or minimize potential effects. All geologic and geotechnical field studies would be coordinated with the appropriate land management agencies, and the appropriate permits would be obtained.

Geotechnical investigations would be performed in the field to evaluate soils strength and bearing capacity, which is necessary for determining proper structure foundations. This effort would include field investigations at readily accessible proposed structure site locations along the proposed transmission line route. The drilling program would consist of drilling borings (6 to 8 inches in diameter up to 50 feet deep) from which soil or bedrock samples would be taken for laboratory testing and analysis. Soil borings would be performed with rubber-tired or low-impact drill rigs using approved access routes and methods in accordance with agency requirements and applicable mitigation measures. The typical drilling time at each site is approximately half a day. Work areas are typically 40 by 40 feet in size. Once drilling is completed at each site, holes would be backfilled with the drilled materials. Any remaining soils would be spread at the site. The size of excess soil spreading is small and typically would not exceed a 10- by 10-foot area. No open holes would be left unattended, and all holes would be backfilled prior to leaving the site.

### 2.2.6 Construction

Due to the broad scope of construction, the varied nature of construction activities, and the geographic diversity of area, Tri-State may construct multiple segments concurrently using multiple contractors. It is estimated that construction would begin in 2015 and that the line would be in service by the end of 2016 or early 2017. Construction is expected to take approximately 18 to 24 months to complete.

The estimated number of potential workers and types of equipment required to construct the proposed transmission line, substations and communication facilities is shown in Exhibit 2-20, Personnel and Equipment for Construction of the Proposed Transmission Line, and Exhibit 2-21, Personnel and Equipment Required for Substation Construction.

**Exhibit 2-20**
**Personnel and Equipment for Construction of the Proposed Transmission Line**

| Activities | Crew Size | Equipment Type |
|---|---|---|
| Survey crew | 2 crews (2 people) | Pickup truck |
| Geologic and geotechnical investigations | 1 crew (3–5 people) | Soil boring truck, pickup truck |
| Vegetation clearing and trimming | 4 crews (3–4 people each) | Pickup truck, chipper, brush hog (cutter), roller chopper, buncher, masticators, backhoe, haul truck, and other forestry equipment |
| Road construction crew | 2 crews (2–3 people each) | Pickup truck, D-6 bulldozer, road grader, dump truck |
| Foundation installation crew | 6 crews (4–6 people each) | Digger derrick, concrete truck, crane, pickup truck, bobcat |
| Anchor installation | 1 crew (3 people) | Bobcat, pickup truck |
| Structure haul crew | 2 crews (1–4 people each) | Pole trailer or helicopter, pickup truck, flatbed truck with crane |
| Structure assembly crews | 8–10 crews (4–6 people each) | Crane, bucket truck, pickup truck, boom truck |
| Structure erection crews | 4–6 crews (4–6 people each) | Crane, bucket truck, helicopter, pickup truck |
| Wire installation crew | 1 crew (16–21 people) | Tensioner, bucket truck, pickup truck, helicopter, small bulldozer, boom truck, reel trailers, wire-pulling truck |
| Post-construction cleanup | 2 crews (2–4 people each) | Pickup truck, road grader |
| Revegetation | 2 crews (3–6 people each) | Pickup truck, seeding equipment |

*Note: The above table reflects estimated personnel and equipment requirements. Final requirements will be determined based on final design and construction sequencing.*

**Exhibit 2-21**
**Personnel and Equipment Required for Substation Construction**

| Activities | Crew Size | Equipment Type |
|---|---|---|
| Survey crew | 1 crew (2 people) | Pickup truck |
| Site development – civil work crew | 1 crew (6 people) | Road grader, fence tensioner, 4-wheelers, and bobcat |
| Fence installation crew | 1 crew (4 people) | Bobcat |
| Equipment foundation crew | 1 crew | Concrete truck, digger derrick, crane |
| Cable trench, conduits, and station grounding crew | 1 crew (2 people) | Bobcat |
| Steel structure and bus installation crew, ancillary buildings construction crew, equipment assembly and erection crew | 1 crew (8–10 people) | Crane, digger derrick |
| Power equipment assembly and wiring crew | 2 crews (2–4 people each) | Bobcat, crane |
| Communications construction crew | 1 crew (2 people) | – |
| Wire installation crew | 1 crew (2 people) | – |
| Post-construction cleanup | 1 crew (2 people) | Dump truck |

*Note: The above table reflects estimated personnel and equipment requirements. Final requirements will be determined based on final design and construction sequencing.*

In addition, construction of the transmission lines and substations would require water, mostly for dust control and for the concrete needed to build transmission line structure and substation foundations. In most cases, concrete will be obtained from a local vendor. If a concrete batch plant is needed at a construction staging area, water would be required. The required water would be procured from municipal sources, from commercial sources, or under a temporary water use agreement with landowners holding existing water rights. No new water rights would be required.

Construction activities for the SJBEC Project are described below. These include access road construction, equipment staging, vegetation clearing, site preparation, installing structure foundations, erecting support structures, stringing conductors and overhead ground wire, substation construction, cleanup and restoration, and revegetation.

### 2.2.6.1 Access Road Construction

Typically, new access roads or improvements to existing access roads will be constructed using a bulldozer or grader, possibly followed by a roller to compact and smooth the ground. Access roads will be constructed to drain properly, maintain natural drainage patterns, and minimize erosion potential. A stormwater management plan will be prepared to avoid and minimize potential effects to water quality. Construction activities will not occur when weather or other conditions increase potential environmental effects to unacceptable levels, as determined by the agencies. Such conditions can arise during heavy rains or high winds.

#### Surface Water Crossings

Disturbance within jurisdictional waters of the US would occur as part of the SJBEC Project. This work would be completed under the terms of Clean Water Act (CWA) Section 404 and Section 401 permits, which govern activities within any jurisdictional water of the US. Where applicable, Tri-State would follow BLM's, SUIT's, or the affected agency's standards for designing roads and water crossings.

### 2.2.6.2 Equipment Staging

Construction of the SJBEC Project would begin with the establishment of staging areas. The staging areas would serve as field offices; reporting locations for workers; parking space for vehicles and equipment sites for material storage, fabrication and assembly; areas for equipment maintenance; and as a location for concrete batch plants, if needed. Approximately five staging areas, up to 20 acres each, would be needed to construct the project. Staging areas would be located near improved, existing roads and in previously disturbed areas with minimal vegetation, where feasible. Preconstruction surveys for cultural, natural, and paleontological resources would be completed prior to establishing staging areas.

In addition, a fly yard for helicopter operations would be located along the route where helicopter construction is planned and would occupy approximately 10 to 20 acres. The fly yard would be used for material storage and erecting structure sections prior to transport for installation. Fueling trucks, maintenance trucks, and operations crews would be based in the fly yard. In addition, up to 25 temporary one-acre sites would be needed to support helicopter operations when stringing the transmission line. These temporary sites would typically be located adjacent to access roads and would provide a place for the helicopter to set down and refuel.

Appropriate dust control, fire prevention, and pollution prevention measures would be implemented at these construction yards.

#### 2.2.6.3 Vegetation Clearing

Within the SJBEC Project area, vegetation clearing and trimming would be required at helicopter fly yards, within the transmission line right-of-way, access roads, and possibly staging areas. Clearing for the transmission right-of-way would be done in accordance with NERC guidelines and Tri-State's Integrated Vegetation Management Plan. Any vegetation or trees that are cleared would be disposed of as directed by the affected agency or landowner. Options could include stacking the material, lopping and scattering the material, creating brush piles, or providing woody debris as firewood.

#### 2.2.6.4 Site Preparation

Clearing individual structure sites may be required to install the structures. The type of equipment used to clear individual structure sites would be determined based on topography and site conditions. Typically this is done using a bulldozer or other equipment to blade the required area. At each 230 kV structure location, an area approximately 150 by 200 feet would be needed for construction laydown, tower assembly, and erection. After line construction is complete, all areas not needed for normal transmission line maintenance, including fire and personnel safety clearance areas, would be graded to blend as well as possible with the natural contours and would be revegetated as required.

Additional equipment may be required if solid rock is encountered at a structure location. Rock hauling, hammering, or blasting may be required to remove the rock. Excess rock that is too large in size or volume to be spread at the sites would be hauled away and disposed of at approved sites or at a location specified by the affected agency or landowner.

#### 2.2.6.5 Install Structure Foundations

Each new 230 kV support structure would require the installation of concrete piers. First, one to four holes would be excavated for each structure (depending on the type of structure). The holes would be drilled using truck- or track-mounted augers of various sizes depending on the diameter and depth requirements of the hole to be drilled. Each concrete pier foundation typically extends 0.5 to 3 feet above the ground.

Excavations for transmission line structures on the SJBEC Project are expected to encounter hard rock, typically sandstone. Blasting will most likely be required to complete the required excavations. The construction contractor will be required to prepare a blasting plan for the SJBEC Project that will be included in the Final POD. The blasting plan will be consistent with all requirements of the Bureau of Alcohol, Tobacco, and Firearms; Department of Homeland Security; BLM; and BIA. The blasting plan will address the types of explosives; storage, security, and general use of explosives; the contractor’s proposals for compliance with agency requirements; and the general concepts proposed to achieve the desired excavations. In addition, the blasting plan will address proposed methods for controlling fly rock, providing blasting warnings, and use of non-electrical blasting systems. The contractor will be required to maintain explosive logs during construction.

A blasting plan for the SJBEC Project might include the following details for blasting a hole for a directly embedded pole or concrete foundation. An example is provided in Exhibit 2-22, Typical Blast Hole Pattern for Wood Poles.

1. Drill a single 3-inch-diameter center hole, which will not be loaded with explosives.

2. Drill three 1.75-inch-diameter holes about 6 to 8 inches from center on a triangular pattern.

3. Drill four 1.75-inch-diameter holes equally spaced on the perimeter of the excavation.

4. Typical drill depth will be 10 to 11 feet and the diameter will typically be 30 to 36 inches—all dependent on pole size.

5. The 1.75-inch-diameter holes will be loaded with explosives from the bottom up to about 3.5 to 4 feet from the surface.

6. Each hole will have four to six charges separated vertically by PVC pipe sections.
7. The seven charged holes will be detonated in sequence with 25 millisecond delays between holes.

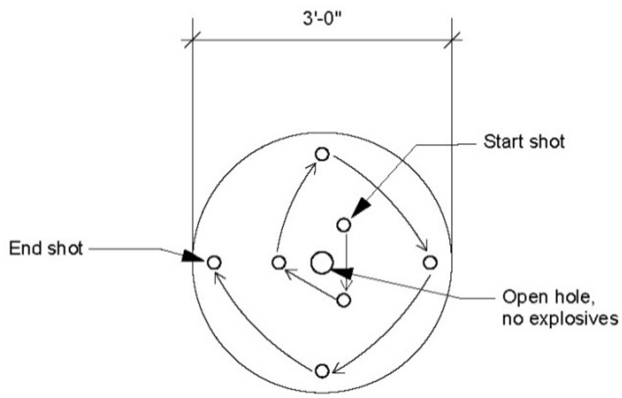
The goal of the blast pattern shown in Exhibit 2-22 would be to break the rock toward the center hole while leaving the material in situ with no fly rock. Truck-mounted, heavy-duty auger equipment would then be used to remove the cracked rock from the hole.

Blasting near buildings, structures, facilities, and other resources susceptible to vibration or air blast damage will be carefully planned by the contractor and Tri-State and controlled to eliminate the possibility of damage to such facilities and structures. For example, patterning the explosives inward to the open center hole, along with possible matting of the shot hole, limits ground acceleration and vibrations to ensure peak particle velocities at potentially sensitive resources will not exceed 0.75 inch per second per BLM Manual H-3150-1, Onshore Oil and Gas Geophysical Exploration Surface Management. When used, blasting will take place between sunrise and sunset and will be brief in its duration (milliseconds). Rock anchoring or micropile systems will be used in areas where site access is limited or where adjacent structures or potentially sensitive resources could be damaged as a result of blasting or rock hauling activities.

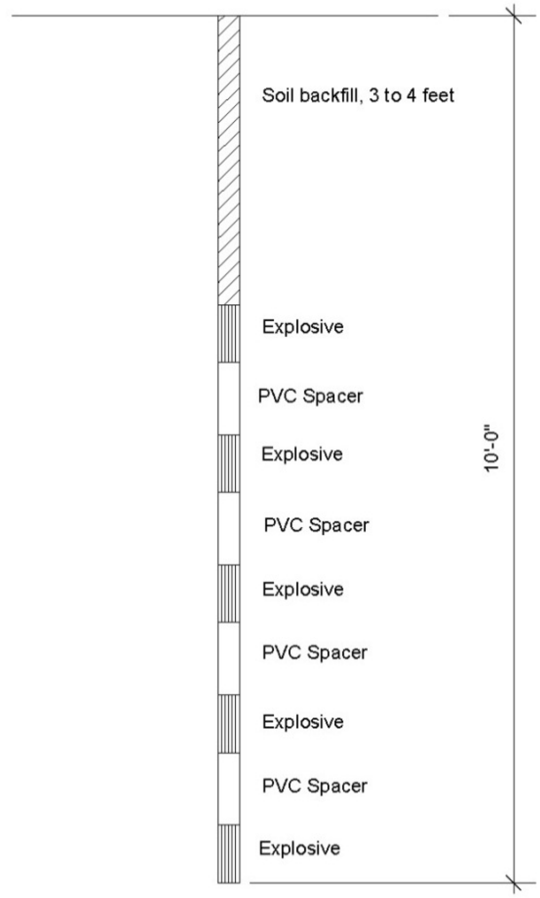
In wet areas with soft, caving soils, slurry excavation may be used. Slurry excavation involves drilling underwater (or with a drilling mud slurry) and using the water or slurry pressure to prevent the excavation from caving in. The water or slurry is then pumped out as the concrete is placed and disposed of according to the stormwater pollution prevention plan (SWPPP).

Steel rebar and anchor bolt cages will be installed after excavation and prior to structure installation. These cages are designed to strengthen the structural integrity of the foundations and will be assembled at the nearest SJBEC Project construction yard and delivered to the structure site via flatbed truck or helicopter (if necessary). These cages will be inserted in the holes prior to pouring concrete.

**Exhibit 2-22**
## Typical Blast Hole Pattern for Wood Poles




**Plan View**
**Typical Blast Hole**




**Profile View**
**Typical Blast Hole**

### 2.2.6.6 Erect Support Structures

The 230 kV steel lattice, steel mono-pole, wood H-frame, and wood or steel three-pole support structures would be assembled on site, except where helicopters are needed. Helicopters may be used to deliver construction workers, equipment, and materials to structure sites; for structure placement; and for hardware installation. In addition, wire stringing will be done using a helicopter.

When helicopter construction methods are employed, helicopter construction activities would be based at a fly yard. Prior to installation, each tower structure would be assembled in multiple sections at the fly yard. Tower sections or components would be assembled by weight based on the lifting capacity of the helicopter in use. After assembly at the fly yard, the tower sections would be attached, with cables, to the helicopter and airlifted to the structure location. Upon arrival at the structure location, the section would be placed directly onto the foundation or atop the previous structure section. Guide brackets attached on top of each section would assist in aligning the stacked sections. Once aligned correctly, line crews would climb the structures to bolt the sections together permanently.

When ground-based construction methods are employed, steel lattice, steel mono-pole, wood H-frame, and wood or steel three-pole support structures and associated hardware for each structure would be delivered to the site by trucks and flatbed trailers. Structures would be assembled on the ground at the site. The assembled structure or assembled structure sections would be lifted onto the concrete piers, placed in the previously drilled holes (direct embedded structures), or placed on top of previously placed structure sections. The crane would move along the right-of-way to the next location.

### 2.2.6.7 String Conductors and Overhead Ground Wire

Conductor, shield wire, and optical ground wire would be placed on the transmission line support structures by a process called stringing. Stringing would be done primarily by helicopter for the proposed route. The first step would be to install insulators and hardware (if not already installed on the structures during ground assembly) and stringing sheaves.

Additionally, temporary clearance structures (also called guard structures) would be placed where required (areas such as highway crossings), prior to stringing any transmission lines. The temporary clearance structures are typically two vertical wood poles with a third wood pole, placed horizontally between the vertical poles, and are erected at road crossings or crossings with other energized electrical and communication lines to prevent contact during stringing activities. Bucket trucks may also be used to provide temporary clearance.

Once the stringing sheaves and temporary clearance structures are in place, the initial stringing operation would commence with the pulling of a lightweight sock line through the sheaves along the same path the transmission line would follow. The sock line would be pulled through the stringing sheaves by helicopter. A helicopter would pull the sock line and hover at each structure to thread the sock line through the stringing sheaves. The sock line would be attached to a larger diameter steel cable, known as the hard line. The sock line would be used to pull the hard line through the stringing sheaves. The hard line would be attached to the conductor, shield wire, or optical ground wire to pull them through the sheaves. Following the initial stringing operation, conductors and shield wires would be tensioned to achieve the correct amount of sag (tension) between support structures.

Pulling and tensioning sites for 230 kV construction would be required approximately every 2 to 3 miles along the right-of-way. Each site would require an area of approximately 150 by 600 feet to accommodate required equipment. To the extent practicable, pulling and tensioning sites will be located within the right-of-way. Depending on topography, minor grading may be required at some sites to create level pads for equipment.

At the tangent and small angle structures, the conductors would be attached to the insulators using clamps to suspend the conductors from the bottom of the insulators. At the larger angle deadend structures, the conductors are cut and attached to the insulator assemblies at the structure, deadending the conductors.

### 2.2.6.8 Cleanup and Refueling Procedures

Construction sites, staging areas, material storage yards, helicopter fly yards, and access roads will be kept in an orderly condition throughout the construction period. Approved enclosed refuse containers will be used throughout construction areas. Refuse and trash will be removed from the sites and disposed of in an approved manner. Oils or chemicals will be hauled to a disposal facility authorized to accept such materials. Open burning of construction trash will not be allowed.

The contractor will implement standard refueling procedures for heavy equipment that is left on the right-of-way for long periods of time such as cranes, blades, dozers, and drill rigs. This equipment will be refueled in place. As a rule, no personal or light duty vehicles will be allowed to refuel on the right-of-way. Standard EPMs regarding refueling are provided in Exhibit 2-23, Environmental Protection Measures.

### 2.2.6.9 Substation Construction

Preparation and construction at the substation sites would require the following:

- Conducting survey work, geotechnical drillings, and soil resistivity measurements
- Assessing area to ensure drainage patterns are maintained and the area is prepared to manage stormwater in accordance with the project SWPPP
- Clearing and grading
- Constructing access roads
- Building staging and storage yards
- Placing and compacting structural fill to serve as a subbase under the foundations for equipment
- Installing subsurface grounding rods
- Installing subsurface control conduits
- Constructing oil spill containment facilities
- Erecting fencing

- Building the facility (foundations, structure and equipment, power equipment assembly, conductors)
- Conducting site cleanup and revegetation, as necessary

Substation construction is expected to take approximately 5 months at each of the substation sites and would be constructed during the 18- to 24-month construction period for the SJBEC Project.

### 2.2.7 Post-Construction Activities

Post-construction activities include cleanup and restoration and revegetation as described below.

#### 2.2.7.1 Cleanup and Restoration

After construction, all surplus building equipment, lumber, refuse, fencing, and other building materials would be removed. The right-of-way would be restored as near to its original condition as practicable when construction is complete.

Disturbed areas not required for permanent access and maintenance areas around structures would be restored and revegetated as required by the property owner or land management agency. All practical means would be made to restore the land to its original contour and to restore natural drainage patterns along the right-of-way.

#### 2.2.7.2 Revegetation

Temporarily disturbed areas (i.e., all areas scarred, defaced, or damaged as a result of construction) will be regraded, shaped, and smoothed to contours close to the original or naturally appearing contours to avoid increased erosion and washouts. Slope stabilization and soil loss prevention techniques will be identified in a SWPPP. All disturbed areas on BLM-managed lands will be seeded with native grass/brush species compatible with surrounding vegetation. Seed mixture, season, and rate of application guidelines will be followed, as specified by BLM on BLM-managed lands. On state, SUIT and private lands, reclamation and re-seeding will be done according to the landowner's specifications.

Tri-State will be responsible for managing treatable weed populations that are propagated as the result of construction activities within the limits of the right-of-way. Tri-State will consult with the authorized BLM officer, or other landowners, to plan acceptable weed control measures for treatable noxious weed infestations within the limits of the right-of-way. The need to treat along with the treatment methods will be determined based on species type and density in surrounding areas. All seed mixes utilized for seeding of disturbed areas will be certified weed-free. All mulch materials utilized for interim revegetation activities will also be certified weed-free. Tri-State will furnish the BLM with proof of weed-free equipment for transmission line reconductoring and operation and maintenance activities. Tri-State and its contractors will clean all off-road equipment before entering the project right-of-way and access routes. Cleaning will remove all dirt and plant parts and material that may carry noxious weed seeds into the project area. If noxious weeds are identified within the transmission line right-of-way or along newly constructed access roads during operation and maintenance activities, Tri-State will consult with BLM on appropriate treatment or control measures. Any use of herbicides will be determined in consultation with the agency or landowner and will comply with federal and state laws governing their proper use, storage, and disposal.

### 2.2.8 Operation and Maintenance Activities

Operation and maintenance activities will include the following activities described below—routine maintenance, access road maintenance, vegetation management and weed control, substation maintenance, emergency maintenance, fire protection, and termination and restoration.

Operation and maintenance activities will be conducted in accordance with the Final POD, right-of-way grant stipulations, and landowner requirements. In addition, when conducting maintenance activities, Tri-State will implement EPMs listed in Exhibit 2-23 that are applicable to maintenance activities. The EPMs would be implemented to the greatest extent feasible during emergency maintenance activities. In an emergency situation, Tri-State would do whatever is necessary to get power restored.

Tri-State would notify the affected agency or landowner of emergency maintenance activities as soon as possible to follow up on any needed reclamation or effects to the natural and built environment.

#### 2.2.8.1 Routine Maintenance

Routine maintenance activities will be conducted on a regular basis. The following are examples of routine maintenance activities:

- Routine air patrols from a helicopter to inspect for structural and conductor defects, conductor clearance problems, and vegetation hazards.
- Routine ground patrols to inspect structural and conductor components. Patrols are typically conducted year round as conditions permit. Follow-up maintenance is scheduled depending on the severity of the problem—either as soon as possible or as part of routine scheduled maintenance.
- Climbing structures to inspect hardware or to make repairs. Using a bucket truck to perform conductor maintenance.
- Cathodic protection surveys to check the integrity and function of anodes and ground beds.
- Vegetation clearing to trim or remove tall shrubs and trees to ensure adequate ground-to-conductor clearances and to minimize outages or fire risk.
- Testing and treating wood poles to minimize rotting and structural degradation. Wood pole inspections and treatments occur on a 15-year cycle. Poles are inspected and treated by injecting them with preservatives.
- Access road maintenance includes blading to improve surface conditions; removing large rocks, vegetation, and debris; maintaining and repairing erosion control and water drainage systems; and repairing roads after damage from washouts or slumping. Road repairs will be scheduled as a result of line inspections or will occur in response to an emergency situation.
- Reduction of fuel loads (such as vegetation removal) around poles in fire-prone areas.

- Installation of bird protection devices, bird perch discouragers, and relocation or removal of bird nests, as needed.
- Follow-up restoration activities, such as seeding, noxious weed control, and erosion control.
- Miscellaneous damage repair from the failure of conductor splices, lightning strikes, wildfires, high winds, ice, or vandalism.
- Structure repair and replacement.

#### 2.2.8.2 Emergency Maintenance

Emergency situations are those conditions that may result in imminent or direct threats to public safety or that threaten or impair Tri-State's ability to provide power to its customers or the grid. The following are examples of potential emergency situations:

- Lightning strike or wildfire, resulting in burning of wood pole structures.
- Breaking or imminent failure of cross arms or insulators, potentially causing conductor failures.
- Vandalism to structures or conductors from shooting or other destructive activities.

The transmission system and substations would be remotely managed and monitored by Tri-State from control rooms at its operation center. Electrical outages or variations from normal operating protocols would be sensed and reported at these operation centers. Substations would be equipped with remote monitoring, proximity alarms, and, in some cases, video surveillance.

In the event of an emergency, Tri-State must respond as quickly as possible to fix the problem, safeguard human health, prevent damage to the environment, and restore power. In most cases, the equipment required to carry out emergency repairs is similar to the equipment needed to conduct routine maintenance. As soon as an incident is detected, control room dispatchers would notify the responsible operations staff in the area(s) affected, and crews and equipment would be organized and dispatched to respond to the incident. Tri-State would notify the affected agency or landowner of emergency maintenance activities as soon as the emergency was addressed or as soon as practicable. Follow-up actions and additional reporting requirements would be coordinated with the affected agencies and landowners as necessary.

#### 2.2.8.3 Access Road Maintenance

Tri-State would maintain new access roads and existing access roads that are open to the public or shared by others commensurate with use. Typical repairs would include grading; repair of access roads and work areas; spot repair of sites subject to flooding or scouring removal of rock, vegetation, and debris; construction or maintenance of appropriate erosion control measures; and gate repair in areas where access roads are gated. Required equipment may include a grader, backhoe, pickup truck, and a cat-loader or bulldozer. Repairs to the right-of-way will be scheduled as a result of line inspections or will occur in response to an emergency situation.

#### 2.2.8.4 Vegetation Management and Weed Control

Maintaining adequate clearance between vegetation and conductors is essential to safe and reliable operation of the transmission line. In addition, vegetation management would be needed to maintain access roads and keep substation areas free of vegetation. The right-of-way areas for the SJBEC Project include a variety of vegetation types, including grasslands, sagebrush, low-elevation shrubland, pinon-juniper woodlands, aspen forests, oak shrublands, ponderosa pine forests, and conifers. Vegetation management would generally be scheduled according to maintenance cycles (5- or 10-year cycles), depending on the amount and type of vegetation. Trees with the potential to grow or fall into the transmission right-of-way, access roads, or substations would be removed. Compatible vegetation such as low-growing species would not be removed. Vegetation would be removed as needed to keep substations free of vegetation for safety. Weed and vegetation treatment would occur annually at a minimum.

In accordance with Tri-State's transmission vegetation management program, vegetation that poses a hazard to reliable operation of the transmission line and substations would be removed, where necessary, based on current or expected vegetation height and underlying terrain. According to NERC FAC-003-1, Requirement R1.2.1, the minimum clearance distance between vegetation and conductors for a 230 kV transmission line is 18 feet. Vegetation removal would be accomplished primarily through mechanical means, though herbicides may be used in some selected areas with agency or private landowner approval.

Under the requirements of a right-of-way grant, Tri-State is responsible for controlling noxious weed species that result or will result from the construction, operation, and maintenance of the improvements authorized under the grant. Therefore, a noxious weed control strategy would be developed in coordination with affected agencies prior to construction to reduce the opportunity for weeds to invade new areas and to minimize the spread of weeds within the SJBEC Project area.

#### 2.2.8.5 Substation Maintenance

Substation monitoring and control functions would be performed remotely by Tri-State from its operation center. SJBEC Project substations would not be staffed; however, a remotely monitored security system would be installed. Maintenance activities would include equipment testing, equipment monitoring and repair, emergency and routine procedures for service continuity, preventive maintenance, maintaining drainage improvements and substation access roads, and stabilizing soils. Routine operations activities would typically occur monthly, and a major maintenance inspection would take place once a year.

#### 2.2.8.6 Fire Protection

All federal, state, and county laws, ordinances, rules, and regulations pertaining to fire prevention and suppression would be strictly adhered to. All personnel would be advised of their responsibilities under the applicable fire laws and regulations. Tri-State would regularly inspect the transmission line for fire hazards.

If Tri-State becomes aware of a fire that is on or threatening BLM-managed lands or other lands where the SJBEC Project is located, it would notify the appropriate agency contact. Specific safety measures would be implemented during construction of the transmission line in order to prevent fires and to ensure quick response and suppression in the event a fire occurs. Typical practices to prevent fires during construction and maintenance or repair activities include brush clearing prior to work, stationing a water truck at the job site to keep the ground and vegetation moist in extreme fire conditions, enforcing red flag warnings, providing fire behavior training to all pertinent personnel, keeping vehicles on or within designated roads or work areas, and providing fire suppression equipment and emergency notification numbers at each construction site.

#### 2.2.8.7 Termination and Restoration

The term of the BLM right-of-way grant to allow use of federal land would be limited to 50 years. At the end of the 50-year BLM lease, Tri-State would need to renew its lease. If at some point in the future, the facility is no longer required, the transmission line would be removed from service. Prior to removal, a termination and restoration plan covering planned activities would be prepared by Tri-State for review and approval.

### 2.2.9 Environmental Protection Measures

EPMs are design features that are specific means, measures, or practices that reduce or eliminate effects of a proposed action. These measures, in some cases, are sufficient for meeting environmental policy and regulatory requirements. In some cases, additional specific mitigation may be required to offset project effects.

Exhibit 2-23, provides a list of measures and design features that will be incorporated into the project and are expected to be adopted as requirements for right-of-way grants. This table is organized by major resource topics and identifies the phases during which each measure would be implemented. These and other measures will be reviewed, revised, and developed further to reduce effects associated with specific resource concerns and will be included in the Draft and Final EIS, the Record of Decision (ROD), and the Final POD.

Tri-State will work with the affected agencies and private landowners to implement the EPMs as appropriate for the SJBEC Project to avoid and minimize potential effects to resources.

**Exhibit 2-23**

## Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **General Measure** | | | |
| 1 | Compliance with agency stipulations and ROD | The SJBEC Project will be planned, constructed, and operated in accordance with the ROD, the right-of-way grant stipulations, and requirements of other permitting agencies. | P, C, O |
| 2 | Compliance with laws and regulations | Tri-State and contractors will comply with all applicable environmental laws and regulations. Applicable laws and regulations may include, but are not limited to, the CWA Section 303(d) and Section 404; the Endangered Species Act, Section 7; the National Historic Preservation Act, Section 106, the Native American Graves Protection and Repatriation Act. Compliance with all applicable laws and regulations will be documented in the Final POD. | P, C, O |
| 3 | Mitigation monitoring plan | The Final POD will include mitigation monitoring requirements that will address how each mitigation measure, required by permitting agencies in their respective decision documents and permits, will be monitored for compliance. | P |
| 4 | Environmental and cultural training | Prior to and throughout construction, the contractor will instruct all personnel on the protection of livestock, cultural, ecological, and other natural resources including: (a) federal and state laws regarding antiquities and plants and wildlife, including collection and removal; (b) the importance of these resources; and (c) the purpose and necessity of protecting them. | P, C |
| 5 | Electrical conductivity | Tri-State will apply necessary mitigation where possible to eliminate problems of induced currents and voltages onto conductive objects sharing the same right-of-way to meet the appropriate National Electrical Safety Code and to the mutual satisfaction of parties involved. | C, O |
| **Project Design, Access, and Construction** | | | |
| 6 | Design, general | The Final POD will display the location of project infrastructure (such as towers, access roads, substations) and will include mitigation measures to be implemented for site-specific and resource-specific environmental effects. | P |
| 7 | Design, aviation | Towers, conductors, and ground wires will be marked with high-visibility devices where required by governmental agencies (FAA). Tower heights will be less than 200 feet to avoid the need for aircraft obstruction lighting. | P, C, O |

*P = Preconstruction, C=Construction, and O = Operation*

**Exhibit 2-23**
## Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **Project Design, Access, and Construction (Continued)** | | | |
| 8 | Design, minerals and mining | Tri-State will work with affected oil, gas, and mine operators during project design, construction, and operations on a case-by-case basis. In general Tri-State will:<br>• Contact all affected operators in the study area to explain the project, and<br>• Work with operators to identify areas that may require special design considerations on a case-by-case basis. This could include conducting field visits with operators, identifying pipelines that may require cathodic protection (due to proximity to the transmission line), or specific design considerations if they are located under or near access roads; or identifying areas where subsidence may be a concern. As part of these discussions, best management practices and standard operating procedures would be identified on a case-by-case basis, as well as measures that would be implemented to minimize effects to operators during construction. Tri-State would continue to work with operators throughout construction and operation of the project.<br>In addition, to ensure the integrity and safe operation of Tri-State's transmission structures, substations, and access roads, the BLM or other land managing agencies would inform Tri-State of any applications for work within the SJBEC right-of-way and provide Tri-State with an opportunity to provide input to development plans within the right-of-way to minimize potential conflicts. | P, C, O |
| 9 | Design, geology | As part of preconstruction activities, Tri-State will perform detailed geologic evaluation and investigations to evaluate potential geologic and geotechnical hazards and design the project to avoid and minimize potential geotechnical risks such as slope failure, unstable soils, and landslide risks. In addition, soil would be sampled if potentially contaminated soils were observed during the preconstruction geotechnical investigation. | P |
| 10 | Design | In designated areas, structures will be placed to avoid sensitive features where feasible, such as, but not limited to, threatened or sensitive plants, riparian areas, water courses, and cultural sites to avoid or minimize effects to sensitive features. | P, C |
| 11 | Construction, access | Prior to construction, Tri-State or its contractors would develop a construction traffic management plan in consultation with affected land owners. This includes working with the Colorado Department of Transportation to incorporate appropriate measures and obtain approval for construction of the transmission line across US 550. It also includes obtaining crossing permits as required by state, county, and local requirements and developing a plan for installing warning signs where construction activities would cross a recreational trail. | P |
| 12 | Construction, access | All construction access outside the right-of-way will be restricted to pre-designated access, contractor-acquired access, or public roads. | C, O |

*P = Preconstruction, C=Construction, and O = Operation*

**Exhibit 2-23**

## Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **Project Design, Access, and Construction (Continued)** | | | |
| 13 | Construction, general | Stream and waterway crossings will be designed to minimize effects to surface waters and to ensure the long-term viability of the crossing in compliance with federal, state, and local regulations. All construction and maintenance activities will be conducted in a manner that will minimize disturbance to vegetation, drainage channels, and stream banks. All existing roads will be left in a condition equal to their condition prior to the construction of the transmission line. Towers will be sited with a minimum distance of 200 feet from perennial streams wherever possible. | P, C |
| 14 | Construction, cleanup | During construction, the right-of-way will be free of non-biodegradable debris. Slash will be left in place or disposed of in accordance with requirements of the affected agency or private landowner. | C, O |
| 15 | Construction, cleanup | Except for permanent survey markers and material that locate proposed facilities, stakes, pins, rebar, spikes, and other material will be removed from the surface and within the top 15 inches of the topsoil as a part of final cleanup. Fences on right-of-way will be removed where necessary and replaced to the original condition or better when the work is finished. Where existing fences are removed to facilitate the work, temporary fence protection for lands adjacent to the right-of-way will be provided at all times during construction. Such temporary fence protection will be adequate to prevent public access to restricted areas. Temporary fencing constructed on the right-of-way will be removed by the contractor as part of the clean-up operations prior to final acceptance of the completed work. | C, O |
| 16 | Construction, restoration | Tri-State or its contractors would repair or reconstruct existing roads or trails if they were damaged by construction activities associated with the SJBEC Project. | C, O |
| 17 | Construction, restoration | In construction areas where ground disturbance is substantial or where recontouring is required, surface restoration will occur as required by the landowner or land management agency for erosion control. The method of restoration will normally consist of, but not be limited to, returning disturbed areas back to their natural contour, reseeding (if required), installing cross drains for erosion control, and placing water bars in the road. All areas on BLM lands that are temporarily disturbed as a part of the construction or maintenance of the proposed transmission line will be seeded, to 70 percent of existing cover, where practicable, with a seed mixture appropriate for those areas. The BLM will prescribe a seed mixture that fits each range site. | C, O |
| 18 | Construction, restoration | Watering facilities (such as tanks, natural springs, developed springs, water lines, and wells) will be repaired or replaced, if damaged or destroyed by construction activities, to their pre-disturbed condition as required by the landowner or land management agency. | C, O |
| 19 | Construction, restoration | Merchantable forest products will either be removed or stacked at locations determined by the land management agency. | C, O |

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**Exhibit 2-23**
# Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **Groundwater, Surface Water, and Wetlands** | | | |
| 20 | Groundwater | A dewatering permit will be obtained from the appropriate agencies if required for construction dewatering activities. | P |
| 21 | Surface water, drainage crossings | If necessary, low water crossings will be designed and constructed in a manner that will prevent any blockage or restriction of the existing channel. | P, C, O |
| 22 | Water quality | A buffer strip of vegetation, width determined on a case-by-case basis, will be left between areas of surface disturbance and riparian vegetation. | P, C, O |
| 23 | Water quality | Tri-State will identify all streams in the vicinity of the proposed project sites that are listed as impaired under Section 303(d) of the CWA and will develop a management plan to avoid, reduce, or minimize adverse effects to those streams if the SJBEC Project could affect these areas. | P |
| 24 | Water quality | Runoff from excavated areas, construction materials or wastes (including truck washing and concrete washes), and chemical products such as oil, grease, solvents, fuels, and pesticides will be controlled and contained. Excavated material or other construction material will not be stockpiled or deposited near or on stream banks, ditches, irrigation canals, or other areas where runoff could affect the environment. | C |
| 25 | Water quality | Washing concrete trucks or disposing excess concrete in any ditch, canal, stream, or other surface water will not be permitted. Concrete wastes will be disposed of in accordance with all federal, state, and local regulations. | C |
| 26 | Wetlands | Transmission structures and access roads will be routed outside of wetland areas to the greatest extent feasible. | P, C |
| **Vegetation and Soils Management** | | | |
| 27 | Reclamation and noxious weeds | The Final POD will include a reclamation and noxious weed management plan, which will be approved by the appropriate agency prior to the issuance of a right-of-way grant. The noxious weed management plan will be developed in accordance with appropriate land management agencies' standards, consistent with applicable regulations and agency permitting stipulations for the control of noxious weeds and invasive species (Executive Order 3112). Included in the noxious weed plan will be stipulations regarding construction, restoration, and operation. | P, C, O |
| 28 | Vegetation and soil, construction | Clearing, grading, and other disturbance of vegetation and soil will be limited to the minimum area required. | C, O |
| 29 | Vegetation, construction | In construction areas where recontouring is not required, vegetation will be left in place wherever possible, and original contour will be maintained to avoid excessive root damage and allow for resprouting. | C |
| 30 | Vegetation | For safe operation of the transmission line and substations, vegetation removal will be limited to areas that would create a threat to the electrical reliability of the transmission line or substations or would impede access for safe operations. Except for dangerous vegetation, which is defined as vegetation that could grow in, fall in, blow in, or be a fuel loading hazard in the right-of-way, no clearing would be performed outside of the limits of the right-of-way. | O |

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**Exhibit 2-23**

## Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **Vegetation and Soils Management (Continued)** | | | |
| 31 | Vegetation, removal | Clearing will be performed so as to minimize marring and scarring the countryside and to preserve the natural beauty to the maximum extent possible. | C, O |
| 32 | Vegetation, treatment | Use of pesticides and herbicides shall comply with applicable federal and state laws. | C, O |
| 33 | Soils, drainage and erosion control | A SWPPP will be prepared for the SJBEC Project and will be included as part of the Final POD. Implementation of the SWPPP will manage erosion and provide adequate drainage around structure and tower sites. Excavated material will be spread around the site from where it was excavated. | C, O |
| 34 | Soils, construction | No construction or routine maintenance activities will be performed when the soil is too wet to adequately support construction equipment. If such equipment creates ruts in excess of 6 inches deep, the soil will be deemed too wet to work. | C, O |
| 35 | Soils, construction | Grading will be minimized by driving overland within work areas whenever possible. | C, O |
| 36 | Soils, restoration | In newly disturbed temporary work areas, the soil will be salvaged and will be distributed and contoured evenly over the surface of the disturbed area after construction is completed. The soil surface will be left rough to help reduce potential wind erosion. | C, O |
| 37 | Soils, restoration | Topsoil removed during construction will be stockpiled and used in reclamation. | C |
| **Biological Resources** | | | |
| 38 | Biological, special status species | Special status species or other species of particular concern will be considered in accordance with management policies set forth by appropriate land-management agencies. This will entail conducting surveys for plant and wildlife species of concern along the proposed transmission line route and associated facilities as agreed upon by the responsible land-management agencies. In cases where such species are identified, appropriate action will be taken to avoid adverse effects to the species and its habitat and may include monitoring and altering the placement of roads or towers, where practicable. | P, C, O |
| 39 | Biological, special status species | The Final POD will include biological stipulations provided by the BLM and the USFWS, which will identify measures to avoid, minimize, or mitigate effects to special status species. | P, C, O |
| 40 | Biological, special status species | Prior to the start of construction, Tri-State will provide training to all contractor and subcontractor personnel and others involved in construction activities where there is a known occurrence of protected species or habitat in the construction area. Sensitive areas will be considered avoidance areas. Prior to any construction activity, avoidance areas will be marked on the ground and maintained through the duration of the contract. Tri-State will remove markings during or following final inspection of the project. | P, C |

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**Exhibit 2-23**
## Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **Biological Resources (Continued)** | | | |
| 41 | Biological, special status species | If evidence of an ESA-listed species is found in the project area, the contractor will immediately notify the appropriate land management agencies and provide the location and nature of the findings. The contractor will stop all activity within 200 feet of the protected species or habitat. | C |
| 42 | Biological, special status species | Tri-State will comply with any and all environmental protection and mitigation measures identified by the USFWS, BLM, BIA, and SUIT in the Section 7 consultation, regarding federally listed, candidate, proposed species. | P, C, O |
| 43 | Biological, migratory birds | Given the scope of the proposed project, it is likely that avoiding construction during the avian breeding season is not possible. Prior to construction during the avian breeding season, Tri-State will coordinate appropriate mitigation measures with the BLM, BIA, SUIT, and USFWS. | P, C |
| 44 | Biological, wildlife | Seasonal restrictions may be implemented in specific areas as required by permitting and land management agencies to mitigate effects to wildlife. With the exception of emergency repair situations, right-of-way construction, restoration, maintenance, and termination activities in designated areas will be modified or discontinued during sensitive periods (such as nesting and breeding periods) for candidate, proposed threatened and endangered, or other sensitive animal species, as required by permitting and land management agencies. The Final POD will incorporate the seasonal restrictions and stipulations contained in the ROD. A seasonal restriction of November 1 through March 31 and a 0.5-mile buffer will be implemented for the bald eagle roost located near the Iron Horse substation. Other seasonal restrictions that may apply in locations to be determined on a case-by-case basis include:<br>• Migratory Birds – May 15 through July 31<br>• Southwestern Willow Flycatcher and Yellow-Billed Cuckoo – May 1 through August 31<br>• Peregrine and Prairie Falcons – March 1st through June 30<br>• Bald Eagle – November 1 through March 31<br>• Golden Eagle – February 1 through June 30<br>• Western Burrowing Owl – April 1st through August 15 (In New Mexico) | P, C, O |
| 45 | Biological, wildlife and livestock | Tri-State will repair holes created by construction of transmission structures to avoid and minimize effects to wildlife and livestock. | C |
| 46 | Biological, raptors | The transmission line design will consider the Avian Power Line Interaction Committee's suggested practices for avian protection on power lines. | P, C |
| 47 | Biological, raptors | Tri-State will follow BLM, Colorado Parks and Wildlife, and USFWS guidelines for raptor protection during the breeding season (Migratory Bird Executive Order 13186, January 10, 2001). | P, C, O |

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**Exhibit 2-23**
## Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **Cultural Resources – Historic, Archaeological, Tribal** | | | |
| 48 | Cultural resources, mitigation | In consultation with the appropriate land management agencies and state historic preservation officers (SHPOs) specific measures for cultural resources will be developed and implemented to mitigate any identified adverse effects. These may include SJBEC Project modifications to avoid adverse effects, monitoring construction activities, data recovery, or other efforts. | P, C |
| 49 | Cultural resources, tribal consultation | The SJBEC Project will be built and operated in accordance with all laws, policies, and regulations pertaining to consultations with federally recognized tribes. | P, C, O |
| 50 | Cultural resources, construction | Prior to and throughout construction, all construction personnel will be instructed on the protection of cultural resources, including the provisions of federal, state, and tribal laws regarding cultural resources, including prohibition of collection and removal; and the importance of these resources and the purpose and necessity of protecting them. | P, C |
| 51 | Cultural resources, construction | If a contractor or Tri-State discovers any previously unidentified historic or prehistoric cultural resources during construction or operation, then work in the vicinity of the discovery will be suspended, and the discovery would be promptly reported to the affected agency. The affected agency will then specify what action is to be taken. If there is an approved “discovery plan” in place for the SJBEC Project, then the plan will be executed. In the absence of an approved plan, the affected agency will evaluate the significance of the discovery and consult with the appropriate land managing agency and SHPO in accordance with 36 CFR § 800.11. | C, O |
| 52 | Cultural resources, construction | If in its construction or operations a contractor or Tri-State damages, or is found to have damaged, any previously documented or undocumented property, excluding “discoveries” as noted above, the contractor or Tri-State agrees to cover expenses to have a permitted cultural resources consultant prepare and execute an approved data recovery plan. | C, O |
| **Paleontological Resources** | | | |
| 53 | Paleontology, construction | If paleontological material (fossils) is observed during construction or operations, Tri-State or contractor shall immediately contact the BLM. Tri-State shall cease any construction or operations that would result in the destruction of such objects. Further investigation would dictate site-specific measures for salvage of any significant paleontological resources. | C, O |
| 54 | Paleontology, construction | Preconstruction surveys of areas having a high potential to contain paleontological material will be conducted as required the land managing agency or landowner. If paleontological material is found, Tri-State would work with the land managing agency or landowner to remove the material prior to construction. | P, C |

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**Exhibit 2-23**
## Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **Land Use and Visual Resources** | | | |
| 55 | Land use, agriculture | On agricultural land, the right-of-way will be aligned, in so far as practicable, to reduce the effects to farm operations and agricultural production. Similarly, temporary construction and maintenance activities would be located to minimize disturbance to livestock, where practicable. | P, C, O |
| 56 | Land use, agriculture | In cultivated agricultural areas, soil compaction caused by construction activities will be decompacted as required by landowners. Construction activities will occur so as to minimize effects to agricultural operations. | C |
| 57 | Land use, access | Fences, gates, or other natural barriers to livestock will be repaired or replaced by Tri-State or Tri-State's contractor to their original predisturbed condition as required by the agency or private landowner if they are damaged or destroyed by construction or maintenance activities. Temporary gates will be installed only with the permission of the agency or private landowner and will be restored to their original predisturbed condition following construction. Cattle guards will be installed where new permanent access roads cut through fences, at the request of the affected agency, to prevent escape of livestock. | C, O |
| 58 | Land use, access | Tri-State is responsible to contact the grazing lessees prior to crossing any fence on public land or any fence between public and private land, and to offer the lessees an opportunity to be present when the fence is cut to ensure the fence is adequately braced and secured. | P, C, O |
| 59 | Land use, access | Tri-State will establish and maintain appropriate closure devices in consultation with the BLM to minimize unauthorized public access on roads created specifically for Tri-State access to the transmission line and substations. | P, C, O |
| 60 | Visual resources, design | Non-specular conductors will be used to reduce visual effects. | P, C, O |
| 61 | Visual resources, access roads | The alignment of any new access roads will follow the designated area's landform contours where practical, providing that such alignment does not additionally affect resource values. This will minimize ground disturbance and reduce scarring (visual contrast). | P |
| 62 | Visual resources, construction | No paint or permanent discoloring agents will be applied to rocks, vegetation, structures, and fences to indicate survey or construction activity limits. | P, C, O |
| 63 | Visual resources, restoration | Tri-State may be required to reconstruct rock rims as near as possible to the original condition. | C, O |
| **Air Quality** | | | |
| 64 | Construction | As part of the Final POD, Tri-State would develop and implement a fugitive dust control plan that would, at a minimum, include EPMs 65 to 70 listed below. | P, C |
| 65 | Construction | The contractor and subcontractors will be required to have and use air emissions control devices on construction machinery, as required by federal, state, or local regulations or ordinances. | C, O |
| 66 | Construction | All trucks hauling soil, sand and other loose material would be covered. | C, O |

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Exhibit 2-23
## Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **Air Quality (Continued)** | | | |
| 67 | Construction | Tri-State will minimize dust using means satisfactory to the affected agency. | C, O |
| 68 | Construction | When appropriate, windbreaks will be installed at the windward sides of construction areas. | C, O |
| 69 | Construction | Tri-State will suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 miles per hour. | C, O |
| 70 | Construction | Exposed stockpiles of dirt and sand will be enclosed, covered, or will have non-toxic soil binders applied. | C, O |
| **Noise** | | | |
| 71 | Corona | Transmission line materials will be designed to minimize effects from corona. The proposed hardware and conductor will limit the audible noise, radio interference, and TV interference due to corona. Tension will be maintained on all insulator assemblies to assure positive contact between insulators, thereby avoiding sparking. Caution will be exercised during construction to avoid scratching or nicking the conductor surface which may provide points for corona to occur. | P, C, O |
| 72 | Operation | Tri-State will respond to complaints of line-generated radio or television interference by investigating the complaints and implementing appropriate mitigation measures. The transmission line will be patrolled on a regular basis so that damaged insulators or other line materials that could cause interference are repaired or replaced. | O |
| **Public Health and Safety** | | | |
| 73 | Safety standards | The SJBEC Project will be designed, constructed, and operated to meet or exceed the requirements of the National Electrical Safety Code, US Department of Labor, Occupational Safety and Health Standards, and Tri-State's requirements for safety and protection of landowners and their property. | P, C, O |
| 74 | Blasting | The Final POD will include a blasting plan, which will identify methods and mitigation measures to minimize the effects of blasting, where applicable. The blasting plan will document the proposed methods to achieve the desired excavations, proposed methods for blasting warning, use of non-electrical blasting systems, and provisions for controlling fly rock, vibrations and air blast damage. | P, C |
| 75 | FAA regulations | The SJBEC Project will be designed to comply with FAA regulations, to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips. | P, C, O |
| 76 | Maintenance | The transmission line will be regularly patrolled and properly maintained in compliance with applicable safety codes. | O |

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Exhibit 2-23
## Environmental Protection Measures

| No. | Topic | Description of Measure | Phase |
|---|---|---|---|
| **Hazardous Materials, Waste, and Wastewater Management** | | | |
| 77 | Storage and removal | Tri-State will provide a Hazardous Materials Management Plan. Hazardous material shall not be drained onto the ground or into streams or drainage areas. Totally enclosed containment would be provided for all trash. All construction waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials. | C, O |
| 78 | Hazardous materials, vehicles | Vehicle refueling and servicing activities would be performed in the right-of-way or in designated construction zones located more than 300 feet from wetlands and streams. Spill preventative and containment measures or practices would be incorporated as needed. | C, O |
| 79 | Hazardous materials, spills | Tri-State will provide a spill prevention notification and cleanup plan. The SJBEC Project will comply with all applicable federal, state, and local regulations, and will include: spill prevention measures, notification procedures in the event of a spill, employee awareness training, and commitment of manpower, equipment, and materials to respond to spills, if they occur. | P, C, O |
| **Fire Protection** | | | |
| 80 | Fire protection | A fire protection plan would be developed and approved by the affected agency prior to the issuance of a right-of-way grant. Tri-State or its contractors would:<br>• Implement and follow the fire protection plan approved by the affected agency.<br>• Operate all internal and external combustion engines on federally managed lands per 36 CFR 261.52(j), which requires all such engines to be equipped with a qualified spark arrester that is maintained and not modified. | P, C, O |
| **Additional Considerations** | | | |
| 81 | Mitigation | Tri-State will consider additional compensatory, off-site, or other mitigation for permanently disturbed areas or areas where such mitigation could successfully compensate for remaining unavoidable effects to a particular resource. | P, C, O |

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# 2.3 Alternatives Considered but Eliminated

## 2.3.1 Introduction

A collaborative and comprehensive process was used to develop and consider a range of alternatives for the SJBEC Project. The alternatives development process included public engagement through NEPA scoping meetings, tribal consultation, agency coordination, and cooperating agency participation. Exhibit 2-24, Alternatives Development Process, identifies the studies, opportunities for public input and formal NEPA scoping, and outcomes of the analysis completed throughout the alternatives development process. The alternatives development process included looking at the electrical system and transmission line routes.

Exhibit 2-24
**Alternatives Development Process**

| Phase | Studies/Public Involvement | Purpose | Outcome |
|---|---|---|---|
| **Electrical System Alternatives** | Alternatives Evaluation Study (Appendix A) | • Evaluate solutions to meet electrical system needs. This analysis included evaluating transmission line and non-transmission line alternatives. | • Established that electrical system needs would be met by building a new 230 kilovolt (kV) transmission line between the Shiprock and Iron Horse Substations. |
| **Transmission Line Corridor and Route Development** | Macro Corridor Study (Appendix B) | • Identify possible transmission corridor segments by soliciting input from the public, gathering data, and determining constraints and opportunities for siting a transmission line. | • Identified 36 preliminary transmission line corridor segments. |
| | • Route Refinement Report (Appendix C)<br>• Additional Analysis of Alternatives A Through F (Appendix D) | • Develop transmission line alternatives from the corridor segments identified in the Macro Corridor Study and solicit public input on the alternatives. | • Identified 55 route segments based on corridor segments established in the Macro Corridor Study.<br>• Refined the 55 route segments to 26 based on input from the public and key stakeholders. Identified and analyzed six possible preliminary routes (Alternatives A through F), identified a preliminary preferred route (Alternative D). |
| **NEPA Scoping** | Environmental Assessment (EA) Scoping | • Begin the NEPA process and collect input on issues and alternatives to consider in the EA. | • Collected public input for EA scoping and determined that an EIS would be needed. |
| | EIS Scoping | • Collect input on alternatives and issues to consider in the EIS | • Collected public and agency input on the alternatives and issues to be addressed in the EIS. |

Electrical system needs were assessed in an Alternatives Evaluation Study (Appendix A). Through this study, it was determined that the best way to meet electrical system needs was to build a transmission line from the Shiprock Substation to the Iron Horse Substation. Electric system alternatives considered but eliminated are summarized in Section 2.3.2, Electrical System Alternatives.

Once an electrical system solution was identified, transmission line corridors and routes were identified and evaluated by collecting data and engaging the public and key stakeholders. Transmission line corridors were identified and evaluated in a Macro Corridor Study (Appendix B). Once the corridors were identified, six specific routes (Alternatives A, B, C, D, E, and F) were developed and analyzed in a Route Refinement Report (Appendix C). These six alternatives were analyzed in greater detail in Additional Analysis of Alternatives A through F (Appendix D). Alternative routes considered but eliminated are summarized in Section 2.3.3, Transmission Line Corridors and Route Development.

**Appendices A, B, C, and D**

Appendix A, Alternatives Evaluation Study evaluates the options of adding generation capacity, managing demand, or building alternative transmission line configurations.

Appendix B, Macro Corridor Study identifies transmission line corridors for the SJBEC Project.

Appendices C and D explain how transmission line routes were identified, refined, and evaluated.

### 2.3.2 Electrical System Alternatives

Different solutions to meeting electrical system needs were assessed in the Alternatives Evaluation Study. The following alternatives were considered for meeting the established system needs:

- Adding generation capacity in lieu of a transmission line
- Managing demand in lieu of a transmission line
- Building new transmission lines

The remainder of this section summarizes the systemwide alternatives considered, the analysis conducted, and the conclusions of the analysis.

#### 2.3.2.1 Adding Generation Capacity In Lieu of a Transmission Line

Utilities often consider using conventional gas-fired, simple cycle combustion turbines (SCCT) as the most economical way to add generation capacity to meet load increases. Tri-State considered adding SCCT to serve the electrical system needs within La Plata County. In the San Juan Basin area, the electrical load factor in the LPEA service area is high because existing electrically driven compressors and artificial lift units in the area are used about 95 percent of the time. Furthermore, the performance of a combustion turbine is highly dependent on air density and mass flow of the air intake to the compressor. Anything that affects the gas turbine's ability to "breathe" affects performance.

The altitude of the San Juan Basin is approximately 6,500 feet above mean sea level, which requires the application of a 0.65 derating factor per General Electric reference manuals. Because of such derating factors, installations above 4,000 feet above mean sea level become decreasingly cost effective. The result is that larger and more expensive combustion turbine units are required to provide the equivalent output. Additional backup capacity could also be needed due to reliability concerns. Because of this, if SCCT units were used to meet the load requirements in the San Juan Basin area, multiple units would be needed to allow for outages and routine maintenance.

SCCT generation may create concerns regarding effects to local air quality. If air quality effects require that SCCT generation be physically located away from the loads, then the electrical system, by necessity, would require the construction of new transmission lines from the generation source to the load area. In this situation, SCCT is not technically feasible because it would not replace the need for transmission line construction and would instead require additional transmission support.

With the above considerations, the installation of SCCT generation to serve the forecasted LPEA load was investigated. Three configurations and three different combustion turbine units were evaluated. The least expensive turbine option was estimated to cost $327 million, and the most expensive option was estimated to cost $474 million. Considering capital costs only, it was determined that adding generation in La Plata County is not an economically feasible alternative, particularly when compared to the transmission options discussed below in Section 2.3.2.3, Alternative Transmission Line Configurations. The lowest capital cost generation alternative substantially exceeds the highest capital cost transmission option. That cost differential increases when integrating fuel costs and combustion turbine operation and maintenance expenses.

In summary, the option of adding generation capacity using an SCCT system was eliminated as an alternative to a new transmission line because:

- It would be technically infeasible—it would not replace the need for transmission line construction but would require additional transmission support.
- It would be economically infeasible.

The possibility of adding generation capacity by using renewable generation resources (such as wind and solar) was also considered, since this approach might avoid the air quality concerns cited above for SCCT systems. These renewable energy resources are intermittent in nature and are not always available. Therefore, for this particular application that requires consistent generation, implementation was considered to be remote and speculative. Furthermore, installing intermittent generation resources does not meet the reliability requirements included in the proponent's objectives discussed in Section 1.3, Proponent's Project Objectives.

#### 2.3.2.2 Managing Demand In Lieu of Building a Transmission Line

Utilities use demand-side management to encourage consumers to modify their patterns of electricity use, including how much they use and when. The goal of managing demand is to more efficiently use the electrical system network and to reduce the need for investments in the electrical system where feasible. Tri-State has implemented demand-management programs designed to be compatible with the primary loads in the San Juan Basin. They have been in place for a number of years and have helped to minimize the amount of energy used and the load at the time of system peak demand (a system must be designed to meet peak demand). Tri-State's individual member-systems also have energy efficiency and demand-side management programs in place. All three of the members serving the San Juan Basin offer consumers appliance use information, energy use information, conservation guides, web-based conservation strategies and links, web-based energy calculators, free energy audits and conservation programs, compact fluorescent programs, and time-of-use rates. Each also has strategies in place to reduce the amount of energy lost from transmitting and distributing electricity and participates through Tri-State in research efforts with the Electric Power Research Institute and the Cooperative Research Network.

Tri-State performed a comprehensive end-use energy efficiency demand-side management demand response study across its entire system. This study examined the technical, economic, practical, and actual energy and demand reduction potential. The study measured potential in discrete geographic regions, such as the San Juan Basin, and identified those programs and measures that will have the most value to the member-consumers of Tri-State. For certain loads, this sometimes requires installing expensive communications and metering equipment and upgrading distribution infrastructure. These investments are underway. Tri-State is working with its members to support smart grid expansion, which will support additional demand response.

As described above, Tri-State and its members have been managing demand and will continue to do so in the future. This alternative was dropped from further evaluation because it is remote and speculative that total system peak load in the San Juan Basin can be sufficiently reduced to effectively meet the load forecasts and solve existing transmission deficiencies, particularly since demand management relies on consumer behavior and is out of Tri-State's control.

#### 2.3.2.3 Alternative Transmission Line Configurations

The Alternatives Evaluation Study[2] indicated that an additional transmission line needs to be built to increase the load-serving capability and avoid degrading the transfer capability between southern Colorado and New Mexico. Various transmission configurations were considered, such as 345 kV lines to serve increased load requirements in southwestern Colorado, but it was determined that 230 kV would be sufficient to meet required loads

[2] Tri-State 2012

for less cost. In general, 345 kV lines cost about 60 percent more than 230 kV lines.

The following four 230 kV transmission system alternative configurations were studied:

- Shiprock–Kiffen Canyon–Iron Horse
- Ojo East–Turley–Chama–Iron Horse
- San Luis Valley–Chama–Iron Horse
- Curecanti–Montrose–Nucla–Florida River

Exhibit 2-25, Comparison of Transmission Line Alternatives, compares these transmission routes by their projected length, ability to meet load growth, and construction costs. A discussion of each of the transmission line alternatives is provided below.

**Exhibit 2-25**
**Comparison of Transmission Line Alternatives**

| | Length (miles) | Capability | Total Cost |
|---|---|---|---|
| Shiprock–Kiffen Canyon–Iron Horse | 68 | 250 MW | $180,885,000 |
| Ojo East–Turley–Chama–Iron Horse | 110 | 250 MW | $195,650,000 |
| San Luis Valley–Chama–Iron Horse | 172 | 250 MW | $214,789,000 |
| Curecanti–Montrose–Nucla–Florida River | 201 | 100 MW | $256,412,000 |

*Source: Tri-State 2012*

### Shiprock–Kiffen Canyon–Iron Horse

The Shiprock–Kiffen Canyon–Iron Horse line is by far the shortest route. It is 42 miles shorter than the next comparable alternative, and would have a much smaller footprint and would create less disturbance than the other alternatives. It is expected that because less area would be affected, that the Shiprock–Iron Horse line would have fewer overall effects to the natural and human environment. In addition, the Shiprock–Iron Horse line is estimated to be the lowest cost alternative.

### Ojo East–Turley–Chama–Iron Horse

This transmission line alternative consists of tapping the Public Service Company of New Mexico's (PNM) 345 kV line near Gavilan, New Mexico, and constructing a 345 to 230 kV substation at that location. A 230 kV transmission line would be built north to a new substation near the intersection of Pounds Mill Road and US 64. At Pounds Mill Substation, a 115 kV transmission line would serve the Dulce-Chama area, and the 230 kV line would continue west to the vicinity of Turley, New Mexico, and then north toward Ignacio, Colorado (and the Iron Horse Substation). Improvements at the Turley Substation would be needed.

The Ojo East–Iron Horse line would provide about the same transfer capability as the Shiprock–Iron Horse line, which would be beneficial to the TOT 2A path. It would, however, increase loads on a different WECC-rated path in northern New Mexico known as the NM2 path. The Ojo East–Iron Horse line also appeared to be a less desirable solution than the Shiprock–Iron Horse line based on discussions with PNM planning personnel. They stated it would require a new tap on PNM's northern New Mexico 345 kV transmission system, which is already limited in its available transmission capacity. Because this alternative would require increasing loads on an already restricted system, this alternative was dropped because its implementation is remote and speculative.

In addition, the Ojo East–Iron Horse line would be 42 miles longer than the Shiprock–Iron Horse line, and would, therefore, have a larger footprint and create more disturbance. This alternative was dropped because it would cause unnecessary and undue degradation of the environment, which is contrary to BLM's objective to grant right-of-way in a manner that protects natural resources and prevents unnecessary and undue degradation of the environment. In addition, the Ojo East–Iron Horse line is estimated to cost more than the Shiprock–Iron Horse line without providing additional benefits.

### San Luis Valley–Chama–Iron Horse

This transmission line alternative consists of building a radial 230 kV line originating at the San Luis Valley Substation north of Alamosa, Colorado. The line would generally extend south from that location to the Colorado border and then proceed west to a new substation located near Chama, New Mexico. At the new Chama Substation, transformers would serve the Dulce-Chama area. The 230 kV line would continue in a westerly direction to the vicinity of Trujillo, Colorado, where a transformer would be the source for a new 115 kV line connecting to Tri-State's Pagosa Substation. A capacitor bank would be installed at the Trujillo Substation. Tri-State's existing Pagosa-Bayfield 115 kV line would be modified to accommodate power flow from the Trujillo transformer. The 230 kV line would continue west to terminate in the Iron Horse Substation.

This alternative would require an additional 104 miles of transmission line development than the Shiprock–Iron Horse line, and would, therefore, have a larger footprint and create more disturbance. This alternative was dropped because it would cause unnecessary and undue degradation of the environment, which is contrary to the BLM's objective to grant right-of-way in a manner that protects natural resources and prevents unnecessary and undue degradation of the environment.

The San Luis Valley–Iron Horse line would provide about the same amount of power transfer capability as the Shiprock–Iron Horse line. As shown previously in Exhibit 2-25, however, the San Luis Valley–Iron Horse line would be substantially similar in purpose and function to other alternatives considered, but at a much higher cost without providing additional benefits.

### Curecanti–Montrose–Nucla–Florida River

This transmission line alternative consists of building a new radial 230 kV line extending westerly from the Curecanti Substation located east of Montrose, Colorado, past Tri-State's South Canal, Nucla, Cahone, and Empire Substations to terminate at a new 230/115 kV substation near LPEA's Florida River Substation west of Ignacio, Colorado. The 230 kV line would be constructed in an existing 115 kV transmission line corridor on new transmission structures. The existing 115 kV substations would be converted to 230 kV. South of the Empire Substation, the 230 kV line would be a double-circuit line to maintain the 115 kV source serving the Lost Canyon, Durango, Hesperus, and Florida River Substations. In addition, a capacitor bank would be installed at the Empire Substation to reduce line impedances so that power could flow into the LPEA service area.

This alternative would require an additional 133 miles of transmission line development than the Shiprock–Iron Horse line, and would, therefore, have a larger footprint and create more disturbance. This alternative was dropped because it would cause unnecessary and undue degradation of the environment, which is contrary to the BLM's objective to grant right-of-way in a manner that protects natural resources and prevents unnecessary and undue degradation of the environment.

In addition, the Curecanti–Florida River line would offer significantly less power transfer capability than other alternatives considered. As shown in Exhibit 2-25, the Curecanti–Florida River line would be substantially similar in purpose and function to other alternatives considered, but at a much higher cost substantially without providing additional benefits.

### 2.3.3 Transmission Line Corridors and Route Development

#### 2.3.3.1 Macro Corridor Study

A Macro Corridor Study was conducted to identify opportunities and constraints for siting transmission line corridor segments between the Shiprock and Iron Horse Substations. Transmission line corridors were identified in the Macro Corridor Study by:

- Defining the study area
- Collecting and evaluating best publicly available land use and resource data
- Completing an opportunities and constraints analysis based on best available land use and resource data
- Identifying transmission line corridor segments based on opportunities and constraints for transmission line siting

The details of the Macro Corridor Study are provided in Appendix B, Macro Corridor Study. Exhibit 2-26, Opportunity, Avoidance, and Exclusion Areas, summarizes the results of the Macro Corridor Study and shows areas identified as opportunities, avoidance, and exclusion zones based on the developed criteria and resource data. Based on this analysis, 36 corridor segments were identified as possible opportunities for locating possible transmission line routes. These 36 corridor segments were available for public review and comment at EA scoping meetings held on October 7 and 8, 2009, in Farmington, New Mexico, and Ignacio, Colorado. EA scoping is discussed in additional detail in Section 1.8.1, EA Scoping.

#### 2.3.3.2 Route Refinement Process

After EA scoping and the Macro Corridor Study were completed, corridor segments were refined to develop transmission line routes. This work is documented in Appendix C, Route Refinement Report, and is summarized in this section. Additional analysis of identified routes is contained in Appendix D. The route refinement process included:

- Refining corridor segments (as shown on Exhibit 2-26)
- Developing routing objectives
- Collecting and evaluating land use and resource data
- Inviting public and stakeholder input
- Developing and evaluating routes

##### Refining Corridor Segments

As part of route refinement, some of the 36 corridor segments identified in the Macro Corridor Study were modified or removed from further consideration based on public comment from EA scoping meetings, agency and tribal input, detailed data review, and extensive field reconnaissance. In some areas, corridor segments representing favorable locations for a transmission line were added. The corridor modifications that resulted are summarized in Table 1, Corridor Segment Modification Tracking, of Appendix A, Corridor and Route Modification Descriptions, of the Route Refinement Report (Appendix C of this EIS). A total of 43 corridor segments was considered, and 22 were removed due to conflicts with existing land uses; habitat concerns for sensitive, threatened, or endangered species; adverse effects to river and riparian areas; or a greater potential for adverse effects to undisturbed areas. The remaining 21 corridor segments were carried forward for further analysis in the route refinement process.

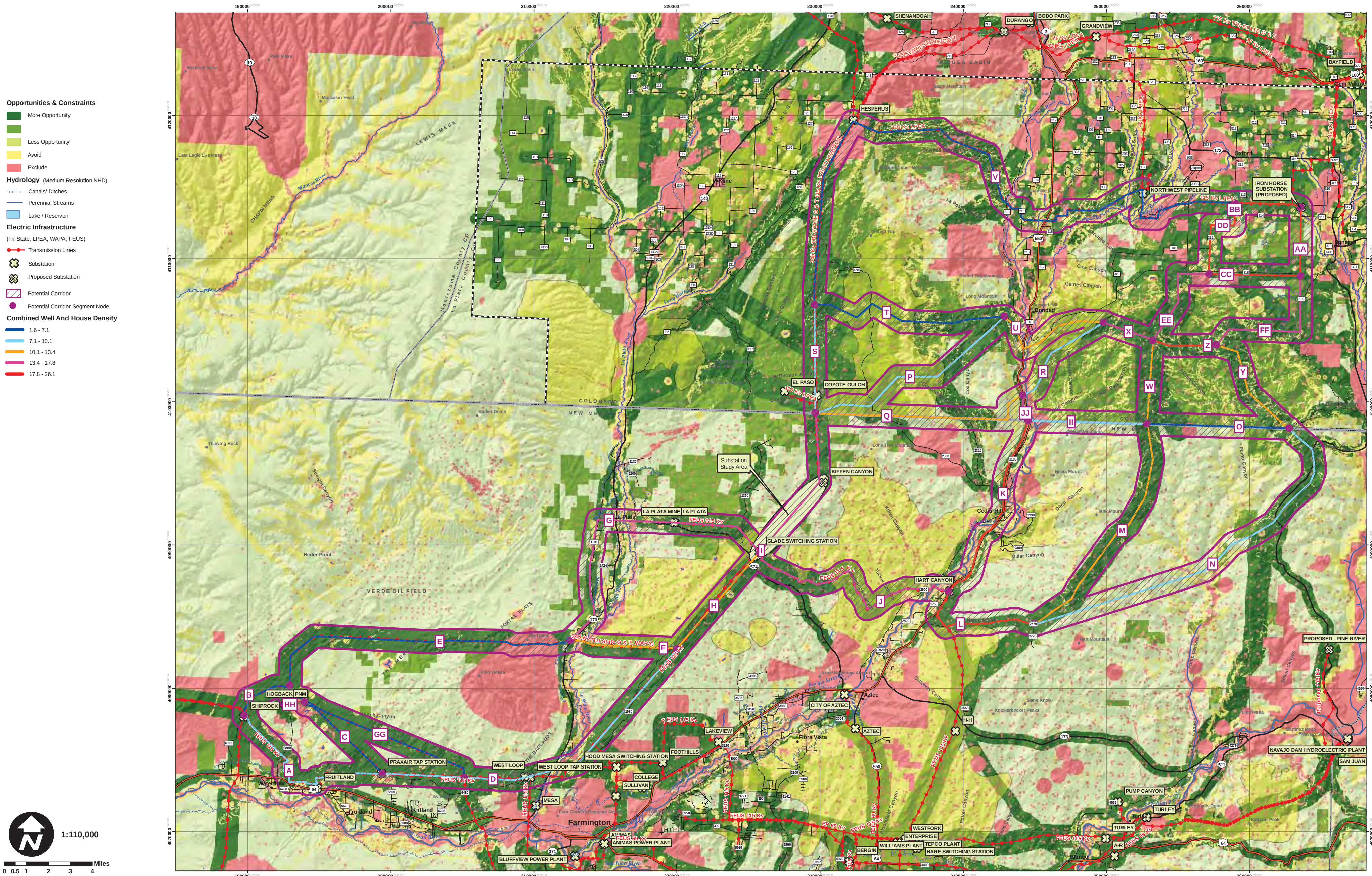



Exhibit 2-26 Opportunity, Avoidance, and Exclusion Areas

### Developing Routing Objectives

Next, routing objectives were developed based on input received from agencies, stakeholders, and past transmission line routing experience. The routing objectives were used as the primary tool for identifying preliminary routes. The routing objectives are provided in Table 3.3-1 of the Route Refinement Report and are summarized below. The routing objectives focused on the following:

**Appendix C, Route Refinement Report**

Table 3.3-1 of the Route Refinement Report provides a complete listing of the routing objectives.

- Land use – Route the transmission line through areas with compatible land uses.
- Transportation – Parallel existing roads, where feasible.
- Land cover – Route the transmission line through shrubland, grassland, cropland, and agricultural land and avoid routing the transmission line through forested areas.
- Existing utility infrastructure – Route the line near existing transmission and distribution lines.
- Cultural and historic resources – Avoid potential effects to cultural and historic resources.
- Biological resources – Reduce potential effects to avian species and threatened and endangered wildlife and plant species habitat.

### Collecting and Evaluating Land Use and Resource Data

Once the routing objectives were developed, existing resource and land use data were gathered to create maps to supplement the GIS information used in the Macro Corridor Study. Specific data sets that were collected are listed in Section 3.4, Data and Field Review, of the Route Refinement Report, and data maps are located in Appendix B, Resource Maps, of the Route Refinement Report. Data collected fall into the broad categories below:

**Appendix C, Route Refinement Report**

Section 3.4 of Appendix C lists the specific data sets that were collected to help identify possible route segments for transmission line routing. Appendix B of the Route Refinement Report contains the maps that show possible route segments and known resources such as land uses, residential areas, and wildlife and plant habitat.

- Cultural and historic resources
- Wildlife and plant habitat
- Water resources
- Jurisdictions

- Residences
- Land cover
- Land use and land use sensitivities
- Geologic formations and soils
- Communications facilities
- Fossil fuel extraction areas
- Transportation
- Utilities

### Inviting Public and Stakeholder Input

Throughout 2010, meetings and field visits were held with agencies and stakeholders to develop specific route segments. In addition to BLM-sponsored scoping meetings, three route refinement workshops were conducted to discuss preliminary routes with the public, agencies, and industrial operators. These meetings were held on September 21 and 22, 2010, in Farmington and Aztec, New Mexico, and Ignacio, Colorado.

Common themes from the public and agency representatives included concerns with:

- Visual effects
- Property value loss
- Electromagnetic fields
- Proximity to residences
- Noise
- Effects to wildlife
- Effects to recreation

Colorado Parks and Wildlife, the New Mexico Department of Game and Fish, the BLM, and the SUIT preferred routes that created the least amount of disturbance. They preferred routes that limited effects to existing land uses and would parallel existing transmission lines, disturbed areas, or roadways. Commenters preferred that the routes be constructed away from populated areas, and many people preferred the use of previously disturbed areas. People also provided specific comments on individual route segments.

As a result of the comments received during the route refinement workshops and additional investigation, 55 alternative route segments were identified. The 55 route segments were refined to 26, based on public and stakeholder comments and field reconnaissance. The list of segments considered and the rationale for removing segments is provided in Appendix A, Table 2, Route Segment Modification Tracking, of the Route Refinement Report. In general, segments were removed due to conflicts with existing land uses; habitat concerns for sensitive, threatened, or endangered species; adverse effects to river and riparian areas; or a greater potential for adverse effects to undisturbed areas.

### Developing and Evaluating Routes

After the route refinement workshops, the 26 route segments were assembled into six routes, A through F. The key features of Alternatives A through F are shown in Exhibit 2-27, Key Features of Alternatives A Through F. Exhibit 2-28, Alternatives A Through F, shows the location of the alternatives evaluated.

Exhibit 2-27

## Key Features of Alternatives A Through F

| | Alternative | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| | **Total Length (miles)** | **67.72** | **68.59** | **64.52** | **65.41** | **66.76** | **67.65** |
| **Length Following Existing Disturbance** | Miles paralleling transmission lines | 15.99 | 15.99 | 28.48 | 28.48 | 24.49 | 24.49 |
| | Miles paralleling pipelines | 14.68 | 19.28 | 5.52 | 10.12 | 5.29 | 9.89 |
| | Miles paralleling roads | 17.13 | 14.23 | 14.43 | 11.63 | 13.38 | 10.48 |
| | Miles paralleling linear disturbance | 42.93 | 44.48 | 44.22 | 45.76 | 39.13 | 40.67 |
| **Land Ownership** | Miles crossing BLM lands | 22.61 | 22.61 | 25.88 | 25.88 | 35.61 | 35.60 |
| | Miles crossing SUIT lands | 13.09 | 14.46 | 13.09 | 14.46 | 7.03 | 8.41 |
| | Miles crossing New Mexico State Lands | 3.02 | 3.02 | 3.95 | 3.95 | 3.78 | 3.78 |
| | Miles crossing private lands | 28.99 | 28.5 | 21.59 | 21.12 | 20.34 | 19.86 |
| **Land Use** | Miles crossing BLM-managed SDAs[1] or ACECs[2] | 16.66 | 16.66 | 11.48 | 11.48 | 26.29 | 26.29 |

**Exhibit 2-27**

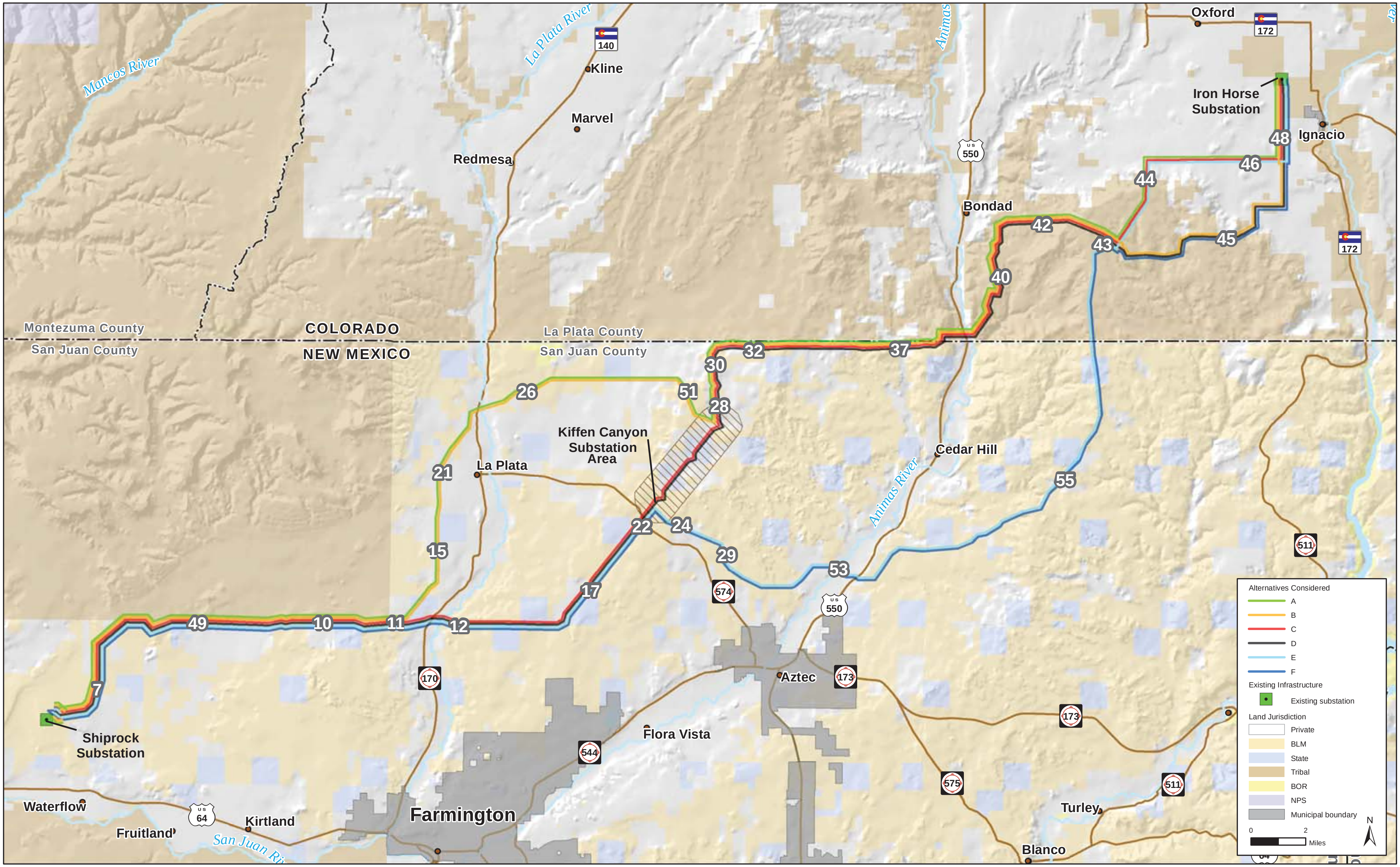
## Key Features of Alternatives A Through F

| | Alternative | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| **Socioeconomics** | Miles crossing subdivisions | 0.52 | 0.41 | 0.12 | 0 | 0.12 | 0 |
| | Number of subdivisions crossed by centerline | 2 | 1 | 1 | 0 | 1 | 0 |
| | Residences within 150–300 feet of centerline | 5 | 1 | 5 | 1 | 4 | 0 |
| | Total residences within 0.25 mile of centerline | 61 | 35 | 64 | 38 | 132 | 106 |
| **Visual Resources** | Miles crossing Class II VRM[3] areas | 1.75 | 1.75 | 0 | 0 | 0 | 0 |
| | Miles paralleling scenic byways | 0 | 0 | 0 | 0 | 0.47 | 0.47 |
| | Number of scenic byway crossings | 0 | 0 | 0 | 0 | 1 | 1 |

[1] *SDA – Special Designated Area*
[2] *ACEC – Area of Critical Environmental Concern*
[3] *VRM – Visual Resource Management, Data reference GIS BLM 2013a*

The six routes (Alternatives A, B, C, D, and F) were compared and evaluated based on land use, environmental, and engineering factors including the length following existing linear features; land use; residential and agricultural effects; and proximity to visual, biological, recreational, and cultural resources. One route, Alternative D was identified as a preliminary preferred alternative. The five routes and the preliminary preferred alternative were shown to the public to receive input as part of EIS public scoping meetings held on March 16 and 17, 2011, in Farmington and Aztec, New Mexico, and Ignacio, Colorado. During the scoping meetings, commenters expressed preferences for specific segments or routes, and many people expressed a preference for the preliminary preferred route.[3] No route segments were modified as a result of comments received during scoping meetings. Additional information about the EIS scoping meetings is provided in Section 1.8.2, EIS Scoping, and Section 1.9, Issues Raised During Scoping.

[3] BLM 2011




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

Exhibit 2-28 Alternatives A through F

After considering a range of factors, five routes (Alternatives A, B, C, E, and F) were dropped from further evaluation as discussed below. Alternative D was brought forward and served as the basis for the action alternatives.

### Alternative A

Exhibit 2-28 shows Alternative A. Alternative A is approximately 68 miles long and is comprised of Route Segments 7, 49, 10, 11, 15, 21, 26, 51, 28, 30, 32, 37, 40, 42, 43, 44, 46, and 48. Alternative A was eliminated from further evaluation in this EIS for the reasons summarized below.

*Route Segments 15, 21, and 26*

Alternative A would use Route Segments 15, 21, and 26. This routing combination was dropped for reasons cited below:

- **Land Use and Effects to Visual Resources** – Alternative A would cross the Thomas Canyon Recreation/Wildlife Area, and the East La Plata Wildlife Area as shown in Exhibit 2-29, BLM Special Designated Areas. Currently there are no existing transmission lines and supporting infrastructure in these areas as shown in Exhibit 2-30, Existing Transmission Lines. Adding a transmission line in this area would affect views, recreational users, and could result in habitat fragmentation. In the Thomas Canyon Recreation/Wildlife Area and the East La Plata Wildlife Area, the transmission line and associated supporting infrastructure would not be consistent with existing land uses in the area. In the Thomas Canyon Recreation/Wildlife Area a transmission line would not be consistent with BLM's management objectives, which include managing the area for the optimal combination of primitive recreation opportunities and wildlife protection.[4] Similarly for the East La Plata Wildlife Area, the transmission line and associate supporting infrastructure would not be consistent with the BLM's management objectives of managing the area to protect and preserve big game habitat.[5] Additionally, adding a transmission line in this area would not be consistent with the BLM's VRM

**Appendix D, Additional Analysis of Alternatives A through F**

Appendix D contains additional information and analysis regarding the BLM's land use objectives for SDAs and visual resource objectives.

[4] BLM 2003

[5] BLM 2003

Class II objectives in the Thomas Canyon Recreation/Wildlife Area, which require retaining the existing character of the landscape.

- **Residential Effects and Concerns** – Alternative A crosses a subdivision in Route Segment 26. Several residents located in Route Segments 15, 21, and 26 were opposed to the transmission line being located in these areas due to possible effects to properties, views, and public health.[6]
- **Likelihood of Effects to Wildlife and Plant Resources.** As described above for land use, the Thomas Canyon Recreation/Wildlife Area and the East La Plata Wildlife Area have desirable wildlife habitat that is protected under the RMP. Adding a transmission line in this area would not be consistent with the BLM's management objectives in this area. Furthermore, the New Mexico Department of Fish and Game submitted a comment letter during EIS scoping[7] that indicated a preference to avoid Route Segments 15, 21, 26, and 51 because of possible effects to various wildlife and avian species including big game, mule deer, Gunnison prairie dog, and bald eagle.

*Route Segments 44 and 46*

Alternative A would use Route Segments 44 and 46. This routing combination was dropped for reasons cited below:

- **Residential Effects** – Route Segments 44 and 46 are used for Alternatives A, C, and E. These route segments were dropped because they would add a new transmission line in an area that contains a subdivision and are located within 0.25 mile of 29 residences. By comparison, Route Segments 43 and 45 used for Alternatives D and F do not cross a subdivision, and have three residences located within 0.25 mile. Because of this, Alternatives A, C, and E would cause undue and unnecessary effects to the human environment.

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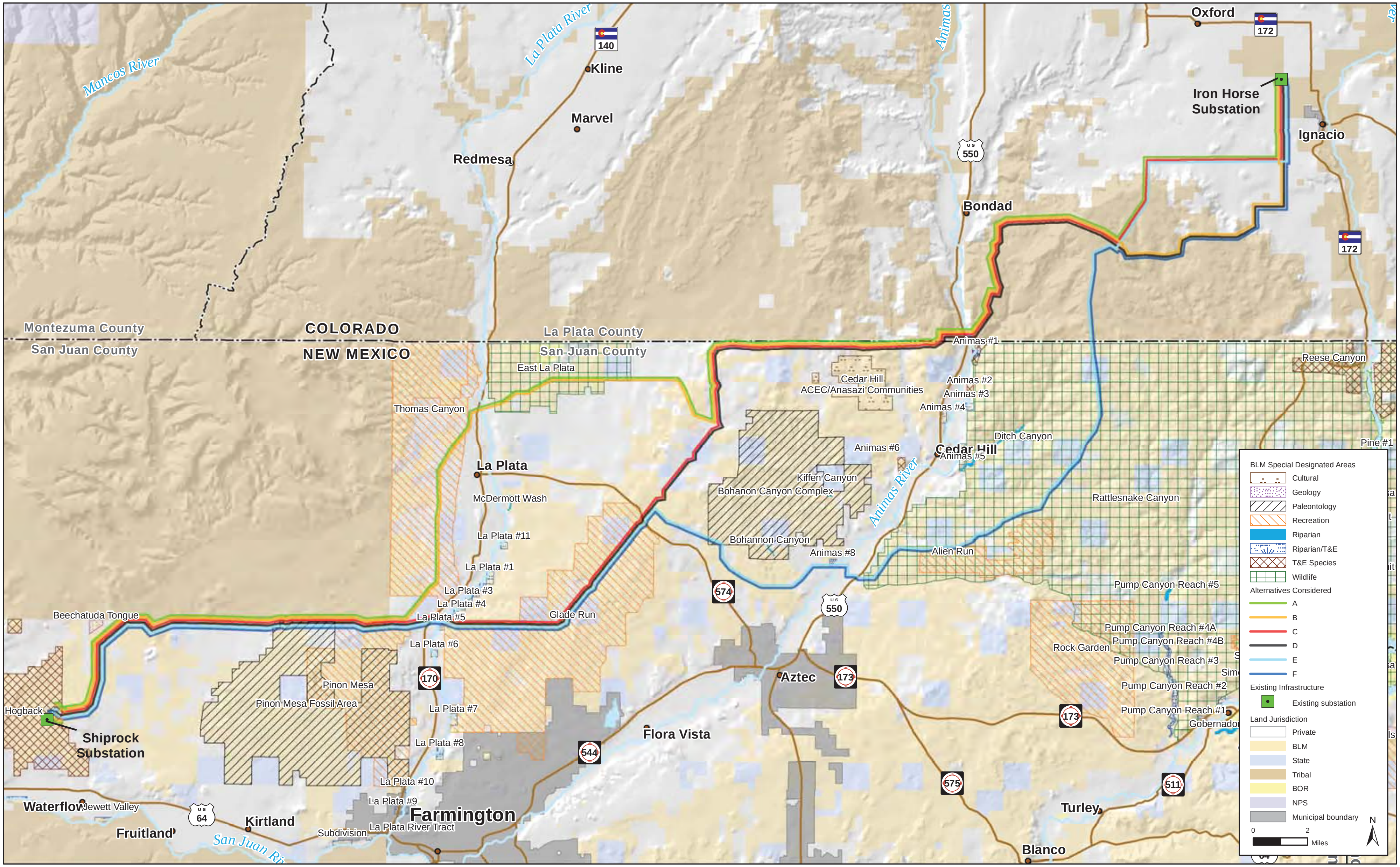
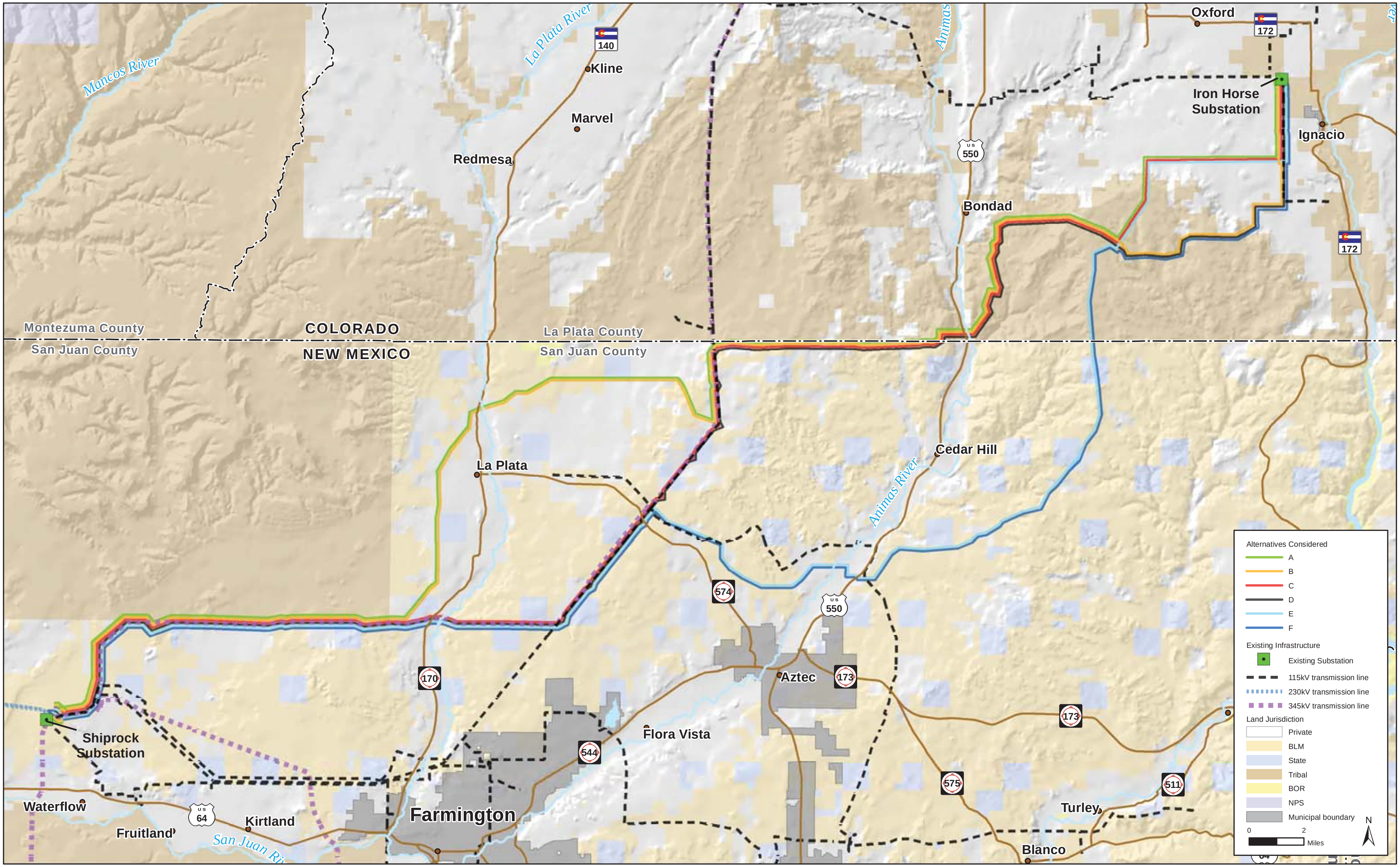
[6] BLM 2011

[7] BLM 2011




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

**Exhibit 2-29 BLM Special Designated Areas**




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013, GIS Tetra Tech 2010

**Exhibit 2-30 Existing Transmission Lines**

- **Greater Likelihood for Effects to Wildlife and Their Habitat** – Route Segments 44 and 46 associated with Alternatives A, C, and E have a greater potential to affect wildlife species than Route Segments 43 and 45, associated with Alternatives D and F. Segments 44 and 46 cross mule deer and elk severe winter range areas for a greater distance than Segments 43 and 45. Segments 44 and 46 cross 5.01 miles of mule deer severe winter range as compared to 3.63 miles for Segments 43 and 45. For elk severe winter range, Segments 44 and 46 cross 3.69 miles as compared to 3.64 miles for Segments 43 and 45. In an EIS scoping letter, the Colorado Division of Wildlife (now called Colorado Parks and Wildlife)[8] expressed a preference for routing the line along Route Segments 43 and 45 over Route Segments 44 and 46 since Route Segments 43 and 45 are more heavily disturbed from existing roads and would have fewer effects to wintering deer and elk. Because of this, Alternatives A, C, and E would cause unnecessary and undue effects to the natural environment.

**Appendix C, Route Refinement Report**

Appendix D, Comparative Route Segment Matrix, in the Route Refinement Report documents the number of miles of elk and mule deer habitat that could potentially be affected by each route segment.

- **Requires More Disturbance than Segments 43 and 45** – Segments 44 and 46 use the existing LPEA poles for a shorter distance (approximately 3 miles) than Segments 43 and 45 (approximately 4.5 miles). This means that Segments 44 and 46 would disturb more area than Segments 43 and 45. The existing LPEA poles can accommodate both the existing LPEA and new SJBEC Project transmission lines. This eliminates the need to add poles and construct new access in the area. Because of this, Alternatives A, C, and E would cause undue and unnecessary effects to the human and natural environment.

*Other Factors Considered*

In addition to the considerations discussed above, Alternatives A and B would be located adjacent to existing transmission lines for 15.99 miles as compared to 28.48 miles for Alternatives C and D, or 24.49 miles for Alternatives E and F. To the extent feasible, an effort has been made to locate the transmission line and associated access

[8] BLM 2011

roads to minimize effects to land use, landowners, viewsheds, and to biological and cultural resources.

In conclusion, the BLM dropped Alternative A from further consideration because it:

- Is inconsistent with the BLM's management objectives for the Thomas Canyon Recreation/Wildlife Area and East La Plata Wildlife Area.
- Is inconsistent with VRM Class II objectives for the Thomas Canyon Recreation/Wildlife Area.
- Would cause unnecessary and undue effects to the human and natural environment because it would place a transmission line in two subdivisions where a transmission line does not currently exist, would affect protected wildlife habitat areas and big game habitat for mule deer and elk, and would require more disturbance to undisturbed areas than other alternatives considered.

### Alternative B

Exhibit 2-28 shows Alternative B. Alternative B is approximately 69 miles long and consists of Route Segments 7, 49, 10, 11, 15, 21, 26, 51, 28, 30, 32, 37, 40, 42, 43, 45, and 48. The reasons why Alternative B was eliminated from further evaluation in this EIS are summarized below. Similar to Alternative A, Alternative B uses Route Segments 15, 21, and 26, which was eliminated for reasons discussed above in the Alternative A section.

Specifically, the BLM dropped Alternative B from further consideration because it:

- Is inconsistent with the BLM's management objectives for the Thomas Canyon Recreation/Wildlife Area and East La Plata Wildlife Area.
- Is inconsistent with VRM Class II objectives for the Thomas Canyon Recreation/Wildlife Area.
- Would cause unnecessary and undue effects to the human and natural environment because it would place a transmission line in a subdivision where a transmission line does not currently exist, would affect protected wildlife habitat areas and big game habitat

**Appendix D, Additional Analysis of Alternatives A through F**

Appendix D contains additional information and analysis regarding the BLM's land use objectives for SDAs and visual resource objectives.

for mule deer and elk, and would require more disturbance to undisturbed areas than other alternatives considered.

### Alternative C

Exhibit 2-28 shows Alternative C. Alternative C is approximately 65 miles long and is comprised of Route Segments 7, 49, 10, 11, 12, 17, 22, 27, 28, 30, 32, 37, 40, 42, 43, 44, 46, and 48. The reason why Alternative C was eliminated from further evaluation in this EIS is summarized below.

**Appendix C, Route Refinement Report**

Appendix D, Comparative Route Segment Matrix, in the Route Refinement Report shows the number of residences and subdivisions within each route segment.

Alternative C uses Route Segments 44 and 46. This routing was eliminated for reasons discussed for Alternative A. The BLM dropped Alternative C because it:

- Would be substantially similar in design to another alternative analyzed (Alternative D)
- Would cause unnecessary and undue effects to the human and natural environment because it would place a transmission line in a subdivision where a transmission line does not currently exist, would affect protected wildlife habitat areas and big game habitat for mule deer and elk, and would require more disturbance to undisturbed areas than other alternatives considered.

### Alternative E

Exhibit 2-28 shows Alternative E. Alternative E is approximately 67 miles long and is comprised of Route Segments 7, 49, 10, 11, 12, 17, 22, 24, 29, 54, 55, 44, 46, and 48. The reasons why Alternative E was eliminated from further evaluation in this EIS are summarized below.

*Route Segments 24, 29, 53, and 55*

Alternative E places the proposed transmission line on Route Segments 24, 29, 53, and 55. This route is often referred to as the southern Animas River crossing. The southern Animas River crossing used for Alternative E was dropped for reasons cited below:

- **Land Use** - Alternative E would cross the BLM's Rattlesnake Canyon Wildlife Area as shown in Exhibit 2-29. The transmission line and associated supporting infrastructure would not be consistent with existing land uses in the area. That is, there are no existing transmission lines and supporting infrastructure within most of the SDA as shown in Exhibit 2-30. The transmission line would represent a new use that would

**Appendix D, Additional Analysis of Alternatives A through F**

Appendix D contains additional information and analysis regarding the BLM's land use objectives for SDAs and visual resource objectives.

not be consistent with the BLM's land use objectives to support increases in potential wildlife areas.

- **Residential Effects** – Many comments were received during EIS scoping[9] stating concerns with possible residential effects along Route Segments 24, 29, 53, and 55. These segments are within 0.25 mile of 79 residences, as documented in Appendix D of the Route Refinement Report. Residents near the southern Animas River crossing were strongly opposed to the use of Route Segment 53 because it crosses active agricultural land and would be visible to many residents northeast of Aztec. In addition, residents were concerned about property effects and possible health effects from electromagnetic fields. Many residents in this area stated they prefer a route that uses a northern Animas River crossing in Colorado. The BLM did not receive any comments opposing the northern Animas River crossing.
- **Floodplain, Riparian, and Wildlife Effects** – Alternative E crosses the Animas River at a location that would require placing multiple structures in the river's floodplain and riparian areas. Placing structures in the river's floodplain and riparian areas would affect habitat and biological resources. Specific comments were received from the BLM regarding the use of Segment 55. The BLM was concerned with potential effects to wildlife including further fragmentation of the Rattlesnake Canyon Wildlife Area. In addition, the New Mexico Department of Game and Fish expressed a preference for routes that would use the northern Animas River crossing over a route that would use the southern river crossing and the Arkansas Loop Road and pipeline corridor.[10] The New Mexico Department of Game and Fish expressed concern that a route using the southern crossing would impact wildlife habitat for deer, elk, and turkey as well as projects designed to improve habitat for those species. Additionally, there was concern that a route through this vicinity could affect areas with high densities of protected wildlife species.

[9] BLM 2011

[10] BLM 2011

- **Conflicts with Existing Oil and Gas Infrastructure** – Alternatives E and F largely follow the Arkansas Loop Road and pipeline corridor. Locating the transmission line along other existing infrastructure is preferred; however, in this case it is difficult to locate a transmission line directly adjacent to the existing pipeline corridor located in Route Segment 55 due to the congestion of existing oil and gas infrastructure. Spacing constraints with existing gas wells and other infrastructure would require the route to be located as much as 0.5 mile away from the established corridor, resulting in additional disturbance and minimizing the benefits of co-location.

*Route Segments 44 and 46*

Alternative E would also follow Route Segments 44 and 46. This routing combination was dropped for reasons discussed for Alternative A.

*Other Factors Considered*

Alternative E is adjacent to existing transmission lines for 24.49 miles as compared to 28.48 miles for Alternative D. To the extent feasible, an effort has been made to locate the proposed transmission line and associated access roads to minimize effects to land use, landowners, viewsheds, and to biological and cultural resources.

In conclusion, the BLM dropped Alternative E from further consideration because it:

- Is inconsistent with the BLM's management objectives for the Rattlesnake Canyon Wildlife Area.
- Would cause unnecessary and undue effects to the human and natural environment because it would place a transmission line in a subdivision and other residential areas where a transmission line does not currently exist; would affect protected wildlife habitat areas, floodplains, riparian areas, and big game habitat for mule deer and elk; and would require more disturbance to undisturbed areas than other alternatives considered.

### Alternative F

Exhibit 2-28 shows Alternative F. Alternative F is approximately 68 miles long and is comprised of Route Segments 7, 49, 10, 11, 12, 17, 22, 24, 29, 53, 55, 45, and 48. Alternative F uses Route Segments 24, 29, 53, and 55. This routing was eliminated for reasons discussed for Alternative E. The BLM dropped Alternative F from further consideration because it:

- Is inconsistent with the BLM’s management objectives for the Rattlesnake Canyon Wildlife Area.
- Would cause unnecessary and undue effects to the human and natural environment because it would place a transmission line in residential areas where a transmission line does not currently exist; would affect protected wildlife habitat areas, floodplains, riparian areas, and big game habitat for mule deer and elk; and would require more disturbance to undisturbed areas than other alternatives considered.

# Chapter 3 – Affected Environment and Environmental Effects

# 3 Affected Environment and Environmental Effects

*Chapter 3 describes the affected environment and identifies the environmental effects of the No Action Alternative, the Preferred Alternative and the Proposed Action.*

## 3.1 Introduction

This chapter describes the affected environment and the environmental effects of the No Action Alternative, the Preferred Alternative, and the Proposed Action. Environmental Protection Measures (EPMs) listed in Exhibit 2-23, Environmental Protection Measures, are part of the Preferred Alternative and the Proposed Action and were considered before arriving at effects described in this chapter.

**What are direct and indirect effects?**

- **Direct effect** – An effect that would occur at the same time and place that an action is being performed.
- **Indirect effect** – An effect that would occur later in time or farther from the initial action, but is still reasonably foreseeable.

The analysis considers the direct and indirect effects of operating, maintaining, and constructing the SJBEC Project as described in Section 2.2, Actions Common to All Action Alternatives. Effects that would occur throughout the life of the project or beyond are considered to be permanent, long-term effects. The life of the project is estimated to be a minimum of 50 years. For purposes of the permanent effects analysis, the area of land permanently affected by ground-disturbing activities for transmission line structures, substations, and access roads is estimated at 182 acres for the Preferred Alternative and 183 acres for the Proposed Action. This is discussed more fully in Section 3.3, Land Ownership and Use.

This chapter also describes possible direct and indirect effects of construction activities. These effects would be temporary and would occur from the time that ground-disturbing activities begin through reclamation when vegetation has been re-established. The estimated time frame for these effects is up to approximately 5 years. For most resources (such as air quality or noise), the timeframe for temporary effects is the 18- to 24-month construction period. For resources such as vegetation, effects may occur for up to a 5-year period, since it will take time to re-establish vegetation after construction is complete. For purposes of the temporary effects analysis, the area of land temporarily affected by ground-disturbing activities for transmission line structures, substations, and access roads is estimated at 800 acres for the Preferred Alternative and approximately 827 acres for the Proposed Action. This is discussed more fully Section 3.3 Land Ownership and Use.

The estimated area of effects includes constructing new access roads or improving existing access roads. Proposed access roads for the Preferred Alternative and the Proposed Action are provided below in Exhibits 3-1, Estimate of New and Improved Access Roads for the Preferred Alternative, and 3-2, Estimate of New and Improved Access Roads for the Proposed Action.

**Exhibit 3-1**

## Estimate of New and Improved Access Roads for the Preferred Alternative

| Jurisdiction | Miles of New Access Roads | Miles of Existing Roads Requiring Improvement | Total (miles) |
|---|---|---|---|
| BLM | 8.4 | 14.2 | 22.6 |
| NMSLO | 1.7 | 5.2 | 6.9 |
| SUIT | 11.6 | 0 | 11.6 |
| Private | 6.9 | 6.0 | 12.9 |
| **Total** | **28.6** | **25.4** | **54.0** |

*NMSLO – New Mexico State Land Office*

**Exhibit 3-2**

## Estimate of New and Improved Access Roads for the Proposed Action

| Jurisdiction | Miles of New Access Roads | Miles of Existing Roads Requiring Improvement | Total (miles) |
|---|---|---|---|
| BLM | 8.3 | 14.9 | 23.2 |
| NMSLO | 1.2 | 4.8 | 6.1 |
| SUIT | 11.6 | 0 | 11.6 |
| Private | 6.9 | 6.5 | 13.4 |
| **Total** | **28.0** | **26.3** | **54.2** |

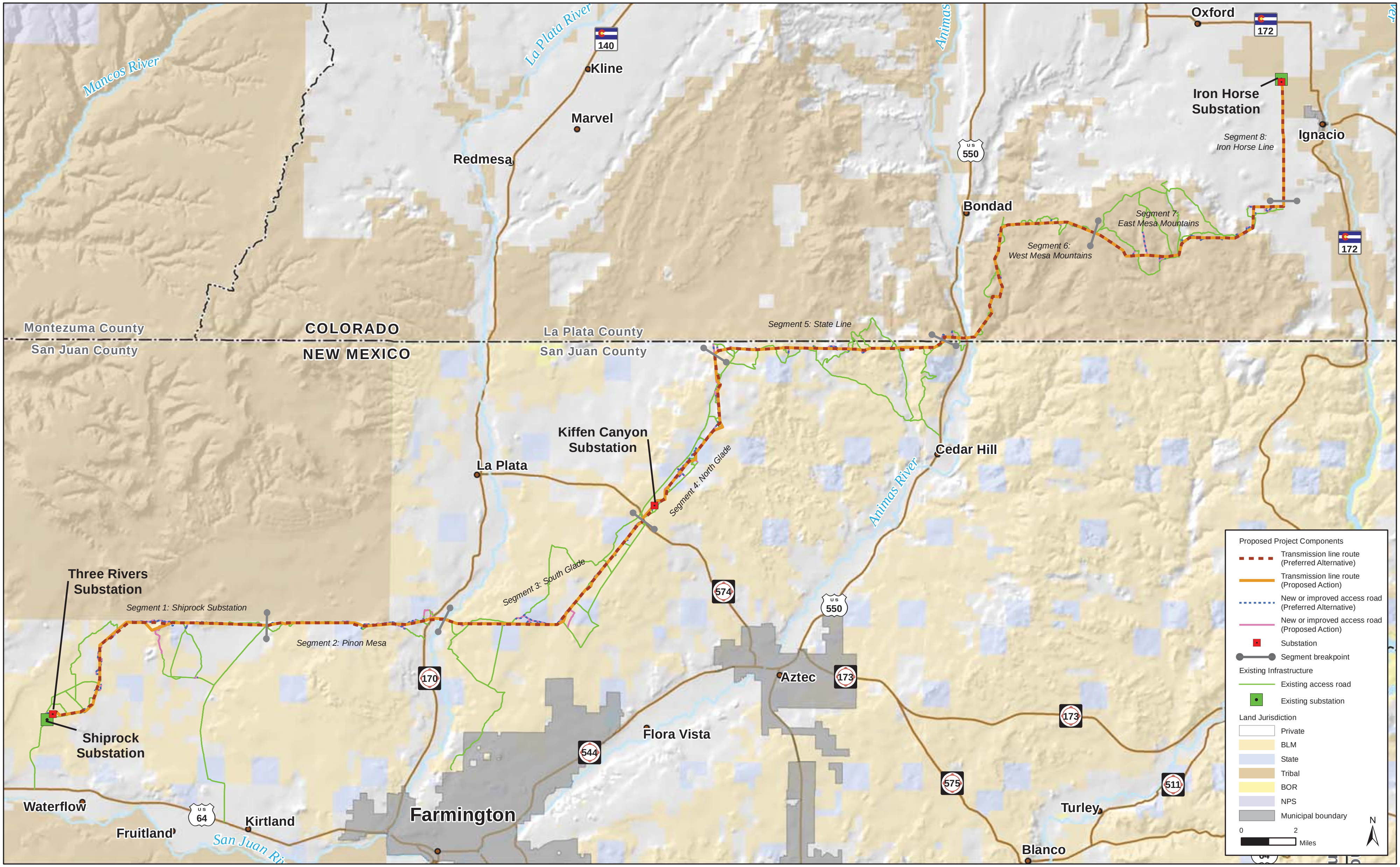
Improved or new access roads would be widened or constructed, respectively, to a roadway width of 20 feet and a right-of-way width of 30 feet required for construction and long-term operation of the transmission line. Sometimes additional right-of-way (up to a maximum width of 50 feet) would be required because conditions such as challenging topography or drainages would require more road improvements, though the footprint of the roadway surface would remain 20 feet.

The term of the BLM right-of-way grant to allow use of federal land would be limited to 50 years, though the expected life of the SJBEC Project likely extends beyond 50 years. At the end of the 50-year BLM lease, Tri-State would need to renew its lease. If, at some point in the future, the SJBEC Project is no longer required, the transmission line, substations, and new access roads would be removed from service and decommissioned. As part of decommissioning, all infrastructure would be removed and disturbed areas would be restored in accordance with a termination and restoration plan that would be prepared by Tri-State for review and approval by the BLM and other affected land owners. Effects resulting from decommissioning would be similar to the effects that would occur during project construction; however, potential effects and the timeframe of decommissioning are considered speculative and, therefore, cannot be meaningfully analyzed in this EIS.

## 3.2 Study Area

The SJBEC Project is located between the Shiprock Substation near Farmington, New Mexico, and the Iron Horse Substation near Ignacio, Colorado. For the purposes of this analysis, the study area for both alternatives includes a 150-foot-wide transmission line right-of-way, plus 50-foot buffers on either side for a total of 250 feet as shown in Exhibit 3-3, Study Area.

The study area for access roads generally includes a 50-foot-wide easement, along with 50-foot buffers on either side for a total of 150 feet. In and around the substations, the study area will include the total area of disturbance, plus a 100-foot buffer around the entire site. The study area also includes infill areas where access roads and the transmission line right-of-way are in close proximity.




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

**Exhibit 3-3 Study Area**

In some areas, the study area was expanded slightly to incorporate buffers to provide flexibility for engineers to site project features, including transmission towers and access roads, to avoid and minimize effects to sensitive cultural or natural resources.

This study area was used to describe the affected environment and project effects for the resources listed below.

- Land ownership and use
- Special designation lands
- Recreation
- Grazing and livestock
- Transportation and access
- Geology and geologic hazards
- Paleontology
- Minerals
- Soils
- Farmlands
- Vegetation
- Electric and magnetic fields

For the following resources, the study area was modified and is described later in this chapter:

- Visual resources
- Water resources and wetlands
- Fish and wildlife
- Cultural resources
- Air quality
- Noise and vibration
- Hazardous materials
- Socioeconomics
- Environmental justice

Because the study area is large, it has been divided into eight segments that are discussed throughout the text. The locations of the eight segments are shown in Exhibit 3-3, Study Area, and the segment names are provided below:

- Segment 1 Shiprock Substation
- Segment 2 Pinon Mesa
- Segment 3 South Glade
- Segment 4 North Glade
- Segment 5 State Line
- Segment 6 West Mesa Mountains
- Segment 7 East Mesa Mountains
- Segment 8 Iron Horse

## 3.3 Land Ownership and Use

### 3.3.1 Methods

Existing land use planning documents provide information on current land use conditions for the study area. The following planning documents are applicable to the portion of the study area in New Mexico and were used for the analysis in this EIS:

- BLM FFO Resource Management Plan (RMP)
- San Juan County Growth Management Plan

In Colorado, the study area crosses private land in La Plata County and tribal land within the SUIT Reservation. Existing land use planning criteria, applicable to the portion of the study area in Colorado, used for the analysis in this EIS include:

- La Plata County Comprehensive Plan
- La Plata County Land Use Code
- SUIT Land Use Objectives
- Town of Ignacio's Three-Mile Plan

Information obtained from the planning documents listed above in conjunction with GIS data were used to:

- Determine current land use conditions and the amount of permanent and temporary disturbance that would occur on existing land uses.
- Evaluate the proximity of the alternatives to urban areas and nearby residential land uses.
- Assess potential inconsistencies with current planning objectives.
- Describe the right-of-way and easement acquisition process.

Analysis of the current and future land use conditions will also guide the BLM in granting right-of-way for the alternatives. To authorize right-of-way, the BLM must determine if the project is consistent with the mandates in Title V of the Federal Land Policy and Management Act of 1976 (Public Law 94-579), including a finding that the right-of-way will not impose unnecessary damage to the environment.

Indicators used to determine the potential for effects on land use include:

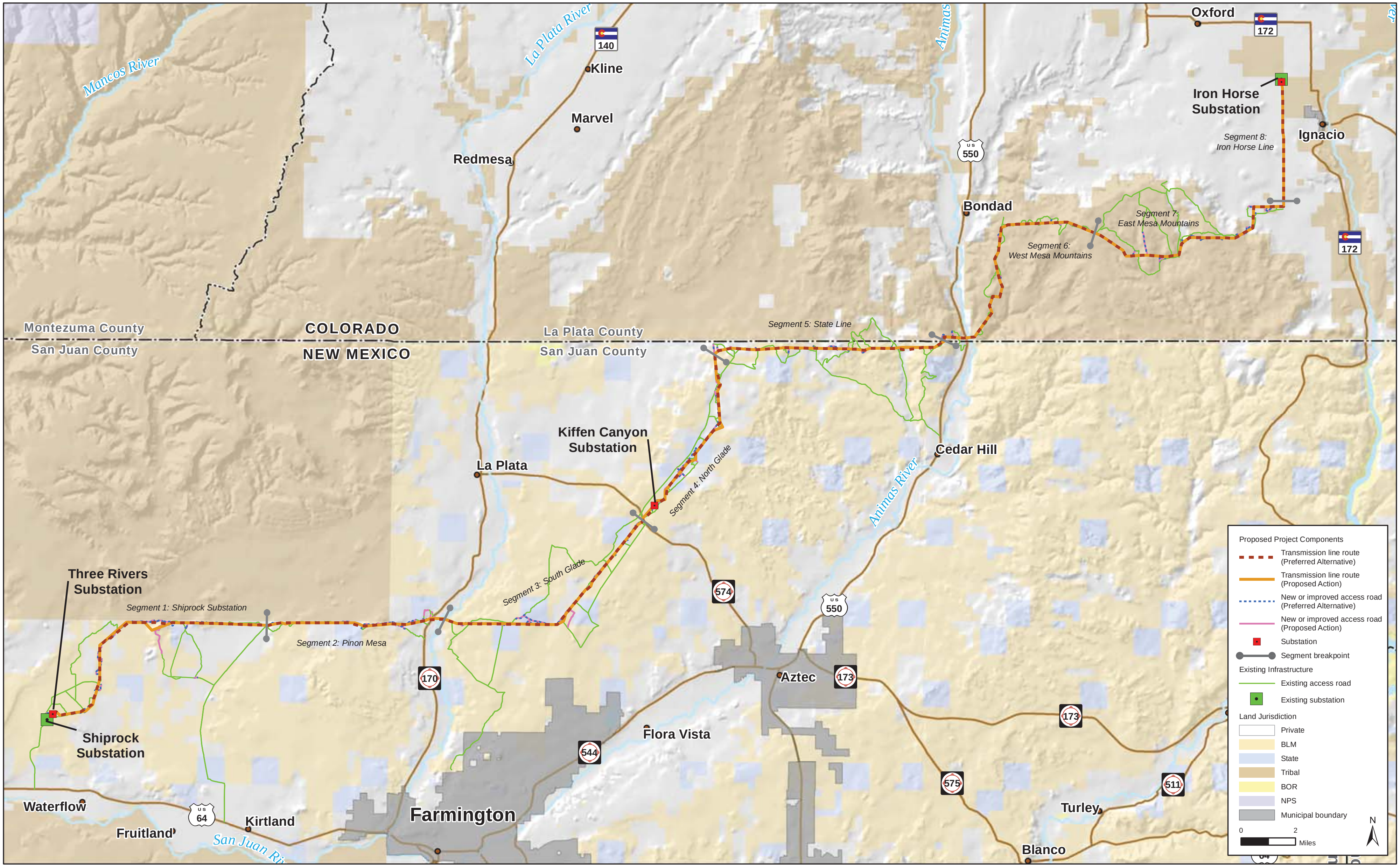
- Conflicts with existing or adjacent land uses;
- Conflicts with existing federal, tribal, state, and local land uses, plans, and policies; or
- Conflicts with existing BLM land use authorizations.

### 3.3.2 Affected Environment

The study area encompasses federal, state, and private lands in New Mexico and tribal and private lands in Colorado. See Exhibit 3-4, Land Jurisdiction. In New Mexico, most of the study area is on BLM land within the BLM Farmington Field Office (FFO). The remaining portions of the study area in New Mexico are on state and private land. There are two primary entities responsible for land use planning within the study area in New Mexico: the BLM and San Juan County.

**Land Ownership and Use Study Area**

The study area for lands and realty is the same as the general study area described in Section 3.2, Study Area.




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

**Exhibit 3-4 Land Jurisdiction**

In Colorado, the study area includes SUIT and private lands located in La Plata County.

Existing land use conditions consist of land ownership, current land use planning objectives contained in plans and policies, and land use authorizations within the study area.

#### 3.3.2.1 Regional Setting and Existing Land Use

Northwestern New Mexico and southwestern Colorado are on the west slope of the continental divide. The San Juan River drainage basin dominates the landscape in northwestern San Juan County, New Mexico. River valleys and washes, mesas, and undulating uplands punctuate the landscape along the New Mexico and Colorado border. Riparian areas exist along drainage areas, especially adjacent to the San Juan, La Plata, and Animas Rivers.

Oil and gas development and coal extraction are central features to the northwestern New Mexico and southwestern Colorado landscape. Grazing and irrigated agriculture is found along the San Juan, Animas, and La Plata Rivers. Urban development in the region is largely concentrated in the cities of Farmington and Aztec. In southeastern La Plata County, Colorado, the towns of Durango, Ignacio, and Bayfield are the main urban centers.

#### 3.3.2.2 Land Use Plans and Policies

The study area encompasses federal, state, and private lands in New Mexico and tribal and private lands in Colorado as shown in Exhibit 3-4. In New Mexico, most of the study area is on BLM-managed land within the BLM Farmington Field Office (FFO). The remaining portions of the study area in New Mexico are on state and private land. There are two primary entities responsible for land use planning within the study area in New Mexico: the BLM and San Juan County. In Colorado, the study area includes SUIT and private lands located in La Plata County.

##### BLM FFO

The BLM FFO is responsible for managing 1.4 million surface acres of public lands, which is roughly half of the total area in the San Juan Basin. The BLM FFO’s approved Resource Management Plan

(RMP) Record of Decision was signed in September 2003.[1] The RMP planning area includes all of San Juan County, northern McKinley County, western Rio Arriba County, and the northwestern portion of Sandoval County in New Mexico.

Consistent with the multiple-use, sustained-yield mandate of the Federal Lands Policy and Management Act of 1976 (Public Law 94-579), the Farmington RMP contains land use management objectives. Oil and gas development is the foremost activity on BLM-managed lands in the FFO. On BLM-managed lands in the planning area, there are approximately 18,000 active oil and gas wells and 2,400 existing leases for oil and gas. Corresponding development and maintenance of access roads, pipelines, energy transmission lines, and communication sites is a primary activity on public land in the region. Management goals in the RMP address the need to support further development of energy resources while maintaining natural and cultural resources and providing recreation opportunities.[2]

### San Juan County

San Juan County lies in the sparsely populated northwestern corner of New Mexico. Tribal land governed by the Navajo Nation and the Ute Mountain Ute Indian Tribe occupies 65 percent of the county's land area, while BLM-managed land accounts for nearly 28 percent. There are 230,196 acres of private land in the county, equal to almost 7 percent of the county's land area. Land uses on private lands include a mixture of low-density rural residential; agricultural, such as alfalfa production and livestock grazing; oil and gas development; and undeveloped open space.

The San Juan County Growth Management Plan,[3] adopted in July 2007, guides physical development activities on unincorporated lands in the county and provides local-level planning objectives for a 20-year horizon. One of the primary purposes of San Juan County's Growth Management Plan is to guide future development near urban areas. The Growth

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[1] BLM 2003a

[2] BLM 2003a

[3] San Juan County 2007

Management Plan encourages coordination with the BLM to identify lands suitable for conversion to private status, and ultimately, future development. For rural areas under federal administration, the plan defers to the BLM, noting that where suitable, the areas should continue to be used for ranching, oil and gas development, and general open space.[4]

### SUIT

Land use on the SUIT Reservation is largely dispersed residential development and oil and gas production. Within and immediately adjacent to the study area as it crosses tribal land, the primary activity is oil and gas development. As the study area exits the Mesa Mountains and turns north toward Ignacio, oil and gas wells are less frequent, and land uses within and adjacent to the study area are predominately dispersed ranches and open space.

### La Plata County

La Plata County is located in rural southwest Colorado. The largest urban area is Durango, with smaller population centers in Ignacio and Bayfield. Approximately 41 percent of La Plata County land is managed by federal and state agencies, with an additional 18 percent governed by the SUIT. Land use throughout the county varies. In the more-arid, less-mountainous southern half of the county, dominant land uses are agriculture and oil and gas development. In the northern, more-rugged portion of the county, land is primarily managed by the US Forest Service and managed as open space.

The La Plata County Comprehensive Plan[5] guides future land use development and planning activities for unincorporated areas of the county. La Plata County adopted the plan in 2001 largely in reaction to a significant population increase throughout the county. An overriding theme of the plan is to accommodate future development without compromising the quality of the county's natural environment. More specific district plans guide land use decision making within the county's 10 planning districts. The study area is located within the Southeast La Plata planning district.

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[4] San Juan County 2007

[5] La Plata County 2001a

Pressure on natural resources from urban development in this district is limited.[6] Ignacio is the largest population center in the Southeast District and is located approximately 0.75 mile from the study area. The Town of Ignacio administers land use planning and development activities consistent with the Three Mile Plan adopted in 2004. The Three Mile Plan provides general development standards for a range of land use classifications within a 3-mile radius of the town limits. Land use classifications in the Three Mile Plan underlying the study area include D4 – Large Lot Residential, E-3 – Mixed Use, B-2 – Commercial, and D1 – Large Lot Residential.[7]

#### 3.3.2.3 Land Use Authorizations

Existing land use authorizations in the study area consist of rights-of-way to access oil and gas operations, utility corridors, highways, communication facilities, and pipelines. There are no BLM-designated right-of-way exclusion or avoidance areas within or adjacent to the study area.

Several electrical transmission lines and gas pipelines traverse northern San Juan County, New Mexico, and southern La Plata County, Colorado, as shown in Exhibit 3-5, Existing Transmission Lines. An existing 345 kV transmission line extends from the beginning of the study area near the existing Shiprock Substation in Segment 1 to the end of Segment 4 (see Exhibit 3-3 for segment locations) where the proposed transmission line will turn to the east and run parallel to the New Mexico and Colorado state line. Additionally, portions of the study area (Segments 1 and 3, all of Segment 4, and Segment 8) contain existing 115 kV electrical transmission line infrastructure.

Similarly, the study area associated with the West and East Mesa Mountains (Segments 6 and 7) contain existing gas pipeline infrastructure.

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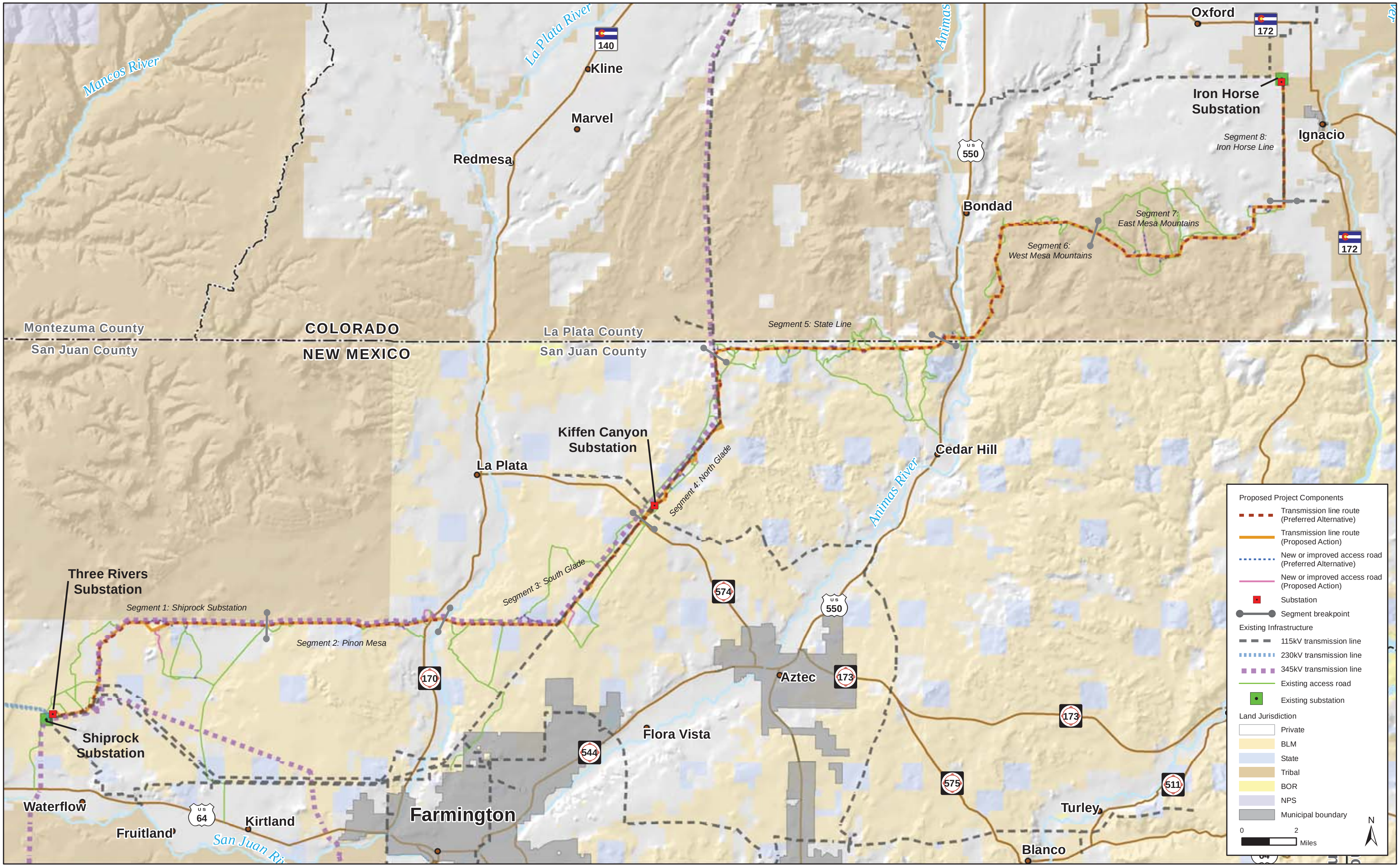
[6] La Plata County 2001a

[7] Town of Ignacio 2004




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013, GIS Tri-State 2008

**Exhibit 3-5 Existing Transmission Lines**

## 3.3.3 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects to land use would occur with this alternative.

## 3.3.4 Preferred Alternative

### 3.3.4.1 Permanent Effects

**Consistency with Existing Land Use Plans and Guidelines**

Existing comprehensive planning documents contain land use goals and objectives for lands within the study area. The Preferred Alternative is consistent with each of these documents, as follows.

FFO RMP

In general, the Preferred Alternative is consistent with the BLM's multiple-use mandate in the Federal Land Policy and Management Act. Specific to the FFO, the FFO RMP identifies right-of-way development for roads and energy-related corridors as an important part of the FFO lands program.[8] The Preferred Alternative is also consistent with the RMP objective to locate new right-of-way parallel to existing right-of-way as a strategy to minimize resource effects.

San Juan County Growth Management Plan

Goals and objectives in the San Juan County Growth Management Plan are in place to manage future urban development activity in San Juan County. Strategies include concentrating urban growth in existing urban areas and coordinating with public land management agencies, such as the BLM, to ensure consistency in land use planning policies.[9] The Preferred Alternative would not affect urban areas. Additionally, the Preferred Alternative would parallel existing transmission infrastructure for much of the study area in New Mexico, minimizing effects to the rural character of the county.

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[8] BLM 2003a

[9] San Juan County 2007

### La Plata County Comprehensive Plan

The Preferred Alternative does not conflict with the La Plata County Comprehensive Plan goals and objectives which include concentrating new urban growth in the county's existing urban areas.[10] Additional electricity capacity that would be provided by the Preferred Alternative could support future urban growth in La Plata County.

### Town of Ignacio Three-Mile Plan

The Three-Mile Plan provides general development standards such as building density requirements for land use classifications within a 3-mile radius of the Town of Ignacio limits. It also sets general scenic resource protection standards. The Preferred Alternative, which would be 0.75 mile from the town limits and co-located with existing infrastructure for the existing Iron Horse transmission line and substation, would neither impede the town's urban growth potential nor conflict with the plan's scenic resource standards or any other element of the plan.[11]

### SUIT Land Use Objectives

Land use planning, including establishing right-of-way on SUIT land, is carried out on a case-by-case basis. Activities are consistent with SUIT land use objectives only if they are in the best interest of the Tribe. The Preferred Alternative is consistent with current land uses on SUIT land, which include electrical transmission lines.

## Land Use and Ownership

Elements of the Preferred Alternative that would result in permanent direct effects from disturbance to existing land within the study area fall within three general categories: (1) transmission line infrastructure; (2) substations; and (3) access roads. Exhibit 3-6, Summary of Land Required for Operation of the Preferred Alternative (Permanent Effects), summarizes proposed permanent disturbance areas by land ownership.

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[10] La Plata County 2001a

[11] Town of Ignacio 2004

**Exhibit 3-6**

## Summary of Land Required for Operation of the Preferred Alternative (Permanent Effects)[1]

| Description | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Lattice Tower Tangent | 2.306 | 0.422 | – | 0.956 | **3.684** |
| Lattice Tower Angle | 0.404 | 0.060 | – | 0.147 | **0.611** |
| Lattice Tower Deadend | 0.511 | – | – | 0.325 | **0.836** |
| Mono-Pole Tangent | 0.001 | – | – | – | **0.001** |
| Mono-Pole Deadend | 0.006 | – | – | – | **0.006** |
| 3-Pole Self-Supporting Deadend or Angle | 0.011 | – | 0.016 | 0.011 | **0.038** |
| Wood H-Frame Tangent | 0.014 | – | 0.044 | 0.014 | **0.072** |
| Wood 3-Pole Deadend or Angle | 0.013 | – | 0.023 | 0.007 | **0.043** |
| Three Rivers Substation | 20.000 | – | – | – | **20.000** |
| Kiffen Canyon Substation | 23.000 | – | – | – | **23.000** |
| Iron Horse Expansion | 0.000 | – | – | 3.500 | **3.500** |
| Access Roads | 54.749 | 16.577 | 28.018 | 31.086 | **130.429** |
| **Total** | **101.015** | **17.059** | **28.101** | **36.045** | **182.220** |

[1] *The purpose of this table is to provide an estimate of the area that would be permanently affected by the SJBEC Project. These areas may change as final design progresses. Areas were determined using assumptions from Exhibit 2-14, Typical Design Characteristics – 230 kV Transmission Line.*

The transmission line support structures, substations, and access roads would add infrastructure to the area. In addition, easements on private land and authorizations on public land would encumber the easement areas with specific land use limitations. No permanent indirect effects to land uses in the study area from the transmission line, substations, or access roads are anticipated.

### Adjacent Residential Land Uses

The nearest urbanized areas are Farmington, New Mexico, and Ignacio, Colorado. Ignacio town limits are approximately 0.75 mile from the study area, and Farmington city limits are approximately 2 miles from the study area. Land uses adjacent to the proposed transmission line are primarily dedicated to existing transmission infrastructure and oil and gas development. As shown in Exhibit 3-125, Location of Sensitive Receptors, there are four known residences in the study area with the potential to be affected by noise and electric and magnetic fields from the operation of the proposed transmission line. Potential effects for these receptors are discussed in Section 3.19, Noise and Vibration, and Section 3.20, Electric and Magnetic Fields. In general, effects to adjacent residential land uses are not expected in most areas since the proposed transmission line would be adjacent to existing transmission line and roadway infrastructure, and effects from the Preferred Alternative would be similar to existing conditions.

#### Right-of-Way Requirements

For the Preferred Alternative, a 150-foot-wide right-of-way would be necessary to accommodate the proposed line and its support structures. The minimum right-of-way width for access roads would be 30 feet, and the maximum would be 50 feet depending on the level of improvement required. Right-of-way would also be necessary for each of the proposed substations. For public lands, right-of-way authorizations would be obtained from the applicable permitting agency based on land ownership. For BLM-managed land, a right-of-way to occupy the land would be negotiated with and obtained directly from the FFO. The BLM has authority under the Federal Land Policy and Management Act to authorize right-of-way grants for transmission lines. A similar negotiation process would be necessary with the New Mexico State Land Office (NMSLO) and SUIT for the portions of the study area on state and tribal land, respectively.

On private land, where new easements are required, Tri-State would compensate individual property owners with a one-time payment for an easement on their land. The Preferred Alternative could result in minimal changes to the assessed value of private lands affected by the project, which could be considered an indirect effect of the Preferred Alternative. Commensurate with the easements, Tri-State would be responsible for paying property taxes to San Juan County for the portion of the line in New Mexico and to La Plata County for the portion in Colorado. In Segment 8, the Preferred Alternative would use the existing poles that carry the Iron Horse 115 kV line and the existing right-of-way; therefore, no new easements would be required (segments are shown in Exhibit 3-3).

### 3.3.4.2 Temporary Effects

There would be no temporary indirect effects to land use. Temporary direct effects to existing land uses would include noise and dust. Temporary air quality and noise effects are discussed in

Section 3.18, Air Quality, Climate Change, and Greenhouse Gases, and Section 3.19, Noise and Vibration. Temporary effects would primarily include disturbance related to equipment staging areas, a helicopter fly yard and helicopter staging areas, and structure laydown sites. Tri-State would be responsible for obtaining temporary use permits for any temporary work areas located outside the permitted right-of-way. Exhibit 3-7, Summary of Land Required for Construction of the Preferred Alternative (Temporary Effects), summarizes temporary disturbance areas by land ownership and type of disturbance.

**Exhibit 3-7**

**Summary of Land Required for Construction of the Preferred Alternative (Temporary Effects)[1]**

| Description | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Structure Work Area | 103.600 | 11.900 | 70.700 | 70.000 | **256.200** |
| Wire-Pulling for Conductor and Shield Wire | 25.389 | 4.557 | 15.624 | 19.530 | **65.100** |
| Wire Pulling for Optical Ground Wire | 16.380 | 2.940 | 10.080 | 12.600 | **42.000** |
| Construction Staging Areas | – | – | – | 100.000 | **100.000** |
| Helicopter Fly Yard | 20.000 | – | – | – | **20.000** |
| Helicopter Staging Areas | 13.000 | 2.000 | – | 10.000 | **25.000** |
| Guard Structures | 0.312 | 0.056 | 0.192 | 0.240 | **0.800** |
| Three Rivers Substation | 20.000 | – | – | – | **20.000** |
| Kiffen Canyon Substation | 23.000 | – | – | – | **23.000** |
| Iron Horse Expansion | – | – | – | 3.500 | **3.500** |
| Access Roads, 30-Foot Right-of-Way | 54.329 | 19.596 | 17.755 | 30.873 | **122.553** |
| Access Roads, 50-Foot Right-of Way | 46.323 | 8.782 | 40.453 | 26.261 | **121.819** |
| **Total** | **322.333** | **49.831** | **154.804** | **273.004** | **799.972** |

1 *This exhibit provides an estimate of the area that would be temporarily affected by construction activities for the SJBEC Project. These areas may change as final design progresses. Areas were determined using assumptions from Exhibit 2-14. The area for substations is included both as a permanent and temporary effect, since areas where substations are proposed would be affected by constructing the substations.*

### 3.3.4.3 Mitigation

No mitigation measures are proposed.

## 3.3.5 Proposed Action

### 3.3.5.1 Permanent Effects

#### Consistency with Existing Land Use Plans and Guidelines

The Proposed Action is consistent with land use plans and guidelines for the study area. As discussed above for the Preferred Alternative, the Proposed Action would be consistent with the BLM FFO RMP, San Juan County Growth Management Plan, La Plata County Comprehensive Plan, Town of Ignacio Three-Mile Plan, and SUIT land use objectives.

#### Land Use and Ownership

Exhibit 3-8, Summary of Land Required for Operation of the Proposed Action (Permanent Effects), summarizes proposed permanent disturbance areas by land ownership. Permanent effects for the Proposed Action would be similar to those discussed above for the Preferred Alternative; 183 acres of land would be permanently affected (instead of 182 acres for the Preferred Alternative). In addition, the distribution of land ownership for affected lands would be slightly different due to differences in the location of the transmission line and access roads. Specifically, compared with the Preferred Alternative, the Proposed Action would affect:

- About 1 additional acre of BLM lands
- About 2 fewer acres of lands managed by the NMSLO
- About 0.5 acre less of SUIT lands
- About 2 additional acres of private lands

**Exhibit 3-8**
**Summary of Land Required for Operation of the Proposed Action (Permanent Effects)[1]**

| Description | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Lattice Tower Tangent | 1.90 | 0.50 | – | 1.0 | **3.400** |
| Lattice Tower Angle | 0.24 | – | – | 0.09 | **0.330** |
| Lattice Tower Deadend | 0.72 | 0.04 | – | 0.12 | **0.880** |
| Mono-Pole Tangent | 0.002 | – | – | – | **0.002** |
| Mono-Pole Deadend | 0.009 | – | – | – | **0.009** |
| 3-Pole Self-Supporting Deadend or Angle | 0.01 | – | 0.01 | – | **0.020** |

**Exhibit 3-8**

**Summary of Land Required for Operation of the Proposed Action (Permanent Effects)[1]**

| Description | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Wood H-Frame Tangent | 0.02 | – | 0.05 | 0.01 | **0.080** |
| Wood 3-Pole Deadend or Angle | 0.02 | – | 0.02 | 0.01 | **0.050** |
| Three Rivers Substation | 20.00 | – | – | – | **20.000** |
| Kiffen Canyon Substation | 23.00 | – | – | – | **23.000** |
| Iron Horse Expansion | 0.00 | – | – | 3.5 | **3.500** |
| Access Roads | 56.60 | 14.8 | 27.40 | 33.1 | **132.000** |
| **Total** | **102.50** | **15.3** | **27.50** | **37.9** | **183.2** |

1 *The purpose of this table is to provide an estimate of the area that would be permanently affected by the SJBEC Project. These areas may change as final design progresses. Areas were determined using assumptions from Exhibit 2-14, Typical Design Characteristics – 230 kV Transmission Line.*

### Adjacent Residential Land Uses

Effects to adjacent residential land uses for the Proposed Action would be similar to those discussed above for the Preferred Alternative. The only difference is that the Proposed Action has the potential to affect six known residences in the study area by noise and electric and magnetic fields from the operation of the proposed transmission line (as compared with four for the Preferred Alternative). Potential effects for these receptors are discussed in Section 3.19, Noise and Vibration, and Section 3.20, Electric and Magnetic Fields. In general, effects to adjacent residential land uses are not expected in most areas since the proposed transmission line would be adjacent to existing transmission line and roadway infrastructure, and effects from the Proposed Action would be similar to existing conditions.

### Right-of-Way Requirements

Right-of-way requirements for the Proposed Action are the same as those discussed above for the Preferred Alternative.

### 3.3.5.2 Temporary Effects

Temporary effects from the Proposed Action to land uses would be similar to those discussed above for the Preferred Alternative. The only difference is that the Proposed Action would require 827 acres for construction; the Preferred Alternative would require 800 acres. Exhibit 3-9, Summary of Land Required for Construction of the

Proposed Action (Temporary Effects), shows the area of land needed for construction.

**Exhibit 3-9**
**Summary of Land Required for Construction of the Proposed Action (Temporary Effects)[1]**

| Description | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Structure Work Area | 119.7 | 19.6 | 70.7 | 77.7 | **287.70** |
| Wire-Pulling for Conductor and Shield Wire | 25.4 | 4.6 | 15.6 | 19.5 | **65.10** |
| Wire Pulling for Optical Ground Wire | 16.4 | 2.9 | 10.1 | 12.6 | **42.00** |
| Construction Staging Areas | – | – | – | 100.0 | **100.00** |
| Helicopter Fly Yard | 20.0 | – | – | – | **20.00** |
| Helicopter Staging Areas | 13.0 | 2 | – | 10.0 | **25.00** |
| Guard Structures | 0.2 | 0.04 | 0.1 | 0.2 | **0.06** |
| Three Rivers Substation | 20.0 | – | – | – | **20.00** |
| Kiffen Canyon Substation | 23.0 | – | – | – | **23.00** |
| Iron Horse Expansion | – | – | – | 3.5 | **3.50** |
| Access Roads, 30-Foot Right-of-Way | 63.8 | 21.2 | 16.9 | 32.5 | **134.40** |
| Access Roads, 50-Foot Right-of Way | 35.2 | 1.6 | 40.5 | 28.7 | **106.00** |
| **Total** | **336.7** | **51.9** | **153.8** | **284.7** | **827.2** |

1 *This exhibit provides an estimate of the area that would be temporarily affected by construction activities for the SJBEC Project. These areas may change as final design progresses. Areas were determined using assumptions from Exhibit 2-14. The area for substations is included both as a permanent and temporary effect, since areas where substations are proposed would be affected by constructing the substations.*

#### 3.3.5.3 Mitigation

No mitigation measures are proposed.

## 3.4 Special Designation Lands

### 3.4.1 Methods

The following methods and indicators were used to determine effects to lands with special designations – specifically areas of critical environmental concern (ACECs).

- ACECs in the study area were identified.
- Effects to special designation lands were indicated by determining if the alternatives would directly affect resources for which the ACEC was designated to protect.

**There are two Special Designation Lands in the Study Area**

- Hogback ACEC
- Cedar Hill ACEC

- Indirect effects to resources were identified and described in their specific resource sections, specifically vegetation and cultural resources.

### 3.4.2 Affected Environment

There are no wilderness areas, wilderness study areas, or national or state parks in the study area. Specially designated recreation areas are discussed in Section 3.5, Recreation, and fossil areas are discussed in Section 3.10, Paleontology. There are two specially designated areas located in the project study area: the Hogback ACEC and the Cedar Hill ACEC. These ACEC are shown in Exhibit 3-10, Special Designated Lands.

**Special Designation Lands Study Area**

The study area for special designation lands is the same as the general study area described in Section 3.2, Study Area.

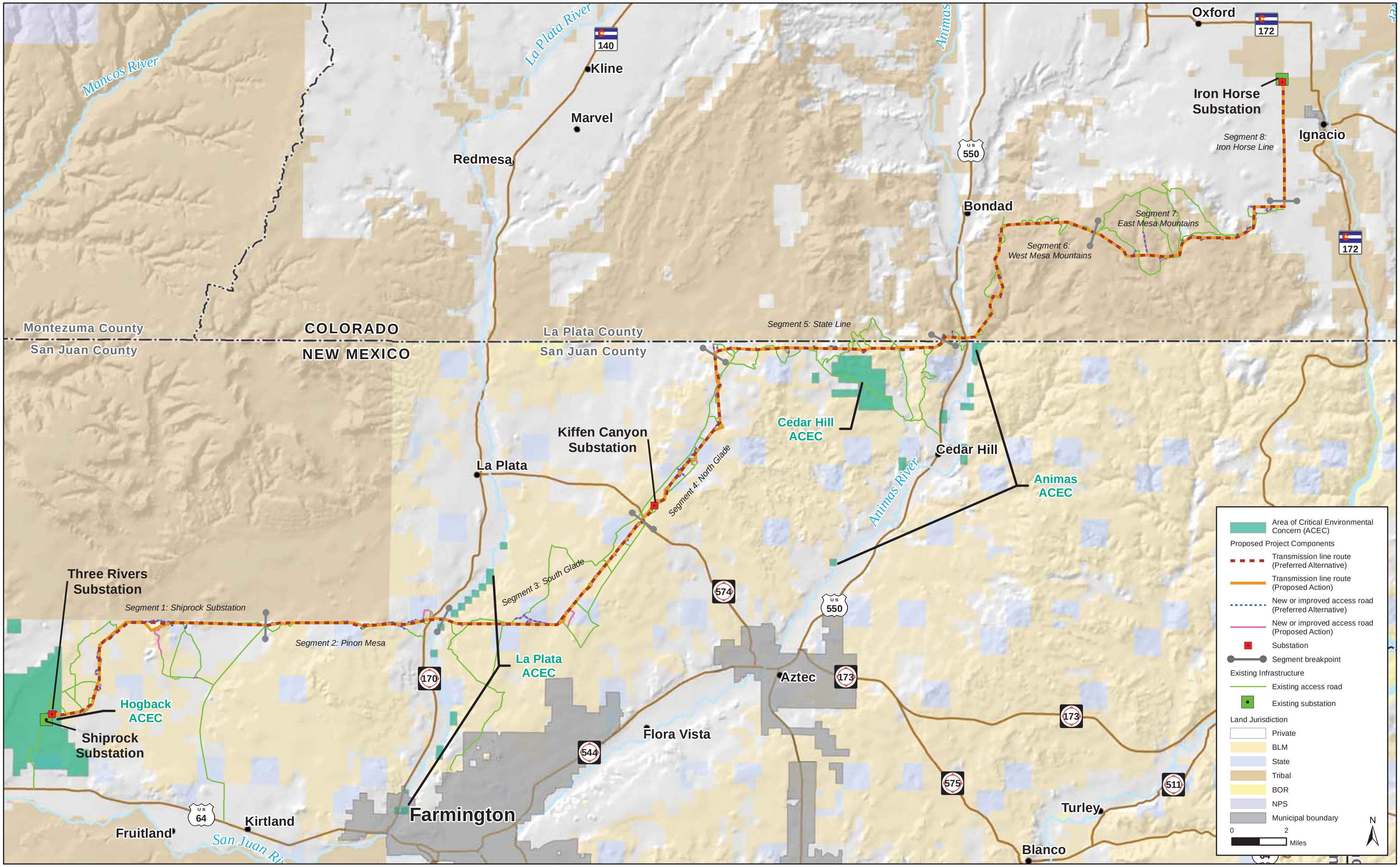
Other specially designated areas are located in proximity to, but do not coincide with, the study area. Two ACECs associated with the La Plata and Animas Rivers are within close proximity to the study area. In particular, the La Plata River ACEC Tracts #2, #3, #4, #5, and #6 are within 1 mile of the study area where it crosses the La Plata River. The La Plata River ACEC Tract #5 is less than 1,000 feet from the study area. All La Plata River ACEC tracts are in place to protect sensitive riparian environments and species habitats along the La Plata River.

**What is an ACEC?**

ACECs are the principal BLM designation for public lands where special management is required to protect important natural, cultural, and scenic resources, or to identify natural hazards.

Along the Animas River, there are eight Animas River ACEC tracts. The ACEC is designated for the protection of sensitive riparian environments and bald eagle habitat. All Animas River ACEC tracts are within 6 miles of the study area. Animas River ACEC Tract #1 is less than 0.25 mile from the proposed transmission line route and is designated for riparian resource protection and bald eagle habitat management.

Other special designation areas are slightly farther away. For example, the Aztec Ruins National Monument, located near Aztec, New Mexico, is over 6 miles to the east of the study area.




Source: GIS BLM 2012, GIS BLM 2012b, GIS Tri-State 2013

Exhibit 3-10 Special Designated Lands

### 3.4.2.1 Hogback ACEC

The Hogback ACEC consists of 9,407 acres. The Hogback ACEC is an area of regional and national significance for the conservation and study of rare plants. Management prescriptions for the Hogback ACEC are tailored to protect existing populations of Mesa Verde cactus (*Sclerocactus mesae-verdae*) and Mancos milkvetch (*Astragalus humillimus*). Both species are unique to the four corners region, and all known populations within the BLM FFO are found within the Hogback ACEC. [12] There are 32 known instances of Mesa Verde cactus in the ACEC. The number of Mancos milkvetch instances is unknown.

The Hogback ACEC is also important for the study of transition zones between different plant communities for several rare or endemic plant species. In particular, small-leaf mahogany (*Cercocarpus intricatus*) and singleleaf ash (*Fraxinus anomala*) are found within the Hogback ACEC but do not extend any farther south.

In order to protect the habitats of rare plant species, BLM management prescriptions in the Hogback ACEC include limiting off-highway vehicle use to existing roads, permitting right-of-way on a case-by-case basis, and using stipulations for existing oil and gas leases.

The Hogback ACEC contains existing electrical transmission infrastructure, including transmission lines, access roads, and the Shiprock Substation.

### 3.4.2.2 Cedar Hill ACEC

Cedar Hill is the remains of an archaeological community that contains numerous pueblo structures, kivas, middens, and pithouses. Evidence suggests the Anasazi occupied the pueblo for several hundred years. Management objectives for this ACEC are intended to protect and preserve the area’s unique cultural and natural resources.

The northern boundary of the 1,886-acre Cedar Hill ACEC is approximately 0.1 mile south of the study area. An existing access

[12] BLM 2003a

road traverses the Cedar Hill ACEC in a northwest-southeast direction for approximately 3 miles.

### 3.4.3 No Action Alternative

With the No Action Alternative, the proposed SJBEC Project would not be developed; therefore, no effects to specially designated lands would occur with this alternative.

### 3.4.4 Preferred Alternative

#### 3.4.4.1 Permanent Effects

The Preferred Alternative intersects the Hogback and Cedar Hill ACECs. Only the Hogback ACEC would be traversed by the proposed transmission line, while the Cedar Hill ACEC overlaps with portions of existing access roads. There are no other specially designated lands within the study area.

#### Hogback ACEC

BLM Management prescriptions for the Hogback ACEC are provided to protect existing populations of special status and rare plant species, specifically the Mesa Verde cactus (*Sclerocactus mesae-verdae*) and Mancos milkvetch (*Astragalus humillimus*). See Section 3.15, Vegetation, for analysis related to these vegetation communities.

As part of the Preferred Alternative, direct permanent effects to the Hogback ACEC and the plant species it was established to protect would be confined to the areas of disturbance listed in Exhibit 3-11, ACEC Disturbance Areas for the Preferred Alternative. These areas include lands required for construction of the Three Rivers Substation, new transmission line support structures, and new or improved access roads.

Exhibit 3-11
**ACEC Disturbance Areas for the Preferred Alternative**

| ACEC | Transmission Line Structures (acres) | 20-Foot-Wide Access Roads (acres) | Substations (acres) | Total (acres) |
|---|---|---|---|---|
| Hogback | 0.1 | 1.2 | 20.0 | **21.3** |
| Cedar Hill | 0.0 | 0.0 | 0.0 | **0.0** |
| **Total** | **0.1** | **1.2** | **20.0** | **21.3** |

According to field surveys conducted in 2009,[13] 2010,[14] 2012,[15] and 2013,[16] there are no Mesa Verde cacti individuals in the area of proposed new disturbance. Therefore, permanent effects to Mesa Verde cactus are not expected. Approximately 21.3 acres of the Hogback ACEC would be used to build the Three Rivers Substation, new transmission line support structures, and new or improved access roads. This new infrastructure would be similar to existing transmission line infrastructure in the area including the Shiprock Substation, an existing 345 kV transmission line, and associated access roads. Constructing transmission line infrastructure in this area would not affect the relevant and important values for which the ACEC was designated.

Habitat suitable for the Mancos milkvetch does not occur in the area, given the absence of the Mesaverde Group within the study area, and no Mancos milkvetch plants were observed as part of a 2012 survey.[17] Therefore, the Preferred Alternative is unlikely to affect the Mancos milkvetch.

No permanent indirect effects to the Hogback ACEC, or the resources the ACEC is in place to protect, are anticipated from the Preferred Alternative.

### Cedar Hill ACEC

Management objectives for the Cedar Hill ACEC are intended to protect and preserve cultural and natural resources associated with the Anasazi culture. See Section 3.17, Cultural Resources, for analysis related to cultural resource effects.

No new surface disturbance would occur in the Cedar Hill ACEC as indicated in Exhibit 3-11. As shown in Exhibit 3-10, there is an existing access road that would be used to access the transmission line; however, this road would not require improvements. Therefore, no permanent or indirect effects are anticipated.

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[13] Ecosphere 2009

[14] Ecosphere 2010

[15] Parametrix 2012

[16] Loebig and Paulek 2013

[17] Loebig and Paulek 2013

#### 3.4.4.2 Temporary Effects

Temporary direct effects to the Cedar Hill ACEC are not expected. Temporary direct effects from the Preferred Alternative to the Hogback ACEC would include surface disturbance from the construction of the proposed Three Rivers Substation, placement of new transmission line support structures, and grading of 1.8 acres of access roads in the Hogback ACEC.

Temporary effects from the placement of structures include surface disturbance from structure work areas that would cover an area of approximately 150 by 200 feet at each proposed structure location. Wire pulling, tensioning, and splicing sites would cover an area of approximately 150 feet by 600 feet during construction.

Construction would temporarily increase traffic on Road 6893, which crosses the Hogback ACEC in a north-south orientation. Road 6893 currently provides access to the Shiprock Substation and would be the primary access road to the proposed Three Rivers Substation. Dust from an increase in construction traffic could temporarily affect the ACEC, though effects would be minimized through the implementation of the fugitive dust control plan discussed in EPM 64 listed in Exhibit 2-23.

No temporary indirect effects to the Hogback or Cedar Hill ACECs or the resources they are in place to protect are anticipated from the Preferred Alternative.

#### 3.4.4.3 Mitigation

No mitigation measures are proposed.

### 3.4.5 Proposed Action

#### 3.4.5.1 Permanent Effects

Permanent effects from the Proposed Action would be similar to those discussed above for the Preferred Alternative. The only difference is that the Proposed Action would affect a slightly larger area of the Hogback ACEC (21.6 acres) than the Preferred Alternative (21.3 acres) as shown in Exhibit 3-12, ACEC Disturbance Areas for the Proposed Action.

**Exhibit 3-12**
**ACEC Disturbance Areas for the Proposed Action**

| ACEC | Transmission Line Structures (acres) | 20-Foot-Wide Access Roads (acres) | Substations (acres) | Total (acres) |
|---|---|---|---|---|
| Hogback | 0.1 | 1.5 | 20.0 | **21.6** |
| Cedar Hill | 0.0 | 0.0 | 0.0 | **0.0** |
| **Total** | **0.1** | **1.5** | **20.0** | **21.6** |

### 3.4.5.2 Temporary Effects

Temporary effects for the Proposed Action would be similar to those discussed above for the Preferred Alternative. The only difference is that the Preferred Alternative would disturb a slightly larger area in the Hogback ACEC during construction. Disturbance areas in the Hogback ACEC would include surface disturbance from the construction of the proposed Three Rivers Substation, placement of new transmission line support structures, and grading of 2.2 acres of access roads in the Hogback ACEC (as compared to 1.8 acres for the Preferred Alternative).

### 3.4.5.3 Mitigation

No mitigation measures are proposed.

# 3.5 Recreation

## 3.5.1 Methods

The methods listed below were used to determine possible permanent and temporary effects to recreational resources:

- Existing recreation resources were cataloged and described based on information provided by the agencies managing each recreation resource. These agencies include the BLM, SUIT, and the NMSLO.
- BLM's RMP was reviewed to assess compatibility with recreational goals and objectives.

- An interview was conducted with BLM staff to determine the existing level of recreational activity in BLM's identified recreation areas.
- The project description and GIS data showing the preliminary design for the alternatives were reviewed to determine effects to recreational resources.

The following indicators were used to evaluate potential effects to recreational resources:

- Changes in access to, or visitor satisfaction with, existing recreation areas or sites, or
- Modifications to existing routes of travel or courses for motorized recreational users.

### 3.5.2 Affected Environment

Exhibit 3-13, Recreation Areas, shows the two designated recreation areas in the study area: the Pi**n**on Mesa Recreation Area and Glade Run Recreation Area. Both of these areas are located on BLM-managed lands. Outside of designated recreation areas, the most popular recreational activity is likely hunting. Lower elevation areas, especially near Farmington, are used year-round, but most recreation occurs in the summer and fall.

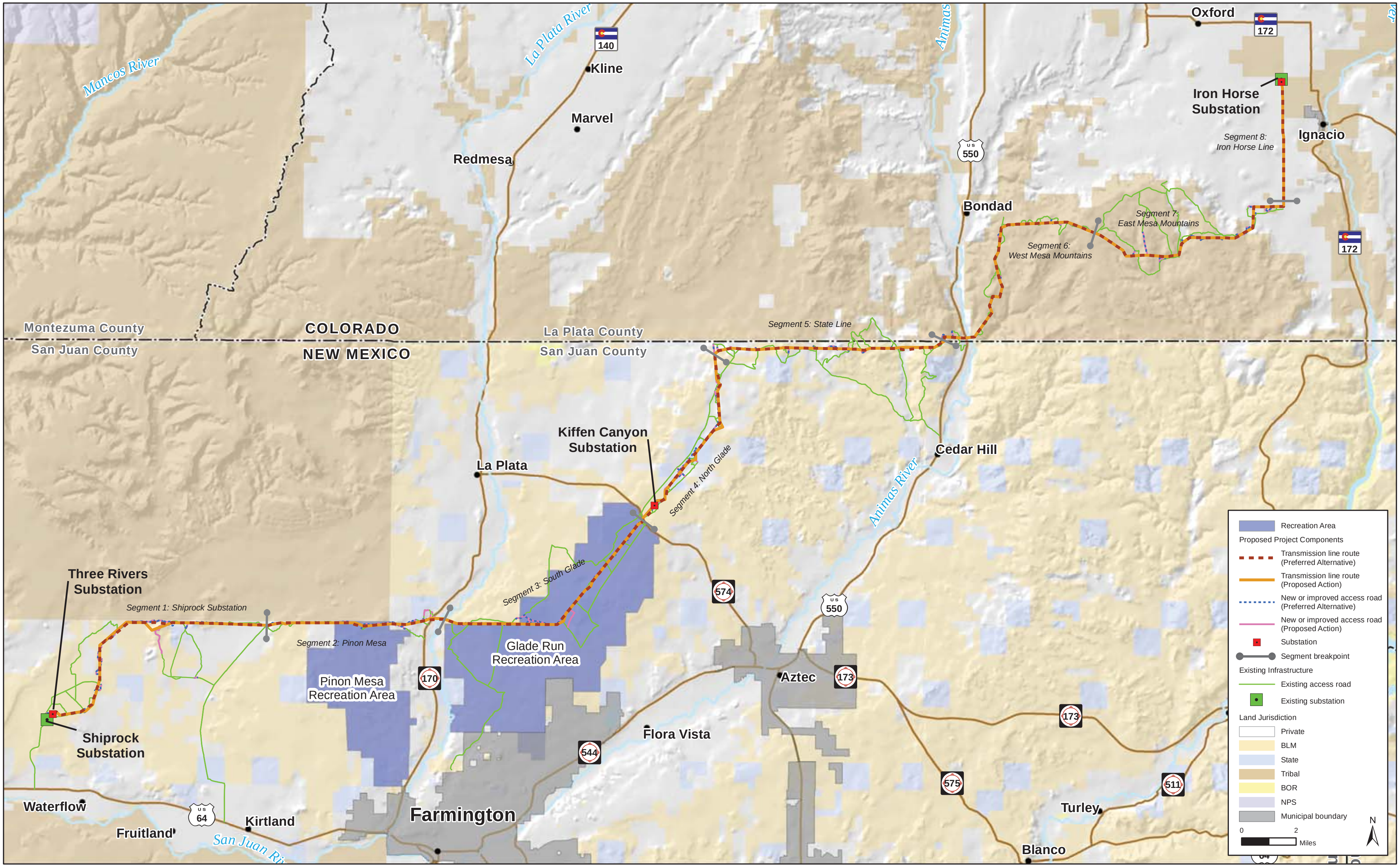
**Recreation Study Area**

The study area for recreation is the same as the general study area described in Section 3.2, Study Area.

Approximately 30 percent of the study area is comprised of private land where public recreational access is usually prohibited. A further 19 percent is on SUIT lands, where non-tribal public access is often restricted, as described below. As a result, public recreation primarily occurs on the 52 percent of the study area that overlies BLM-managed lands and state trust lands.

#### 3.5.2.1 BLM Recreation Lands

On BLM lands, concentrated recreational use occurs in two areas: the Pinon Mesa Recreation Area and the Glade Run Recreation Area. Common recreational activities in the study area include hunting, mountain biking, off-highway vehicle driving, hiking, and horseback riding.




Source: GIS BLM 2012, GIS BLM 2012b, GIS Tri-State 2013

**Exhibit 3-13 Recreation Areas**

Exhibit 3-13 shows the study area in relation to the Pinon Mesa and Glade Run Recreation Areas. Outside of the Pinon Mesa and Glade Run areas, recreational use on BLM-managed lands is minimal and mainly consists of hunting. New Mexico Game and Fish administers permits and licenses through a draw for all hunting in New Mexico.[18]

### Pinon Mesa Recreation Area

The Pinon Mesa Recreation Area is located approximately 2 miles north of Farmington and provides a variety of recreational opportunities. The BLM's management focus is on equestrian use, followed by mountain biking, and finally opportunities for off-highway vehicles. Most visitors come from the surrounding area, but mild winter conditions draw visitors from around the region in cooler months. The area is home to the Pinon Mesa Competitive Trail Ride, a 2-day sanctioned endurance equestrian event held each spring.

Although equestrian and mountain biking use are the primary and secondary management focuses, respectively, Pinon Mesa is becoming increasingly popular for rock crawling, motorcycle, and all-terrain vehicle use. Rock hounding, and petrified wood collection in particular, has also grown in popularity. In areas near the urban interface, day hiking and dog walking are common activities.

The Pinon Mesa Recreation area has an existing network of roads that provide access to an existing 345 kV transmission line and oil and gas infrastructure that is located throughout the area. The study area overlaps 60 acres of the northern portion of the Pinon Mesa Recreation Area and includes 1.8 miles of existing roads used primarily for access to well pads.

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[18] New Mexico Department of Game and Fish 2012

### Glade Run Recreation Area

The Glade Run Recreation Area receives the most recreational use in the study area. Located approximately 3 miles northeast of Farmington, this 19,000-acre BLM-managed recreation area is managed to accommodate a large variety of recreational uses and outdoor recreational experiences. The recreation area is split into two off-highway vehicle use zones that provide opportunities for distinct recreational activities. There are approximately 42 miles of marked trails for motorized trail bike and mountain bike riders in the northern 15,200 acres. The Road Apple Rally, which is the oldest annual mountain bike race in the US, utilizes all 42 miles of these trails. In addition, a dense network of roads serving gas well pads and existing 345 kV and 115 kV transmission lines provides excellent access for off-highway recreation. The southern 3,800 acres are managed as an open off-highway vehicle area and provide slick rock and wide sandy washes for off-highway vehicle enthusiasts.

The study area overlaps 270 acres of the Glade Run Recreation Area, including 3.7 miles of trails and roads used for energy infrastructure access and recreation.

## 3.5.2.2 Other Lands

### State Trust Lands

The study area encompasses several one-square-mile parcels of New Mexico state trust land. These lands, managed by the state under a fiduciary responsibility to generate funds for public schools and other institutions, typically provide limited recreation opportunities. The State Game Commission has purchased an easement on state trust land, however, for fishermen, hunters, and trappers to use. Under this easement, the New Mexico State Land Office (NMSLO), in cooperation with the New Mexico Department of Game and Fish, authorizes licensed hunters, anglers, and trappers to access certain state trust lands. This authorization extends to all state trust lands in the study area.[19]

[19] New Mexico State Land Office 2012

### SUIT Reservation

Recreation on SUIT lands is generally limited to tribal members, their families, and their guests.[20] An annual non-member elk hunt is conducted for two weeks in January, and participation is limited to Native American hunters. The number of permits varies from 100 to 150 each year. Tribal members may participate in a variety of hunting seasons on SUIT lands, ranging from small game and waterfowl to mountain lion, deer, and elk.

Tribal fishing permits are available to members and non-members alike and can be obtained at six vendors, including vendors in Ignacio and Farmington. Tribal members may fish along all tribal trust lands in the reservation. Non-members may fish along the Animas, Los Pinos, Piedra, and San Juan Rivers.

Boating is allowed on tribal portions of navigable rivers within the reservation, although take-out on tribal lands is not permitted (unless take-out is associated with use of a fishing permit).

### 3.5.2.3 Trails

There are approximately 30.8 miles of routes (roads and trails) within the study area on BLM-managed lands.[21] BLM GIS route data do not distinguish between trails and roads, but site visits and interpretation of satellite imagery suggest most routes within the study area are considered roads, meaning they are traversable by four-wheel-drive vehicles. A majority of these roads access gas well pads, gas pipelines, and other transmission lines. They are also used for motorized recreation, especially in the Glade Run Recreation Area.

In addition, the study area contains roads on private lands (13.1 miles), New Mexico state lands (4.3 miles), and tribal trust lands (6.7 miles).[22]

Based on archival research by the National Park Service (NPS) and other scholars, the Armijo Route of the Old Spanish National Historic Trail is thought to cross the study area in the Glade Run

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[20] SUIT 2012a

[21] GIS BLM 2012a

[22] GIS BLM 2012a

Recreation Area in Segment 3 (see Exhibit 3-3 for segment locations) about 1 mile south of New Mexico (NM) 574. Additional information about the Old Spanish Trail is provided in Section 3.17.4.2, The Historic Built Environment. Archaeologists have not found traces of the Old Spanish Trail within the study area.

#### 3.5.2.4 Scenic Byways

There are no BLM Back Country Byways, National Scenic Byways, or state scenic byways in the study area.

### 3.5.3 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects on recreation would occur with this alternative.

### 3.5.4 Preferred Alternative

#### 3.5.4.1 Permanent Effects

Operation and maintenance of the Preferred Alternative would not preclude the use of or access to any existing recreation areas or activities. Improvements to existing access roads and constructing new access roads would likely provide improved access to areas that were previously inaccessible. For example, the construction of approximately 28.6 miles of new roads would slightly increase recreational access on BLM (8.4 miles) and New Mexico state lands (1.7 miles). In the Pinon Mesa Recreation Area, the Preferred Alternative would add 0.5 mile of new access roads. In the Glade Run Recreation Area, the Preferred Alternative would add 1.8 miles of access roads. Existing and proposed roads represent approximately 2 percent of all roads in the Pinon Mesa Recreation Area and the Glade Run Recreation Area and would likely not result in a noticeable change in opportunities or experiences for the average recreational user.

Some roads created on BLM-managed lands may be gated to preclude unauthorized public access within the right-of-way. As stated in EPM 59, Tri-State will work with the BLM to establish appropriate closure devices (e.g., gates). Closures would not affect existing public access opportunities. Public use of the project's access roads would be determined on a case-by-case basis by the BLM. For roads where access to public lands could be obtained, no indirect effects to recreation resources would likely occur, because the principal recreation use of these lands is dispersed recreation.

Short-term direct effects to recreation could occur during maintenance activities and would involve noise and disruption of the recreation setting from the presence of workers, equipment, and materials. These effects to the recreational user, however, would be infrequent, short-term, and localized to the specific area of the maintenance activity. The effects are not expected to be noticeable to the average recreational user, because the existing recreation areas currently experience noise and disturbance from activities related to existing transmission lines and oil and gas development in the study area.

#### 3.5.4.2 Temporary Effects

The Preferred Alternative would result in the construction of an additional 0.5 mile of roads within the Pinon Mesa Recreation Area and 1.8 miles of roads in the Glade Run Recreation Area. Effects from road construction would be similar to those discussed above. Existing and proposed roads in the study area would represent approximately 2 percent of all roads in the Pinon Mesa and Glade Run Recreation Areas and would likely not result in a noticeable change in opportunities or experiences for the average recreational user.

Construction of the Preferred Alternative may require the temporary closure of access roads to protect public safety. Recreation areas that have limited access options may result in direct effects if these areas become inaccessible for short periods during construction. Some unauthorized off-highway vehicle use may occur during construction when workers are not on site (such as weekends or between the time that a section is completed but not activated). Road closures would be conducted in accordance with the Final Plan of Development (POD) and respective agency requirements.

Construction of the Preferred Alternative could directly affect dispersed recreational activities such as hiking, mountain biking, and horseback riding, due to the presence of workers, equipment, and materials. These effects to the recreational user, however, would be temporary, localized, and intermittent in nature. The presence of construction equipment and workers in the area is common throughout most of the study area from activities related to existing transmission lines, substations, and oil and gas development. Possible effects to recreational users would be minimized by installing warning signs if construction activities cross a recreation trail per EPM 11. In addition, as stated in EPM 16, any trails altered by construction activities would be rehabilitated.

Hunting opportunities could be indirectly affected by the Preferred Alternative if wildlife species choose to avoid the area near construction activities. Please see Section 3.16, Fish and Wildlife, for a discussion of effects to wildlife. These effects would be limited to the immediate area of construction activity and would be temporary. Temporary effects to specific recreation areas are discussed below.

Due to proposed mitigation measures listed in Section 3.5.4.3, Mitigation, construction activities are not expected to interfere with permitted recreational activities such as the Pinon Mesa Competitive Trail Ride and Road Apple Rally mountain bike race that takes place annually in the Glade Run Recreation Area.

#### Other Lands

Within the study area, there are no designated areas managed for recreational activities or experiences on New Mexico state trust lands or SUIT lands. The primary activity on these lands is hunting, and effects would be similar to those described above.

#### Historic Trails

No effects to the Old Spanish National Historic Trail are expected. Additional discussion is provided in Section 3.17, Cultural Resources.

### 3.5.4.3 Mitigation

Mitigation measures to reduce potential effects to recreation include:

- Avoiding possible effects during BLM authorized recreation events, by not allowing construction or routine maintenance activities during these events.

#### 3.5.4.4 Residual Effects

The mitigation measure identified above would reduce, but not completely eliminate, potential temporary construction or maintenance effects to recreational users. The mitigation measures identified above would eliminate the potential for conflicts with BLM-authorized recreational events.

**What are residual effects?**

Residual effects are the effects that remain after mitigation has been applied.

### 3.5.5 Proposed Action

#### 3.5.5.1 Permanent Effects

Permanent effects associated with the Proposed Action are similar to those discussed for the Preferred Alternative. The only difference is that the Proposed Action would construct fewer miles of new roads than the Preferred Alternative. The Proposed Action would construct approximately 28 miles of new roads in the study area (as compared to 28.6 miles for the Preferred Alternative), which would slightly increase recreational access on BLM (8.3 miles) and New Mexico state lands (1.2 miles). In comparison, the Preferred Alternative would increase recreational access on BLM lands by 8.4 miles and 1.7 miles on New Mexico state lands. In the Pinon Mesa Recreation Area, the Proposed Action would add 0.4 mile of new access roads, as compared to 0.5 mile for the Preferred Alternative. In the Glade Run Recreation Area, the Proposed Action would add 1.5 miles of access roads, as compared to 1.8 miles for the Preferred Alternative. Existing and proposed roads in the study area would represent approximately 2 percent of all roads in the Pinon Mesa Recreation Area and the Glade Run Recreation Area and would likely not result in a noticeable change in opportunities or experiences for the average recreational user.

#### 3.5.5.2 Temporary Effects

Temporary effects associated with the Proposed Action are similar to those discussed above for the Preferred Alternative. The Proposed Action would construct an additional 0.4 mile of road within the Pinon Mesa Recreation Area and 1.5 miles of road in the Glade Run Recreation Area. This is less than what is proposed for the Preferred Alternative, which would build 0.5 mile in the Pinon Mesa Recreation Area and 1.8 miles in the Glade Run Recreation Area. Existing and proposed roads in the study area would represent approximately 2 percent of all roads in the Pinon Mesa and Glade Run Recreation Areas and would likely not result in a noticeable change in opportunities or experiences for the average recreational user.

Due to proposed mitigation measures listed in Section 3.5.5.3, Mitigation, construction activities are not expected to interfere with permitted recreational activities such as the Pinon Mesa Competitive Trail Ride and Road Apple Rally mountain bike race that takes place annually in the Glade Run Recreation Area.

#### 3.5.5.3 Mitigation

Mitigation measures to reduce potential effects to recreation include:

- Avoiding possible effects during BLM authorized recreation events, by not allowing construction or routine maintenance activities during these events.

#### 3.5.5.4 Residual Effects

The mitigation measure identified above would reduce, but not completely eliminate, potential temporary construction or maintenance effects to recreational users. The mitigation measures identified above would eliminate the potential for conflicts with BLM-authorized recreational events.

## 3.6 Grazing and Livestock

### 3.6.1 Methods

The following steps were taken to analyze effects on livestock grazing:

- Using GIS, animal unit months (AUMs) and grazing areas were mapped in the study area. This information was used to determine the number of BLM, SUIT, and New Mexico state livestock grazing allotments, and private pastures that have one or more elements of the SJBEC Project within them.

- The BLM, SUIT, and NMSLO were contacted to determine the numbers of livestock currently using, or approved to use, allotments or grazing units.

- Using GIS, analysts determined the approximate total area of land that would be lost to forage production in allotments or

**Grazing and Livestock Study Area**

The study area for grazing and livestock is the same as the general study area described in Section 3.2, Study Area.

pastures due to construction or operation of the Preferred Alternative or the Proposed Action.

- On public or SUIT lands, analysts determined the number of AUMs lost in each affected allotment or pasture, based on a percentage of land lost to forage production.
- Analysts identified any springs, watering holes, or other range improvements that would be affected by the alternatives.

The following indicators were used to evaluate potential project effects to grazing and livestock:

- Number of livestock grazing allotments on BLM, New Mexico state lands, SUIT lands, or private pastures, that have one or more elements of the SJBEC Project within them.
- Changes to the number of livestock approved to use BLM, New Mexico state lands, and SUIT allotments.
- Locations of watering holes, springs, and other range improvements in relation to areas directly affected.

### 3.6.2 Affected Environment

BLM manages grazing under the authority of the Taylor Grazing Act of 1934, the Federal Land Policy and Management Act of 1976, and the Public Rangelands Improvement Act of 1978. Under this management, ranchers may obtain permits for an allotment of public land on which a specified number of livestock may graze. The number of permitted livestock on a particular allotment is determined by how many animal unit months (AUMs) that land will support.

**What is an animal unit month (AUM)?**

An AUM is defined as the amount of forage required to sustain one cow and one calf for one month.

BLM operates a program to stabilize or improve the ecological condition of the allotments in compliance with the New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management.[23] Standards are expressions of physical and biological condition or the degree of function required for healthy land, and they define minimum resource conditions that must be

[23] BLM 2001

achieved or maintained. The BLM adopted three standards for public land health:

1. Upland sites
2. Biotic communities (including native, threatened, endangered, and special status species)
3. Riparian sites

Guidelines were established to ensure that these standards could be met or that progress could be made toward meeting each standard. The standards and guidelines are implemented through terms and conditions of each grazing permit.

Rangeland managed by the BLM FFO is comprised primarily of five major vegetation types including grasslands, sagebrush-grasslands, pinon juniper, ponderosa pine-mixed shrubs, and small riparian areas.[24] Specific information on the rangeland vegetation is discussed in Section 3.15, Vegetation.

The study area also contains New Mexico state trust lands. These lands are held in trust for beneficiaries such as public schools and universities, and resources on these lands including surface use for agricultural purposes are managed by the New Mexico State Land Office. On state trust lands, livestock grazing is managed by agricultural leases, which are discussed below in Section 0.5, New Mexico State Lands Agricultural Leases.

The Range Division of the SUIT Department of Natural Resources manages the use and conservation of rangelands on the reservation. This includes issuing grazing permits for designated range units and short-term grazing leases on assignments and tribal land, treatments of tribal rangelands, and fence construction and maintenance.[25] Specific range units in the study area are discussed below.

In addition, the alternatives pass through approximately 1,060 acres of private land. A portion of the private land in the study area is zoned for agricultural use. Farms often include pastures that are

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[24] BLM 2003b

[25] SUIT 2012b

rotated for grazing livestock. Therefore it is assumed that the Preferred Alternative and the Proposed Action traverse through some private parcels that run grazing operations.

In total, the study area crosses portions of nine BLM grazing allotments, eight grazing areas managed by the NMSLO, and three SUIT range units as shown in Exhibit 3-15, Grazing Areas. Details for grazing within each area are included below. It should be noted that acres and AUMs represent the total for each grazing allotment, grazing unit or agricultural lease rather than the portion within the planning area.

#### 3.6.2.1 BLM Grazing Allotments

BLM allotments are identified in Exhibit 3-14, BLM Grazing Allotments, and are described in detail below.

Exhibit 3-14
**BLM Grazing Allotments**

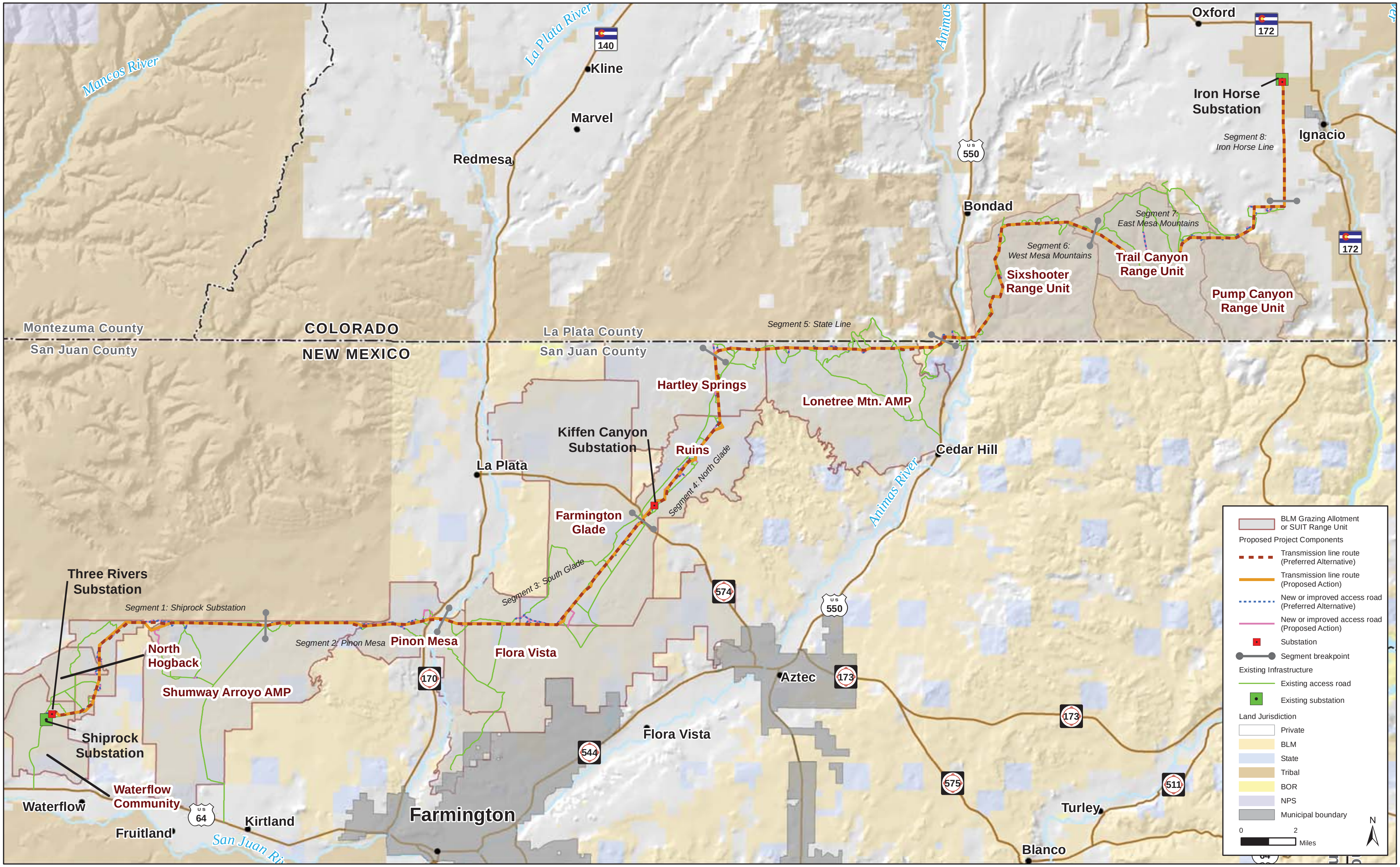
| Allotment Name | Total Acres | Livestock Type | Season of Use | Total AUMs |
|---|---|---|---|---|
| Farmington Glade | 23,670 | Cattle | Nov 1–May 31 | 194 |
| Flora Vista | 19,640 | Sheep | Nov 3–May 15 | 1,214 |
| Hartley Springs | 10,310 | Cattle | Dec 1–May 31 | 308 |
| Lonetree Mtn. AMP | 15,700 | Cattle | Dec 1–May 31 | 790 |
| North Hogback | 4,480 | Cattle | Nov 1–Jan 31 | 265 |
| Pinon Mesa | 8,530 | Cattle | Nov 1–May 31 | 106 |
| Ruins | 6,990 | Cattle | Dec 1–May 30 | 316 |
| Shumway Arroyo AMP | 22,300 | Cattle | Dec 1–May 20 | 1,003 |
| Waterflow Community | 5,020 | Cattle | Nov 1–March 31 | 292 |

#### Farmington Glade

The alternatives traverse the Farmington Glade grazing allotment which is permitted for 140 cattle beginning November 1 through May 31 annually at 97 percent federal range for a total of 194 federal AUMs.

#### Flora Vista

The alternatives traverse the Flora Vista Grazing Allotment which is permitted for 1,080 sheep beginning November 3 through May 15 annually at 89 percent federal range for 1,214 federal AUMs.




Source: GIS BLM 2012, GIS BLM 2012b, GIS Tri-State 2013, GIS SUIT 2012a

Exhibit 3-15 Grazing Areas

### Hartley Springs

The alternatives traverse the Hartley Springs Grazing Allotment which is permitted for 154 cattle beginning December 1 through May 31 annually at 50 percent federal range for 308 federal AUMs.

### Lonetree Mountain AMP

The alternatives traverse the Lonetree Mountain Grazing Allotment which is permitted for 220 cattle beginning December 1 through May 31 annually at 60 percent federal range for 790 federal AUMs.

### North Hogback

The alternatives traverse the North Hogback Grazing Allotment which is permitted for 85 cattle beginning November 1 through January 31 annually at 79 percent federal range for 265 federal AUMs.

### Pinon Mesa

The alternatives traverse the Pinon Mesa Grazing Allotment which is permitted for 68 cattle beginning November 1 through May 31 annually at 53 percent federal range for 106 federal AUMs.

### Ruins

The alternatives traverse the Ruins Grazing Allotment which is permitted for 100 cattle beginning December 1 through May 30 annually at 53 percent federal range for 316 federal AUMs.

### Shumway Arroyo AMP

The alternatives traverse the Shumway Arroyo AMP Grazing Allotment which is permitted for 283 cattle beginning December 1 through May 20 annually at 63 percent federal range for 1,003 federal AUMs.

### Waterflow Community

The alternatives traverse the Waterflow Community Grazing Allotment which is permitted for 60 cattle beginning November 1 through March 31 annually at 98 percent federal range for 292 federal AUMs.

### New Mexico State Land Agricultural Leases

The study area includes portions of eight agricultural leases on New Mexico state lands. Agricultural leases are identified in Exhibit 3-16, New Mexico State Land Agricultural Leases.

Exhibit 3-16
**New Mexico State Land Agricultural Leases**

| Agricultural Lease | Total Acres | Permitted Use | Total AUMs |
|---|---|---|---|
| G00128 | 1,640 | Cattle | 10 |
| G01963 | 1,280 | Cattle | 40 |
| G02195 | 1,798 | Cattle | 18 |
| GM0457 | 1,280 | Cattle | 18 |
| GM1400 | 240 | Cattle | 9 |
| GM1794 | 858 | Cattle | 40 |
| GT0716 | 480 | Cattle | 9 |
| GT2540 | 2,600 | Cattle | 18 |

*Source: New Mexico State Land Office 2012*

### 3.6.2.2 SUIT Range Units

The study area includes a portion of the Sixshooter, Trail Canyon, and Pump Canyon Range Units on SUIT lands. The Sixshooter Range Unit is designated for wildlife only and covers 13,091 acres. The Trail Canyon Range Unit (10,735 acres) is permitted for 456 AUMs and the Pump Canyon Range Unit (6,664 acres) is permitted for 184 AUMs. Grazing is permitted annually June 1 through September 30. Range Units are identified in Exhibit 3-17, SUIT Range Units.

Exhibit 3-17
**SUIT Range Units**

| Range Unit | Total Acres | Livestock Type | Season of Use | Total AUMs |
|---|---|---|---|---|
| Pump Canyon | 6,664 | Cattle/Wildlife | June 1–September 30 | 184 |
| Trail Canyon | 10,735 | Cattle/Wildlife | June 1–September 30 | 456 |
| Sixshooter | 13,091 | wildlife use only | June 1–September 30 | Wildlife use only |

## 3.6.3 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, livestock grazing would not be affected.

## 3.6.4 Preferred Alternative

### 3.6.4.1 Permanent Effects

#### BLM Lands

Exhibit 3-18, Permanent Disturbance of BLM Grazing Allotments for the Preferred Alternative – Proposed Structures and Substations, and Exhibit 3-19, Permanent Disturbance of BLM Grazing Allotments for the Preferred Alternative – Proposed Access Roads, show the acreages of forage areas and grazing allotments that would be permanently disturbed by the operation and maintenance of proposed transmission line structures, substations, and new access roads. With the Preferred Alternative, approximately 3.24 total acres would be disturbed from proposed structures and an additional 43 acres disturbed from proposed substations. Access roads would disturb an additional 51 acres located within grazing allotments.

**Exhibit 3-18**
**Permanent Disturbance of BLM Grazing Allotments for the Preferred Alternative – Proposed Structures and Substations**

| Allotment | Number of Proposed Structures | Acres of Disturbance from Proposed Structures[1] | Acres of Disturbance from Proposed Substations[1] | Percentage of Allotment Disturbed |
|---|---|---|---|---|
| Farmington Glade | 22 | 0.68 | 0 | 0.003% |
| Flora Vista | 16 | 0.50 | 0 | 0.002% |
| Hartley Springs | 8 | 0.11 | 0 | 0.001% |
| Lonetree Mountain AMP | 23 | 0.02 | 0 | Less than 0.001% |
| North Hogback | 2 | 0.06 | 0 | 0.001% |
| Pinon Mesa | 9 | 0.27 | 0 | 0.003% |
| Ruins | 8 | 0.31 | 23 (Kiffen Canyon substation) | 0.33% |
| Shumway Arroyo AMP | 34 | 1.08 | 0 | 0.005% |
| Waterflow Community | 15 | 0.21 | 20 (Three Rivers substation) | 0.40% |
| **Total** | **137** | **3.24** | 43 | |

*1 Acres of disturbance from proposed structures and from access roads may overlap.*

*AMP = Allotment Management Plan*

**Exhibit 3-19**

## Permanent Disturbance of BLM Grazing Allotments for the Preferred Alternative – Proposed Access Roads

| Allotment | Acres of Disturbance from Proposed Access Roads (20-foot-wide permanent road surface)[1] | Percentage of Allotment Disturbed |
|---|---|---|
| Farmington Glade | 11 | 0.05% |
| Flora Vista | 5 | 0.03% |
| Hartley Springs | 4 | 0.04% |
| Lonetree Mtn. AMP | 5 | 0.03% |
| North Hogback | 2 | 0.04% |
| Pinon Mesa | 5 | 0.06% |
| Ruins | 2 | 0.03% |
| Shumway Arroyo AMP | 15 | 0.07% |
| Waterflow Community | 2 | 0.04% |
| **Total** | **51** | |

*1 Rounded to nearest whole acre.Acres of disturbance from proposed structures and from access roads may overlap.*

*AMP = Allotment Management Plan*

The acreage that would be disturbed by the Preferred Alternative in each allotment would be less than 1 percent of its area. Therefore, there would be no measurable effects upon grazing capacity (AUMs) and no change in the authorized uses for the allotments.

Livestock could be disturbed by noise and the presence of vehicles and construction workers during maintenance activities; however, these effects would be infrequent and localized. As described previously, much of the area experiences this type of noise and activity from adjacent oil and gas development and frequent use of existing access roads. Livestock use patterns may change, and livestock may also permanently avoid small localized areas such as structure and substation sites as a result of implementing the Preferred Alternative. In addition, unwanted dispersal of livestock could occur if gates are left open or damaged during maintenance activities; however, implementation of EPMs 57 and 58 would reduce the likelihood of livestock dispersal.

If range improvements are permanently disturbed or removed, Tri-State would incur costs to replace these structures. EPMs 18, 55, 57, and 58, listed in Exhibit 2-23, would reduce potential effects to range improvements.

### New Mexico State Lands

The nature and type of permanent effects would be as described above for BLM lands. Direct effects would include a permanent loss of forage from the footprint of transmission line support structures and access roads. No substations would be constructed on New Mexico state lands. In total the Preferred Alternative would permanently disturb 0.51 acre of grazing leases by transmission line structures and 16.8 acres by proposed roads on New Mexico state lands. The amount of land that would be permanently disturbed by the Preferred Alternative within all agricultural leases would be less than 1 percent of their respective areas; therefore, there would be no measurable effects upon grazing capacity or a change in the authorized uses for these allotments. Acres affected on New Mexico state land agricultural leases are shown in Exhibit 3-20, Permanent Disturbance of New Mexico State Land Agricultural Leases for the Preferred Alternative – Proposed Structures, and Exhibit 3-21, Permanent Disturbance of New Mexico State Land Agricultural Leases for the Preferred Alternative – Proposed Access Roads.

**Exhibit 3-20**

**Permanent Disturbance of New Mexico State Land Agricultural Leases for the Preferred Alternative – Proposed Structures**

| Agricultural Lease | Number of Proposed Structures | Acres of Disturbance from Proposed Structures | Percentage of Lease Disturbed |
|---|---|---|---|
| G00128 | 0 | 0.00 | 0% |
| GO1963 | 7 | 0.21 | 0.016% |
| GO2195 | 0 | 0 | 0% |
| GM0457 | 5 | 0.15 | 0.012% |
| GM1400 | 1 | 0.03 | 0.012% |
| GM1794 | 0 | 0.00 | 0% |
| GT0716 | 2 | 0.06 | 0.012% |
| GT2540 | 2 | 0.06 | 0.002% |
| **Total** | **17** | **0.51** | |

*Acres of disturbance from proposed structures and from access roads may overlap.*

**Exhibit 3-21**

**Permanent Disturbance of New Mexico State Land Agricultural Leases for the Preferred Alternative – Proposed Access Roads**

| Agricultural Lease | Acres of Disturbance from Proposed Access Roads (20-foot-wide permanent road surface) | Percentage of Lease Disturbed |
|---|---|---|
| G00128 | 0.0 | 0.00% |
| GO1963 | 4 | 0.31% |
| GO2195 | 1 | 0.05% |
| GM0457 | 3 | 0.23% |
| GM1400 | 0.4 | 0.17% |
| GM1794 | 0.0 | 0.00% |
| GT0716 | 1.4 | 0.29% |
| GT2540 | 7 | 0.27% |
| **Total** | **16.8** | |

*Acres of disturbance from proposed structures and from access roads may overlap.*

### SUIT Lands

The nature and type of permanent effects would be the same as described previously for BLM lands. Direct effects would include a permanent loss of forage from the footprint of support structures and access roads in the study area. No substations would be constructed on SUIT lands. There may be direct effects to the Pump Canyon and Trail Canyon range units where a cumulative total of 0.076 acre would be disturbed by proposed structures and 24 acres by access roads. The acreage that would be disturbed by the Preferred Alternative in all allotments would be less than 1 percent of their respective areas; there would be no measurable effects upon grazing capacity and no change in the authorized uses for these allotments. Acres affected on SUIT grazing lands are shown in Exhibit 3-22, Permanent Disturbance of SUIT Range Units for the Preferred Alternative – Proposed Structures, and Exhibit 3-23, Permanent Disturbance of SUIT Range Units for the Preferred Alternative – Proposed Access Roads.

**Exhibit 3-22**
**Permanent Disturbance of SUIT Range Units for the Preferred Alternative – Proposed Structures**

| Range Unit | Number of Proposed Structures | Acres of Disturbance from Proposed Structures | Percentage of Range Unit Disturbed |
|---|---|---|---|
| Pump Canyon | 7 | 0.005 | Less than 0.001% |
| Sixshooter | 50 | 0.044 | Less than 0.001% |
| Trail Canyon | 37 | 0.027 | Less than 0.001% |
| **Total** | **94** | **0.076** | |

*Acres of disturbance from proposed structures and from access roads may overlap.*

**Exhibit 3-23**
**Permanent Disturbance of SUIT Range Units for the Preferred Alternative – Proposed Access Roads**

| Range Unit | Acres of Disturbance from Proposed Access Roads (20-foot-wide permanent road surface)[1] | Percentage of Range Unit Disturbed |
|---|---|---|
| Pump Canyon | 3 | 0.05% |
| Sixshooter | 10 | 0.08% |
| Trail Canyon | 11 | 0.10% |
| **Total** | **24** | |

[1] *Rounded to nearest whole acre. Acres of disturbance from proposed structures and from access roads may overlap.*

### Private Lands

The Preferred Alternative would pass through approximately 1,530 acres of private land. An undetermined portion of the private land is zoned for agricultural use and may include pastures that are rotated for grazing livestock. Effects to private grazing lands would be similar to those discussed previously for BLM lands.

## 3.6.4.2 Temporary Effects

### BLM Lands

As shown in Exhibit 3-24, BLM Grazing Allotments Temporarily Affected by Construction Disturbance for the Preferred Alternative, and Exhibit 3-25, Temporary Disturbance of BLM Grazing Allotments for the Preferred Alternative – Proposed Access Roads and Roads with Improvements, total temporary disturbance to grazing allotments would be 138.9 acres. Less than 1 percent of all allotments would be affected during construction at any given site, and the total duration of construction would generally be limited to only a portion of the 18- to 24-month construction period.

Temporary construction effects to livestock grazing would include the temporary direct loss of forage and temporary ground disturbance during construction. This area includes structure work areas, substation construction sites, and access roads and their associated right-of-way. To the extent practicable and feasible, activities would be located within the right-of-way.

**Exhibit 3-24**

## BLM Grazing Allotments Temporarily Affected by Construction Disturbance for the Preferred Alternative

| Allotment | Acres of Disturbance from Structure Work Areas | Acres of Disturbance from Substation Construction | Total Acres of Disturbance from Construction | Percentage of Allotment Disturbed |
|---|---|---|---|---|
| Farmington Glade | 15.4 | 0 | 15.4 | 0.07% |
| Flora Vista | 11.2 | 0 | 11.2 | 0.06% |
| Hartley Springs | 5.6 | 0 | 5.6 | 0.05% |
| Lonetree Mountain AMP | 16.1 | 0 | 16.1 | 0.10% |
| North Hogback | 1.4 | 0 | 1.4 | 0.03% |
| Pinon Mesa | 6.3 | 0 | 6.3 | 0.07% |
| Ruins | 5.6 | 23 (Kiffen Canyon substation) | 28.6 | 0.41% |
| Shumway Arroyo AMP | 23.8 | 0 | 23.8 | 0.11% |
| Waterflow Community | 10.5 | 20 (Three Rivers substation) | 30.5 | 0.61% |
| **Total** | **95.9** | **43** | **138.9** | |

*Acres of substation disturbance are the same for permanent and temporary disturbance.*

*AMP = Allotment Management Plan*

In addition to the disturbance listed above per allotment, the Preferred Alternative would affect 20 sites for wire pulling, tensioning, and splicing, with approximately 2.1 acres of disturbance per site. Negligible effects are anticipated to grazing livestock from these sites, because each site would be active for short periods of time throughout the 18- to 24-month construction period.

Guard structures represent an additional disturbance; approximately 31 sites are anticipated on BLM lands with a total disturbance of 0.31 acre for all 31sites. Grazing would be temporarily excluded from these areas; however, due to the small area of disturbance, no measurable effects on livestock grazing are anticipated.

Access rights-of-way for construction of access roads would result in additional disturbance. The permanent road surface would be approximately 20 feet wide. A minimum right of way for access roads is 30 feet and maximum is 50 feet depending on improvement level required. The additional area beyond the 20-foot road surface (10 to 30 feet) would be temporarily affected due to cut and fill and associated drainage features. After construction, temporarily disturbed areas will be reseeded and reclaimed. The range of disturbance from road construction and improvement activities within each allotment is shown Exhibit 3-25, Temporary Disturbance of BLM Grazing Allotments for the Preferred Alternative – Proposed Access Roads and Roads with Improvements. In total, an estimated 96 acres of disturbance would occur from the construction of access roads. It should be noted that acres of disturbance from new and improved roads may overlap construction disturbance discussed above.

**Exhibit 3-25**

**Temporary Disturbance of BLM Grazing Allotments for the Preferred Alternative – Proposed Access Roads and Roads with Improvements**

| Allotment | Acres of Disturbance from Access Roads (30- and 50-foot-wide right-of-way)[1] | Percentage of Allotment Disturbed |
|---|---|---|
| Farmington Glade | 19 | 0.08% |
| Flora Vista | 11 | 0.06% |
| Hartley Springs | 10 | 0.10% |
| Lonetree Mtn. AMP | 12 | 0.08% |
| North Hogback | 3 | 0.07% |
| Pinon Mesa | 11 | 0.13% |
| Ruins | 4 | 0.06% |
| Shumway Arroyo AMP | 23 | 0.10% |
| Waterflow Community | 3 | 0.06% |
| **Total** | **96** | |

*1 Rounded to nearest whole acre.Acres of disturbance from proposed structures and from access roads may overlap.*

*AMP Allotment Management Plan*

A variety of range improvements may also be found on land that the transmission line may follow. Range improvements include, but are not limited to, water sources, fences, and gates. In areas where the proposed transmission line and fences coincide, direct effects to fences would include removal or opening of sections to accommodate construction traffic. Permittees and lessees would be notified prior to opening or removal of fences, and fences and gates would be repaired or replaced to pre-disturbed condition as detailed in EPMs 18, 45, 57, and 58, listed in Exhibit 2-23. In addition, as specified in EPMs 4 and 55, contractors would receive training prior to construction and construction activities would be located to minimize disturbances to livestock, where practicable.

Temporary direct effects to grazing activities from construction would include noise and disruption from the presence of workers and construction equipment. Dust created from project construction could indirectly affect forage palatability by coating vegetation in the area adjacent to the Preferred Alternative. These effects would be localized and temporary. Possible effects related to dust would be minimized through the implementation of a fugitive dust plan discussed in EPM 64 and listed in Exhibit 2-23.

### New Mexico State Lands

Temporary effects from construction could occur, as discussed above for BLM lands. The transmission line for the Preferred Alternative would pass through approximately 4 miles of New Mexico state lands and portions of seven agricultural leases. An estimated total of 11.9 acres of temporary disturbance would occur; acres disturbed during the construction phase of the project on New Mexico state agricultural leases are shown below in Exhibit 3-26, New Mexico State Land Agricultural Leases Temporarily Affected by Construction Disturbance for the Preferred Alternative. Less than 1 percent of all allotments on New Mexico state lands would be affected during construction, and disturbance at any given site and the total duration of construction would generally be limited to only a portion of the 18- to 24-month construction period.

**Exhibit 3-26**

### New Mexico State Land Agricultural Leases Temporarily Affected by Construction Disturbance for the Preferred Alternative

| Agricultural Lease | Acres of Disturbance from Structure Work Areas | Percentage of Lease Temporarily Disturbed |
|---|---|---|
| G00128 | 0 | 0% |
| GO1963 | 4.9 | 0.38% |
| GO2195 | 0 | 0% |
| GM0457 | 3.5 | 0.27% |
| GM1400 | 0.7 | 0.29% |
| GM1794 | 0 | 0% |
| GT0716 | 1.4 | 0.29% |
| GT2540 | 1.4 | 0.05% |
| **Total** | **11.9** | |

*Acres of substation disturbance are the same for permanent and temporary disturbance.*

In addition to the disturbance listed above, the Preferred Alternative would require three sites for wire pulling, tensioning, splicing are, with approximately 2.1 acres of disturbance per site. Negligible effects are anticipated to grazing livestock from the pulling and tensioning sites, because each site would be active for short periods of time throughout the 18- to 24-month construction period.

Guard structures represent an additional disturbance. With the Preferred Alternative, approximately six sites are anticipated on New Mexico state lands with a total disturbance of 0.06 acre for all six sites. Grazing would be temporarily excluded from these areas; however, due to the small area of disturbance, no measurable effects on livestock grazing are anticipated. No fly yards or substations are proposed on New Mexico state lands.

Access rights-of-way for road construction would result in additional disturbance of approximately 29 acres. Levels of disturbance for access roads with the Preferred Alternative are shown in Exhibit 3-27, Temporary Disturbance of New Mexico State Land Agricultural Leases for the Preferred Alternative – Proposed Access Roads and Roads with Improvements.

**Exhibit 3-27**
### Temporary Disturbance of New Mexico State Land Agricultural Leases for the Preferred Alternative – Proposed Access Roads and Roads with Improvements

| Agricultural Lease | Acres of Disturbance from Access Roads (30- and 50-foot-wide right-of-way)[1] | Percentage of Range Unit Disturbed |
|---|---|---|
| G00128 | 0.0 | 0.00% |
| GO1963 | 7 | 0.54% |
| GO2195 | 3 | 0.16% |
| GM0457 | 5 | 0.39% |
| GM1400 | 1 | 0.42% |
| GM1794 | 0.0 | 0.00% |
| GT0716 | 2 | 0.42% |
| GT2540 | 11 | 0.42% |
| **Total** | **29** | |

[1] *Rounded to nearest whole acre.Acres of disturbance from proposed structures and from access roads may overlap*

## SUIT Lands

The nature and type of temporary effects on SUIT lands for the Preferred Alternative would be as described for BLM lands. An estimated total of 65.8 acres of temporary disturbance would occur on SUIT lands as shown below in Exhibit 3-28, SUIT Range Units Temporarily Affected by Construction Disturbance for the Preferred Alternative.

Less than 1 percent of all allotments on SUIT lands would be affected during construction, and disturbance at any given site and the total duration of construction would generally be limited to only a portion of the 18- to 24-month construction period.

**Exhibit 3-28**
### SUIT Range Units Temporarily Affected by Construction Disturbance For the Preferred Alternative

| Range Unit | Acres of Disturbance from Structure Work Areas | Percentage of Range Unit Disturbed |
|---|---|---|
| Pump Canyon | 4.9 | 0.07% |
| Sixshooter | 35.0 | 0.27% |
| Trail Canyon | 25.9 | 0.24% |
| **Total** | **65.8** | |

*Acres of substation disturbance are the same for permanent and temporary disturbance.*

In addition to the disturbance listed above, the Preferred Alternative would affect 12 sites for wire pulling, tensioning, and splicing, with approximately 2.1 acres of disturbance per site. Negligible effects are anticipated to grazing livestock from the pulling and tensioning sites because each site would be active for short periods of time throughout the 18- to 24-month construction period.

Guard structures represent an additional disturbance. With the Preferred Alternative, approximately 19 sites are anticipated on SUIT lands with a total disturbance of 0.19 acre. Grazing would be temporarily excluded from these areas; however, due to the small area of disturbance, no measurable effects on livestock grazing are anticipated.

As described for BLM lands, temporary disturbance from new access roads and improvements to existing access roads would result in disturbance in a 30- to 50-foot-wide area depending on the site-specific level of improvements required. With the Preferred Alternative, a total of 50 acres would be disturbed for access road construction as shown in Exhibit 3-29, Temporary Disturbance of SUIT Range Units for the Preferred Alternative – Proposed Access Roads and Roads with Improvements. This represents less than 1 percent of all range units that would be affected, and the total duration would be limited to only a portion of the 18- to 24-month construction period.

**Exhibit 3-29**

**Temporary Disturbance of SUIT Range Units for the Preferred Alternative – Proposed Access Roads and Roads with Improvements**

| Range Unit | Acres of Disturbance from Access Roads (30- and 50-foot right-of-way)[1] | Percentage of Range Unit Disturbed |
|---|---|---|
| Pump Canyon | 6 | 0.09% |
| Sixshooter | 22 | 0.16% |
| Trail Canyon | 22 | 0.20% |
| **Total** | **50** | |

[1] *Rounded to nearest whole acre. Acres of disturbance from proposed structures and from access roads may overlap.*

### Private Lands

Temporary effects from construction could occur, as discussed above for BLM lands; therefore, there is potential for effects to grazing operations on private lands where they overlap with private range operations. The nature and type of direct and indirect effects would be as described for BLM lands.

#### 3.6.4.3 Mitigation

No mitigation measures are proposed.

## 3.6.5 Proposed Action

#### 3.6.5.1 Permanent Effects

### BLM Lands

Effects for the Proposed Action would be similar to those discussed above for the Preferred Alternative. Differences between the two alternatives are discussed below.

The Proposed Action would have more transmission line support structures and would therefore affect approximately 1.35 more acres than the Preferred Alternative. The area that would be permanently affected by the Proposed Action is shown in Exhibit 3-30, Permanent Disturbance of BLM Grazing Allotments for the Proposed Action – Proposed Structures and Substations.

The acreage that would be permanently disturbed by the Proposed Action in each allotment would remain less than 1 percent of its area. Therefore, there would be no measurable effects upon grazing capacity (AUMs) and no change in the authorized uses for the allotments.

Exhibit 3-30

**Permanent Disturbance of BLM Grazing Allotments for the Proposed Action – Proposed Structures and Substations**

| Allotment | Number of Proposed Structures | Acres of Disturbance from Proposed Structures | Acres of Disturbance from Proposed Substations | Percentage of Allotment Disturbed |
|---|---|---|---|---|
| Farmington Glade | 36 | 0.75 | 0 | 0.003% |
| Flora Vista | 15 | 0.32 | 0 | 0.002% |
| Hartley Springs | 25 | 0.33 | 0 | 0.003% |
| Lonetree Mountain AMP | 64 | 0.05 | 0 | Less than 0.001% |
| North Hogback | 3 | 0.06 | 0 | 0.001% |

**Exhibit 3-30**
## Permanent Disturbance of BLM Grazing Allotments for the Proposed Action – Proposed Structures and Substations

| Allotment | Number of Proposed Structures | Acres of Disturbance from Proposed Structures | Acres of Disturbance from Proposed Substations | Percentage of Allotment Disturbed |
|---|---|---|---|---|
| Pinon Mesa | 21 | 0.38 | 0 | 0.004% |
| Ruins | 35 | 0.89 | 23 (Kiffen Canyon substation) | 0.34% |
| Shumway Arroyo AMP | 68 | 1.51 | 0 | 0.007% |
| Waterflow Community | 8 | 0.21 | 20 (Three Rivers substation) | 0.40% |
| **Total** | **275** | **4.59** | **43** | |

*Acres of disturbance from proposed structures and from access roads may overlap.*
*AMP = Allotment Management Plan*

Conversely, the Proposed Action would affect 8 fewer acres of grazing lands than the Preferred Alternative due to the construction of access roads. Exhibit 3-31, Permanent Disturbance of BLM Grazing Allotments for the Proposed Action – Proposed Access Roads, show the acreages of forage areas and grazing allotments that would be permanently disturbed by the operation and maintenance of new access roads. Taken together, the Proposed Action would affect about 6.65 fewer acres of grazing lands than the Preferred Alternative, though the amount of land affected would remain less than 1 percent of the allotment disturbed, so neither alternative would result in measurable effects to grazing capacity (AUMs) and there would be no change in the authorized uses for the allotments.

**Exhibit 3-31**
## Permanent Disturbance of BLM Grazing Allotments for the Proposed Action – Proposed Access Roads

| Allotment | Acres of Disturbance from Proposed Access Roads (20-foot-wide permanent road surface)[1] | Percentage of Allotment Disturbed |
|---|---|---|
| Farmington Glade | 3 | 0.01% |
| Flora Vista | 1 | 0.01% |
| Hartley Springs | 4 | 0.04% |
| Lonetree Mtn. AMP | 18 | 0.11% |
| North Hogback | 0 | 0.00% |

**Exhibit 3-31**

## Permanent Disturbance of BLM Grazing Allotments for the Proposed Action – Proposed Access Roads

| Allotment | Acres of Disturbance from Proposed Access Roads (20-foot-wide permanent road surface)[1] | Percentage of Allotment Disturbed |
|---|---|---|
| Pinon Mesa | 3 | 0.04% |
| Ruins | 4 | 0.03% |
| Shumway Arroyo AMP | 8 | 0.04% |
| Waterflow Community | 2 | 0.04% |
| **Total** | **43** | |

*Note that acres of disturbance from proposed structures and from access roads may overlap.*

*AMP = Allotment Management Plan*

[1] *Rounded to nearest whole acre.*

### New Mexico State Lands

Effects for the Proposed Action would be similar to those discussed above for the Preferred Alternative. Differences between the two alternatives are discussed below.

The Proposed Action would affect 0.07 additional acres of grazing lands due to structures than the Preferred Alternative. Disturbance from proposed access roads is 21.5 total acres, approximately 4.7 acres more than the Preferred Alternative. Taken together, the Proposed Action would affect 4.7 more acres of grazing areas on New Mexico state lands. The amount of acreage that would be disturbed by the Proposed Action within all agricultural leases would be less than 1 percent of their respective areas; so there would be no measurable effects upon grazing capacity or a change in the authorized uses for these allotments.

Acres affected on New Mexico state land agricultural leases are shown in Exhibit 3-32, Permanent Disturbance of New Mexico State Land Agricultural Leases for the Proposed Action – Proposed Structures, and Exhibit 3-33, Permanent Disturbance of New Mexico State Land Agricultural Leases for the Proposed Action – Proposed Access Roads.

**Exhibit 3-32**

### Permanent Disturbance of New Mexico State Land Agricultural Leases for the Proposed Action – Proposed Structures

| Agricultural Lease | Number of Proposed Structures | Acres of Disturbance from Proposed Structures | Percentage of Lease Disturbed |
|---|---|---|---|
| G00128 | 0 | 0.00 | 0% |
| GO1963 | 11 | 0.04 | 0.003% |
| GO2195 | 0 | 0.20 | Less than 0.001% |
| GM0457 | 6 | 0.12 | 0.009% |
| GM1400 | 2 | 0.04 | Less than 0.001% |
| GM1794 | 0 | 0.00 | 0% |
| GT0716 | 2 | 0.04 | Less than 0.001% |
| GT2540 | 7 | 0.14 | Less than 0.001% |
| **Total** | **28** | **0.58** | |

*Note that acres of disturbance from proposed structures and from access roads may overlap.*

**Exhibit 3-33**

### Permanent Disturbance of New Mexico State Land Agricultural Leases for the Proposed Action – Proposed Access Roads

| Agricultural Lease | Acres of Disturbance from Proposed Access Roads (20-foot-wide permanent road surface) | Percentage of Lease Disturbed |
|---|---|---|
| G00128 | 0.0 | 0.00% |
| GO1963 | 6.3 | 0.49% |
| GO2195 | 0.5 | Less than 0.01% |
| GM0457 | 2.1 | 0.16% |
| GM1400 | 0.5 | 0.21% |
| GM1794 | 0.0 | 0.00% |
| GT0716 | 2.1 | 0.44% |
| GT2540 | 10.0 | 0.38% |
| **Total** | **21.5** | |

*Note that acres of disturbance from proposed structures and from access roads may overlap.*

### SUIT Lands

Effects on SUIT Lands would be the same as described for the Preferred Alternative.

### Private Lands

The Proposed Action passes through approximately 1,520 acres of private land, which is 10 acres less than for the Preferred Alternative. An undetermined portion of the private land in the study area is zoned for agricultural use and may include pastures that are rotated for grazing livestock. Effects to private grazing lands would be similar to those discussed previously for BLM lands.

### 3.6.5.2 Temporary Effects

#### BLM Lands

Temporary effects for the Proposed Action would be similar to those discussed for the Preferred Alternative. However, the Proposed Action would affect a larger area of grazing lands than the Preferred Alternative. For all project elements (structure work areas, substations, access roads, pull sites, and guard structures), the Proposed Action would affect an additional 169.49 acres of grazing lands than the Preferred Alternative. However, the percentage of allotments affected would still remain less than 1 percent for each allotment, so the Proposed Action would not have a measurable effect to grazing.

Grazing areas that would be temporarily affected during construction of the transmission line and substations are shown below in Exhibit 3-34, BLM Grazing Allotments Temporarily Affected by Construction Disturbance for the Proposed Action. The Proposed Action would affect approximately 96.6 more acres of grazing lands due to structure work areas and substations than the Preferred Alternative.

**Exhibit 3-34**

**BLM Grazing Allotments Temporarily Affected by Construction Disturbance for the Proposed Action**

| Allotment | Acres of Disturbance from Structure Work Areas | Acres of Disturbance from Substation Construction | Total Acres of Disturbance from Construction | Percentage of Allotment Disturbed |
|---|---|---|---|---|
| Farmington Glade | 25.2 | 0 | 25.2 | 0.11% |
| Flora Vista | 10.5 | 0 | 10.5 | 0.05% |
| Hartley Springs | 17.5 | 0 | 17.5 | 0.17% |
| Lonetree Mountain AMP | 44.8 | 0 | 44.8 | 0.29% |
| North Hogback | 2.1 | 0 | 2.1 | 0.05% |
| Pinon Mesa | 14.7 | 0 | 14.7 | 0.17% |

Exhibit 3-34
## BLM Grazing Allotments Temporarily Affected by Construction Disturbance for the Proposed Action

| Allotment | Acres of Disturbance from Structure Work Areas | Acres of Disturbance from Substation Construction | Total Acres of Disturbance from Construction | Percentage of Allotment Disturbed |
|---|---|---|---|---|
| Ruins | 24.5 | 23 (Kiffen Canyon substation) | 44.5 | 0.68% |
| Shumway Arroyo AMP | 47.6 | 0 | 47.5 | 0.21% |
| Waterflow Community | 5.6 | 20 (Three Rivers substation) | 25.6 | 0.51% |
| **Total** | **192.5** | **43** | **235.5** | |

*Acres of substation disturbance are the same for permanent and temporary disturbance.*
*AMP = Allotment Management Plan*

Effects from the Proposed Action from wire pulling and tensioning sites and guard structures would be the same as discussed for the Preferred Alternative and would not measurably affect livestock grazing, due to the small footprint of the effects.

Disturbance from access roads construction would increase by 73 acres for the Proposed Action as compared to the Preferred Alternative. The range of disturbance from road construction and improvement activities within each allotment by the Proposed Action is discussed below in Exhibit 3-35, Temporary Disturbance of BLM Grazing Allotments for the Proposed Action – Proposed Access Roads and Roads with Improvements.

Exhibit 3-35
## Temporary Disturbance of BLM Grazing Allotments for the Proposed Action – Proposed Access Roads and Roads with Improvements

| Allotment | Acres of Disturbance from Access Roads (30- and 50-foot-wide right-of-way)[1] | Percentage of Allotment Disturbed |
|---|---|---|
| Farmington Glade | 31 | 0.13 % |
| Flora Vista | 10 | 0.05 % |
| Hartley Springs | 24 | 0.23 % |
| Lonetree Mtn. AMP | 21 | 0.13 % |
| North Hogback | 3 | 0.06 % |
| Pinon Mesa | 19 | 0.22 % |
| Ruins | 20 | 0.29 % |

Exhibit 3-35

### Temporary Disturbance of BLM Grazing Allotments for the Proposed Action – Proposed Access Roads and Roads with Improvements

| Allotment | Acres of Disturbance from Access Roads (30- and 50-foot-wide right-of-way)[1] | Percentage of Allotment Disturbed |
|---|---|---|
| Shumway Arroyo AMP | 38 | 0.17 % |
| Waterflow Community | 3 | 0.06 % |
| **Total** | **169** | |

*Note that acres of disturbance from proposed structures and from access roads may overlap.*

*AMP Allotment Management Plan*

*1 Rounded to nearest whole acre.*

## New Mexico State Lands

Temporary effects from construction of the Proposed Action would be similar to those discussed for the Preferred Alternative. In total, the Proposed Action would affect approximately 1.6 additional acres of agricultural leases on New Mexico state lands; however, this additional disturbance is not meaningfully different than the Preferred Alternative and represents less than one percent of all allotments on New Mexico state lands.

The Proposed Action would pass through approximately 4 miles of New Mexico state lands and portions of seven agricultural leases. The Proposed Action would disturb approximately 19.6 acres of agricultural leases for structure work areas. as shown below in Exhibit 3-36, New Mexico State Land Agricultural Leases Temporarily Affected by Construction Disturbance for the Proposed Action. In comparison, the Preferred Alternative would affect 11.9 acres with structure work areas.

Exhibit 3-36

### New Mexico State Land Agricultural Leases Temporarily Affected by Construction Disturbance for the Proposed Action

| Agricultural Lease | Acres of Disturbance from Structure Work Areas | Percentage of Range Unit Disturbed |
|---|---|---|
| G00128 | 0 | 0% |
| GO1963 | 7.7 | 0.60% |
| GO2195 | 0 | 0% |
| GM0457 | 4.2 | 0.33% |

**Exhibit 3-36**

### New Mexico State Land Agricultural Leases Temporarily Affected by Construction Disturbance for the Proposed Action

| Agricultural Lease | Acres of Disturbance from Structure Work Areas | Percentage of Range Unit Disturbed |
|---|---|---|
| GM1400 | 1.4 | 0.58% |
| GM1794 | 0 | 0% |
| GT0716 | 1.4 | 0.29% |
| GT2540 | 4.9 | 0.19% |
| **Total** | **19.6** | |

*Acres of substation disturbance are the same for permanent and temporary disturbance.*

*1 Rounded to nearest whole acre.*

Proposed access roads for the Proposed Action would result in approximately 22.9 acres of additional disturbance for access road construction as shown in Exhibit 3-37, Temporary Disturbance of New Mexico State Land Agricultural Leases for the Proposed Action – Proposed Access Roads and Road with Improvements. In comparison, the Preferred Alternative would disturb 29 acres of grazing areas for access road construction. The number of wire pulling, tensioning, and splicing sites and guard structures are similar for the two alternatives.

**Exhibit 3-37**

### Temporary Disturbance of New Mexico State Land Agricultural Leases for the Proposed Action – Proposed Access Roads and Roads with Improvements

| Agricultural Lease | Acres of Disturbance from Access Roads (30- and 50-foot-wide right-of-way)[1] | Percentage of Range Unit Disturbed |
|---|---|---|
| G00128 | 0.0 | 0.00% |
| GO1963 | 6.4 | 0.50% |
| GO2195 | 0.47 | 0.00% |
| GM0457 | 2.3 | 0.18% |
| GM1400 | 0.53 | 0.22% |
| GM1794 | 0.0 | 0.00% |
| GT0716 | 2.4 | 0.50% |
| GT2540 | 10.8 | 0.42% |
| **Total** | **22.9** | |

*Note that acres of disturbance from proposed structures and from access roads may overlap.*

*1 Rounded to nearest whole acre.*

#### SUIT Lands

Temporary effects from the Proposed Action on SUIT lands would be the same as described for the Preferred Alternative.

#### Private Lands

Effects to grazing on private lands from the Proposed Action would be the same as discussed for the Preferred Alternative.

#### 3.6.5.3 Mitigation

No mitigation measures are proposed.

## 3.7 Visual Resources

### 3.7.1 Study Area

The study area for visual resources was expanded to conduct visual contrast ratings from the most critical viewpoints, called key observation points (KOPs). KOPs are usually located along commonly traveled routes or at other likely observation points.

**What is a KOP?**

A key observation point (KOP) is a viewpoint typically located along commonly traveled routes or observation areas with unique or interesting landscapes.

### 3.7.2 Methods

BLM's visual contrast rating system was used to analyze potential effects to visual resources. BLM's visual contrast rating system involves identifying the degree of contrast between major landscape features (land, water, vegetation, and structures) and the features of the alternatives using basic design elements (form, line, color, and texture). The analysis involves determining whether the potential visual effects from proposed ground-disturbing activities or developments will meet the VRM class objectives established for the area by comparing the results of the visual resource contrast ratings with VRM class objectives. The visual resource contrast rating system is described in BLM Handbook H 8431-1, Visual Resource Contrast Rating.[26]

The visual quality analysis involved the following steps:

- Identify KOPs (critical viewpoints in the study area) in consultation with the BLM.
- Visit each KOP and photograph existing landscape conditions.

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[26] BLM 1986

- Create photo simulations for selected KOPs, and complete BLM Form 8400-4 for each KOP.

The BLM identified 12 KOPs in the study area based on guidance in BLM Handbook H 8431-1, review of public comments, and best professional judgment. These KOPs are shown in Exhibit 3-47, Key Observation Points. KOPs are typically selected only for BLM-managed lands. However, the alternatives cross both BLM-managed and non-BLM-managed lands. In order to capture representative views of the alternatives that viewer groups are likely to encounter, as well as to address views found along the entire study area, KOPs were selected for both BLM-managed and non-BLM-managed lands. Similarly, visual contrast rating forms were completed for all KOPs in order to maintain consistency for the effects analysis. KOPs 1, 2, 4, 5, 6, 7, 8, and 9 provide representative views of BLM-managed lands in the vicinity of the KOPs. KOPs 3, 10, 11, and 12 provide representative views that are not located on BLM-managed lands.

For BLM-managed lands, KOPs 1, 2, 4, and 5 are managed for VRM Class III objectives. The VRM Class III objective is to partially retain the existing character of the landscape, and the level of change to the characteristic landscape should be moderate. For BLM-managed lands, KOPs 6, 7, 8, and 9 are managed for VRM Class IV objectives. The VRM Class IV objective is to provide for management activities which require major modification of the existing character of the landscape; the level of change to the characteristic landscape can be high.

If changes to the landscape do not meet the VRM class objective for the area, the BLM can either identify mitigation that would allow the project to meet VRM class objectives, deny the application for the project, or amend the RMP for the area. For non-BLM-managed land, an evaluation of the conformance of the alternatives to VRM class objectives was not conducted because VRM classes are only established for BLM-managed lands. Effects on each KOP, however, were still documented using BLM Form 8400-4. These forms are located in Appendix E, Visual Contrast Rating Worksheets and Study Area Photos.

## 3.7.3 Affected Environment

Visual resources refer to the visible physical features (land, water, vegetation, animals, structures, and other features) on a landscape. These features contribute to the scenic or visual quality and appeal of the landscape. Linear projects, such as the SJBEC Project, are rated from areas representing the most critical viewpoints. These include views from communities or road crossings; viewpoints representing typical views encountered in representative landscapes, if not covered by critical viewpoints; and any special project or landscape features such as a skyline crossing, river crossing, or substation.

Existing transmission lines parallel the transmission line routes for the Preferred Alternative and the Proposed Action in several segments of the study area as shown in Exhibit 3-5, Existing Transmission Lines. An existing 345 kV line begins at the Shiprock Substation in Segment 1 and continues to the end of Segment 4 (where the route turns to the east and parallels the state line). An existing 115 kV line traverses portions of Segments 1 and 3 and all of Segments 4 and 8 in the study area. Also, substations for the Preferred Alternative and the Proposed Action are in areas where there are existing substations.

### 3.7.3.1 BLM Lands

Management of visual resources on BLM-managed land is influenced by the Federal Land Policy and Management Act of 1976 and the Farmington RMP with Record of Decision dated September 2003 and updated in December 2003. Under the Federal Land Policy and Management Act, public lands are to be managed in a manner that protects scenic values. The Farmington RMP identifies visual resource management (VRM) classes with objectives for managing visual resources on BLM-managed land.

**What is VRM?**

Visual resource management (VRM) is a tool to identify and map essential landscape settings to meet public preferences and recreational experiences today and into the future.

The BLM's VRM system is a way to identify and evaluate scenic values to determine the appropriate levels of management.[27] It helps to ensure that actions taken on public lands will benefit the visual qualities associated with the described landscape.

[27] BLM 1984

The BLM's VRM system consists of two stages: inventory and analysis (visual resource contrast rating). The BLM classifies visual resources by conducting a visual resource inventory (VRI). This process is described in detail in BLM Handbook H-8410-1, Visual Resource Inventory.[28] The VRI has three components: scenic quality, sensitivity, and distance zone. The most recent VRI was conducted in 2009.[29]

### Scenic Quality

Scenic quality is a measure of the visual appeal of a tract of land. In the VRI process, BLM-managed lands are given an A, B, or C rating based on the apparent scenic quality. Scenic quality is determined by considering seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modification. Scenic quality rating units with the most visual appeal are rated A, while scenic quality rating units with the least visual appeal are rated C. The study area is within scenic quality rating units rated either B or C for scenic quality. Descriptions of these scenic quality rating units in the study area are provided below and are illustrated in Exhibit 3-38, Scenic Quality Rating Units. Specific areas that fall within the study area include:

#### 001 Pinon Mesa

Pinon Mesa, an elongated bluff with steep cliffs, serves as the visual focal point in this area. The mesa is comprised of dramatic, eroded cliffs and light brown to buff colored rock outcrops. The vertical cliffs with their diagonal talus slopes provide contrast to the overall horizontal landscape.

The dominant vegetation is dark green pinon and juniper which is patchy and scattered on the talus slopes, but forms a continuous mass on the top of the mesa. Grey-green grasses and shrubs comprise the remainder of the vegetation.

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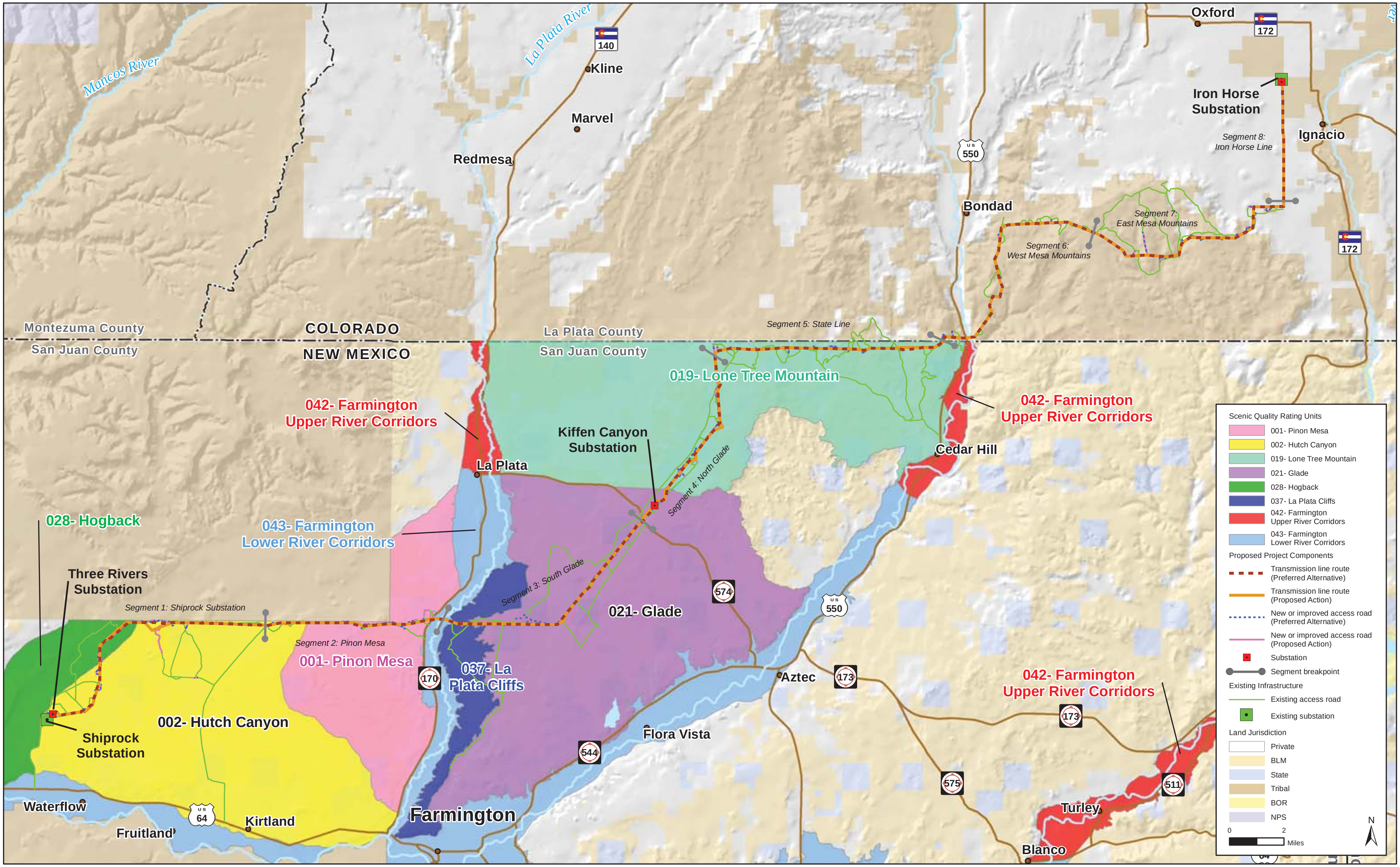
[28] BLM 1986

[29] Otak 2009




Source: GIS BLM 2012, GIS BLM 2012b, GIS Tri-State 2013

**Exhibit 3-38 Scenic Quality Rating Units**

### 002 Hutch Canyon

This area contained rolling hills incised by draws in addition to eroded hills and low, table mesas. The primarily horizontal landscape is muted gray, buff, and brown in color. The vegetation is comprised of green juniper with a grass understory.

### 019 Lone Tree Mountain

The area is characterized by rolling hills, open sagebrush valleys, and gentle slopes. A prominent, but not dramatic, mountain is the focal point for the area. The area is mostly covered by pinon/juniper woodland and sagebrush, but a few areas are devoid of vegetation. Colors vary from the browns and beiges of the soils to the greens and grays of the vegetation.

Cox Canyon is in the Lone Tree Mountain area. It contains a natural stone arch in an area visited for recreation. The arch is about 42 feet wide and 35 feet tall. This area is near Road 2310.

### 021 Glade

The area is comprised of a broad valley with rolling hills to the east and low bluffs to the west. Vegetation is low, continuous sage. Colors vary from the beiges and grays of the soil to the greens and grays of the vegetation. Power lines and well sites are noticeable and add vertical lines to the otherwise horizontal landscape.

### 028 Hogback

This area is characterized by a long series of overlapping triangular rock features and steep rock outcrops. The horizontal contains complex, undulating diagonal lines. Colors vary from browns and beiges of the soil to the greens of the thin shrub and grass understory.

### 037 La Plata Cliffs

This area is characterized by rugged cliffs, deep drainages, steep eroded slopes, and a narrow alluvial fan. Vegetation consists of pinon/juniper in various shades of green, contrasting with the browns, beiges, oranges, and grays of the soils. Evidence of development is present, including oil tanks and power poles.

### 042 Farmington Upper River Corridors

The upper river corridors of the FFO retain a scenic, pastoral appearance. The level floodplain slopes gently away from the rivers. Vegetation includes the bold forms of the trees and low vegetation in the fields. Seasonal variations change colors for greens to browns to grays. Human activity is noticeable, but does not dominate the landscape.

#### Sensitivity

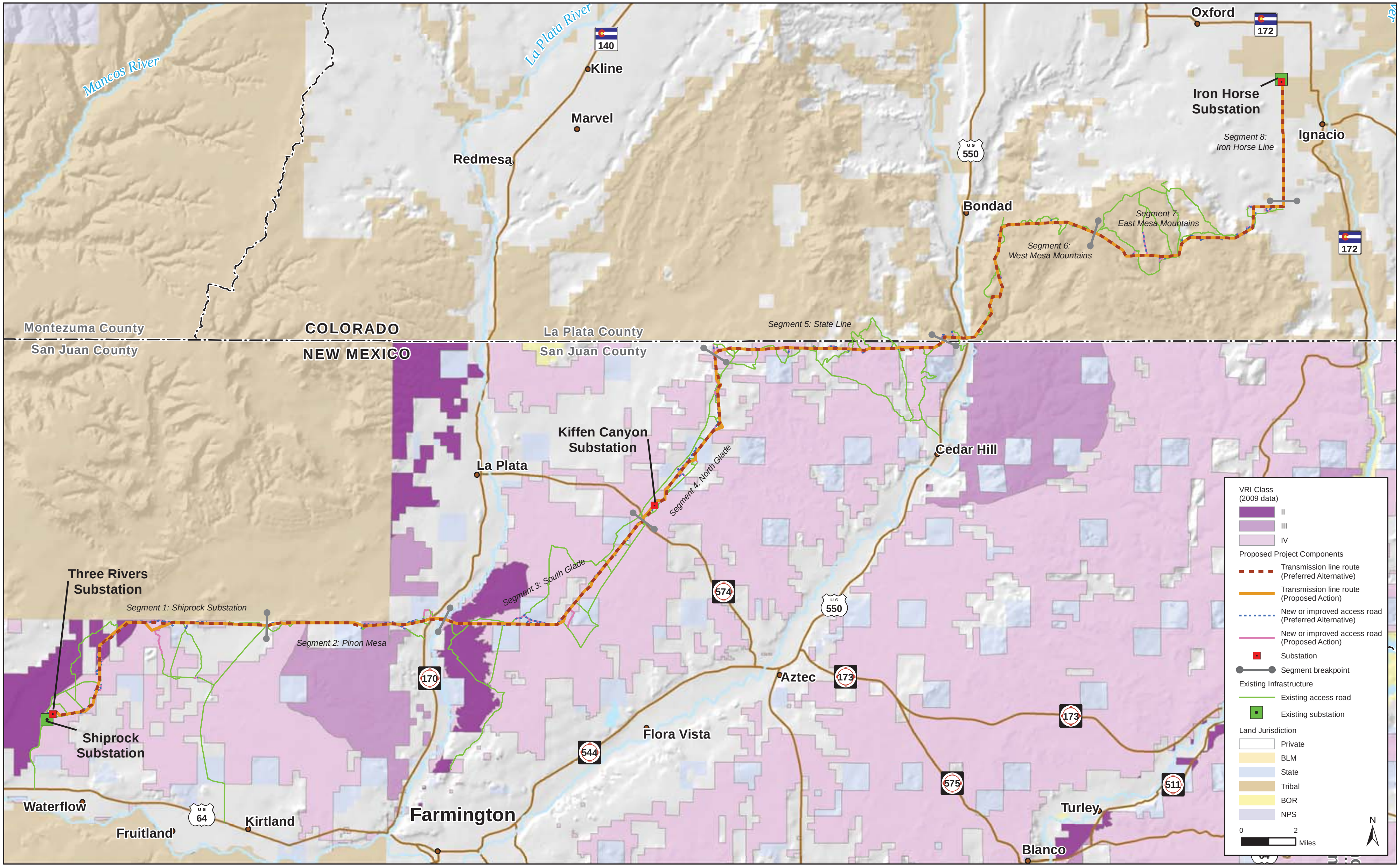
Sensitivity is a measure of the public concern for scenic quality. During the sensitivity rating, public lands are assigned high, medium, or low sensitivity by analyzing six indicators of public concern: type of user, amount of use, public interest, adjacent land uses, special areas, and other factors. The study area is within areas rated either low or high for sensitivity, except for the Pinon Mesa area which is rated medium for sensitivity. Views of the alternatives would be afforded to individuals recreating (such as mountain bike and OHV riders), individuals driving vehicles along local travel routes (primarily NM 170, NM 574, San Juan County Road [SJ] 2310, US 550, La Plata County Road [LP] 318, LP 314, and LP 315), individuals working on agricultural lands or operating and maintaining the extensive network of energy developments (primarily oil and gas), and individuals on Native American lands.

#### Distance Zone

The distance zone analysis is conducted to determine the relative visibility from travel points or observation points. The distance zone for the SJBEC study area is foreground/middle ground, meaning most project features are within 3 to 5 miles of travel routes and observation points. This indicates activities and development may be able to be viewed in detail.

#### VRI Classes

Scenic quality, sensitivity levels, and distance zones are used to develop VRI classes for BLM-managed land. As shown in Exhibit 3-39, BLM VRI Classes, the SJBEC study area is in an area assigned either to VRI Class II or VRI Class IV, except for the Pinon Mesa area which is assigned to VRI Class III.




Source: GIS BLM 2012, GIS BLM 2009, GIS Tri-State 2013

**Exhibit 3-39 BLM VRI Classes**

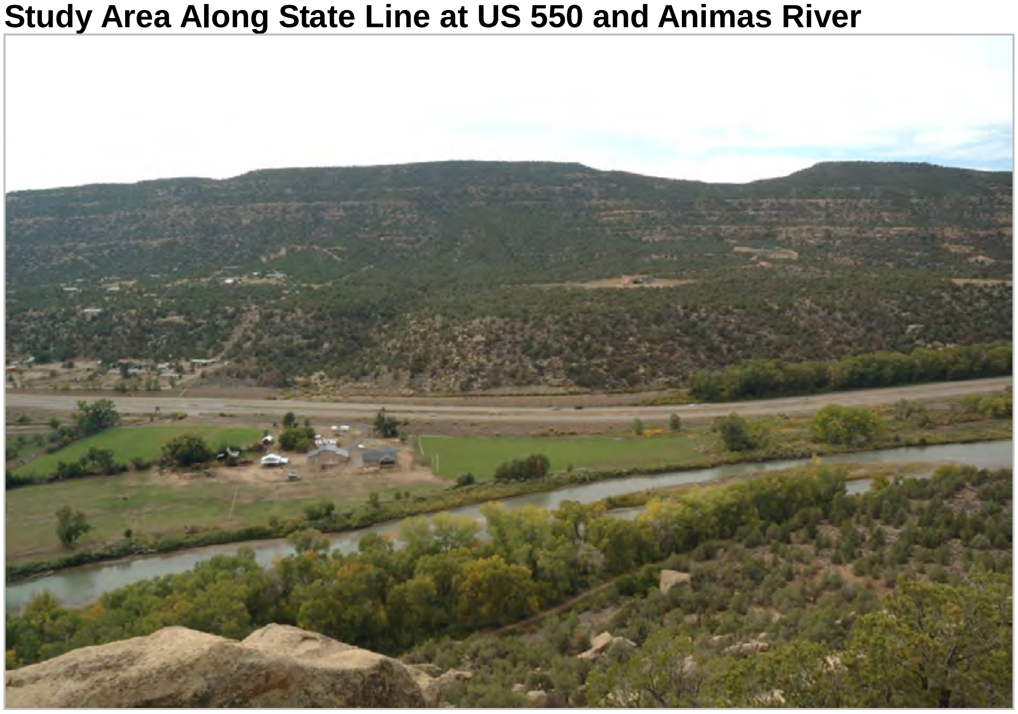
Exhibit 3-40 through Exhibit 3-43 are photos showing landscapes found throughout the study area.

**Exhibit 3-40**
**Study Area Northeast of Shiprock Substation**

**Exhibit 3-41**
**Study Area at State Route 170**

**Exhibit 3-42**
## Study Area at NM 574

**Exhibit 3-43**
## Study Area Along State Line at US 550 and Animas River



## VRM Classes

Inventory classes are informational in nature and provide the basis for considering visual values in the BLM FFO's RMP. VRM classes are assigned through resource management plans. The BLM has four VRM classes (classes I through IV). There are no lands in the study area designated as VRM Class I or VRM Class II, the BLM's most restrictive visual resource management class.

VRM classes for the study area are detailed in Exhibit 3-44, VRM Classes on BLM Land. Exhibit 3-45, BLM VRM Classes, depicts the VRM classes for the study area.

**Exhibit 3-44**

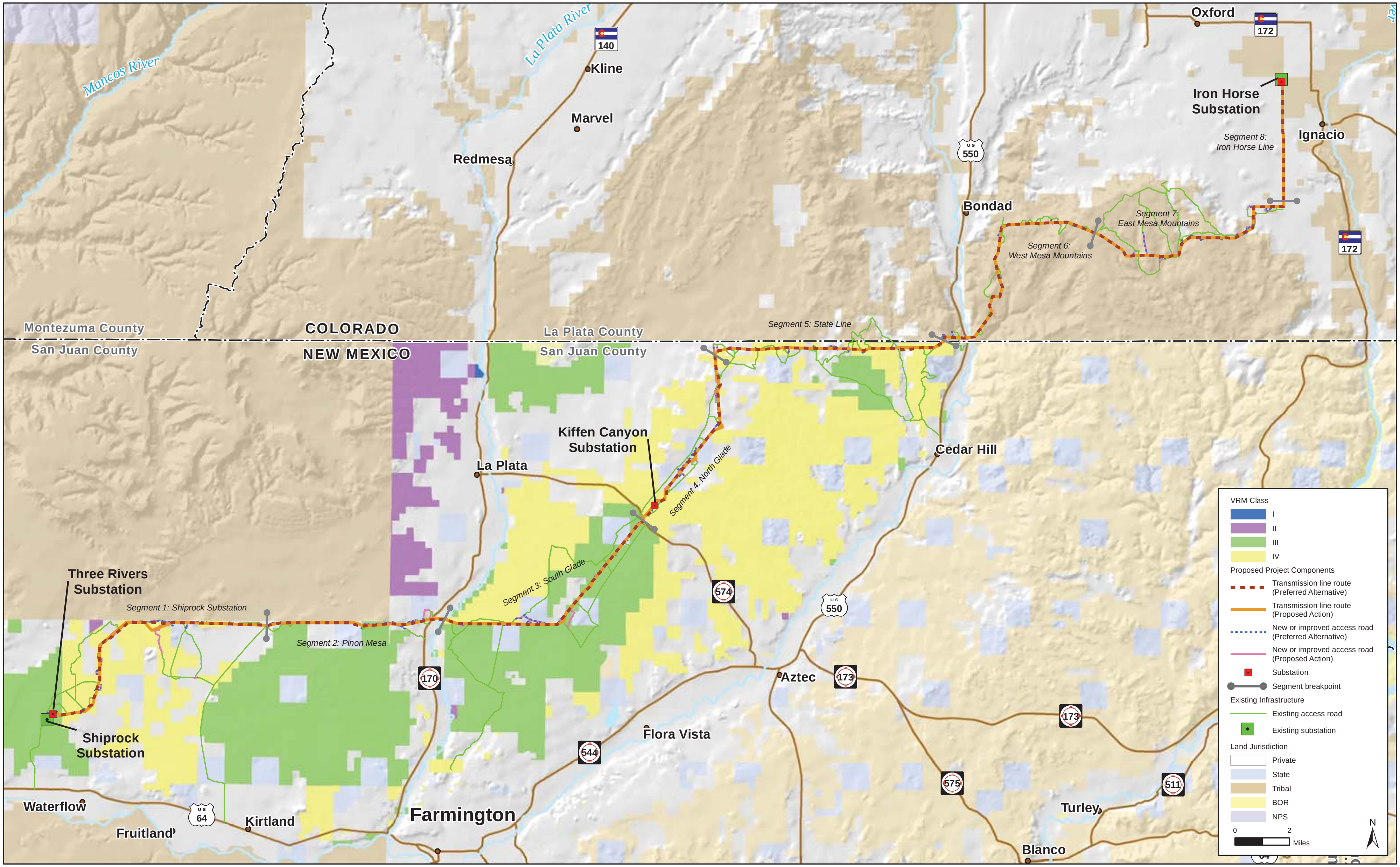
**VRM Classes on BLM Land**

| VRM Class | Acres of VRM Class[1] |
|---|---|
| III | 510 |
| IV | 1,000 |

[1] *Rounded to nearest whole acre.Based on VRM classes provided in GIS BLM 2013a*

The objectives for visual classes found in the study area are summarized below:

- Class III Objectives are to partially retain existing landscape character. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate a casual observer's view. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- Class IV Objective: Provide for management activities that require major modification of the landscape character. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. Every attempt should be made, however, to minimize the impact of these activities through careful location, minimal disturbance, and repetition of the basic landscape elements.




Source: GIS BLM 2012, GIS BLM 2013a, GIS Tri-State 2013

Exhibit 3-45 BLM VRM Classes

### 3.7.3.2 Other Lands in New Mexico

#### New Mexico State Lands

The SJBEC Project would cross lands managed by the NMSLO in San Juan County. The scenic quality of these areas is similar to the lands described above in Section 3.7.3.1, BLM Lands, Scenic Quality. There are no state visual resources policies or guidance for these areas.

#### Private Lands in New Mexico

In New Mexico, the SJBEC Project would cross private lands in San Juan County. The scenic quality of these areas is similar to the lands described above in Section 3.7.3.1.

#### National Park Service

The closest National Park Service land to the the SJBEC Project is the Aztec Ruins National Monument, over 6 miles to the east of Segment 3 (segments are shown in Exhibit 3-3, Study Area). Due to topography and distance, the SJBEC Project is not visible from the Aztec Ruins National Monument.

### 3.7.3.3 Other Lands in Colorado

#### SUIT Lands

The SJBEC Project would cross SUIT lands. The scenic quality is similar to the Lone Tree Mountain area described above in Section 3.7.3.1. There are no SUIT visual resources policies or guidance for these areas.

#### Private Lands in Colorado

In Colorado, the SJBEC Project would cross private lands in La Plata County. These areas are primarily west of Ignacio and contain low rolling hills covered with some agricultural fields, scattered rural homes, a network of energy developments (primarily oil and gas), and a system of county and dirt roads. Most vegetation is sparse and low-growing, with the exception of scattered clusters of trees and trees following surface water drainages.

The La Plata County Comprehensive Plan states that district plans contain a variety of incentives to protect visual resources.[30] The SJBEC Project crosses the Southeast La Plata and Florida Mesa districts. The Southeast La Plata District is subject to the La Plata Land Use Code because a district plan and map have not been adopted by the planning commission. The La Plata Land Use Code primarily contains encouraged standards for the protection of visual resources and development within the corridor district.

The Florida Mesa District Land Use Plan states the Animas and Florida Rivers are valued for their scenic beauty.[31] Also, in agricultural-rural residential areas, site design should visually screen structures while preserving as many trees as possible. In areas lacking vegetation, landscaping should be established to screen new development.

### 3.7.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects on visual resources would occur with this alternative.

### 3.7.5 Preferred Alternative

EPMs 60 through 63, described in Exhibit 2-23, have been incorporated into the alternatives to minimize visual effects. Permanent effects from the Preferred Alternative are identified below.

#### 3.7.5.1 Permanent Effects to BLM-Managed Lands

Exhibit 3-46, VRM Classes on BLM Land for the Preferred Alternative, shows the VRM destinations for BLM lands where transmission lines, substations, and access roads associated with the Preferred Alternative are proposed. Improvements associated with the Preferred Alternative would be located on lands designated as VRM Class III or VRM Class IV.

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[30] La Plata County 2001a

[31] La Plata County 2001b

**Exhibit 3-46**

## VRM Classes on BLM Land for the Preferred Alternative

| VRM Class | Miles of Proposed Transmission Line | Acres of Proposed Transmission Line Right-of-Way | Miles of Existing Access Routes | Miles of Proposed Access Routes | Acres of Existing Access Routes | Acres of Proposed Access Routes | Acres for Proposed Substations |
|---|---|---|---|---|---|---|---|
| III | 8.1 miles | 240 acres | 34.8 miles | 1.9 miles | 620 acres | 50 acres | 20 acres (Three Rivers) |
| IV | 17.3 miles | 510 acres | 36.9 miles | 6.5 miles | 670 acres | 140 acres | 23 acres (Kiffen Canyon) |

*The transmission line and road corridors have some overlap.*

For KOPs 1, 2, 4, 5, 6, 7, 8, and 9, the degree of contrast created by the Preferred Alternative would meet VRM class objectives for BLM-managed lands. A discussion of these findings and permanent direct effects from the Preferred Alternative is provided below.

### Access Roads

For all KOPs on BLM-managed lands (KOPs, 1, 2, 4, 5, 6, 7, 8, and 9), the Preferred Alternative would add new access roads or improve existing roads. An abrupt vegetation edge would appear along new and improved roads from vegetation removal. Smooth access roads would stand out against the moderately coarse texture of the terrain. This would affect visual resources by dividing the landscape with areas that lack vegetation, altering the natural topography, and altering the texture and color of the land surface. The new and improved roads would not be highly visible from most of the KOPs due to distance, topography, or vegetation.

### Transmission Line

For KOPs 1, 2, 4, 5, and 6, the Preferred Alternative would add a transmission line, using galvanized steel structures, to an area containing similar structures and activities. The form, line, color, and texture of the transmission line and transmission line structures for the Preferred Alternative would resemble nearby structures, since existing galvanized steel transmission line structures are present in these areas.

For KOPs 7 and 8, the Preferred Alternative would add a transmission line to an area lacking similar nearby structures. The transmission line would sit on top of minor elevated areas.

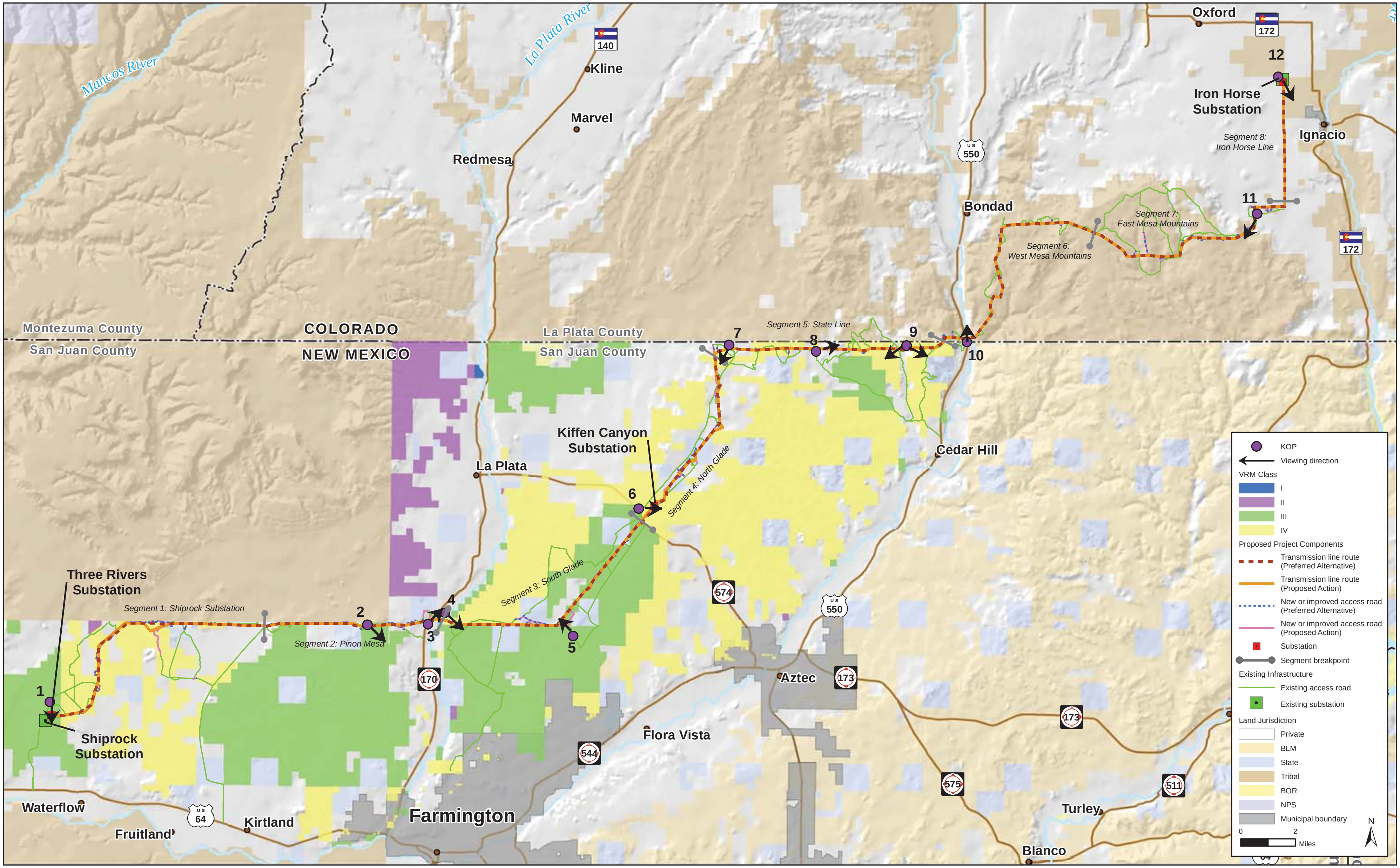
Although the form, line, and texture of the transmission line for the Preferred Alternative would not resemble nearby structures, the color of the wood poles that would be used (brown) is found in the surrounding landscape. The surrounding area contains numerous well pads; therefore, the Preferred Alternative would continue the visual theme of energy-related development in the area.

For KOP 9, the Preferred Alternative would add a transmission line to an area lacking similar nearby structures. The transmission line would span topographic depressions and would sit on top of prominent elevated areas. Due to distance, minor changes would be visible to the skyline of the ridgeline to the west of KOP 9. Compared to the ridgeline to the west of KOP 9, the changes to the skyline of the ridgeline to the east of KOP 9 would be more visible, because the ridgeline is much closer.

Exhibit 3-47, Key Observation Points, shows the KOPs that were evaluated.

For KOP 9, this segment of the Preferred Alternative would not be co-located with similar structures or activities. The centerline of the proposed transmission line would pass within approximately 800 feet of a natural stone arch, which is an area visited for recreation. The transmission line, however, would be at a lower elevation than the stone arch. Also, the surrounding area contains Road 2310 with vehicles traveling at a modest rate of speed perpendicular to the transmission line, thereby allowing opportunities for viewing the arch and canyon surroundings.

For KOP 9, the form and line of the Preferred Alternative would not resemble nearby elements and would create a moderate degree of contrast. The Preferred Alternative would create a weak degree of contrast with respect to color, because the color of the transmission line structures is found in the surrounding landscape. Self-weathering steel poles would be used in this area; the poles weather to a rust color. The texture of the Preferred Alternative would create a moderate degree of contrast, because the Preferred Alternative rises above the dominant natural landscape feature (juniper trees).




Source: GIS BLM 2012, GIS BLM 2013, GIS BLM 2013a, GIS Tri-State 2013

**Exhibit 3-47 Key Observation Points**

As shown in Exhibit 3-48, Key Observation Point 9 – View West for the Preferred Alternative, and Exhibit 3-49, Key Observation Point 9 – View East for the Preferred Alternative, the project design for the transmission line would meet VRM Class IV objectives for BLM-managed lands because the level of change to the landscape would be mostly moderate.

#### Substations

New substations would be constructed near KOPs 1 and 6. The proposed Three Rivers Substation would be built adjacent to the existing Shiprock Substation near KOP 1, an area highly altered by similar energy-related development including a power plant, substation, and transmission and distribution lines. The proposed Kiffen Canyon Substation would be built adjacent to the existing City of Farmington Substation located near KOP 6. The new substations would consist of components and activities similar to those at the adjacent substations. The form, line, color, and texture of the substations for the Preferred Alternative would resemble adjacent substation components. In these areas, similar facilities would be co-located, which would minimize changes to the landscape.

There would be no sources of permanent lighting. Lighting would be installed, however, in the event maintenance crews need to access the substation at night for repairs. The lighting would only be used when necessary.

### 3.7.5.2 Permanent Effects to Other Lands

For KOPs 3, 10, 11, and 12, there are no VRM class objectives because the KOPs are not located on BLM-managed lands. The level of change to the landscape, however, would be low to moderate, similar to the KOPs with representative views on BLM-managed lands. The following permanent direct effects would occur.

**Exhibit 3-48**

## Key Observation Point 9 – View West for the Preferred Alternative

*Existing and simulated view west. View is from the natural arch in Cox Canyon.*

**Exhibit 3-49**

## Key Observation Point 9 – View East for the Preferred Alternative

*Existing and simulated view east from KOP 9. View is from the natural arch in Cox Canyon.*

### Access Roads

For KOPs, 3, 10, 11, and 12, the Preferred Alternative would add new access roads or improve existing roads. As described previously, an abrupt vegetation edge would appear along new and improved roads from vegetation removal. Smooth access roads would stand out against the moderately coarse texture of the terrain. This would affect visual resources by dividing the landscape with areas that lack vegetation, altering the natural topography, and altering the texture and color of the land surface. The new and improved roads would not be highly visible from most of these KOPs due to distance, topography, or vegetation.

### Transmission Line

For KOP 12, the Preferred Alternative would add conductors to existing transmission line structures. No additional transmission line structures would be added; therefore, views would change minimally. For KOPs 3 and 11, the Preferred Alternative would add a transmission line to an area containing similar structures and activities. The form, line, color, and texture of the transmission line for the Preferred Alternative would resemble nearby structures. As shown in Exhibit 3-50, Key Observation Point 3, the transmission line would be co-located near similar structures, which would minimize changes to the landscape. For KOP 11, the surrounding area contains numerous well pads. Therefore, the Preferred Alternative would continue the visual theme of energy-related development in the area. Also, few viewer groups frequent this area.

For KOP 10, the Preferred Alternative would add a transmission line to an area lacking similar nearby structures. As shown in Exhibit 3-51, Key Observation Point 10, the transmission line would sit on top of prominent elevated areas. The aerial marker balls would attract a viewer’s attention. At its lowest point, the power line would be approximately 187 feet above the Animas River. Although the line of the transmission line for the Preferred Alternative would not resemble nearby structures, the form, color, and texture of the poles, which would change to brown, weathered steel over time, is found in the surrounding landscape. Also, the surrounding area contains US 550 with vehicles traveling at a high rate of speed perpendicular to the transmission line, thereby limiting viewing time of the transmission line.

### Iron Horse Substation

As shown in Exhibit 3-52, Key Observation Point 12, the Preferred Alternative would expand the existing substation. The expanded substation would be approximately twice the size of the existing substation. The existing substation is 2.5 acres, and the expanded substation would expand the substation to an area of 5 acres. A buffer area of 1 acre would be provided outside of the substation fence line. The expanded substation would consist of components and activities similar to those at the existing substation. The form, line, color, and texture of the substation for the Preferred Alternative would resemble existing substation components. In this area, similar structures would be co-located, which would minimize changes to the landscape.

There would be no sources of permanent lighting at the substation. Lighting would be installed, however, in the event maintenance crews need to access the substation at night for repairs. The lighting would only be used when necessary.

## 3.7.5.3 Temporary Effects

Temporary direct effects to visual resources would occur from ground-disturbing activities at structure work areas, proposed substations, and access roads. To the extent practicable and feasible, activities would be located within the right-of-way. During the construction period, crews may be working concurrently on several parts of the line. Therefore, the temporary effects to visual resources described below may occur at the same time in multiple locations.

### Ground Disturbance and Dust

Construction activities at structure work areas, proposed substations, and access roads would disturb the ground surface and require removing vegetation, which would affect visual resources by creating land barren of vegetation when compared to adjacent land. Also, ground disturbances would affect visual resources by creating exposed soil with a different texture and color than undisturbed soil. These temporary effects would be minimized through the implementation of EPMs 17, 22, 28, 29, and 31 identified in Exhibit 2-23.

**Exhibit 3-50**
# Key Observation Point 3



*Existing and simulated view northeastward from KOP 3*

**Exhibit 3-51**

## Key Observation Point 10



*Existing and simulated view northeastward from KOP 10.*

**Exhibit 3-52**
# Key Observation Point 12

*View southeastward from KOP 12.*

In addition, ground-disturbing activities would generate dust from vehicle movement, excavation, and from wind blowing across exposed soil. Fugitive dust would affect visual resources by diminishing atmospheric clarity. This effect would be minor, since the dust would settle in minutes and would be minimized by implementing a fugitive dust control plan as outlined in EPM 64 in Exhibit 2-23. Dust from vehicle movement and wind is common in the area since there are many access roads in the study area that are used by oil and gas operators, other transmission line operators, and recreational users.

#### Construction Lighting

Lights would be used during construction only when necessary for safety. Effects to surrounding areas would be minimal since nighttime work is not proposed, and lighting would be kept to a minimum.

#### Glare

Reflective surfaces on construction equipment and vehicles create glare. The intensity and amount of glare would vary depending on sunlight and the time of day. This would affect visual resources by adding points of illumination not found naturally in the landscape. The effect of glare would be minimal, since the Preferred Alternative would be constructed in an area where there are few receptors.

#### Cluttered Views

During construction, views in the study area would be cluttered with construction equipment and construction materials. The color and geometric, boxy forms of construction materials and equipment would contrast with the rolling form of the terrain and the scattered vegetation. The rigid vertical elements would create various focal points on a mostly open landscape and would not mimic other landscape elements, which are mostly vegetation. The color of construction equipment and vehicles would not resemble the muted tans and greens of the terrain and vegetation.

The effects described above would occur in a particular area for a short period of time (weeks or months) and would be minimal; there are few viewers that frequent most of the study area and maintenance vehicles are common in the area due to the presence of oil and gas infrastructure. After construction is completed, all equipment would be removed, and staging and construction areas would be reclaimed to a pre-disturbance condition. The following EPMs would minimize effects related to cluttered views: 15, 17, 22, 28, 29, 31, 62, and 63 identified in Exhibit 2-23.

#### 3.7.5.4 Mitigation

No mitigation measures are proposed in this VRM Class IV area.

### 3.7.6 Proposed Action

#### 3.7.6.1 Permanent Effects

Exhibit 3-53, VRM Classes on BLM Land for the Proposed Action, shows the VRM destinations for BLM lands where transmission lines, substations, and access roads associated with the Proposed Action are proposed. Improvements associated with the Proposed Action would be located on lands designated as VRM Class III or VRM Class IV.

**Exhibit 3-53**
**VRM Classes on BLM Land for the Proposed Action**

| VRM Class | Miles of Proposed Transmission Line | Acres of Proposed Transmission Line Right-of-Way | Miles of Existing Access Routes | Miles of Proposed Access Routes | Acres of Existing Access Routes | Acres of Proposed Access Routes | Acres for Proposed Substations |
|---|---|---|---|---|---|---|---|
| III | 7.6 miles | 230 acres | 35 miles | 2.2 miles | 630 acres | 60 acres | 20 acres (Three Rivers) |
| IV | 17.9 miles | 540 acres | 41.3 miles | 6.1 miles | 740 acres | 140 acres | 23 acres (Kiffen Canyon) |

*The transmission line and road corridors have some overlap.*

Permanent effects to visual resources for the Proposed Action would be the same as discussed for the Preferred Alternative, with one exception. The Proposed Action would have greater visual effects near the natural stone arch at KOP 9 because this alternative would be located about 400 feet closer to the arch and transmission structures would not be located in the valley below the arch, as proposed with the Preferred Alternative.

For KOP 9, the Proposed Action would add a transmission line to an area lacking similar nearby structures. The transmission line would span topographic depressions and would sit on top of prominent elevated areas. Due to distance, minor changes would be visible to the skyline of the ridgeline to the west of KOP 9. The changes to the skyline of the ridgeline to the east of KOP 9 would be more visible, because the ridgeline is much closer.

This segment of the Proposed Action would not be co-located with similar structures or activities. The centerline of the proposed transmission line would pass within approximately 400 feet of a natural stone arch, which is an area visited for recreation. Also, the surrounding area contains Road 2310 with vehicles traveling at a modest rate of speed perpendicular to the transmission line, thereby allowing opportunities for viewing the arch and canyon surroundings.

The form and line of the Proposed Action would not resemble nearby elements and would create a strong degree of contrast. The Proposed Action would create a weak degree of contrast with respect to color, because the color of the poles is found in the surrounding landscape due to the self-weathering steel poles that would turn to a rust color over time. The texture of the Proposed Action would create a moderate degree of contrast, because it rises above the dominant natural landscape feature (juniper trees).

As shown in Exhibit 3-54, Key Observation Point 9 – View West for the Proposed Action, and Exhibit 3-55, Key Observation Point 9 – View East for the Proposed Action, the project design for the transmission line would meet VRM Class IV objectives for BLM-administered lands because the level of change to the landscape would be mostly moderate.

#### 3.7.6.2 Temporary Effects

Temporary effects for the Proposed Action would be the same as those discussed for the Preferred Alternative.

#### 3.7.6.3 Mitigation

No mitigation measures are proposed in this VRM Class IV area.

**Exhibit 3-54**
## Key Observation Point 9 – View West for the Proposed Action

**Exhibit 3-55**
## Key Observation Point 9 – View East for the Proposed Action

# 3.8 Transportation and Access

## 3.8.1 Methods

The following steps were taken to analyze effects to transportation and access throughout the study area.

- All federal, state, and county roads within the study area were identified using GIS. General assessments were made regarding effects to traffic and to intersections with proposed access roads.
- All unnamed service roads on BLM, New Mexico State Trust, SUIT, and private lands were identified using GIS. In addition, the proposed spur roads that are part of the proposed access network for the Preferred Alternative and the Proposed Action were identified.
- All roads proposed for access were categorized under Tri-State's standard road improvement classifications and right-of-way widths. Tri-State's improvement classifications include:
  - Existing roads (requiring no improvement)
  - Improvement Level I (overland access)
  - Improvement Level II (minor grading)
  - Improvement Level III (moderate to heavy grading)
  - Surface water crossings
- For construction, operation, and maintenance, estimates of the types and numbers of vehicles were collected. These data were used to assess effects to traffic on existing area federal, state, county, tribal, and private roads.
- Traffic data from the New Mexico Department of Transportation, the Colorado Department of Transportation, and La Plata County were considered. Traffic data were unavailable for the SUIT, San Juan County, the BLM, private landowners, and the NMSLO.

Indicators used to evaluate the potential effects to transportation and access include the following:

- How vehicles taking materials and personnel to and from the project site would affect traffic patterns
- How roads would be affected
- Whether construction and operation of the project would cut off access to any previously accessible areas

## 3.8.2 Affected Environment

A network of federal highways, state highways, county roads, private roads, BLM, SUIT, and other agency roads serves the study area as shown in Exhibit 3-56, Existing Roads and Access. Throughout the study area there are a range of single-lane, two-lane, and four-lane roads with varying degrees of improvements and a broad range of users. Descriptions of federal, state, and county roads are provided to support discussions of access road use in the study area. Traffic data are provided when available; however, traffic data are unavailable for the majority of access roads in the study area because they are generally service roads—not federal, state, or county system roads.

**Transportation and Access Study Area**

The study area for transportation and access is the same as the general study area described in Section 3.2, Study Area.

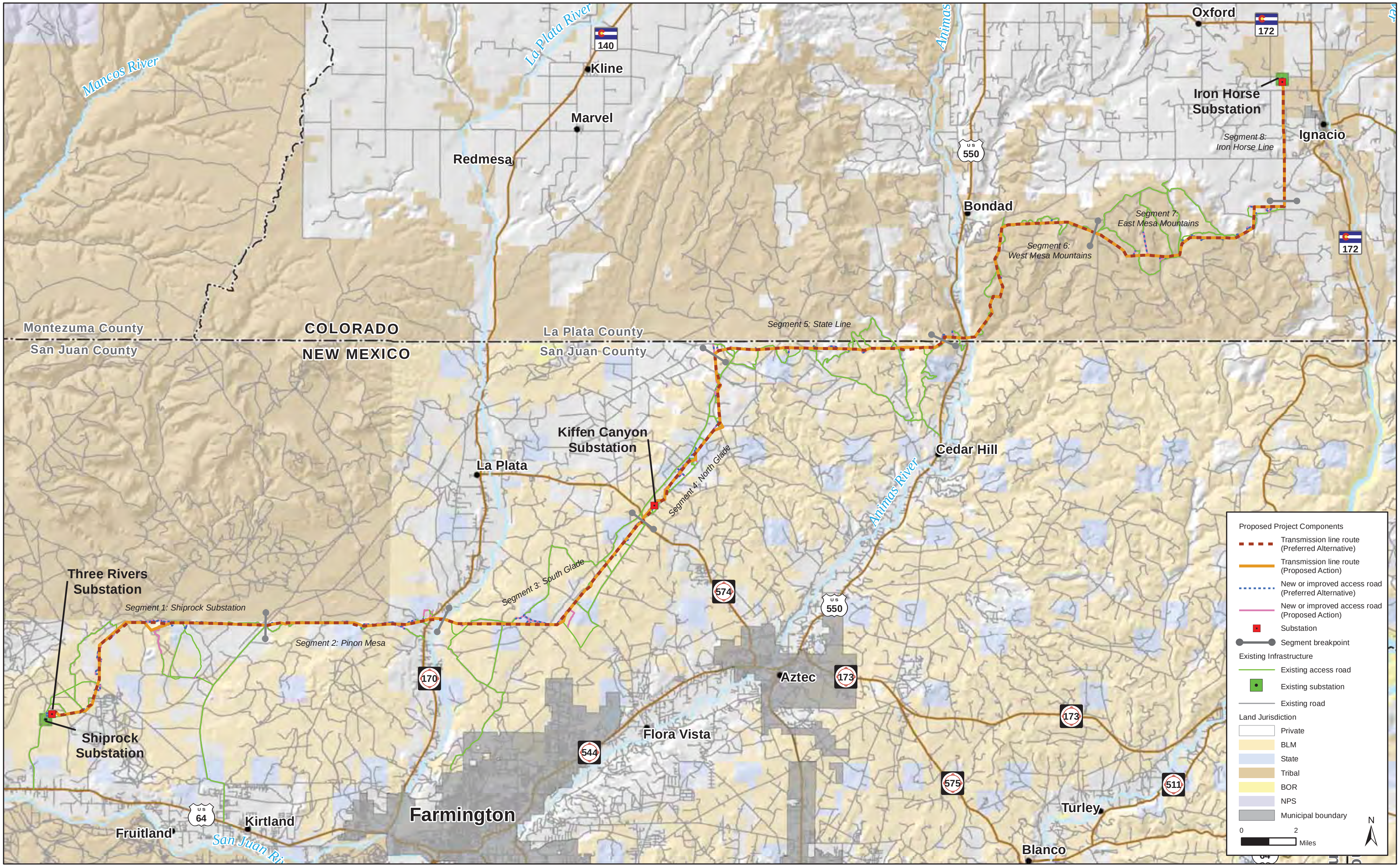
### 3.8.2.1 Federal Highways

There is one federal highway located within the study area shown in Exhibit 3-56: US 550. This interstate highway consists of a four-lane artery, with large shoulders, and connects New Mexico and Colorado.

In Colorado (from the state line to Bondad Hill), the 2011 Colorado Department of Transportation data for US 550 indicate the annual average daily traffic volume is 7,500 vehicles. Of this, 9 percent of the total traffic is associated with commercial trucking. The remaining 91 percent is related to commuters, vacationers, and light commercial activities.

In New Mexico, on US 550 from Aztec to the Colorado state line, the 2011 annual average daily traffic volume is 7,866 vehicles.[32] No data are available for the percentage of heavy truck volume, although it is likely similar to 9 percent listed above for Colorado.

[32] NMDOT 2011




Source: GIS BLM 2012, GIS BLM 2012a,GIS La Plata 2010, GIS Montezuma 2009, GIS RGIS 2010, GIS Tri-State 2013

**Exhibit 3-56 Existing Roads and Access**

#### 3.8.2.2 State Highways

There are two state highways within the study area. Both are in New Mexico and are shown in Exhibit 3-56: NM 170 near the eastern edge of Segment 2 and NM 574 in the central portion of the North and South Glade area between the communities of La Plata and Aztec.

Limited traffic data are available for both state roads. For NM 170 the 2011 annual average daily traffic volume is 4,889 vehicles. For NM 574, the 2011 annual average daily traffic volume is 3,018 vehicles.[33] Both state highways are two-lane roads with narrow shoulders.

#### 3.8.2.3 County Roads

In New Mexico, San Juan (SJ) County roads in the study area include SJ 1500, SJ 1980, SJ 2001, SJ 2300, SJ 2310, SJ 6500, and SJ 6893, all of which are in good condition. San Juan County has not collected road traffic or other data on these seven county roads.[34] In Colorado, La Plata (LP) County roads in the study area include LP 314, LP 318, and LP 319. La Plata County's traffic data indicate that LP 318's 2011 annual average daily traffic volume is 3,361 vehicles. LP 314 and LP 319 had annual average daily traffic volumes of 1,317 and 239 vehicles in 2011, respectively.[35]

#### 3.8.2.4 Roads on BLM Lands

The BLM has jurisdiction over 76.4 miles of existing roads identified in the study area. In general they are partially improved, single-lane native-dirt-surface roads or two-track roads with no improvements. The primary function of these roads is to provide access for natural gas operators, electric utilities, and recreationalists to BLM-managed lands. Most of the roads parallel existing infrastructure such as the Western Area Power Administration's 345 kV transmission line, the City of Farmington's 115 kV transmission line, and the various natural gas pipelines that cross the area.

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[33] NMDOT 2011

[34] San Juan County 2012

[35] La Plata County 2006; Hickman 2012

As with many of the other roads in the study area, none of these are considered system roads or trails by the BLM. As such, the BLM does not maintain traffic data for any of these roadways or two-tracks.

#### 3.8.2.5 Roads on State Trust Lands

There are approximately 18.2 miles of existing roads on New Mexico State Trust Lands in the study area. These roads are generally single lane and unimproved with native dirt surfaces. No traffic data are available. In general, the users are limited to ranchers, natural gas providers, electric utilities, and recreationalists.

#### 3.8.2.6 Roads on SUIT Lands

The SUIT, and the users of its lands (mostly natural gas operators), have an extensive and well-defined network of roads. There are approximately 34.5 miles of roads on SUIT lands in the study area. In general, SUIT roads are 20 to 30 feet wide and have gravel or compacted, native dirt surfaces. A consortium of users contributes to an annual maintenance fund, which facilitates proactive grading and other associated maintenance activities on the entire network of roads.

No traffic data are available for SUIT roads, although it is important to note that use is restricted to members of the SUIT and to users who possess a valid crossing permit issued by the SUIT.

#### 3.8.2.7 Roads on Private Lands

There are approximately 46.4 miles of roads on private lands in the study area. The roads are generally associated with ranching or natural gas operations and consist of partially improved, single-lane native-dirt-surface roads or two-track roads with no improvements. No traffic data exists for these roads.

### 3.8.3 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects to transportation and access would occur with this alternative.

## 3.8.4 Preferred Alternative

### 3.8.4.1 Permanent Effects

Exhibit 3-59, Road Improvements Proposed for the Preferred Alternative, shows where existing roads would be improved and new roads would be needed for construction, operation, and maintenance of the Preferred Alternative. Exhibit 3-57, Access Roads Proposed for the Preferred Alternative, shows the breakdown of existing and proposed access roads on all lands. As designed, existing roads constitute 86 percent (169.1 miles) of the 197.7 miles of proposed access for the Preferred Alternative. Of those roads, 15 percent (25.4 miles) would require ground-disturbing upgrades. The remaining 14 percent of all roads (28.6 miles) are proposed new roads and are primarily located on BLM and SUIT lands, although new spur roads are proposed on private property and New Mexico state lands.

**Exhibit 3-57**
**Access Roads Proposed for the Preferred Alternative**

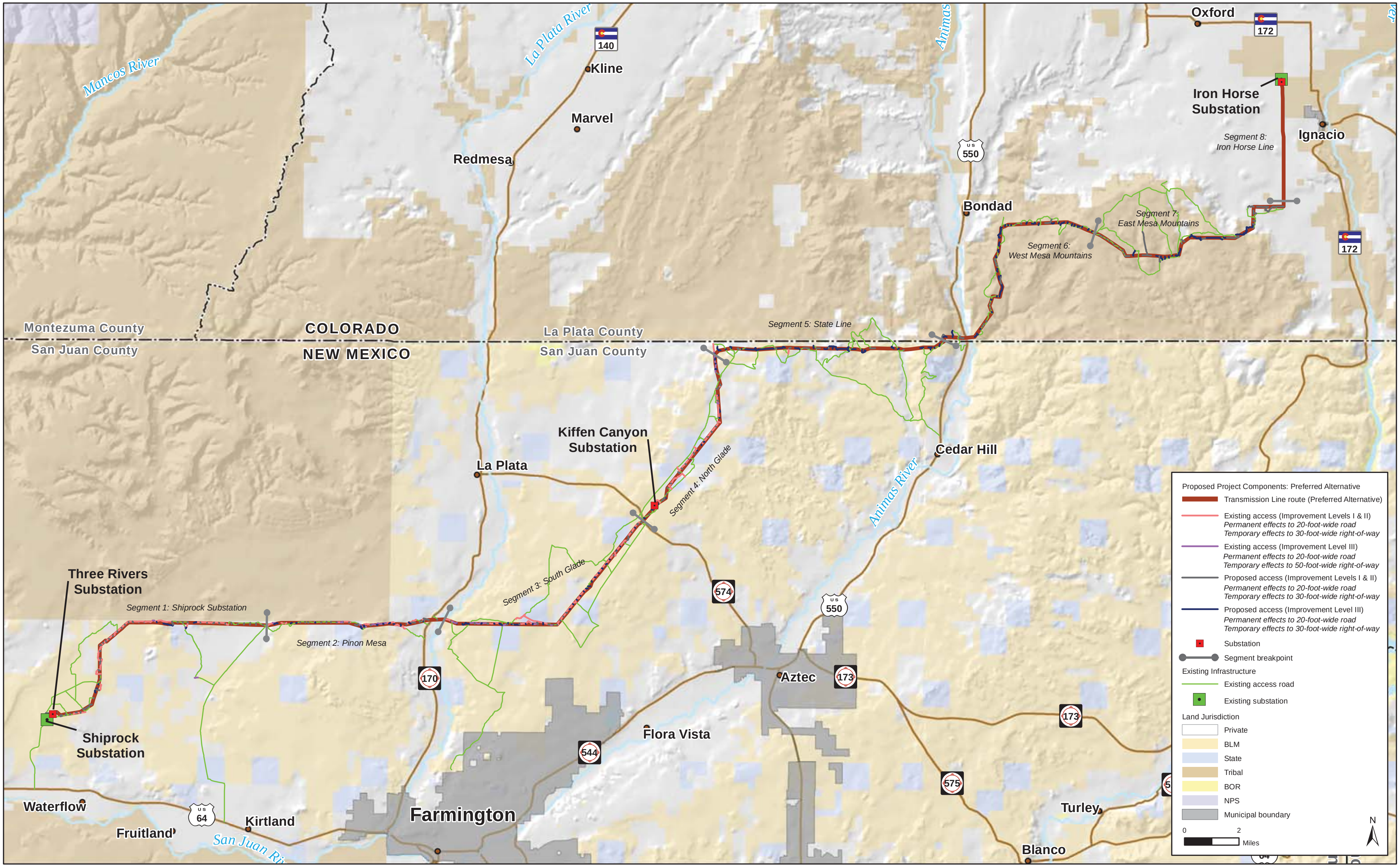
| Road Type | BLM | NMSLO | SUIT | Private | Total |
|---|---|---|---|---|---|
| Existing (miles) | 71.7 | 17.4 | 34.5 | 45.5 | 169.1 |
| Proposed (miles) | 8.4 | 1.7 | 11.6 | 6.9 | 28.6 |
| **Total (miles [*percentage of total*])** | **80.1 (*40.5*)** | **19.1 (*9.7*)** | **46.1 (*23.3*)** | **52.4 (*26.5*)** | **197.7 (*100*)** |

In addition to the existing network of roads, Exhibit 3-58, Permanent Effects from Access Roads for the Preferred Alternative, provides the permanent acreage that would be directly affected to build new roads or improve existing roads.

**Exhibit 3-58**
**Permanent Effects from Access Roads for the Preferred Alternative**

| | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Acreage of permanent disturbance from access roads to be improved (in all classifications) or proposed new access roads.[1] | 54.7 | 16.6 | 28.0 | 31.1 | **130.4** |

[1] *All roads will be approximately 20 feet wide with rights-of-way ranging from 30 to 50 feet.*




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

Exhibit 3-59 Road Improvements Proposed for the Preferred Alternative

Project operation would involve periodic inspection and maintenance of the transmission line and associated access roads. During operation, maintenance crews and vehicles would conduct inspection and maintenance activities. Detailed ground inspections of the entire transmission line system would take place on a semi-annual or annual basis. A crew with a service vehicle, typically a bucket truck, and four-wheel-drive trucks or all-terrain vehicles would patrol the line and make necessary repairs. Personnel and equipment traveling to and from sites for operation would not noticeably affect traffic volumes on local roads. In addition, access roads would be used to access the transmission line in instances where emergency repairs are required. Typically, emergency repairs would be expected to require a bucket truck and four-wheel-drive trucks or all-terrain vehicles.

#### Federal, State, and County Roads

Direct permanent effects to federal and state highways and county roads located within the study area are not anticipated since the Preferred Alternative would not improve or create impediments to these roadways. Traffic volumes from maintenance activities would be negligible and would not have a measurable effect to roads.

#### BLM, New Mexico State Lands, Private, and SUIT Roads

The area that would be directly affected by road improvements on BLM, New Mexico State Trust, and private lands is shown in Exhibit 3-58.

Permanent direct effects that could affect other users of existing roads and transportation networks in the study area would include noise and disruption from the presence of workers and construction equipment during regular maintenance activities. These effects would be infrequent, short-term, and localized. These effects are not expected to be noticeable to roadway users because existing roads in the area currently experience noise and disturbance from maintenance activities related to existing transmission lines and oil and gas development.

### 3.8.4.2 Temporary Effects

Temporary construction effects to transportation and access would primarily be related to the proposed road improvements and new road construction. Exhibit 3-60, Temporary Effects from Access

Roads for the Preferred Alternative, details these temporary effects by land ownership. Direct temporary effects of the Preferred Alternative would include 244.4 acres of total disturbance for access roads.

**Exhibit 3-60**
**Temporary Effects From Access Roads for the Preferred Alternative**

| Road Improvement Category | BLM | NMSLO | SUIT | Private | Total |
|---|---|---|---|---|---|
| Proposed new access roads or access roads to be improved (including Improvement Levels I and II) that require a 30-foot-wide right-of-way (acres) | 54.3 | 19.6 | 17.8 | 30.9 | **122.6** |
| Proposed new access roads or access roads to be improved (including Improvement Levels III and Surface Water Crossings) that require a 50-foot-wide right-of-way (acres) | 46.3 | 8.8 | 40.4 | 26.3 | **121.8** |
| **Total Acres Affected** | **100.6** | **28.4** | **58.2** | **57.1** | **244.4** |

Constructing new roads or improving existing ones would result in temporary direct effects to the right-of-way outside the road surface, potentially including cuts and fills or other features such as wing ditches, water bars, and other associated roadway infrastructure. As discussed in Section 2.2.7.2, Revegetation, temporarily disturbed areas would be regraded, shaped, and smoothed to contours close to the original or naturally appearing contours to mitigate temporary effects, according to the land agency requirements. In addition, as discussed in EPM 16 in Exhibit 2-23, Tri-State or its contractors would repair or reconstruct existing roads or trails if they were damaged by construction activities.

Other direct temporary effects include increased traffic on existing federal, state, county, tribal, and private roadways. There may be infrequent and localized disruptions of vehicle traffic as construction personnel access structure assembly areas; wire-pulling, tensioning and splicing sites; construction yards and staging areas; structure construction sites; substation construction sites; and structures. During construction, heavy and light vehicles would access the area, transporting equipment and personnel to work sites using highways and county roads, along with other roads on BLM, New Mexico State Trust, SUIT, and private lands. Helicopters stringing sock line across roads in advance of pulling conductor and flying sections of structures for installation may require brief (likely less than one hour) road closures. US 550 may be closed for 15 to 20 minutes. Tri-State would work with the appropriate department of transportation to submit a plan discussing construction activities where the proposed transmission line would cross US 550 as discussed in EPM 11 in Exhibit 2-23. Guard structures located at the edges of critical higher traffic roads would be used to mitigate potential events such as sock line or conductor falling onto the road surface. As discussed in EPM 11, appropriate driveway permits, utility crossing permits, and any other associated approvals would be obtained from the relevant land- or road-managing agency prior to construction.

Any temporary increase in traffic would be localized and of a relatively short duration (weeks or months) within the 18- to 24-month construction window. Exhibit 3-61, Temporary Effects from Construction Traffic for the Preferred Alternative and the Proposed Action, details the total increase of traffic on the roads where traffic count data are available, which is similar for both alternatives.

Traffic counts show the temporary effects would be negligible—less than 1 or 2 percent—even if all the construction vehicles were being used at one location simultaneously. The exceptions are two La Plata County roads, LP 314 and LP 319, which would be used to access small sections of the transmission line: 3 miles and 4.3 miles, respectively. LP 314 would be used to support expansion of the Iron Horse Substation. LP 314 and LP 319 would be used to access the Iron Horse line to hang new arms and string conductor. For LP 314 and LP 319 the duration of use would be less than shown in Exhibit 3-61.

**Exhibit 3-61**

## Temporary Effects from Construction Traffic for the Preferred Alternative and the Proposed Action

| Road and Segment | Annual Average Daily Traffic (AADT) (vehicles) | Projected Maximum Daily Traffic from the SJBEC Project[1] (vehicles) | Increase in AADT from the SJBEC Project (percent) |
|---|---|---|---|
| US 550 in Colorado from the state line to Bondad Hill | 7,500 | 58 | 0.8 |
| US 550 in New Mexico from the state line to Aztec | 7,866 | 58 | 0.7 |
| NM 170 from Farmington to the state line (includes the community of La Plata) | 4,889 | 58 | 1.2 |
| NM 574 from La Plata to Aztec | 3,018 | 58 | 1.9 |

**Exhibit 3-61**
### Temporary Effects from Construction Traffic for the Preferred Alternative and the Proposed Action

| Road and Segment | Annual Average Daily Traffic (AADT) (vehicles) | Projected Maximum Daily Traffic from the SJBEC Project[1] (vehicles) | Increase in AADT from the SJBEC Project (percent) |
|---|---|---|---|
| LP 318 (at its intersection with CO 172 near Ignacio) | 3,361 | 58 | 1.7 |
| LP 314 (at its intersection with CO 172 near Ignacio) | 1,317 | 58 | 4.4 |
| LP 319 (at its intersection with LP 318) | 239 | 58 | 24.3 |

*Source: NMDOT 2011, La Plata County 2006, Hickman 2012*

*1 This projected maximum daily traffic is taken from Exhibit 2-20, Personnel and Equipment for Construction of the Proposed Transmission Line, and assumes at least one operator for each vehicle type identified and no more than two construction personnel in each typical pickup truck, resulting in a maximum total of 136 vehicles. This total includes vehicles from all construction phases, even though some phases would not be simultaneous. For example, the geotechnical investigations crew would not be working at the same time as the post-construction cleanup crews or revegetation crews; their work may occur at either end of the 2-year construction period. Further, Tri-State anticipates the workforce would be split into at least two, if not more, segments (possibly between New Mexico and Colorado) and would not all be utilizing the same roads in a given day, therefore the total maximum daily traffic (at a given location) is also split and totals 58.*

Most of the roads where traffic count data are unavailable are roads that typically experience low traffic volumes with infrequent or episodic use. Temporary effects from increased traffic (daily commute patterns of construction workers and the periodic delivery of supplies and materials) on these smaller, uncongested service roads—regardless of land status—would have no noticeable effect on traffic volumes or patterns.

There may be a noticeable effect on SUIT lands where traffic is more common due to the extensive natural gas facilities in the Mesa Mountains. Further, the proposed structures are frequently located closer to service roads, and some are directly adjacent to existing roads. Possible effects from increased traffic volumes during construction would be minimized through the implementation of a construction traffic management plan as discussed in EPM 11 of Exhibit 2-23.

#### 3.8.4.3 Mitigation

No mitigation measures are proposed.

## 3.8.5 Proposed Action

### 3.8.5.1 Permanent Effects

The Proposed Action would have similar permanent effects as those described for the Preferred Alternative. The proposed roadway network for the Proposed Action is shown in Exhibit 3-64, Road Improvements Proposed for the Proposed Action.

As detailed in Exhibit 3-62, Access Roads for the Proposed Action, The Proposed Action would have a larger roadway network of 203.6 miles as compared to the network of 197.7 miles of the Preferred Alternative (Exhibit 3-57, Access Roads Proposed for the Preferred Alternative). In addition, the Proposed Action includes the construction of 28 miles of new roadways, which is slightly less than the Preferred Alternative, which would construct 28.6 miles of new roadways.

**Exhibit 3-62**
**Access Roads for the Proposed Action**

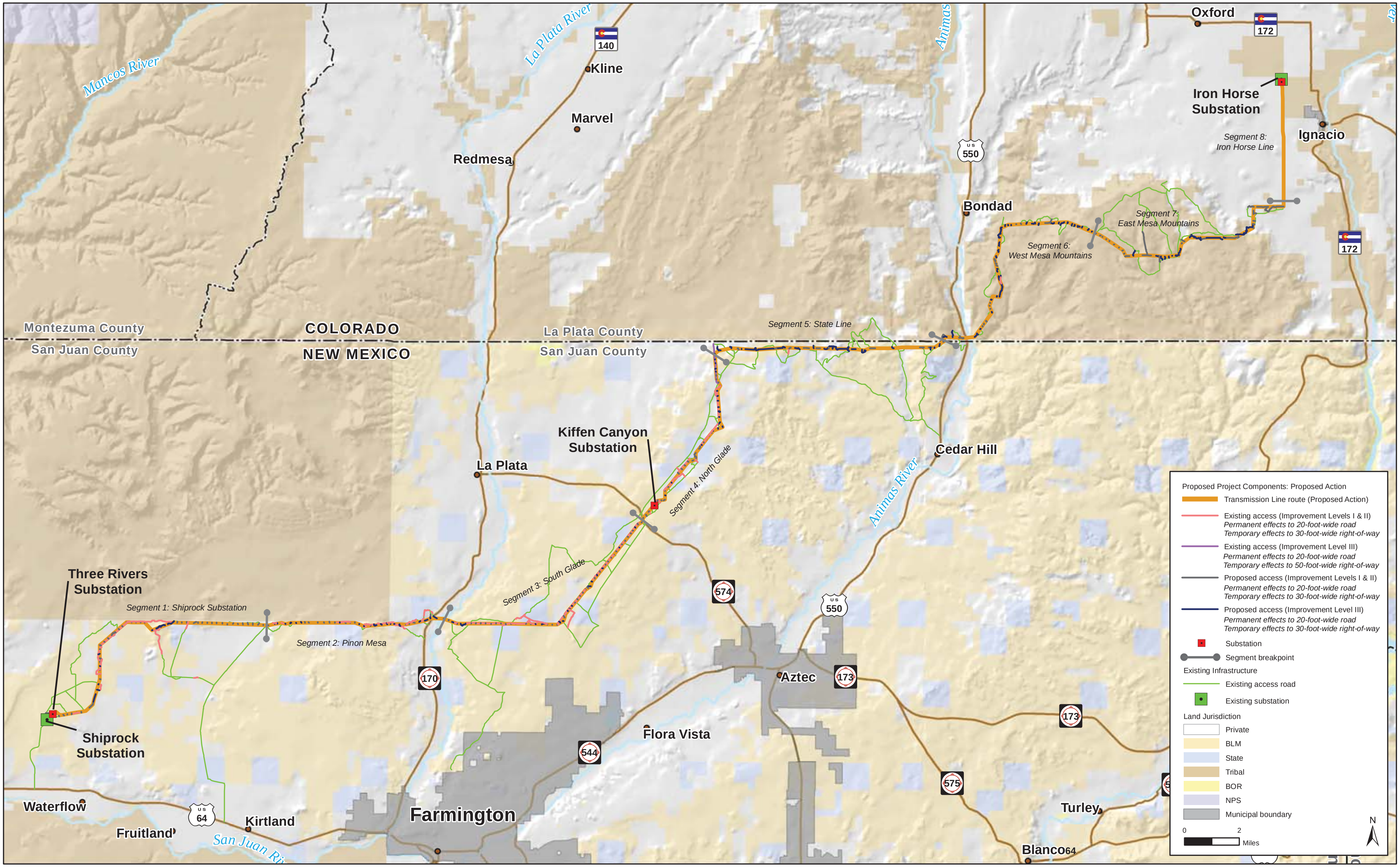
| Road Type | BLM | NMSLO | SUIT | Private | Total |
|---|---|---|---|---|---|
| Existing (miles) | 76.4 | 18.2 | 34.5 | 46.4 | 175.6 |
| Proposed (miles[) | 8.3 | 1.2 | 11.6 | 6.9 | 28.0 |
| **Total (miles [percentage of total])** | **84.7 (*41.6*)** | **19.5 (*9.6)*** | **46.1 (*22.6*)** | **53.3 (*26.2*)** | **203.6 (*100*)** |

The Proposed Action would require disturbance of a total of 132 acres for access road improvements or new roadways as shown below in Exhibit 3-63, Permanent Effects from Access Roads for the Proposed Action. In addition, the Proposed Action would permanently affect 1.6 more acres than the Preferred Alterative (as detailed in Exhibit 3-58, Permanent Effects from Access Roads for the Preferred Alternative), because it includes 5.9 more miles of access roads as compared to the Preferred Alternative.

**Exhibit 3-63**
**Permanent Effects from Access Roads for the Proposed Action**

| | BLM | NMSLO | SUIT | Private | Total |
|---|---|---|---|---|---|
| Acreage of permanent disturbance from access roads to be improved (in all classifications) or proposed new access roads.[1] | 56.6 | 14.8 | 27.4 | 33.1 | **132.0** |

[1] *All roads will be approximately 20 feet wide with rights-of-way ranging from 30 to 50 feet.*




Source: GIS BLM 2012, GIS CDOT and SJC 2012, GIS Tri-State 2013

**Exhibit 3-64 Road Improvements Proposed for the Proposed Action**

#### 3.8.5.2 Temporary Effects

Temporary effects from the Proposed Action would be similar to those described for the Preferred Alternative. The Proposed Action would disturb a total of approximately 240 acres as shown in Exhibit 3-65, Temporary Effects from Access Roads for the Proposed Action. These temporary effects, however, are 4 acres fewer than the Preferred Alternative (as detailed in Exhibit 3-60, Temporary Effects from Access Roads for the Preferred Alternative) because the Proposed Action includes fewer access roads with 50-foot-wide rights-of-way (and potential for more temporary effects), even though the total roadway network for the Proposed Action is larger than what is proposed for the Preferred Alternative.

**Exhibit 3-65**
**Temporary Effects From Access Roads for the Proposed Action**

| Road Improvement Category | BLM | NMSLO | SUIT | Private | Total |
|---|---|---|---|---|---|
| Proposed new access roads or access roads to be improved (including Improvement Levels I and II) that require a 30-foot-wide right-of-way (acres) | 63.8 | 21.2 | 16.9 | 32.5 | **134.4** |
| Proposed new access roads or access roads to be improved (including Improvement Levels III and Surface Water Crossings) that require a 50-foot-wide right-of-way (acres) | 35.2 | 1.6 | 40.5 | 28.7 | **106.0** |
| **Total Acres Affected** | **99.0** | **22.8** | **57.4** | **61.2** | **240.4** |

#### 3.8.5.3 Mitigation

No mitigation measures are proposed.

## 3.9 Geology and Geologic Hazards

### 3.9.1 Methods

Analysts identified locations in the study area with potential geologic hazards by reviewing existing data sources. Information reviewed included GIS files from the US Geological Survey (USGS)[36] and the Office of Pipeline Safety (OPS) National Pipeline Risk Index Technical Report (Produced by FEMA for OPS, 1996).[37]

[36] USGS 2007

[37] FEMA 1996

Potential effects from earthquakes, landslides, shallow bedrock, and subsidence were evaluated. Methods for determining possible geologic hazards and analyzing potential effects include:

- **Landslide hazard** – Landslide hazards were identified by overlaying the proposed transmission line, substations, and access roads with proposed improvements on OPS GIS data. Landslide hazards were determined using the National Disaster Study National Pipeline Risk Index Technical Report. This report ranks landslide hazards nationally based on the presence of swelling clay, landslide incidence, landslide susceptibility, and land subsidence. Landslide rankings of 85 to 100 were assumed to have a high risk of landslides.
- **Earthquake hazard –** The USGS Quaternary Fault and Fold Database,[38] National Seismic Hazard Maps,[39] and 2008 Interactive Deaggregation[40] websites were all used to assess the seismic hazard for the SJBEC Project.
- **Subsidence** – Areas of potential subsidence were established by identifying areas of coal mining or the production of coal bed methane.
- **Shallow bedrock** – Areas of shallow bedrock were determined by reviewing USDA Soil Surveys.[41] The USDA Soil Surveys extend to a depth of 5 feet and indicate if bedrock is present. Any soil unit with bedrock identified at a depth of 5 feet or less was identified as having shallow bedrock.

## 3.9.2 Affected Environment

### 3.9.2.1 Regional Geologic Setting

The study area is located within the San Juan Basin, which is the dominant structural feature within the four corners area and the east-central Colorado Plateau. It covers more than 26,000 square miles of New Mexico and Colorado. The portion of the study area that begins in Shiprock is located within a central, bowl-like

**Geology and Geologic Hazards Study Area**

The study area for geology and geologic hazards is the same as the general study area described in Section 3.2, Study Area.

[38] USGS et al. 2010

[39] USGS 2008a

[40] USGS 2008b

[41] NRCS 2012a and 2012b

depression. It is composed of over 2.5 miles of layers of sedimentary rocks created from deposition over the past two million years. The boundaries of the basin are characterized by uplifts that brought older, igneous formations to the surface. The northern edge typically has a steep slope leading from the uplift to the central basin.

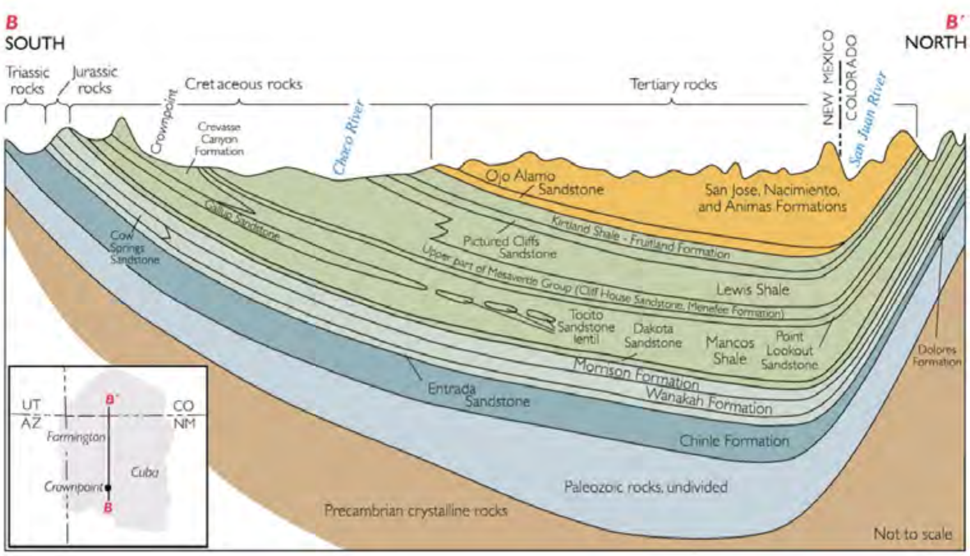
**What is a syncline?**

In geology, a syncline is a fold with younger layers closer to the center of the structure.

Exhibit 3-66, North-South Cross Section of the San Juan Basin, shows a north-south cross section of the San Juan Basin, a typical syncline with bowl-like lake layers. The steeper slope on the northern edge has caused the younger outcrops to be shifted towards the north. Older formations will be exposed at the edges of the basin. In Exhibit 3-66 below, the study area spans from the Pictured Cliffs Sandstone southern edge, across the New Mexico-Colorado border, to the northern edge of the San Jose, Nacimiento, and Animas Formations.

**Exhibit 3-66**

**North-South Cross Section of the San Juan Basin**




*Diagrammatic south to north cross-section of San Juan Basin. Source: Brister and Hoffman 2002*

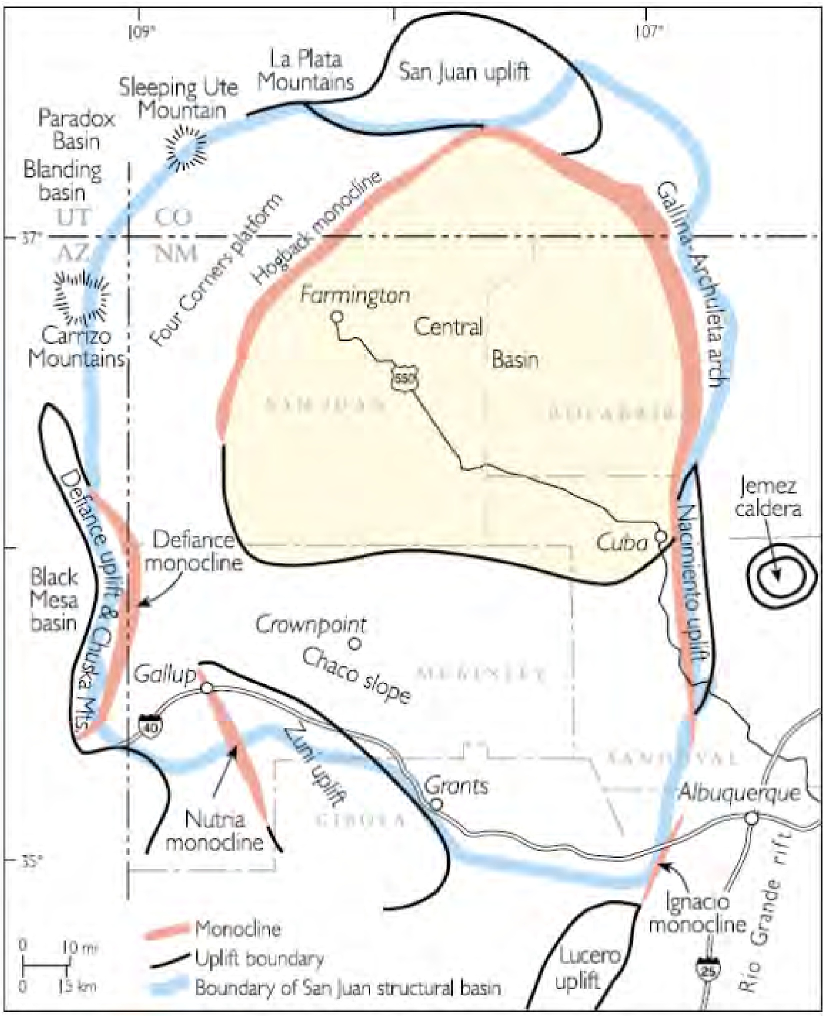
### 3.9.2.2 Geologic Structure

The study area is primarily located within the central basin although sections of it may encroach upon the Hogback monocline as seen in Exhibit 3-67, Structural Features of the San Juan Basin and Adjacent Areas. The Hogback monocline, composed of

Mesaverde sandstone, is the most distinctive basin boundary and has a steep descent into the central basin from the surrounding structures. One of these structures is the Four Corners Platform, which is northeasterly trending, 110 miles long, and 20 to 40 miles wide. It is highest on the northern and southern ends with a structural relief of 4,000 feet above the central basin. The adjacent San Juan Uplift is also a distinctive formation with a basement of Precambrian rock that was pushed upwards and covered with volcanic piles during the Cretaceous period.[42]

**Exhibit 3-67**

## Structural Features of the San Juan Basin and Adjacent Areas




*Source: Brister and Hoffman 2002*

[42] Kelley 1957

The general movement of the region over time has been characterized by subsidence of the central basin and uplift of the surrounding rim. The basin is more pronounced in the north and levels out towards the south. Tangential folds are present on the rim as downwarp occurred from shrinkage of the basin boundary. Folds within the basin tend to be radial as the rock layers were pulled into the central subsidence. The nested bowls of the basin creates an environment where each layer will slide against each other creating folds in the weak units and is known as drag folding. Additionally, due to consistent movement beginning after the Precambrian, the intensity of the folds increases with depth.[43]

### 3.9.2.3 Outcropping Formations

The study area is located on the northeastern edge of the San Juan Basin and generally follows the outcropping formation sequence as shown in Exhibit 3-66. These are the bedrock formations that are exposed or lie under the soils and could have the greatest effect on project design and construction. Formations present in the study area are listed below in order of geologic age and correspond to the location of the study area from Shiprock to Ignacio because of the basin structure:[44]

- Lewis Shale
- Pictured Cliffs Sandstone
- Fruitland Formation and Kirtland Shale
- Animas Formation
- Nacimiento Formation
- Ojo Alamo Sandstone
- San Jose Formation
- Quaternary Alluvium

**Outcropping Formations**

Descriptions of these formations are included are derived from *Geologic Framework of the San Juan Structural Basin in New Mexico, Colorado, Arizona, and Utah with Emphasis on Triassic through Tertiary Rocks*[45] and *Hydrogeology and Water Resources of San Juan Basin, New Mexico.*[46]

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[43] Kelley 1950
[44] USGS 2007
[45] Craigg 2001
[46] Stone et al. 1983

#### 3.9.2.4 Lewis Shale

Lewis Shale typically produces topography that is flat, with broken land leading to badlands. Erodibility depends on the amount of sandstone and siltstone interbeds. Pure shale will have defined bedding planes that will lead to slope instability. It consists of light to dark gray and black shale and interbeds of silty limestone, siltstone, fine grained limestone, and possible calcareous and bentonite layers. Thickness increases to the north of the basin with the maximum thickness in Colorado approaching 2,400 feet. It is also a confining unit between the Cliff House and Pictured Cliff aquifers.

**What are badlands?**

Badlands are a type of dry terrain where softer sedimentary rocks and clay-rich soils have been extensively eroded by wind and water.

The Lewis Shale represents the last instance that the San Juan Basin area was flooded in the late Cretaceous by the Western Interior Seaway.[47] This geologic unit was deposited in still waters below wave-base.

#### 3.9.2.5 Pictured Cliffs Sandstone

The Pictured Cliffs Sandstone will typically form cliffs, mesas, and butte caps. It is relatively erosion resistant and can form steep slopes. Grains will increase in size from the lower to upper members. It is found in thick beds with thin interbeds of shale. It is expected to be about 400 feet thick in the study area, and is located in the north-central portion of the basin. It is an aquifer throughout the basin but does not have a high yield.

The Pictured Cliffs Sandstone is composed of interbedded fine to very fine-grained sandstone and gray silty shale.[48] This geologic unit was deposited along a beach of a regressing shoreline of the Western Interior Seaway and intertongues landward with the Fruitland Formation and seaward with the Lewis Shale.[49]

#### 3.9.2.6 Fruitland Formation and Kirtland Shale

The Fruitland Formation and Kirtland Shale are found together with the Fruitland Formation being the lower member. The formations can form steep slopes if capped by sandstone but will typically produce flat badlands if outcropping. Both consist of

[47] Fassett and Hinds 1971; Young 1973

[48] Flores and Erpenbeck 1981

[49] Young 1973

sequences of nonmarine sandstone, siltstone, shale, and claystone. Coal beds and carbon-rich shales can be found within the Fruitland formation. Thickness ranges from zero on the eastern side to 2,000 feet in the northwest; and the study area will fall somewhere in between. The Fruitland Formation was deposited on a delta plain that prograded over the regressing beachfront of the Western Interior Seaway.[50]

#### 3.9.2.7 Animas Formation

The Animas Formation is composed of fluvial and volcaniclastic deposits and is only found in the La Plata and Animas River Valley. It is a combination of tuff, sandstones, conglomerates, and shales of various colors. It has been recorded to be about 230 feet thick around Durango and increases to 2,700 feet at the state border.

#### 3.9.2.8 Nacimiento Formation

The Nacimiento Formation is a highly erosive formation that will typically decay to badlands or low, rounded hills. It is composed of sediments from lake beds and consists of black and gray shale with pickets of white, medium to coarse grained arkosic sandstone. The shale has also been known to produce swelling clays. It is expected to be approximately 500 feet thick in the study area. The formation can produce local aquifers as the sandstone lenses can hold water.

#### 3.9.2.9 Ojo Alamo Sandstone

The Ojo Alamo Sandstone will form cliffs, dip slopes, low rounded hills and will cap mesas. It was deposited in stream channels and flood plains and formations remain in that configuration. It consists of layers of sandstone and conglomerate sandstones with shale lenses. Grain size varies from medium to pebbles. The Ojo Alamo Sandstone is a profitable aquifer and will produce springs where it outcrops.

#### 3.9.2.10 San Jose Formation

The San Jose Formation conformably overlies the Nacimiento Formation in the northern San Juan Basin near the Colorado-New Mexico border. The San Jose Formation is the youngest sedimentary formation in the San Juan basin and outcrops throughout. It consists of four members; the Cuba Mesa, Regina, Llaves, and

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[50] Lucas and Mateer 1983

Tapicitos. Sandstone, siltstone, and shale layers are interbedded. Sandstone has coarse grains, conglomerates and silicified wood. Swelling clay has been identified from popcorn weathering of the rocks.

#### 3.9.2.11 Quaternary Alluvium

Alluvium in the study area is located near the Animas River valley. It is primarily composed of mixtures of gravel, sand, silt, and clays. In the Animas River Valley it can range from 40 to 100 feet thick and will form terrace deposits consisting of boulders with a maximum diameter of 12 inches and of igneous and metamorphic origin.

### 3.9.3 Geologic Hazards

#### 3.9.3.1 Seismic Hazards

The study area has a low risk for seismic hazards. The USGS Quaternary Fault and Fold Database[51], does not list any active faults in the study area. In addition, according to the National Seismic Hazard Maps[52], strong ground motion is not a hazard to the area.

**Appendix G, Geology and Soils**

Appendix G provides detailed maps of the study area and shows specific seismic hazard areas.

Additionally, the USGS 2009 Probabilistic Seismic Hazard Model[53] predicts the probability of events greater than particular magnitude occurring in a specific area. Exhibit 3-68, Map of Landslide Hazard Risk by Segment, shows that there is a 0.00 percent probability of an event with a magnitude greater than 6 occurring in a 50-kilometer radius of the study area in the next 50 years.

Additional seismic hazards include surface faulting, liquefaction, and slope stability. Surface faulting is not a concern since there are no active faults in the project area. Liquefaction occurs in saturated, loose soils when dynamic loading causes the water pore pressure to exceed the contact pressure between soil grains, resulting in soil collapse. This is not expected to be a hazard as the bedrock is shallow in most areas and the water table is deep. Slope stability is discussed below in the landslides section.

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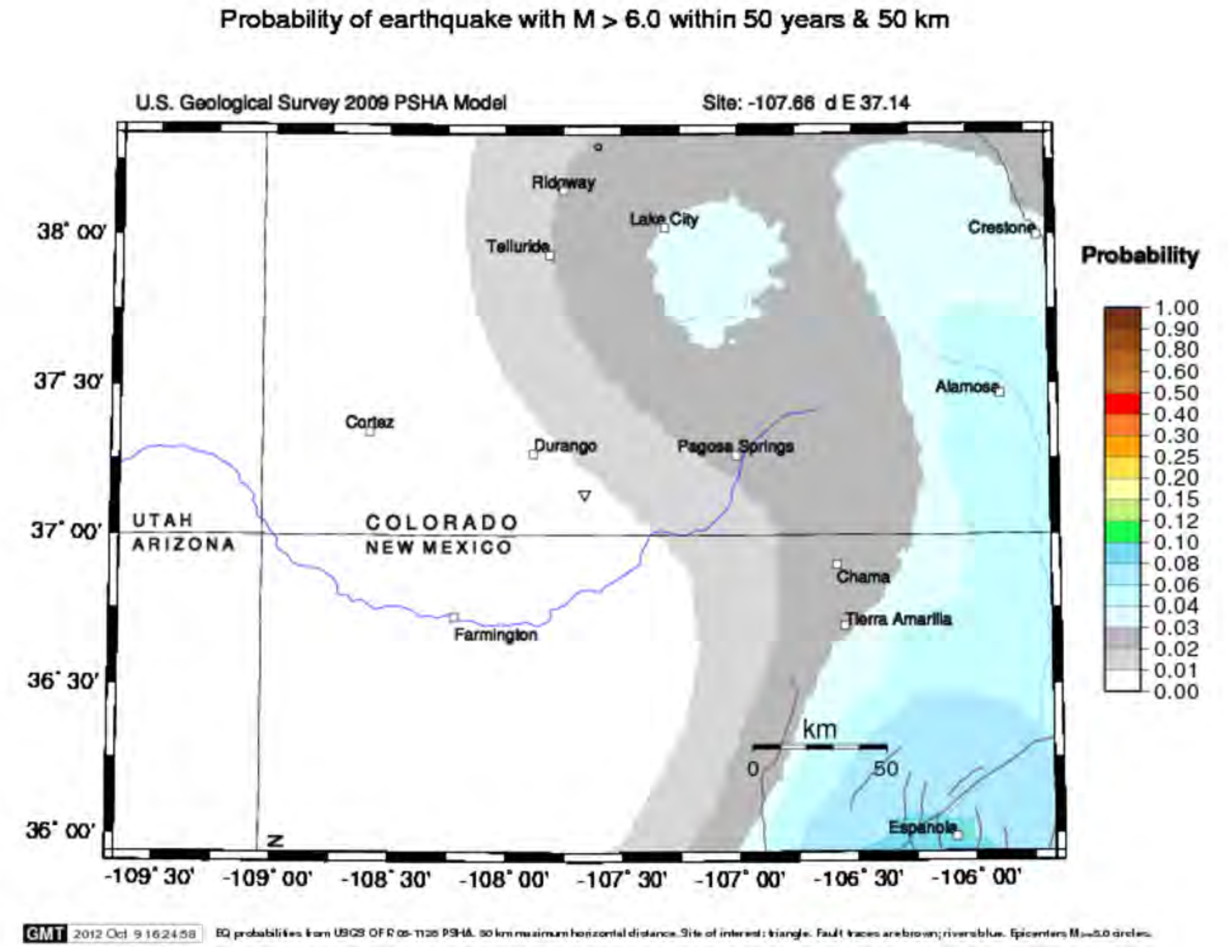
[51] USGS et al. 2010

[52] USGS 2008a

[53] USGS 2009

**Exhibit 3-68**
## Map of Landslide Hazard Risk by Segment




*https://geohazards.usgs.gov/eqprob/2009/index.php, Lat. 37.14436111, Long. -107.6626944*

### 3.9.3.2 Landslides

Landslides, including mudflows, mudslides, rock flows, rock slides, rock falls, and debris flows could occur in some portions of the study area. Landslides are often triggered by other natural events, including earthquakes, or precipitation sufficient to cause earth movements. The Office of Pipeline Safety (OPS) Study was used to evaluate effects from landslides. The OPS data provide landslide hazard rankings for the United States, including portions of New Mexico and Colorado near the proposed transmission lines. The OPS report utilized information from USGS and US Natural Resources Conservation Service (NRCS) for locations of swelling clay, landslide incidence, landslide susceptibility, and land subsidence. Based on those four factors, landslide hazard rankings were assigned from zero to 100, where zero represents the lowest ground failure hazard and 100 represents the highest. Landslide hazard rankings of 85 to 100 were assumed to have high risk of landslides, rankings between 70 and 84 were considered to have medium risk, and areas less than 70 were assumed to have low risk. To identify existing landslide potential, the study area was overlaid on the OPS data to identify the percent of the segment within each landslide risk category. Exhibit 3-69, Landslide Hazard Risk by Segment, presents the percent of low, medium, and high landslide risk within the study area by segment (Exhibit 3-3 shows the location of each of the segments.)

**Exhibit 3-69**
**Landslide Hazard Risk by Segment**

| Segment | Landslide Hazard Rankings by Percent of Analysis Area | | |
| --- | --- | --- | --- |
| | Low <70 | Medium 70 to 84 | High 85 to 100 |
| 1 | 100 | – | – |
| 2 | 100 | – | – |
| 3 | 100 | – | – |
| 4 | 100 | – | – |
| 5 | 100 | – | – |
| 6 | 50 | 25 | 25 |
| 7 | – | – | 100 |
| 8 | – | 60 | 40 |

### 3.9.3.3 Subsidence

Subsidence is the vertical sinking of earth, typically because of a natural or man-made void in underlying rock formations. Geologic areas with extensive limestone caves or large natural voids possess the potential for natural subsidence. Human-caused subsidence occurs in areas overlying extensive underground mine workings or in areas of aquifer drawdown or removal of other fluids, such as natural gas or crude oil. Underground coal mines can be particularly susceptible to subsidence because of their large extent.

The current subsurface coal mining operations northeast of Farmington do not advance beneath the study area. Some areas of reclaimed land from surface mining activities exist along Segment 1.

No evidence to date has been found that ground subsidence has resulted from the production of coal bed methane in the San Juan Basin. Additionally, no noticeable or measurable aquifer compression or ground subsidence has been observed in the San Juan Basin to date.

### 3.9.3.4 Shallow Bedrock

Much of the study area is located on soil units that are very shallow or are considered outcropping rock. The USDA Soil Surveys[54] only analyze soils to a depth of 5 feet. Using available data, any of the soil units with bedrock at a depth above 5 feet are considered to be shallow (see Exhibit 3-70, Depth to Bedrock).

Rock hardness varies depending on the geologic unit and location. Geologic formations likely to make augering difficult are the Pictured Cliffs Sandstone, the Ojo Alamo Sandstone, and the San Jose Formation.

**Exhibit 3-70**

**Depth to Bedrock**

<table>
<tr><th rowspan="3">Segment</th><th colspan="7">Depth to Bedrock (Percent by Segment)[1]</th></tr>
<tr><th colspan="6">Shallow Bedrock</th><th></th></tr>
<tr><th>0–10″</th><th>10–20″</th><th>20–30″</th><th>30–40″</th><th>40–50″</th><th>50–60″</th><th>>60″</th></tr>
<tr><td rowspan="2">1</td><td colspan="2">54.1%</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>45.9%</td></tr>
<tr><td rowspan="4">2[2]</td><td>7.6%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">50.9%</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="5">9.6%</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>32.0%</td></tr>
<tr><td rowspan="3">3[2]</td><td colspan="2">36.7%</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">11.5%</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>51.7%</td></tr>
<tr><td rowspan="2">4</td><td></td><td colspan="5">37.3%</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>62.7%</td></tr>
<tr><td rowspan="3">5[2]</td><td colspan="2">52.3%</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="5">32.2%</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>15.5%</td></tr>
<tr><td rowspan="4">6</td><td>3.2%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>78.0%</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="2">5.3%</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>13.6%</td></tr>
</table>

[54] NRCS 2012a; NRCS 2012b

**Exhibit 3-70**

## Depth to Bedrock

<table>
<tr><th rowspan="3">Segment</th><th colspan="7">Depth to Bedrock (Percent by Segment)[1]</th></tr>
<tr><th colspan="6">Shallow Bedrock</th><th></th></tr>
<tr><th>0–10″</th><th>10–20″</th><th>20–30″</th><th>30–40″</th><th>40–50″</th><th>50–60″</th><th>>60″</th></tr>
<tr><td rowspan="3">7</td><td></td><td>28.5%</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="2">1.0%</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>70.5%</td></tr>
<tr><td rowspan="3">8</td><td></td><td>8.5%</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="2">7.6%</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>83.9%</td></tr>
</table>

1 *All data was acquired from the USDA/NRCS Soil Surveys which extend to a depth of 5 feet (60″). For the purpose of this study we have defined shallow bedrock as occurring anywhere from the surface to 5 feet below ground surface; i.e., in the range of the referenced soil surveys.*

2 *Percentages were calculated as the percent that each soil complex comprises of the segment alignment. Each soil complex with shallow bedrock has a range over which the top of bedrock is expected to be encountered and is represented by the shading above. Shading overlaps because bedrock depth ranges of each soil complex overlap.*

### 3.9.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, there would be no effects to the geologic environment, or effects from geologic hazards.

### 3.9.5 Preferred Alternative

#### 3.9.5.1 Permanent Effects

Construction of the proposed transmission line structures, access roads, and substations could directly affect landforms and the geologic environment by:

- Destabilizing nearby landforms and slopes, which can cause landslides
- Disturbing an already weak surface layer above underground voids, which can cause subsidence
- Removing soil at the base of an unstable slope, which can decrease slope stability

These effects would be both temporary and permanent; however, risks from induced landslides would be highest during construction. The risks of landslides would be less during operation than those during construction because areas disturbed during construction would be stabilized. Areas with a high risk for landslides include about 50 percent of Segment 6, all of Segment 7, and about 40 percent of Segment 8.

The possible risks and effects listed above would be avoided or minimized by evaluating geotechnical conditions before construction as described in Chapter 2 and EPM 9. Information obtained during these evaluations would be used to design the SBJEC Project to avoid or minimize possible geotechnical risks and effects to the surrounding landscape.

In addition, blasting activities could permanently affect area geology by increasing the risk of uncontrolled explosions caused by unknown underground pockets of methane from coal beds. This risk is expected to be low and would be avoided or minimized through the blasting plan that would be prepared for the project as described in Exhibit 2-23, EPM 74.

Geologic hazards in the study area could indirectly affect the proposed structures, access roads, and substations once they are built. There would be a higher risk of effects from geologic hazards during operation than during construction because of the longer time interval for operation. As described in Section 3.9.3.1, Seismic Hazards, the study area has a low risk for earthquakes. According to the National Seismic Hazard Maps, strong ground motion is not a significant hazard. Using the USGS 2008 Interactive Deaggregations website to study the proposed placement of the transmission line on a rock site, analysts estimated an event with a mean return time of 2,475 years to have a peak ground acceleration less than 0.07 g[55] or 7 percent of gravitational acceleration. A mean return time of 2,475 years corresponds to a 5 percent chance of exceeding the projected ground motion in a 50-year period. Given the consequences of failure and the structures involved, a peak ground acceleration of 0.07 g is a very low ground motion and would not be expected to affect stability.

Additional seismic hazards include surface faulting, liquefaction, and subsidence. Surface faulting is not a concern since there are no

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[55] Where g = the acceleration due to Earth's gravity, equivalent to g-force.

active faults in the project area. Liquefaction is not expected to be a hazard because the bedrock is shallow in most areas and the water table is deep. The potential risk from subsidence is limited to a small section of Segment 1 where there are coal mining operations. The subsurface coal mining operations do not advance beneath the study area in Segment 1; however, there are some areas of reclaimed land from surface mining activities along Segment 1. The 50-year operations interval could also result in additional mining that could render more areas subject to subsidence risks. This risk would be avoided or minimized by talking with mine owners as described in EPM 8 to identify the location of underground voids and areas of possible subsidence.

#### 3.9.5.2 Temporary Effects

As described above under permanent effects, the risk of temporary indirect effects during construction from geologic hazards such as earthquakes and subsidence are expected to be low.

Construction of the proposed transmission line structures, access roads, and substations could directly affect landforms and the geologic environment. As discussed above, these effects would be both temporary and permanent; however, risks from landslides would be highest during construction. Direct effects from these activities may include:

- Nearby landforms and slopes could become unstable, which can cause landslides.
- Excavation for transmission line structures, substations, or access roads could disturb an already weak surface layer above underground voids, which can cause subsidence.
- Soil removal at the base of an unstable slope could decrease slope stability and cause a landslide.
- Mid-slope road construction, concentration of drainage water on unstable ground, and removal of vegetation during construction could trigger landslides.

- Minor surface failures could result from the presence of large vehicles on slopes.
- Drill rigs used for assessment or excavation would disturb bedrock and create microfractures.

In addition, blasting activities can come in contact with underground pockets of methane from unknown coal beds and create a dangerous, uncontrolled explosion. This risk is expected to be low; however, and would be avoided or minimized through the development of the blasting plan as described in, EPM 74.

Many of these effects and landslide risks would be avoided with informed construction planning and analysis. The extent of these effects would be assessed and minimized on a site-specific basis as the design progresses and site investigations are performed. Appendix G, Geology and Soils, presents the location of potential geologic hazards, so as the design progresses, engineers and scientists would develop solutions to protect the surrounding environment. As described in EPM 9 in Exhibit 2-23, geotechnical conditions would be evaluated at proposed structure locations so foundations would be designed to minimize possible effects.

#### 3.9.5.3 Mitigation

No mitigation measures are proposed.

### 3.9.6 Proposed Action

#### 3.9.6.1 Permanent Effects

Permanent effects for the Proposed Action would be the same as described above for the Preferred Alternative.

#### 3.9.6.2 Temporary Effects

Temporary effects for the Proposed Action would be the same as described above for the Preferred Alternative.

#### 3.9.6.3 Mitigation

No mitigation measures are proposed.

# 3.10 Paleontology

## 3.10.1 Regulatory Framework

**Paleontology Study Area**

The study area for paleontology is the same as the general study area described in Section 3.2, Study Area.

Paleontological resources are recognized as nonrenewable scientific resources and are afforded protection by federal statutes and policies. The BLM has a system of rating the sensitivity of geologic units known as Potential Fossil Yield Classification (PFYC).[56]

The PFYC system is a five-tiered system that classifies geologic units based on the relative abundance of vertebrate fossils or scientifically significant invertebrate and plant fossils and their potential to be adversely affected, with a higher class number indicating a higher potential level. This classification system is applied to the geologic formation, member, or other distinguishable map unit, preferably at the most detailed level possible. This approach recognizes the direct relationship that exists between paleontological resources and the geologic units within which fossils are entombed. By knowing the geology of a particular area and the fossil productivity of particular geologic units that occur in the area, it is possible to predict where fossils may be found. Each class is defined briefly as follows:

- Class 1 – Very Low Potential. Geologic units not likely to contain recognizable fossil remains. These units include igneous, metamorphic, and Precambrian rocks.
- Class 2 – Low Potential. Sedimentary geologic units not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils. These units include diagenetically altered formations or Holocene sediments.
- Class 3 – Moderate or Undetermined Potential. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence, or sedimentary units of unknown fossil potential. Class 3 is divided into two parts:
  - Class 3a – Moderate Potential. Units are known to contain vertebrate fossils or scientifically significant nonvertebrate

[56] BLM 2007

  fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils may be found in the area.
  - Class 3b – Undetermined Potential. Units exhibit geologic features that suggest significant fossils could be present, but little information about the paleontological resources of the unit or area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant fossils.

- Class 4 – High Potential. Geologic units that contain a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability.

- Class 5 – Very High Potential. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils.

### 3.10.2 Methods

The BLM New Mexico State Office and the BLM FFO were consulted to obtain local refinements of the PFYC system. The PFYC is discussed in Section 3.10.1, Regulatory Framework, and was used to assess the paleontological resource sensitivity of geologic units crossed by the Preferred Alternative and the Proposed Action. The BLM Colorado State Office did not have records of any known fossil localities within the study area. The BLM FFO provided information on known fossil resources and recorded fossil localities in the vicinity of the study area. Other data sources include:

- The New Mexico Museum of Natural History and Science provided paleontological locality information in the vicinity of the study area.

- The Paleobiology Database maintained by the University of California-Santa Cruz provided data for fossil collections from geologic units occurring in the project area.

- The scientific literature concerning the paleontological resources of the San Juan Basin provided descriptions of paleontological resources found within the study area.

The BLM's PFYC system was used to determine the paleontological sensitivity (likelihood of containing scientifically significant fossils) of the geologic units crossed by the SJBEC Project. Local refinements to the PFYC system provided by the FFO were applied to the statewide system to better reflect the elevated potential for fossil discovery in the San Juan Basin. This analysis was augmented with paleontological locality data from state and national databases and the scientific literature.

The indicator of direct paleontological resource effects includes any ground-disturbing activities where geologic units with moderate/undetermined to very high paleontological sensitivity (PFYC ratings of 3, 4, or 5) are mapped. The indicator of indirect paleontological resources effects includes increased public access to geologic units with moderate to undetermined to very high paleontological sensitivity that would increase the potential for vandalism or unauthorized removal of paleontological resources.

Project features and disturbance calculations were overlain on the geologic maps of New Mexico and Colorado to determine the geographic extent of effects, in acres, on geologic units with moderate/undetermined to very high paleontological sensitivity (PFYC 3, 4, or 5).

### 3.10.3 Affected Environment

The San Juan Basin has a long history of fossil collection that includes fossils ranging in age from the Cretaceous through the Eocene. Cretaceous-aged rocks from the San Juan Basin include marine shales, nearshore sandstones, and coastal beach deposits representing the final inundation and regression of the Western Interior Seaway in northwestern New Mexico. Fossils from these rocks include marine fish and reptiles and terrestrial reptiles, dinosaurs, and mammals. Paleocene and Eocene-aged rocks from the San Juan Basin include fluvial and lacustrine deposits. Fossils from these rocks include extensive fossil mammal assemblages following the end of the Mesozoic and extinction of the dinosaurs.

Exhibit 3-71, Geologic Units and Paleontological Resources, shows the geologic units found along the study area and their associated PFYC rating for paleontological sensitivity. As shown in Exhibit 3-72, Geologic Units and PFYC Ratings, much of the study area located in New Mexico is located in areas that have a very high potential for yielding fossils, based on BLM's PFYC rating system. In addition, a small portion of the study area crosses a BLM specially designated area called the Pinon Mesa Fossil Area.

**Exhibit 3-71**
**Geologic Units and Paleontological Resources**

| Geologic Age | Geologic Unit | Fossils | PFYC | Paleontological Sensitivity |
|---|---|---|---|---|
| Quaternary | Quaternary Alluvium and Older Gravels | Rare fossils | 2 | Low |
| Eocene | San Jose Formation | Mammals | 3 | Moderate/ Undetermined |
| Paleocene | Nacimiento Formation | Mammals | 5 | Very High |
| Paleocene | Animas Formation | Mammals | 3 | Moderate/ Undetermined |
| Paleocene | Ojo Alamo Sandstone | Dinosaur material | 5 | Very High |
| Cretaceous | Fruitland and Kirtland Formation | Sharks, bony fish, amphibians, turtles, lizards, snakes, crocodiles, dinosaurs | 5 | Very High |
| Cretaceous | Pictured Cliffs Sandstone | Sharks, turtles, plesiosaurs, crocodiles, dinosaurs, and mammals | 5 | Very High |
| Cretaceous | Lewis Shale | Ammonites, mosasaurs, plesiosaurs | 5 | Very High |

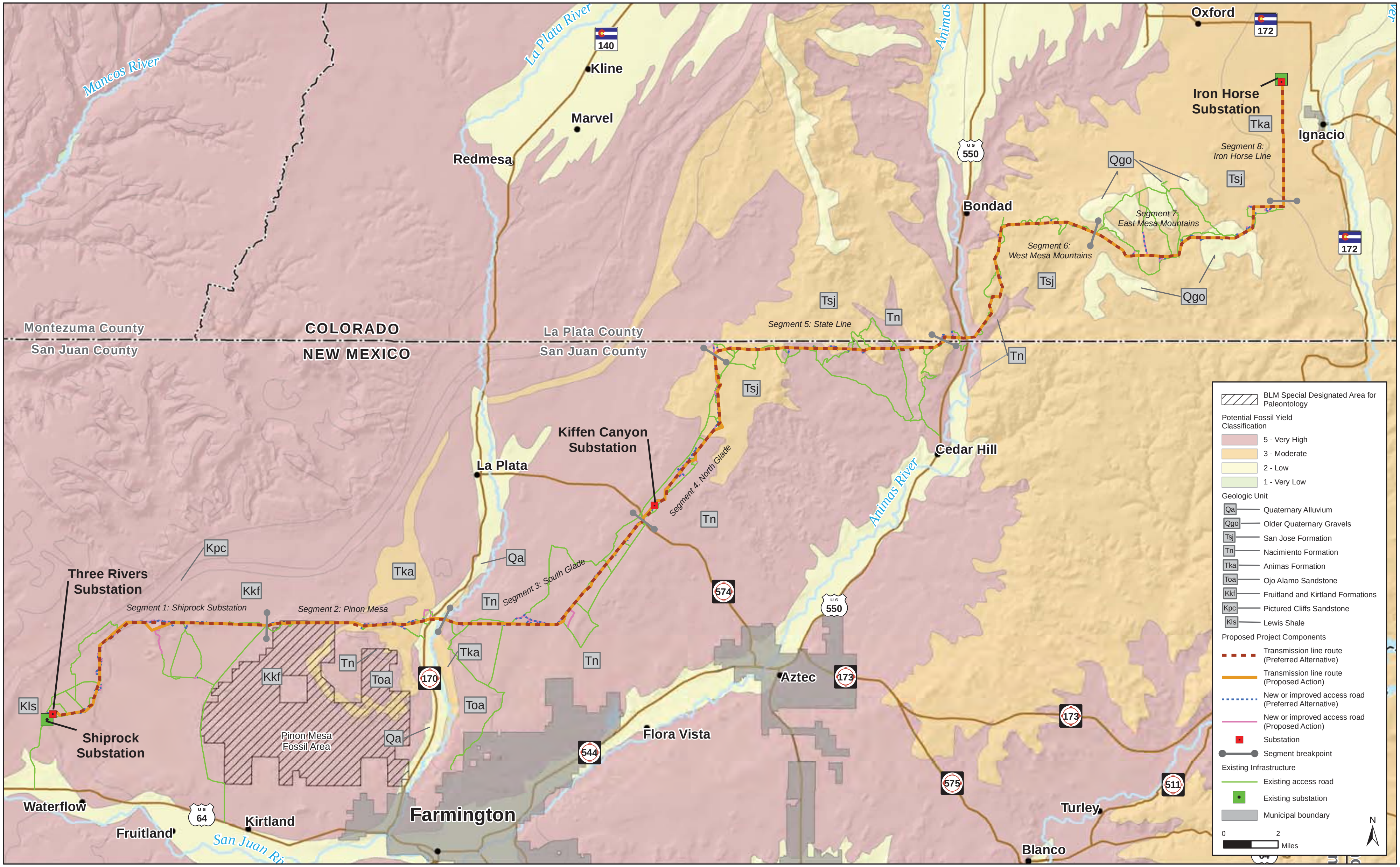
### 3.10.3.1 Quaternary Alluvium

Geologic units younger than 10,000 years before present and have a low potential for containing fossils.

### 3.10.3.2 San Jose Formation

Paleontological resources from the San Jose Formation include turtles, crocodilians, marsupials, insectivores, primates, rodents, carnivorans, condylarths, pantodonts, perissodactyls, and artiodactyls.[57]

[57] Lucas 1977




Source: GIS BLM 2012, GIS Tri-State 2013, GIS U.S. Geologic Survey 2012, GIS EPG and USGS 2012

**Exhibit 3-72 Geologic Units and PFYC Ratings**

### 3.10.3.3 Nacimiento Formation

Fossils collected from the Nacimiento Formation include turtles, crocodilians, lizards, multituberculate, and eutherian mammals.[58]

### 3.10.3.4 Animas Formation

Fossils collected from this geologic unit include condylarths, arctocyonids, mesonychids, pantodonts, and primates.[59]

### 3.10.3.5 Ojo Alamo Sandstone

Fossils collected from the Ojo Alamo Sandstone include fragmentary dinosaur material that may be reworked from underlying geologic units.[60]

### 3.10.3.6 Fruitland and Kirtland Formations

Fossils collected from the Fruitland Formation include a diverse assemblage of chondrichthyans, osteichthyans, amphibians, turtles, lizards, a snake, and crocodiles.[61] The extensive collection of dinosaur fossils from the Fruitland Formation includes ornithomimids, dromaeosaurs, troodontids, tyrannosaurs, nodosaurs, pachycephalosaurs, ceratopsians, hypsilophodontids, and hadrosaurs. Furthermore, fossil mammals including multituberculates, metatherians, and eutherians have all been discovered in the Fruitland Formation.[62]

Fossils collected from the Kirtland Formation include a diverse assemblage of turtles, crocodiles, and dinosaurs.[63] Dinosaur fossils from the Kirtland Formation unique to the San Juan Basin include *Pentaceratops sternbergii*, *Parasaurolophus cyrtocristatus*, and *Kritosaurus navajovius*.[64]

[58] Lucas and Estep 2000; Lucas and Williamson 1993

[59] Lofgren et al. 2004

[60] Lucas and Williamson 1993

[61] Lucas and Williamson 1993; Lucas et al. 2006a

[62] Lucas and Williamson 1993

[63] Lucas and Williamson 1993; Lucas et al. 2006b; Sullivan and Lucus 2006

[64] Sullivan and Lucas 2006

#### 3.10.3.7 Pictured Cliffs Sandstone

Fossils collected from the Pictured Cliffs Sandstone include a diverse fauna of chondrichthyans, turtles, plesiosaurs, crocodiles, dinosaurs, and mammals.[65]

#### 3.10.3.8 Lewis Shale

Fossils collected from the Lewis Shale include a number of ammonites, mosasaurs, and plesiosaurs.[66]

#### 3.10.3.9 Known Fossil Localities by Segment

There are no known fossil localities within the study area. There are four known fossil localities within 500 feet of proposed project access roads including two Lewis Shale localities that have produced bivalves and ammonites and two Kirtland Formation localities that have produced crocodile and dinosaur material.

### 3.10.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects to paleontological resources would occur.

### 3.10.5 Preferred Alternative

#### 3.10.5.1 Permanent Effects

No permanent direct effects to paleontological resources due to operation and maintenance are expected. Potential permanent direct effects to paleontological resources have the greatest likelihood of occurring in paleontologically sensitive geological units (PFYC 3, 4, and 5) during ground-disturbing activities. Ground-disturbing activities that could disturb paleontological resources include clearing and leveling transmission line support structure sites, constructing or expanding substations, and constructing or improving access roads. Permanent direct effects due to construction include possible damage to paleontological specimens and possible loss of associated data. Ground disturbance during construction could result in the discovery of isolated fossil specimens, and further examination in the vicinity of these isolated finds could result in additional fossil discoveries. Excavation or

[65] Lucas and Williamson 1993

[66] Lucas and Williamson 1993

blasting in fossil-bearing rock formations could permanently damage intact fossils and reduce the scientific value of the paleontological resource.

Possible direct effects to paleontological resources would be avoided or minimized through the implementation of EPMs 53 and 54 in Exhibit 2-23. As described in EPM 54, pre-construction surveys would be conducted where required by the land managing agency. If specimens are encountered during pre-construction surveys, they would be collected, identified, and curated to avoid possible damage to the specimens. In addition, EPM 53 would minimize potential permanent effects to paleontological resources during construction by requiring Tri-State or its contractors to contact the BLM and stop work in the affected area until the area could be examined and fossils recovered, if they are found.

BLM-managed areas in Segments 1 through 5 that could be directly affected include:

- Structure work areas would disturb approximately 83 acres of land with a high sensitivity and 21 acres of land with a moderate sensitivity for paleontological resources.
- The proposed Three Rivers Substation in Segment 1 would disturb approximately 20 acres of land with a high sensitivity for paleontological resources.
- The proposed Kiffen Canyon Substation in Segment 4 would affect approximately 23 acres of land with a high sensitivity for paleontological resources.
- New access road construction or existing access road improvement would disturb approximately 78 acres of land with a high sensitivity and 24 acres of land with a moderate sensitivity for paleontological resources.

New Mexico state lands that could be directly affected in Segments 1 through 5 by construction include:

- Structure work areas would disturb approximately 9 acres of land with a high sensitivity and 3 acres of land with a moderate sensitivity for paleontological resources.

- New access road construction or existing access road improvement would disturb approximately 24 acres of land with a high sensitivity and 4 acres of land with a moderate sensitivity for paleontological resources.

SUIT lands that could be directly affected by construction in Segments 6 through 8 include:

- Structure work areas would disturb approximately 5 acres of land with a high sensitivity and 60 acres of land with a moderate sensitivity for paleontological resources.
- New access road construction or existing access road improvement would disturb approximately 4 acres of land with a high sensitivity and 45 acres of land with a moderate sensitivity for paleontological resources.

Private lands that could be directly affected by construction include:

- Structure work areas would disturb approximately 23 acres of land with a high sensitivity and 33 acres of land with a moderate sensitivity for paleontological resources.
- The proposed expansion of the Iron Horse Substation would disturb approximately 3.5 acres of land with a moderate sensitivity for paleontological resources.
- New access road construction or existing access road improvement would disturb approximately 23 acres of land with a high sensitivity and 44 acres of land with a moderate sensitivity for paleontological resources.

In addition, there is a low likelihood that the Proposed Action could indirectly affect paleontology by providing new public access to geologic units that may have a high likelihood for containing fossils. The Preferred Alternative would construct 8.4 miles of new access roads on BLM-managed lands and 1.7 miles of new access roads on New Mexico state lands. These new roadways on public lands may provide the public with access to areas containing fossils that are located outside of the area directly affected by the Preferred Alternative. This could result in an increased potential for vandalism or unauthorized collection of paleontological resources. The likelihood of vandalism or unauthorized collection is low, since the study area already has many existing roadways and public access points located in potentially sensitive geologic areas. Furthermore, vandalism or unauthorized collection would not occur within the footprint of the new roadways for the Preferred Alternative, since pre-construction surveys would be conducted and specimens would be removed as needed.

#### 3.10.5.2 Temporary Effects

No temporary direct or indirect effects to paleontological resources are expected, since the only possible effects are permanent effects that would result from ground disturbing activities described above.

#### 3.10.5.3 Mitigation

No mitigation measures are proposed.

### 3.10.6 Proposed Action

#### 3.10.6.1 Permanent Effects

Permanent effects from the Proposed Action would be the same as described for the Preferred Alternative. The only difference between the alternatives is that the Proposed Action would have the potential to affect a slightly larger footprint than the Preferred Alternative.

BLM-managed areas that could be directly affected in Segments 1 through 5 include:

- Structure work areas would disturb approximately 87 acres of land with a high sensitivity and 21 acres of land with a moderate sensitivity for paleontological resources.
- The proposed Three Rivers Substation would disturb approximately 20 acres of land in Segment 1 with a high sensitivity for paleontological resources.
- The proposed Kiffen Canyon Substation would affect approximately 23 acres of land in Segment 4 with a high sensitivity for paleontological resources.

- New access road construction or existing access road improvement would disturb approximately 78 acres of land with a high sensitivity and 22 acres of land with a moderate sensitivity for paleontological resources.

New Mexico state areas that could be directly affected by construction in Segments 1 through 5 include:

- Structure work areas would disturb approximately 16 acres of land with a high sensitivity and 4 acres of land with a moderate sensitivity for paleontological resources.
- New access road construction or improvements to existing access roads would disturb approximately 20 acres of land with a high sensitivity and 3 acres of land with a moderate sensitivity for paleontological resources.

SUIT lands that could be directly affected by construction for the Proposed Action are the same as described for the Preferred Alternative. Private areas that could be directly affected by construction include:

- Structure work areas would disturb approximately 25 acres land with a high sensitivity and 50 acres of land with a moderate sensitivity for paleontological resources.
- The proposed expansion of the Iron Horse Substation would disturb approximately 3.5 acres of land with a moderate sensitivity for paleontological resources.
- New access road construction or existing access road improvement would disturb approximately 22 acres of land with a high sensitivity and 37 acres of land with a moderate sensitivity for paleontological resources.

#### 3.10.6.2 Temporary Effects

No temporary direct or indirect effects to paleontological resources are expected, since the only possible effects are permanent effects that would result from ground disturbing activities.

#### 3.10.6.3 Mitigation

No mitigation measures are proposed.

# 3.11 Minerals

## 3.11.1 Policies Regarding Mineral Resource Extraction within the San Juan Basin

Mineral resources (whether as solid, liquid, or gaseous materials) are normally taken from beneath the surface of the land. Within the western US, surface ownership and use rights are often distinct from minerals ownership and mineral rights use; this concept is known as *split estate* and is common within the San Juan Basin. Having split estate ownership rights can create potential conflicts and disputes between the surface owner and lessee and the mineral rights owner and lessee when mineral resources are extracted. The exercise of mineral ownership rights has priority over surface uses and ownership under the laws of the US and the states of New Mexico and Colorado.

**Minerals Study Area**

The study area for minerals is the same as the general study area described in Section 3.2, Study Area.

On federal land, BLM serves as the primary land management agency. The BLM classifies mineral products as locatable, leasable, or saleable, and each category is managed under different laws. Locatable minerals include both metallic minerals (such as gold, silver, lead, copper, zinc, and nickel), nonmetallic minerals (such as fluorspar, mica, certain limestones, uranium, gypsum, clay, heavy minerals in placer form, and gemstones), and certain uncommon variety minerals. Mining of locatable minerals on public land is a right protected by the General Mining Law of 1872. Locatable mineral deposits may be claimed by filing a mining claim with the BLM.

Leasable minerals include fluid minerals such as oil and gas, oil shale, and geothermal resources; and non-fluid minerals such as potash, sodium, native asphalt, solid and semisolid bitumen, bituminous rock, phosphate, and coal. The Mineral Leasing Act of 1920, as amended, and the Acquired Lands Leasing Act of 1947, as amended, give the BLM responsibility for leasing rights to these minerals on BLM-managed and other federal lands. The BLM can also lease rights to minerals on private lands provided the mineral rights were retained and still owned by the federal government (i.e., where a split estate exists).

Saleable minerals include some of the most basic natural resources, such as sand, gravel, soil, rock, and building stone, used for common construction uses. Since July 23, 1955, common varieties of saleable minerals were removed from the General Mining Law and placed under the Materials Act of 1947, as amended. BLM sells mineral materials to the public at fair market value but gives them free to states, counties, or other government entities for public projects.

It is the policy of the BLM to make mineral resources available for exploration and to encourage development of mineral resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable market prices. At the same time, BLM strives to ensure that mineral development is carried out in a manner that minimizes environmental damage and provides for the rehabilitation of affected lands.[67] Similarly, the State of New Mexico, the State of Colorado, and the SUIT encourage the active exploitation and use of subsurface minerals, so long as such use is consistent with public policy objectives of environmental protection and sustainability.

### 3.11.2 Methods

In addition to conducting a three-day pedestrian and vehicular site visit and observation of mineral industry activities along the proposed right-of-way, analysts conferred with the BLM FFO's Minerals Management, NMSLO, and SUIT mineral leasing office staff to obtain local office-specific data regarding the location of mineral resources and leases (primarily coal, oil and gas reserves or surface facilities) that have the potential to be affected by the SJBEC Project. Data sources used include:

- BLM's Legacy Rehost System, designated as LR2000, provides location data on BLM land and mineral use authorizations for oil, gas, and coal leasing; right-of-way; coal and other mineral development; land and mineral titles, mining claims, withdrawals, and classifications on federal lands and on federal mineral estate ownership.

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[67] BLM 2003b

- State of New Mexico Oil Conservation Division records on oil and gas exploration and production operations within the southern half of the proposed route.
- State of New Mexico Land Office maps of oil and gas leases within the study area.
- SUIT Minerals Leasing Office maps and records for oil, gas, and other mineral leases on SUIT lands within the northern portion of the proposed route.

Information gathered from the data sources listed above was used to determine direct and indirect effects from the SJBEC Project. Analysis of potential environmental permanent and temporary effects to mineral resources included identifying:

- Areas where existing or proposed mineral or mining activity would be constrained or curtailed (direct effects)
- Areas where potential off-site mining industry activities or mineral rights leasing and development would be discouraged or made economically infeasible (indirect effects)

## 3.11.3 Affected Environment

### 3.11.3.1 Regional Setting and Overview

The San Juan Basin is known as a major source area for valuable mineral resources, especially natural gas, petroleum, bituminous coal, and aggregate materials. Since 1950, more than 30,000 oil and gas wells have been drilled within the basin, and some 18,000 are still active today. Two major coal mines (the surface Navajo Mine and underground San Juan Mine) each supply coal for the adjacent Four Corners Power Plant and San Juan Generating Station.[68]

In addition, a number of small sand, gravel, and aggregate mines are scattered throughout the San Juan Basin. Relatively little hard-rock mining or metallic mineral resources are found within the northern portion of the basin; however, extensive deposits of gold, silver, copper, zinc, and other metallic minerals have been located and historically mined in the adjacent San Juan and La Plata

[68] Brister 2002

Mountains. Although extensive uranium deposits are found in the southern and western portions of the San Juan Basin, no economically viable uranium resources are known or are mined in the study area. Similarly, no economically exploitable quantities of carbon dioxide, helium, or geothermal energy are known to exist within this portion of the San Juan Basin.

#### 3.11.3.2 Mineral Resources in the Study Area

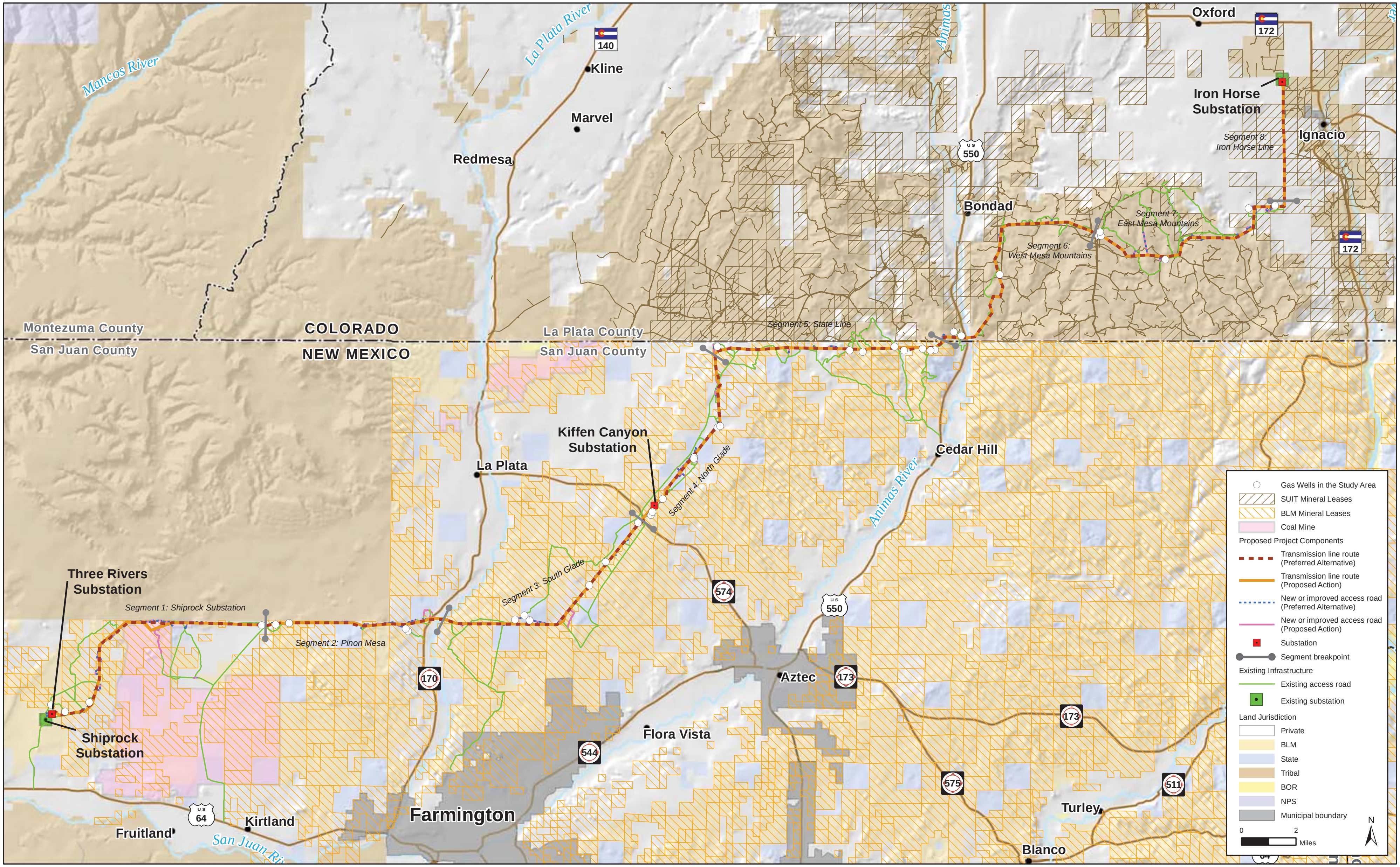
Within the San Juan Basin, there are tens of thousands of individual mineral properties and owners or lessees of mineral rights. The study area contains several thousand mineral property owners and lessees, mostly for natural gas, oil, and coal resources, only a few hundred of which are actively being developed or were previously extracted.

Future development of mineral resources within the study area will likely be dependent on the future economic value of these resources and technological advancements in mineral extraction, since there are ample resources elsewhere in the San Juan Basin to supply any foreseeable future need and demand for such products. Several reasonably foreseeable future mineral industry developments are presented and discussed in detail in Exhibit 4-1, Reasonably Foreseeable Projects Near the SJBEC Study Area.

This section describes mineral resources and infrastructure within each major segment of the study area. Exhibit 3-73, Mineral Resources, shows locations of oil and gas leases, wells, coal mines, aggregate mines, rock quarries, and mineral leases by segment.

##### Segment 1 – Shiprock Substation

Although oil and gas deposits underlie this segment, only a handful of well pads and gathering pipelines exist in the study area. Three abandoned and reclaimed gas well pads are located adjacent to access roads requiring improvements for the Preferred Alternative and the Proposed Action.




Source: GIS BLM 2012, GIS BLM 2012a, GIS BLM 2012b, GIS SUIT 2012, GIS P3 2012, GIS Tri-State 2013

**Exhibit 3-73 Mineral Resources**

As shown in Exhibit 3-73, extensive coal deposits lie at or near the surface, and the region's largest underground coal mine (the San Juan Mine) and previously reclaimed surface mine areas are located immediately east and south of the study area. Mineral rights for coal mining are leased from the BLM by San Juan Coal Company, which is actively pursuing expansion of its underground mine activities at the San Juan Mine, located more than 5 miles southeast of the study area in Segment 1. No other mineral leases or potentially locatable mineral deposits are known to exist along this segment.

### Segment 2 – Pinon Mesa

Four existing gas well pads, all located on BLM-leased lands, lie along this segment in the study area as shown in Exhibit 3-73. For the Preferred Alternative and the Proposed Action, access roads would be located adjacent to two abandoned well pads and another two well pads (one active and one abandoned) are crossed by an access road that would require improvements. A number of natural gas gathering lines follow this segment, especially as they converge on compressor stations and major gas collection pipelines in the vicinity of the La Plata River corridor leading to processing plants along the San Juan River, more than 15 miles to the south.

Mineral rights for coal are held by the BLM and State of New Mexico along this segment. Rights for minerals other than coal are held by private owners or the State of New Mexico in Sections 1, 2, 3, 5, and 6, of T30N, R14W.

### Segments 3 and 4 – South and North Glade

There are numerous oil and gas well pads, gathering lines, and roads within the South and North Glade as shown in Exhibit 3-73. Thirteen gas well pads are located within the study area and include five active wells adjacent to access roads and eight wells (seven active and one abandoned) that are crossed by access roads with proposed improvements for the Preferred Alternative and the Proposed Action.

No known mineral resources (other than underlying oil and natural gas deposits) are present or being developed at the proposed Kiffen Canyon Substation site, and the nearest rock pits, sand and gravel, or construction aggregate sites are located several miles outside the study area. Mineral rights along the South Glade Segment are held by the BLM. Under the North Glade Segment, mineral rights are owned by a mix of private interests, the State of New Mexico, and BLM.

### Segment 5 – State Line Segment

Surface rights ownership along this segment is evenly split between the BLM and private owners, with mineral ownership held mostly by BLM. Extensive oil and natural gas deposits underlie the Segment 5 as shown in Exhibit 3-73, with 25 gas well pads and numerous gathering lines and access roads running parallel and adjacent to the study area, including eight located within the proposed right-of-way for the Preferred Alternative and the Proposed Action. Of these well pads, one active well is adjacent to an access road and seven wells (six active and one abandoned) would be crossed by access roads with proposed improvements.

No economically exploitable coal or aggregate materials are known to exist along this segment, and mineral rights are held primarily by BLM, other than in Section 11 of T32N, R11W, which is privately owned.

### Segments 6 and 7 – West and East Mesa Mountains

Both of these segments lie within the SUIT Reservation, with surface and mineral rights owned and managed by SUIT. Mineral leases are held by numerous natural gas and oil producers, who have created a dense network of gathering and collection lines, compressor stations, and access roads throughout the area. Approximately 20 active oil or gas well pads lie near the study area along Segments 6 and 7. As shown in Exhibit 3-73, within the proposed right-of-way for the Preferred Alternative and the Proposed Action there are eight wells (six active, one abandoned, and one of unknown status) adjacent to an access road and one active well that would be crossed by an access road with proposed improvements.

Although there are likely to be deep deposits of coal and locatable minerals underlying Segments 6 and 7, they are not economically recoverable, and no mining activities for such resources or aggregate material are currently found in the study area.

#### Segment 8 – Iron Horse Line

More than two dozen scattered oil or gas well pads and mineral deposits (mostly coal-beds which contain coal-bed methane within the underlying Fruitland Formation) are known to exist along this 5-mile-long segment, but all are outside the study area. Existing access roads and pipeline infrastructure supporting natural gas gathering, collection and compression facilities are also found in this segment, but they are all located outside the study area. Mineral ownership is mostly controlled by private surface owners.

## 3.11.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects to minerals would occur.

## 3.11.5 Preferred Alternative

### 3.11.5.1 Permanent Effects

No active surface mineral resource development is presently being conducted along the proposed right-of-way or within the study area. The Preferred Alternative, however, would have direct effects from permanently precluding future development of surface mineral resources (such as coal, sand, gravel, and aggregate) on approximately 182 acres within the proposed right-of-way. Additionally, a single foundation for a leg of a metal lattice structure would be located in a previously mined area of the former San Juan Mine along Segment 1, which is currently undergoing reclamation. Construction of this structure would result in approximately 20 square feet of permanent effects from the concrete footer. Potential effects would be minimized through implementation of EPM 8, which is discussed in text below.

In addition, portions of new or upgraded access roads that are part of the Preferred Alternative have the potential to permanently affect 38 existing or abandoned well locations, as shown in Exhibit 3-74, Potential Access Effects to Existing and Abandoned Wells from the Preferred Alternative and the Proposed Action. Both alternatives would use existing roads across the operational areas (areas that are cleared and leveled with infrastructure) of well leases and would begin new road construction at the margins of non-operational areas. In certain instances, the non-operational areas of well-lease locations (or well locations that have been abandoned and reclaimed) may have been reseeded and revegetated; therefore, construction could permanently affect these areas. Although these effects are not likely to create any serious disruption to existing operations, possible effects could be avoided or minimized through limitations to construction activities as described in the following paragraphs.

**Exhibit 3-74**

### Potential Access Effects to Existing and Abandoned Wells from the Preferred Alternative and the Proposed Action

| | Segments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total |
| **Access Adjacent to Well Pad** | **3** | **2** | **3** | **2** | **1** | **3** | **5** | **0** | **19** |
| Abandoned | 3 | 2 | – | – | 1 | 1 | – | – | **7** |
| Active | 1 | – | 3 | 2 | – | 2 | 4 | – | **11** |
| Unknown | – | – | – | – | – | – | 1 | – | **1** |
| **Access Crosses Well Pad** | – | **2** | **3** | **5** | **7** | – | **1** | **0** | **18** |
| Abandoned | – | 1 | 1 | – | 1 | – | – | – | **3** |
| Active | – | 1 | 2 | 5 | 6 | – | 1 | – | **15** |
| **Total** | **4** | **4** | **6** | **7** | **8** | **3** | **6** | **0** | **38** |

Right-of-way planning for the SJBEC Project involved extensive advance consultation with and consideration of past and present mining and minerals industry activity within the region—the goal being to avoid any potential conflict or adverse effect on these activities. The alternatives development process took into account the location of known oil, natural gas, coal, aggregate, and other mineral deposits and industry facilities in order to avoid affecting them.

EPM 8 listed in Exhibit 2-23 has been incorporated as part of the SJBEC Project to avoid or prevent adverse effects to mineral resources. EPM 8 describes the process Tri-State would follow to develop specific measures with affected operators on a case-by-case basis. The general process Tri-State would follow includes:

- Contacting all operators in the study area to explain the project.
- Working with operators to identify areas that may require special design considerations on a case-by-case basis. This could include conducting field visits with operators and identifying pipelines that may require cathodic protection (due to proximity to the transmission line) or specific design considerations if they are located under access roads. As part of these discussions, best management practices and standard operating procedures would be identified on a case-by-case basis, as well as measures that would be implemented to minimize effects to operators during construction. Tri-State would continue to work with operators throughout construction.

No natural gas compressor stations or processing plants lie within the study area, and no current surface or underground mining of coal, aggregate, or other minerals is currently taking place within the right-of-way or at the proposed substation locations. Industry-standard setbacks for such facilities from proposed transmission line structures and conductors would prevent any direct effects to oil or gas extraction and processing activities, and gathering and collection lines for produced water and gas have been mapped so they would be avoided by the SJBEC Project when construction of transmission structures and substations takes place. Application of the EPM 8 listed in Exhibit 2-23 would minimize direct, permanent effects to mineral resources as a result of implementing the Preferred Alternative.

Potential indirect effects to minerals within the study area could include effects to existing buried pipelines near the proposed transmission line. To avoid or minimize this effect, Tri-State would work with all pipeline operators in the study area to incorporate appropriate best management practices and standard operating procedures, which include locating and marking all buried pipelines prior to construction. Other indirect effects could include the necessity for future oil and natural gas operations to employ slant or directional drilling and extraction techniques in pursing deposits that might lie beneath the transmission line right-of-way, substations, transmission line structures, and access roads. Slant or directional drilling is a common industry practice and would not preclude or impede future development of mineral resources underlying the study area. As stated in EPM 8, however, BLM or other landowners would inform Tri-State of applications for work within the proposed right-of-way to provide an opportunity for coordination between the applicant and Tri-State to minimize potential conflicts and effects to the operation and maintenance of the transmission line and substations. Another indirect effect could occur if future leasing, development, and exploitation of surface minerals (such as aggregate material) was discouraged or prohibited within the right-of-way; however, no such development plans are currently proposed.

#### 3.11.5.2 Temporary Effects

During the construction phase of the Preferred Alternative, approximately 800 acres would be temporarily disturbed or unavailable for surface mineral resource development. Another temporary direct effect during construction would be minor increases in access road traffic and use by construction workers and equipment, as well as brief periods where short portions of access road use is curtailed within the right-of-way while structures are being transported and conductors installed. Additionally, a portion of a metal lattice structure would be located in an area of the former San Juan Surface Mine along Segment 1; the mine is currently undergoing reclamation. Construction of this structure would result in approximately 0.6 acre of temporary effects from construction of the structure. These potential direct effects could be avoided by contractors communicating construction activity plans and schedules with local coal, oil, gas, and mining operators or by constructing temporary roads to reroute traffic as necessary for a specific period of construction, as identified in Exhibit 2-23, EPM 8.

#### 3.11.5.3 Mitigation

No mitigation measures are proposed.

### 3.11.6 Proposed Action

#### 3.11.6.1 Permanent Effects

Permanent effects from the Proposed Action would be the same as described above for the Preferred Alternative. The only differences are that the Proposed Action would potentially preclude future development of surface mineral resources (such as coal, sand, gravel, and aggregate) on approximately 183 acres (as compared to 182 acres for the Preferred Alternative). In addition, the Proposed Action would entirely span the area of the former San Juan Mine currently under restoration. In comparison the Preferred Alternative would require a small portion of a transmission line structure to be located in the reclamation area.

#### 3.11.6.2 Temporary Effects

Temporary effects would be the same for the Proposed Action as described above for the Preferred Alternative. The only difference is that during the construction phase, 827 acres would be temporarily disturbed or unavailable for surface mineral resource development for the Proposed Action instead of 800 acres for the Preferred Alternative. In addition, the Proposed Action would have no temporary effects at the San Juan Mine.

#### 3.11.6.3 Mitigation

No mitigation measures are proposed.

## 3.12 Soils

### 3.12.1 Methods

Soils and soil hazards will be identified using the following information sources:

**Appendix G Geology and Soils**

Detailed maps and descriptions of the soils and soil hazards in each segment can be found in Appendix G.

- Soil surveys of La Plata County, Colorado, and San Juan County, New Mexico, published by the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) on its Soil Survey Geographic Database.[69] The database includes mapped soil units in the requested area and corresponding characteristics to a depth of 5 feet.

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[69] NRCS 2012a

For this study, the chemical, physical, and engineering properties were evaluated.

- The US Geological Survey National Geologic Map Database[70] was also used to identify underlying geologic formations.
- A basic site reconnaissance was performed to get a general idea of the topography and soil environment. The full extent of the soil properties and hazards, however, can only be identified during site-specific geotechnical investigation.

Soil hazards were identified from the characteristics of each soil unit mapped in the regional soil surveys. Knowledge of underlying geologic formations was also used to identify soils that are typically produced by erosion of the underlying rock. These general areas were identified using the criteria listed below:

- **Erosive soils** – USDA uses a K factor to measure the susceptibility of a soil to sheet and rill erosion by water. K values range from 0.02 to 0.69, and soils with K values greater than or equal to 0.43 were assumed to have a high potential for water erodibility. In order to estimate wind erosion, the USDA uses a wind erodibility index which assigns soils to eight groups. Soils in Group 1 are most susceptible to wind erosion, and those in Group 8 are the least susceptible. Group classification is based on texture of the surface layer, size, and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. For this analysis, Groups 1 through 4 were considered to have a high potential of wind erosion averaging at a minimum, 86 tons of soil per acre per year lost to wind.
- **Expansive clays** – Two sets of criteria were used to identify soil units that have a high shrink-swell potential. Soils with 6 percent or greater linear extensibility, as defined by USDA/NCRS,[71] cause difficulty in shallow excavations. In addition, soils that also have a liquid limit greater than 40 and plasticity index greater than 25 potentially cause difficulty in shallow excavations.

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[70] USGS 2012

[71] NRCS 2012b

- **Gypsum content** – The USDA Soil Survey Handbook[72] identifies soils with more than 1 percent gypsum as having the potential to corrode concrete. Soils with more than 10 percent gypsum may cause hydrocollapse.

## 3.12.2 Affected Environment

This section summarizes the major soil units found along each segment of the transmission line (segments are shown in Exhibit 3-3) and specifically analyzes them for potential erosion, expansive behavior, and high gypsum content. Other related characteristics or hazards such as landslides, groundwater, and farmland are discussed in Sections 3.9.3.2, Landslides; 3.14.3.4, Groundwater; and 3.13, Farmlands.

**Soils Study Area**

The study area for soils is the same as the general study area described in Section 3.2, Study Area.

### 3.12.2.1 Soils Overview

Soil units in the study area have been mapped by the USDA based on physical characteristics, water capacity, susceptibility to erosion, and geologic origins. Soil units in the study area are described for each segment and potential soil hazard areas are mapped in Appendix G, Geology and Soils. The western edge of the study area near the existing Shiprock Substation consists of high ridges and mesas that form badlands and rock outcrops. They are intertwined with low lying valleys that have thick layers of silty clay sediments and form deep arroyos. As the study area trends towards the northeast the soils become sandier and the topography becomes flat in the area referred to as the Glades. Sandstone outcrops are the prominent feature at the New Mexico and Colorado state line. They form cliffs and the derived soils are sandy and shallow and susceptible to wind erosion.

**Appendix G Geology and Soils**

Detailed maps and descriptions of the soils and soil hazards in each segment can be found in Appendix G.

The next distinct topographic and soil environment occurs where the study area intersects SUIT land and the Mesa Mountains. Soils range from cobbly to clay loam depending on whether they are in a highland valley or mesa top. The study area then crosses down from the mountains to the flat lying plains surrounding the eastern terminus. Soils tend to be deep clay loams, derived from the underlying shale.

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[72] NRCS 2012c

### 3.12.2.2 Soil Hazards

Exhibit 3-75, Potential Soil Hazards, identifies the potential hazards associated with each soil unit found in the study area. Exhibit 3-3 maps the segments listed below in Exhibit 3-75. The USDA classifies each soil unit in a regional context and the characteristics of the soil within each specific location will vary. Soil hazards are dependent on the slope, depth of the soil, water exposure, and type and extent of disturbance. The locations of potential soil hazards identified by the USDA and based on the soil unit present provided in Appendix G. Potential hazards analyzed include erosion, expansive clays, and soils containing gypsum.

Exhibit 3-75
**Potential Soil Hazards**

| Segment | Soil Unit, Percent Slope | Potential Soil Hazards | | | | |
|---|---|---|---|---|---|---|
| | | Water Erosion | Wind Erosion | Expansive Clays | Shallow Bedrock | Gypsum |
| Segment 1 | Av – Avalon sandy loam, 2–5% | X | X | | | |
| | BA – Badland | | X | X | X | X |
| | BB – Badland-Monierco-Rock outcrop complex | | | X | X | |
| | BT – Blancot- Notal association, gently sloping | X | | X | | |
| | DS – Doad-Sheppard-Shiprock association, rolling | | | | | |
| | Ha – Haplargids-Blackston-Torriorthents complex, very steep | | | | X | |
| | RO – Rock outcrop | | | | X | |
| | Tr – Turley clay loam, 1–3% | | | | | |
| | Tt – Turley clay loam, wet, 0–2% | | X | | | |
| Segment 2 | BA – Badland | | X | X | X | X |
| | BC – Badland-Rock outcrop-Persayo complex, extremely steep | | | | X | |
| | BT – Blancot- Notal association, gently sloping | X | | X | | |
| | FA – Farb-Persayo-Rock outcrop complex, very steep | | X | | X | |

**Exhibit 3-75**
## Potential Soil Hazards

| Segment | Soil Unit, Percent Slope | Potential Soil Hazards | | | | |
|---|---|---|---|---|---|---|
| | | Water Erosion | Wind Erosion | Expansive Clays | Shallow Bedrock | Gypsum |
| Segment 2 (Continued) | Ha – Haplargids-Blackston-Torriorthents complex, very steep | | | | X | |
| | SV – Stumble sandy clay loam, gently sloping | | | | | |
| | SW – Stumble-Fruitland association, gently sloping | | X | | | |
| | Wr – Werlog loam | | | | | |
| Segment 3 | BT – Blancot- Notal association, gently sloping | X | | X | | |
| | FA – Farb-Persayo-Rock outcrop complex, very steep | | X | | X | |
| | GY – Gypsiorthids-Badland-Stumble complex, moderately steep | | X | | X | X |
| | Ha – Haplargids-Blackston-Torriorthents complex, very steep | | | | X | |
| | SW – Stumble-Fruitland association, gently sloping | | X | | | |
| Segment 4 | AT – Atrac-Florita-Travessilla association, hilly | X | X | | X | |
| | BT – Blancot- Notal association, gently sloping | X | | X | | |
| | BU – Buckle silt loam, gently sloping | X | | | | |
| | FA – Farb-Persayo-Rock outcrop complex, very steep | | X | | | |
| | GY – Gypsiorthids-Badland-Stumble complex, moderately steep | | X | | X | X |
| | Ha – Haplargids-Blackston-Torriorthents complex, very steep | | | | X | |
| Segment 5 | AT – Atrac-Florita-Travessilla association, hilly | X | X | | X | |
| | Ax – Avalon sandy loam, 5–8% | X | X | | | |
| | BT – Blancot- Notal association, gently sloping | X | | X | | |
| | BU – Buckle silt loam, gently sloping | X | | | | |
| | Db – Doak loam, 1–3% | | | | | |
| | Ha – Haplargids-Blackston-Torriorthents complex, very steep | | | | X | |

**Exhibit 3-75**
## Potential Soil Hazards

| Segment | Soil Unit, Percent Slope | Potential Soil Hazards | | | | |
|---|---|---|---|---|---|---|
| | | Water Erosion | Wind Erosion | Expansive Clays | Shallow Bedrock | Gypsum |
| Segment 5 (Continued) | RT – Rock outcrop-Travessilla-Weska complex, extremely steep | | | | X | |
| | TA – Travessilla-Weska-Rock outcrop complex, moderately steep | | X | | X | |
| | TW – Twick-Silver Association, moderately sloping | | | X | X | |
| Segment 6 | 5 – Arboles Clay, 3–10% | | X | X | | |
| | 24 – Dulce-Travessilla-Rock outcrop complex, 6–50% | | X | | X | |
| | 44 – Mikim loam, 3–12% | | | | | |
| | 50 – Pescar fine sandy loam | | X | | | |
| | 56 – Pulpit loam | | | | X | |
| | 58 – Rock outcrop | | | | X | |
| | 76 – Witt loam, 3–8% | X | | | | |
| | 82 – Zyme-Rock outcrop complex, 12–25% | | | | X | |
| Segment 7 | 5 – Arboles Clay, 3–10% | | X | X | | |
| | 10 – Bayfield silty clay loam, 1–3% | | | | | |
| | 16 – Buckle loam | | X | | | |
| | 25 – Durango cobbly loam, 3–20% | | | | | |
| | 62 – Sili clay loam, 1–3% | | X | | | |
| | 63 – Sili clay loam, 3–6% | | X | | | |
| | 70 – Ustic Torriorthents-Ustollic Haplargids, 12–60% | X | | | | |
| | 76 – Witt loam, 3–8% | X | | | | |
| Segment 8 | 5 – Arboles Clay, 3–10% | | X | X | | |
| | 8 – Baca Variant loam, 3–12% | | | | | |
| | 10 – Bayfield silty clay loam, 1–3% | | | | | |
| | 14 – Bodot clay, 3–10% | | X | | X | |
| | 25 – Durango cobbly loam, 3–20% | | | | | |
| | 63 – Sili clay loam, 3–6% | | X | | | |
| | 70 – Ustic Torriorthents-Ustollic Haplargids, 12–60% | X | | | | |
| | 82 – Zyme-Rock outcrop complex, 12–25% | | | | X | |

## 3.12.3 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, soils would not be affected by this alternative.

## 3.12.4 Preferred Alternative

### 3.12.4.1 Permanent Effects

The Preferred Alternative is expected to permanently disturb approximately 182 acres as summarized below:

- 5.3 acres would be permanently disturbed by transmission line structures, and soil in a small portion of this area would be permanently lost and replaced by structure foundations
- 46.5 acres would be permanently disturbed by substations
- 130.4 acres would be permanently disturbed by access roads

Possible direct effects to soils are described below and include:

- Permanent soil loss
- Erosion
- Soil compaction

The following soil hazards have the potential to directly affect proposed structures, substations, and access roads. Damage of these elements could then alter the surrounding soil environment:

- Expansive clays
- Gypsum

#### Permanent Soil Loss

Approximately 5.3 acres of soil would be permanently disturbed by transmission line structures, and soil in a small portion of this area would be permanently lost and replaced by structure. New access road construction and substation expansion would remove existing topsoil. If large cut and fill volumes are required, the surface topography would change.

#### Erosion

As shown in Exhibit 3-75, soils that are susceptible to erosion from wind and water are present in all segments of the study area. In general, most of the disturbed area with the highest potential for permanent erosion is along the 130.4 acres of proposed access roads, since these areas would continue to be used and disturbed throughout the life of the project. Substation areas are not likely to have higher erosion rates, since they are covered with permeable rock that slows runoff to the surrounding areas. Erosion could occur during earthmoving activities required for ongoing maintenance of the transmission line structures and access roads. These activities would be temporary and localized, but would occur periodically throughout the life of the SJBEC Project.

Potential effects from erosion would be minimized by implementing EPMs 17, 22, and 33 listed in Exhibit 2-23. In particular, implementation of the SWPPP listed in EMP 30 would minimize possible soil loss from erosion.

### Soil Compaction

Soil compaction would occur in the construction disturbance area from driving vehicles and heavy equipment over the soil. Soil compaction is permanent, as revegetation and restoration efforts would not extend to the depth of consolidation. Additionally it would affect the response of the soil to different loading conditions in the future. Areas under roadways, structures, and high-use areas would be most affected. Some soils, such as very fine-grained, poorly drained soil have the greatest potential for compaction; however, all soil would have some potential for compaction. EPM 56 listed in Exhibit 2-23 would be employed to minimize effects to agricultural soils from compaction.

### Expansive Soils

As shown in Exhibit 3-75, and based on the mapped soils units identified in the area, expansive clay soils are in every segment of the study area. They are expected, however, to be predominantly found along the proposed transmission line route in Segments 1, 3, 4, and 8. Structures not designed properly to interact with expansive clays can become instable, causing damage to the surrounding soils and landform. As described in Section 2.2.5.3, Geologic Investigation, Tri-State would conduct geotechnical investigations to better understand possible soil hazards on a site-by-site basis and would employ measures to minimize potential effects from expansive soils.

#### Gypsum

Gypsum-containing soils are found in Segments 1, 2, 3, and 4 based on soil types (see Exhibit 3-75), though most of these soils are located in areas outside of the proposed right-of-way. Soils with high gypsum content can corrode concrete foundations leading to structural instability. As described in Section 2.2.5.3, Tri-State would conduct geotechnical investigations to better understand possible soil hazards on a site-by-site basis and would employ measures to minimize potential effects from gypsum.

### 3.12.4.2 Temporary Effects

The Preferred Alternative is expected to temporarily disturb approximately 800 acres as summarized below:

- Approximately 509.1 acres would be temporarily disturbed for building the structures, wire pulling sites, construction staging areas (including area for helicopter use), and guard structures
- 46.5 acres would be temporarily disturbed by substation construction
- 244.4 acres would be temporarily disturbed by access roads

By disturbing the soil and vegetative cover, there would be an increased potential for soil erosion.

#### Erosion

Project construction activities that would directly affect soils include clearing, grubbing, and grading along the right-of-way and at additional temporary workspaces; trenching; backfilling; excavating; and construction of permanent structures, such as transmission line support structures, access roads, and substations. Temporary erosion can be considered small scale and an effect which can be corrected through restoration and revegetation. Ground clearing during construction would increase the potential for erosion. Vegetation removal would expose soil to potential wind and water erosion. As described in Chapter 2, the affected area due to construction activities would be larger than the operation acreage due to the temporary need for work areas at each structure, laydown yards, staging areas, and tensioning sites. The areas used only for construction would be reclaimed as soon as possible, which may include regrading to original land contours, topsoil replacement, and revegetation. Possible temporary effects from erosion would be minimized through the implementation of EPMs 17, 22, 24, 25, 33, 35, and 36 listed in Exhibit 2-23. In particular, implementation of the SWPPP listed in EPM 33 would minimize possible soil loss from erosion.

#### 3.12.4.3 Mitigation

No mitigation measures are proposed.

### 3.12.5 Proposed Action

#### 3.12.5.1 Permanent Effects

Permanent effects from the Proposed Action would be similar to those discussed for the Preferred Alternative. The only difference is that the Proposed Action would affect a slightly larger area of soil (183 acres) than the Preferred Alternative (182 acres). The distribution of the affected area includes:

- 4.7 acres would be permanently disturbed by transmission line structures, and soil in a small portion of this area would be permanently lost and replaced by structure foundations
- 46.5 acres would be permanently disturbed by substations
- 132 acres would be permanently disturbed by access roads

#### 3.12.5.2 Temporary Effects

Temporary effects from the Proposed Action would be similar to those discussed for the Preferred Alternative. The only difference is that the Proposed Action would affect a larger area of soil (827 acres) than the Preferred Alternative (800 acres). The distribution of the affected area includes:

- Approximately 540 acres would be temporarily disturbed for building the structures, wire pulling sites, construction staging areas (including area for helicopter use), and guard structures
- 46.5 acres would be temporarily disturbed by substation construction
- 250.4 acres would be temporarily disturbed by access roads

#### 3.12.5.3 Mitigation

No mitigation measures are proposed.

# 3.13 Farmlands

## 3.13.1 Methods

Datasets from the US Geological Society National Gap Analysis Program, the Natural Resources Conservation Service, SWCA Environmental Consultants pivot irrigation data, and SUIT Agricultural Land data were used to identify areas that have the potential to be farmlands as determined by soil type. Farmlands were correlated with structures, substations, and access roads identified as part of the alternatives. Areas where potential farmlands would be directly affected were identified and affected acreages were calculated. Indirect effects related to fragmentation of larger parcels into smaller parcels and to transmission line operation were also considered.

The following indicators have been identified in order to evaluate potential project effects on farmlands:

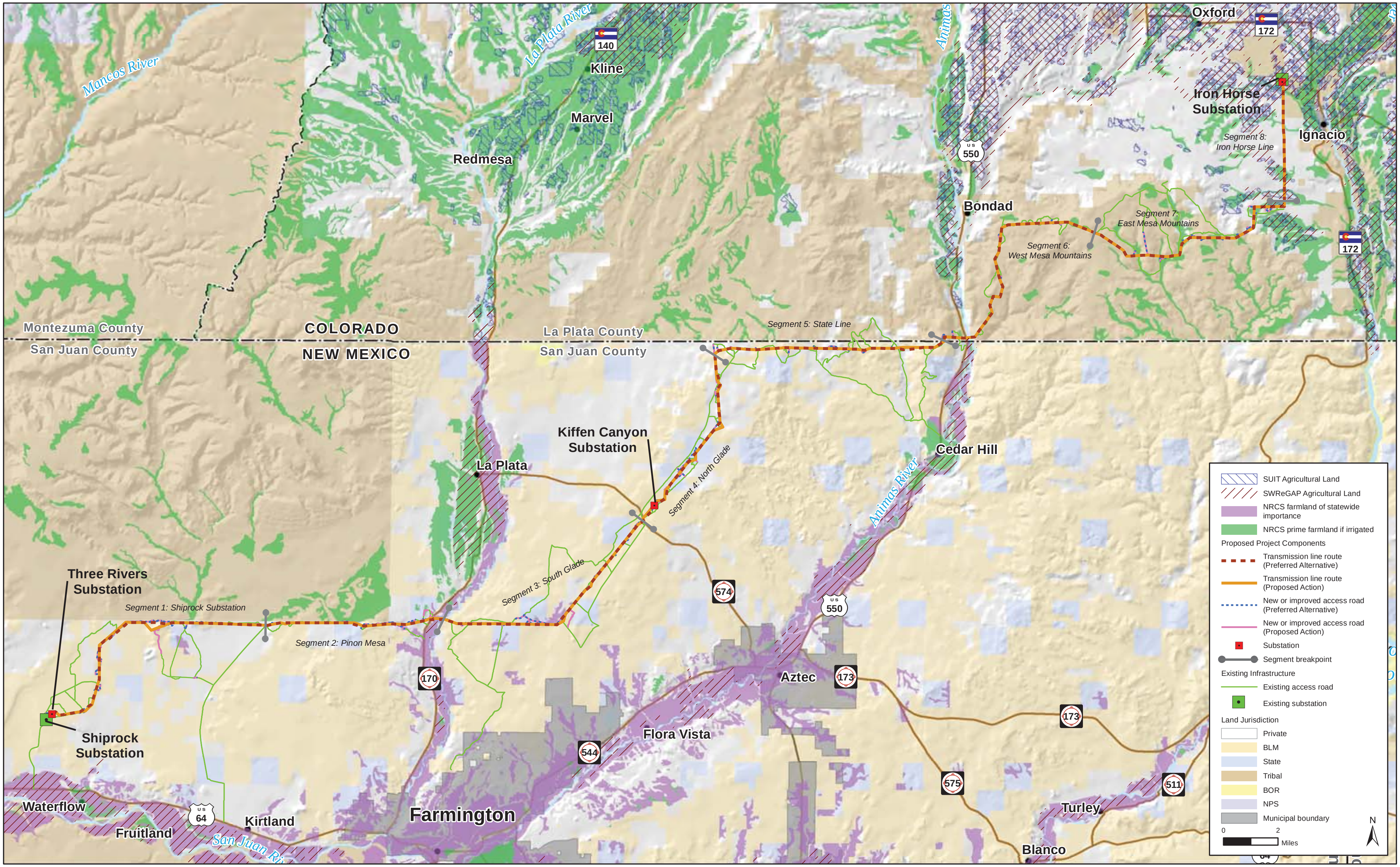
- Location of farmlands of statewide significance, SWReGAP land, SUIT agricultural lands, and prime farmland if it were irrigated
- Changes to agricultural production

## 3.13.2 Affected Environment

Lands identified below as "farmlands" are identified using NRCS soil data. Lands identified as farmlands may or may not be currently used as farmland. The purpose of the information below is to identify lands that have the potential to be used as farmland based on soil type.

**Farmlands Study Area**

The study area for farmlands is the same as the general study area described in Section 3.2, Study Area.




Source: GIS BLM 2012, GIS Tri-State 2013, GIS SWReGAP 2004, GIS NRCS 2012, GIS SUIT 2012c

**Exhibit 3-76 Farmlands**

No prime or unique farmlands as defined in Section 657.5 of the NRCS Soil Survey Handbook[73] have been identified in the study area. Nevertheless, the study area for the proposed transmission line and access roads contains land designated as farmlands of statewide importance, land that would be considered prime farmlands if irrigated,[74] and existing agricultural land. The proposed substation locations are not located on any farmlands of statewide importance, land that would be considered prime farmland if irrigated, or areas currently irrigated.

### 3.13.2.1 Farmlands

#### New Mexico Farmlands

In New Mexico, farmlands of statewide importance and prime farmland if irrigated are found in Segments 2 and 3 of the study area as shown in Exhibit 3-76, Farmlands. Acreages of lands identified with potential farmland are shown in Exhibit 3-77, Farmlands of Statewide Importance – New Mexico, and Exhibit 3-80, Prime Farmlands if Irrigated – New Mexico.

**Exhibit 3-77**
**Farmlands of Statewide Importance – New Mexico**

| Land Ownership | Acres |
|---|---|
| State | 18 |
| Private | 78 |

**Exhibit 3-78**
**Prime Farmlands if Irrigated – New Mexico**

| Land Ownership | Acres |
|---|---|
| State | 5 |
| Private | 3 |

[73] NRCS 2012c
[74] NRCS 2012d

### Colorado Farmlands

In Colorado, land that would be considered prime farmlands if irrigated exists along Segments 6, 7, and 8. Land status of prime farmlands if irrigated and the total amount of acreage are listed in Exhibit 3-79, Prime Farmlands if Irrigated – Colorado.

**Exhibit 3-79**
**Prime Farmlands if Irrigated – Colorado[1]**

| Land Ownership | Acres |
|---|---|
| Private | 58 |
| Tribal Lands | 84 |

### Other Agricultural Lands

Additionally, SUIT agricultural land data[75] and Southwest Regional Landcover Data[76] indicate that agricultural lands are located along Segments 2, 7, and 8 as shown in Exhibit 3-76. The acreage of these lands is listed in Exhibit 3-80, Other Agricultural Lands in New Mexico and Colorado.

**Exhibit 3-80**
**Other Agricultural Lands in New Mexico and Colorado**

| Land Ownership | Acres[1] |
|---|---|
| SUIT Agricultural Land | 23 |
| SWReGAP New Mexico Agricultural land | 18 |
| SWReGAP Colorado Agricultural land | 82 |

*Source: SWReGAP 2004*

*1 Note that some of these acres overlap with farmlands of statewide importance and prime farmland if irrigated. Therefore, the acreages listed are approximate.*

## 3.13.2.2 Irrigation

According to data developed for the project,[77] there are no irrigation ditches or constructed irrigation facilities in the study area. There are private irrigation ditches, however, located in La Plata County that intersect with the study area. Pivot irrigation[78] is

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75 SUIT 2012c
76 GIS USGS 2004
77 SWCA 2009
78 SWCA 2009

used in limited applications near the study area but does not intersect with the proposed alignment.

## 3.13.3 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects to farmlands would occur.

## 3.13.4 Preferred Alternative

### 3.13.4.1 Permanent Effects

Transmission line structures, substations, and access roads associated with the Preferred Alternative could directly affect farmlands in the study area. The types of farmland that could be affected include farmlands of statewide significance in New Mexico, SWReGAP land, SUIT agricultural lands, and land that could be considered prime farmland if it were irrigated. Areas identified as farmland may not be currently operated as farmland, but they have the potential to serve as farmland based on soil type. Exhibit 3-81, Farmlands Permanently Affected by the Preferred Alternative, shows the maximum amount of land with the potential to be farmland that would be affected. Permanent direct effects include the loss of potential farmlands due to the footprint of support structures, substations, and new access roads in the study area.

**How much farmland would be affected?**

The information provided in this section identifies the acres of lands designated as farmland that could be affected. It is unknown if these lands are currently being operated as farmland or not, since the farmland designation is based on soil type and not current land uses.

**Exhibit 3-81**

**Farmlands Permanently Affected by the Preferred Alternative[1]**

| Farmland Classification | Land Status | Type and Number of Proposed Permanent Structures | Total Area of Permanent Disturbance from Proposed Structures (acres) | Area of Permanent Disturbance from Proposed Substations (acres) | Permanent Disturbance from Proposed Access Road (acres) | Total Area of Permanent Disturbance (acres)[2] |
|---|---|---|---|---|---|---|
| NM Farmlands of statewide importance | Private | 3 metal lattice tangent | 0.09 | 0 | 1.47 | 1.56 |
| | New Mexico State Lands | NA | 0 | 0 | 1.07 | 1.07 |
| SWReGAP NM Agricultural land | Private | 1 steel lattice tangent | 0.03 | 0 | 0.014 | 0.044 |
| SWReGAP CO Agricultural land | Tribal Lands | 2 wood H-frame tangents | 0.0012 | 0 | 0.69 | 0.69 |
| | Private | 5 wood H-frame tangents | 0.0033 | 3.5 | 1.29 | 4.79 |
| | | 1 wood 3-pole dead end | 0.0011 | | | |

**Exhibit 3-81**
## Farmlands Permanently Affected by the Preferred Alternative[1]

| Farmland Classification | Land Status | Type and Number of Proposed Permanent Structures | Total Area of Permanent Disturbance from Proposed Structures (acres) | Area of Permanent Disturbance from Proposed Substations (acres) | Permanent Disturbance from Proposed Access Road (acres) | Total Area of Permanent Disturbance (acres)[2] |
|---|---|---|---|---|---|---|
| CO Prime farmland if irrigated | Tribal Lands | 3 wood 3-pole dead end | 0.0033 | 0 | 4.54 | 4.54 |
| | | 5 wood H-frame tangent | 0.003 | | | |
| | Private | 5 wood H-frame tangent | 0.003 | 0 | 1.32 | 1.32 |
| SUIT Agricultural land | Private | None | 0 | 3.5 | 0.001 | 3.5 |

[1] *Areas identified as farmland may not be currently operated as farmland, but they have the potential to serve as farmland based on soil type.*

[2] *There may be overlapping disturbance from the structures and access roads, and actual acres of disturbance may be fewer than specified in the total column.*

The NRCS[79] determined that the Preferred Alternative would not cause Prime or Unique Farmlands to be converted to non-agricultural uses and is not subject to the Farmland Protection Policy Act. Therefore, there would be no need to complete the land evaluation and site assessment system form (Form AD-1006 or Form CPA-106) to establish a farmland conversion impact rating score.

### 3.13.4.2 Temporary Effects

Temporary direct effects would include a potential short-term loss of production on farmlands dueto construction of the Preferred Alternative. The area that would be disturbed during construction is larger than the area that would be permanently affected. During construction larger areas are needed to construct transmission line structures, pull wires, stage construction, and build access roads. Affected areas would be returned to pre-construction conditions after project construction as described in Section 2.2.7, Post-Construction Activities. Construction effects would be temporary and would not permanently convert farmland to other uses. Exhibit 3-82, Farmlands

[79] Montoya 2012

Temporarily Affected by the Preferred Alternative, lists the farmland classifications and maximum acres that would be temporarily disturbed during construction.

**Exhibit 3-82**
**Farmlands Temporarily Affected by the Preferred Alternative[1]**

| Farmland Classification | Land Status | Area of Temporary Disturbance from Proposed Structures (acres) | Temporary Disturbance from Proposed Access Road (30- and 50-foot ROW) (acres) | Area of Temporary Disturbance from Proposed Substations (acres) | Maximum Total Area of Temporary Disturbance (acres)[2] |
|---|---|---|---|---|---|
| NM Farmlands of statewide importance | Private | 2.1 | 2.37 | 0 | 4.47 |
| | New Mexico State Lands | 0 | 1.8 | 0 | 1.8 |
| SWReGAP NM Agricultural land | Private | 0.7 | 0.028 | 0 | 0.73 |
| SWReGAP CO Agricultural land | Tribal Lands | 1.4 | 1.06 | 0 | 2.46 |
| | Private | 11.9 | 1.92 | 3.5 | 17.32 |
| CO Prime farmland if irrigated | Tribal Lands | 5.6 | 9.9 | 0 | 15.5 |
| | Private | 4.9 | 2 | 0 | 6.9 |
| SUIT Agricultural land | Private | 4.2 | 0 | 3.5 | 7.7 |

[1] *Areas identified as farmland may not be currently operated as farmland, but they have the potential to serve as farmland based on soil type.*

[2] *There may be overlapping disturbance from the structures and access roads, and actual acres of disturbance may be fewer than specified in the total column.*

#### 3.13.4.3 Mitigation

No mitigation measures are proposed.

### 3.13.5 Proposed Action

#### 3.13.5.1 Permanent Effects

Permanent effects from the Proposed Action would be similar to those discussed above for the Preferred Alternative. The distribution of lands potentially affected with the Proposed Action is shown in Exhibit 3-83, Farmlands Permanently Affected by the Proposed Action. The Proposed Action would affect the same amount of potential farmlands in Colorado as the Preferred Alternative. In New Mexico, the Proposed Action would affect about 0.85 acre of potential farmlands as compared to 2.67 acres for the Preferred Alternative.

**Exhibit 3-83**

## Farmlands Permanently Affected by the Proposed Action[1]

| Farmland Classification | Land Status | Type and Number of Proposed Permanent Structures | Total Area of Permanent Disturbance from Proposed Structures (acres) | Area of Permanent Disturbance from Proposed Substations (acres) | Permanent Disturbance from Proposed Access Road (acres) | Total Area of Permanent Disturbance (acres)[2] |
|---|---|---|---|---|---|---|
| NM Farmlands of statewide importance | Private | 2 metal lattice tangent | 0.06 | 0 | 0.67 | 0.73 |
| | New Mexico State Lands | NA | 0 | 0 | 0.12 | 0.12 |
| SWReGAP NM Agricultural land | NA | 0 | 0 | 0 | 0 | 0 |
| SWReGAP CO Agricultural land | Tribal Lands | 2 wood H-frame tangents | 0.0012 | 0 | 0.7 | 0.7 |
| | Private | 5 wood H-frame tangents | 0.003 | 3.5 | 1.29 | 4.79 |
| | | 1 wood 3-pole dead end | 0.0011 | | | |
| CO Prime farmland if irrigated | Tribal Lands | 3 wood 3-pole | 0.0033 | 0 | 4.54 | 4.54 |
| | | 5 wood H-frame tangent | 0.003 | | | |
| | Private | 5 wood H-frame tangent | 0.003 | 0 | 1.32 | 1.32 |
| SUIT Agricultural land | Private | None | 0 | 3.5 | 0 | 3.5 |

[1] *Areas identified as farmland may not be currently operated as farmland, but they have the potential to serve as farmland based on soil type.*

[2] *There may be overlapping disturbance from the structures and access roads, and actual acres of disturbance may be fewer than specified in the total column.*

### 3.13.5.2 Temporary Effects

Temporary effects from the Proposed Action would be similar to those discussed above for the Preferred Alternative. The distribution of lands potentially affected with the Proposed Action is shown in Exhibit 3-84, Farmlands Temporarily Affected by the Proposed Action. The Proposed Action would temporarily affect the same amount of potential farmlands in Colorado as the Preferred Alternative. In New Mexico, the Proposed Action would temporarily affect about 7.12 acres of potential farmlands as compared to 7 acres for the Preferred Alternative. The Proposed

Action is expected to temporarily affect a slightly larger area than the Preferred Alternative due to temporary disturbance from proposed access road construction. Affected areas would be returned to pre-construction conditions after construction; therefore, construction effects would be temporary and would not permanently convert farmland to other uses.

**Exhibit 3-84**

**Farmlands Temporarily Affected by the Proposed Action[1]**

| Farmland Classification | Land Status | Area of Temporary Disturbance from Proposed Structures (acres) | Temporary Disturbance from Proposed Access Road (30- and 50-foot ROW) (acres) | Area of Temporary Disturbance from Proposed Substations (acres) | Maximum Total Area of Temporary Disturbance (acres)[2] |
|---|---|---|---|---|---|
| NM Farmlands of statewide importance | Private | 1.4 | 3.47 | 0 | 4.87 |
| | New Mexico State Lands | 0 | 1.8 | 0 | 1.8 |
| SWReGAP NM Agricultural land | Private | 0 | 0.45 | 0 | 0.45 |
| SWReGAP CO Agricultural land | Tribal Lands | 1.4 | 1.06 | 0 | 2.46 |
| | Private | 11.9 | 1.92 | 3.5 | 17.32 |
| CO Prime farmland if irrigated | Tribal Lands | 5.6 | 9.9 | 0 | 15.5 |
| | Private | 4.9 | 2 | 0 | 6.9 |
| SUIT Agricultural land | Private | 4.2 | 0 | 3.5 | 7.7 |

[1] *Areas identified as farmland may not be currently operated as farmland, but they have the potential to serve as farmland based on soil type.*

[2] *There may be overlapping disturbance from the structures and access roads, and actual acres of disturbance may be fewer than specified in the total column.*

#### 3.13.5.3 Mitigation

No mitigation measures are proposed.

## 3.14 Water Resources and Wetlands

### 3.14.1 Study Area

The study area for surface water resources and wetlands includes the study area described in Section 3.2, Study Area, as well as the San Juan and Los Pinos Rivers, which are the first perennial watercourses located outside of the study area that receive runoff from the study area, and the connecting drainages in between.

## 3.14.2 Methods

### 3.14.2.1 Surface Water

Surface waters in the study area were identified using data from the USGS and other agencies such as the New Mexico Environment Department (NMED) and Colorado Department of Public Health and Environment (CDPHE) to establish existing conditions. In addition, fieldwork in support of a preliminary determination of waters of the US was carried out in 2012 and 2013.[80] Potential direct and indirect effects to surface water were identified using the following indicators:[81]

- Construction activities within the ordinary high water mark of waters of the US.
- Ground surface disturbance that may cause erosion, increased sediment loading and turbidity.
- Vegetation removal that could indirectly result in increased soil erosion.
- Spills of hazardous fluids used during construction or maintenance.

### 3.14.2.2 Floodplains

Project features located within 100-year floodplains were identified and mapped using Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps to determine effects. Indicators that were analyzed include:

- The potential for increased runoff as a result of added permanent and temporary disturbance from transmission line and associated access road construction resulting in increased flooding or erosion.
- Areas where permanent structures would be placed in floodplains that would result in potential effects to floodplain structure and function.

**Waters of the US**

Waters of the US are jurisdictional waters regulated under the Clean Water Act by the USACE, who categorize certain drainages as perennial, intermittent, and ephemeral.

- ***Perennial stream:*** A perennial stream has flowing water year-round during a typical year. The water table is located above the streambed for most of the year and most flow is provided through groundwater.
- ***Intermittent stream***: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water.
- ***Ephemeral stream:*** An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral streambeds are located above the water table year-round.

[80] URS 2013

[81] USACE 2012

#### 3.14.2.3 Wetlands

Wetlands were identified through biological and water resource surveys conducted in the study area in 2012 and 2013, including delineation of the single wetland that occurs near a location where construction efforts are proposed.[82, 83] The final determination regarding the jurisdiction of these wetlands as waters of the US (as defined under Section 404 of the Clean Water Act) will be considered by the US Army Corps of Engineers (USACE) following submittal of the data. Potential effects to wetlands were identified using the following indicators:

- Alterations to wetland hydrology
- Alterations to wetland plant communities
- Loss of wetlands due to filling or sedimentation

#### 3.14.2.4 Groundwater

Groundwater hydrology was identified using data from the USGS, NMED, and CDPHE to establish existing conditions within the study area and region. Anticipated effects to groundwater were determined using the following indicators:

- The potential for direct effects to groundwater from accidental contamination during construction
- Possible effects from accidental spills of hazardous materials
- Dewatering activities during construction of foundations for transmission line support structures

#### 3.14.2.5 Water Quality

Water quality data were identified from the USGS, NMED, and CDPHE to establish existing conditions and identify surface waters in the project area that are currently impaired. For example, the NMED Surface Water Quality Bureau conducted a water quality survey of the San Juan-Animas watersheds in 2010. The data collected were compared with New Mexico Water Quality

[82] URS 2013

[83] Loebig 2013; Loebig and Paulek 2013

Standards to identify impaired waters.[84] Potential effects to water quality were identified using the following indicators:

- Ground surface disturbance that may cause erosion, and increased sediment loading
- Vegetation removal that could indirectly result in increased soil erosion
- Spills of hazardous fluids during construction or maintenance

## 3.14.3 Affected Environment

This section describes the following water resources in the study area: surface water, floodplains, wetlands, groundwater, and water quality.

### 3.14.3.1 Surface Water

Exhibit 3-85, Surface Water, presents surface water resources for primary, secondary, and tertiary drainages within each segment in the study area. The entire study area lies within the San Juan River Basin, which drains an area of approximately 7,500 square miles across the Colorado-New Mexico state line.[85] The total area drained by all of the watersheds crossed by the study area combined is approximately 2,773 square miles. The study area crosses two major watersheds and three minor watersheds and ends in a major watershed in southwestern Colorado. These six watersheds are referred to as the Shumway Arroyo watershed, La Plata River watershed, Farmington Glade watershed, Animas River watershed, Pump Canyon watershed, and Los Pinos River watershed.

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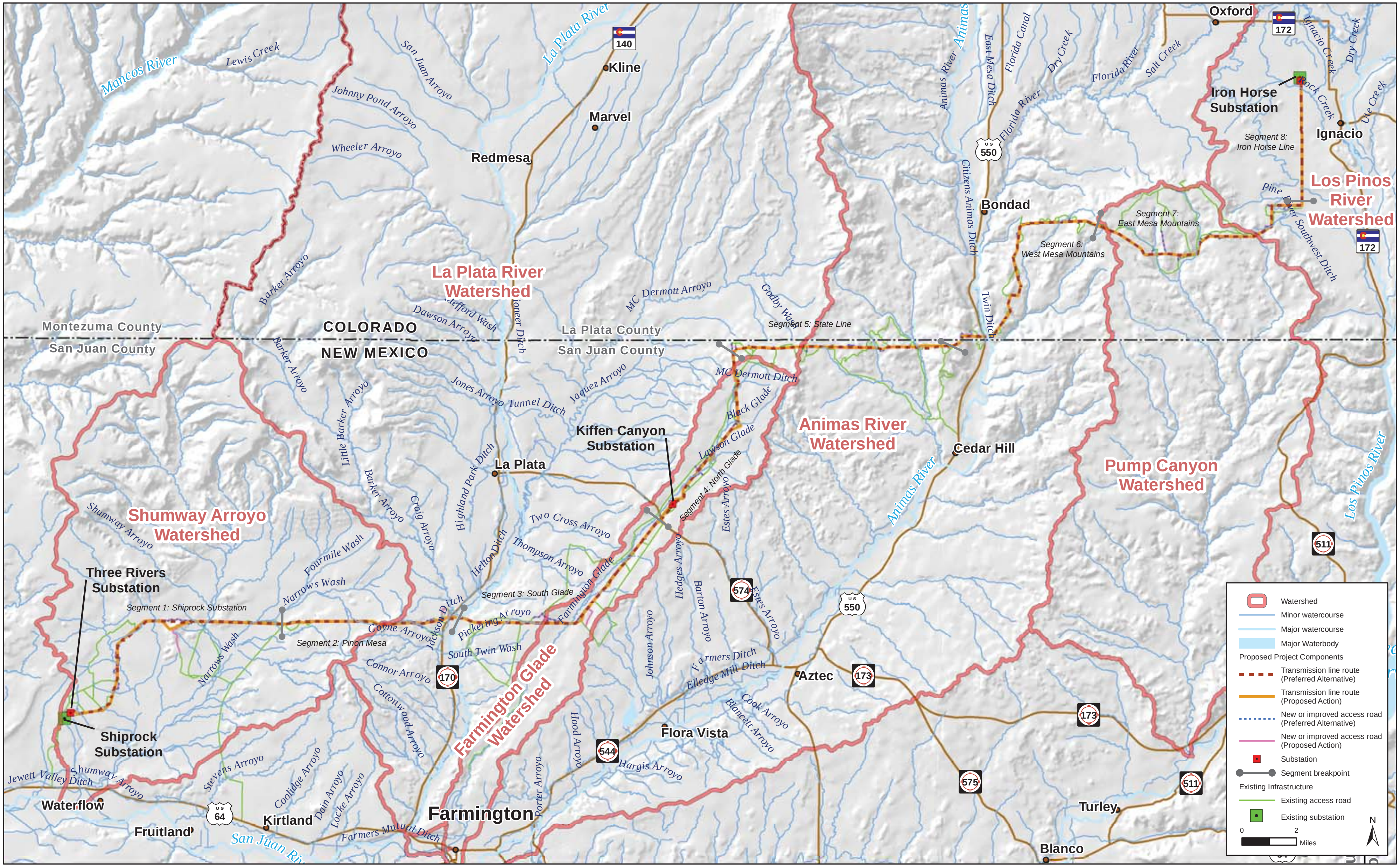
[84] NMED 2012

[85] EPA 2004




Source: GIS Tri-State 2013, GIS ESRI 2010, GIS USGS 2011, GIS USGS 2011a

**Exhibit 3-85 Surface Water**

Average annual precipitation is 14.72 inches near Ignacio, Colorado, which is nearly double the average annual precipitation near Shiprock, New Mexico. The Animas River and Rock Creek are the only perennial streams crossed by the study area. The La Plata River is intermittent, and the study area does not cross the Los Pinos or San Juan Rivers, although these latter two perennial streams receive runoff from the study area. Most of the drainages crossed by the study area are intermittent or ephemeral, fed by stormwater runoff.

In consultation with the USACE, fieldwork was conducted in 2012 and 2013 in support of a pending preliminary jurisdictional determination of waters of the US.[86] Exhibit 3-86, Potential Waters of the US, provides a detailed breakdown of the potential jurisdictional drainages by segment.

**Exhibit 3-86**

## Potential Waters of the US

| Segments | Ephemeral | Intermittent | Perennial | Total Potential Waters of the US |
|---|---|---|---|---|
| Segment 1: Shiprock Substation | 15 | 0 | 0 | 15 |
| Segment 2: Pinon Mesa | 6 | 1 (La Plata River) | 0 | 7 |
| Segment 3: South Glade | 10 | 0 | 0 | 10 |
| Segment 4: North Glade | 4 | 0 | 0 | 4 |
| Segment 5: State Line | 7 | 0 | 0 | 7 |
| Segment 6: West Mesa Mountains | 3 | 0 | 1 (Animas River) | 4 |
| Segment 7: East Mesa Mountains | 3 | 1 | 0 | 4 |
| Segment 8: Iron Horse Line | 1 | 2 | 1 (Rock Creek) | 4 |
| **Total** | **49** | **4** | **2** | **55** |

[86] URS 2013

### 3.14.3.2 Floodplains

Exhibit 3-87, FEMA Floodplains, shows the location and extent of 100-year floodplains in the study area and immediately surrounding region. As shown in Exhibit 3-87, all of the 100-year floodplains crossed in the study area are located in the first four segments, except for the Animas River crossing in Segment 6. All of these floodplains experience flash flooding from rainstorms in the summer. The La Plata and Animas Rivers also occasionally flood as a result of snowmelt in the spring.[87] The floodplains in Segments 1 through 4 are fed by sandy arroyos with little or no vegetation. Sediment loading during flood events in these segments is naturally high.

### 3.14.3.3 Wetlands

Wetlands in the study area are found along the banks of the La Plata and Animas Rivers within the last 1.1 miles of Segment 7 and in Segment 8. Wetlands located in Segments 7 and 8 are shown in Exhibit 3-88, Potential Wetlands.[88] All but one of the wetlands located in Segments 7 and 8 are considered to be "potential wetlands" because they have not been officially delineated or considered by USACE personnel; however, their approximate boundaries are defined by the presence of wetland plant species. These emergent wetlands are characterized by drainages and depressions receiving irrigation runoff from fields and pastures and ultimately drain into Jacques Park Creek, Pine River, Klusman Park Creek, and Rock Creek. One wetland, located in Segment 7, approximately 1 mile from the existing Iron Horse 115kV line (Segment 8), has been delineated.

### 3.14.3.4 Groundwater

One known shallow aquifer (20 feet deep or less) is found in the northern portion of Segment 8. There are no shallow groundwater wells in the study area with a static water level less than 20 feet deep.[89]

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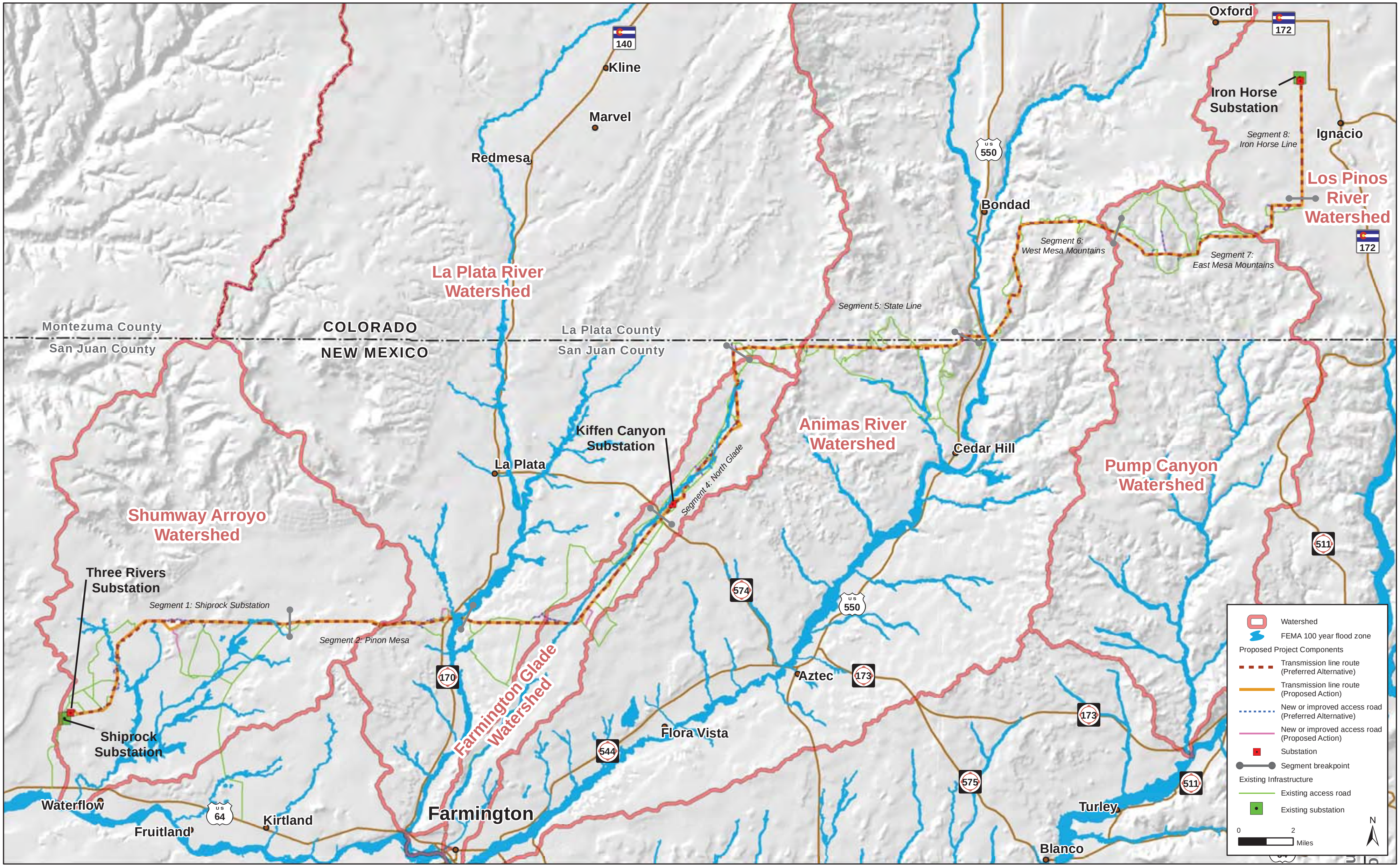
[87] USGS 2012a, 2012b

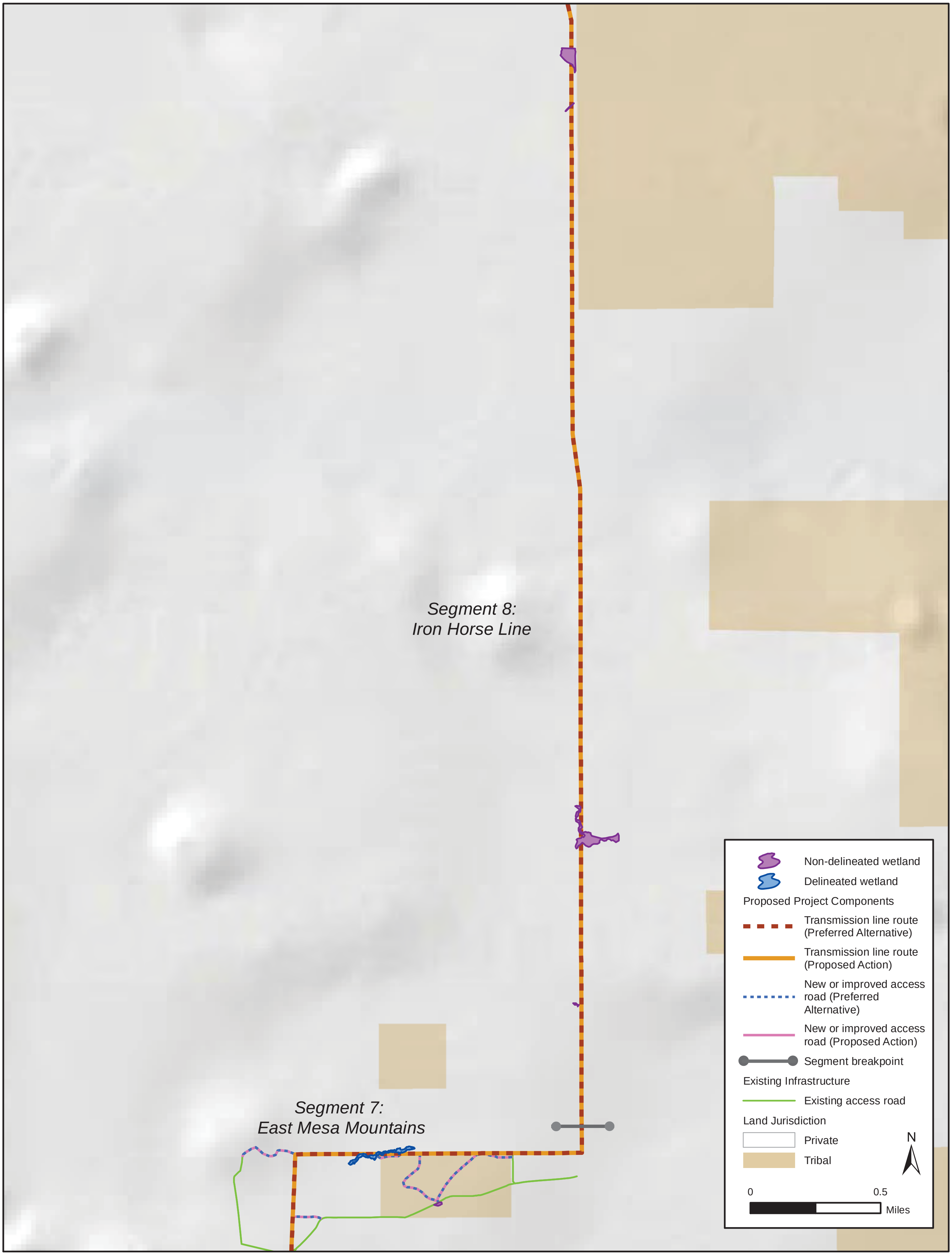
[88] Loebig 2013; Loebig and Paulek 2013

[89] GIS USGS 2011




Source: GIS Tri-State 2013, GIS USGS 2011a, GIS FEMA 2012

**Exhibit 3-87 FEMA Floodplains**




Source: GIS BLM 2012, GIS Tri-State 2013, GIS URS 2013

**Exhibit 3-88 Potential Wetlands**

The aquifers in the study area are part of the Colorado Plateaus Aquifer. All of Segment 1 and the first 3.6 miles of Segment 2 of the study area are located over the Mesaverde Aquifer. The remainder of the study area is located over the Uinta-Animas Aquifer shown in Exhibit 3-89, Colorado Plateaus Aquifers. In general, the Colorado Plateaus Aquifers are composed of permeable, moderately to well-consolidated sedimentary rocks. These rocks range in age from Permian to Tertiary and vary greatly in thickness, lithology, and hydraulic characteristics.[90]

The depth to groundwater varies throughout the region, but is generally closer to the surface at lower elevations and deeper at higher elevations. The notable exception to this is the abundance of small springs located near the central portion of the study area where it parallels the state line in Segment 5.[91] These springs appear to be located where groundwater flows laterally on top of an impermeable layer of sandstone to an outcrop where it comes to the surface. There are no springs located within the study area.

### 3.14.3.5 Water Quality

#### Surface Water

The Surface Water Quality Bureau (SWQB) of the New Mexico Environment Department (NMED) conducted a water quality survey of the San Juan-Animas watersheds in 2010. These watersheds are subdivided into reaches and defined as follows:

- Upper La Plata – McDermott Arroyo to the Colorado border
- Lower La Plata – San Juan River to McDermott Arroyo
- Upper Animas – Estes Arroyo to the Colorado border
- Lower Animas – San Juan River to Estes Arroyo
- Middle San Juan – Animas River to Cañon Largo
- Lower San Juan – Navajo Nation boundary at Hogback to the Animas River

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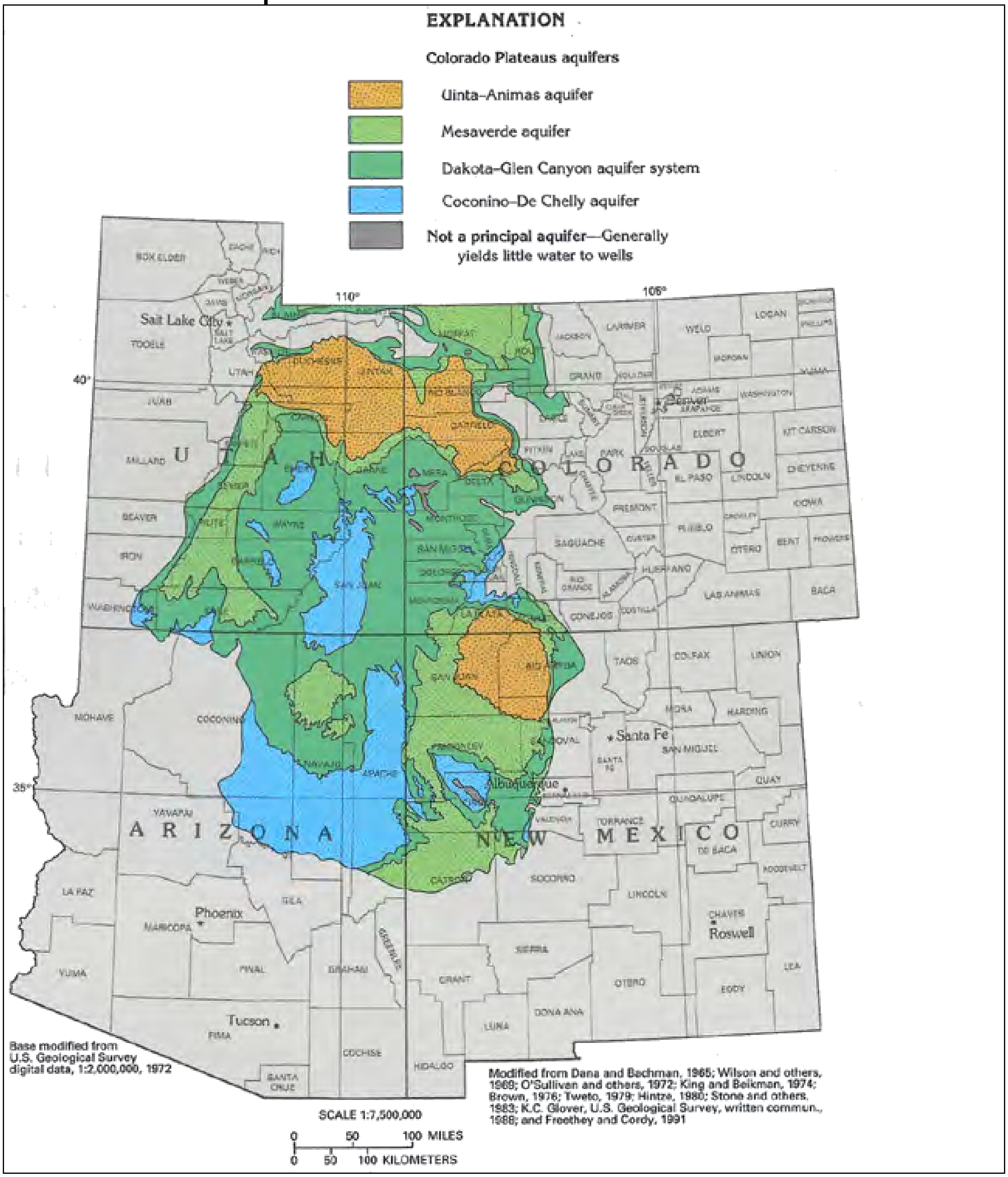
[90] USGS 2012c

[91] GIS USGS 2011

**Exhibit 3-89**
## Colorado Plateaus Aquifers




*Excerpted from Groundwater Atlas of the United States (USGS 2012c).*

The SWQB Water Quality Standards were not met in the La Plata, Animas, and San Juan Rivers for the following criteria:

- Dissolved oxygen: Lower La Plata River
- *E. coli*: Animas River, La Plata River, Lower San Juan River
- Nutrient/eutrophication biological indicators: Lower Animas River
- Total phosphorus: Upper Animas River
- Sedimentation/siltation: Upper Animas River, Lower La Plata River, Middle and Lower San Juan River
- Temperature: Animas River
- Turbidity: Animas River, Lower La Plata River, Middle and Lower San Juan River

The following surface waters within the study area are listed as impaired for the parameters noted by the SWQB under Section 303(d) of the Clean Water Act:[92]

- Middle and Lower San Juan River: *E. coli*, sedimentation/siltation.
- Animas River: *E. coli*, sedimentation/siltation, nutrients, total phosphorus, temperature, turbidity.
- Lower La Plata River: *E. coli*, sedimentation/siltation, nutrients, dissolved oxygen.

Total maximum daily loads have not been established for these waters.

### Groundwater

The quality of the water in the Mesaverde Aquifer is extremely variable. The dissolved solids concentration of water from the aquifer is less than 1,000 milligrams per liter (mg/L) in many of the basin-margin areas but locally can be very large (more than 35,000 mg/L in the central part of the Uinta Basin and more than

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[92] NMED 2012

10,000 mg/L in the central part of the Piceance Basin).[93] In general, areas of the aquifer that are recharged by infiltration from precipitation or surface water sources contain relatively fresh water.

The Uinta-Animas aquifer in the San Juan Basin contains fresh to moderately saline water. Dissolved-solids concentrations generally increase along the groundwater flow path from less than 1,000 mg/L near recharge areas to about 4,000 mg/L near the discharge area along the valley of the San Juan River.[94]

## 3.14.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects on water resources and wetlands would occur with this alternative.

## 3.14.5 Preferred Alternative

### 3.14.5.1 Permanent Effects

#### Surface Water

The Preferred Alternative would not be built within the ordinary high water mark of perennial or intermittent streams or rivers in the study area. An examination of North American Rivers data[95] and the results from field investigations in 2012 and 2013[96] indicate that construction activities for the Preferred Alternative would intersect with 48 ephemeral drainages that are potential waters of the US as shown in Exhibit 3-90, Potential Waters of the US Intersecting the Preferred Alternative. As indicated in Exhibit 3-90, these 48 drainages may intersect with the Preferred Alternative in more than one location.

There are numerous other ephemeral drainages scattered throughout the study area that are not expected to be jurisdictional but may intersect with the the Preferred Alternative. Determining the exact number and nature of these locations would depend on final engineering and ongoing efforts in support of an application for a preliminary jurisdictional determination by the USACE.

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[93] USGS 2012b

[94] USGS 2012b

[95] GIS Esri 2010

[96] URS 2013

Permanent effects to ephemeral drainages would result from access road crossings, which could result in sedimentation, permanent fill placement, and channel bank alteration.

Exhibit 3-90
## Potential Waters of the US Intersecting the Preferred Alternative

| Segments | Ephemeral | Intermittent | Perennial | Total Potential Waters of the US | Total Intersections with the Preferred Alternative |
|---|---|---|---|---|---|
| Segment 1: Shiprock Substation | 15 | 0 | 0 | 15 | 17 |
| Segment 2: Pinon Mesa | 6 | 1 (La Plata River) | 0 | 7 | 13 |
| Segment 3: South Glade | 10 | 0 | 0 | 10 | 13 |
| Segment 4: North Glade | 3 | 0 | 0 | 3 | 6 |
| Segment 5: State Line | 7 | 0 | 0 | 7 | 7 |
| Segment 6: West Mesa Mountains | 3 | 0 | 1 (Animas River) | 4 | 4 |
| Segment 7: East Mesa Mountains | 3 | 1 | 0 | 4 | 6 |
| Segment 8: Iron Horse Line | 1 | 2 | 1 (Rock Creek) | 4 | 4 |
| **Total** | ***48*** | ***4*** | ***2*** | ***54*** | ***70*** |

Construction of new or improved access roads would most likely have the greatest effect on ephemeral drainages. Crossing drainages may require placing permanent fill into the drainage channel below the ordinary high water mark. This fill includes the installation of structures, such as culverts, and armoring channels and banks to protect water resources and allow for unimpeded flow.

Due to the erosive nature of the soils in the study area, proper design and construction of pad sites at transmission structures, staging areas, pulling sites, and access roads are critical to facilitate proper drainage and minimize erosion. Areas where ephemeral drainages would be permanently affected would be designed to minimize surface erosion and re-routed to ensure their previous flow pattern.

As part of ongoing maintenance activities, Tri-State would inspect, maintain, and repair water crossings built as part of the SJBEC Project to minimize erosion and sedimentation to area surface water. Indirect short-term effects may result from increased soil erosion due to vegetation removal and increased runoff from roadway grading activities. Greater sediment inputs from roads could exacerbate the sediment impairment already present in the Lower La Plata, Animas, and Middle and Lower San Juan Rivers (see Section 0, Water Quality). These potential effects, however, would be minimized by implementing EPMs 13, 21, 22, 23, 24, and 33 identified in Exhibit 2-23. As described in Exhibit 2-23, EPM 33, an SWPPP would be prepared to manage erosion and provide adequate drainage. Implementing these measures is expected to mitigate erosion and possible sedimentation to the extent practicable from the Preferred Alternative.

### Floodplains

The Preferred Alternative would permanently affect 100-year floodplains defined by FEMA in the Shumway Arroyo, La Plata River, and Farmington Glade watersheds across Segments 1 through 4. Exhibit 3-87, FEMA Floodplains, shows the 100-year floodplains in the region and where the Preferred Alternative would intersect them in the study area. As detailed in Exhibit 3-91, Permanent Effects to 100-year Floodplains from the Preferred Alternative, most of the permanent effects to the floodplains would be from improving existing access roads or constructing new access roads, as well as constructing four transmission line structures, totaling 1.67 acres and 0.12 acre, respectively. The Preferred Alternative is not expected to result in alterations to the structure or proper function of floodplains. Construction for the Preferred Alternative would not occur in any 100-year floodplains in Segments 5 through 8.

Exhibit 3-91
**Permanent Effects to 100-year Floodplains from the Preferred Alternative**

| Segment | New Access Roads or Existing Roads Requiring Improvements (acres) | Transmission Structures (acres) | Total (acres) |
|---|---|---|---|
| 1 | 0.40 | 0.00 | **0.40** |
| 2 | 0.01 | 0.03 | **0.04** |
| 3 | 0.09 | 0.00 | **0.09** |
| 4 | 1.17 | 0.09 | **1.26** |
| **Total** | **1.67** | **0.12** | **1.79** |

### Wetlands

The Preferred Alternative would use an existing road in Segment 7 with a culvert (requiring no improvements) to cross a single, delineated wetland to access an area where construction efforts are proposed as shown in Exhibit 3-88, Potential Wetlands. In addition, there is a second wetland in Segment 7 near an existing access road with no proposed improvements. Four wetlands in Segment 8 are spanned by the existing Iron Horse 115 kV line. These five wetlands would not be affected by the Preferred Alternative; therefore, they were not formally delineated. Instead, these five wetlands in Segments 7 and 8 were identified through the presence of obligate species and other criteria.

By implementing EPMs 33, 34, 77, 78, and 79, which include development and execution of a SWPPP and a hazardous materials plan as described in Exhibit 2-23, there would be little to no direct permanent effects to wetlands in the study area from the Preferred Alternative.

### Groundwater

Direct permanent effects to groundwater from the Preferred Alternative are not expected due to the implementation of EPMs 33, 77, and 79 as described in Exhibit 2-23. These items include the implementation of a SWPPP, a hazardous materials management plan, and a spill prevention notification and cleanup plan.

### Water Quality

Permanent effects to surface water quality from the Preferred Alternative could include accidental spills of fuel, lubricants, or any other chemicals used during operation. By implementing EPMs 33, 77, and 79 listed in Exhibit 2-23, however, there would be little or no permanent direct effects to water quality. Effects would be further avoided and minimized by implementing EPM 78 listed in Exhibit 2-23 that would require vehicle refueling and servicing activities to take place in areas located a minimum of 300 feet from wetlands and streams.

The Preferred Alternative could potentially reduce surface water quality through increased sediment loads from stormwater runoff from areas such as new roads, transmission line structures, and substations. Design features of the Preferred Alternative, including proper design of pad sites, temporary use areas, and access roads; site restoration, recontouring, and revegetation (identified in Exhibit 2-23, EPM 17); along with adherence to the SWPPP (identified in Exhibit 2-23, EPM 33), would be expected to result in little or no permanent direct effects to surface water quality. Tri-State would be required to comply with all stipulations included in the Section 401/404 permit required for the project. These stipulations would also address minimizing effects such as increased erosion and subsequent sedimentation and siltation in downstream drainages.

### 3.14.5.2 Temporary Effects

#### Surface Water

An examination of North American Rivers data[97] and the results from field investigations in 2012 and 2013[98] indicate the potential for construction efforts from the Preferred Alternative to intersect with 48 ephemeral drainages. Determining the exact number and nature of these locations would depend on final engineering and ongoing efforts in support of an application for a preliminary jurisdictional determination by the USACE. No construction activities would take place within the ordinary high water mark of perennial or intermittent streams or rivers.

Potential temporary effects to surface water from these road crossings include channel bank erosion and increased

[97] GIS Esri 2012

[98] URS 2013

sedimentation from runoff associated with new roads. Temporary channel bank modification could include vegetation removal that could take many years to recover. Temporary indirect effects could occur during installation of the project infrastructure from the Preferred Alternative and include disturbed vegetation, although effects from erosion and other effects would be minimized through the implementation of EPMs 13, 17, 21, 22, 23, 33, and 34, which are listed in Exhibit 2-23.

### Floodplains

Temporary effects related to floodplains would occur in the Shumway Arroyo, La Plata River, and Farmington Glade watersheds within Segments 1 through 4. Proposed activities include improving existing access roads or constructing new access roads, which would affect 2.81 acres of floodplain, and constructing four transmission line structures, which would affect 2.80 acres of floodplain. This includes the right-of-way outside of the road surface (for example, cuts and fills or other features such as wing ditches) and broader areas around transmission structures necessary for cranes, drills, and concrete trucks. These effects are shown by segment in Exhibit 3-92, Temporary Effects to 100-year Floodplains from the Preferred Alternative. The Preferred Alternative is not expected to result in alterations to the structure or proper function of floodplains. Construction for the Preferred Alternative would not occur in any 100-year floodplains in Segments 5 through 8; therefore, there would be no temporary effects.

Exhibit 3-92
**Temporary Effects to 100-year Floodplains from the Preferred Alternative**

| Segment | New Access Roads or Existing Roads Requiring Improvements (acres) | Transmission Structures (acres) | Total (acres) |
|---|---|---|---|
| 1 | 0.77 | 0.00 | **0.77** |
| 2 | 0.03 | 0.70 | **0.73** |
| 3 | 0.24 | 0.00 | **0.24** |
| 4 | 1.77 | 2.10 | **3.87** |
| **Total** | **2.81** | **2.80** | **5.61** |

### Wetlands

All construction elements for the Preferred Alternative would be located outside wetlands in the study area. As described above, the Preferred Alternative would use an existing road with a culvert (requiring no improvements) to cross a single wetland and access an area where construction efforts are proposed. Ground disturbance and construction activities could cause temporary effects from runoff or sedimentation to the aforementioned wetland and the five other wetlands in the study area, though the four wetlands in Segment 8 would be spanned and are not proximal to construction activities. By implementing EPMs 33, 34, 77, and 79, which include development and execution of a SWPPP and a hazardous materials plan as described in Exhibit 2-23, there would be little to no direct permanent effects to wetlands in the study area from construction of the Preferred Alternative.

### Groundwater

Dewatering, or lowering of groundwater levels through pumping, may be required for the installation of some of the transmission structures. Holes would be drilled into the ground, as deep as 20 feet in some cases, for the placement of concrete piers for metal lattice structures or the direct embedment of wood poles. In most of the study area, dewatering would not be required. The segments where it would most likely be necessary are within the last 2.1 miles of Segment 7 and Segment 8 where the Iron Horse Substation would be expanded—an area with extensive irrigation for pastures. Shallow groundwater wells would not be directly affected by dewatering, because static groundwater levels in the one shallow water well located in this portion of the study area are deeper than would be required for structure foundations in Segment 7, and in Segment 8 the structures are already in situ and in use. Dewatering permits, issued by the CDPHE, would be required in these locations if the water removed during construction could not be managed per CDPHE requirements. Dewatering activities would be temporary, short-term in duration, and carried out in compliance with required permits as described in EPM 20 listed in Exhibit 2-23, which would minimize possible temporary effects to groundwater.

#### Water Quality

The potential for the Preferred Alternative to temporarily affect water quality, as well as measures to avoid and minimize these effects, are the same as those described above for permanent effects.

### 3.14.5.3 Mitigation

No mitigation is proposed.

## 3.14.6 Proposed Action

### 3.14.6.1 Permanent Effects

#### Surface Water

Permanent effects to surface water with the Proposed Action would be the same as described above for the Preferred Alternative. The only difference is that the Proposed Action has the potential to intersect with 49 ephemeral drainages that are potential waters of the US as compared to 48 for the Preferred Alternative. Exhibit 3-93, Potential Waters of the US Intersecting the Proposed Action, details the breakdown of these drainages by segment. There are numerous other ephemeral drainages scattered throughout the study area that are not expected to be jurisdictional but may intersect with the Proposed Action. Determining the exact number and nature of these locations would depend on final engineering and ongoing efforts in support of an application for a preliminary jurisdictional determination by the USACE.

**Exhibit 3-93**
**Potential Waters of the US Intersecting the Proposed Action**

| Segments | Ephemeral | Intermittent | Perennial | Total Potential Waters of the US | Total Intersections with the Proposed Action |
|---|---|---|---|---|---|
| Segment 1: Shiprock Substation | 15 | 0 | 0 | 15 | 17 |
| Segment 2: Pinon Mesa | 6 | 1 (La Plata River) | 0 | 7 | 13 |
| Segment 3: South Glade | 10 | 0 | 0 | 10 | 13 |
| Segment 4: North Glade | 4 | 0 | 0 | 4 | 8 |
| Segment 5: State Line | 7 | 0 | 0 | 7 | 7 |
| Segment 6: West Mesa Mountains | 3 | 0 | 1 (Animas River) | 4 | 4 |

Exhibit 3-93
**Potential Waters of the US Intersecting the Proposed Action**

| Segments | Ephemeral | Intermittent | Perennial | Total Potential Waters of the US | Total Intersections with the Proposed Action |
|---|---|---|---|---|---|
| Segment 7: East Mesa Mountains | 3 | 1 | 0 | 4 | 6 |
| Segment 8: Iron Horse Line | 1 | 2 | 1 (Rock Creek) | 4 | 4 |
| **Total** | **49** | **4** | **2** | **55** | **72** |

### 100-Year Floodplains

Permanent effects to floodplains from the Proposed Action would be the same as those discussed above for the Preferred Alternative, although the Proposed Action would affect a larger acreage of floodplain areas than the Preferred Alternative. As detailed in Exhibit 3-94, Permanent Effects to 100-year Floodplains from the Proposed Action, most of the permanent effects to the floodplains would be from improving existing access roads or constructing new access roads, as well as from constructing 10 transmission line structures, totaling 2.54 acres and 0.21 acre, respectively. By comparison, the Preferred Alternative would affect 1.17 acres due to road improvements and 0.09 acre due to transmission structures. the Proposed Action is not expected to result in alterations to the structure or proper function of floodplains.

Exhibit 3-94
**Permanent Effects to 100-year Floodplains from the Proposed Action**

| Segment | New Access Roads or Existing Roads Requiring Improvements (acres) | Transmission Structures (acres) | Total (acres) |
|---|---|---|---|
| 1 | 0.47 | 0.06 | **0.53** |
| 2 | 0.29 | 0.02 | **0.31** |
| 3 | 0.15 | 0.02 | **0.17** |
| 4 | 1.63 | 0.11 | **1.74** |
| **Total** | **2.54** | **0.21** | ***2.75*** |

### Wetlands, Groundwater, and Water Quality

Permanent effects to wetlands, groundwater, and water quality would be the same for the Proposed Action as described in Section 3.14.5.1, Permanent Effects, for the Preferred Alternative.

## 3.14.6.2 Temporary Effects

### Surface Water

Temporary effects to surface water with the Proposed Action would be the same as described above for the Preferred Alternative. The only difference is that the Proposed Action has the potential to intersect with 49 ephemeral drainages that are potential waters of the US as compared to 48 for the Preferred Alternative.

### 100-Year Floodplains

Temporary effects to floodplains from the Proposed Action would be the same as those discussed above for the Preferred Alternative, although the Proposed Action would affect a larger acreage of floodplain areas than the Preferred Alternative. As detailed in Exhibit 3-95, Temporary Effects to 100-year Floodplains from the Proposed Action, most of the permanent effects to the floodplains would be from improving existing access roads or constructing new access roads, as well as constructing 10 transmission line structures, totaling 4.46 and 7 acres, respectively. By comparison, the Preferred Alternative would affect 2.81 acres due to road improvements and 2.80 acres due to transmission structures. The Proposed Action is not expected to result in alterations to the structure or proper function of floodplains.

**Exhibit 3-95**

**Temporary Effects to 100-year Floodplains from the Proposed Action**

| Segment | New Access Roads or Existing Roads Requiring Improvements (acres) | Transmission Structures (acres) | Total (acres) |
|---|---|---|---|
| 1 | 0.93 | 2.10 | **3.03** |
| 2 | 0.72 | 0.70 | **1.42** |
| 3 | 0.24 | 0.70 | **0.94** |
| 4 | 2.57 | 3.50 | **6.07** |
| **Total** | **4.46** | **7.00** | **11.46** |

**Wetlands, Groundwater, and Water Quality**

Temporary effects to wetlands, groundwater, and water quality would be the same for the Proposed Action as described in Section 3.14.5.1 for the Preferred Alternative.

#### 3.14.6.3 Mitigation

No mitigation measures are proposed.

## 3.15 Vegetation

### 3.15.1 Methods

Following consultation with the US Fish and Wildlife Service (USFWS), BLM, and other land-managing agencies, biologists conducted several field surveys in the study area to identify threatened or endangered species, such as the Mesa Verde cactus, and to document other special status plants, general vegetation communities, and noxious weeds.[99] These data were used to map vegetation communities in the study area.

Analysis of each vegetation community's characteristics, including color and texture, were then combined with interpretation of high-resolution aerial photography to delineate similar habitats along the proposed access roads for the SJBEC Project. This information was analyzed using GIS to calculate areas of permanent and temporary effects to special status plants, vegetation communities, and noxious weeds.

The effects analysis considered the following indicators:

- Areas of permanent and temporary vegetation loss and the type of vegetation community affected
- Potential effects to special status species
- Areas where ground-disturbing activities could cause an increase in noxious weeds

[99] Loebig 2013; Loebig and Paulek 2013; Parametrix 2012

## 3.15.2 Affected Environment

Several biological surveys of the study area were completed in 2012 and 2013 along with associated reports.[100] Results from the surveys form the basis for understanding vegetation communities in the study area, as well as the extent and frequency of special status plants. Portions of the reports were excerpted for this section of the EIS. Scientific names follow those published by K. Allred.[101] Each of these plant communities is defined by the dominant species found in their structural vegetation layers and is described in detail in Appendices H and I.

**Vegetation Study Area**

The study area for vegetation is the same as the general study area described in Section 3.2, Study Area.

### 3.15.2.1 Vegetation Communities along Segments 1 to 5 (New Mexico)

Eight general plant community types were defined within the New Mexico portion of the study area located in Segments 1 through 5, which are detailed in Exhibit 3-96, Vegetation Communities Along Segments 1 to 5 (New Mexico).[102] Exhibit 3-97, Vegetation Zones, New Mexico (west), and Exhibit 3-98, Vegetation Zones, New Mexico (east), show the locations of these vegetation communities.

Exhibit 3-96
**Vegetation Communities Along Segments 1 to 5 (New Mexico)**

| Community | Segment | Number of Subcommunities | Key Features |
|---|---|---|---|
| Desert Grassland | 1 | 0 | • Galleta (*Pleuraphis jamesii*) and cheatgrass (*Bromus tectorum*) are co-dominant and account for 80% to 90% of the sparse plant cover.<br>• Vegetation cover ranges from 10% to 30%. |
| Salt Desert Scrubland | 1 | 2 | • Dominated by a diverse mix of grass and shrub species. Scrub height ranges from 12 to 16 inches.<br>• Provides marginal to low potential suitable habitat for Mesa Verde cactus (*Sclerocactus mesae-verdae*).<br>• Water erosion is moderate to heavy.<br>• Subcommunity comprised of mostly drought-tolerant, low-growing shrubs (<12 inches).<br>• Vegetation cover ranges from 20% to 30%. |
| Desert Shrubland | 1 | 0 | • Characterized by black greasewood (*Sarcobatus vermiculatus*), 4 to 6 feet high.<br>• Understory varies with mixes of herbaceous annuals and weeds.<br>• Occurs at major arroyo crossings and areas subject to excessive erosion and deposition.<br>• Vegetation cover ranges from 20% to 30%. |

[100] Loebig 2013; Loebig and Paulek 2013; Parametrix 2012

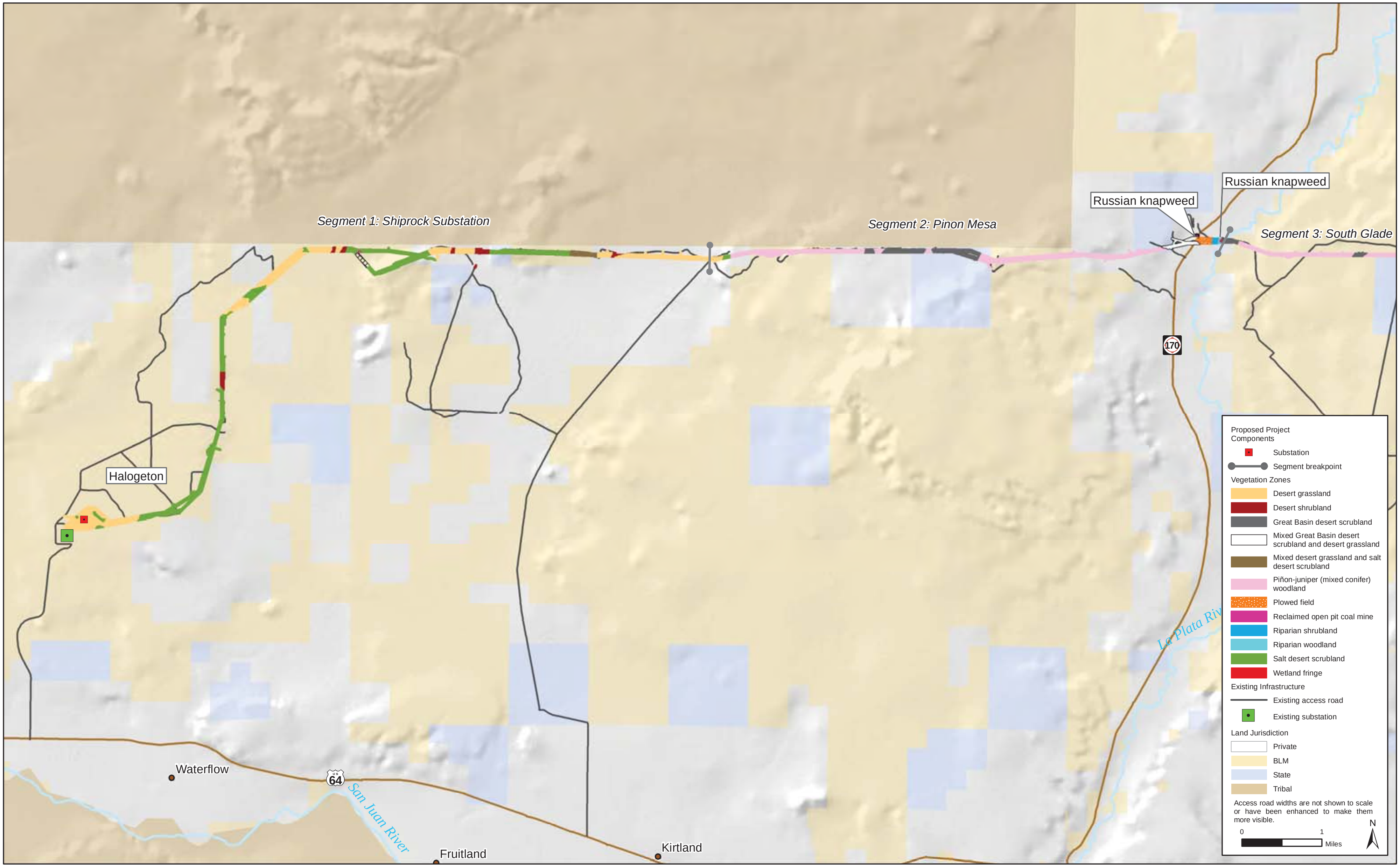
[101] Allred 2012

[102] Loebig and Paulek 2013

**Exhibit 3-96**

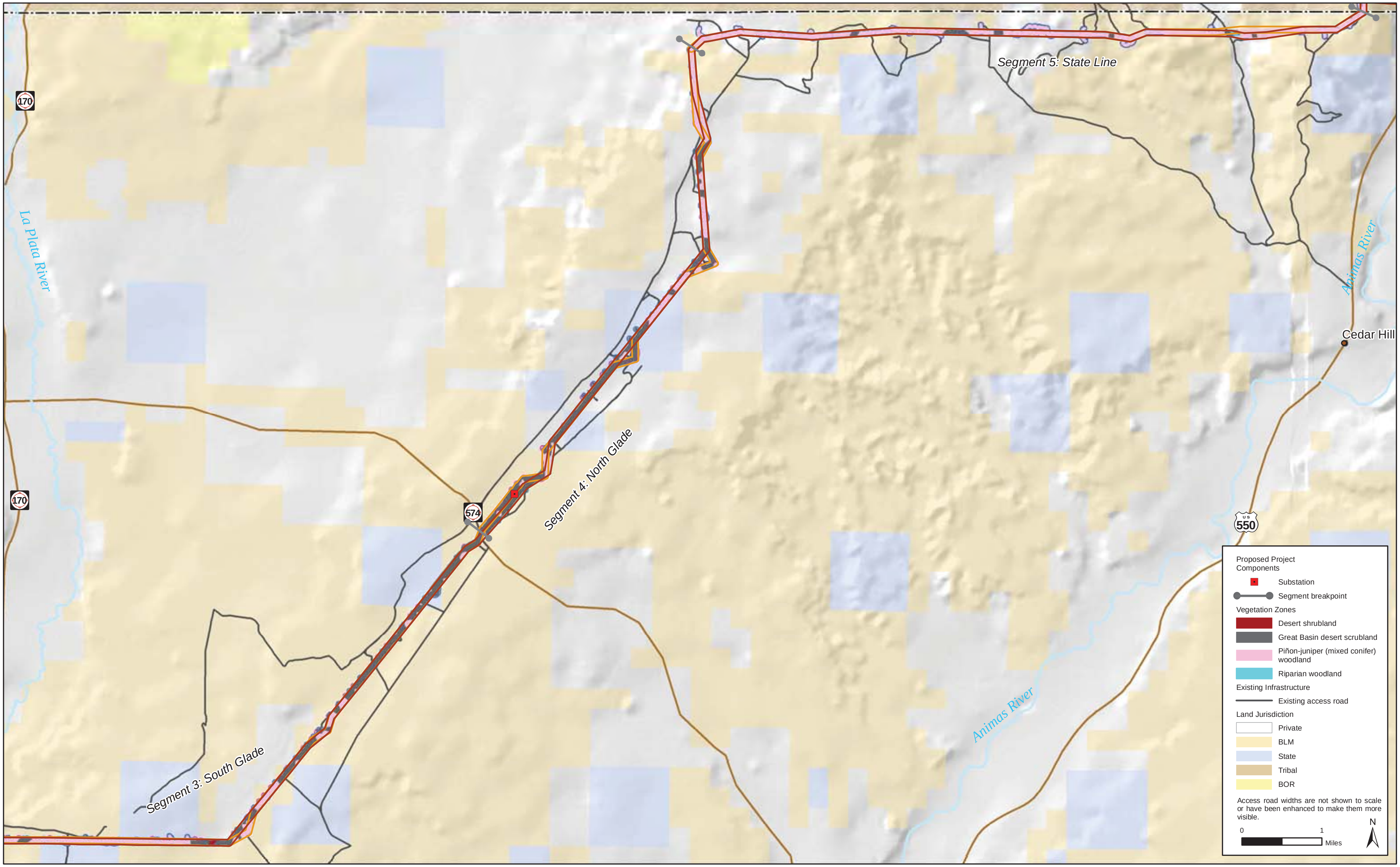
## Vegetation Communities Along Segments 1 to 5 (New Mexico)

| Community | Segment | Number of Subcommunities | Key Features |
|---|---|---|---|
| Great Basin Desert Scrubland | 2,3,4,5 | 2 | • Dense stands of the dominant species, big sagebrush (*Artemisia tridentata*), grow 2.5 to 5 feet high.<br>• Herbaceous layer mostly lacks perennial grass cover, which distinguishes it from Great Basin Desert Scrubland 2.<br>• Dominant herbaceous species are weeds mixed with more-desirable natives.<br>• Vegetation cover ranges from 40% to 70%. |
| Pinon-Juniper (Mixed Conifer) Woodland | 2,3,4,5 | 7 | • The seven subcommunities vary mostly in the makeup of shrub and herbaceous layer.<br>• Canopy has a mix of Utah juniper and Colorado pinon pine ranging from 6 to 25 feet high. Pinon pines affected by pine beetle infestations.<br>• Shrub layer is open; dominant species depend on the subcommunity.<br>• Herbaceous layer consists of a mix of grasses, forbs, and shrubs.<br>• Grazing pressure is low in most subcommunities.<br>• Vegetation cover varies from 10% to 70% depending on subcommunity. |
| Wetland Fringe | 2 | 0 | • Found only on the lower banks of the La Plata River.<br>• Dominated by American three-square (*Scirpus pungens*) and redtop bentgrass (*Agrostis gigantea*).<br>• Upper banks include many herbaceous species that typically occur near wetland perimeters.<br>• Vegetation cover ranges from 70% to 100%. |
| Riparian Shrubland | 2 | 0 | • Occurs only on the La Plata River floodplain west of the river.<br>• Characterized by nearly impenetrable thickets of the invasive tamarisk (*Tamarix ramosissima*) with stands averaging 8 to 12 feet high.<br>• Shrub and herbaceous layers are dominated by flax-leaved rabbitbrush (*Lorandersonia linifolia*), four-wing saltbush (*Atriplex canescens*), and alkali sacaton (*Sporobolus airoides*). Weeds are common.<br>• Grazing pressure is low. |
| Riparian Woodland | 2, 5 | 2 | • The Riparian Woodland 2 community occurs only at the La Plata River crossing. The canopy is 30 to 40 feet high and contains box elder (*Acer negundo*), Russian olive (*Elaeagnus angustifolia*), and scattered cottonwood saplings and trees. The shrub contains dense tamarisk, coyote willow (*Salix exigua*), New Mexico olive (*Forestiera pubescens*), and flax-leaved rabbitbrush. Primary herbaceous species include grass species and Western virgin's bower (*Clematis ligusticifolia*). Vegetation cover is 100%.<br>• Riparian Woodland 1 is present only at the Cox Canyon crossing. The canopy is comprised of 40- to 50-foot-tall valley cottonwood trees (*Populus deltoides* ssp. *wislizenii*). The shrub and herbaceous layers are sparse and subject to heavy livestock grazing. Vegetation cover is 50% to 60%. |




Source: GIS BLM 2012, GIS Tri-State 2013, GIS Loebig and Paulek 2013

**Exhibit 3-97 Vegetation Zones, New Mexico (west)**




Source: GIS BLM 2012, GIS Tri-State 2013, GIS Loebig and Paulek 2013

**Exhibit 3-98 Vegetation Zones, New Mexico (east)**

Beginning at the proposed Three Rivers Substation adjacent to the Shiprock Substation through the end of Segment 1, the study area mostly comprises Desert Grassland and Salt Desert Scrubland plant communities with a few small, interspersed areas of Desert Shrubland. Segments 2, 3, and 4 are composed primarily of Pinon-Juniper (Mixed Conifer) Woodland and Great Basin Desert Scrubland with small, interspersed areas of Desert Grassland. Segment 5 is mostly Pinon-Juniper (Mixed Conifer) Woodland with some interspersed Great Basin Desert Scrubland.

**What does the term *scrubland* mean?**

There are a number of definitions for this term that can be found in the literature depending upon where it is being applied and what kind of moisture regime is present at that location. It is most commonly used to describe areas that are dominated by low-growing (less than 20 feet high), woody plants that are typically low-moisture and drought tolerant and potentially fire-maintained.

### 3.15.2.2 Vegetation Communities Along Segments 6 to 8 (Colorado)

Seven general plant community types were identified within the Colorado portion of the study area located in Segments 6, 7, and 8, which are detailed in Exhibit 3-99, Vegetation Communities Along Segments 6 to 8 (Colorado).[103] Exhibit 3-100, Vegetation Zones, Colorado, shows the locations of these vegetation communities.

**Exhibit 3-99**
**Vegetation Communities Along Segments 6 to 8 (Colorado)**

| Community | Segment | Number of Subcommunities | Key Features |
|---|---|---|---|
| Pinon-Juniper (Mixed Conifer) Woodland | 6,7,8 | 4 | • For Pinon-Juniper (Mixed Conifer) Woodlands, pinon pine tends to be the more dominant tree species in areas of moderate moisture, whereas Utah juniper (*Juniperus osteosperma*) favors areas with less moisture. The four subcommunities vary in the species contained in the shrub and herbaceous layers.<br>• Percent vegetation cover ranges from 30% to 65%. |
| Lower Montane Chaparral | 6,7 | 2 | • Found only in the Mesa Mountains.<br>• Maintained by periodic wildlfire events.<br>• Contains two subcommunities. |
| Riparian Shrubland | 6 | 0 | • Community is located in one small area in Colorado.<br>• The canopy includes willows 8 to 12 feet high and varies from 10 to 60 feet wide. Much of the willow is dead.<br>• The herbaceous layer is dominated by smooth brome (*Bromus inermis*), and the perimeter is fringed with heath aster (*Symphyotrichum falcatum*), foxtail barley (*Hordeum jubatum*), and cocklebur (*Xanthium strumarium*). |

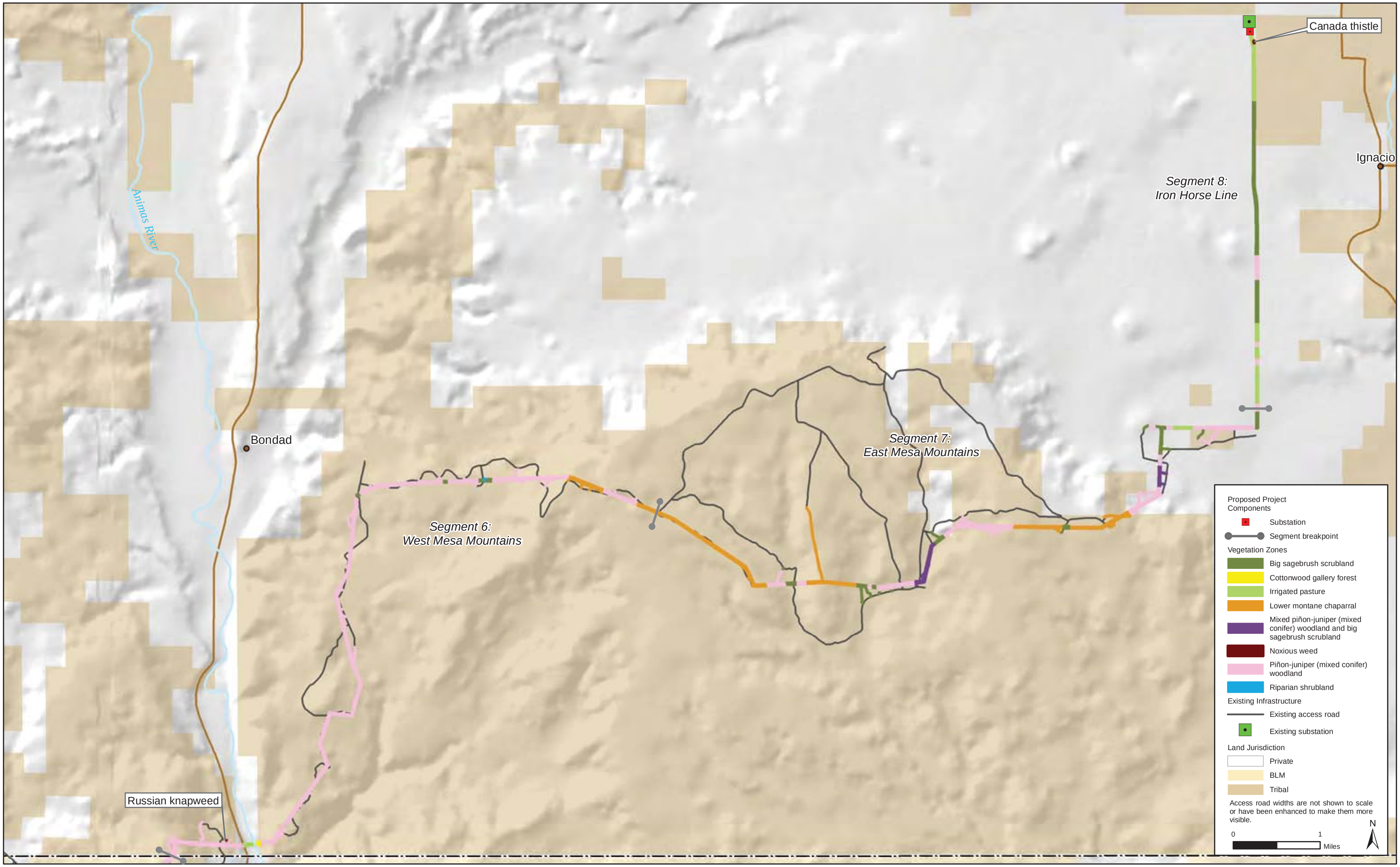
[103] Loebig 2013

**Exhibit 3-99**

## Vegetation Communities Along Segments 6 to 8 (Colorado)

| Community | Segment | Number of Subcommunities | Key Features |
|---|---|---|---|
| Big Sagebrush Scrubland | 7,8 | 0 | • Shrub layer dominated by sagebrush stands 2 to 4 feet high, often with rubber rabbitbrush or four-wing saltbush as subdominant. The herbaceous layer varies considerably and is composed of a wide variety of native grasses and forbs.<br>• Percent vegetation cover ranges from 40% to 60%. |
| Cottonwood Gallery Forest | 7 | 0 | • Only present on the east side of the Animas River.<br>• Canopy is composed exclusively of narrowleaf cottonwood (*Populus angustifolia*). The subcanopy is occupied by box elder.<br>• Shrub layer is composed of dense skunkbush (*Rhus trilobata*), coyote willow, New Mexico olive, Wood's rose (*Rosa woodsii*), and chokecherry (*Prunus virginiana* var. *melanocarpa*).<br>• Understory includes dense vines of western virgin's bower cover. |
| Irrigated Pasture | 8 | 0 | • In well-drained areas, cultivated pasture species, such as smooth brome, orchard grass (*Dactylis glomerata*), alfalfa (*Medicago sativa*), and meadow timothy (*Phleum pratense*) dominate.<br>• In saturated zones, dominant species include spike bentgrass (*Agrostis exarata*), Baltic rush (*Juncus arcticus*), reed canarygrass (*Phalaris arundinacea*), English plantain (*Plantago lanceolata*), and quackgrass (*Elymus repens*).<br>• Percent vegetation cover ranges from 95% to 100%. |

Pinon-Juniper (Mixed Conifer) Woodland is the dominant vegetation community in most of Segment 6 in the study area from the state line to near the head of Pump Canyon. From this point to the base of the Mesa Mountains further east in Segment 7, Pinon-Juniper (Mixed Conifer) Woodland and Lower Montane Chaparral are most common. The last 2 miles of Segment 7, starting at the base of the Mesa Mountains, comprises mostly Big Sagebrush Scrubland and Pinon-Juniper (Mixed Conifer) Woodland with one short section of Irrigated Pasture and Emergent Wetland. The Iron Horse Line Segment of the study area is dominated by Big Sagebrush Scrubland, Pinon-Juniper (Mixed Conifer) Woodland and Irrigated Pasture, with a few scattered wetlands.




Source: GIS BLM 2012, GIS Tri-State 2013, GIS Loebig 2013

**Exhibit 3-100 Vegetation Zones, Colorado**

### 3.15.2.3 Special Status Plant Species

Twelve special status plant species and their habitat associations were identified through consultation with the BLM, USFWS, and consideration of the New Mexico Rare Plants website[104] for San Juan County, New Mexico. Formal definitions for each of these designations is provided in Section 3.16.3.3, Special Status Species. These species are detailed in Exhibit 3-101, Special Status Plant Species.

**Exhibit 3-101**
**Special Status Plant Species**

| Species Name | Common Name | Habitat Notes | USFWS | BLM | NM |
|---|---|---|---|---|---|
| *Asclepias sanjuanensis* | San Juan Milkweed | Sandy loam soils, usually in disturbed sites in juniper savanna and Great Basin Desert Scrubland. | – | S | SC |
| *Astragalus humilis* | Mancos Milkvetch | Cracks, depressions on sandstone rim rock ledges and mesa tops of Point Lookout Sandstone 5,000-6,000'. | E | S | E |
| *Astragalus naturitensis* | Naturita Milkvetch | Sandstone ledges and rimrock along canyons in Pinon-Juniper Woodland. | – | S | SC |
| *Astragalus oocalycis* | Arboles Milkvetch | Seleniferous clay soils in sage, pinon-juniper, and transitional areas to ponderosa pine, often in disturbed sites. | – | S | SC |
| *Astragalus proximus* | Aztec Milkvetch | Substrates underlain by the San Jose, Nacimiento, Pictured Cliffs Sandstone-Lewis Shale. | – | S | – |
| *Aliciella formosa* | Aztec (beautiful) Gilia | Salt desert scrub in the Nacimiento Formation, often in associated with Brack's cactus. | SC | S | E |
| *Ipomopsis polyantha* | Pagosa Skyrocket | Known only from soils of the Mancos Formation in Archuleta County, CO at elevations of 6,800-7,300'. | E | – | – |
| *Pediocactus knowltonii* | Knowlton's Cactus | Rolling, gravelly hills in pinon-juniper-sagebrush. | E | S | E |
| *Proatriplex pleiantha* | Mancos Saltplant | Desert badlands on saline clay soils of the Mancos and Fruitland formations. | – | S | SC |
| *Puccinellia parishii* | Parish's Alkali Grass | Winter annual in alkaline springs, seeps, wet areas. Frequently associated with *Distichlis stricta* and other wetland indicators. | SC | S | E |
| *Sclerocactus cloverae* ssp. *Brackii* | Brack's Hardwall Cactus | Sandy clay strata of the Nacimiento Formation in sparse shadscale scrub. | SC | S | E |
| *Sclerocactus mesae-verdae* | Mesa Verde Cactus | Sparse alkaline hills of Mancos or Fruitland shale, clay soils with high shrink-swell capacity. | T | S | E |

*E: Endangered S: Sensitive SC: Species of Concern T: Threatened*
*Definitions for each of these listings is provided in Section 3.16.3.3.*

[104] NMRPTC 1999

As shown in Exhibit 3-101, there are four plant species that are listed as threatened or endangered under the ESA. These plants are discussed in greater detail below and include the Knowlton's cactus, Mancos miklvetch, Mesa Verde cactus, and Pagosa skyrocket. Biological field investigations and surveys in Colorado did not identify any federally listed (or candidate) threatened or endangered plants, or other special status species[105].

**What are special status species?**

Special status species are living organisms that have been identified by biologists as sufficiently rare as to warrant legal protection (endangered or threatened), monitoring and additional study to determine if they should be legally protected (candidate), or be taken into consideration when projects occur in areas where they are potentially present (sensitive or species of concern). Formal definitions are provided in Section 3.16.3.3.

## Endangered Species Act–Listed Plants

A discussion of ESA-listed plant species in the study area is provided below.

### Knowlton's Cactus

Knowlton's cactus is federally listed as endangered and is also a BLM sensitive and State of New Mexico endangered species. It occurs on tertiary alluvial deposits that have formed gravelly, dark, sandy loams on slopes or hills. It is found under the shade of trees and shrubs and in open areas in dry pinon-juniper woodlands at 5,900 to 6,560 feet elevation. It has a very limited distribution and is known only from the Los Pinos Valley near the New Mexico-Colorado border, approximately 8 miles from the study area.

### Mancos Milkvetch

Mancos milkvetch is federally listed as endangered and is also a BLM sensitive and State of New Mexico endangered species. It is a narrow endemic known only from the Four Corners region of the southwestern US. Its known global distribution includes 13 sites, including 3 sites from Colorado in Montezuma County and 10 sites from New Mexico, in San Juan County. Mancos milkvetch grows within pinon-juniper woodland and desert scrub communities, with populations occurring in the Colorado Plateau subdivision of the Great Basin Desert of northwestern New Mexico and southwestern Colorado. The nearest known populations of this plant are approximately 2 miles west of the study area.

### Mesa Verde Cactus

Mesa Verde cactus was listed by USFWS as a federally threatened species in 1979. It is also listed as endangered by the State of New

[105] Loebig and Paulek 2013

Mexico and as sensitive by the BLM. No Mesa Verde cacti were identified in the study area during the 2009,[106] 2010,[107] 2012,[108] and 2013[109] surveys of suitable habitat within the study area in New Mexico. The BLM and USFWS initially identified 383.8 acres of potential habitat for this species within Segments 1 and 2 of the study area. This potential habitat was surveyed for the presence of Mesa Verde cactus during its flowering period in 2012, although none were identified in the study area.[110] In 2013 the BLM and USFWS identified an additional 120 acres of potential habitat (based on field visits with BLM personnel and new findings from the Navajo Natural Heritage Program),[111] which was surveyed during the Mesa Verde cactus flowering period; none were identified.[112] Mesa Verde cactus surveys conducted in support of initial studies in 2009 and 2010 for the SJBEC Project only located cactus populations in areas south of the study area and the existing Shiprock Substation.[113] Other research documented Mesa Verde cacti to the west-northwest of the Shiprock Substation in the BLM's Hogback Area of Critical Environmental Concern (ACEC).[114]

### Pagosa Skyrocket

Pagosa skyrocket is perennial herb that inhabits rocky clay soils of the Mancos Shale in the southern San Juan Mountains, typically on road shoulders where the soil has been disturbed. Highest densities are under ponderosa pine forests with montane grassland understory. It is known only from Archuleta County, Colorado, approximately 35 miles outside of the action area near the town of Pagosa Springs, Colorado.[115]

[106] Ecosphere 2009
[107] Ecosphere 2010
[108] Parametrix 2012
[109] Loebig and Paulek 2013
[110] Parametrix 2012
[111] Hazelton 2012
[112] Loebig and Paulek 2013
[113] Ecosphere 2010
[114] Kendall 2012a
[115] USFWS 2013

## Other Special Status Plant Species

Other special status plant species that may occur in the study area are discussed below.

### Aztec Gilia

Aztec gilia is a federal species of concern, is listed as endangered by the State of New Mexico, and is listed as sensitive by the BLM. The BLM and USFWS initially identified 225.2 acres of potential habitat for this species within a 6-mile-long portion of Segments 3 and 4 of the study area, which was surveyed in 2012.[117] In addition, in the spring of 2013 the BLM and USFWS identified an additional 6 acres of potential habitat.[118] Over the 2012 and 2013 field seasons, approximately 344 individual plants were identified.

### Brack's Hardwall Cactus

Brack's hardwall cactus is a federal species of concern, is listed as endangered by the State of New Mexico, and is listed as sensitive by the BLM. Habitat for this cactus is the same as for Aztec gilia, and field surveys were conducted in 2012 and 2013. Of the 231.2-acre area of potential habitat identified by the BLM and USFWS and described above (Aztec gilia and Brack's hardwall cacti share the same potential habitat),[119,120] a total of 70 individuals, including four dead Brack's hardwall cacti, were found in Segment 3 over the two field seasons.

### San Juan Milkweed

San Juan milkweed is listed by the State of New Mexico as a species of concern and by the BLM as sensitive. Only one individual of this species was observed during surveys in Segment 1. [121]

## Noxious Weeds

BLM personnel have indicated widespread halogeton (*Halogeton glomeratus*) is a concern in Segment 1 near the San Juan Power Plant

**What *are* weeds?[116]**

Generally speaking, weeds are plants that are considered undesirable. Weeds can be separated into a few categories: native, exotic, and noxious. Noxious weeds are brought from somewhere else and are so vigorous and competitive that they tend to crowd out native plants. The US Department of Agriculture and most state agriculture departments maintain lists of certain noxious weeds that are considered economically damaging. These noxious weeds are classified three ways:

- Class A weeds have limited distribution and eliminating them or limiting their spread is of the highest priority.
- Class B weeds are limited to certain areas of a state. Containment is the primary objective.
- Class C weeds are widespread with management determined at the local level.

[116] NMDA 2009

[117] Parametrix 2012

[118] Loebig and Paulek 2013

[119] Loebig and Paulek 2013

[120] Parametrix 2012

[121] Parametrix 2012

and existing Shiprock Substation.[122] Russian knapweed (*Acroptilon repens*), a New Mexico Class B noxious weed, was found in four locations within the study area in New Mexico: two in the La Plata River valley and two in the North Glade segment.[123] Two Class B noxious weed infestations were also identified in the study area in Colorado, including locations with Russian knapweed and a particularly dense concentration of Canada thistle (*Cirsium arvense*).[124] In addition, scattered individual Canada thistle were identified in Segments 7 and 8 of the study area in various irrigated pastures and around the perimeter of wetlands.[125] Russian knapweed is a Class B weed in Colorado. Exhibit 3-97 and Exhibit 3-100 show the locations of these infestations in the study area.

## 3.15.3 No Action Alternative

Under the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects to vegetation would occur.

## 3.15.4 Preferred Alternative

### 3.15.4.1 Permanent Effects

The Preferred Alternative would have a permanent direct effect on approximately 182 acres in the study area by removing vegetation for transmission line structures, substations, or new or improved access roads. Exhibit 3-102, Permanent Effects to Vegetation Communities for the Preferred Alternative, details the amount of each vegetation community that would be permanently affected in the study area along with the land ownership where these effects would occur. The total area of permanent vegetation loss would be less than shown in Exhibit 3-102 as these totals include portions of existing roads proposed for improvement where the majority of the road surface is already disturbed or devoid of vegetation. None of the affected habitat types is rare or uncommon. In New Mexico the following vegetation communities identified in Section 3.15.2.1, Vegetation Communities Along Segments 1 to 5 (New Mexico), would not be affected: wetland fringe, riparian shrubland, and

[122] BLM 2013

[123] Loebig and Paulek 2013

[124] CDOA 2012

[125] Loebig 2013

riparian woodland. In Colorado the following vegetation communities identified in Section 0, Vegetation Communities Along Segments 6 to 8 (Colorado), would not be affected: riparian shrubland and cottonwood gallery forest.

**Exhibit 3-102**

**Permanent Effects to Vegetation Communities for the Preferred Alternative**

| Affected Vegetation Community | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| **SEGMENTS 1–5: NEW MEXICO** | | | | | |
| Desert grassland | 23.19 | 0 | 0 | 2.51 | **25.70** |
| Desert shrubland | 0.91 | 0 | 0 | 1.21 | **2.12** |
| Great Basin desert scrubland | 35.95 | 6.97 | 0 | 7.93 | **50.85** |
| Mixed desert grassland and salt desert scrubland | 0.84 | 0 | 0 | 0.24 | **1.08** |
| Mixed Great Basin desert scrubland and desert grassland | 0 | 0.42 | 0 | 0.72 | **1.14** |
| Pinon-juniper (mixed conifer) woodland | 24.27 | 9.28 | 0 | 13.06 | **46.61** |
| Plowed field | 0 | 0 | 0 | 0.05 | **0.05** |
| Salt desert scrubland | 16.22 | 0.46 | 0 | 2.18 | **18.86** |
| **SEGMENTS 6–8: COLORADO** | | | | | |
| Big sagebrush scrubland | 0 | 0 | 2.00 | 1.13 | **3.13** |
| Irrigated pasture | 0 | 0 | 0.07 | 3.98 | **4.05** |
| Lower montane chaparral | 0 | 0 | 8.21 | 0.02 | **8.23** |
| Mixed pinon-juniper (mixed conifer) woodland and big sagebrush scrubland | 0 | 0 | 1.00 | 0.48 | **1.48** |
| Pinon-juniper (mixed conifer) woodland | 0.09 | 0 | 17.22 | 2.88 | **20.19** |
| **Total[1]** | **101.47** | **17.13** | **28.5** | **36.39** | **183.49** |

*[1] Some margin of error is present (less than 1 percent) due to overlapping polygons for vegetation communities and rounding in the GIS. The actual permanent effects to vegetation communities would total 182.22 acres (see Exhibit 3-6, Summary of Land Required for Operation of the Preferred Alternative [Permanent Effects]).*

Permanent indirect effects that could occur include decreased plant vigor or health from runoff; introduction of weeds that compete with desirable, native vegetation; or establishment of conditions that enhance the spread of weeds. These possible indirect effects would be avoided or minimized through the implementation EPMs 27, 30, 31, 32, and 33, and listed in Exhibit 2-23. Key EPMs include:

- EPM 27 – Developing and implementing a noxious weed management plan with the appropriate agency for construction, restoration, and operation. The noxious weed management plan may include measures such as treatment of and washing construction vehicles prior to construction or in areas where there is the potential to spread noxious weeds.

- EPM 33 – Preparing and implementing a SWPPP.

## Special Status Species

### ESA-Listed Species

As discussed below, the Preferred Alternative is not expected to affect ESA-listed plant species. Specific effect determinations are part of ongoing consultation under the ESA with the USFWS and the outcome of ESA consultation will be discussed in the Final EIS.

*Knowlton's Cactus, Mancos Milkvetch, and Pagosa Skyrocket*

These three species would not be affected by the Preferred Alternative because there is either no habitat present in the study area or their known populations are well outside the study area.[126]

*Mesa Verde Cactus*

No Mesa Verde cacti were identified during the 2009,[127] 2010,[128] 2012,[129] and 2013[130] surveys of suitable habitat within the study area in New Mexico. Therefore, permanent effects to Mesa Verde cactus are not expected. A pre-construction survey would be completed in the Hogback ACEC in Segment 1 to confirm that there are no Mesa Verde cacti. If individual plants of the species are found, conservation measures would be developed in consultation with the USFWS as part of ESA consultation.

### Other Special Status Species

Aztec gilias, Brack's cactus, and the one San Juan milkweed were identified during the 2012 and 2013 field surveys in New Mexico,[131] in areas close to proposed transmission structures or new or improved access roads. Aztec gilia were found in Segments 3 and 4,

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[126] USFWS 2013

[127] Ecosphere 2009

[128] Ecosphere 2010

[129] Parametrix 2012

[130] Loebig and Paulek 2013

[131] Loebig and Paulek 2013, Parametrix 2012

Brack's cactus were found in Segment 3, and one San Juan milkweed was found in Segment 1. Effects to these species would be avoided by implementing EPMs 38 and 39 listed in Exhibit 2-23. These EPMs call for following stipulations provided by the BLM, USFWS, and land-managing agencies for protecting special status species. As such, the Preferred Alternative would not have the potential to adversely affect these populations.

#### Noxious Weeds

The two Class B noxious weeds, Russian knapweed and Canada thistle, were identified in the study area during 2012 field investigations.[132,133] BLM personnel also indicated widespread halogeton is a concern in Segment 1.[134,135] To limit the spread of these weeds, a noxious weed management plan would be developed as described in Section 2.2.7.2, Revegetation, and identified in EPM 27 in Exhibit 2-23.

### 3.15.4.2 Temporary Effects

The Preferred Alternative would temporarily remove or disturb vegetation in up to 800 acres required for construction of transmission line structures, substations, and new or improved access roads. Exhibit 3-103, Temporary Effects to Vegetation Communities for the Preferred Alternative, details the amount of each vegetation community that would be temporarily affected in the study area, along with the land ownership where these effects would occur. Note that Exhibit 3-103 accounts for the vegetation community types that would be affected on approximately 550 acres. Specific vegetation community types that would be affected on the remaining 250 acres would be similar, but GIS data are not available to determine the specific vegetation communities that would be affected. None of the affected habitat types is rare or uncommon.

Acreages shown in Exhibit 3-103 include areas outside the proposed road surface of access roads, for cuts and fills, wing

[132] Loebig 2013

[133] Loebig and Paulek 2013

[134] BLM 2009

[135] BLM 2013

ditches, water bars, or other features. These temporary effects to vegetation would include broader areas around transmission structures necessary for cranes, drills, and concrete trucks, and other equipment. Further temporary effects would occur at locations related to wire-pulling, tensioning, and splicing sites; construction yards and staging areas; and guard structures. As discussed in Section 2.2.7.2, Revegetation, these areas would be remediated and revegetated to mitigate temporary effects according to the land agency requirements.

Exhibit 3-103
**Temporary Effects to Vegetation Communities for the Preferred Alternative**

| Affected Vegetation Community | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| **SEGMENTS 1-5: NEW MEXICO** | | | | | |
| Desert grassland | 39.82 | 0 | 0 | 9.74 | **49.56** |
| Desert shrubland | 1.50 | 0 | 0 | 3.72 | **5.22** |
| Great Basin desert scrubland | 62.83 | 17.40 | 0 | 20.99 | **101.22** |
| Mixed desert grassland and salt desert scrubland | 2.57 | 0 | 0 | 0.36 | **2.93** |
| Mixed Great Basin desert scrubland and desert grassland | 0.00 | 0.70 | 0 | 2.37 | **3.07** |
| Pinon-juniper (mixed conifer) woodland | 99.81 | 20.80 | 0 | 48.37 | **168.98** |
| Plowed field | 0.00 | 0 | 0 | 0.73 | **0.73** |
| Salt desert scrubland | 41.27 | 1.62 | 0.05 | 5.38 | **48.32** |
| **SEGMENTS 6-8: COLORADO** | | | | | |
| Big sagebrush scrubland | 0 | 0 | 6.17 | 11.50 | **17.67** |
| Irrigated pasture | 0 | 0 | 0.10 | 10.53 | **10.63** |
| Lower montane chaparral | 0 | 0 | 33.91 | 0.05 | **33.96** |
| Mixed pinon-juniper (mixed conifer) woodland and big sagebrush scrubland | 0.84 | 0 | 84.61 | 15.67 | **101.12** |
| Pinon-juniper (mixed conifer) woodland | 0 | 0 | 5.23 | 2.24 | **7.47** |
| **Totals[1]** | **248.64** | **40.52** | **130.07** | **131.65** | **550.88** |

1 *Some margin of error is present (less than 1 percent) due to overlapping polygons for vegetation communities and rounding in the GIS. The total temporary effects to vegetation communities are expected to be about 800 acres, which includes certain project elements that do have locational data.*

The total area of temporary effects on vegetation would likely be less than 800 acres, since improvements such as new roads would typically be 20 feet wide and would not encompass the entire 30- to 50-foot road right-of-way. Once construction was completed, right-of-way areas outside of the roadway surface would be re-seeded. In addition, the study area and the entire right-of-way is not completely covered in vegetation.

#### Special Status Species

Potential temporary effects to special status species are discussed above in Section 3.15.4.1, Permanent Effects.

#### Noxious Weeds

Temporary effects related to noxious weeds are the same as discussed above in Section 3.15.4.1.

### 3.15.4.3 Mitigation

No mitigation is proposed.

## 3.15.5 Proposed Action

### 3.15.5.1 Permanent Effects

The Proposed Action would have similar permanent effects as described above above in Section 3.15.4.1 for the Preferred Alternative. The primary difference is that the Proposed Action would have a permanent direct effect to approximately 183 acres in the study area as compared to 182 acres for the Preferred Alternative. Vegetation effects would include removing vegetation for transmission line structures, facilities, or new or improved access roads. Exhibit 3-104, Permanent Effects to Vegetation Communities for the Proposed Action, details the amount of each vegetation community that would be permanently affected in the study area along with the land ownership where these effects would occur. The total area of permanent vegetation loss would be less than shown in Exhibit 3-104 as these totals include portions of existing roads proposed for improvement where the majority of the road surface is already disturbed or devoid of vegetation. None of the affected habitat types is rare or uncommon.

**Exhibit 3-104**
**Permanent Effects to Vegetation Communities for the Proposed Action**

| Affected Vegetation Community | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| **SEGMENTS 1–5: NEW MEXICO** | | | | | |
| Desert grassland | 25.48 | 0 | 0 | 2.9 | **28.38** |
| Salt desert scrubland | 15.02 | 0.38 | 0 | 1.42 | **16.82** |
| Desert shrubland | 0.92 | 0 | 0 | 1.06 | **1.98** |
| Great Basin desert scrubland | 33.04 | 5.5 | 0 | 9.98 | **48.52** |

**Exhibit 3-104**
## Permanent Effects to Vegetation Communities for the Proposed Action

| Affected Vegetation Community | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| Pinon-juniper (mixed conifer) woodland | 30.33 | 9.04 | 0 | 14.09 | **53.46** |
| Mixed desert grassland and salt desert scrubland | 0.01 | 0 | 0 | 0.08 | **0.18** |
| **SEGMENTS 1–5: NEW MEXICO (Continued)** | | | | | |
| Mixed Great Basin desert scrubland and desert grassland | 0 | 0.53 | 0 | 1.76 | **2.29** |
| Plowed field | 0 | 0 | 0 | 0.38 | **0.38** |
| **SEGMENTS 6–8: COLORADO** | | | | | |
| Pinon-juniper (mixed conifer) woodland | 0 | 0 | 17.07 | 2.05 | **19.13** |
| Lower montane chaparral | 0 | 0 | 7.99 | 0.02 | **8.01** |
| Big sagebrush scrubland | 0 | 0 | 1.99 | 1.11 | **3.10** |
| Irrigated pasture | 0 | 0 | 0.06 | 3.98 | **4.04** |
| Mixed pinon-juniper (mixed conifer) woodland and big sagebrush scrubland | 0 | 0 | 0.94 | 0.38 | **1.32** |
| **Total[1]** | **104.89** | **15.45** | **28.07** | **39.22** | **187.65** |

*All measurements given in acres*

1 *Some margin of error is present (less than 3 percent) due to overlapping polygons for vegetation communities and rounding in the GIS. The actual permanent effects to vegetation communities would total 183.20 acres (see Exhibit 3-8, Summary of Land Required for Operation of the Proposed Action [Permanent Effects]).*

### Special Status Plant Species

#### ESA-Listed Plant Species

Effects from the Proposed Action to ESA-listed plant species and other special status plant species would be the same as described in Section 3.15.4.1 for the Preferred Alternative.

### Noxious Weeds

Effects related to noxious weeds with the Proposed Action are the same as described for the Preferred Alternative in Section 3.15.4.1.

### 3.15.5.2 Temporary Effects

Temporary effects from the Proposed Action would be similar to those discussed for the Preferred Alternative, only the Proposed Action would temporarily remove or disturb vegetation in 827 acres as compared to 800 acres for the Preferred Alternative. As discussed in Section 2.2.7.2, these areas would be remediated and revegetated to mitigate temporary effects according to the land agency requirements. Exhibit 3-105, Temporary Effects to Vegetation Communities for the Proposed Action, details the amount of each vegetation community that would be temporarily affected in the study area along with the land ownership where these effects would occur. These calculations account for about 570 acres of temporary effects. Specific vegetation community types that would be affected on the remaining 250 acres would be similar, but GIS data are not available to determine the specific vegetation communities that would be affected.

**Exhibit 3-105**

## Temporary Effects to Vegetation Communities for the Proposed Action

| Affected Vegetation Community | BLM (acres) | NMSLO (acres) | SUIT (acres) | Private (acres) | Total (acres) |
|---|---|---|---|---|---|
| **SEGMENTS 1-5: NEW MEXICO** | | | | | |
| Desert grassland | 36.20 | 0 | 0 | 12.16 | **48.36** |
| Salt desert scrubland | 43.00 | 1.93 | 0.02 | 5.33 | **50.28** |
| Desert shrubland | 2.81 | 0 | 0 | 3.39 | **6.20** |
| Great Basin desert scrubland | 67.31 | 18.41 | 0 | 20.66 | **106.38** |
| Pinon-juniper (mixed conifer) woodland | 103.28 | 21.49 | 0 | 55.97 | **180.74** |
| Mixed desert grassland and salt desert scrubland | 0.83 | 0 | 0 | 0.79 | **1.62** |
| Mixed Great Basin desert scrubland and desert grassland | 0 | 0.81 | 0 | 5.13 | **5.94** |
| Plowed field | 0 | 0 | 0 | 3.28 | **3.28** |
| **SEGMENTS 6-8: COLORADO** | | | | | |
| Pinon-juniper (mixed conifer) woodland | 0 | 0 | 85.96 | 13.43 | **99.39** |
| Lower montane chaparral | 0 | 0 | 33.59 | 0.05 | **33.64** |
| Big sagebrush scrubland | 0 | 0 | 6.17 | 11.48 | **17.65** |
| Irrigated pasture | 0 | 0 | .09 | 10.52 | **10.61** |
| Mixed pinon-juniper (mixed conifer) woodland and big sagebrush scrubland | 0 | 0 | 5.10 | 2.11 | **7.21** |
| **Total**[1] | **253.43** | **42.64** | **130.93** | **144.30** | **571.30** |

*1 Some margin of error is present (less than 1 percent) due to overlapping polygons for vegetation communities and rounding in the GIS. The total temporary effects to vegetation communities are expected to be about 827 acres, which includes certain project elements that do have locational data.*

The total area of temporary effects on vegetation would be less than shown in Exhibit 3-105 above, as these totals include areas that would likely not see any improvements or construction. For example, the infrastructure associated with new roads and road improvements—wing ditches, cuts and fills, etc.—would not encompass the entire right-of-way outside of the road surface and would only be located in areas where topography and others factors dictate their placement. In addition, the entire right-of-way is not completely covered in vegetation.

#### Special Status Species

Potential temporary effects to special status species for the Proposed Action would be the same as discussed for the Preferred Alternative in Section 3.15.4.1, Permanent Effects.

#### Noxious Weeds

Temporary effects related to noxious weeds for the Proposed Action are the same as discussed above in the Preferred Alternative in Section 3.15.4.1.

### 3.15.5.3 Mitigation

No mitigation measures are proposed.

# 3.16 Fish and Wildlife

## 3.16.1 Study Area

The study area for fish, wildlife, and special status species is described in Section 3.2, Study Area. In addition, biologists identified possible indirect effects (such as noise) to documented occurrences of prairie falcons, peregrine falcons, and burrowing owls within 1/3-mile of the study area. For golden and bald eagles, biologists identified possible direct and indirect effects to documented occurrences of these species within ½-mile of the study area.

## 3.16.2 Methods

To determine the effects to fish and wildlife species within the study area, published literature, websites, available GIS information, agency biologists, and species experts were consulted to map the known distribution of target species and to determine the likely effects to their habitat. In addition, biologists conducted several field surveys to identify vegetation communities in the study area.[136] This information is discussed in Section 3.15, Vegetation, and this information was used to describe the affected

**Methods**

To determine the effects to fish and wildlife within the study area, project biologists consulted published literature, websites, agency biologists, and species experts.

[136] Loebig 2013; Loebig and Paulek 2013; Parametrix 2012

environment and to determine the effects to habitat. Information regarding known raptor nests and habitat was provided by the BLM and the SUIT.

Biologists used several sources to determine the status of species that have been documented or are possibly present in the study area. These sources include published literature, websites, available GIS information, and agency biologists. The following indicators were examined to determine effects:

- Information of known species distribution based on field surveys conducted in the study area, information provided by the BLM and cooperating agencies, and a literature search.
- Identifying areas where ground disturbance would directly or indirectly affect species.
- Identifying possible effects related to noise and habitat fragmentation.
- Determining whether effects would be temporary or permanent.

## 3.16.3 Affected Environment

### 3.16.3.1 Fish Resources

This section describes the general fish fauna in the study area and their habitat. Federally listed and other special status fish and wildlife species are described in Section 3.16.3.3, Special Status Species.

**Fish Species**

Currently, nonnative species significantly outnumber native species in both the Animas and La Plata Rivers.

Exhibit 3-85, Surface Water, shows surface water resources (i.e., fish habitat) in the study area, all of which ultimately drain southward into the San Juan River. The two largest watercourses crossed by the study area are the Animas and La Plata Rivers. The Animas is a perennial river in the study area; the La Plata, while it is perennial upstream closer to its headwaters, becomes intermittent through the study area.

Due to the intermittent nature of the La Plata River (at least six visits have been made to the site during which it was dry), it is assumed that there are no permanent fish resources in the La Plata River through the study area.

In the Animas River, nonnative species outnumber native species.[137] The most recent comprehensive surveys indicate 5 native and 11 nonnative species in the Animas River south of Durango, Colorado.[138] These species are listed in Exhibit 3-106, Current Fish Species of the Animas River Near the Study Area.

**Exhibit 3-106**

## Current Fish Species of the Animas River Near the Study Area

| Species | Scientific Name |
|---|---|
| **Native Fish** | |
| Zuni Bluehead Sucker | *Catostomus discobolus* |
| Colorado Pikeminnow[1] | *Ptychocheilus lucius* |
| Flannelmouth Sucker | *Catostomus latipinnis* |
| Mottled Sculpin | *Cottus bairdii* |
| Razorback Sucker[1] | *Xyrauchen texanus* |
| Roundtail Chub[1] | *Gila robusta* |
| Speckled Dace | *Rhinichthys osculus* |
| **Nonnative Fish** | |
| Black Bullhead | *Ameiurus melas* |
| White Sucker | *Catostomus commersonii* |
| Red Shiner | *Cyprinella lutrensis* |
| Common Carp | *Cyprinus carpio* |
| Johnny Darter | *Etheostoma nigrum* |
| Channel Catfish | *Ictalurus punctatus* |
| Snake River Cutthroat Trout | *Oncorhynchus clarkii* |
| Rainbow Trout | *Oncorhynchus mykiss* |
| Fathead Minnow | *Pimephales promelas* |
| Brown Trout | *Salmo trutta* |
| Brook Trout | *Salvelinus fontinalis* |

*1 Indicates Special Status Species*

*Note: Additional information in this table was gathered from New Mexico Game and Fish 2006 and from Whiteman 2012.*

Possible movements of fish from the San Juan River into the Animas River are largely restricted, as irrigation diversions, several feet high, in Flora Vista and Aztec, New Mexico, provide a partial barrier to upstream migration.

[137] Whiteman 2012

[138] Miller and Rees 2000

### 3.16.3.2 Wildlife Resources

Vegetation community types were used to assess where various species may occur in the study area and are a larger component of identifying habitat types. As described in detail in Section 3.15, Vegetation, primary vegetation communities in the study area consists of Great Basin Desert Scrubland, Desert Grassland, Pinon-Juniper (Mixed Conifer) Woodland, and Lower Montane Chaparral.

#### Migratory Birds

Although no comprehensive bird surveys have been completed for the study area, as many as 320 migratory and resident bird species have been documented in northwestern New Mexico and southwestern Colorado.[139] At least 119 species are known to breed in San Juan County, New Mexico, or La Plata County, Colorado.[140] Loebig[141] and Loebig and Paulek[142] observed 61 species of birds in or immediately adjacent to the study area in one season (May through November 2012), which did not include formalized point counts for birds. At least 30 of the 61 bird species identified exhibited territorial or other nesting behavior. Only a portion of the study area, however, was surveyed during the breeding season.

The surrounding region provides either breeding or wintering habitat for a number of raptor species, including bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), burrowing owl (*Athene cunicularia*), and peregrine falcon (*Falco peregrinus*). There are five active or recently active raptor nesting or roosting areas in the study area as shown in Exhibit 3-107, Key Wildlife Areas. These areas include one active nest site for American peregrine falcon, two inactive nest sites for golden eagle, one active roosting site for bald eagle, and one inactive nest site for burrowing owl (individual species sites are not identified in the exhibit to protect the nests).

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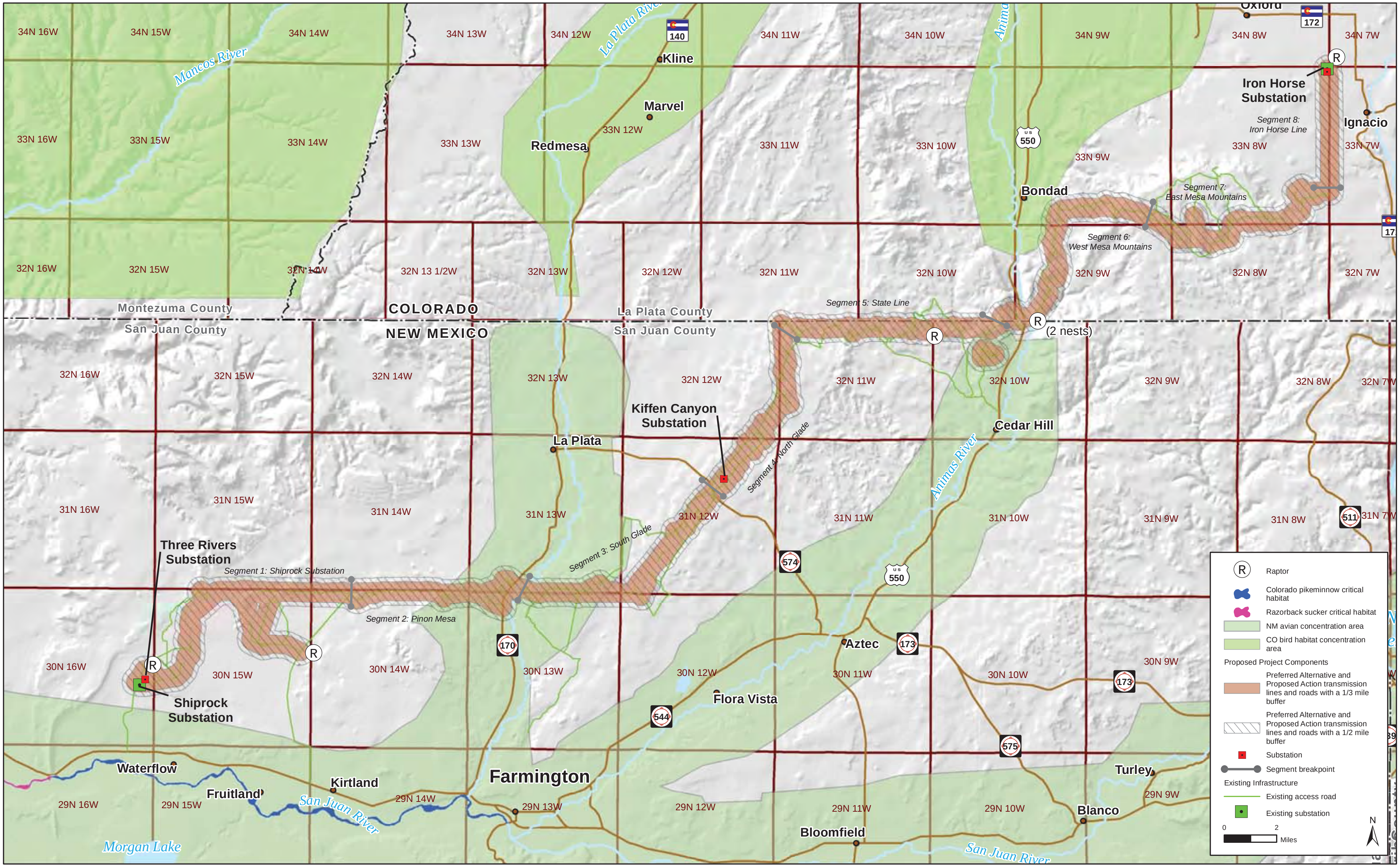
[139] NMOS 2012; USGS 2012a; USGS 2012b

[140] USGS 2012b

[141] Loebig 2013

[142] Loebig and Paulek 2013




Source: GIS Tri-State 2013,GIS BLM 2012b, GIS USFWS 2013, GIS NMAP 2010, GIS IWJV 2005, GIS CPW 2012, GIS SUIT 2012e, GIS BLM 2012c

**Exhibit 3-107 Key Wildlife Areas**

In the New Mexico portion of the study area, which was surveyed in the fall, Loebig and Paulek[143] found the greatest number of birds in woodland habitats. The most frequently encountered species were American crow (*Corvus brachyrhynchos*), Western scrub jay (*Aphelocoma californica*), black-capped chickadee (*Poecile atricapillus*), dark-eyed junco (*Junco hyemalis*), and mountain bluebird (*Sialia currucoides*). Horned larks (*Eremophila alpestris*) were common in the desert scrubland and grassland communities west of Pinon Mesa, while Western scrub jay, mountain bluebird, bushtit (*Psaltriparus minimus*), and black-capped chickadee primarily occupied the woodland communities. Within this landscape, the Animas, La Plata, and San Juan River corridors have relatively high bird diversity compared to the surrounding uplands. The New Mexico Avian Protection Working Group has identified these three river corridors as Avian Species Concentration Areas,[144] especially for geese, ducks, raptors, and other waterbirds; likewise, several areas immediately adjacent to and north of the study area have been identified as Colorado bird habitat conservation areas.[145] These areas are shown on Exhibit 3-107. The study area is not on any of the major North American migratory bird flyways. River corridors typically provide a migratory pathway for birds, especially in relation to the semi-arid surroundings.[146] In addition, riparian zones in arid and semi-arid environments provide higher species diversity than does the surrounding terrain.[147]

In the Colorado portion of the study area, which was surveyed primarily in spring and summer 2012, Loebig[148] found the greatest number of birds also in woodland habitats. Birds that were especially abundant included mourning doves (*Zenaida macroura*), which were found in most habitats. The most frequently encountered woodland species included Western scrub jay, juniper titmouse (*Parus inornatus*), white-breasted nuthatch (*Sitta carolinensis*), lesser goldfinch (*Carduelis tristis*), American robin

[143] Loebig and Paulek 2013

[144] GIS NMAP 2010

[145] GIS IWJV 2005

[146] Skagen et al. 1998

[147] Farley et al. 1994

[148] Loebig 2013

(*Turdus migratorius*), Northern flicker (*Colaptes auratus*), black-capped chickadee, and several warbler species. Because these birds were present during the summer and often showed territorial behavior, it can be assumed that they are resident breeders. Additional studies by the BLM (some of which cross the study area and some of which are nearby) found spotted towhee (*Pipilo maculatus*), black-headed grosbeak (*Pheucticus melanocephalus*), mourning dove, and ash-throated flycatcher (*Myiarchus cinerascens*) to be abundant during the breeding season.[149]

One bird species that BLM is particularly focused on is the sage thrasher (*Oreoscoptes montanus*). Although this species is not considered a special status species by any of the regulatory agencies, it is considered somewhat rare and, according to unpublished BLM data, their populations are declining. The BLM's interest in this species is largely due to its narrow habitat requirements. It is a sage-obligate species, and due to the relatively low quality breeding habitat in the existing landscape, there is concern for the species. Most of the areas of concern are located south of the study area in the southern portion of the BLM FFO where there were formerly large expanses of sagebrush. The local sage thrasher population is unknown; habitat for this species exists within the study area.

Although much of the study area consists of regionally common habitat, Loebig and Paulek[150] identified several biological points of interest in the study area. Biological points of interest and observations from this survey are included in the biological reports in Appendices H and I.

Loebig and Paulek[151] also identified 23 additional bird species with some potential to occur in the study area that are not endangered or threatened, but are classified by either the USFWS or Partners in Flight to be birds of conservation concern.

[149] BLM unpublished data

[150] Loebig and Paulek 2013

[151] Loebig and Paulek 2013

## Big Game

The study area contains summer and winter big game habitat and five species of big game, all of which have been observed (either the animals or their sign) in the study area during the 2012 field season: Rocky Mountain mule deer (*Odocoileus hemionus*), Rocky Mountain elk (*Cervus elaphus*), pronghorn (*Antilocapra americana*), mountain lion (*Felis concolor*), and black bear (*Ursus americanus*).[152] The majority of big game habitat is in or adjacent to the northern portions of the study area in Segments 5 through 8 as shown in Exhibit 3-108, Big Game. In these areas, there is ample forage, and thermal and hiding cover. The SUIT has designated much of the area in Segments 6 and 7 as a big game management zone. The study area intersects with both deer and elk migration routes and winter range in Segments 6 and 7.[153]

**Big Game Species**

The study area contains five species of big game, all of which have been observed (either the animals or their sign) in the study area in recent months.

## Bats

Seventeen species of bats have been documented or could possibly occur in the study area.[154] Nine of these are considered special status species and are discussed in more detail below.

**Bat Species**

Seventeen species of bats have been documented or could possibly occur in the study area.

## Other Mammals

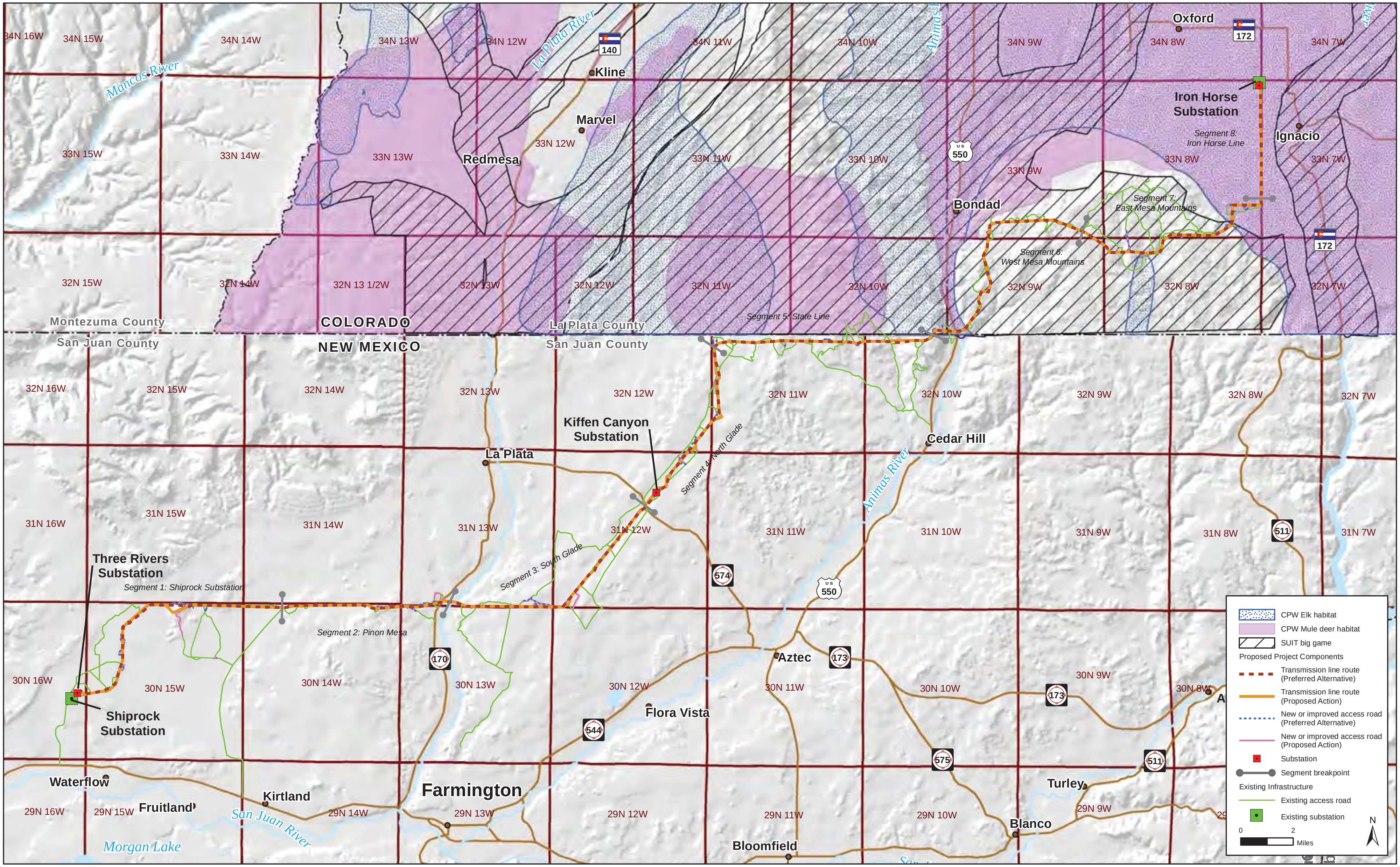
Many other mammals have potential habitat in the study area, some of which are described under Special Status Species below. Common mammals observed in or near the study area, or inferred from evidence, include coyote (*Canis latrans*), bobcat (*Lynx rufus*), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), muskrat (*Ondatra zibethicus*), striped skunk (*Mephitus mephitis*), rock squirrel (*Spermophilus variegatus*), common racoon (*Procyon lotor*), Colorado chipmunk (*Tamias quadrivittatus*), least chipmunk (*Eutamias minimus*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), Kangaroo rat (*Dipodomys* spp.), and Mexican woodrat (*Neotoma mexicana*).[155]

[152] Loebig 2013; Loebig and Paulek 2013; Parametrix unpublished data; BLM unpublished data

[153] Loebig 2013; Whiteman 2012

[154] Harvey et al. 1999; Armstrong et al. 2011; Kendall 2012b

[155] Loebig 2013; Loebig and Paulek 2013




Source: GIS BLM 2012b, GIS Tri-State 2013, GIS CPW 2011, GIS SUIT 2012d

**Exhibit 3-108 Big Game**

Several other mammal species likely inhabit the study area, particularly rodents, but were not observed during daytime surveys.[156]

### Reptiles and Amphibians

Snakes observed in the study area during recent fieldwork include the Great Basin gopher snake (*Pituophis catenifer* ssp. *deserticola*), the Western terrestrial garter snake (*Thamnophis elegans*), coachwhip (*Mastico flagellum*), and the Western rattlesnake (*Crotalus viridis*). Five lizard species, the sagebrush lizard (*Sceloporus graciosus*), lesser earless lizard (*Holbrookia maculata*), plateau/prairie lizard (*Sceloporous undulatus*), plateau striped whiptail (*Aspidoscelis velox*), and the short-horned lizard (*Phrynosoma hernandesi*) were also observed in the vicinity of the study area. All but the lesser earless lizard were observed in scrubland and woodland habitats. Amphibians were observed only in the northern portion of the project along Klusman Park Creek and the various irrigation runoff-induced wetlands. Confirmed amphibian species include the Western chorus frog (*Pseudacris triseriata*), bullfrog (*Rana catesbeiana*), and the Woodhouse toad (*Bufo woodhousii*).[157]

Some other common species that were not observed but would be expected to occur include blackneck garter snake (*Thamnophis cyrtopsis*), Western whiptail (*Aspidoscelis tigris*), side-blotched lizard (*Uta stansburiana*), sagebrush lizard (*Sceloporus graciosus*), short-horned lizard (*Phrynosoma hernandesi*), collared lizard (*Crotaphytus collaris*), New Mexico spadefoot toad (*Spea multiplicata*), and tiger salamander (*Ambystoma tigrinum*).[158]

## 3.16.3.3 Special Status Species

Species federally listed as endangered or threatened are protected under the ESA; other designations such as federal candidate or sensitive species, or state designations such as endangered, threatened, or sensitive, do not carry the same legal restrictions and requirements, but are analyzed here for planning purposes. Species

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[156] Findley et al. 1975; Armstrong et al. 2011

[157] Loebig and Paulek 2013

[158] Degenhardt et al. 1996

considered in this EIS include those with the following designations:

- Federally Endangered – A species which is in danger of extinction throughout all or a significant portion of its range.
- Federally Threatened – A species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- Federal Candidate – A species for which USFWS has sufficient information on its biological status and threats to propose it as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.
- Federal Proposed – Those candidate species that were found to warrant listing as either threatened or endangered and have been officially proposed as such in a Federal Register notice.
- Federal Species of Concern – Those species that USFWS believes might be in need of concentrated conservation actions. This does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species.
- BLM Sensitive – Those species that are not federally listed as endangered, threatened, or proposed for federal listing, but which are designated by the BLM state director for special management consideration.
- State of New Mexico or Colorado Endangered – A species of fish or wildlife whose prospects of survival or recruitment within the state are in jeopardy. The term may also include any species of fish or wildlife appearing on the US list of endangered species.
- State of New Mexico or Colorado Threatened – A species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range in the state; the term may also include any species of fish or wildlife appearing on the US list of threatened species.

In the tables that follow, some species occasionally have designations other than those listed above, but only when they are also designated by one of the above categories. The SUIT designates listed species parallel to the federal designations for the species below. In addition to the protection afforded by the various federal and state designations, all birds are protected from unpermitted take by the Migratory Bird Treaty Act.[159] Exhibit 3-107, Key Wildlife Areas, shows the general locations of wildlife in the area.

Many listed or special status species that are known to occur or possibly occur in San Juan County, New Mexico, or La Plata County, Colorado, were eliminated from consideration based on the unanimous agreement of the state, federal, tribal, and contract biologists consulted that the species lack habitat in the study area. In some cases, such as the whooping crane (*Grus canadensis*), the species was not considered because it has been locally extirpated.

### ESA-Listed Species

ESA-listed species that were analyzed are listed below in Exhibit 3-109, ESA-Listed Species.

**Exhibit 3-109**
**ESA-Listed Species**

| Common Name | Scientific Name | USFWS | BLM | NM | SUIT | CO |
|---|---|---|---|---|---|---|
| **Fish** | | | | | | |
| Colorado Pikeminnow | *Ptychocheilus lucius* | E | – | E | E | T |
| Razorback Sucker | *Xyrauchen texanus* | E | – | S | E | E |
| **Mammals** | | | | | | |
| Black-Footed Ferret | *Mustela nigripes* | E | – | – | E | E |
| **Birds** | | | | | | |
| Mexican Spotted Owl | *Strix occidentalis lucida* | T | – | S | T | T |
| Southwestern Willow Flycatcher | *Empidonax traillii extimus* | E | – | E | E | E |

*Abbreviations: E-Endangered; S-Sensitive; SC-Species of Concern; T-Threatened*

[159] 16 USC §§ 703–712

### Colorado Pikeminnow

The Colorado pikeminnow (formerly known as the Colorado squawfish) is listed as endangered under the ESA. The pikeminnow is endemic to the Colorado River Basin,[160] though it is now restricted to the upper reaches of the watershed in Colorado, Utah, and New Mexico. A reproducing population has been documented on the San Juan River[161] approximately 4 miles from the proposed Three Rivers Substation. There are several diversions in the river that could impede, but likely not exclude, their movement into the Animas River. There is very little spawning habitat in the study area for this species. Designated critical habitat occurs in the San Juan River from Farmington west and northwest into Utah. The critical habitat nearest the study area is approximately 3.8 miles south of the proposed Three Rivers Substation (Exhibit 3-107).

### Razorback Sucker

The razorback sucker is listed as federally endangered. This species once lived throughout the tributary system of the Colorado River but is now restricted to only a few scattered areas. Historically, the razorback sucker was extirpated from the San Juan River, and restocking efforts have had unknown results. [162] Suitable habitat for the razorback sucker does not occur in the study area; however, there is critical habitat for approximately 6.3 miles southwest of the proposed Three Rivers Substation (Exhibit 3-107), and the species may be present in the San Juan River.

### Black-Footed Ferret

The black-footed ferret is listed as endangered by the USFWS. Its habitat consists of plains, desert grasslands, and desert scrubland communities that support prairie dogs, which comprise its primary food source. The black-footed ferret requires prairie dog towns of at least 80 acres for black-tailed prairie dogs and at least 200 acres for the white-tailed and Gunnison's prairie dogs.[163,164] A number of active Gunnison's prairie dog towns are present in the study area,

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[160] Tyus 1991

[161] Propst 1999

[162] Propst 1999

[163] USFWS 1989

[164] USFWS 2013a

primarily in desert grassland, salt desert scrubland, and Great Basin desert scrubland at the west end of the study area as shown in Exhibit 3-110, Prairie Dog Towns. One prairie dog town large enough to be considered potential habitat has been mapped by the BLM FFO. This town is located at the western terminus of the study area near the existing Shiprock Substation and is approximately 1,171 acres, extending north to northwest from the vicinity of the western end of Segment 1. Other prairie dog towns found in Segments 1, 2, and 3 are shown in Exhibit 3-110, including two larger towns of 207.7 acres and 446.3 acres. The black-footed ferret is believed extirpated from the wild in New Mexico, and no black-footed ferret have been found in the wild in New Mexico for several decades.[165]

### Mexican Spotted Owl

The Mexican spotted owl is a federally listed threatened species. The highest densities occur in mixed-conifer forests that have experienced minimal human disturbance. Though the species is likely present in both counties of the study area at higher elevations, there is no habitat for this species in the study area.

### Southwestern Willow Flycatcher

The southwestern willow flycatcher is a small, neotropical migrant songbird that likely migrates through the study area. This species occurs in riparian habitats along rivers, streams, or other wetlands with dense, multilayered growth of willows or other shrubs and medium-sized trees. The nearest current known active nesting location in New Mexico occurs approximately 15 miles southwest of the study area along the San Juan River near the town of Shiprock, New Mexico.[166] The nearest site in Colorado is believed to be the recently active territory on the Los Pinos River near the town of Ignacio, Colorado, approximately 1.5 miles from the study area.[167] The only potential nesting habitat for this species in the study area is at the La Plata River crossing where there is some willow and cottonwood, though the dense, multilayered nesting habitat this species normally prefers is not abundant.

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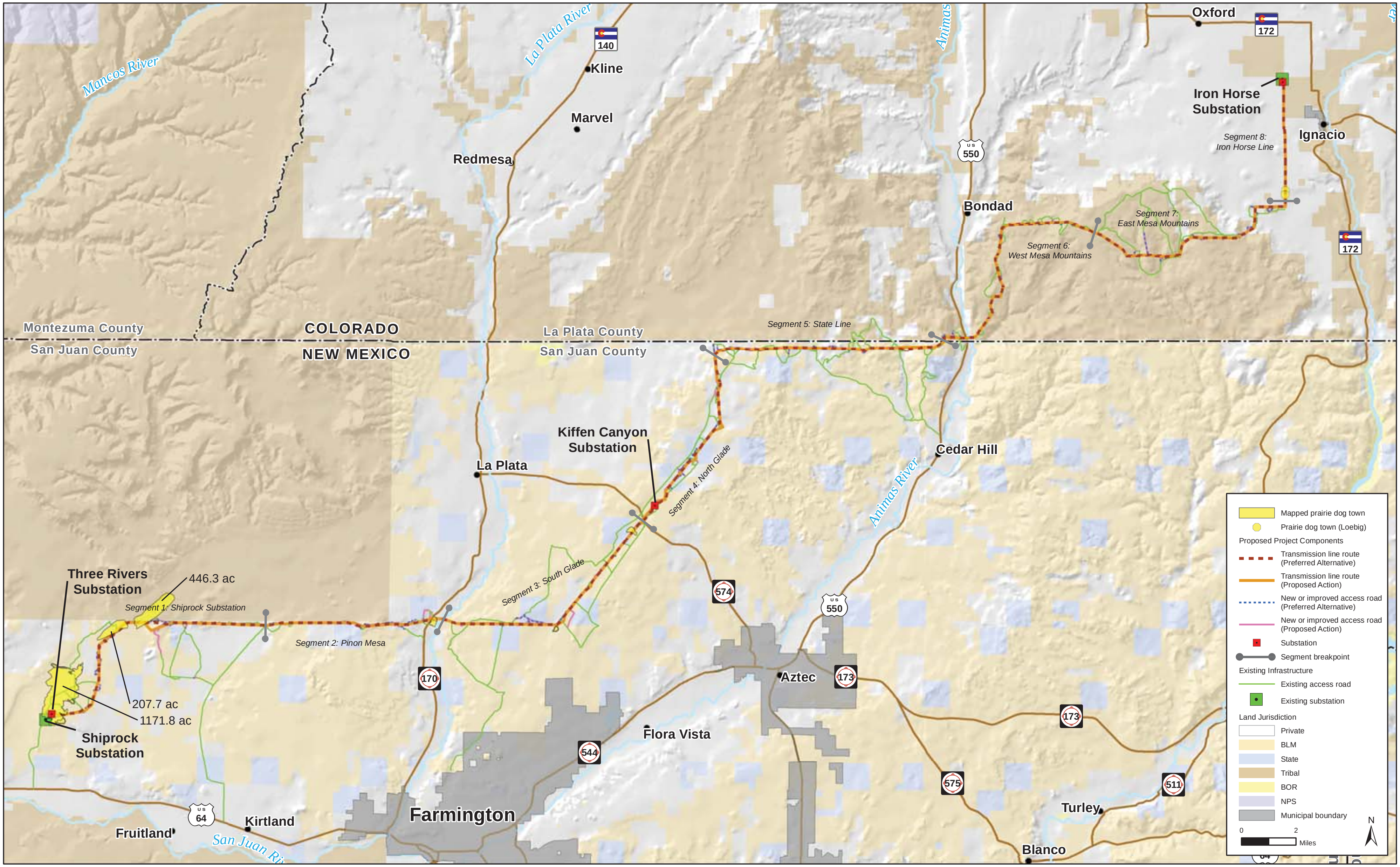
[165] Frey 2004

[166] NNHPDFW 2005 and 2008

[167] Whiteman 2013b




Source: GIS BLM 2012, GIS BLM 2012b, GIS Tri-State 2013, GIS Loebig 2012, GIS Loebig and Paulek 2012, GIS URS 2013

**Exhibit 3-110 Prairie Dog Towns**

One willow flycatcher was detected by the BLM FFO during the nesting season in 1997 and 1998, though follow-up surveys later in those years failed to detect the birds again. It was not determined if the species ever nested.[168] These sites were approximately 0.25 mile from the study area, and the species has not been detected since 1998.[169] Designated critical habitat for southwestern willow flycatcher was finalized on January 3, 2013 (78 FR 343 534), by the USFWS. The study area does not contain any designated critical habitat for the southwestern willow flycatcher.

### Other Special Status Fish Species

Other special status fish species are listed in Exhibit 3-111, Other Special Status Fish Species, and are discussed in the text below.

**Exhibit 3-111**
**Other Special Status Fish Species**

| Common Name | Scientific Name | USFWS | BLM | NM | SUIT | CO |
|---|---|---|---|---|---|---|
| **Fish** | | | | | | |
| Roundtail Chub | *Gila robusta* | C | S | E | – | SC |

*Abbreviations: E-Endangered; S-Sensitive; SC-Species of Concern; T-Threatened*

#### Roundtail Chub

Historically, the roundtail chub lived throughout the larger streams and rivers of the Colorado River watershed. In New Mexico, it was extirpated in the San Francisco and Zuni River drainages with diminishing numbers in the San Juan and Gila River watersheds. Reduced flows, water diversions, and predation by nonnative fish may be factors in its decline.[170] The roundtail chub lives in pools of large streams and rivers with moderate flow.[171] It prefers channels of larger rivers or areas vegetative cover, overhanging cliffs, and boulders.[172] Habitat suitable for the roundtail chub occurs in the study area, and the species is likely present.[173]

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[168] BLM 2002

[169] Kendall 2012c; Ireland 2012

[170] Sublette et al. 1990

[171] New Mexico Department of Game and Fish 1996

[172] Lee et al. 1981

[173] Whiteman 2013a

### Other Special Status Bird Species

Other special status bird species are listed in Exhibit 3-112, Other Special Status Bird Species. These birds have the potential to occur in the study area when considering their range, habitat requirements, and the habitat present in the study area. Relative abundance was derived from a bird list of San Juan County.[174]

**Exhibit 3-112**

## Other Special Status Bird Species

| Common Name | Scientific Name | USFWS[1] | BLM[1] | NM[1] | SUIT[1] | CO[1] | RA[2] | Habitat Present near Study Area | Likelihood of Species Presence in Study Area[3] |
|---|---|---|---|---|---|---|---|---|---|
| American Peregrine Falcon | *Falco peregrinus anatum* | SC | – | T | – | T | R | Yes | Present |
| Arctic Peregrine Falcon | *Falco peregrinus tundrius* | SC | – | T | – | – | R | Minimal | Possible in Migration |
| Baird's Sparrow | *Ammodramus bairdii* | SC | S | T | – | – | R | Minimal | Unlikely |
| Bald Eagle | *Haliaeetus leucocephalus* | P | – | T | – | T | U | Yes | Present |
| Bendire's Thrasher | *Toxostoma bendirei* | – | S | | – | – | O | Yes | Moderate |
| Broad-billed Hummingbird | *Cynanthus latirostris* | – | – | T | – | – | A | Minimal | Unlikely |
| Brown Pelican | *Pelecanus occidentalis* | – | – | E | – | – | A | No | Unlikely |
| Chestnut-collared Longspur | *Calcarius ornatus* | – | S | – | – | – | R | No | Unlikely |
| Golden Eagle | *Aquila chrysaetos* | P | W | – | – | – | O | Yes | Present |
| Gray Vireo | *Vireo vicinior* | – | W | T | – | – | U | Yes | Present |
| Long-billed Curlew | *Numenius americanus* | – | S | – | – | SC | R | No | Unlikely |
| Pinon Jay | *Gymnorhinus cyanocephalus* | – | S | – | – | – | C | Yes | Present |
| Western Burrowing Owl | *Athene cunicularia* | SC | S | – | – | T | U | Yes | Present |

[174] USGS 2012b; NMOS 2012; CNHP 2012

**Exhibit 3-112**
## Other Special Status Bird Species

| Common Name | Scientific Name | USFWS[1] | BLM[1] | NM[1] | SUIT[1] | CO[1] | RA[2] | Habitat Present near Study Area | Likelihood of Species Presence in Study Area[3] |
|---|---|---|---|---|---|---|---|---|---|
| White-faced Ibis | *Plegadis chihi* | – | S | – | – | – | R | Minimal | Unlikely |
| Yellow-Billed Cuckoo | *Coccyzus americanus* | C | – | S | C | SC | R | Marginal | Unlikely |

1 *Abbreviations: C-Candidate species; E-Endangered; P-Protected; S-Sensitive; SC-Species of Concern; T-Threatened; W-BLM Watch List,*

2 *Relative abundance (RA) in the vicinity of the study area:*

*__C__ommon – often present in the right habitat*

*__U__ncommon – expected in small numbers for brief periods*

*__O__ccasional – usually seen a few times a season*

*__R__are – seen once every few years*

*__A__ccidental – recorded a few times, but not expected*

3 *The likelihood of species present in the study area was determined based on interview and literature reviews.*

### American Peregrine Falcon and Arctic Peregrine Falcon

The American peregrine falcon typically nests on cliffs over 100 feet tall in wooded and forested habitats with openings, often near riparian zones. The arctic peregrine falcon is a rare migrant through the study area.[175] The proposed transmission line would cross the Animas River approximately 400 meters (1,312 feet) from areas where peregrine falcons have nested in the past. The nests are not known to be currently active, though nesting activity changes from year to year. In addition, potential nesting habitat may be located within 0.67 mile of the project area on the high cliffs in the Cox Canyon area. Although peregrine falcons do not successfully breed in the study area every year, the SUIT considers the area "active" for peregrine falcons every year.[176]

### Baird's Sparrow

The Baird's sparrow is a small, ground-nesting neotropical migrant songbird. Nesting habitat includes ungrazed or lightly grazed

[175] BISON-M 2013

[176] Whiteman 2012

mixed-grass prairie.[177] There is very little habitat in the study area that meets the nesting needs of this species, and it is unlikely to occur there.

### Bald Eagle

The bald eagle is a large raptor found throughout nearly the entire US. Though no longer protected by the ESA, bald eagles remain protected by the Migratory Bird Treaty Act[178] and the Bald and Golden Eagle Protection Act of 1940.[179] The species is considered rare to uncommon in the breeding season in the study area,[180] and it is relatively common in winter. The BLM FFO has been conducting monthly surveys from November to March at Navajo Lake since the early 1990s and has indicated that local wintering populations have been stable over the past 20 years.[181] In the study area:

- Bald eagles have used a roost site in a small grove of cottonwood trees near the Iron Horse substation near the terminus of the project in Segment 8 (Exhibit 3-107) for several years. Because this area is not near any of the larger riparian corridors that hold the greatest number of eagles, normally only a few eagles roost here. They are usually present between mid-November and mid-March.
- The riparian forest of narrow-leaf cottonwood and other riparian trees on the east side of the Animas River immediately south of the study area may provide roosting habitat.[182] Though no birds were observed at the site, they are known to use the Animas River Valley in the winter.[183]

### Bendire's Thrasher

Bendire's thrasher is a largely ground-dwelling bird. The species is considered rare to occasional in San Juan County, New Mexico,[184] is

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[177] NatureServe 2012

[178] 16 USC §§ 703-712

[179] 16 USC §§ 668-668c

[180] USGS 2012a

[181] Kendall 2013c

[182] Loebig 2013

[183] Kendall 2012d; D. Stahlecker, unpublished data

[184] USGS 2012b

present in La Plata County, Colorado,[185] and the NMOS database lists at least 50 records for the species. The study area contains habitat for this species, and it is likely present near the study area. Loebig[186] considered the likelihood of occurrence low to moderate.

### Broad-Billed Hummingbird

The broad-billed hummingbird is a small migrant hummingbird found in a variety of habitats. The species is accidental in San Juan County, New Mexico, which means it has been recorded a few times but is not expected. The NMOS database lists only one record for this species near Farmington. The study area contains some habitat, though the species range is generally considered far to the south of the study area.[187] Loebig and Paulek[188] considered the likelihood of occurrence low to moderate.

### Brown Pelican

The brown pelican is a large, fish-eating bird that is rarely found inland in the western US. The NMOS database contains six records of brown pelican in San Juan County, New Mexico, all from Morgan Lake, approximately 3.5 miles south of the study area. There is no suitable habitat for the brown pelican in the study area, and migration through the study area is possible but unlikely.

### Chestnut-Collared Longspur

The chestnut-collared longspur is a small, sparrow-like neotropical migrant songbird. The species is rare to accidental in the study area,[189] and the NMOS database has only three records for San Juan County. The study area does not contain much undisturbed native grassland, and the species is not likely to occur there.

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[185] CFO 2012

[186] Loebig 2013; Loebig and Paulek 2013

[187] NMACP 2012

[188] Loebig and Paulek 2013

[189] USGS 2012a; USGS 2012b

### Golden Eagle

Golden eagles are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. There are no documented active nests within the study area, though eagles nested in Segment 5 as recently as 2005.

The SUIT has documented nesting by golden eagles approximately 1.5 miles north of the state line, approximately 0.5 mile west of the study area boundary. Although golden eagles do not successfully nest at the site every year, the SUIT considers the area active for golden eagles.

### Gray Vireo

The gray vireo is a small neotropical migrant songbird that breeds in the woodlands of the Southwest. BLM has documented nesting gray vireos along at least one study transect that crosses the study area,[190] and the Colorado Natural Heritage Program [191] has documented the species near the study area. Loebig[192] observed the species during field investigations. There is suitable breeding habitat for this species in the study area.

### Long-Billed Curlew

The long-billed curlew is a large, very long-billed shorebird that breeds in inland western North America. In New Mexico, the long-billed curlew nests primarily in the northeastern part of the state and rarely in the northwestern part, though no breeding records exist for San Juan County.[193] There is very limited potential habitat for this species in the study area, though there are some recorded accounts of the species being present in San Juan County, New Mexico,[194] and La Plata County, Colorado.[195]

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[190] BLM, unpublished data

[191] CNHP 2012

[192] Loebig 2013

[193] NMACP 2012

[194] USGS 2012b

[195] CFO 2012

### Pinon Jay

The pinon jay is a crow-like bird of the Great Basin and Southwest. It is a common resident in pinon habitats in San Juan County, New Mexico, and La Plata County, Colorado.[196] There is suitable habitat for this species in the study area, and Loebig[197] observed the species there.

### Western Burrowing Owl

No active burrowing owl nests are known to be present at this time in the study area, though owls have, in the past, nested in the prairie dog colony near the Shiprock Substation and new nests may arise, as there are active prairie dog towns present as shown in Exhibit 3-110.

### White-Faced Ibis

The white-faced ibis is a large, long-legged migratory wading bird. There is no suitable nesting habitat in the study area, though some birds likely occasionally migrate through the study area.

### Yellow-Billed Cuckoo

The yellow-billed cuckoo is a large, secretive, riparian-obligate migratory songbird native to nearly the entire US. In the New Mexico portion of the study area, marginal potentially suitable yellow-billed cuckoo nesting habitat occurs in Segment 3 within the riparian habitat along the La Plata River, though no birds have ever been detected there.[198] Potential migratory habitat for the yellow-billed cuckoo occurs in Segment 6 in Colorado along the cottonwood gallery forest patch along the east side of the Animas River (Exhibit 3-107). The small size of this patch (approximately 175 feet wide by 600 feet long) is not optimal for this species. No birds have been detected at this location.

## Other Special Status Mammal Speices

Non-ESA listed, special status mammal species that are either known to occur or have the potential to occur based on habitat and range are listed in Exhibit 3-113, Other Special Status Mammal Species.

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[196] USGS 2012a; USGS 2012b; CFO 2012

[197] Loebig 2013; Loebig and Paulek 2013

[198] Kendall 2013a

**Exhibit 3-113**

## Other Special Status Mammal Species

| Common Name | Scientific Name | USFWS[1] | BLM[1] | NM[1] | SUIT[1] | CO[1] | Habitat Present in SA? | Likelihood of Species Presence in SA |
|---|---|---|---|---|---|---|---|---|
| **Bats** | | | | | | | | |
| Big Free-tailed Bat | *Nyctinomops macrotis* | – | S | S | – | – | Yes | Unlikely |
| Fringed Myotis Bat | *Myotis thysanodes* | – | S | S | – | – | Yes | Unlikely |
| Long-eared Myotis | *Myotis evotis evotis* | – | S | S | – | – | Yes | Likely |
| Long-legged Myotis | *Myotis volans interior* | – | S | S | – | – | Yes | Likely |
| **Bats (Continued)** | | | | | | | | |
| Spotted Bat | *Euderma maculatum* | – | S | T | – | – | Yes | Unlikely |
| Townsend's Big-Eared Bat | *Corynorhinus townsendii* | SC | S | S | – | SC | Yes | Likely |
| Western Small-footed Myotis | *Myotis ciliolabrum* | – | S | S | – | – | Yes | Likely |
| Yuma Myotis | *Myotis yumanensis* | – | S | S | – | – | Yes | Unlikely |
| **Other Mammals** | | | | | | | | |
| Gunnison's Prairie Dog | *Cynomys gunnisoni* | – | S | S | – | – | Yes | Present |
| NM Meadow Jumping Mouse | *Zapus hudsonius luteus* | C | – | – | C | – | Minimal | Unlikely |

*1 Abbreviations: C-Candidate species; E-Endangered; P-Protected; S-Sensitive; SC-Species of Concern; T-Threatened; SA-Study Area*

### Big Free-Tailed Bat

The species has been documented from San Juan County, New Mexico, though it is relatively rare and unlikely to occur in abundance.[199, 200] It is considered to possibly occur in La Plata County, Colorado.[201] Suitable habitat exists for this species in Segments 2 through 7.

[199] Findley et al. 1975

[200] Kendall 2013b

[201] CDOT 2006

### Fringed Myotis

The fringed myotis is not common in San Juan County, New Mexico.[202] Though it has been documented in the BLM Farmington District,[203] it is unlikely to occur.[204] It is considered likely to occur in La Plata County, Colorado.[205] Some suitable habitat exists for this species in Segments 6 and 7.

### Long-Eared Myotis

The species has been documented in San Juan County, New Mexico,[206] though not in the study area. Although very limited breeding habitat (ponderosa pine forest) is present for this species in the study area, foraging habitat is present along the Animas (Segment 6) and La Plata Rivers (Segments and 3) and in the wetlands and agricultural areas south of Ignacio, Colorado (Segments 6, 7, and 8). As such, the species may be present during non-breeding periods. Loebig[207] and Kendall[208] considered the species likely in the study area.

### Long-Legged Myotis

The long-legged myotis roosts in trees and rock crevices, and there is roosting habitat for this species in the study area. It has been documented within 20 miles of the study area in San Juan County, New Mexico,[209] and is present on the BLM Farmington District;[210] it is also likely present in the Colorado portion of the study area (Segments 6, 7, and 8).[211] Foraging habitat is also present along the Animas (Segment 6) and La Plata Rivers (Segments 2 and 3) and in the wetlands and agricultural areas south of Ignacio, Colorado (Segment 8).

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[202] Armstrong et al. 2011; NatureServe 2012

[203] Kendall 2012b

[204] Kendall 2013b

[205] CDOT 2006

[206] Findley et al. 1975

[207] Loebig 2013

[208] Kendall 2012b

[209] Findley et al. 1975

[210] Kendall 2012b

[211] Armstrong et al. 2011

### Spotted Bat

There is one (auditory) record of uncertain quality for the spotted bat on BLM FFO lands.[212] Roosting habitat is highly unlikely on BLM FFO lands of the study area. The species has not been documented in La Plata County, Colorado, but could be present based on habitat affinities such as the cliffs and crevices near the higher elevation portions of the study area in Colorado in Segment 7.[213]

### Townsend's Big-Eared Bat

The Townsend big-eared bat typically roosts and rears young in crevices, caves, lava tubes, mines, and buildings from the desert to montane forests. [214] Townsend's big-eared bat has been documented in northwestern New Mexico,[215] including in the BLM Farmington District[216] and southwestern Colorado.[217] Loebig[218] considered the species likely to occur in the study area and determined that potentially suitable habitat is present in crevice-cliff habitat found sporadically in Segment 6 in the western Mesa Mountains.

### Western Small-Footed Myotis

The western small-footed myotis has been documented in ponderosa pine and pinon-juniper habitat is northwestern New Mexico,[219] including in the BLM Farmington District[220] in areas very close to the study area.[221] Preferred ponderosa pine habitat is rare in the study area, but foraging habitat is present along the Animas (Segment 6) and La Plata Rivers (Segments 2 and 3) and in the wetlands and agricultural areas south of Ignacio, Colorado (Segment 8).

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[212] BLM 2012b; Kendall 2012b
[213] CDOT 2006
[214] Loebig and Paulek 2013
[215] Findley et al. 1975
[216] BLM 2012b; Kendall 2012b
[217] USFS 2006
[218] Loebig 2013; Loebig and Paulek 2013
[219] Rizzi et al. 2002
[220] Kendall 2012b
[221] Findley et al. 1975

#### Yuma Myotis

In New Mexico, the species is usually found at elevations between 4,000 and 7,000 feet above mean sea level (amsl), and it has been documented from San Juan County, New Mexico,[222] to La Plata County, Colorado,[223] and likely occurs in the study area.[224] Suitable habitat is present for this species in the study area, especially in the Animas (Segment 6) and La Plata River (Segments 2 and 3) corridors, and among the wetlands and stock ponds in the Colorado portion of the study area (Segments 6, 7, and 8).

#### Gunnison's Prairie Dog

Gunnison's prairie dogs are present as shown in Exhibit 3-110, Prairie Dog Towns. Prairie dog towns tend to expand and contract over time. There are three larger prairie dog towns that are over 200 acres located in Segment 1.

#### New Mexico Meadow Jumping Mouse

There are no historic records of this species from San Juan County. Frey,[225] however, confirms that the species was recently identified in the Florida River Valley, at least 2 miles from the study area. This species is present only in ungrazed tall, dense native sedges, which do not occur in the study area. Therefore, suitable habitat does not exist in the study area.

## 3.16.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects on fish and wildlife would occur with this alternative.

## 3.16.5 Preferred Alternative

### 3.16.5.1 Permanent Effects

#### Fish Resources

With the Preferred Alternative, transmission lines would span both the Animas and La Plata Rivers, with the towers, staging areas, and

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[222] Findley et al. 1975

[223] CDOT 2006

[224] Kendall 2012b; Loebig 2013; Loebig and Paulek 2013

[225] Frey 2012

other associated permanent and temporary development remaining completely out of the river, riparian zones, and associated wetlands. Because these rivers and their riparian habitats would remain unchanged, fish species and fish habitats would not be permanently affected by the Preferred Alternative. Some temporary effects to fish and fish habitat may occur, however, due to possible increases in sedimentation; this is discussed under temporary effects below.

### Wildlife Resources

Permanent effects from the Preferred Alternative include the following:

- Habitat loss
- Disturbance from periodic maintenance activities
- Potential for increased risk of collisions for some bird species
- Increased perching and nesting areas on transmission structures

#### Permanent Habitat Loss

The Preferred Alternative would permanently disturb approximately 182 acres of land. Much of the affected habitat would be adjacent to already disturbed habitat, using corridors that have already been created for transmission lines and roads, thus minimizing the loss of undisturbed habitat. Most of the habitat loss would be in the Desert Grassland, Great Basin Desert Scrubland, and Pinon Pine-Juniper (Mixed Conifer) Woodlands (see Section 3.15 for a discussion of effects to vegetation). As described in Section 3.15, Vegetation, the Preferred Alternative would not adversely affect rare or uncommon habitat in the study area, and several EPMs, including 27, 30, 31, 32, and 33, would be implemented as part of the project to minimize effects.

**Habitat Loss**

Habitat loss would lead to lower local populations of some species of mammals, birds, reptiles, and other terrestrial species and their prey. Preferred Alternative would permanently remove 182 acres of land.

Habitat loss from roads, substations, and transmission line structures could reduce the number of individual species of mammals, birds, reptiles, and other terrestrial species in the immediate vicinity of the disturbed vegetation and their prey that depend on this habitat (the duration of this effect would vary depending on what type of vegetation would be removed and how quickly it would recover). Unpermitted take of active nests of those species protected under the Migratory Bird Treaty Act is prohibited by law. Tri-State would comply with the Migratory Bird Treaty Act and work with the USFWS and appropriate land management agency if there is a potential effect to nesting migratory birds. Disturbance for the vast majority of species would be temporary. Some species, especially edge-dependent species, could benefit from increased edge habitat, and the number of individuals could increase.

There would be potential direct effects from habitat loss to songbirds, mammals, reptiles, and other species in the study area. Nesting or breeding habitat for individuals of some species would be permanently lost, though species at the regional or local level would likely not be affected. None of the habitat that would be lost is particularly rare in the region. Many individuals would relocate to different areas, though for many species, especially territorial species, this may still mean a reduction in numbers or overall density.

None of the habitat that will be lost is particularly rare in the region, and most wildlife would be expected to relocate to different areas.

Indirect effects from habitat fragmentation could occur. Some species of wildlife, especially woodland nesting songbirds, avoid edges; other species, such as coyotes, jackrabbits, and ravens,[226] tend to use edge habitats, including transmission line corridors, to their respective advantages. In general, habitat fragmentation appears to be a minor concern since the Preferred Alternative would remove a small acreage of potential habitat for woodland nesting songbirds, reptiles, mammals, and their prey that use woodlands. In addition, the Preferred Alternative was designed to follow existing transmission line infrastructure and oil and gas development to minimize effects to habitat, including fragmentation. As previously stated, EPMs 27, 30, 31, 32, and 33 would be implemented to minimize potential effects from habitat loss.

### Disturbance from Periodic Maintenance Activities

Vehicle traffic on new roads from maintenance vehicles and possible use by other unauthorized vehicles may result in direct

[226] Atamian et al. 2007

disturbance to wildlife, including raptors and large mammals. This disturbance would be localized, short-term, and temporary in nature. In areas where existing access roads would be used, maintenance activities would not appreciably increase vehicular traffic compared to existing conditions since maintenance activities occur over a short period of time and these existing access roads are used more frequently by other users.

During routine maintenance activities, crews and vehicles would conduct detailed ground inspections of the entire transmission line system on a semi-annual or annual basis using an all-terrain vehicle or four-wheel-drive truck. If repairs are necessary, line crews may require the use of a bucket truck and other equipment to repair the line. In most years, this inspection would include one vehicle traveling down the right-of-way over a period of a few weeks, which is less frequent usage than other current usage of existing access roads in the study area. In addition, Tri-State personnel would use authorized access roads to respond to and repair any sections of the line in cases where emergency repairs are needed. Possible indirect effects to species would be minor, since this activity would require a couple of vehicles and would occur for a short duration in a localized area. Access would be restricted to permitted access roads and the transmission right-of-way to further minimize effects to resources. Tri-State would implement seasonal restrictions to minimize effects to nesting raptors as listed in EPM 44, Exhibit 2-23, for both construction and routine maintenance activities.

Tri-State would coordinate with the BLM to restrict access to new roads authorized specifically for transmission line construction and maintenance as listed in EPM 59, Exhibit 2-23. Roads on private lands and on SUIT lands are more heavily regulated. As such, increased traffic from the general public is not expected.

#### Potential for Increased Risk from Collisions for Some Bird Species

After construction is complete, some species of migratory birds in the study area could experience mortality from collision with the transmission line. The study area spans two migration corridors that are considered Avian Concentration Areas[227] along the Animas and La Plata River Valleys. In desert environments, areas of dense vegetation, such as forested or heavily vegetated areas along river corridors, generally provide more diverse and abundant habitat compared to the surrounding landscape and, therefore, often harbors more diverse wildlife species, including birds.

The Avian Power Line Interaction Committee's *Reducing Avian Collisions with Power Lines*[228] summarizes that "the susceptibility of avian species to collision with power lines depends on biological, environmental, and engineering factors. Larger, heavier bodied birds with short wings spans and poorer vision are more susceptible to collisions than smaller, lighter-weight birds with relatively large wing spans, agility, and good vision." Environmental conditions that can affect collision risk include poor weather conditions and darkness. Engineering aspects include design and placement of the transmission lines relative to potential high risk areas.

EPM 7, which would mark the transmission line over the Animas and La Plata Rivers, would reduce the risk. Tri-State's Avian Protection Plan (APP) proactively protects avian species in areas where Tri-State operates, builds, and maintains electrical infrastructure. The APP outlines how potential effects to avian species can be analyzed for new and existing transmission lines, including for collision risk. For the SBJEC Project, an avian collision risk assessment would be conducted by qualified specialists to identify areas of potential for avian collision risk. Areas with a moderate to high risk of increasing avian collisions would be marked with diverter devices. There could be effects to bats from collisions; however, they appear to be less susceptible to collisions with transmission lines[229] due to their ability to echolocate (navigate by sending out and receiving sonic impulses).

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[227] New Mexico Avian Protection Working Group 2007

[228] APLIC 2012

[229] NedPower Mount Storm LLC 2003

### Increased Perches and Nesting Areas on Transmission Structures

Some species of birds would benefit from the increased perches and nest substrates provided by the transmission structures. At least one red-tailed hawk nest is present on a transmission tower on the existing transmission line in the study area.[230] Indirect effects would include increased hunting perches for raptors and ravens, which could benefit these species, but result in increased predation for other species, such as rodents and other small mammals.

### Other Potential Effects Analyzed

#### *Electrocution Risk*

Avian electrocutions can occur when an animal completes an electric circuit by simultaneously touching two energized parts or an energized part and a grounded part of the electric equipment. Recent advances in technology and best management practices have reduced potential risks to birds from electrocution. Electrocution is typically not associated with transmission lines greater than 115 kV, since the electric components are typically far enough apart that a bird can avoid contact with two of them at once. To minimize possible effects on birds, suggested practices for avian protection by the Avian Power Line Interaction Committee would be considered as part of transmission line design as listed in Exhibit 2-23, EPM 45. This includes designing the transmission line for the SJBEC Project with phase-to-phase and phase-to-ground separation greater than 60 inches.

#### *Electric and Magnetic Fields*

Several studies have examined the potential effects to nesting birds from electric and magnetic fields.[231] Most of these studies have been in a laboratory setting with fields far higher than will be produced by the SJBEC Project. Field studies on wild birds are rare, and the results have been inconclusive. Similarly, studies on big game and other animals in the field have reached no firm consensus on effect.[232] Ground-dwelling small animals are largely shielded from the effects of electric and magnetic fields, and larger animals, such

[230] Parametrix, unpublished data

[231] Fernie and Reynolds 2005

[232] Reimers et al. 2000

as big game, generally spend only very limited time exposed to electric and magnetic fields. No adverse effects are expected from electric and magnetic fields, since electric and magnetic field exposure will not exceed established thresholds or guidelines.

#### 3.16.5.2 Temporary Effects

Temporary effects from the Preferred Alternative are discussed in greater detail below and include the following:

- Temporary species displacement
- Potential for reduced productivity

##### Fish Resources

Ground surface disturbance from the construction of transmission line structures, staging areas, and new or improved access roads may temporarily increase erosion, which could lead to increased sediment loading and turbidity to the La Plata River, Animas River, and associated drainages in the study area. No work would be done in riparian areas adjacent to the La Plata and Animas Rivers, and possible effects to potential fish habitat from increased turbidity would be minimized through the implementation of an SWPPP (identified as EPM 33) and EPMs 17, 22, 24, 28, 35, and 36 listed in Exhibit 2-23.

##### Wildlife Resources

Temporary effects to wildlife resources during construction are discussed below and include:

- Temporary species displacement
- Potential for reduced productivity

##### Temporary Species Displacement

The Preferred Alternative would temporarily remove approximately 800 acres of wildlife habitat, primarily in the Great Basin Desert Scrubland, and Pinon-Pine Juniper (Mixed Conifer) Woodlands habitats (see Section 3.15, Vegetation, for a complete breakdown of all habitat types temporarily affected and their acreage).

Nearly all wildlife currently inhabiting these areas is expected to be directly affected by vegetation removal and associated disturbance.

Because plans call for revegetating the area, these effects are expected to be temporary. Nearly full recovery to revegetated areas is expected within 5 years (except as described above under permanent effects).

Passerines would likely not nest in the area once construction was initiated, and small- and medium-size mammals would likely avoid areas of activity, noise, and fugitive dust. Some less-mobile mammals or reptiles could be killed during construction from crushing, entombment, entrapment, or collision with vehicles and heavy equipment operation. Assuming vehicles operate on site at reasonable speeds, wildlife mortality from collision with vehicles would not be detectible.

Possible effects identified above would be minimized through the implementation of several EPMs listed in Exhibit 2-23. Specific EPMs that would minimize effects include EPMs 7 and 38 through 47. As specified in EPM 39, biological stipulations—which would include specific measures to avoid, minimize, or mitigate effects to habitats and species—would be developed for the project.

#### Potential for Reduced Productivity – Raptors and Big Game

Raptors and big game may be more susceptible to disturbance than other groups of wildlife. Human-caused disturbances have been implicated in the population decline of many species of birds of prey and big game.[233,234] Even when adult birds are not necessarily harmed, prolonged absences from a nest can lead to decreases in productivity, missed feedings for young, or increased predation.[235] All birds are not susceptible to disturbance in the same ways. Burrowing owls appear relatively tolerant to disturbance (for raptors) and have nested near human development, including several nests near the Shiprock Substation in past years. Golden eagles are generally considered more susceptible to disturbance than many species of raptors. Similarly, Phillips and Alldredge[236]

[233] Richardson and Miller 1997
[234] Phillips and Alldredge 2000
[235] Richardson and Miller 1997
[236] Phillips and Alldredge 2000

cite examples where cow elk that were disturbed during the calving season had lower productivity than those that were not. Watson and Dennis[237] found lower productivity of raptors at sites closer to human populations, though they did not find differences in productivity based on distances to public roads.

Five active or recently active raptor nesting or roosting sites were identified in Section 3.16.3.2, Wildlife Resources.

Possible temporary effects to these species would be minimized through the implementation of EPMs 43, 44, and 47 which focus on following raptor protection guidelines concerning limitations on construction activities during the nesting season, and seasonal restrictions as directed by affected agencies.

Specific seasonal restrictions that may be applied in specific areas as required by permitting and land management agencies to minimize effects are provided below and listed in EPM 44 in Exhibit 2-23:

- Migratory Birds – May 15 through July 31
- Southwestern willow flycatcher and yellow-billed cuckoo – May 1 through August 31
- Peregrine and prairie falcons – March 1 through June 30
- Bald eagle – November 1 through March 31
- Golden eagle – February 1 through June 30
- Western burrowing owl – April 1 through August 15 (in New Mexico)

The study area crosses through areas that have been identified (1) by the BLM, the New Mexico Department of Game and Fish, SUIT, and CPW as big game wintering areas, mostly in Segment 5, where the line runs parallel to the state border; and (2) by the SUIT as mule deer fawning and elk calving areas in Segments 5, 6, and 7. These areas are shown in Exhibit 3-108, Big Game. Big game areas in Segment 5 are located outside improvements associated with the

[237] Watson and Dennis 1992

Preferred Alternative. Per discussions with the SUIT, no seasonal restrictions for big game would be required in these areas.[238]

### 3.16.5.3 Special Status Species Effects

#### ESA-Listed Species

Potential effects to ESA-listed species are discussed below. Specific effect determinations are part of ongoing consultation under the ESA with the USFWS, and the outcome of ESA consultation will be discussed in the Final EIS.

#### Colorado Pikeminnow and Razorback Sucker

*Permanent Effects*

It unlikely that Colorado pikeminnow and razorback sucker are present.[239, 240] Critical habitat for the Colorado pikeminnow is located 3.8 miles from the proposed Three Rivers Substation. Critical habitat for the razorback sucker is located approximately 6.3 miles from the study area. The proposed transmission lines for the Preferred Alternative would span both the Animas and La Plata Rivers. Towers, staging areas, and other associated permanent and temporary development would remain completely out of the river, riparian zones, and associated wetlands. Because these rivers and their riparian habitats would remain unchanged, there would be no permanent or direct effects to these fish species.

*Temporary Effects*

Indirect, short-term temporary effects may result from increased soil erosion caused by ground disturbance, vegetation removal, and increased runoff from roadway grading and other construction activities, especially in Segments 1 and 2 where soils are often bare and erosive. These activities could affect Colorado pikeminnow and razorback sucker habitat by increasing sediment loading and turbidity. No work would be done in riparian areas, and possible effects to potential fish habitat from increased turbidity would be minimized through the implementation of a SWPPP (identified as EPM 33) and EPMs 17, 22, 24, 28, 35, and 36 listed in Exhibit 2-23.

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[238] Whiteman 2013c

[239] Miller and Rees 2000

[240] Whiteman 2012

## Black-Footed Ferret

*Permanent and Temporary Effects*

It is very unlikely that the black-footed ferret is present. No black-footed ferret have been found in the wild in New Mexico for several decades.[241] The last confirmed sighting in New Mexico was in 1934, and the species is considered extirpated.[242] The black-footed ferret reintroduction program has released animals into northwestern Colorado and northeastern New Mexico, more than 100 miles from the study area.[243]

The Preferred Alternative is not expected to have any direct or indirect effects to black-footed ferrets. As described in EPM 38, however, a pre-construction USFWS protocol survey will be conducted by a qualified biologist within areas identified as suitable habitat. Areas where pre-construction surveys would be required by the BLM FFO are all located in Segment 1 and include the three prairie dog towns that are larger than 200 acres (Exhibit 3-110). Surveys would be conducted in the spring of the year that construction is to occur, as required by the BLM FFO. Results of the survey would be submitted to the USFWS prior to construction. If black-footed ferrets are found, appropriate mitigation measures would be developed and implemented per consultation with the USFWS and the BLM. Implementation of the following EPMs 2, 3, 4, 10, 38, 39, 40, 41, and 42 would avoid possible effects to black-footed ferrets.

## Mexican Spotted Owl

*Temporary and Permanent Effects*

There is no habitat for this species in the study area, and no Mexican spotted owls have been documented in the study area. The Preferred Alternative would have no permanent or temporary effects to this species.

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[241] Frey 2004

[242] Loebig and Paulek 2013

[243] Black-Footed Ferret Recovery Team 2013

## Southwestern Willow Flycatcher

*Temporary and Permanent Effects*

Southwestern willow flycatcher habitat will not be permanently affected, either directly or indirectly at either the Animas or La Plata river crossings by the Preferred Alternative, as towers, staging areas, and other permanent and temporary development would remain completely out of the rivers and riparian zones and no riparian vegetation would be removed. Some temporary disturbance from construction noise, helicopters, and other human activity during construction or routine maintenance is possible. At the La Plata River crossing, there are some willow and cottonwood, though the dense, multi-layered nesting habitat this species normally prefers is not abundant. No breeding activity has been documented at this site, though the BLM did detect one willow flycatcher during the nesting season. One willow flycatcher was detected by the BLM FFO during the nesting season in 1997 and 1998, though follow-up surveys later in those years failed to detect the birds again. It was not determined if the flycatcher ever nested.[244] These sites were approximately 0.25 mile from the study area, and the species has not been detected since 1998.

At the Animas River crossing, the habitat is more limited for this species, and slow-moving water with backwater or wetland habitat is not present. Consultation with BLM and SUIT biologists confirmed that the habitat at the Animas River does not constitute breeding habitat for this species. In addition, consultation with the USFWS Grand Junction Office[245] confirmed that the USFWS did not have any concerns about effects to the southwestern willow flycatcher at this site.

In order to reduce noise and other potential disturbance, the BLM has indicated that a seasonal restriction on construction and maintenance activities at the La Plata River would be required from May 1 through August 31 to protect any possible nesting habitat near the La Plata River crossing in accordance with EPM 44. This restriction at the La Plata River would avoid any potential effects to

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[244] BLM 2002

[245] Ireland 2012

southwestern willow flycatchers. If any construction is planned during the nesting season at the La Plata River crossing, a USFWS-approved protocol survey will take place prior to construction. Because the Animas River crossing does not have nesting willow flycatcher habitat, no seasonal restrictions are necessary at this site. EPMs that would be implemented to avoid effects include 2, 3, 4, 10, 13, 26, 38, 39, 40, 41, 42, 43, and 44 listed in Exhibit 2-23.

## Other Special Status Fish Species

### Roundtail Chub

*Permanent Effects*

It is likely that roundtail chub are present in the study area.[246] With the Preferred Alternative, transmission lines would span both the Animas and La Plata Rivers. Towers, staging areas, and other associated permanent and temporary development would remain completely out of the river, riparian zones, and associated wetlands. Because these rivers and their riparian habitats would remain unchanged, there would be no permanent or direct effects.

*Temporary Effects*

Ground disturbance from the construction of transmission line structures, staging areas, and new or improved access roads associated with the Preferred Alternative may temporarily increase erosion. These activities could affect roundtail chub habitat by increased sediment loading and turbidity, especially in Segments 1 and 2 where soils are often bare and erosive. No work would be conducted in riparian areas, and possible effects to potential fish habitat from increased turbidity would be minimized through the implementation of a SWPPP (identified as EPM 33) and EPMs 17, 22, 24, 28, 35, and 36 listed in Exhibit 2-23.

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[246] Whiteman 2012

### Other Special Status Bird Species

The Preferred Alternative is unlikely to have any permanent or temporary effects to the following species:

- Arctic peregrine falcon. This subspecies is a rare migrant through the area, and does not breed in the Southwest.
- Baird's sparrow. There is very little suitable habitat for this species in the project area, and it is unlikely to occur there.
- Broad-billed hummingbird. This species is rare in San Juan County, and although there is some habitat in the study area, it is very unlikely that the species would be affected.
- Brown pelican. This species is rare in San Juan County, and although the bird has likely migrated through the study area in the past, there is no habitat in the study area. It is very unlikely that the species would be affected.
- Chestnut-collard longspur. This species is rare in San Juan County, and although there is some habitat in the study area, it is very unlikely that the species would be affected.
- Long-billed curlew. This species is rare in San Juan County, and although there is some habitat in the study area, it is very unlikely that the species would be affected.
- White-faced ibis. This species is rare in San Juan County, and there is very little suitable habitat, except possibly during migration; it is very unlikely that the species would be affected.
- Yellow-billed cuckoo. This species possibly migrates through the study area, and there is some potentially marginal habitat along the Animas River. There does not appear to be any breeding habitat, and it is unlikely the species is present during the breeding season. In addition, rivers and riparian areas will be spanned and will not be affected. Seasonal restrictions proposed for the southwestern willow flycatcher at the La Plata River would also benefit the yellow-billed cuckoo.

Possible effects to other special status species are discussed below.

## American Peregrine Falcon

*Permanent Effects*

There are no active peregrine falcon nests in the study area. The Preferred Alternative would cross the Animas River at a location approximately 400 meters (1,312 feet) from areas where peregrine falcons have nested in the past. At this crossing, the transmission lines would be marked to make the wires more visible as identified in EPM 7, thus reducing the danger of collisions. The Preferred Alternative would have no permanent direct effects to falcons.

*Temporary Effects*

Construction activities during the raptor nesting season (March 1 through June 30), especially those using helicopters, could disrupt breeding falcons. Possible temporary effects to these species would be avoided through the implementation of EPMs 43, 44, 46, and 47, which focus on implementing seasonal restrictions as directed by affected agencies.

## Bald Eagle

*Permanent Effects*

Bald eagles likely use the Animas and La Plata River corridors to migrate between roosting areas and feeding areas along the San Juan River, Morgan Lake, and other areas. The Preferred Alternative could have permanent direct effects on bald eagles due to collisions with transmission lines, though eagle collisions with transmission lines are rare[247] and implementation of EPM 7 (marking transmission lines over the La Plata and Animas Rivers) would further reduce the likelihood of collisions. As mentioned in Section 3.16.5.1, Permanent Effects, an avian collision risk assessment would be conducted by qualified specialists to identify areas of potential for avian collision risk. Areas with a moderate to high risk of increasing avian collisions would be marked with diverter devices.

*Temporary Effects*

The Preferred Alternative could have direct temporary effects to bald eagles if construction occurs during a time when bald eagles

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[247] APLIC 2006

are roosting or feeding in the study area. There is a bald eagle roost near the Iron Horse substation. Eagles could be deterred from using their normal roost or expend additional energy from being flushed if construction takes place near this roost if they are present during construction activities. To avoid possible effects, construction activities would be avoided from November 1 through March 31 if bald eagles are roosting in the study area, per EPM 44 as required by regulatory agencies to avoid possible effects.

### Bendire's Thrasher

*Permanent Effects*

Permanent effects to Bendire's thrasher are not expected because the species is rare in the study area, and only a small fraction of its potential habitat would be affected.

*Temporary Effects*

There could be temporary direct effects to Bendire's thrasher, as some individuals might be displaced during construction, though they would likely return once construction activity ceases and disturbed vegetation recovers.

### Golden Eagle

*Permanent Effects*

The Preferred Alternative could have permanent direct effects to golden eagles through increased risk of collisions with transmission lines or towers, though eagle collisions with transmission lines are rare relative to other species and occur mostly during poor weather when visibility is low.[248] The Preferred Alternative could provide increased opportunities for hunting perches. Implementation of EPM 7 (placing markers on transmission lines over the Animas and La Plata Rivers) would reduce the likelihood of collisions. As mentioned in Section 3.16.5.1, an avian collision risk assessment would be conducted by qualified specialists to identify areas of potential for avian collision risk. Areas with a moderate to high risk of increasing avian collisions would be marked with diverter devices.

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[248] APLIC 2006

*Temporary Effects*

There are no documented active golden eagle nests in the study area, so temporary effects to this species are not expected. The Preferred Alternative could have direct temporary effects to golden eagles if construction occurs when eagles are nesting in the study area. Possible temporary effects to these species would be minimized through coordination with agency biologists on the location of active nests (which change from year to year) and the implementation of EPMs 44 and 47 which focus on implementing seasonal restrictions from February 1 through June 30, as directed by affected agencies, or until the birds have fledged their young.

### Gray Vireo and Pinon Jay

*Permanent and Temporary Effects*

Permanent effects to these species are not expected. Temporary effects from construction and maintenance activities are not expected with the implementation of EPMs 43 and 44, which involve implementing seasonal restrictions and conducting construction and tree removing activities outside of the breeding season (May 15 through July 31),. As specified in EPM 43, if construction and tree removal cannot be avoided during the breeding season, Tri-State will coordinate appropriate mitigation measures with the BLM, BIA, SUIT, and USFWS, which may include  or conducting a survey to locate potential nests during the breeding season.

### Western Burrowing Owl

*Permanent Effects*

No active western burrowing owl nests are present in the study area. Though there are no currently active nests, owls have nested in past years near the Shiprock Substation. New nests may arise since there are active prairie dog towns present in the study area. Burrowing owls are relatively tolerant of human activity (in relation to other raptors). They are already present in the study area, which includes transmission lines and associated infrastructure; therefore, it is unlikely there would be any permanent effects to this species.

*Temporary Effects*

If construction occurs during the raptor nesting season (April 1 through August 15) this species may be disturbed from potential nesting sites, which can change from year to year. Most effects to this species would be temporary, taking place only during construction in the immediate vicinity of any particular nest or territory. BLM has recommended surveys for burrowing owls prior to construction in accordance with EPM 38. In addition, possible temporary effects to these species would be minimized through the implementation of EPMs 39, 42, 43, and 44, which focus on implementing seasonal restrictions as directed by affected agencies.

### Other Special Status Mammal Species

#### Bats

*Permanent Effects*

Although research is limited, current studies do not show transmission lines or towers to be a significant cause of bat mortality. This is likely due to the ability of bats to echolocate and avoid collisions. In addition, outside of tree roosting bats, there is limited roosting habitat in the study area for bats, and most bat foraging activity would take place at night when construction is suspended. The removal of trees along the proposed corridor would remove day roosting habitat for some species of bats. Since tree removal is expected to occur outside of the breeding/rearing season (approximately May 15 through July 31), no direct or permanent impacts to roosting bat are expected. No impacts to Townsend's big-eared bats (BLM Sensitive Species) are expected since they mainly roost in caves, mines, and occasionally buildings. None of these roosting substrates are located within the study area.[249]

*Temporary Effects*

There are at least two species of bats in the study area that commonly use trees as a maternal roost: the long-legged myotis (*Myotis volans*) and the long-eared myotis (*M. evotis*). These species may also use rock crevices during the rearing of their young.

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[249] Kendall 2013c

Maternal roosts in trees are often relatively small compared to cave and rock-crevice roosting bats.[250, 251]. According to EPM 43, to the greatest extent feasible, trees would be cut outside of the season when bats with young are present in the study area. If tree cutting is necessary when bats are present (approximately May 15 through July 31), these species may be disturbed from roosting sites. Most effects to this species would likely be temporary, taking place only during construction in the immediate vicinity of any particular roost.

### Gunnison's Prairie Dog

*Permanent and Temporary Effects*

Gunnison's prairie dogs are present as shown in Exhibit 3-110. The Preferred Alternative would construct portions of the Three Rivers Substation, transmission line structures, and access roads among currently active prairie dog towns. There are many prairie dog burrows in close proximity to similar existing infrastructure in the area including the Shiprock Substation and associated roads and other infrastructure. Construction would likely disturb some individuals; however, it is unlikely that constructing transmission line structures would cause more than a temporary disturbance.

### New Mexico Meadow Jumping Mouse

*Permanent and Temporary Effects*

The New Mexico meadow jumping mouse has been identified in the Florida River Valley, at least 2 miles from the study area.[252] Due to the presence of livestock and grazing activities, it is very unlikely the species is present in the project area. The Preferred Alternative would not affect any habitat in which this species occurs. In addition, EPMs for wetlands and riparian communities would help protect potential habitat for this species.

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[250] Snider et. al 2013

[251] Johnson et. al 2007

[252] Frey 2013

#### 3.16.5.4 Mitigation

The following mitigation measures are proposed:

- Snags and live trees with obvious holes and/or loose bark that are not a threat to the safe and reliable operation of the transmission line and substations should be protected whenever possible.
- The BLM FFO conducts annual surveys and monitoring for raptor nests. If new nests in the study area become known, information would be communicated through the appropriate channels and appropriate mitigation measures initiated.

#### 3.16.5.5 Residual Effects

The mitigation measures above would reduce, but not completely eliminate potential permanent and temporary effects to fish and wildlife. The mitigation measure to protect snags and live trees would help minimize effects to habitat. The mitigation measure related to raptor nest would ensure that appropriate measures are taken to protect any new raptor nests found within the study area in the future.

### 3.16.6 Proposed Action

#### 3.16.6.1 Permanent Effects

Permanent effects from the Proposed Action would be the same as discussed in Sections 3.16.5.1, Permanent Effects, and 3.16.5.3, Special Status Species, for the Preferred Alternative. The only difference is that the Proposed Action would permanently affect 183 acres as compared to 182 acres of habitat for the Preferred Alternative.

#### 3.16.6.2 Temporary Effects

Temporary effects from the Proposed Action would be the same as discussed in Sections 3.16.5.2, Temporary Effects, and 3.16.5.3 for the Preferred Alternative. The only difference is that the Proposed Action would temporarily affect 827 acres as compared to 800 acres of habitat for the Preferred Alternative.

#### 3.16.6.3 Mitigation

Mitigation measures are listed in Section 3.16.5.4.

#### 3.16.6.4 Residual Effects

Residual effects for the Proposed Action would be the same as discussed in Section 3.16.5.5, Residual Effects, for the Preferred Alternative.

## 3.17 Cultural Resources

Cultural resources include the present expressions of human culture and the physical remains of past activities such as buildings, structures, districts, landscapes, archaeological sites, objects, or other locations. These can be significant in national, regional, or local history, architecture, archaeology, engineering, or culture, and can also include natural features significant to extant communities or peoples.

### 3.17.1 Study Area

The study area for cultural resources is described in Section 3.2, Study Area. In addition, one portion of the study area with importance for cultural resources was expanded. This area is where the transmission line for the Preferred Alternative and the Proposed Action intersects with the congressionally designated route of the Old Spanish National Historic Trail (usually referred to as the Old Spanish Trail). At this location, the study area was widened by an additional 500 feet on either side of the proposed transmission line right-of-way for a distance of 0.25 mile up and down line. When considering cultural resources herein, the term *study area* employed in this EIS is considered to be synonymous with the *area of potential effects* referred to in Section 106 of the National Historic Preservation Act[253] and its enabling legislations.

The goal of the NHPA is to ensure that federal agencies make informed decisions about how an undertaking will affect cultural resources.

### 3.17.2 Cultural Background

Humans have occupied northwestern New Mexico and southwestern Colorado for at least the past 10,000 years, leaving behind diverse cultural resources. The area has been the setting for the development of early farming villages nearly 2,000 years ago,

[253] NHPA; P.L. 89-665, as amended

the expansion of the regional system associated with Chaco Canyon roughly 900 to 1,000 years ago, the formation of large Mesa Verde period pueblos in the following centuries, the establishment of the Navajo homeland of Dinetah during the protohistoric period, Spanish/Mexican exploration, and the historic expansion of ranching and the oil and gas industry in the twentieth century. Understanding these varied and complex trends is critical in determining the historical significance (and National Register of Historic Places [NRHP] eligibility) of cultural resources in the study area. The following background is therefore provided to briefly describe the major developments in the vicinity of the SJBEC Project.

#### 3.17.2.1 Prehistoric Background

The cultural history of the Southwest, including northwest New Mexico and southern Colorado, can be divided into five general cultural periods: Paleoindian, Archaic, Formative, Protohistoric, and Historic, with each of these typically being further subdivided into specific phases summarized in Exhibit 3-114, Major Cultural Prehistoric Periods and Phases in the Pecos Classification. These periods are distinguished by changing settlement patterns, subsistence strategies, technology, and social structure and interaction.

**Anasazi or Ancestral Puebloan**

Differing opinions exist among various groups over appropriate terminology for the peoples occupying the greater San Juan Basin in the first millennia A.D. —Anasazi versus Ancestral puebloan, for example. In many instances scholars use the terms interchangeably; we use puebloan herein and acknowledge it is somewhat problematic to certain groups.

Exhibit 3-114

**Major Cultural Prehistoric Periods and Phases in the Pecos Classification**

| Period | Date Range |
|---|---|
| **Paleoindian** | 10,000 to 5500 B.C. |
| **Archaic** | 5500 B.C. to A.D. 400 |
| *Early Archaic* | *5500 to 3500 B.C.* |
| *Middle Archaic* | *3500 to 1500 B.C.* |
| *Late Archaic* | *1500 B.C. to A.D. 400* |
| **Formative** | A.D. 400 to 1600 |
| *Basketmaker III* | *A.D. 400 to 700* |
| *Pueblo I* | *A.D. 700 to 900* |
| *Pueblo II* | *A.D. 900 to 1100* |
| *Pueblo III* | *A.D. 1100 to 1300* |
| *Pueblo IV* | *A.D. 1300 to 1600* |
| **Protohistoric** | undefined |
| **Historic** | A.D. 1600 to present |

Most researchers consider the Paleoindians to be the earliest recognizable culture in the Southwest and North America. This culture occurred during a period when the climate was quite different than it is now, including extensive areas of glaciation. These peoples practiced a highly mobile hunting and gathering way of life. They successfully pursued mammoths, camelids, giant sloths, and other Pleistocene megafauna, perhaps even contributing to these species' extinctions as the climate grew more arid (and similar to the present) at the beginning 5500 B.C.

This climatic shift also marked the beginning of the Archaic period as groups began to employ more generalized, broad-spectrum subsistence strategies with a greater reliance on small-bodied game and wild plants.[254] People remained highly mobile, but this mobility appears to have been seasonal and more restricted. More plant resources were used, settlement patterns became more complex, the number of sites increased, and simple pithouse residential structures came into use.[255] Around 2000 B.C., cultigens such as maize, beans, and squash were introduced into the Southwest from Mesoamerica. The final phase of the Archaic period was characterized by significant changes in land use patterns, widespread (although sporadic) adoption of cultigens, increases in seasonal sedentism and aggregation, and an increase in structures and agricultural villages. Upland locations were largely abandoned, and sites became concentrated on terraces, valley bottoms, and alluvial fans.

The Formative period that followed the Archaic is generally subdivided into smaller units identified in the Pecos Classification.[256] This chronology provides a general framework to categorize developments in Southwestern prehistory, specifically that of the puebloan tradition and culture. The beginning of the puebloan tradition is characterized by the culmination of several trends that first emerged during the Late Archaic period. The puebloan tradition continued trends that emerged in the Late

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[254] Huckell 1996

[255] Huckell 1996

[256] Kidder 1927

Archaic, including population growth, greater sedentism and associated architectural and sociopolitical development, the emergence of ceramic technology, and an increasing dependence on agriculture and the storage of agricultural products.

The Basketmaker III period (A.D. 500 to 700) is defined by the development of formalized pithouses and a suite of new technologies including ceramics, the bow and arrow, and two-hand manos and slab metates.[257] Basketmaker III sites are common in the La Plata Valley, where large pit structures date to the late A.D. 600s,[258] and in the Animas Valley farther to the east.

Across the Southwest, the Pueblo I period (A.D. 700 to 900) is defined by the shift from pithouses to aboveground masonry roomblocks (although pithouses remained common), development of new ceramic styles, and changes in settlement patterns.[259] The first large Pueblo I villages occurred in the Four Corners area in the late A.D. 700s. By A.D. 850, over one-third of the known population in the puebloan world lived in the San Juan/Four Corners region—no other area in the Southwest was as dense or populous.[260] Large Pueblo I communities have been documented in the Cedar Hill area near the Colorado state line and in the La Plata Valley.[261]

During the Pueblo II period (A.D. 900 to 1100), large-scale construction episodes in Chaco Canyon and elsewhere resulted in multistory masonry great houses and aggregated communities, usually located near fertile floodplains or major drainages where water-control systems were constructed. Chaco Canyon emerged as the center of a regional economic and ideological system that stretched across the San Juan Basin.[262] Population appears to have been fairly low in the Four Corners region in the 900s and early 1000s, as aggregation was occurring at Chaco Canyon and other areas in the southern San Juan Basin. When Chacoan influence arrived, it involved construction of the two largest great houses

The Chaco Phenomenon refers to the social and economic network defined by multi-story great houses and roads that occurred across the Colorado Plateau in the A.D. 1000s.

[257] Reed 2000

[258] Toll and Wilson 2000

[259] Cordell 1984

[260] Wilshusen and Ortman 1999

[261] Toll and Wilson 2000

[262] Kantner and Mahoney 2000

outside of Chaco Canyon—Salmon and Aztec Ruins—located south of the study area. The area around Aztec Ruins became a major population center at this time, and Pueblo II sites are common in the western part of the study area, particularly around Pinon Mesa.

In general, the Pueblo III period (A.D. 1100 to 1300) was a time of migration and reorganization throughout the Southwest.[263] The beginning of the period corresponds with the collapse of the Chaco regional system between A.D. 1130 and 1150 and later included significant restructuring of economic networks, periodic abandonment of pueblos including most Chacoan great houses, a general move to upland settings or perennial river valleys, and an increased emphasis on defense in the location of settlements. The entire San Juan Basin was largely abandoned by the beginning of the Pueblo IV period (A.D. 1300 to 1600) as Pueblo groups coalesced along the Rio Grande, on the Hopi Mesas, and in the areas around Zuni and Acoma. The Pueblo IV period tends to closely mirror modern pueblo society in terms of village location and social relationships and practices.

#### 3.17.2.2 Protohistoric Background

The Protohistoric period was marked by the emergence of non-pueblo cultural groups including Numic (Ute) and Athabaskan (Navajo and Apache) groups in the Four Corners region where many still reside today. A variety of opinions exist on when these peoples arrived in the region, with some difficulties occurring due to the challenges of identifying groups based on general material culture and the archaeological record. There is a general scientific consensus based on various data that Athabaskan groups emigrated from northern Canada and Alaska to arrive in the American Southwest sometime after A.D. 1300.[264]

According to Spanish documents, the Navajo people (or Diné) were living in the Four Corners area of the American Southwest during Spanish contact. The Navajo homeland in the Southwest (the "Dinetah") is the area surrounding Largo and Gobernador canyons, east of Aztec. Navajo oral traditions recognize the relationships

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[263] Adler 1996

[264] Towner1996

between ancestral Navajo and puebloan groups and acknowledge intermarriage between these groups,[265] including several clans that descend from these roots. During the early Protohistoric, the Navajo generally resided in forked-pole dwellings (hogans); other architecture included ramadas, sweat lodges, and corrals. After Spanish contact, animal husbandry played an increasingly important role in the Navajo economy, which fit well with the mobile Navajo and their dispersed settlements.[266]

The timing of the Ute entry into southwestern Colorado is less well understood than that of the Navajo. Early sites that can be positively attributed to the Ute are not common, most likely due to the Ute's extreme mobility and correspondingly diffuse archaeological remains. Consequently much of the archaeological literature focuses on the more recognizable puebloan and Navajo remains. The earliest historical reference to the Ute Indians is in 1626, and the Spanish waged a campaign against the Ute between 1637 and 1641. Intermittent Ute raiding parties hampered the settlement of northern New Mexico and southern Colorado until the US government took control of the territory in 1848. Nevertheless, conflicts with the Ute apparently continued until treaties were signed in 1868 and 1874, which restricted the Ute to the western third of Colorado.

#### 3.17.2.3 Historic Background

European contact occurred in central New Mexico in the mid-sixteenth century with the arrival of the Spanish conquistadors of the Coronado expedition, and permanent settlements were established following Oñate's expedition in 1598. Spanish settlement remained confined to the Rio Grande Valley and its major tributaries until the 1700s, although exploration of the Four Corners began at this time. Spanish exploration increased in the 1760s, in part out of desire to link the colonies of New Mexico and California with an overland trade route, a process that eventually led to the establishment of the Old Spanish Trail (discussed in

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[265] Warburton and Begay 2005

[266] Brugge 1983

greater detail below). Despite these forays, permanent Euro-American settlement of the region did not begin until the 1860s.

In Colorado, the discovery of gold in the San Juan Mountains in 1860 led to an influx of miners to the region. Miners established Animas City, just north of present-day Durango, in 1861, and other communities were established in the 1870s. The Denver & Rio Grande Railroad created the town of Durango in 1880 to use as a railroad hub, and within several months the population swelled to 2,500 people. Durango quickly became an important center for mining, agriculture, and business.

Ranches and farms sprung up throughout the valleys of southwestern Colorado and northwestern New Mexico during the 1870s when Anglo and Hispanic settlers began arriving and quickly established homesteads in the major river valleys. San Juan County was created in 1887, and Aztec became its county seat as it remains today. Farther to the west, settlement was also growing in the town of Farmington near the confluence of the San Juan and Animas Rivers. The success of local agriculture due to the ample water supply caused Farmington to grow into a regional economic center and it is still the largest town. The 1950s brought oil and gas production to the area, along with thousands of new residents, eventually supplanting agriculture as the primary economic activity. Today, San Juan County continues to grow with the combination of these industries along with tourism.

### 3.17.3 Methods

Understanding the existing conditions and potential effects to cultural resources required both background research and field efforts to identify cultural resources in the study area. The background research included consulting with the appropriate agencies (BLM, SUIT, and Bureau of Indian Affairs [BIA]) and institutions (New Mexico Archaeological Records Management Section and Colorado Office of Archaeology and Historic Preservation), as well as considering listings on the NRHP and New Mexico State Register of Cultural Properties. These data, including records for all previously documented archaeological sites in the vicinity of the Preferred Alternative and the Proposed Action, were used to determine the location of known cultural resources and develop a context for identifying and assessing cultural resources in the study area.

Section 106 of the National Historic Preservation Act (NHPA) obligates BLM, as the lead federal agency, to determine an area of potential effects and identify historic properties in the study area; however, the exact nature of how to comply is left up to the individual agency in consultation with others, including Native American tribes, advocacy groups, and State Historic Preservation Officers. As such, the methods employed to identify cultural resources and historic properties in New Mexico were taken from Procedures for Performing Cultural Resource Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities.[268] In Colorado, the methods relied on applicable state statutes and guidelines provided by the SUIT and BIA, who assist the SUIT in its right-of-way grant process on tribal trust lands. Other methods and guidelines include those put forth in the New Mexico Cultural Properties Act[269] and the Prehistoric and Historic Sites Preservation Act[270] that describe the treatment of cultural resources on State of New Mexico lands.

The BLM, SUIT, and other consulting agencies, tribes, and individuals in the Section 106 process determined that the methods for identifying historic properties in the study area would include a pedestrian archaeological survey of the entire study area subject to the specific guidelines of each land-managing agency and consultation with various Native American tribes per Section 101(d) of the NHPA. Further, each cultural resource encountered and documented in the study area would be assessed for its potential eligibility to the NRHP under each of the four major criteria.

Section 106 of the NHPA requires federal agencies to take into account the effects an undertaking may have on historic properties. Agencies must evaluate an undertaking using the criteria defined in 36 CFR Part 800 which defines adverse effects as "direct or indirect

**Eligibility to the NRHP**[267]

Cultural resources may be eligible for listing in the NRHP under the four major criteria:

- *Criterion A:* association with events important in local, regional, or national history
- *Criterion B*: association with lives of important historical persons
- *Criterion C*: displaying the characteristics of a specific type, period or method of construction, the work of a master, possessing high artistic value, or being part of an entity whose components lack individual distinction (such as a historic district)
- *Criterion D*: having yielded, or being likely to yield, information important in prehistory or history

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[267] NPS 2002, 36 CFR 60.4

[268] BLM 2005

[269] 18-6-1 through 18-6-17 New Mexico Statutes Annotated [NMSA] 1978

[270] 18-8-1 through 18-8-9 NMSA 1978

alteration of the characteristics that qualify a property for inclusion in the NRHP in a manner that diminishes integrity of location, design, setting, materials, workmanship, feeling, or association." Adverse effects also include "reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative" [36 CFR § 800.5(a)(1)]. Possible indicators of adverse effects include:

- Physical destruction or damage to all or part of a property
- Removal of a property from its historic location
- Change in use, character, or setting of a property if these characteristics contribute to its historic significance
- Introduction of visual, atmospheric, or auditory elements that diminish its integrity
- Neglect that leads to deterioration
- Transfer, lease, or sale of a property out of federal ownership

As demonstrated above, a variety of direct and indirect effects to historic properties are possible (for example, physical destruction or alterations to the setting or visual environment, respectively). How a property is eligible to the NRHP—under what criteria it qualifies—is critical to assessing potential adverse effects from an undertaking. For example, sites that are eligible or potentially eligible to the NRHP under Criterion D for their information potential (as are the majority of sites in the study area) typically are not eligible due to qualities such as setting and feeling. Potential effects to these aspects of integrity, therefore, have no bearing on the eligibility of the site, regardless of whether these effects are direct or indirect.

### 3.17.4 Affected Environment

Cultural resources in the study area were identified through various efforts, including consulting with Native American tribes, considering previous research, and conducting intensive archaeological surveys of the study area. Exhibit 3-115, Land Status of Cultural Resources Identified, details the cultural resources identified by this investigation, including 193 archaeological sites

(146 in New Mexico and 47 in Colorado) and three resources from the built environment. Additionally, The Navajo Nation indicated that 10 traditional cultural properties (TCPs) of importance to the Nation may be located in the study area. The nature and location of these resources relative to the study area has yet to be determined through consultation, so they are not included in Exhibit 3-115.

**Exhibit 3-115**

**Land Status of Cultural Resources Identified**

| | BLM | BLM/ NMSLO | BLM/ Private | NMSLO | NMSLO/ Private | SUIT | Private | Total |
|---|---|---|---|---|---|---|---|---|
| Archaeological Sites | 80 | 9 | 6 | 13 | 2 | 32 | 51 | **193** |
| Historic Built Environment | 1 | - | - | - | - | - | 2 | **3** |

*[1] The Armijo segment of the Old Spanish National Historic Trail is considered by the National Park Service to cross the Farmington Glade (and study area) somewhere just south of NM 574. No physical remains of the trail or associated resources were identified in the study area.*

*NMSLO = New Mexico State Land Office*

### 3.17.4.1 Traditional Resources

Cultural resources are not limited to archaeological sites or buildings; they include objects or locations that have a direct association with living cultural groups and are of religious, cultural, or traditional significance to a Native American tribe or other group. When these resources meet the criteria for listing in the NRHP, they are referred to as Traditional Cultural Properties (TCPs).[271] These are eligible for listing due to their "association with cultural practices or beliefs of a living community that are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community."[272] Examples of TCPs include locations for ceremonies or gathering of medicinal plants, agricultural areas, natural features such as springs, ancestral sites, and other sacred spaces. Such locations are often identified through government-to-government consultation with Native American tribal elders or with the public involvement processes in NEPA and Section 106 of the National Historic Preservation Act (NHPA).

**What are TCPs?**

TCPs are cultural resources that qualify for listing in the NRHP based on their association with cultural practices or beliefs of an existing community or group.

[271] NPS 1990

[272] NPS 1990

Section 101(d) of the NHPA requires that federal agencies consult with Native American tribes who historically occupied the area of the undertaking or who may attach significance to resources in the region. Provisions of NEPA also require that agencies consult with Native American tribal leaders. The BLM initiated government-to-government consultation with a series of letters between December 10, 2009, and August 16, 2012. Letters were sent to the following potentially interested tribes:

- Hopi Tribe
- Jicarilla Apache Nation
- Navajo Nation
- Pueblo of Acoma
- Pueblo of Cochiti
- Pueblo of Isleta
- Pueblo of Jemez
- Pueblo of Kewa
- Pueblo of Laguna
- Pueblo of Nambe
- Pueblo of Ohkay Owingeh
- Pueblo of Picuris
- Pueblo of San Ildefonso
- Pueblo of Sandia
- Pueblo of Santa Ana
- Pueblo of Santa Clara
- Pueblo of Taos
- Pueblo of Tesuque
- Pueblo of Zia
- Pueblo of Zuni
- Southern Ute Indian Tribe
- Ute Mountain Ute Tribe

These letters requested information on known TCPs or other locations of importance to these tribes and assured that tribes had the opportunity to provide input on the scope of identification and identification strategies for cultural resources, evaluation of their historical significance, and on other major issues such as the treatment of human remains.

Responses of interest have been received from the Hopi Tribe, the Navajo Nation, and the SUIT. The Hopi Tribe responded that they consider puebloan archaeological sites to be sacred locations of their ancestors. The Navajo Nation noted that the SJBEC Project would take place within the traditional Navajo homeland of Dinetah and indicated 10 TCPs important to them may be located in the study area. In addition, the Navajo Nation noted that they claim cultural affiliation to all Anasazi (Pueblo) people (periods from Archaic to Pueblo IV) of the southwest. The Navajo Nation makes this claim through Navajo oral and ceremonial history, which has been documented as early as 1880. The Navajo Nation also made clear that the treatment of archaeological sites encountered should follow applicable statutes relating to cultural resources, and that each site should be treated accordingly.

#### 3.17.4.2 The Historic Built Environment

The historic built environment includes buildings, structures, linear engineering features such as acequias (irrigation ditches) and roads, and other features that are of historic or aesthetic significance. Three resources from the historic built environment resources were considered or identified in the study area: the Jackson Ditch, the Ralston Ditch (this is listed as an archaeological site by the Colorado Office of Archaeology and Historic Preservation but is described here rather than with the archaeological sites below), and the Old Spanish Trail. The Jackson Ditch parallels the La Plata Highway in New Mexico and is a historic, unlined acequia that is still in use for delivering water to adjacent agricultural fields. It likely dates to the period of settlement along the La Plata River in the late 1800s and early 1900s, and because of this association and its integrity is considered eligible to the NRHP. The Ralston Ditch has been previously determined not eligible to the NRHP by the Colorado SHPO, no new information has been provided that would merit reassessing this determination for the segment of the Ralston Ditch in Colorado (located along US 550) that crosses the study area.

The Old Spanish Trail was referred to as the "Camino de California" by New Mexican traders and the "Camino de Santa Fe" by those in California.

Based on archival research by the NPS and other scholars, the Armijo Route of the Old Spanish Trail is thought to cross the study area in the Farmington Glade about 1 mile south of NM 574. The Old Spanish Trail extended from Santa Fe to Los Angeles and was a pack trail used by traders, explorers, and prospectors between 1829 and 1848. It is historically significant for its role in the early nineteenth century increase in commerce and travel in the Southwest, which also included other routes such as the Santa Fe Trail. Major travel on the trail first occurred in 1829 when Antonio Armijo, a trader from Santa Fe, left Abiquiu with a caravan of

60 men and 100 mules and followed a network of known trails used by previous explorers, trappers, and native groups through northwestern New Mexico, Utah, Nevada, and California.[273] His route was soon supplanted, however, by establishment of a more northerly route through Colorado and Utah that would become the main thoroughfare for trade caravans[274] (Exhibit 3-116, Multiple Routes of the Old Spanish Trail). The Old Spanish Trail was added to the National Historic Trail System in 2002 and is currently managed jointly by the BLM and NPS.

**Exhibit 3-116**
## Multiple Routes of the Old Spanish Trail


*The Armijo route is shown in green.*
*Source: Old Spanish Trail Association Website*

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[273] NPS 2001

[274] Warren 2004

Based on historical records, the Armijo Route was only used a small number of times and was possibly never a formally improved trail or road. Special consideration was therefore used during survey of where the route is thought to cross the study area, and, at the suggestion of the BLM and NPS, an area measuring 0.25 mile long by 1,000 feet wide was subject to greater scrutiny in an attempt to identify material evidence of the trail's location; however, no evidence of the trail was identified during this expanded survey effort. This lack of material evidence may indicate that the actual trail does not follow the congressionally designated and federally managed route (this portion of the trail was not previously verified with archaeological or other evidence) or that this segment of the Armijo Route is no longer visible or identifiable at this location.

#### 3.17.4.3 Archaeological Resources

Archaeological resources include tangible prehistoric and historic sites where humans have left physical remains of purposeful activity; as with other cultural resources, these can be significant in national, regional, or local history. The existing conditions in New Mexico and Colorado are discussed separately due to varying land managing agencies and their guidelines.

Previous archaeological research within or intersecting the study area includes 165 surveys in New Mexico and 14 in Colorado, ranging from 1977 to 2011. Most of these efforts were associated with mining and oil and gas exploration and were related to installation of seismic lines, gas pipelines, well pads, and access roads. Many of these intersect a small portion of the study area; however, several studies cover larger areas and have made significant contributions to the understanding of prehistory and history throughout the region. These larger investigations include survey for the construction of the San Juan Generating Plant and associated facilities, the San Juan Coal Mine Lease, the Colorado-Ute Electric Association's Rifle-to-San Juan transmission line, the La Plata transportation corridor, the Ruins Roller Chop project, and the Cedar Hill Special Treatment project.

A variety of previously documented sites (303 sites) are located within 500 feet of the study area in New Mexico, including 78 sites co-located with the study area. Only 58 of these were actually identified in the study area—most of the others are actually located outside the study area but exhibit slight overlap due to how spatial data is presented in ARMS, although some sites have been subsumed by other nearby sites, are erroneously plotted in the ARMS database, or have been entirely removed during previous projects. Most of the sites in the vicinity of the study area date to the pre-contact period. Sites located in the project vicinity (but outside the study area) are most numerous within Segments 1 and 5.

A total of 146 sites were identified in the study area in New Mexico, including 58 that were previously documented. Sites are most numerous in the Pinon Mesa and South Glade areas in Segments 2 and 3 (segments are shown in Exhibit 3-3). Occupation dates ranged from the Middle Archaic (3500 B.C.) to the recent historic period. Similar to the sites in the surrounding vicinity, the sites in the study area in New Mexico are mostly prehistoric, with 77 sites exhibiting some residential or other features such as roomblocks, middens, and hearths. These prehistoric sites are located throughout the study area. Formative period sites with earlier occupations from around A.D. 400 to 900 tend to be more common in Segments 4 and 5, and later sites from roughly A.D. 900 to 1300 are more frequent in the western portion of the study area. This appears to reflect a previously identified movement by prehistoric peoples out of upland areas east of the La Plata River prior to A.D. 1000. Eighteen Navajo sites were also identified, primarily along the State Line segment nearest to the Dinetah homeland.

**Number of Archaeological Sites in New Mexico by Segment**

| | |
|---|---|
| Segment 1 | 16 sites |
| Segment 2 | 39 sites |
| Segment 3 | 49 sites |
| Segment 4 | 22 sites |
| Segment 5 | 30 sites |

In Colorado, 47 archaeological sites were identified in the study area. As in New Mexico, the majority of sites are prehistoric with a significant percentage of Ute and Navajo sites. The sites are mostly artifact scatters, although there are some sites with features such as forked-pole hogans and hearths. In addition, one large historic site appears to the remains of a possible homestead occupied during the late 1800s or early 1900s.

Exhibit 3-117, Preliminary NRHP Eligibility of Archaeological Sites Identified, details the sites in New Mexico and Colorado—all of which have varied historic values, periods of significance, and eligibility to the NRHP. Most of the sites that are eligible or potentially eligible to the NRHP in the study area qualify under Criterion D[275] for their information potential to inform on several important historical trends, including, for example, the growth of the regional system associated with Chaco Canyon. Additionally, a small number of sites may be eligible under Criterion A for their association with important historical events. The remaining sites are either of an undetermined eligibility to the NRHP or are not considered eligible as they lack information potential, historic integrity, or historic significance.

**Exhibit 3-117**
**Preliminary NRHP Eligibility of Archaeological Sites Identified**

| | New Mexico | Colorado | Total |
|---|---|---|---|
| Archaeological sites eligible to the NRHP under Criterion D | 80 | 15 | **95** |
| Archaeological sites with undetermined eligibility to the NRHP under Criterion D[1] | 41 | 24 | **65** |
| Archaeological sites that are ineligible to the NRHP | 25 | 8 | **33** |

[1] *Further investigations such as archaeological test excavation would likely be required to determine the information potential of these sites and their consequent eligibility to the NRHP.*

### 3.17.4.4 Affected Environment Summary

There are 206 identified cultural resources in the study area, including 193 archaeological sites (146 in New Mexico and 47 in Colorado), three resources from the built environment, and 10 potential traditional cultural properties (TCPs). Of these, 160 archaeological sites and two resources from the built environment are listed on, eligible to, or potentially eligible to the NRHP. They are, therefore, considered historic properties and are listed in Exhibit 3-118, Potential Historic Properties Identified. The total number of traditional resources and their potential to qualify as TCPs under NRHP criteria would be determined during ongoing government-to-government consultation. These resources, therefore, do not appear in Exhibit 3-118. An additional eight archaeological sites in Colorado that do not qualify as historic properties will be avoided per SUIT guidelines.

[275] See Section 3.17.3, Cultural Resources Methods, for more information on NRHP criteria.

**Exhibit 3-118**

## Potential Historic Properties Identified

| | New Mexico | Colorado | Total |
|---|---|---|---|
| Resources from the historic built environment[1] | 2 | 0 | **2** |
| Archaeological sites eligible to the NRHP under Criterion D | 80 | 15 | **95** |
| Archaeological sites with undetermined NRHP eligibility under Criterion D[2] | 41 | 24 | **65** |

[1] *The Old Spanish National Historic Trail is listed on the NRHP and is the only NRHP-listed historic property in the study area.*

[2] *Further investigations such as archaeological test excavation may be required determine the information potential of these sites and their consequent eligibility to the NRHP.*

## 3.17.5 No Action Alternative

With the No Action Alternative, historic properties would not be affected.

## 3.17.6 Preferred Alternative

### 3.17.6.1 Permanent Effects

The Preferred Alternative has the potential to affect historic properties in a number of adverse and permanent ways. These include physical destruction of properties as a result of constructing transmission line structures or new or improved access roads. Indirect effects may include diminishment of the historic significance of a property (for example, the setting or feeling of a TCP) or increased traffic along access roads. The three primary classes of effects from the Preferred Alternative, both direct and indirect include:

1. Adverse effects would occur from construction or maintainance activities proposed within the boundaries of a historic property.

2. No adverse effects would occur at a historic property proximal to proposed construction or maintenance activities due to avoidance and minimization measures such as fencing and monitoring.

3. No effects would occur at a historic property due to its distance from proposed construction or maintenance activities.

Land-managing agencies manage undertakings that would occur near historic properties in various ways. For example, the BLM FFO typically requires monitoring and avoidance strategies when construction is proposed within 100 feet of a historic property, whereas the SUIT requires similar measures when construction would occur within 50 feet of a cultural resource.

### Traditional Resources

The BLM has initiated government-to-government consultation as discussed in Section 3.17.4.1, Traditional Resources, through a series of letters to potentially interested tribes, a process that has resulted in the identification of 10 potential TCPs important to the Navajo Nation that may be in the study area. Further consideration of the resources identified by the Navajo Nation, however, showed that at least three are outside the study area, and the nature and eligibility of the remaining resources to qualify as TCPs has not yet been determined. An additional response of interest was received from the Hopi Tribe who stated that they consider Ancestral Pueblo archaeological sites to be sacred locations of their ancestors, although they did not identify specific TCPs. The Hopi Tribe will be provided with the cultural resource survey report to review and determine if additional investigations for traditional resources are warranted.

Upon receiving a preliminary cultural resources report, the BLM will continue government-to-government consultation with the Navajo Nation, Hopi Tribe, and other interested Native American tribes. This consultation will seek to identify TCPs, determine their significance and potential effects, and develop any necessary protection, avoidance, minimization, or mitigation measures for these resources.

### Resources from the Historic Built Environment

Two historic properties from the built environment are located in proximity to the Preferred Alternative: the Jackson Ditch and the Old Spanish National Historic Trail. The Jackson Ditch is a historic acequia likely associated with the period of settlement along the La Plata River in the late 1800s and early 1900s and therefore eligible under Criterion A. An access road that requires no improvement would cross the ditch using existing culverts, no structures are proposed within 100 feet of the ditch, and the proposed transmission line would span the ditch. Furthermore, the proposed project would parallel an existing overhead transmission line in a heavily developed area and would not significantly alter the setting or feeling of the Jackson Ditch. Therefore, the Preferred Alternative would have no adverse effects to the Jackson Ditch.

The Old Spanish Trail was listed as a National Historic Trail in 2002 after it was determined to be nationally significant "with respect to the theme of the Changing Role of the United States in the World Community and the topics of trade and commerce during the period of 1829-1848."[276] National Park Service (NPS) records show the Armijo Route of the Old Spanish Trail crossing the study area somewhere in the Farmington Glade about 1 mile south of NM 574.

Based on the characteristics cited by the NPS, the Old Spanish Trail is likely eligible for listing on the NRHP. The location where it may cross the study area was subject to intensive investigations that did not identify material evidence of the trail—perhaps because the Armijo Route was only used a few times. However, lightly used portions of the route that do not exhibit material evidence may still contribute to the Old Spanish Trail's significance, as it is the route itself and not necessarily its physical manifestation that is significant.[277] In this case, additional research (specifically methods other than pedestrian survey) is necessary to determine the historic integrity of the trail segment and how it relates to the potential eligibility of the entire Old Spanish Trail. The area where the Old Spanish Trail crosses the study area includes two existing overhead transmission lines, several natural gas facilities, existing roads, and underground utility lines, all of which have diminished the historic integrity (particularly setting and feeling) for this segment of the trail. Construction of the Preferred Alternative would, therefore, be consistent with existing development in the area and would not have direct or indirect adverse effects on this segment of the Old Spanish Trail.

### Archaeological Sites

Potential effects to archaeological sites are summarized in Exhibit 3-119, Effects on Potentially NRHP-Eligible Archeological Sites from the Preferred Alternative. Proposed construction associated with the Preferred Alternative intersects with 36 archaeological sites considered eligible, or potentially eligible, to the NRHP in New Mexico. This

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[276] NPS 2001

[277] NPS 2001

includes locations where existing access roads would be improved or new access roads, structures, or other facilities are proposed within a site boundary and would result in permanent adverse effects to some of these sites. Further investigations, such as archaeological test excavations, would be necessary to determine the exact number and nature of the permanent effects from the Preferred Alternative. The Preferred Alterantive in Colorado does not intersect with historic properties or any archaeological sites. As a result, the proposed project would not have direct or indirect effects on archaeological sites in Colorado.

**Exhibit 3-119**
**Effects on Potentially NRHP-Eligible Archaeological Sites from the Preferred Alternative**

| Effects | New Mexico | Colorado | Total |
|---|---|---|---|
| Adverse effect | 36 | 0 | **36** |
| No adverse effect | 49 | 14 | **63** |
| No effect | 36 | 33 | **69** |

### 3.17.6.2 Temporary Effects

Temporary effects from the Preferred Alternative to historic properties and potentially traditional resources would include increased traffic on roadways and possible diminishment of setting and feeling from nearby construction. In most areas, however, existing roadways that experience traffic would be used, so possible effects to the setting would be limited. Any temporary increases in road traffic or construction near a historic property would be localized and of a relatively short duration (weeks or months) within the 18 to 24 month construction timeframe. Further, the majority of the historic properties within the study area are eligible to the NRHP under Criterion D for their intrinsic research potential, and nearby construction activities would not have temporary effects on the eligibility of these properties.

### 3.17.6.3 Mitigation Measures

EPMs 48 through 52 listed in Exhibit 2-23 would be implemented to avoid or minimize effects to cultural resources. In addition, the following sections present specific measures for avoiding, minimizing, and mitigating potential direct and indirect effects. The discussion is divided among traditional resources, resources from the historic built environment, and archaeological resources.

### Traditional Resources

To date, the Navajo Nation and the Hopi Tribe are the only tribes that have expressed interest in the SJBEC Project, and the Navajo Nation identified a number of potential TCPs that may be located within the Preferred Alternative. Furthermore, the Navajo Nation expressed concern regarding all archaeological sites containing prehistoric or Navajo structures. Specific avoidance, minimization, and mitigation measures for these resources would be determined during ongoing government-to-government consultation between the BLM and interested tribes. The Navajo Nation and Hopi Tribe suggested some specific mitigation measures, including:

- The Navajo Nation requested notification if habitation sites, plant-gathering areas, human remains, or other objects of cultural patrimony are identified.
- The Hopi Tribe noted that human remains and funerary items should be avoided or reburied as close to their original location as possible.

### Resources from the Historic Built Environment

As noted above, the Preferred Alternative is unlikely to have direct or indirect effects on the Old Spanish Trail, because it is consistent with current development in the area. The NPS and Old Spanish Trail Association (OSTA), a preservation group dedicated to educating the public about the trail, however, have informally suggested several potential mitigation measures.

- The OSTA suggested combining GIS with historical records in an attempt to refine our understanding of where the trail is located and clarify what adverse effects could occur from the SJBEC Project.

NPS recommended archaeological monitoring at any structures proposed within 0.25 mile of the presumed trail crossing to ensure materials dating to the period of significance for the Old Spanish Trail (1829 to 1848) are not adversely affected during construction.

Consultation about this issue is ongoing to determine any specific monitoring plans or mitigation measures.

### Archaeological Resources

In Colorado, SUIT guidelines require that all prehistoric resources be avoided regardless of their potential eligibility to the NRHP. Per these stipulations, the Preferred Alternative would avoid all resources in Colorado, although monitoring would be required at 14 archaeological sites located within 50 feet of improvements associated with the Preferred Alternative.

Due to the number of resources within the study area and the number of access roads requiring improvements, avoidance of all archaeological resources is not feasible in New Mexico. Mitigation measures would be developed through the Section 106 consultation process (and agreed to in a Memorandum of Agreement [MOA] to be signed by the consulting parties) and by using the standards in the Procedures for Performing Cultural Resource Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities[278] and those outlined in NMAC 4.10.8 to avoid, minimize, or mitigate potential effects to sites located within or near construction areas. These measures are divided between those that would result in no adverse effects to a historic property and those that would minimize and/or mitigate potential or likely effects to a historic property.

#### No Adverse Effects

As discussed in Section 3.17.6.1, Permanent Effects, no adverse effects would occur from the Preferred Alternative at 49 sites due to avoidance and minimization measures such as fencing and monitoring. The following measures would likely be used at these sites:

- The Preferred Alternative has been designed to avoid or minimize potential adverse effects to historic properties when such avoidance is practical based on topography, engineering, and other concerns. Temporary barriers would be placed at the edge of construction areas and a permitted archaeologist would

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[278] BLM 2005

monitor all construction activity within 100 feet of a historic property. Several factors may affect the intensity and duration of these measures including the topographic setting, frequency of construction activities, and their distances from the historic property. These avoidance and minimization measures would potentially result in no adverse effects to these properties.

- Installation of a temporary fence or other barrier would be necessary in circumstances where a structure, facility, new road, or other improvement is proposed within 100 feet of a historic property; this would be necessary at 41 sites. This would likely include monitoring of construction activities by a qualified archaeologist, with the same applicable criteria for monitoring described above. If these avoidance and minimization techniques were implemented, there would likely be no adverse effects to these properties.
- Eleven sites are crossed by existing roads that require no improvements but will be used. Per BLM guidance, use of existing roads crossing a historic property where no improvements are proposed is not considered an adverse effect unless significant cultural deposits or features located within the road surface are threatened and require mitigation. Temporary fences or barriers may be placed along the margins of these existing roads to minimize the potential for adverse effects, and periodic monitoring of these avoidance barriers may be required. Additional avoidance/monitoring measures would required at these sites if there are also construction activities proposed within 100 feet of these sites (discussed above).
- Continuing existing drainage flow patterns during and after construction of transmission line structures, substations, and roads would limit the potential for indirect effects from increased erosion at nearby historic properties.

### Adverse Effects

As discussed in Section 3.17.6.1, adverse effects would occur from the Preferred Alternative at 36 sites. In those instances where historic properties cannot be avoided and an adverse effect would occur, mitigation measures would be implemented to minimize and mitigate these adverse effects. Further, a testing plan would be developed using these same guidelines to determine if sites with undetermined eligibility to the NRHP actually have the potential to qualify them as eligible for inclusion in the NRHP. The following avoidance and mitigation measures would likely be used, subject to the conclusion of the Section 106 process and the stipulations of the MOA:

- In circumstances where improvement of existing access roads or new access roads, structures, or other facilities are proposed within an eligible (or potentially eligible) site, testing or data recovery may be required. Test excavations would typically be used at sites with undetermined eligibility to understand if the site has actual research potential. Testing would also typically be necessary in circumstances where it is unclear if the affected portion of an eligible site contributes to the property's research potential. Data recovery would typically be necessary when an affected portion of a site includes significant cultural materials or features that clearly contribute to its research potential and eligibility. Possible methods for both are described below.
- Testing and data recovery within affected areas of a site may include collecting surface artifacts; excavating shovel test pits, test units, or trenches; and excavating significant cultural materials or features. Testing and data recovery methods would be determined on a site-by-site basis and detailed in a testing and data recovery plan subject to the guidelines described above and approval by the consulting parties in the Section 106 process. These methods would depend on the nature of cultural material located within and along access roads and the types of improvements (grading, widening, and maintenance) that are required.

#### 3.17.6.4 Residual Effects

The mitigation measures listed above would serve to avoid and minimize effects to cultural resources and potential traditional resources. These mitigation measures, however, would not completely eliminate the possibility of permanent and temporary effects to cultural resources.

## 3.17.7 Proposed Action

### 3.17.7.1 Permanent Effects

The Proposed Action would have similar permanent effects as described above for the Preferred Alternative. The same three primary classes of effects discussed in Section 3.17.6.1 could occur with the Proposed Action. Potential effects to traditional resources or resources from the historic built environment would be the same with the Proposed Action as described for the Preferred Alternative. As demonstrated in Exhibit 3-120, Effects on Potentially NRHP-Eligible Archaeological Sites from the Proposed Action, however, the Proposed Action in New Mexico intersects with 48 archaeological sites considered eligible, or potentially eligible, to the NRHP, in contrast to the 36 NRHP-eligible sites intersected by the Preferred Alternative. The Proposed Action includes locations where existing access roads would be improved or new access roads, structures, or other facilities are proposed within a site boundary and would therefore result in permanent adverse effects to some of these sites.

**Exhibit 3-120**

**Effects on Potentially NRHP-Eligible Archaeological Sites from the Proposed Action**

| Effects | New Mexico | Colorado | Total |
|---|---|---|---|
| Adverse effect | 48 | 0 | **48** |
| No adverse effect | 33 | 14 | **47** |
| No effect | 40 | 33 | **73** |

### 3.17.7.2 Temporary Effects

Temporary effects from the Proposed Action are the same as discussed above in Section 3.17.6.2, Temporary Effects, for the Preferred Alternative.

### 3.17.7.3 Mitigation

The specific measures developed and implemented for avoiding, minimizing, and mitigating potential direct and indirect effects to historic properties would be the same as discussed above within Section 3.17.6.3, Mitigation Measures, for the Preferred Alternative. There would be no adverse effects from the Proposed Action at 33 sites, however, due to avoidance and minimization measures such as fencing and monitoring. Potential adverse effects would occur from the Proposed Action at 48 sites. In those instances where historic properties cannot be avoided and an adverse effect would occur, the same mitigation measures discussed in Section 3.17.6.3 would be implemented to minimize and mitigate these adverse effects.

#### 3.17.7.4 Residual Effects

Residual effects from the Proposed Action are the same as discussed above in Section 3.17.6.4, Residual Effects, for the Preferred Alternative.

## 3.18 Air Quality, Climate Change, and Greenhouse Gases

### 3.18.1 Study Area

The study area for air quality includes the federally designated Four Corners Interstate Air Quality Control Region (40 CFR § 81.121), of which San Juan County, New Mexico, and La Plata County, Colorado, are a part, as well as designated Class I areas within 100 kilometers (62 miles) [279] of the study area.

Because climate change is a global condition, climate change trends are discussed at both a global and a regional level. The study area for greenhouse gases includes the affected counties; however, national and statewide greenhouse gas emissions are provided to give context to localized emissions.

### 3.18.2 Methods

#### 3.18.2.1 Air Quality Methods

**Permanent Effects Methods**

A qualitative analysis was performed to describe the permanent effects of the alternatives since pollutants would be emitted at a much lower rate than during construction. Operation of the transmission line and associated equipment would have no air quality emissions, since the alternatives would not require any new generation as discussed in Section 1.3, Proponent’s Project Objectives. Emissions would be limited to equipment required for routine maintenance and emergency repairs, including periodic

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[279] NMED Air Quality Bureau 2012

helicopter inspections, vehicle inspections, vegetation control, and road maintenance.

### Temporary Effects Methods

Effects to air quality would occur primarily during construction and would include exhaust emissions from construction equipment, helicopters, and vehicles, and fugitive dust emissions from site disturbance by off-road vehicle travel and construction equipment use and resuspension of dust during on-road vehicle travel. Because of this, a quantitative analysis of construction-related emissions has been developed to disclose the types and scale of potential emissions expected during the 18- to 24-month construction schedule. Since the SJBEC Project would be built in an air quality attainment area, Clean Air Act conformity does not apply. In addition, there are no construction-related significance thresholds that have been developed by state, regional, or tribal air quality agencies in the study area.

Emissions were calculated using the emission factors described below for each category of pollution source. Construction emissions are reported in tons for the entire construction period and include both equipment and vehicle emissions and fugitive dust emissions. Emissions have not been broken out by state, since the entire project area is within the Four Corners Interstate Air Quality Control Region. Input data were obtained from applicant engineering and construction staff and are based on the best available information at the time of analysis. Where specific construction data are not available, assumptions were made based on professional judgment and experience with other transmission line projects. Construction emissions would be minimized by developing a fugitive dust control plan as described in EPM 64. The fugitive dust control plan would include implementing standard methods for controlling exhaust and dust emissions during construction. The fugitive dust control plan would include EPMs 65 through 70 described in Exhibit 2-23, and these measures are reflected in the emissions calculations.

Fugitive dust emissions were estimated based on Western Regional Air Partnership fugitive dust emission factors assuming a 50 percent mitigation efficiency of fugitive dust control through watering. Dust emissions from vehicle travel on paved and unpaved roads were calculated using the Western Regional Air Partnership's dust generation spreadsheet models.[280]

On-road traffic emissions were calculated using South Coast Air Quality Management District (SCAQMD) on-road vehicle emission factors.[281] The factors are based on federal vehicle standards found in 40 CFR Part 86 et seq. and provide a composite emission factor for various classes (passenger vehicles, mid-size trucks, and heavy duty diesel trucks) and ages of vehicles for a chosen scenario year (2015 was selected). Emission sources in this category include commuter vehicles, on-site light duty trucks, bucket trucks, water trucks, delivery trucks, and tractor-trailers. Construction equipment emissions were calculated using spreadsheet calculations with SCAQMD diesel engine emission factors. Emission sources in this category include dozers, graders, cranes, drill rigs, generators, and the like. Helicopter emissions were calculated using emission factors from the Federal Aviation Administration Aircraft Emission Database[282] and fuel rates from the US Department of the Interior National Business Center, Aviation Directorate aircraft rental agreement.[283]

Per discussions with project engineers, no concrete batch plants are proposed at this time. Therefore, emissions from concrete mixer truck trips were estimated rather than emissions from batch plants. The number of truck trips required was calculated using the cubic yards of concrete required assuming a concrete mixer capacity of 10 cubic yards.

#### 3.18.2.2 Climate Change Methods

As described above for air quality, a qualitative analysis was performed to describe the operational (permanent) effects on climate change, while a quantitative analysis was performed to describe the construction (temporary) effects. Greenhouse gas emissions were estimated for construction-related activities,

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[280] Western Regional Air Partnership 2007

[281] SCAQMD 2007a

[282] FAA 2006

[283] NBC 2006

including vehicle, helicopter, and equipment use. Greenhouse gas emissions from vehicle and equipment use were calculated using SCAQMD emission factors for on-road and off-road vehicles and equipment.[284] Greenhouse gas emissions from helicopters were calculated using a $CO_2$ emission factor for aviation gasoline from US Department of Energy, Energy Information Administration.[285]

Operation of the transmission line and associated equipment would have no greenhouse gas emissions. Greenhouse gas emissions would be limited to equipment required for routine maintenance and emergency repairs, including periodic inspections by helicopter and maintenance vehicles, vegetation control, and road maintenance.

Indicators for air quality and greenhouse gas analysis include emissions of pollutants and greenhouse gases from:

- Fugitive dust
- Vehicles
- Helicopters
- Diesel construction equipment

## 3.18.3 Affected Environment

### 3.18.3.1 Climate

Climate in the study area is classified as arid-continental and is characterized by cool, dry winters and warm, dry summers. The area is rarely influenced by oceanic moisture due to its distance from the Pacific Ocean, resulting in a sunny climate with large variations between daytime and nighttime temperatures.[286]

Peak precipitation occurs in late summer and early fall, when moisture from the Gulf of Mexico moves into the region. Annual average precipitation in Shiprock, New Mexico, is 8.21 inches. June is typically the driest month with an average rainfall of 0.22 inch. August is typically the wettest month with an average

[284] SCAQMD 2007a, 2007b
[285] DOE 2008
[286] BLM 2003b

rainfall of 1.24 inches. In Shiprock, August is typically the warmest month with average high and low temperatures of 92.9 and 59.8 degrees Fahrenheit. January is typically the coldest month with average high and low temperatures of 46.4 and 19.1 degrees Fahrenheit.[287] Snowfall in Shiprock averaged 3.7 inches for the 1948–2007 period of record, with most of the snow falling in January.[288]

In Ignacio, Colorado, annual average precipitation is 14.72 inches, nearly double that of Shiprock. June is typically the driest month with an average rainfall of 0.48 inch. August is typically the wettest month with an average rainfall of 1.64 inches. July is typically the warmest month with average high and low temperatures of 89.9 and 50.3 degrees Fahrenheit. January is typically the coldest month with average high and low temperatures of 42.0 and 11.6 degrees Fahrenheit.[289] Snowfall in Ignacio averaged 36.1 inches for the 2001–2010 period of record, with most of the snow falling December through February.[290]

Prevailing wind direction in the region is generally from the southwest and west. Local wind conditions can vary substantially due to topographic channeling and mountain-valley circulations.

#### 3.18.3.2 Air Quality Standards

The federal Clean Air Act (42 USC §§ 7401−7642) established the principal framework for national, state, and local efforts to protect air quality in the US. Regulations and standards to implement the requirements of the federal Clean Air Act are set by the US Environmental Protection Agency (EPA). While the EPA retains authority for certain air quality rules, including most rules pertaining to emission standards for mobile sources, many requirements are delegated to states and, in some cases, to tribal governments. In New Mexico, the New Mexico Environment Department (NMED) is the delegated authority. In Colorado, the delegated agency is the Colorado Department of Public Health and

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[287] Western Regional Climate Center 2010a

[288] Western Regional Climate Center 2010b.

[289] Western Regional Climate Center 2010c

[290] Western Regional Climate Center 2010d

Environment (CDPHE). On SUIT lands, the Southern Ute tribal government is the delegated authority.

Under the Clean Air Act, the EPA has set time-averaged standards known as National Ambient Air Quality Standards (NAAQS) for six air pollutants considered to be key indicators of air quality: carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead, and two categories of particulate matter. The standards are two-tiered and may include primary and secondary standards. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Averaging periods vary by pollutant, based on potential health and welfare effects of each pollutant. States may set their own ambient air quality standards, but these standards must be at least as stringent as the national standards.

National, New Mexico, and Colorado air quality standards are shown on Exhibit 3-121, National, New Mexico, and Colorado Ambient Air Quality Standards. For actions in Colorado that occur on lands within the boundaries of the SUIT Reservation, national rather than Colorado standards would apply.

**Exhibit 3-121**
## National, New Mexico, and Colorado Ambient Air Quality Standards

| Pollutant | Averaging Time | National Standards | | New Mexico Standard | Colorado Standard |
|---|---|---|---|---|---|
| | | Primary | Secondary | | |
| Ozone | 8-hour | 0.075 ppm[a] | Same as primary | – | – |
| | 1-hour | – | – | – | 0.12 ppm |
| Carbon Monoxide | 8-hour | 9 ppm | – | 8.7 ppm | 9 ppm |
| | 1-hour | 35 ppm | – | 13.1 ppm | 35 ppm |
| Nitrogen Dioxide | Annual (arithmetic mean) | 0.053 ppm | Same as primary | 0.05 ppm | 0.053 ppm |
| | 24-hour | – | – | 0.10 ppm | – |
| | 1-hour | 100 ppb | – | – | – |

**Exhibit 3-121**

## National, New Mexico, and Colorado Ambient Air Quality Standards

| Pollutant | Averaging Time | National Standards | | New Mexico Standard | Colorado Standard |
|---|---|---|---|---|---|
| | | Primary | Secondary | | |
| Sulfur Dioxide | Annual (arithmetic mean) | – | – | 0.02 ppm | – |
| | 24-hour | – | – | 0.10 ppm | – |
| | 3-hour | – | 0.5 ppm | – | 700 μg/m$^3$ (0.267 ppm) |
| | 1-hour | 75 ppb[b] | – | – | – |
| $PM_{10}$ | 24-hour | 150 μg/m$^3$ | Same as primary | -- | 150 μg/m$^3$ |
| | Annual (arithmetic mean) | – | – | – | 50 μg/m$^3$ |
| $PM_{2.5}$ | Annual (arithmetic mean) | 15 μg/m$^3$ | Same as primary | -- | – |
| | 24-hour | 35 μg/m$^3$ | Same as primary | – | – |
| Lead[c] | Rolling 3-month average | 0.12 μg/m$^3$ | 0.15 μg/m$^3$ | – | – |
| | 1-month | – | – | – | 1.5 μg/m$^3$ |
| Total Suspended Particulates | Annual (geometric mean) | – | – | 60 μg/m$^3$ | – |
| | 30-day average | – | – | 90 μg/m$^3$ | – |
| | 7-day | – | – | 110 μg/m$^3$ | – |
| | 24-hour | – | – | 150 μg/m$^3$ | – |
| Hydrogen Sulfide | 1-hour | – | – | 0.010 ppm | – |
| Total reduced sulfur | 0.5 hour | – | – | 0.003 ppm | – |

*Source: EPA 2012a, New Mexico Commission of Public Records 2002, Colorado Revised Statutes 2012.*

[a] *Final rule signed March 12, 2008. The 1997 standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have obligations under that standard (anti-backsliding). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 12 ppm is less than or equal to 1. EPA is considering revising the 8-hour standard to 0.070 ppm; the 5-year review period of the ozone standard is set to be completed in 2013.The 0.075 ppm standard is the standard in place at the time this EIS was drafted.*

[b] *Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards (0.03 ppm and 0.14 ppm, respectively) were revoked in that same rulemaking. However, these standards remain in effect until 1 year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.*

[c] *Final rule signed October 15, 2008. The 1978 lead standard (1.5 μg/m3) remains in effect until 1 year after an area is designated for the 2008 standard, except in areas designate nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.*

Air quality standards have not been developed for specific hazardous air pollutants; rather, these pollutants are regulated under the National Emission Standards for hazardous air pollutants, which regulate emissions from specified emission units and source types.

### 3.18.3.3 Attainment Status

Based on measured ambient criteria for air pollutant concentrations, the EPA classifies areas of the US according to whether they meet the NAAQS. Areas that violate air quality standards are designated as nonattainment areas for the relevant criteria air pollutants. Areas that comply with air quality standards are designated as attainment areas for the relevant criteria air pollutants. Areas that have been redesignated from nonattainment to attainment are considered maintenance areas. Areas of uncertain status are generally designated as unclassifiable but are treated as attainment areas for regulatory purposes. The study area occurs in areas that are attainment or are unclassified for the NAAQS.

Section 176(c) of the Clean Air Act requires that federal actions conform to the appropriate state implementation plan. EPA has promulgated rules establishing conformity analysis procedures for transportation-related actions and for other general federal agency actions (40 CFR Parts 6, 51, and 93). The EPA general conformity rule requires preparation of a formal conformity determination document for federal agency actions that are undertaken, approved, or funded in federal nonattainment or maintenance areas when the total net change in direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. Because the study area is in attainment or unclassified for the NAAQS, the general conformity rule does not apply.

Prevention of Significant Deterioration (PSD) regulations prevent areas that are in attainment of the NAAQS from being polluted up to the level of the standards. The Clean Air Act directs EPA to place selected areas of the US into one of three classes: Classes I, II, or III. Class I areas include national parks and wilderness areas of a certain size that were in existence prior to 1977 or additional areas that have since been designated by federal regulation. Remaining areas in the US (outside nonattainment and maintenance areas) are designated as Class II areas. No Class III areas have been designated. PSD regulations place limits on the total increase in ambient pollution levels above established baseline levels for sulfur dioxide, nitrogen dioxide, and particulate matter greater than 10 microns in diameter that are allowed in these areas. The study area is in Class II area; Mesa Verde National Park is the only Class I area within 100 kilometers of the study area.

#### 3.18.3.4 Sources of Air Pollutants

The Four Corners region has seen increases in ozone, nitrogen oxides, and particulate matter. These increases are attributed to oil and gas operations, power plants, and general growth in the region.

#### 3.18.3.5 Ambient Air Quality

NMED, CDPHE, and SUIT operate air monitoring stations in San Juan County, New Mexico, and La Plata and Montezuma Counties, Colorado, respectively. Exhibit 3-122, Air Quality Monitoring Values in San Juan County, New Mexico, and Exhibit 3-123, Air Quality Monitoring Values in La Plata and Montezuma Counties, Colorado, summarize the last 3 years of monitoring data available from monitoring stations in these counties. As shown in these tables, ambient air concentrations of regulated pollutants are well below NAAQS except for ozone, which is approaching the standard.

Exhibit 3-122
**Air Quality Monitoring Values in San Juan County, New Mexico**

| Pollutant | Averaging Time | 2009 | 2010 | 2011 | 3-Year Average | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|---|
| **US Bureau of Reclamation (USBR) Shiprock Substation (Farmington)** | | | | | | | |
| Ozone | 8-hour | 0.059 ppm | 0.063 ppm | 0.068 ppm | 0.063 ppm | 0.075 ppm | 84 |
| Nitrogen Dioxide | 1-hour | 35 ppb | 40 ppb | 36 ppb | 37 ppb | 100 ppb | 37 |
| $PM_{10}$ | 24-hour BLK Ave | 84 µg/m$^3$ | 56 µg/m$^3$ | 61 µg/m$^3$ | 67 µg/m$^3$ | 150 µg/m$^3$ | 45 |
| Sulfur Dioxide | 1-hour | 25 ppb | 14 ppb | 20 ppb | 19.6 ppb | 75 ppb | 26 |
| | 24-hour BLK Ave | 3 ppb | 2 ppb | 3 ppb | 2.67 ppb | 140 ppb | 2 |
| **Dine College, GIS Lab (Shiprock)[1]** | | | | | | | |
| Ozone | 8-hour | – | 0.185 ppm | 0.063 ppm | – | 0.075 ppm | – |
| Nitrogen Dioxide | 1-hour | – | 32 ppb | 34 ppb | – | 100 ppb | – |
| Sulfur Dioxide | 1-hour | – | 163 ppb | 136 ppb | – | 75 ppb | – |
| | 24-hour BLK Ave | – | 13 ppb | 8 ppb | – | 140 ppb | – |

**Exhibit 3-122**

## Air Quality Monitoring Values in San Juan County, New Mexico

| Pollutant | Averaging Time | 2009 | 2010 | 2011 | 3-Year Average | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|---|
| **3400 Messina Drive, Farmington** | | | | | | | |
| $PM_{10}$ | 24-hour | 73 µg/m³ | 22 µg/m³ | 38 µg/m³ | 44.3 µg/m³ | 150 µg/m³ | 30 |
| $PM_{2.5}$ | 24-hour | – | 18 µg/m³ | 12 µg/m³ | – | 35 µg/m³ | – |
| **162 Highway 544, Bloomfield** | | | | | | | |
| Ozone | 8-hour | 0.052 ppm | 0.065 ppm | 0.066 ppm | 0.069 ppm | 0.075 ppm | 92 |
| Nitrogen Dioxide | 1-hour | 36 ppb | 41 ppb | 44 ppb | 40.3 ppb | 100 ppb | 40 |
| Sulfur Dioxide | 1-hour | 5 ppb | 6 ppb | 9 ppb | 6.7 ppb | 75 ppb | 9 |
| **423 Highway 539, Navajo Dam** | | | | | | | |
| Ozone | 8-hour | 0.061 ppm | 0.069 ppm | 0.074 ppm | 0.076 ppm | 0.075 ppm | 101 |
| Nitrogen Dioxide | 1-hour | 40 ppb | 37 ppb | 40 ppb | 39 ppb | 100 ppb | 39 |

*Source: EPA 2012b*

[1] *This monitor did not operate in 2009; therefore, 3 years of consecutive data are not available to calculate 3-year averages or percent of NAAQS.*

**Exhibit 3-123**

## Air Quality Monitoring Values in La Plata and Montezuma Counties, Colorado

| Pollutant | Averaging Time | 2009 | 2010 | 2011 | 3-Year Average | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|---|
| **County Road 517, Ignacio, La Plata County** | | | | | | | |
| Carbon Monoxide | 1-hour | 1.4 ppm | 1.2 ppm | 1.4 ppm | 1.3 ppm | 35 ppm | 4 |
| | 8-hour | 0.9 ppm | 0.7 ppm | 0.7 ppm | 0.76 ppm | 9 ppm | 9 |
| Ozone | 8-hour | 0.065 ppm | 0.068 ppm | 0.072 ppm | 0.068 ppm | 0.075 ppm | 91 |
| Nitrogen Dioxide | 1-hour | 47 ppb | 35 ppb | 33 ppb | 38.3 ppb | 100 ppb | 38 |
| $PM_{2.5}$ | 24-hour | 9 µg/m³ | 8 µg/m³ | 10 µg/m³ | 9 µg/m³ | 35 µg/m³ | 26 |
| **Weminuche Wilderness Area - Shamrock Station, La Plata County** | | | | | | | |
| Ozone | 8-hour | 0.071 ppm | 0.074 ppm | 0.077 ppm | 0.074 ppm | 0.075 ppm | 99 |
| Nitrogen Dioxide | 1-hour | 16 ppb | 16 ppb | 21 ppb | 17.7 ppb | 100 ppb | 18 |
| **7571 Hwy. 5505, La Plata County** | | | | | | | |
| Ozone | 8-hour | 0.067 ppm | 0.067 ppm | 0.069 ppm | 0.068 ppm | 0.075 ppm | 90 |
| Nitrogen Dioxide | 1-hour | 37 ppb | 39 ppb | 38 ppb | 38 ppb | 100 ppb | 38 |
| $PM_{2.5}$ | 24-hour | 12 µg/m³ | 11 µg/m³ | 12 µg/m³ | 11.3 µg/m³ | 35 µg/m³ | 32 |
| **Durango, La Plata County** | | | | | | | |
| $PM_{10}$ | 24-hour | 50 µg/m³ | 139 µg/m³ | 51 µg/m³ | 80 µg/m³ | 150 µg/m³ | 53 |

**Exhibit 3-123**

**Air Quality Monitoring Values in La Plata and Montezuma Counties, Colorado**

| Pollutant | Averaging Time | 2009 | 2010 | 2011 | 3-Year Average | NAAQS | Percent of NAAQS |
|---|---|---|---|---|---|---|---|
| **106 West North Street, Cortez, Montezuma County** | | | | | | | |
| Ozone | 8-hour | 0.064 ppm | 0.064 ppm | 0.071 ppm | 0.066 ppm | 0.075 ppm | 88 |
| $PM_{2.5}$ | 24-hour | 15 µg/m$^3$ | 13 µg/m$^3$ | 15 µg/m$^3$ | 14.3 µg/m$^3$ | 35 µg/m$^3$ | 41 |
| **Mesa Verde National Park, Montezuma County** | | | | | | | |
| Ozone | 8-hour | 0.069 ppm | 0.066 ppm | 0.07 ppm | 0.068 ppm | 0.075 ppm | 91 |

*Source: EPA 2012b*

### 3.18.3.6 Sensitive Receptors

Sensitive receptors are those populations that are more susceptible to the effects of air pollution than is the population at large. Sensitive receptors include long-term health care facilities, rehabilitation centers, convalescent centers, retirement homes, residences, schools, playgrounds, childcare centers, parks and recreations centers, and athletic facilities.

Sensitive receptors within the study area are limited due to the rural nature of the proposed routes. The proposed transmission line for the Preferred Alternative would be located within 500 feet of approximately four residences, and the Proposed Action would be located within 500 feet of six residences. The locations of these residences are discussed in the Noise and Vibration Sections 3.19.5, Preferred Alternative, and 3.19.6, Proposed Action.

### 3.18.3.7 Climate Change and Greenhouse Gases

Climate change refers to "any change in climate over time, whether due to natural variability or as a result of human activity"[291] Climate change refers not only to changes in temperature but also to changes in precipitation and wind patterns, among other meteorological changes.

Earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, carbon dioxide, methane, and nitrous oxide absorb and retain heat. Over time the amount of energy sent from the sun to the Earth's surface should be approximately the same as the amount of energy radiated back into space, leaving the

**What is climate change?**

The Intergovernmental Panel on Climate Change defines climate change as a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and persist for an extended period. These changes may occur naturally or may be a result of human activity.

[291] IPCC 2007

temperature of the Earth's surface roughly constant. Climate change is caused, in part, by the increase in greenhouse gases in the atmosphere beyond naturally occurring levels; increased levels of greenhouse gases trap more heat in the atmosphere rather than allowing it to escape back into space.

Climate models predict that if greenhouse gases continue to increase, the average temperature at the Earth's surface could increase from 3.2 to 7.2 degrees Fahrenheit above 1990 levels by the end of this century.[292] An increase in the average temperature of the Earth may produce changes in sea levels, rainfall patterns, and intensity and frequency of extreme weather events.

New Mexico has experienced an increase of roughly 2 degrees Fahrenheit in the cold season and 3 degrees Fahrenheit in the warm season since the 1960s. Models predict that the climate in New Mexico could warm as much as 5 degrees Fahrenheit in winter and 8 degrees Fahrenheit in summers by the end of the century.[293] Colorado has experienced an increase of 2 degrees Fahrenheit over the last three decades. Climate models for the state predict Colorado will warm by an additional 1.5 to 3.5 degrees Fahrenheit by 2025 and 2.5 to 5.5 degrees Fahrenheit by 2050.[294]

### Greenhouse Gas Emissions

New Mexico's gross greenhouse gas emissions in 2007 were 76.2 million metric tons carbon dioxide equivalents, or 1.06 percent of total US emissions. Electricity production (41 percent), the fossil fuel industry (22 percent), and transportation (20 percent) accounted for most of the greenhouse gas emissions.[295] No estimates of emissions by county are available.

Colorado's gross greenhouse gas emissions in 2005 were 116 million metric tons of carbon dioxide equivalents, or 1.6 percent of total US emissions. Electricity generation and transportation sector vehicle emissions are Colorado's principal greenhouse gas sources. The combustion of fossil fuels for electricity generation and

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[292] EPA 2011

[293] New Mexico Bureau of Geology and Mineral Resources 2007

[294] Climate and Energy Action Plan Steering Committee and Work Groups 2011

[295] NMED 2010

in the transportation sector accounted for 61 percent of state greenhouse gas emissions in 2005, while the use of fossil fuels (natural gas, oil products, and coal) in the residential, commercial, and industrial sectors constituted another 27 percent of total state emissions.[296] La Plata County estimated greenhouse gas emissions in 2005 at 5 million tons of carbon dioxide equivalents; 72 percent of the greenhouse gas emissions were associated with energy consumption (electrical generation, natural gas consumption, and stationary fuel use).[297]

No ambient air quality standards exist for greenhouse gases; however, under Section 202(a) of the Clean Air Act, the EPA has determined that greenhouse gases are air pollutants subject to regulation under the Clean Air Act. The most recent rules promulgated to regulate greenhouse gas emissions and the industries responsible are the Mandatory Reporting Rule (74 FR 56260) and the Tailoring (PSD) Rule (70 FR 31514).

### 3.18.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be constructed. No new air pollutant-emitting actions would occur, and there would be no direct or indirect air quality or climate change effects.

### 3.18.5 Preferred Alternative

#### 3.18.5.1 Permanent Effects

Maintenance of the SJBEC Project would result in much lower levels of pollutant emissions than construction of the proposed transmission line and associated infrastructure, since the SJBEC Project would not introduce new sources of stationary emissions to the study area.

[296] Center for Climate Strategies 2007

[297] La Plata County, Colorado 2008

Emissions from maintenance activities would be intermittent and temporary and would be associated with the following:

- Periodic air patrols by helicopter to inspect the transmission line for defects or problems (approximately every 5 years)
- Ground patrols by vehicles to inspect structural and conductor components (approximately once per year)
- Vehicle and equipment emissions associated with emergency repairs
- Maintenance of structures, conductors, overhead ground wires, shield wires, and associated hardware
- Vegetation clearing
- Access road maintenance
- Fugitive dust emissions from windborne dust and dust generated by vehicles travelling on unpaved surfaces

Operation of the transmission line and the substations would not result in criteria air pollutant, hazardous air pollutant, or greenhouse gas emissions. Because the transmission line would be used to carry load from existing generation sources, the Preferred Alternative would have no indirect effects on air quality. Greenhouse gas emissions would be associated with the activities described above that employ fuel burning equipment. While not quantified, these emissions would represent a small percentage of total greenhouse gas emissions in Colorado and New Mexico. While it is not possible to directly correlate greenhouse gas emissions from a project to specific local or regional effects on climate change, the Preferred Alternative would not be a locally, regionally, or nationally significant source of greenhouse gases.

#### 3.18.5.2 Temporary Effects

Construction activities would have a temporary direct effect to air quality during the duration of the 18- to 24-month construction period. Emissions, especially fugitive dust emissions, would be localized to the area surrounding any given construction activity.

Site grading and travel on paved and unpaved roadways would generate temporary and localized fugitive dust emissions. Exhaust from construction equipment, helicopters, tractor-trailers bringing in and moving equipment, and construction workers' personal vehicles would generate temporary criteria air pollutant and greenhouse gas emissions. Exhibit 3-124, Project-Related Construction Emissions, shows an estimate of construction emissions for development of the transmission line, substations, and access roads. Appendix J, Air Quality Emissions Tables, details the emission calculations used for each source category as well as the assumptions used in developing activity rates for vehicles and equipment. Emissions during construction would be minimized through the implementation of a fugitive dust control plan during construction identified in EPM 64, which would include measures identified in EPMs 65 to 70.

**Exhibit 3-124**
**Project-Related Construction Emissions**

| | VOC (tons) | NOx (tons) | CO (tons) | SOx (tons) | $PM_{10}$ (tons) | $PM_{2.5}$ (tons) | $CO_2$ (tons) |
|---|---|---|---|---|---|---|---|
| **Fugitive Dust Emissions** | | | | | | | |
| Paved road dust | -- | -- | -- | -- | 7.35 | 0.87 | -- |
| Unpaved road dust | -- | -- | -- | -- | 143.92 | 14.39 | -- |
| Grading | -- | -- | -- | -- | 10.50 | 1.05 | -- |
| **Vehicle Emissions** | | | | | | | |
| Personal vehicles, construction vehicles, tractor trailers | 1.07 | 5.24 | 8.20 | 0.02 | 0.32 | 0.21 | 1,840 |
| **Helicopter Emissions** | | | | | | | |
| Helicopters | 1.06 | 12.28 | 8.29 | 0.28 | 0.72 | 0.72 | 750 |
| **Nonroad Engine Emissions** | | | | | | | |
| Diesel construction equipment | 3.74 | 1.74 | 0.86 | 0.00 | 0.07 | 0.07 | 297 |

*CO = carbon monoxide*
*$CO_2$ = carbon dioxide*
*NOx = nitrogen oxide*
*$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter*
*$PM_{10}$ = particulate matter between 2.5 and 10 micrometers in diameter*
*SOx = sulfur oxide*
*VOC = volatile organic compounds*

In addition to the emissions shown on Exhibit 3-124, minor emissions of toxic air pollutants (diesel particulate matter, acetaldehyde, benzene, and formaldehyde) would occur during vehicle and equipment combustion processes and from minor solvent and coating use. $CO_2$ emissions, at over 2,800 tons, would represent a small fraction of total greenhouse gas emissions in

Colorado and New Mexico. While it is not possible to directly correlate greenhouse gas emissions from a project to specific local or regional effects on climate change, the Preferred Alternative would not be a locally, regionally, or nationally significant source of greenhouse gases.

No indirect effects from construction of the Preferred Alternative have been identified.

#### 3.18.5.3 Mitigation

No mitigation measures are proposed.

### 3.18.6 Proposed Action

#### 3.18.6.1 Permanent Effects

Permanent effects to air quality from the Proposed Action would be the same as discussed in Section 3.18.5.1, Permanent Effects, for the Preferred Alternative.

#### 3.18.6.2 Temporary Effects

Temporary effects to air quality from the Proposed Action would be the same as those discussed in Section 3.18.5.2, Temporary Effects, for the Preferred Alternative.

#### 3.18.6.3 Mitigation

No mitigation measures are proposed.

## 3.19 Noise and Vibration

### 3.19.1 Study Area

For consistency with industry best practices, the study area for the noise and vibration analysis was expanded to analyze potential effects to sensitive receptors within 500 feet from the edge of the general study area described in Section 3.2, Study Area. Accordingly, the total noise and vibration study area around the proposed transmission line is 1,250 feet, 1,150 feet around access roads (including access roads that do not require improvements), and 600 feet from proposed substations.

## 3.19.2 Methods

### 3.19.2.1 Noise

Permanent operational noise effects were evaluated by predicting the corona expected from the proposed transmission line using ENVIRO software and transmission line design information. These data, in addition to the elevation of the proposed transmission line, were used to calculate the audible corona noise using ENVIRO. The proposed transmission line was modeled with an elevation of 6,500 feet, which is equivalent to the highest elevation of the study area.

The noise effects analysis is based on the following:

- Noise is any unwanted sound as perceived by a receptor. The most common method for describing noise levels is the long-term equivalent A-weighted decibel (dBA).
- Noise attenuates (fades) by varying degrees depending on whether the source is a point or line. Sound travels outward in a cylindrical fashion when the source is a line and in a sphere when the source is a single point.
- Sound levels decrease by 3 dBA for every doubling in distance from a line source and 6 dBA for every doubling in distance from a point source.

**What is corona?**

The most common noise associated with transmission lines is corona, which is the result of imploding air molecules surrounding the line. Corona sound is heard as a crackling or hissing near a transmission line.

Temporary direct and indirect effects were determined by using mapping software to verify the distance of potential sensitive receptors from proposed project elements (including the transmission line, substations, and access roads). Then standard documented noise source level information was used to establish noise and vibration levels for various construction activities. Noise effects for sensitive receptors were calculated using noise attenuation rates as a function of distance.

The primary indicator of noise levels for this and similar analyses is the A-weighted average noise level measured in decibels (Leq). The one-hour average noise level (dBA $L_{eq}$ [1 hour]) is often used to characterize ongoing operations or longer-term effect analyses. The maximum dBA level (dBA $L_{max}$) is used to document the highest intensity temporary noise level.

#### 3.19.2.2 Vibration

The vibration effects analysis is based on the following:

- Vibration is the rapidly fluctuating movement of an object from a static point.
- Human annoyance from vibration sources is typically experienced in the form of groundborne vibration and noise, where vibration is expressed in terms of vibration decibels (VdB).
- The threshold of human perception for vibration is approximately 65 VdB.
- Repetitive vibration becomes annoying for most people at 75 VdB. A typical ambient vibration level in an urban area is 50 VdB or lower.
- Effects from vibration are usually short lived, such as during construction activities, and are influenced by variables such as distance, geology, and sensitivity and location of the receiver.[298]

The primary indicator of vibration levels for this analysis is the measurement of groundborne vibration velocity (V) using the decibel (dB) notation. Since no long-term vibration effects are anticipated, vibration effects were considered for temporary construction activities.

### 3.19.3 Affected Environment

#### 3.19.3.1 Noise

Sound is created by a change in pressure as it moves through the air. Decibel (dB) is the unit of measurement for sound pressure levels.[299] The most common method for describing noise levels is the long-term equivalent A-weighted (dBA) sound level.

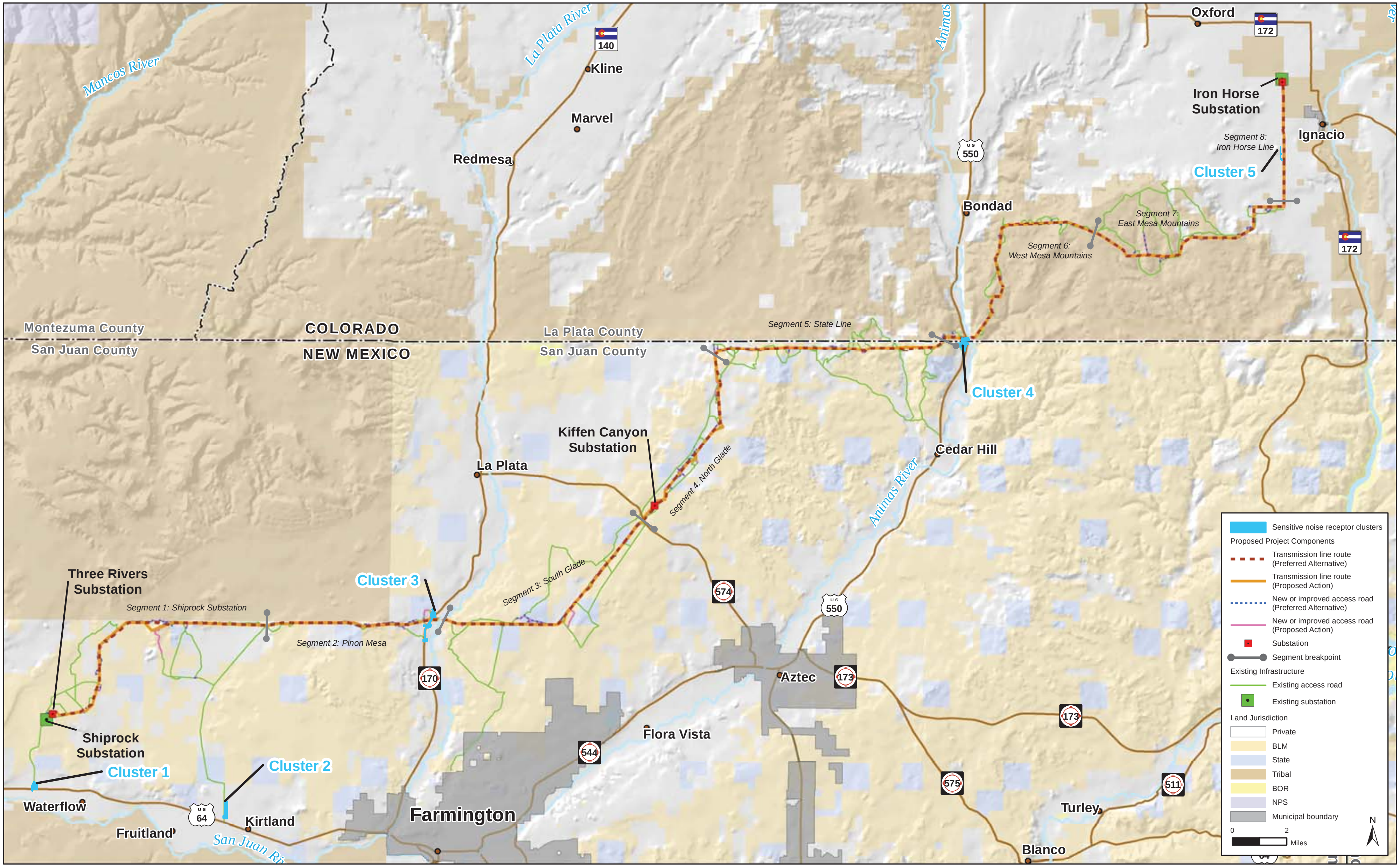
**Noise Fact**

Sound levels decrease by 3 dBA for every doubling in distance from a line source and 6 dBA for every doubling in distance from a point source.

Sensitive receptors include known residences, schools, churches, hospitals, libraries, camping areas, and parks. Any known cultural or sensitive wildlife area is also considered a sensitive noise receptor. Cultural resources and wildlife are discussed in Sections 3.17, Cultural Resources, and 3.16, Fish and Wildlife. Existing sensitive noise and vibration receptors in the study area are limited due to the rural nature of the study area. Exhibit 3-125,

[298] FTA 2006

[299] BLM 2008




Source: GIS BLM 2012, GIS BLM 2013, GIS Tri-State 2013

**Exhibit 3-125 Location of Sensitive Receptors**

Location of Sensitive Receptors, and Exhibit 3-126, Sensitive Receptors in the Noise Study Area by Noise Cluster, show the number and locations of sensitive noise receptors in the study area.

**Exhibit 3-126**

**Sensitive Receptors in the Noise Study Area by Noise Cluster**

| Sensitive Receptor Type | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 | Cluster 5 | Total |
|---|---|---|---|---|---|---|
| Residence | 7 | 65 | 6 | 1 | 3 | **82** |
| School | 0 | 0 | 0 | 0 | 0 | **0** |
| Church | 0 | 1 | 0 | 0 | 0 | **1** |
| Hospital | 0 | 0 | 0 | 0 | 0 | **0** |
| Library | 0 | 0 | 0 | 0 | 0 | **0** |
| Day Care Facility | 0 | 0 | 0 | 0 | 0 | **0** |
| Park | 0 | 0 | 0 | 0 | 0 | **0** |
| Camping Facility | 0 | 1 | 0 | 0 | 0 | **1** |
| Cultural Area[1] | 0 | 0 | 0 | 0 | 0 | **0** |
| Wildlife Area[1] | 0 | 0 | 0 | 0 | 0 | **0** |
| **Total** | **7** | **67** | **6** | **1** | **3** | **84** |

[1] *Known locations.*

As shown in Exhibit 3-125, 81 of the sensitive receptors in the study area are located along existing roadways in Clusters 1, 2, 3 and 4 that experience noise from traffic on the adjacent roadways. In Clusters 3, 4, and 5 there are existing transmission lines that produce corona noise. Existing sources of noise in the study area primarily include transportation routes, access roads, airports, and oil and gas maintenance activities and operations. In addition, existing transmission lines in the study area produce corona.

Topography and local weather conditions also contribute to the existing noise environment. Much of the study area is influenced by noise from adjacent oil and gas development. Where oil and gas operations do not influence the ambient noise environment, noise levels are more consistent with rural areas. Typical ambient noise levels in rural areas are 40 dBA during daytime hours and 30 dBA at night.[300]

[300] BLM 2008

The study area intersects three major transportation routes: NM 170 and NM 574 and US 550. A typical noise level for highways at a distance of 50 feet is 70 dBA.[301] Heavy truck traffic increases noise levels from highways by an additional 10 dBA. To the human ear, a 10 dBA increase in noise doubles the loudness.[302] Sound levels generally decrease by 6 dBA for every doubling of distance away from the noise source. US 550 is a four-lane roadway and serves as an arterial connection between Durango and the Farmington-Aztec metropolitan areas of northern New Mexico. US 550 produces the greatest sustained automobile and truck noise in the study area.

Other smaller roadways, particularly access roads for oil and gas operations, produce less frequent noise within the study area. Although infrequent and short-lived, noise events associated with heavy vehicle use on access roads can produce intense noise events. At 50 feet, heavy equipment noise levels can approach 80 dBA.[303] Traffic on all roadways is generally lighter during the nighttime hours. Other lower decibel ambient noises can become audible during the nighttime hours that would otherwise not be perceptible during the day.

Three airports are located within 10 miles of the study area. Farmington municipal airport in Farmington, New Mexico, is approximately 7.5 miles from the study area. Aztec Municipal Airport in Aztec, New Mexico, is approximately 5.5 miles from the study area. In Colorado, Durango La Plata County Airport is approximately 5 miles from the Iron Horse Substation. Durango La Plata County Airport is the largest airport in the Four Corners region and provides daily flights to Dallas, Denver, and Phoenix. Aircraft noise from operations to and from Dallas may influence the existing noise environment near the Iron Horse Substation.

Oil and gas operations located adjacent to the study area contribute to the existing noise environment. Standard noise sources from oil and gas operations include compressors and pumps. At 50 feet from an operating oil and gas drilling station, noise levels can

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[301] FHWA 2006

[302] BLM 2008

[303] FHWA 2006

approach 70 dBA, decreasing to 55 dBA at 200 feet, and 40 dBA at 1,000 feet. During construction, drilling, and maintenance activities, maximum cumulative noise levels from all equipment are 85 dBA at 50 feet, decreasing to 55 dBA at 1,500 feet from the pad. Construction and maintenance activity generally occurs between 7 a.m. and 7 p.m. and does not affect existing nighttime sound levels in the study area.[304]

Topography, vegetation, and weather patterns influence the dispersion and intensity of sound. Terrain within and adjacent to the study area is characterized by undulating upland areas and shallow valleys. Vertical relief typically acts to attenuate noise but can also reflect sound and create an echo effect. Valleys channel sound and maintain noise levels at greater distances from the noise source. The dry climate in the region supports mainly low-lying vegetation which helps to disperse noise.

Weather patterns contribute to ambient noise conditions and influence noise dispersion. Wind is the most frequent source of weather-related noise. During stronger wind events, the noise created by the wind can drown out other sounds. Where structures such as transmission lines and communication towers are present, wind often generates Aeolian noise which is the result of wind blowing through the structures. Aeolian noise levels fluctuate due to the combination of variables such as wind speed, direction, and structure type.

Wind also carries noise, especially when channeled by existing terrain. The macro- and micro-climate conditions that produce wind influence the direction, intensity, and duration of noise propagation from a given noise source. Winds within the region tend to prevail from the southwest and westerly directions during the daytime hours for much of the year.[305] Localized wind conditions, however, vary greatly due to topography and microclimate conditions.

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[304] La Plata County 2002

[305] BLM 2003a

### Corona Characteristics

Corona is caused by the electrical breakdown of the air in areas of high electric field gradient. The electric field of a high voltage transmission line can cause corona to occur at sharp edges or points on the surface of the conductors, insulators, and hardware of the line. Corona represents a conversion of electrical energy into audible noise; electromagnetic interference with radio and television signals; visible light; and heat. Similar to electric and magnetic fields, existing sources of corona are transmission lines that presently exist in the study area that were shown in Exhibit 3-6 and include:

- Western's 345 kV power line that travels along the proposed route for the SJBEC transmission line from the Shiprock Substation in Segment 1 up through the end of Segment 4 in the North Glade (segments are shown in Exhibit 3-3).
- 115 kV lines that travel along the proposed route part of Segments 1, 3, and all of Segment 4.
- The existing Iron Horse 115 kV line that is located in Segment 8.

The 115 kV lines and distribution lines located in the study area would likely not be a source of corona since the voltage level is low. There are 115 kV lines in parts of Segments 1, 3, all of Segment 4, and the existing Iron Horse line in Segment 8. At 345 kV, corona from Western's power line becomes noticeable.[306] Substations in the study area do not create noticeable corona. Noticeable corona associated with a substation comes from 345 kV and higher transmission lines entering or exiting the substation.

### 3.19.3.2 Vibration

Vibration is the rapidly fluctuating movement of an object from a static point. Vibration is typically experienced in the form of ground-borne vibration and noise, where vibration is expressed in terms of vibration decibels (VdB).

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[306] EPRI 2005

Impacts from vibration are usually short-lived, such as during construction activities, and are influenced by variables such as distance, geology, and sensitivity and location of the receiver. The typical vibration level in an urban area is 50VdB or lower. The threshold of human perception for vibration is approximately 65 VdB.[307]

Vibration sources in the study area include highways, access roads, and oil and gas development. Sustained vibration above the threshold of human perception is uncommon. Perceptible vibration is mainly associated with construction activities and heavy vehicle travel on uneven surfaces.

Truck travel on a paved highway generally results in a vibration level of 62 VdB, which is below the normal threshold of human perception. On uneven roads, truck traffic is capable of generating brief vibration events with levels slightly above human perception.[308]

Vibration levels associated with drilling and blasting can reach 100 VdB at a distance of 50 feet. Construction and maintenance activities at oil and gas well sites as well as on access roads create perceptible vibration within 50 feet of the source.

Variables such as distance, soil type, and geology greatly influence ground-based vibration levels. The type of receiver also contributes to the perceptibility of vibration. For example, a vibration event is more acute when observed in a structure such as a residence or school. The same event, when observed at a non-structural receptor location such as a campground or park, would be less perceptible.

### 3.19.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, effects from noise and vibration would not occur.

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[307] FTA 2006

[308] FTA 2006

### 3.19.5 Preferred Alternative

Of the 84 receptors in the study area, there are four known sensitive noise receptors in the noise study area located within 500 feet of the proposed transmission line for the Preferred Alternative as shown in Exhibit 3-127, Sensitive Receptors Adjacent to Transmission Line for the Preferred Alternative. The potential for corona noise was analyzed for these receptors and is discussed in the text below.

In addition, 81 of the 84 potential receptors in the study area are located along existing access roads where improvements are not proposed and possible effects would be limited to infrequent vehicle traffic during maintenance activities that would be similar to existing conditions on these existing roadways.

Exhibit 3-127
**Sensitive Receptors Adjacent to Transmission Line for the Preferred Alternative**

| Receptor Number and Cluster | Receptor Type | Segment | Location Description | Distance from Proposed Line[1] (feet) |
|---|---|---|---|---|
| Receptor One in Cluster 4 | Residence | 6 | US 550 line crossing | 200[2] |
| Receptor Two in Cluster 5 | Residence | 8 | South of Route 110 on tribal land | 200 |
| Receptor Three in Cluster 5 | Residence | 8 | North of Route 110 on tribal land | 500 |
| Receptor Four in Cluster 5 | Residence | 8 | North of Route 110 on tribal land | 600 |

[1] *Assumes a line location projected on the ground surface.*
[2] *Actual distance would be greater due to proposed line height over the Animas River canyon.*

#### 3.19.5.1 Permanent Effects

Corona noise levels were modeled for all eight segments in the study area. The results of this analysis are provided below.

**Segments 1 through 4**

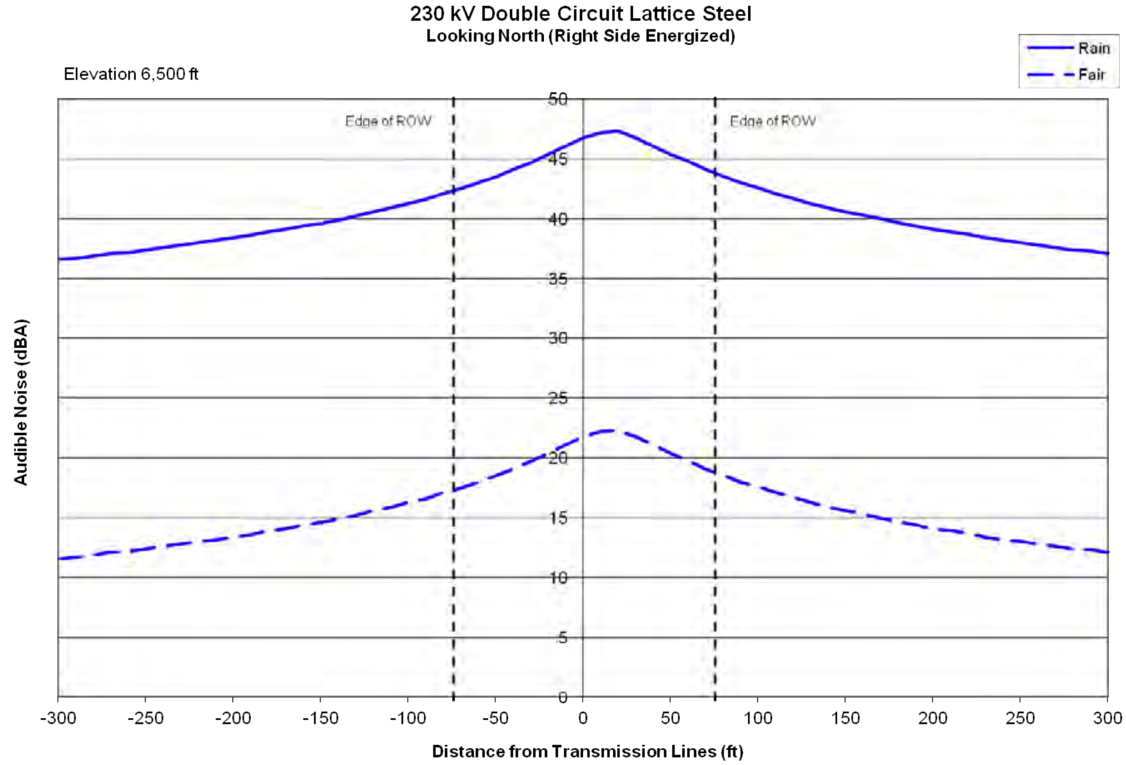
The values of the corona noise for the steel lattice structure configuration of Segments 1 to 4 are identical and are shown in Exhibit 3-128, Audible Corona Noise for Segments 1 to 4 – Steel Lattice Configuration. The exhibit shows results for two weather conditions, rain and fair, to demonstrate the range in corona effects due to changing weather.

**Corona Noise:**

- is caused by the electrical breakdown the air in areas of high electric field gradient
- is heard as a crackling or hissing sound near the line
- is associated with high voltage transmission lines
- increases with wet conditions and higher elevations

**Exhibit 3-128**

## Audible Corona Noise for Segments 1 to 4 – Steel Lattice Configuration




The results of the modeling in Exhibit 3-128 show that on both right-of-way edges the audible noise would be less than 20 dBA in fair weather and less than 45 dBA in wet weather. The maximum noise that occurs within the right-of-way would be 23 dBA in fair weather and 47 dBA in wet weather. Since the new line would only be strung on one side of the structure, maximum noise levels would be skewed slightly to that side. As shown in Exhibit 3-129, Typical Noise Levels, noise falling below 30 dBA is very quiet, similar to a soft whisper. Noise levels near 50 dBA are considered to be quiet and similar to the sound a refrigerator would make from a distance of about 3 feet.

**Exhibit 3-129**
## Typical Noise Levels

| Transportation Sources | Other Sources | | Description |
|---|---|---|---|
| Jet Takeoff (200 feet)<br>Car horn (3 feet) | | 120 dBA | *Maximum vocal effort* |
| | Pile Driver (50 feet) | 110 dBA | |
| | Shout (1/2 foot) | 100 dBA | *Very annoying* |
| Heavy truck (50 feet) | Jackhammer (50 feet)<br>Home shop tools (3 feet) | 90 dBA | *Loss of hearing with prolonged exposure* |
| Train on a structure (50 feet) | Backhoe (50 feet) | | |
| City Bus (50 feet) | Vacuum cleaner (3 feet)<br>Bulldozer (50 feet) | 80 dBA | *Annoying* |
| Train (50 feet) | Blender (3 feet) | | |
| City bus at stop (50 feet)<br>Freeway traffic (50 feet) | Lawn mower (50 feet)<br>Large office | 70 dBA | |
| Train in Station (50 feet) | Washing machine (3 feet) | | *Intrusive* |
| | Television (10 feet) | 60 dBA | |
| Light Traffic (50 feet) | Talking (10 feet) | | |
| Light traffic (100 feet) | | 50 dBA | *Quiet* |
| | Refrigerator (3 feet) | | |
| | Library | 40 dBA | |
| | Soft whisper (15 feet) | 30 dBA | *Very quiet* |

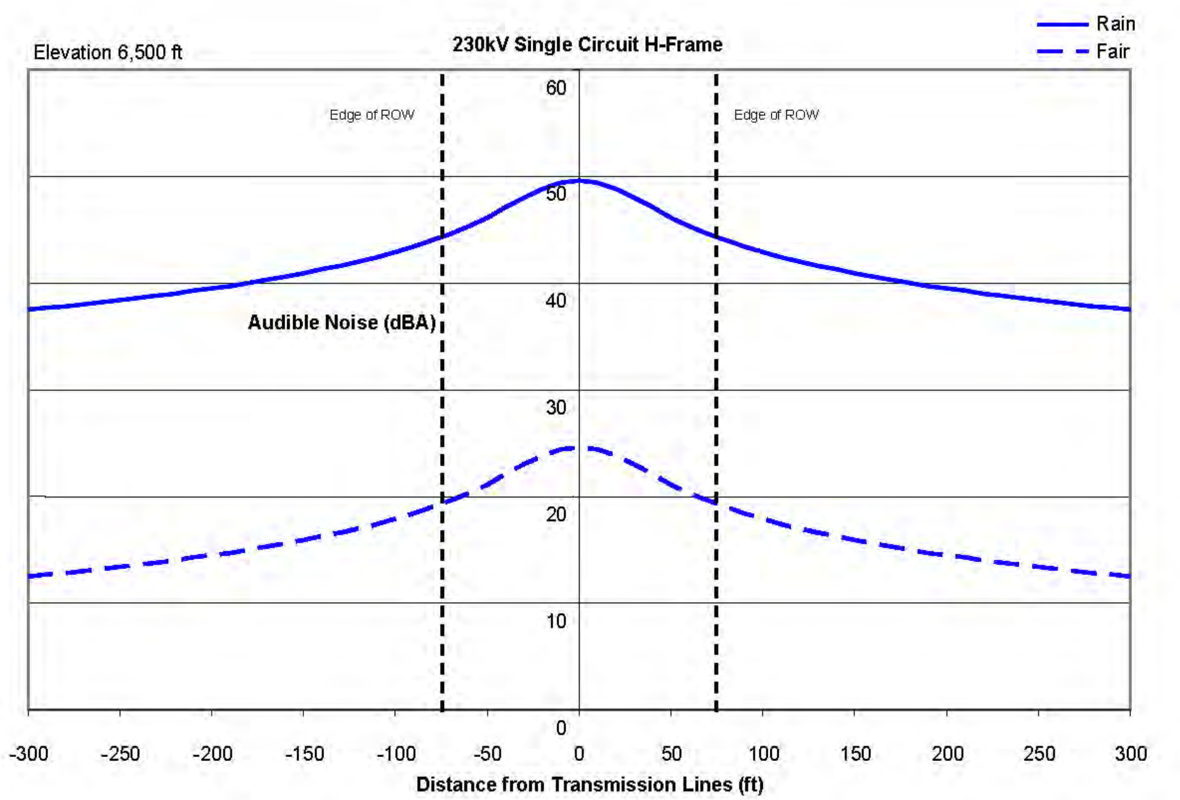
*Sources: FTA 2006; EPA 1971, 1974.*
*Note: dBA = A-weighted decibel*

There are no receptors within 500 feet of Segments 1 through 4. The nearest receptor, which is located in noise cluster 3 near Highway 170, is approximately 650 feet from the proposed line. Based on steel lattice construction, sensitive noise receptors beyond 500 feet would experience corona noise levels less than 40 dBA. A noise level of 40 dBA is considered to be quiet and similar to the noise someone would experience in a library. In dry conditions, corona noise would be less than 15 dBA, which is well below an audible level.

### Segments 5, 6, and 7

The 230 kV single-circuit line for Segments 5, 6, and 7 was modeled for corona audible noise with one structural configuration: wood H-frame structure. The corona audible noise plot for this segment with the wood H-frame structure is presented in Exhibit 3-130, Audible Corona Noise for Segment 5, 6, and 7 – Wood H-Frame Configuration. The exhibit shows results for two weather conditions: rain and fair.

**Exhibit 3-130**
## Audible Corona Noise for Segments 5, 6, and 7 – Wood H-Frame Configuration




The results of the audible corona noise modeling plotted in Exhibit 3-130 show that on both right-of-way edges, the audible noise would be approximately 19 dBA in fair weather and 44 dBA in wet weather. The maximum noise that occurs within the right-of-way would be 24.6 dBA in fair weather and 49.6 dBA in wet weather.

Receptor One is adjacent to Segment 6, near the point where the proposed line would cross US 550. The maximum noise level that would be experienced by Receptor One would be approximately 40 dBA in wet weather. In dry conditions, noise levels would be approximately 15 dBA, well below audible levels. No noise effects to Receptor One are anticipated because of the presence of other noise sources, such as US 550. Additionally, the line would span the Animas River canyon resulting in a line height greater than a typical pole-to-pole span. A greater distance above ground would further reduce noise effects to Receptor One.

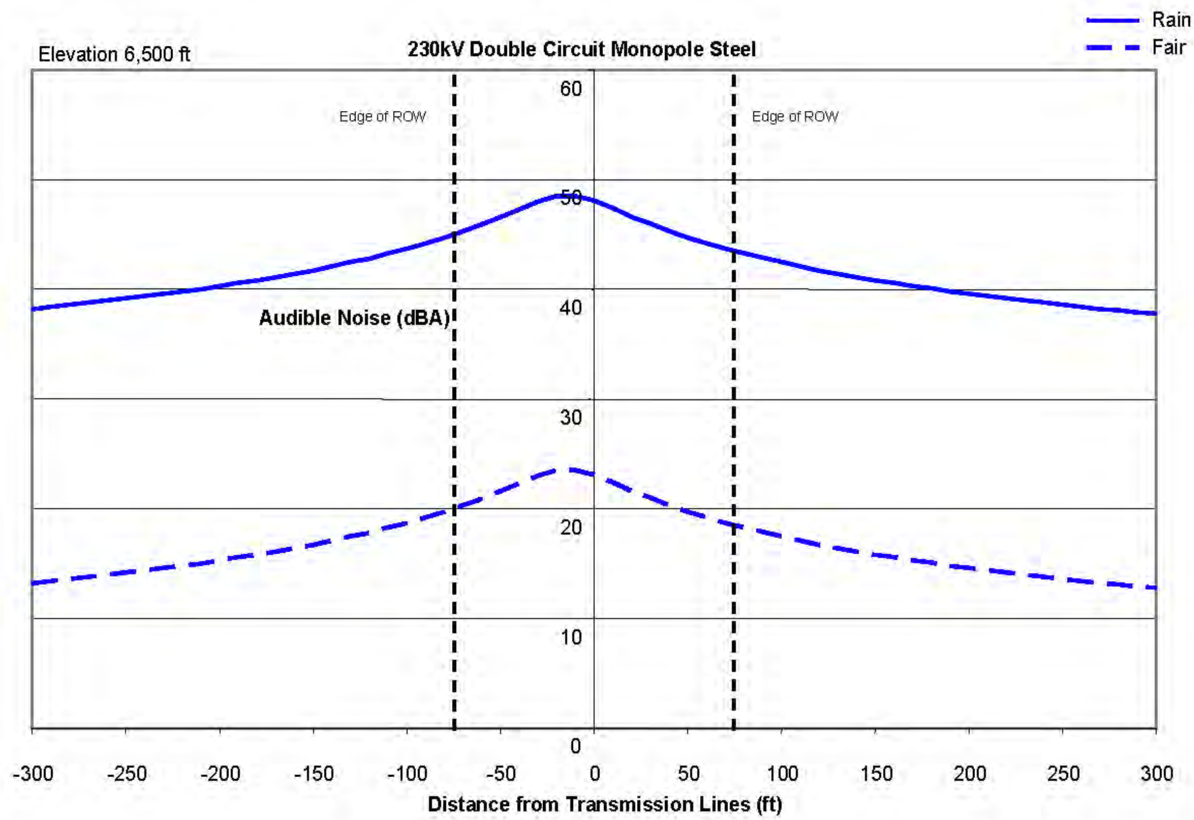
#### Segment 8

The 230 kV double-circuit line in Segment 8 was modeled for audible corona noise with a double-circuit, steel monopole configuration. The audible corona noise plot for this segment is presented in Exhibit 3-131, Audible Corona Noise for Segment 8 – Steel Monopole Configuration.

The results of the audible corona noise modeling plotted for Segment 8 show that on the left right-of-way edge, the audible noise would be approximately 20 dBA in fair weather and 45 dBA in wet weather. On the right right-of-way edge, the audible noise would be approximately 19 dBA in fair weather and 43 dBA in wet weather. The curves are shifted slightly to the left because the 230 kV circuit on the left side would produce slightly more corona noise than would the 115 kV circuit on the right. The maximum noise that occurs within the right-of-way would be 23.5 dBA in fair weather and 48.5 dBA in wet weather.

**Exhibit 3-131**

## Audible Corona Noise for Segment 8 – Steel Monopole Configuration




Receptors Two, Three, and Four are located to the west of the line in Segment 8. Based on the steel monopole configuration, Receptor Two, which is approximately 200 feet from the proposed line, would experience a maximum corona noise level of 40 dBA. In dry conditions, corona noise experienced at Receptor Two would be approximately 15 dBA, well below an audible level. Corona noise from the proposed line during precipitation could result in slightly higher noise levels at Receptor Two than would be the case under the No Action Alternative. Because typical ambient noise levels in rural environments are 40 dBA during the day and 30 dBA at night,[309] possible noise effects to Receptor Two would be confined to nighttime precipitation events.

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[309] BLM 2008

Receptor Three is approximately 500 feet from the proposed line and Receptor Four is 600 feet from the proposed line. The maximum noise level that would be experienced by these receptors, based on a steel monopole configuration, would be approximately 35 dBA. In dry conditions, noise levels from the line would be less than 10 dBA for both receptors. Corona noise from the proposed line during precipitation could result in slightly higher noise levels at Receptors Three and Four than would be the case under the No Action Alternative. Noise levels higher than typical ambient conditions, however, would only take place during nighttime precipitation events.

Due to the study area's arid climate, nighttime corona noise effects during precipitation events would be infrequent. Based on 60 years of climate data for Ignacio, Colorado, there are, on average, 78 days per year with measureable precipitation.[310] Assuming 50 percent of all precipitation events in a given year take place at night, corona noise may increase compared to existing conditions 39 nights per year on average, equivalent to approximately 11 percent of all nighttime hours in a given year. Even though ambient noise levels may increase when it rains, noise levels in the area would continue to be quiet, about 40 dBA, which is similar to the noise level in a library. Because receptors along Segment 8 are residences, occupants are likely to be indoors asleep, thus minimizing noise effects to those receptors.

### Aeolian Noise

Aeolian noise is a less common indirect noise-related effect from transmission line operation. Aeolian noise is a whistling sound made by the wind blowing through power line structures. Aeolian noise is difficult to predict due to the combination of variables (wind speed, direction, and structure type) necessary to generate Aeolian noise. Due to the infrequency of Aeolian events and presence of existing transmission lines capable of producing Aeolian noise, no new effects to sensitive receptors from Aeolian noise are anticipated.

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[310] Western Regional Climate Center 2012

### Maintenance

Maintenance of the Preferred Alternative would result in periodic noise from maintenance vehicles traveling along access roads. Noise effects from maintenance activities would primarily be in the form of intermittent truck traffic and occasional helicopter operation and would be similar to existing conditions for nearly all of the noise receptors in the study area are located along existing access roads that already experience vehicle traffic. At a distance of 50 feet, the noise level from a truck is approximately 75 dBA. Along access roads where the noise study area extends 500 feet beyond the edge of the 50-foot right-of-way, the noise level at the edge of the noise study area from a truck would be approximately 55 dBA.

Sensitive noise receptors with the potential to be affected by periodic traffic would be confined to the following locations (also see Exhibit 3-125, Location of Sensitive Receptors):

- Road 6893 near the intersection with US 64 in Waterflow, New Mexico
- Road 6500 between Road 6480 and US 64 in Kirtland, New Mexico
- NM 170 crossing (Segment 2)
- US 550 crossing (Segment 6)

Receptors in these locations include residences, a church, and an RV park. All locations are adjacent to a major highway and experience daily traffic under current conditions. Additionally, 44 noise receptors are located on Road 6500 between Road 6480 and US 64. This route provides existing access to the Kirtland Transfer Station and similar industrial uses. Road 6893 also provides access to industrial uses, including the existing Shiprock Substation Accordingly, maintenance work would not raise noise levels above current ambient levels in the four identified locations.

For the three receptors located in Cluster 5 along the existing Iron Horse transmission line, possible noise from periodic maintenance activities would be similar to existing conditions when maintenance activities occur for the Iron Horse Line.

Receptors Two, Three, and Four could experience an increase in noise during line maintenance. Noise effects from maintenance activity to these receptors would be infrequent and of a short duration.

As part of routine maintenance of the line, helicopters may be used to aerially inspect the line. Long-term noise effects from helicopter use for maintenance would be of a lower intensity than the temporary effects described for helicopter use during construction. Helicopter use for long-term maintenance would be periodic, short-term, and, outside of emergency repair needs, would occur only between 7 a.m. and 7 p.m. Helicopter use for long-term maintenance would result in no direct environmental effects.

No indirect effects to sensitive noise receptors are anticipated.

### Policy Evaluation

In Colorado, CRS 25-12-103 limits the level of noise allowed at 25 feet from a property line in certain land use areas as follows:

| Land Use Zone | 7:00 a.m. to 7:00 p.m. | 7:00 p.m. to 7:00 a.m. |
|---|---|---|
| Residential | 55 dBA | 50 dBA |
| Commercial | 60 dBA | 55 dBA |
| Light Industrial | 70 dBA | 65 dBA |
| Industrial | 80 dBA | 75 dBA |

*Source: CRS 25-12-103*

In addition, the Colorado Public Utilities Commission[311] has adopted an acceptable level of noise from the 345 kV Xcel Midway to Daniels Park transmission line as 55 dBA from the edge of the right-of-way. Because the Preferred Alternative would not create noise levels above 50 dBA at the edge of the right-of-way, it would be consistent with Colorado’s noise standards. In addition, as described in EPM 71 in Exhibit 2-23, Tri-State would design the transmission line to minimize possible effects from corona noise.

[311] PUC Docket Number 05A-072E

### Vibration

There would be no permanent direct or indirect effects from vibration due to operations or maintenance activities.

### 3.19.5.2 Temporary Effects

Construction of the transmission line, access roads, and substations would generate temporary noise effects. Construction activity along the transmission line route, use of access roads by construction equipment, and helicopter use would temporarily increase noise levels in the study area. See Exhibit 3-132, Noise Levels of Typical Construction Equipment.

**Exhibit 3-132**
**Noise Levels of Typical Construction Equipment**

| Noise Source | Noise Level at 50 feet (dBA) |
|---|---|
| Pile driver | 101 |
| Rock drill | 98 |
| Mobile crane | 83 |
| Bulldozer | 82 |
| Excavator | 81 |
| Concrete mixer truck | 79 |
| Backhoe | 78 |
| Dump truck | 76 |
| Welder torch | 74 |
| Flatbed truck | 74 |

*Source: FHA 2006*

### Access Roads

Along access roads, there would be noise effects from construction traffic accessing the proposed line location. Effects to noise receptors located near noise Clusters 1 and 2 are expected to be minimal since these receptors experience similar types of noise from the existing highway and access roads located there. At the La Plata River crossing near Cluster 3, the Animas River Crossing near Cluster 4, and Segment 8 near Cluster 5, sensitive noise receptors would experience noise from construction traffic driving at slow speeds (likely less than 25 miles per hour) within the proposed transmission line right-of-way. These effects would occur during typical working hours of 7 a.m. and 7 p.m. and would occur periodically during the days or weeks when crews are working in that specific area.

### Transmission Line Construction

Activities associated with transmission line construction, such as drilling holes for structure foundations, blasting (where needed), and using helicopters, are the types of construction activities that could be most bothersome to sensitive noise receptors located in Clusters 3, 4, and 5. These types of activities would take place during typical working hours (7 a.m. and 7 p.m.) and would occur occasionally in a given location over a period of days or weeks. Possible effects from blasting activities would be minimized by implementing a blasting plan as described in EPM 74 in Exhibit 2-23. Segment 8 would have the fewest construction noise effects because construction activity would be limited to stringing new line on existing poles.

Helicopter use would create periodic increases in noise levels between the fly yard and landing points along the proposed transmission line. The typical noise level for a helicopter during flyover is approximately 90 dBA. Helicopter noise levels can increase to 95 dBA or higher during takeoff and landing.[312]

### Vibration

Construction activities could introduce infrequent and short-duration vibration effects to sensitive receptors. Vibration sources would primarily include heavy construction equipment, truck traffic, and excavation for structure foundations, which may include blasting. Exhibit 3-133, Vibration Levels of Typical Construction Equipment, identifies vibration sources and the typical level of human perceptibility.

[312] FAA 2001

**Exhibit 3-133**
**Vibration Levels of Typical Construction Equipment**

| Vibration Source | Vibration Level at 50 ft |
|---|---|
| Blasting Activity | 100 VdB |
| Bulldozer | 92 VdB |
| Truck (over uneven road) | 72 VdB |
| ***Typical Threshold of Human Perceptibility – 65 VdB*** | |
| Truck (normal road) | 62 VdB |
| Typical ambient vibration level | 50 VdB |

*Source: FTA 2006*

Repetitive vibration becomes annoying to most receptors at 75 VdB, while infrequent short duration vibration, even at 85 VdB and higher, is tolerable.[313] Vibration effects associated with the Preferred Alterantive would only occur directly adjacent to transmission line structure sites, staging areas, substations, and proposed new or expanded access roads. Any increase over existing levels would be minimal and likely imperceptible to sensitive receptors, which are located several hundred feet from the proposed construction areas.

#### 3.19.5.3 Mitigation

No mitigation measures are proposed.

### 3.19.6 Proposed Action

#### 3.19.6.1 Permanent Effects

Permanent noise effects from the Proposed Action would be similar to those discussed for the Preferred Alternative. The only difference is that the Proposed Action could affect a total of six receptors as compared to four for the Preferred Alternative. As shown in Exhibit 3-134, Sensitive Receptors Adjacent to Transmission Line for the Proposed Action, there are six known sensitive noise receptors located within 500 feet of improvements proposed for the Proposed Action.

[313] FTA 2006

**Exhibit 3-134**
**Sensitive Receptors Adjacent to Transmission Line for the Proposed Action**

| Receptor Number and Cluster | Receptor Type | Segment | Location Description | Distance from Proposed Line[1] (feet) |
|---|---|---|---|---|
| Receptor One in Cluster 3 | Residence | 2 | NM170 line crossing | 500 |
| Receptor Two in Cluster 3 | Residence | 2 | NM 170 line crossing | 400 |
| Receptor Three in Cluster 4 | Residence | 6 | US 550 line crossing | 200[2] |
| Receptor Four in Cluster 5 | Residence | 8 | South of Route 110 on tribal land | 200 |
| Receptor Five in Cluster 5 | Residence | 8 | North of Route 110 on tribal land | 500 |
| Receptor Six in Cluster 5 | Residence | 8 | North of Route 110 on tribal land | 600 |

[1] *Assumes a line location projected on the ground surface.*
[2] *Actual distance would be greater due to proposed line height over the Animas River canyon.*

Permanent effects to the four receptors located in Colorado in Segments 6 and 8 would be the same as discussed for the Preferred Alternative. In New Mexico, Receptor One is located within 500 feet of the proposed transmission line and Receptor Two is located 400 feet from the proposed transmission line. These sensitive noise receptors would experience corona noise levels less than 40 dBA as shown previously in Exhibit 3-128, Audible Corona Noise for Segments 1 to 4 – Steel Lattice Configuration. A noise level of 40 dBA is considered to be quiet and similar to the noise someone would experience in a library. In dry conditions, corona noise would be less than 15 dBA, which is well below an audible level.

### 3.19.6.2 Temporary Effects

Temporary noise and vibration effects from the Proposed Action would be the same as described for the Preferred Alternative.

### 3.19.6.3 Mitigation

No mitigation measures are proposed.

# 3.20 Electric and Magnetic Fields

Electric transmission lines produce electric and magnetic fields when they are in operation. These fields are caused by transmission line operation and can be evaluated separately.

## 3.20.1 Relevant Regulations and Guidelines

Exposure limits have not been adopted for electric and magnetic fields that the public can be exposed to from electric transmission lines operating in either Colorado or New Mexico. Guidelines have been adopted, however, for the protection of human health. Those guidelines are discussed below.

### 3.20.1.1 Electric Fields

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) guideline for general public exposure to 60 Hz electric fields is 4.2 kilovolts per meter (kV/m).[314] The ICNIRP electric field guideline for occupational exposure is 8.3 kV/m.[315] The Institute for Electrical and Electronics Engineers (IEEE) guidance for occupational exposure is 20 kV/m and for members of the public is 5 kV/m.[316] The American Conference of Governmental Industrial Hygienists (ACGIH) guideline for the exposure of workers to transmission line electric fields is 25 kV/m.[317]

### 3.20.1.2 Magnetic Fields

ICNIRP guidance for exposure of members of the general public to 60 Hz magnetic fields is 833 milligauss (mG).[318] The IEEE guideline for typical human exposure is 9,040 mG.[319] The ACGIH guideline for the exposure of workers to transmission line magnetic fields is 10,000 mG.[320]

**What is an electric field?**

An electric field is the magnitude and direction of the electrical force on a charged particle, due to the presence of other charged particles.

**Electric and Magnetic Fields Study Area**

The study area for electric and magnetic fields is the same as the general study area described in Section 3.2, Study Area.

[314] ICNIRP 1998
[315] ICNIRP 1998
[316] IEEE 2002
[317] ACGIH 2001
[318] ICNIRP 1998
[319] IEEE 2002
[320] ACGIH 2001

### 3.20.2 Methods

The SJBEC Project transmission lines' electric and magnetic fields were modeled using EMFWorkstation ENVIRO module,[321] a Windows-based model developed by the Electric Power Research Institute. It predicts the electric and magnetic fields produced by linear transmission lines. The SJBEC Project substations were not modeled for their resulting electric and magnetic fields because the levels produced within a substation are not detectable beyond the fence line. The area within the substation fence would only be accessible to utility workers and would not be accessible to the public.

Modeling with ENVIRO required detailed information on the proposed design of the line, including projected electric power flows, operating voltage, the configuration of the transmission line support structures, conductor size and type, the height and horizontal location of each conductor, conductor sag, and conductor phasing. The model produced lateral profiles of the electric and magnetic fields out to 250 feet on each side of the centerline of the right-of-way. The profiles are presented in the effects analysis below. The profiles were calculated at mid-span where the lowest phase conductor is closest to the ground, the minimum ground clearance allowed by the National Electrical Safety Code, which coincides with the lowest point of conductor sag. This approach provided conservative estimates of expected magnetic and electric fields. The calculations were computed at a height of 1 meter (3.3 feet) above the ground. The results are within a few percent of the true value for the conditions modeled.

Estimated electric and magnetic fields for the proposed transmission line were compared to established exposure guidelines, which were used as an indicator of effects.

[321] Version 3.52

## 3.20.3 Affected Environment

### 3.20.3.1 Electric Fields

Electric fields are caused by voltage of an object relative to ground. The electric field or voltage gradient is expressed in units of volts per meter (v/m) or kilovolts per meter (kV/m).

Existing sources of electric fields in the study area include the transmission lines, substations, and local distribution power lines. Specific sources of electric fields in the study area include:

- Existing substations located at Shiprock, the City of Farmington Substation located near the proposed Kiffen Canyon Substation, and Iron Horse.
- The Western Area Power Administration's (Western) 345 kV power line that travels along the proposed route for the SJBEC transmission line from the Shiprock Substation in Segment 1 up through the end of Segment 4 in the North Glade (segments are shown in Exhibit 3-3, existing transmission lines are mapped in Exhibit 3-5).
- 115 kV lines that travel along the proposed route from in parts of Segments 1, 3, and all of Segment 4.
- The existing Iron Horse 115 kV line that is located in Segment 8.
- There are distribution lines in the study area; however, distribution lines are of very low voltage, and thus create very low electric fields and do not contribute to the baseline in the study area.

Electric fields from substations typically drop off at the substation fence line. Electric fields from transmission lines typically drop off at the edge of their respective right-of-way. The distribution lines are of very low voltage, and thus create very low electric fields.

### 3.20.3.2 Magnetic Fields

Magnetic fields are produced when an electrical current is flowing through a conductor. The most commonly used magnetic field intensity unit of measure is the gauss. For convenience in reporting magnetic field magnitude, the unit of milligauss (mG) is used, which is one thousandth of a Gauss. Similar to electric fields, magnetic field strength decreases with distance from the transmission line. Magnetic fields from transmission lines reduce at a rate of about one divided by the distance squared ($1/d^2$). Unlike static electric fields, magnetic fields are not constant over time because the electrical current on any transmission line changes in response to increased and decreased electrical load.

Existing sources of magnetic fields are transmission lines, substations, and local distribution power lines in the study area. Specific sources of magnetic fields in the study area include:

- Existing substations located at Shiprock, the City of Farmington Substation located near the proposed Kiffen Canyon Substation, and Iron Horse.
- Western’s 345 kV power line that travels along the proposed route for the SJBEC transmission line from the Shiprock Substation in Segment 1 up through the end of Segment 4 in the North Glade (segments are shown in Exhibit 3-3, existing transmission lines are mapped in Exhibit 3-5).
- 115 kV lines that travel along the proposed route in part of Segments 1, 3, and all of Segment 4.
- The existing Iron Horse 115 kV line that is located in Segment 8.
- There are distribution lines in the study area; however, distribution lines produce low magnetic fields.

Magnetic fields from substations typically drop off at the substation fence line. Magnetic fields from transmission lines typically drop off at the edge of their respective right-of-way. Distribution lines typically produce low magnetic fields.

### 3.20.4 No Action Alternative

With the No Action Alternative, the proposed SJBEC Project would not be developed; therefore, effects from electric and magnetic fields would not occur with this alternative.

## 3.20.5 Preferred Alternative

### 3.20.5.1 Electric Fields

#### Permanent Effects

The electric fields produced from transmission lines and substations proposed with the Preferred Alternative would be produced when the facilities are in operation. Electric fields are caused by voltage of an object relative to ground. The electric field or voltage gradient is expressed in units of volts per meter (V/m) or kilovolts per meter (kV/m). The unperturbed electric field at a height of 1 meter (3.3 feet) is used to describe the electric field near transmission lines. Electric fields for transmission lines remain nearly constant over time because line voltages are kept within about ± 5 percent of the rated voltage. Electric fields from transmission lines decrease with distance from the outermost conductor, typically at a rate of approximately one divided by the distance squared ($1/d^2$). For example, if the electric field is 10 kV/m at a distance of 1.0 m, the electric field would be approximately 2.5 kV/m at 2.0 m away and 0.63 kV/m at 4.0 m away. Electric fields from transmission lines are also typically reduced substantially by surrounding structures and nearby trees and shrubbery.

**What is an electric field?**

An electric field is the magnitude and direction of the electric force on a charged particle, due to the presence of other charged particles.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines for exposure of members of the general public to a 60 Hz electric field is 4.2 kV/m. The ICNIRP electric field guideline for occupational exposure is 8.3 kV/m.[322] The Institute for Electrical and Electronics Engineers (IEEE) guidelines for occupational exposure is 20 kV/m, and for members of the public, 5 kV/m.[323] The American Conference of Governmental Industrial Hygienists (ACGIH) has adopted guidelines for the exposure of workers to electric and magnetic fields from transmission lines: 25 kV/m.[324]

Electric and magnetic fields have been extensively studied as a possible risk factor for adverse health effects in humans. Despite extensive study with well over 10,000 studies being conducted

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[322] ICNIRP 1998

[323] IEEE 2002

[324] ACGIH 2001

around the world, no definitive link has been established between exposure to electric or magnetic fields from electric power lines and any adverse human health effect.

The scientific literature contains some information on power lines and livestock health. Similar to the human health studies, no mechanism has been demonstrated between the exposure of an animal to transmission line levels of electric and magnetic fields and a disease outcome. One noteworthy study was performed by a professor of veterinary medicine at Purdue University.[325] The study evaluated the effect of high voltage power lines on milk production, reproductive performance, and the general health of farm animals maintained under practical farm conditions. Doctors Amstutz and Miller compared horses, beef cattle, dairy cattle, sheep, and hogs on 12 different farms in central Indiana. Some of the farms were located near a 765 kV electric transmission line while other farms with similar herds were located away from the line. The conclusion of the study was that no apparent difference was seen between the animals located near the line and those located away from the line. The line in Indiana is over three times the voltage of the proposed SJBEC transmission line.

In addition, several studies have examined the potential effects to nesting birds from electromagnetic fields.[326] Most of these studies have been in a laboratory setting with fields far higher than will be produced by SJBEC Project. Field studies on wild birds are rare, and the results have been inconclusive. Similarly, studies on big game and other animals in the field have reached no firm consensus on effect.[327] Ground-dwelling small animals are largely shielded from effects of electric and magnetic fields, and larger animals, such as big game, generally spend only very limited time exposed to electric and magnetic fields. No adverse effects are expected from electric and magnetic fields from the Preferred Alternative, as electric and magnetic field exposure will not exceed established thresholds or guidelines.

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[325] Amstutz and Miller 1980

[326] Fernie and Reynolds 2005

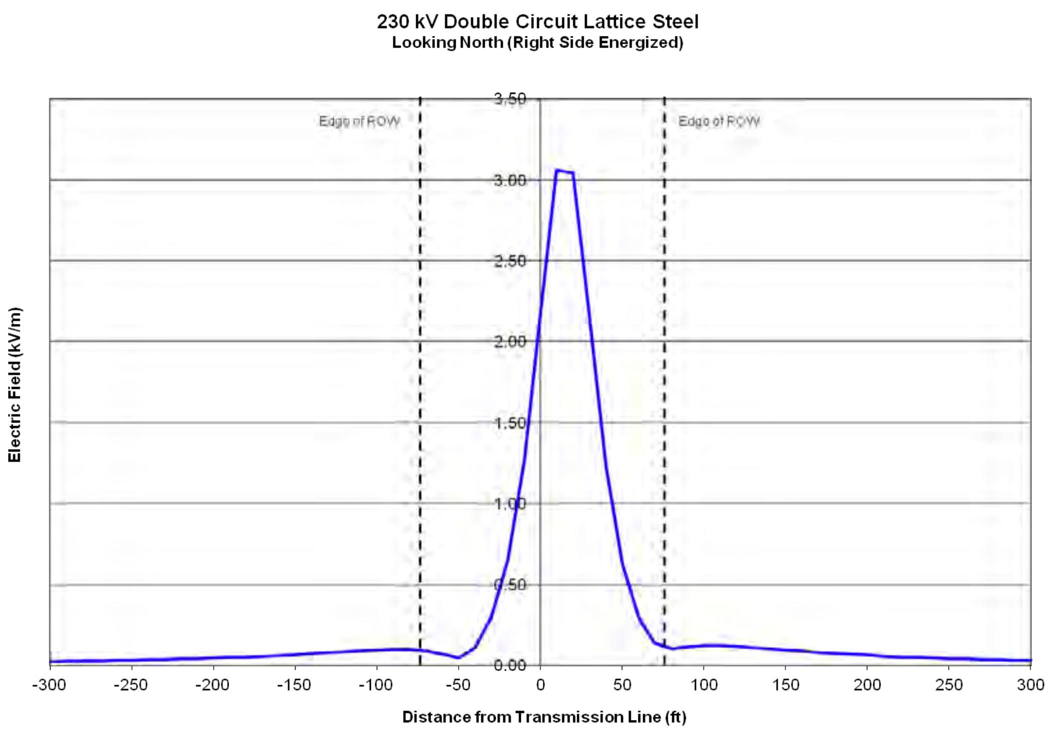
[327] Reimers et al. 2000

As shown in the exhibits below, the level of electric fields from transmission lines and from substations decreases dramatically with distance beyond the proposed right-of-way. All the electric field levels modeled from the proposed SJBEC transmission lines are well below electric field guidelines to protect human health. Therefore, the four sensitive receptors listed in Exhibit 3-127, Sensitive Receptors Adjacent to Transmission Line for the Preferred Alternative, of Section 3.19, Noise and Vibration, would be located in areas that would have very low electric fields that would not pose a human health risk.

The values of the electric field for the lattice steel configuration of Segments 1 through 4 are identical and shown in Exhibit 3-135, Electric Field for Segments 1 to 4 – Steel Lattice Configuration. The calculated electric field is 0.14 kV/m at the right edge of the right-of-way (looking north) and 0.1 kV/m at the left edge of the right-of-way. These values are well below established exposure limits of the ICNIRP general public exposure limit of 4.2 kV/m, the IEEE general public limit of 5 kV/m, and various established limits for occupational exposure.

**Exhibit 3-135**

## Electric Field for Segments 1 to 4 –Steel Lattice Configuration



The values of the electric field for the wood H-frame configuration of Segments 5, 6, and 7 are identical and shown in Exhibit 3-136, Electric Field for Segments 5, 6, and 7 – Wood H-Frame Configuration. The calculated electric field is 0.55 kV/m at the edge of the right-of-way. This value is well below established exposure limits of the ICNIRP general public exposure limit of 4.2 kV/m, the IEEE general public limit of 5 kV/m, and various established limits for occupational exposure.

**Exhibit 3-136**
## Electric Field for Segments 5, 6, and 7 – Wood H-Frame Configuration

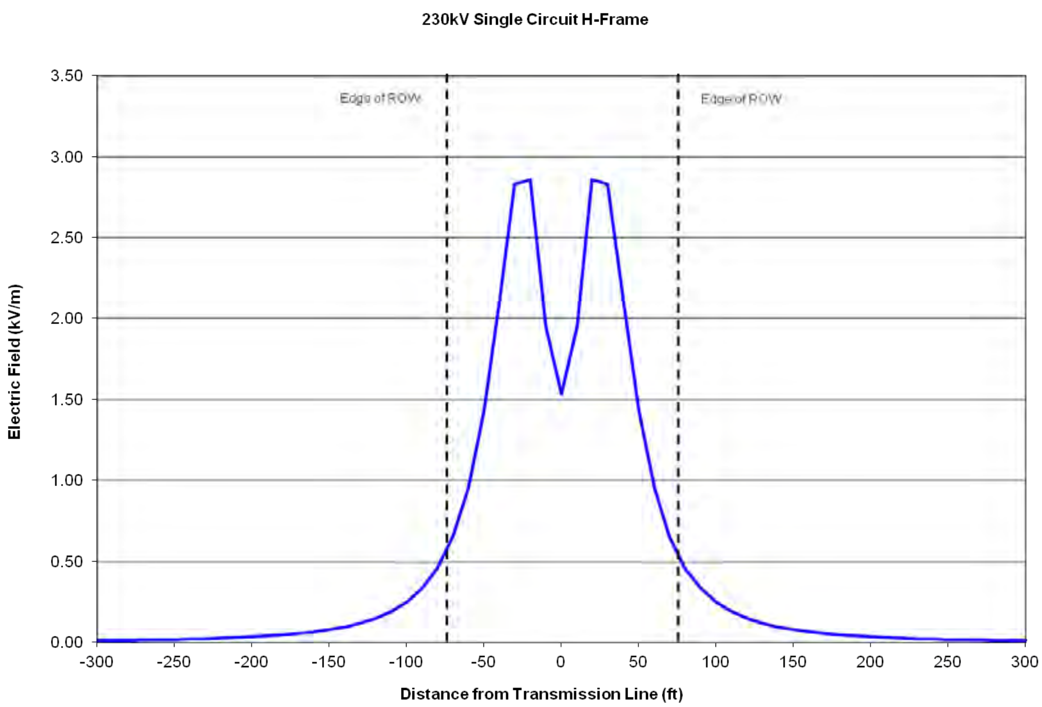
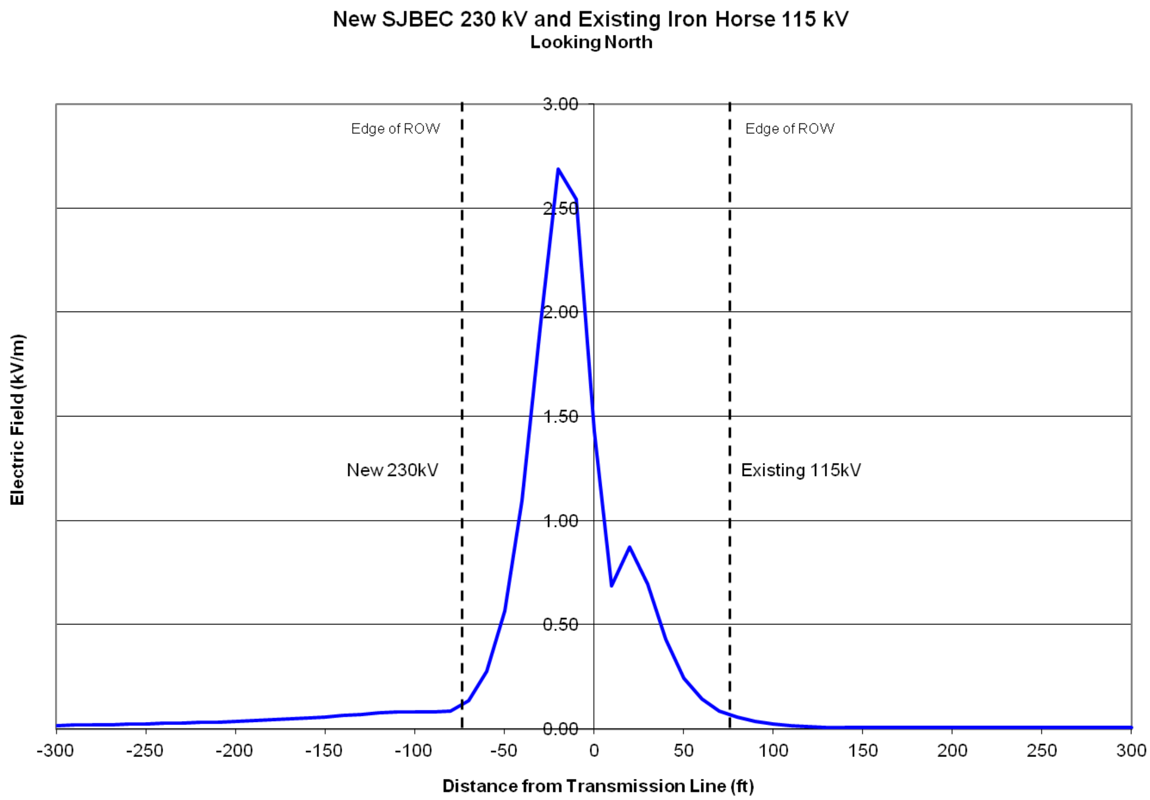



Exhibit 3-137, Electric Field for Segment 8 – Steel Monopole Configuration, shows the calculated value of the electric field for the steel monopole configuration of Segment 8, which is 0.07 kV/m at the edge of the right-of-way. These values are well below established exposure limits of the ICNIRP general public exposure limit of 4.2 kV/m, the IEEE general public limit of 5 kV/m, and various established limits for occupational exposure.

**Exhibit 3-137**

## Electric Field for Segment 8 – Steel Monopole Configuration




### Temporary Effects

The electric fields from the proposed transmission lines and substations would only be produced when the facilities are built and operating. Therefore, the SJBEC Project would not cause any temporary effects to electric fields during construction.

### 3.20.5.2 Magnetic Fields

### Permanent Effects

Magnetic fields are produced when an electric current is flowing through a conductor. The most commonly used magnetic field intensity unit of measure is the gauss. For convenience in reporting the magnitude of a magnetic field, the unit of milligauss (mG) is used, which is one thousandth of a gauss. Similar to electric fields, the strength of a magnetic field decreases with distance from the transmission line. Magnetic fields from transmission lines are reduced at a rate of about one divided by the distance squared ($1/d^2$). Unlike static electric fields, the magnetic fields are not

**What is a magnetic field?**

A magnetic field is a region of space near a magnet, electric current, or moving charged particle in which a magnetic force acts on any other magnet, electric current, or moving charged particle.

constant over time because the electric current on any transmission line changes in response to increasing and decreasing electric load on the power line.

Unlike electric fields, which are easily shielded by common conductive objects such as shrubbery, magnetic fields cannot easily be shielded. Most materials (such as those that make up buildings, trees, and the ground) do not effectively shield magnetic fields. Certain ferromagnetic materials (those containing iron, nickel, or cobalt) have properties that, when in the proper orientation and location, can shield magnetic fields. The ICNIRP guideline for typical human exposure to 60 Hz magnetic fields is 833 mG.[328] The IEEE guideline for typical human exposure is 9,040 mG.[329] The ACGIH has adopted guidelines for the exposure of workers to electric and magnetic fields from transmission lines as 10,000 mG.[330]

Similar to electric fields, the level of magnetic fields decreases dramatically with distance beyond the right-of-way of the proposed transmission line or substation fence line. All the magnetic field levels modeled for the transmission lines proposed for the SJBEC Project are well below established magnetic field guidelines and would not pose a human health risk. Therefore, the four sensitive receptors listed in Exhibit 3-127, Sensitive Receptors Adjacent to Transmission Line for the Preferred Alternative, of Section 3.19.5, would be located in areas associated with low magnetic field levels that would not pose a human health risk.

For the lattice steel configuration of Segments 1 through 4, the maximum calculated magnetic field within the right-of-way during typical initial peak loading conditions for the proposed line is approximately 98.5 mG as shown in Exhibit 3-138, Magnetic Fields for Segments 1 to 4 with Typical Initial Peak Loading – Steel Lattice Configuration. At the right-of-way edges under these initial peak conditions, the calculated magnetic field is approximately 17 mG on the left and 31 mG on the right. The actual level of magnetic field would vary with current loading, conductor temperature, and

[328] ICNIRP 1998

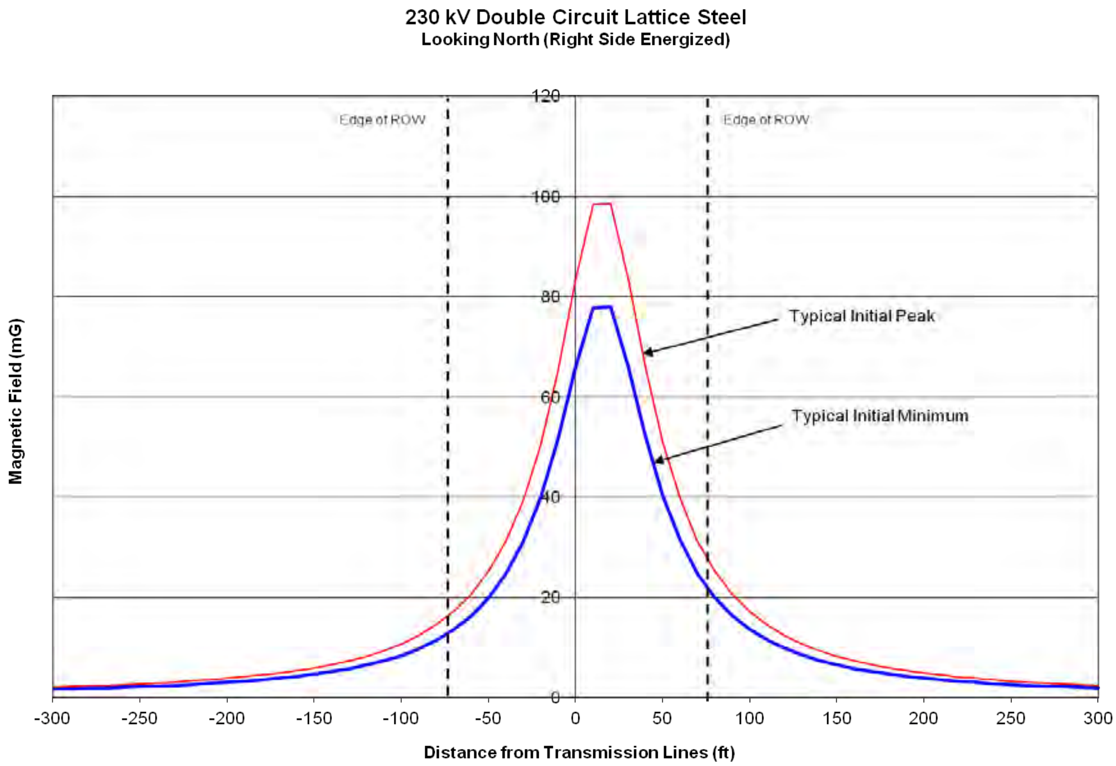
[329] IEEE 2002

[330] ACGIH 2001

ground clearance. These values are below the ICNIRP general public exposure limitation of 833 mG, the IEEE general public limit of 9,040 mG, and the ACGIH occupational exposure of 10,000 mG.

**Exhibit 3-138**

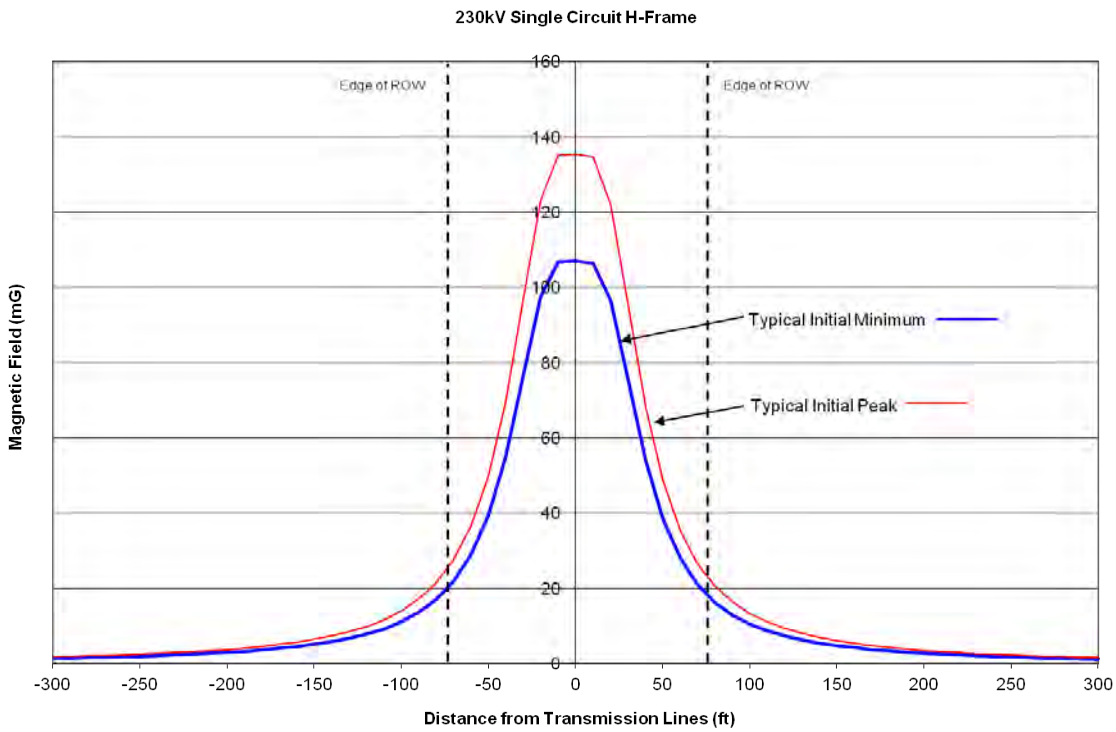
## Magnetic Fields for Segments 1 to 4 with Typical Initial Peak Loading – Steel Lattice Configuration




For the wood H-frame configuration of Segments 5, 6, and 7, the maximum calculated magnetic field within the right-of-way is 135.5 mG, and at the left and right edges of the right-of-way approximately 25 mG and 24 mG respectively as shown in Exhibit 3-139, Magnetic Fields for Segments, 5, 6, and 7 with Typical Initial Peak Loading – Wood H-Frame Configuration. These values are below the ICNIRP general public exposure limitation of 833 mG, the IEEE general public limit of 9,040 mG, and the ACGIH occupational exposure of 10,000 mG.

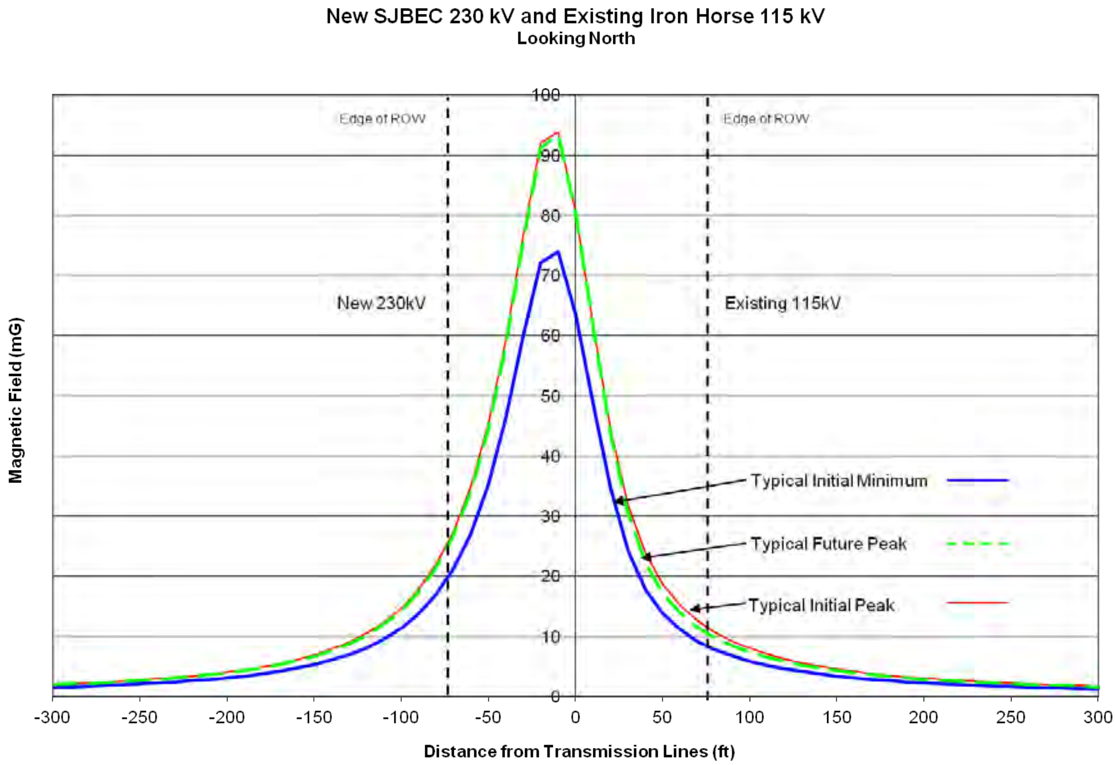
**Exhibit 3-139**

## Magnetic Fields for Segments, 5, 6, and 7 with Typical Initial Peak Loading – Wood H-Frame Configuration




For the steel monopole configuration of Segment 8, the maximum calculated magnetic field within the right-of-way during typical initial peak loading conditions for the proposed line is approximately 94.0 mG as shown in Exhibit 3-140, Magnetic Fields for Segment 8 with Typical Initial Peak Loading – Steel Monopole Configuration. At the right-of-way edges under these initial peak conditions, the calculated magnetic field is approximately 25 mG on the left and 12 mG on the right. The actual magnetic field would vary with current loading, conductor temperature, and ground clearance. With future peak loading conditions, the maximum calculated magnetic field is 93.5 mG, and 24 mG and 11 mG at the left and right edges of the right-of-way. These values are below the ICNIRP general public exposure limitation of 833 mG, the IEEE general public limit of 9,040 mG, and the ACGIH occupational exposure of 10,000 mG.

**Exhibit 3-140**
## Magnetic Fields for Segment 8 with Typical Initial Peak Loading – Steel Monopole Configuration




### Temporary Effects

Magnetic fields from the proposed transmission lines and substations would only be produced when the facilities are operating. Therefore, the SJBEC Project would not cause any temporary effects to magnetic fields during construction.

### 3.20.5.3 Mitigation

No mitigation measures are proposed.

## 3.20.6 Proposed Action

### 3.20.6.1 Permanent Effects

Potential electric and magnetic fields from the Proposed Action would be the same as modeled and described in Sections 3.20.5.1 and 3.20.5.2 for the Proposed Action. The only difference is there are six possible sensitive receptors for the Proposed Action, as compared to four for the Preferred Alternative as identified in Section 3.19, Noise and Vibration.

As shown in Section 3.20.5.1, the level of electric fields from transmission lines and from substations decreases dramatically with distance beyond the proposed right-of-way. All the electric field levels modeled from the proposed SJBEC Project transmission lines are well below electric field guidelines to protect human health. Therefore, the six sensitive receptors located near the proposed transmission line would be located in areas that would have very low electric fields that would not pose a human health risk.

Similar to electric fields, the level of magnetic fields decreases dramatically with distance beyond the right-of-way of the proposed transmission line or substation fence line. As shown in Section 3.20.5.2, all the magnetic field levels modeled for the transmission lines proposed for the SJBEC Project are well below established magnetic field guidelines and would not pose a human health risk. Therefore, the six sensitive receptors located near the proposed transmission line would be located in areas associated with low magnetic field levels that would not pose a human health risk.

#### 3.20.6.2 Temporary Effects

There would be no temporary effects from electric or magnetic fields, since electric and magnetic fields would only be produced once the transmission line is built and operating.

#### 3.20.6.3 Mitigation

No mitigation measures are proposed.

## 3.21 Hazardous Materials

### 3.21.1 Study Area

The study area for hazardous materials is the same as described in Section 3.2, only it was expanded to include existing access roads shown in Exhibit 3-3.

### 3.21.2 Methods

A regulatory databases search of properties was conducted in the study area to identify any documented hazardous waste sites. Thirty-four focus areas along different portions of the study area were used for the database search. The databases searched included more than 100 different federal, state, tribal, and Environmental Data Resources proprietary environmental databases for sites with documented use, storage, or release of hazardous materials or petroleum products. In addition, the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment's Environmental Records Search website database list was reviewed. Databases searched on the website were the same as those included in the EDR database search, so a separate request to search these databases was not made. A complete list of databases searched in the study area is provided in Appendix K, Hazardous Materials. A request was made to the SUIT for information regarding records of the following in the study area: hazardous materials; open dumps; landfills; underground storage tanks, leaking underground storage tanks; remediation sites or sites undergoing environmental clean-up; records of spills and mines or tailings piles. SUIT recommended that information from Environmental Data Resources be utilized.

Information obtained from the database searches was used to determine potentially hazardous sites that could be encountered during construction. The following indicators were considered in the analysis:

- Documented hazardous waste sites that could be affected during construction
- Possible effects that could occur due to spills or contact with hazardous materials

### 3.21.3 Affected Environment

Land use within the study area is a mix of agriculture, open space, and oil and gas production in the rural areas with some commercial use along access roads in urban areas. Agricultural operations, primarily in Segment 8 (Iron Horse) involve the use of petroleum fuels, pesticides, and fertilizers. Pesticides and fertilizers are applied directly to the soil, and potential releases of petroleum fuels can occur through spills and leaks from storage tanks. In addition, there is potential for release of hazardous materials from unregulated, private refuse dumps in remote areas.

**Hazardous Materials Study Area**

The study area for hazardous materials is the same as the general study area described in Section 3.2, Study Area.

Regulatory databases were consulted to identify potential hazarous materials sites in the study area. Potential sources include gasoline service stations and industries that use solvents or other hazardous materials. Residential land use can also result in the release of hazardous materials. The methodology used for the database search is provided in Section 3.21, Hazardous Materials. The database search identified historically contaminated properties; businesses that use, generate, or dispose of hazardous materials or petroleum products in their operations; and active contaminated sites that are currently under assessment and/or remediation. The databases searched included the Comprehensive Environmental Response Compensation and Liability Information System; Solid Waste; Uranium Mill Tailings Remedial Action; National Priorities List; Resource Conservation and Recovery Act Generators; Resource Conservation and Recovery Act Treatment, Storage and Disposal; and Voluntary Cleanup.[331]

No plotted sites were found in the databases search for Segments 2 through 8, and only two sites were listed for Segment 1. The sites found in Segment 1 are at the Kirtland Schools/Transportation Compound and the Central School Bus Barn. Both are located at 76 County Road 6500 in Kirtland, New Mexico. It is assumed that these are the same site, but have different titles in two different databases. The listings are summarized in Exhibit 3-141, Documented Hazardous Materials Sites in the Shiprock Substation Segment, and the location is shown in Exhibit 3-142, Segment 1 – Hazardous Materials. The sites are located along an existing access road where no improvements are proposed.

[331] EDR 2012

**Exhibit 3-141**

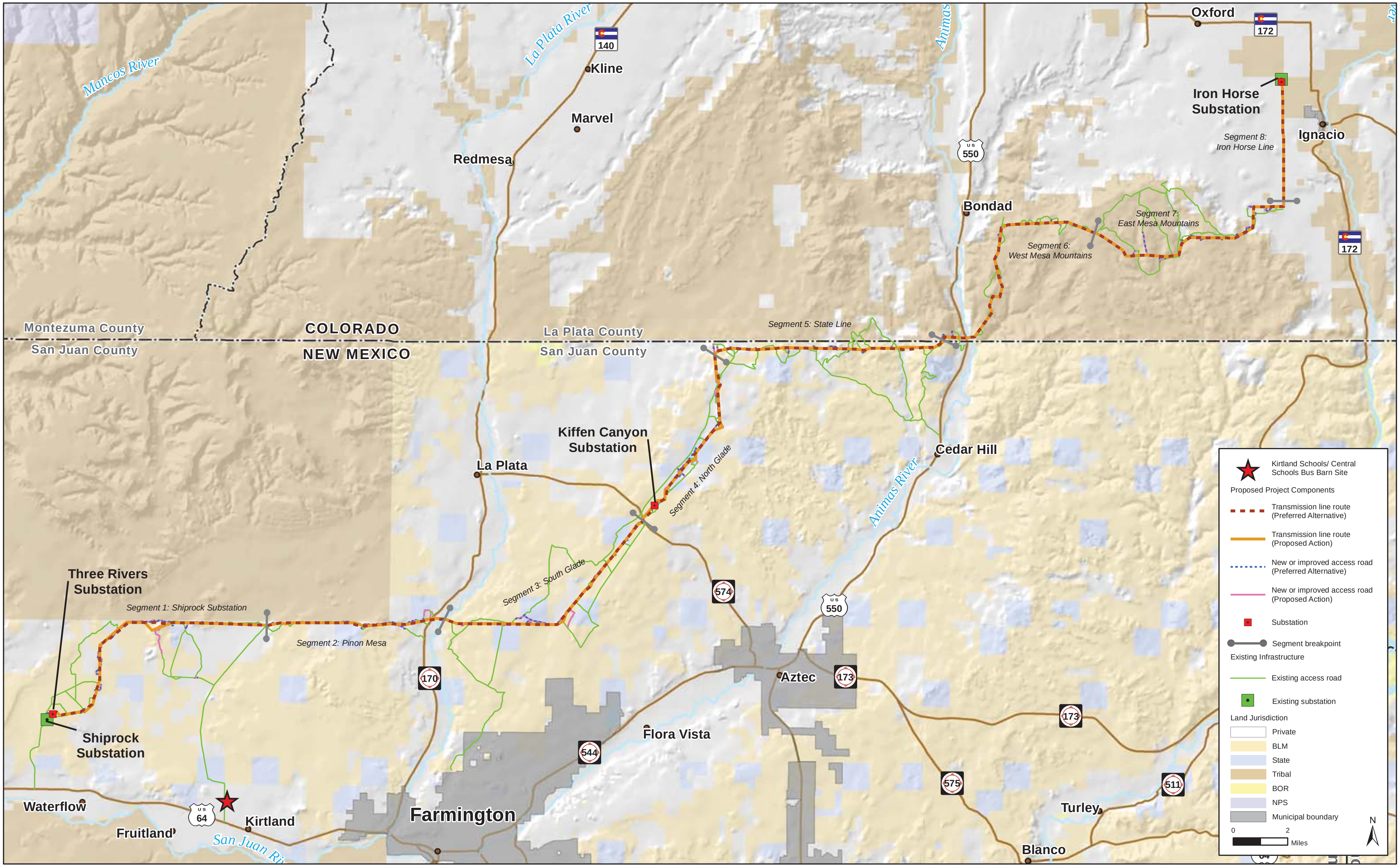
## Documented Hazardous Materials Sites in the Shiprock Substation Segment

| Site | Database | Summary of Findings |
|---|---|---|
| Kirtland Schools/ Transportation Compound 76 Rd 6500 Kirtland, NM 87417 | RCRA-CESQG (FEDERAL) | Resource Conservation and Recovery Act-Conditionally Exempt Small Quantity Generators (RCRA-CESQG) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month. The hazardous waste summary for site includes: chromium, lead, mercury, chloroform, 1,4-dichlorobenzene, various spent non-halogenated solvents and formaldehyde. Notice of Violation during compliance inspection on 3/11/2004; compliance achieved on 5/17/2004. No additional details. |
| | FINDS (FEDERAL) | Facility Index System (FINDS)/Facility Registry System contains both facility information and "pointers" to other sources that contain more detail. Registry ID 1100122599744. No additional information provided. |
| Central Schools Bus Barn 76 A County Rd 6500 Kirtland, NM 87417 | NM LUST (STATE) | Leaking Underground Storage Tank (LUST) Prioritization Database contains an inventory of reported LUST sites. Two releases were reported in March 1993 and April 1994, both with no further action required. |
| | NM LTANKS (STATE) | Leaking Storage Tank (LTANKS) Listing contains an inventory of reported leaking underground storage tank incidents. Two releases were reported in March 1993 and April 1994, both with no further action required. |
| | NM UST (STATE) | Registered Underground Storage Tanks (UST). Two tanks (10,000-gallon diesel and 10,000-gallon unleaded gasoline are reported in use. Three tanks (two 2,000-gallon gasoline unknown and one 500-gallon waste oil tank) are reported removed. |

Numerous orphan sites (unmapped due to poor or inadequate address information) were found throughout all of the study area segments. Leaking underground storage tanks, and brownfields that showed up on the orphan list were checked and an attempt was made to locate them. All sites checked were either closed (no further action required) or were not located in the study area.

### 3.21.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, hazardous sites would not be affected, and potential releases of hazardous materials during construction would not occur.




Source: GIS BLM 2012, GIS Tri-State 2013, GIS EDR 2012

**Exhibit 3-142 Segment 1- Hazardous Materials**

## 3.21.5 Preferred Alternative

### 3.21.5.1 Permanent Effects

During operation, direct effects from the Preferred Alternative could involve spills or minor releases of hazardous, non-hazardous, or potentially hazardous materials that may be used as part of maintaining the transmission line and its components (gasoline, diesel, etc.). These possible effects would be avoided or minimized through the implementation of EPMs 77 through 79 listed in Exhibit 2-23. As stated in EPM 77, a hazardous materials management plan would be developed, which would minimize effects from potential hazardous materials spills.

### 3.21.5.2 Temporary Effects

The Preferred Alternative is not expected to directly or indirectly affect known hazardous materials sites. One site was found during the database search. [332] This site is adjacent to an existing access road that would not require improvements. No suspected sites were observed during a field reconnaissance.

During construction, temporary direct effects from the Preferred Alternative could involve spills or minor releases of hazardous, non-hazardous, or potentially hazardous materials that may be used during construction (gasoline, diesel, etc.). Another temporary direct effect could occur if potentially hazardous materials were found during construction. Because of the historical oil and gas production in the vicinity of the study area, subsurface contamination could be found during construction. Possible risks of encountering contaminated materials during construction would be avoided or minimized by sampling soil if potentially contaminated soils are observed during pre-construction geotechnical investigations as described in EPM 9.

Indirect effects involving hazardous materials could entail transport and disposal of such materials to off-site locations, which could expose people and lands outside of the study area to hazardous materials. These possible effects would be avoided or

[332] During the database search, two sites were found to be listed at the same location (76 County Road 6500 in Kirtland, New Mexico). It is assumed that these are the same site, but have different titles in two different databases.

minimized through the implementation of EPMs 77 through 79 listed in Exhibit 2-23. As stated in EPM 77, a hazardous materials management plan would be developed, which would minimize effects from potential hazardous materials spills.

#### 3.21.5.3 Mitigation

No mitigation measures are proposed.

### 3.21.6 Proposed Action

#### 3.21.6.1 Permanent Effects

Permanent effects would be the same for the Proposed Action as described for the Preferred Alternative in Section 3.21.5.1 above.

#### 3.21.6.2 Temporary Effects

Temporary effects would be the same for the Proposed Action as described for the Preferred Alternative in Section 3.21.5.2 above.

#### 3.21.6.3 Mitigation

No mitigation measures are proposed.

## 3.22 Socioeconomics

### 3.22.1 Study Area

Local and regional demographic characteristics and economies are affected by land uses within the study area. In addition, economic and demographic statistics are primarily reported by county. For these reasons, the study area for socioeconomics and environmental justice (Section 3.23, Environmental Justice) includes the two counties within the planning area: San Juan County, New Mexico, and La Plata County, Colorado. State and national information will be provided as a comparison when information is available, and more detailed descriptions of individual counties and municipalities will be presented as appropriate.

### 3.22.2 Methods

Direct effects were analyzed based on changes to the following indicators:

- Study area or local community income
- Employment (levels of full-time, temporary, and transitory employment)

- Local area population
- Housing availability (the need for permanent or temporary housing, such as motels or trailer parks)
- Land use and property values, including but not limited to taxes, lease revenues, and royalties

Indirect and induced project effects are discussed utilizing regional and industry examples and a regional economic multiplier (RIMS II).[333]

In addition, this analysis considers the effects to on other land uses and social values. Specific indicators considered include:

- Effects on other land uses that currently create revenue:
  - Recreation (visitor days and/or visitor use numbers)
  - Ranching (animal unit months)
  - Energy development and production (barrels of oil produced, millions of cubic feet of natural gas produced)
- Effects to local industry that supports other land uses such as tourism
- Changes to nonmarket values of open space (effects on viewscape, social setting, recreational opportunities, etc.)

One of the purposes of the SJBEC Project is to enhance electrical transmission capacity. The potential for the SJBEC Project to affect electricity costs, efficiency, and reliability were analyzed on a qualitative basis.

The following indicators were examined to determine effects to local public services:

- Electric utilities – cost, reliability, capacity
- Schools – student/teacher ratios
- Medical facilities – numbers of doctors and emergency rooms
- Police and fire protection – number of public service officers

[333] Regional Input-Output Modeling System developed by the Bureau of Economic Analysis

## 3.22.3 Affected Environment

The study area counties have a long history of ranching and farming. Native Americans have had an important role in the area and continue to represent an important social presence. Today, in addition to traditional industries, the economic base of the area includes substantial oil and gas development as well as retail and tourism.

### 3.22.3.1 Social and Economic Conditions

#### Population

The study area is mainly located in unincorporated areas of San Juan and La Plata Counties. As shown in Exhibit 3-143, Study Area Population Trends, the two counties in the study area have a combined population of approximately 181,400 as of 2010. The largest cities in the region are Durango, Colorado (population 16,887 in 2010) in La Plata County, and Farmington, New Mexico (population 45,895 in 2010) in San Juan County. Exhibit 3-144, Study Area Population Centers, provides the population for various towns located in the study area.

**Exhibit 3-143**
**Study Area Population Trends**

| Location | 2000 | 2010 | Percent Population Change 2000–2010 | Projected 2020 | Projected Percent Population Change 2010–2020 |
|---|---|---|---|---|---|
| La Plata County | 43,941 | 51,334 | 16.8 | 66,714 | 30.0 |
| Colorado | 4,301,261 | 5,029,196 | 16.9 | 5,999,989 | 19.3 |
| San Juan County | 113,801 | 130,044 | 14.2 | 146,815 | 12.9 |
| New Mexico | 1,819,046 | 2,059,179 | 13.2 | 2,540,145 | 23.4 |

*Source: Colorado State Demography Office 2012, BBER 2008, US Census 2010c*

**Exhibit 3-144**
**Study Area Population Centers**

| State | City | Population 2010 |
|---|---|---|
| Colorado | Durango | 16,887 |
| Colorado | Bayfield | 2,300 |
| Colorado | Ignacio | 736 |
| New Mexico | Farmington | 45,895 |
| New Mexico | Aztec | 6,763 |
| New Mexico | Bloomfield | 8,112 |

*Source: US Census Bureau 2010a*

In 2010, the population density in San Juan County (23.6 persons per square mile) was higher than that of the state average in New Mexico (17.0 persons per square mile). In La Plata County, the population density was 30.3 persons per square mile. This is lower than the state of Colorado average of 48.5 persons per square mile. The study area as a whole is sparsely populated compared to the national average of 79.6 persons per square mile.[334] Population growth in the study area has followed trends seen in the respective states. As shown in Exhibit 3-143, over the next 10 years, growth in La Plata County is expected to increase, while growth in San Juan County may slow slightly.

### Income and Employment

As shown in Exhibit 3-145, Study Area Income and Employment, the median household income and per capita income for both San Juan and La Plata Counties have remained similar to the average levels for their respective state, for 2000 and 2010 census data. Unemployment rates increased between 2000 and 2011, similar to state and national trends. In La Plata County, unemployment rates have consistently been slightly below the Colorado state average, while San Juan County has remained slightly above the New Mexico state average as shown in Exhibit 3-145.

**Exhibit 3-145**
**Study Area Income and Employment**

| Year | La Plata County | Colorado | San Juan County | New Mexico |
|---|---|---|---|---|
| **Median Household Income in Dollars** | | | | |
| 2000 | 40,159 | 47,203 | 33,762 | 34,133 |
| 2010 | 56,422 | 56,456 | 43,783 | 43,820 |
| **Per Capita Income in Dollars** | | | | |
| 2000 | 21,534 | 24,049 | 14,282 | 17,261 |
| 2010 | 29,836 | 30,151 | 31,232 | 22,996 |
| **Unemployment Rate (annual percent)** | | | | |
| 2000 | 2.9 | 2.7 | 5.8 | 5.0 |
| 2010 | 7.1 | 8.9 | 9.1 | 7.9 |
| 2011 | 6.8 | 8.3 | 7.8 | 7.4 |

*Source: US Census 2000, 2010b; BLS 2012*

[334] US Census Bureau 2010a

Non-labor income is money earned from investments (such as dividends, interest, and rent) and transfer payments (such as government retirement, disability insurance benefits, and unemployment insurance benefits). La Plata County's percentage of non-labor income is slightly higher than that of the state of Colorado (38.3 and 31.4 percent respectively). In contrast, the rate of non-labor income in San Juan County is lower than that of New Mexico's average (34.7 and 38 percent respectively).[335]

Exhibit 3-146, Study Area Employment by Sector (2010), shows the largest employment sectors in the study. The largest sectors include retail trade, construction, health care, accommodation and food services, and government employment. The mining and energy development sector, specifically oil and gas development, represents a substantial source of employment in San Juan County, with approximately 13 percent of total private employment related to this sector. Additional jobs in construction may be related to mining or energy development for both counties. Substantial portions of the oil and gas industry, especially support activities such as excavation, trucking, and servicing, may also be conducted by sole proprietors, which are not accounted for in the table below.

**Exhibit 3-146**

### Study Area Employment by Sector (2010)

| | La Plata County | | Colorado | | San Juan County | | New Mexico | |
|---|---|---|---|---|---|---|---|---|
| | Jobs | Percent of total jobs | Jobs | Percent of total jobs | Jobs | Percent of total jobs | Jobs | Percent of total jobs |
| Total Employment | 37,103 | 100 | 3,155,303 | 100 | 62,508 | 100 | 1,064,452 | 100 |
| Farm Employment | 1,120 | 3 | 45,019 | 1 | 1,887 | 3 | 24,710 | 2 |
| Nonfarm Employment | 35,983 | 97.0 | 3,110,284 | 99 | 60,621 | 97 | 1,039,742 | 98 |
| Private Nonfarm Employment | 30,003 | 80.9 | 2,656,130 | 84 | 49,071 | 79 | 822,436 | 77 |

[335] Headwater Economics 2012

**Exhibit 3-146**
## Study Area Employment by Sector (2010)

**PRIVATE NON-FARM JOBS**

| | La Plata County | | Colorado | | San Juan County | | New Mexico | |
|---|---|---|---|---|---|---|---|---|
| | Jobs | Percent of private non-farm jobs | Jobs | Percent of private non-farm jobs | Jobs | Percent of private non-farm jobs | Jobs | Percent of private non-farm jobs |
| Forestry, Fishing and Related | 227 | 1 | 11,362 | 0 | (D) | NA | 5,327 | 1 |
| Mining and Energy Development | 1,245 | 4 | 45,817 | 2 | 6,575 | 13 | 25,938 | 3 |
| Utilities | 127 | 0 | 8,719 | 0 | 1,117 | 2 | 4,560 | 1 |
| Construction | 3,266 | 11 | 188,518 | 7 | 4,880 | 10 | 62,460 | 8 |
| Manufacturing | 752 | 3 | 140,947 | 5 | 1,942 | 4 | 35,711 | 4 |
| Wholesale Trade | 636 | 2 | 102,074 | 4 | 1,980 | 4 | 26,803 | 3 |
| Retail Trade | 3,895 | 13 | 302,618 | 11 | 7,335 | 15 | 111,810 | 14 |
| Transportation and Warehousing | 776 | 3 | 79,687 | 3 | 1,545 | 3 | 23,705 | 3 |
| Information | 561 | 2 | 83,592 | 3 | (D) | NA | 16,867 | 2 |
| Finance and Insurance | 1,934 | 6 | 205,092 | 8 | 1,440 | 3 | 36,640 | 4 |
| Real Estate and Rental and Leasing | 2,225 | 7 | 174,495 | 7 | (D) | NA | 39,701 | 5 |
| Professional, Scientific and Technical | 2,386 | 8 | 274,197 | 10 | 1,755 | 4 | 79,161 | 10 |
| Management of Companies and Enterprises | 129 | 0 | 32,831 | 1 | 262 | 1 | 5,511 | 1 |
| Administrative and Waste Management | 1,774 | 6 | 189,352 | 7 | 1,967 | 4 | 55,493 | 7 |
| Educational Services | 503 | 2 | 59,051 | 2 | 719 | 1 | 16,699 | 2 |
| Health Care and Social Assistance | 3,527 | 12 | 280,850 | 11 | 6,436 | 13 | 120,088 | 15 |
| Arts, Entertainment and Recreation | 1,335 | 4 | 86,413 | 3 | 1,003 | 2 | 23,407 | 3 |
| Accommodation and Food Services | 3,140 | 10 | 234,396 | 9 | 4,316 | 9 | 81,622 | 10 |
| Other Services | 1,565 | 5 | 156,119 | 6 | 3,284 | 7 | 50,933 | 6 |

**Exhibit 3-146**

**Study Area Employment by Sector (2010)**

| PRIVATE NON-FARM JOBS (Continued) | La Plata County | | Colorado | | San Juan County | | New Mexico | |
|---|---|---|---|---|---|---|---|---|
| | Jobs | Percent of private non-farm jobs | Jobs | Percent of private non-farm jobs | Jobs | Percent of private non-farm jobs | Jobs | Percent of private non-farm jobs |
| Government | 5,980 | 20 | 454,154 | 17 | 11,550 | 24 | 217,306 | 26 |
| Federal-Civilian | 428 | 1 | 56,285 | 2 | 1,704 | 3 | 33,722 | 4 |
| Military | 140 | 0 | 54,045 | 2 | 352 | 1 | 17,136 | 2 |
| State Government | 1,363 | 5 | 98,010 | 4 | 472 | 1 | 60,274 | 13 |
| Local Government | 4,049 | 13 | 245,814 | 9 | 9,022 | 18 | 106,174 | 7 |

*Source: BEA 2012*

Some local oil and gas industry experts believe that peak oil and gas production in the San Juan Basin occurred in the late 1990s.[336] Based on this information, the long-term outlook (15 to 30 years and beyond) suggests a slow overall decline in production volume, revenues, and employment. Over shorter timeframes, the San Juan Basin will likely continue to experience temporary spikes in exploration and production as oil and gas commodity prices change with global demand and economic cycles, consistent with the history of the area.[337]

## Housing

As shown in Exhibit 3-147, Study Area Housing Data (2010), San Juan and La Plata Counties had 10 and 18.4 percent vacancy rate for housing units, respectively, in 2010. La Plata County rates were substantially above the Colorado average while San Juan County had a lower vacancy rate than the New Mexico average.

[336] EPS 2011

[337] EPS 2011

Exhibit 3-147
**Study Area Housing Data (2010)**

| Location | Total Housing Units | Total Occupied Units | Total Vacant Units | Percent Occupied Units | Percent Vacant Units |
|---|---|---|---|---|---|
| La Plata County | 25,860 | 21,100 | 4,760 | 81.6 | 18.4 |
| Colorado | 2,212,898 | 1,972,868 | 240,030 | 89.2 | 10.8 |
| San Juan County | 49,341 | 44,404 | 4,937 | 90.0 | 10.0 |
| New Mexico | 901,388 | 791,395 | 109,993 | 97.8 | 12.2 |

*Source: US Census 2010b*

For both counties, the majority of vacant units are used for seasonal or recreational use as shown in Exhibit 3-148, Study Area Housing Data (2010) – Vacant Housing Units.

Exhibit 3-148
**Study Area Housing Data (2010) – Vacant Housing Units**

| Location | For Rent | Rented, Not Occupied | For Sale Only | Sold, Not Occupied | For Seasonal, Recreational, or Occasional Use | All Other Vacant |
|---|---|---|---|---|---|---|
| La Plata County | 646 | 65 | 470 | 58 | 2,930 | 591 |
| Colorado | 57,644 | 3,058 | 32,673 | 5,418 | 101,965 | 39,272 |
| San Juan County | 1,155 | 84 | 419 | 149 | 1,329 | 1,801 |
| New Mexico | 22,150 | 1,303 | 11,050 | 2,143 | 36,612 | 36,735 |

*Source: US Census 2010b*

## Taxes

Taxes collected and distributed at the local level include sales tax, lodging tax and ad valorem taxes. In addition, payments in lieu of taxes (PILT) are contributed to local governments from federal and tribal governments.

### Sales and Lodging Taxes

Sales taxes are generally imposed on all retail sales, leases and rentals of most goods, as well as on taxable services. In New Mexico, state sales tax is set at 5.13 percent. Counties have additional sales taxes of up to 3.43 percent. In San Juan County, the additional sales tax is 1.18 percent, for a total sales tax in the county of 6.13 percent. County tax revenues for 2010 are shown in Exhibit 3-149, Sales and Use Tax Revenue Fiscal Year 2010. Municipalities can impose additional sales taxes over and above state and county sales tax rates.

Exhibit 3-149

**Sales and Use Tax Revenue Fiscal Year 2010**

| Location | Sales Tax (Dollars) | Lodging Tax (Dollars) |
|---|---|---|
| La Plata County, Colorado | 18,171,619 | 180,453 |
| San Juan County, New Mexico | 33,217,840 | N/A |

*Source: La Plata County 2012a, San Juan County 2012*

In Colorado, the state sales tax rate is 2.9 percent.[338] Similar to New Mexico, Colorado municipalities can impose additional sales taxes. Purchases in La Plata County incur an additional 2 percent sales tax for a total sales tax of 4.9 percent. Revenue for fiscal year 2010 is shown in Exhibit 3-149.

Lodging taxes are imposed on room rentals or accommodations, including bed and breakfasts and short-term or vacation home rentals. In La Plata County the lodging tax rate is 1.9 percent. Lodging tax revenue for fiscal year 2010 is shown in Exhibit 3-149. San Juan County does not have a lodging tax, but the City of Farmington imposes a lodging tax of 5 percent. The City of Farmington collected approximately $1,068,354 in lodging taxes in 2011. Similarly, in Bloomfield and Aztec the lodging tax rate is set at 3 percent, and total receipts were $13,628 and $10,497, respectively, in 2011.[339]

### Ad Valorem Taxes

Ad valorem taxes are levied based on the assessed value of property. Personal property taxes are one type of ad valorem tax; taxes can also be levied on commercial real estate, oil and gas production, or equipment (such as that required for oil and gas development).

Property taxes for a given municipality in Colorado and New Mexico are determined by a formula based on the appraised value of a home, multiplied by the state's current assessment ratio, multiplied by the mill levy rates of taxation set by each county and taxing district, where one mill is one-tenth of a cent ($0.001).

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[338] Colorado Department of Revenue 2012

[339] BBER 2011

In Colorado, the current residential assessment rate is 7.96 percent of assessed value. In contrast, the assessment rate for most classes of non-residential property is fixed at 29 percent (except oil and gas, which is assessed at 87.5 percent of the actual value of production).[340] In La Plata County in 2011, the county mill levy was set at 8.50 mills for residential property; additional taxes are also levied at the individual tax district level to support improvement projects, school boards, fire protection districts, or other programs. Total county property tax revenue for fiscal year 2010 is shown in Exhibit 3-150, Ad Valorem Tax Revenue Fiscal Year 2010.

**Exhibit 3-150**
### Ad Valorem Tax Revenue Fiscal Year 2010

| Location | Property Taxes (Dollars) | Oil and Gas Tax (Dollars) |
|---|---|---|
| La Plata County, Colorado | 26,117,034 | No info provided |
| San Juan County, New Mexico | 21,800,443 | 10,480,170 |

*Source: La Plata County 2012a; San Juan County 2012*

The Colorado property tax system provides revenue exclusively for local government services. The largest share of property tax revenue (49.9 percent) goes to support the state's public schools. County governments claim the next largest share (24.9 percent), followed by special districts (18.8 percent), municipal governments (5.2 percent), and junior colleges (1.2 percent). Taxable property is classified as residential, commercial, industrial, agricultural, and vacant land.

In New Mexico, the property assessment ratio is 33.33 percent of the full assessed value. As in Colorado, mill levy rates vary by county and municipality based on the budgets submitted by counties, schools, cities and the voters through the approval of bond issues.[341] The county mill levy in San Juan County was set at 6.326 mils for residential property and 8.5 mils for non-residential property (including oil and gas production and equipment) in 2012,

[340] Colorado Department of Revenue 2012

[341] New Mexico Department of Finance and Administration 2012

the second lowest mill rate in the state.[342] Revenues for 2010 are shown in Exhibit 3-150.

For the state of New Mexico in 2009, ad valorem taxes were distributed with approximately 4 percent to the state debt service, 31 percent to counties, 14 percent to municipal services, 32 percent to local school districts, and 10 percent to higher education. Rates of distribution vary for residential, non-residential, and ad valorem taxes.

Based on a 1996 taxation compact between the State of Colorado, SUIT, and La Plata County (Section 1. Title 24, Colorado Revised Statutes, Article 61), no ad valorem taxes are collected for property, real or personal, owned or acquired by the tribe and held by the tribe in non-federal-trust status within the boundaries of the reservation. The tribe pays a voluntary PILT to La Plata County based on the value of property. Non-Indian real and personal property interests, however, are not exempt from taxes.

### Payments in Lieu of Taxes

PILT are payments to local governments that help offset losses in property taxes due to nontaxable lands within their boundaries. Federal PILT payments and payments from SUIT tribal government to La Plata County are shown in Exhibit 3-151, Payment in Lieu of Taxes for Fiscal Year 2010.

**Exhibit 3-151**
**Payment in Lieu of Taxes for Fiscal Year 2010**

| Location | Federal PILT (Dollars) | Tribal PILT (Dollars) |
|---|---|---|
| La Plata County, Colorado | 552,252 | 987,706 |
| San Juan County, New Mexico | 2,054,090 | N/A |

*Source: La Plata County 2012a, San Juan County 2012*

## 3.22.3.2 Public Services

### Public Utilities

In San Juan County, New Mexico, electricity and transmission services are supplied primarily by the Farmington Electric Utility

[342] San Juan County 2012

System, which is owned and operated by the City of Farmington. The service territory includes 1,718 square miles and encompasses the City of Farmington, most of the populated area of San Juan County (including the cities of Bloomfield, Aztec, and the San Juan River Valley west from the city to the Navajo reservation). The utility also provides transmission services for the City of Aztec and to Tri-State Generation and Transmission Association. As of fiscal year 2009 the utility served 43,606 customers in total.[343]

In La Plata County, the La Plata Electric Association provides electricity to 30,000 members. As one of Tri-State's 44 member cooperatives, the La Plata Electric Association is owned and operated by the consumers in their service territory. Additional services in both counties are provided by numerous small rural electric cooperatives.[344]

Natural gas in La Plata County is provided by Atmos Energy, based in Dallas, Texas. In San Juan County, natural gas is supplied by the New Mexico Gas Company, which provides natural gas service to more than 500,000 New Mexico customers.[345]

There are numerous water system companies in San Juan and La Plata Counties. Water services are generally provided by the local communities.

Infrastructure for existing utilities, including transmission lines and gas pipelines, are discussed further in Section 3.3, Land Ownership and Use.

### Police and Fire Services

In general, the number of police and fire departments is directly related to the overall size and population of the county, as well as to the number of larger communities within the county. There are multiple law enforcement agencies and providers in the potentially affected counties, including the state patrol, county sheriffs, and local police departments. In many cases mutual aid agreements

[343] City of Farmington 2012

[344] La Plata County 2012b

[345] City of Farmington 2012

between agencies allow members of one agency to provide backup to other agencies in emergency situations.

### 3.22.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects on socioeconomics would occur with this alternative.

### 3.22.5 Preferred Alternative and Proposed Action

#### 3.22.5.1 Permanent Effects

Permanent effects from the Preferred Alternative and the Proposed Action would be similar, though there are minor differences between the alternatives. Effects and differences between the two alternatives are discussed below.

**Population, Housing, and Economic Activity**

Minimal permanent direct effects to the local economy are anticipated as a result of implementing either the Preferred Alternative or the Proposed Action. Existing Tri-State employees would be responsible for operation and maintenance of the transmission line and associated facilities that would be owned by Tri-State. No new permanent employment would be generated, and there would be no change to existing population levels in the study area.

There would be no new expected demand for short- or long-term housing during the operation phase of the Preferred Alternative or the Proposed Action, because the Tri-State employees would come from nearby areas, and, therefore, no operation-related effects to housing resources would be expected.

Operation of the transmission line would likely result in annual tax payments on capital costs of operation and property tax revenues paid to local governments. Total operation amounts and associated tax payments would likely be minor in comparison to construction amounts and related tax payments. Based on area assessment and mill levy rates for every million in assessed property value, approximately $ 24,650 to $28,300 would be generated in taxes for either the Preferred Alternative or the Proposed Action. This revenue would be distributed as described in Section 3.22.3.1, Social and Economic Conditions.

Potential indirect effects for both alternatives include additional spending in the local economy as a result of money spent locally on maintenance-related expenditures (materials and supplies). These effects are expected to be small, especially when compared to the capital costs of construction. Project operation would be centralized and rely upon the use of communication and automated controls. Local expenditures are expected to be limited to occasional expenditures on gas and food by crew members.

### Economic Effects from Other Land Uses

Land uses adjacent to the proposed right-of-way are primarily dedicated to existing transmission infrastructure and oil and gas development. Indirect economic effects to the local economy could occur if other land uses such as recreation, mineral development, or agriculture were affected by operation.

Minimal permanent effects to recreation are anticipated from either alternative since the transmission line and associated access roads are similar to existing development and use in the area. Maintenance of the transmission line, substations, and access roads could involve noise and disrupt the recreational setting, but this would be infrequent and localized and would not likely noticeably affect the recreational visitor’s experience or level of use or associated spending in the local economy. Additional details are included in Section 3.5, Recreation.

There is limited potential for effects to mineral development. No active surface mineral resource development is presently being conducted along the proposed right-of-way or in the study area. However, the Preferred Alternative would have direct effects by permanently precluding future development of surface mineral resources on approximately 182 acres of the proposed right-of-way. The Proposed Action would have similar direct effects on approximately 183 acres. In addition, the Preferred Alternative would place a single foundation for a leg of a transmission line structure in a previously mined area of the former San Juan Mine located in Segment 1, possible effects are discussed in Section 3.11.5.1. In addition for both alternatives, portions of new or upgraded access roads have the potential to permanently affect 38 existing or abandoned well pads. Possible effects to these well pads would be avoided through the implementation of EPM 8, listed in Exhibit 2-23. Minerals would remain unaffected by either alternative as oil and gas could be obtained by directional drilling. Additional details are included in Section 3.11, Minerals.

Both alternatives have the potential to affect agricultural production by reducing the acreage available for farming or livestock grazing due to the presence of transmission structures. Grazing activities within the transmission line right-of-way between structures and substations would not be affected or precluded. With either alternative, the acreage that would become unavailable for use would be negligible when compared to the total allotment acreage in the study area. Therefore, no permanent effects on livestock production or indirect effects to related economic spending are anticipated. Specific effects on grazing and livestock are discussed in Section 3.6, Grazing and Livestock.

The SBJEC Project has the potential to directly (due to the presence of structures) or indirectly (due to fragmentation of land) remove acres of potential farmland from production or future use. The degree of effect to local agricultural production and associated economic effects would likely be limited due to the small area of farmlands that would be permanently disturbed or removed from production by either alternative. Details are included in Section 3.13, Farmlands.

### Property Values

Limited direct effects to local residents and property values are anticipated from implementing either alternative. The nearest urbanized areas are Farmington, New Mexico, and Ignacio, Colorado. Ignacio town limits are approximately 0.75 mile from the study area, and Farmington city limits are approximately 2 miles from the proposed study area. While the line would not be located in proximity to densely developed urban areas, approximately four dispersed residential structures are located between 200 and 600 feet from the proposed transmission line right-of-way for the Preferred Alternative. For the Proposed Action there are six residential structures located between 200 and 600 feet from the proposed transmission line right-of way. In most areas the proposed transmission line would be co-located with existing transmission lines thereby minimizing disturbance and effects. Details about possible effects from the transmission line are discussed throughout this chapter and include effects related to noise discussed in Section 3.19 and electric and magnetic fields discussed in Section 3.20.

On private land, Tri-State would compensate individual property owners with a one-time payment for an easement on their land. Compensation for easements across private lands would be determined for each parcel as appropriate. The process would likely involve a market study to identify the direct cost of purchasing an easement from a property owner and, where necessary, a calculation and compensation for consequential losses incurred on the remaining property as a result of transmission line construction. Approximately 36 acres of private land may require compensation along the proposed transmission line route for the Preferred Alternative and 37.9 acres for the Proposed Action. Commensurate with the easements, Tri-State would be responsible for paying property taxes to San Juan County for the portion of the line in New Mexico and to La Plata County for the portion of the line in Colorado.

A review of current property value impact studies and the issue of high voltage transmission lines indicates that property values can be affected by the proximity to a transmission line and that the effects can depend on site-specific conditions. Property values can be affected by views toward a transmission line and from the uncertainty of transmission line–related health hazards. Other factors, such as terrain, vegetation, size of transmission line structures, views from a particular property, and views toward transmission lines, conductors, or structures greatly influence private property values.[346] When property value effects are evident, they almost always tend be less than 10 percent reduction in value and usually are in the range of 3 to 6 percent.[347] These effects diminish as distance from the lines increases and usually disappear at about 200 feet to 300 feet from the line.[348] In the case of both alternatives,

[346] De Rosiers 2002

[347] Chalmers and Voorvart 2009

[348] Chalmers and Voorvart 2009

there are two residences located within 200 to 300 feet of the proposed right-of-way that could have their property values affected.

The effects from transmission lines depend on many factors including market condition, location, and personal preference.[349] Studies of effects to residential property values during periods of physical change, such as a new transmission line construction or structural rebuilds, have revealed the potential for some short-term effects. However, most studies have concluded that other factors such as location of the property, type and condition of improvements, and the level of real estate activity are far more important than the presence of transmission lines in determining the value of residential property in the long term.[350]

### Lifestyle and Social Values

Transmission line projects have the potential to affect quality of life for area residents by resulting in undesired noise, electric and magnetic fields, or by changing the visual landscape. The proposed project would result in negligible increases in noise over existing ambient noise levels near sensitive noise receptors. Details are provided in Section 3.19, Noise and Vibration. Similarly, the proposed transmission line would result in very low levels of electric and magnetic fields. The transmission line would be well below the guidelines adopted for the exposure of members of the public from any sources of electric and magnetic fields as discussed in Section 3.20, Electric and Magnetic Fields. As a result, noise or electric and magnetic fields from either alternative are not likely to affect the quality of life for area residents.

The proposed transmission line would result in the addition of a new element to the visual landscape, particularly where the transmission line is not co-located with existing structures; this can change the perception of the area as being open and rural. An assessment of the potential visual effects is provided in Section 3.6, Visual Resources. Based on the visual analysis conducted, the Preferred Alternative would have fewer effects to visual resources

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[349] Pitts and Jackson 2007

[350] Bottemiller et al. 2000

than the Proposed Action, since it would be located further away from a natural stone arch in the study area.

#### Public Services

The SJBEC Project would benefit public services by providing a more reliable source of power. This increase in reliability provides economic value by reducing service curtailments and avoiding high-cost outcomes (i.e., blackouts) during extreme system conditions. The SJBEC Project would also result in higher capacity transmission to the region, benefiting local development and providing the opportunity for interconnections and future growth.

It is not anticipated that project operations would affect other local service providers such as water and natural gas.

### 3.22.5.2 Temporary Effects

#### Population, Housing, and Economic Activity

Construction of the Preferred Alternative or the Proposed Action is expected to take approximately 18 to 24 months to complete; it is estimated that construction would begin in 2015 and the line would be in service by the end of 2016. During the construction period, crews may be working on parts of the line in different locations. The estimated number of potential workers and types of equipment required to construct the proposed transmission line, substations, and communication facilities are shown in Exhibit 2-20, Personnel and Equipment for Construction of the Proposed Transmission Line, and Exhibit 2-21, Personnel and Equipment Required for Substation Construction. Based on previous projects, it is estimated that up to 70 construction workers would be working on construction sites at any given time during transmission line construction (40 on the New Mexico portion and 25 to 30 in Colorado). Substation construction would likely require an additional 10 to 15 people in New Mexico.

It is anticipated that, due to the specialized nature of transmission line construction and the expertise required, the majority of the workers employed will be recruited from outside the local area. It is possible that some of this workforce may be drawn from within the state (in particular from the Albuquerque metropolitan area), but the percentage of workers from within the state and outside of the state cannot be quantified.

Workers from outside the region would either temporarily relocate to the area or take up overnight lodging on weekdays, commuting from their permanent residences on Sunday nights and returning home Friday evenings. Workers temporarily relocating to the area would generally be expected to reside in or near existing communities in the vicinity of the project (such as Farmington and Ignacio), where more housing options and services are available. Few of these workers would be expected to permanently relocate to the study area. Staggered construction and the relatively small number of construction employees required would reduce the likelihood of a strain on local communities' housing or public services. Workers staying in area hotels could result in an increase in lodging tax for La Plata County and local municipalities.

Employment of construction workers and income paid directly to the workers represent direct economic effects. Additional economic effects would result from construction and manufacturing activities (indirect effects) as well as from spending on food, clothing, and other services by those who are directly or indirectly employed in the construction of the transmission lines and substations (induced effects).The exact amount of indirect spending would depend on the percentage of materials purchased from the local area and induced spending would depend on the percentage of workers employed from within the local area, as local workers are more likely to spend money locally and thereby support businesses in the region. It should be note that the majority of construction workers employed will likely be from other regions. Similarly, construction materials are likely to be imported from other areas, therefore direct and indirect economic input to the local economy would be minimized.

Construction of either alternative would generate sales and use tax revenues through project expenditures on construction supplies and equipment. Total construction-related sales and use taxes cannot be estimated at this time, as contributions to local sales tax would depend upon the amount of materials purchased from local suppliers compared to those bought outside the region; however, it is likely that the majority of materials for construction will be purchased outside the region. Some limited materials, such as gravel for road construction, may be acquired locally. Based on area tax rates of 4.9 to 6.13 percent, for every thousand dollars spent on construction materials in the region, $490 to $613 would be generated. In addition, corporate income taxes would provide money to the state economies.

Temporary effects may occur to area residents due to the potential for increased noise, traffic, and dust from construction equipment and vehicles. Both alternatives include measures to minimize any direct effects on area residents during project construction, as described in EPMs 64 through 70, and 73 listed in Exhibit 2-23. Effects would be temporary and localized in nature.

### Economic Effects on Other Land Uses

Indirect effects to socioeconomics may occur as spending patterns or social settings change. Land uses with potential effects include recreation, mineral development, and agricultural use.

Temporary effects to recreation during construction are similar for both alternatives and are discussed in Section 3.5 and primarily include access closures, and indirect effects to dispersed recreational activities, such as hiking, mountain biking, hunting, and horseback riding, due to the presence of construction noise or other people.

For the Preferred Alternative, during the construction phase, approximately 800 acres would be temporarily disturbed or unavailable for surface mineral resource development as described in Section 3.11, Minerals. For the Proposed Action approximately 827 acres would be temporarily disturbed or unavailable for surface mineral resource development. Another temporary direct effect during construction would be minor increases in access road traffic and use by construction workers and equipment, as well as brief periods where short portions of access road use is curtailed within the right-of-way while structures are being transported and conductors installed (see Section 3.8, Transportation and Access). These potential direct effects would be avoided by contractors communicating construction activity plans and schedules with local coal, oil, gas, and mining operators or by constructing temporary roads to reroute traffic as necessary for a specific period of construction, as identified in EPM 8 as part of Tri-State's design and construction process. Construction of the either alternative would likely result in the need for mineral materials for road construction, which would provide an economic benefit to local mineral providers.

Effects on livestock grazing for both alternatives as described in Section 3.6, Grazing and Livestock, would include the potential for temporary unavailability of less than 1 percent of individual grazing allotments on BLM, SUIT and New Mexico state lands. Due to the small portion of the area affected and the temporary nature of effects, related economic effects would likely be minimal for both Alternatives. Similarly, the temporary disturbance of potential farmlands is not likely to result in measureable effects to related economic output.

#### Public Services

For both alternatives, temporary construction worker commute traffic and construction activities at specific locations would increase the potential for accidents, fire, or other medical emergencies. The temporary addition of workers to local communities is not expected to exceed the capacities of local law and fire protection personnel or health care services.

For both alternatives, water would be required during construction, primarily for dust control during right-of-way and substation grading and site work. The required water would be procured from municipal sources, from commercial sources, or under a temporary water use agreement with landowners holding existing water rights. No new water rights would be required, and no strain on municipal water sources is anticipated. Construction is also not expected to affect local supplies of electricity or natural gas in the study area.

### 3.22.5.3 Mitigation

No mitigation measures are proposed.

## 3.22.6 Proposed Action

Permanent and temporary effects for the Proposed Action are discussed in Section 3.22.5.

# 3.23 Environmental Justice

## 3.23.1 Study Area

The study area for environmental justice is described above in Section 3.22.1, Study Area.

## 3.23.2 Methods

The environmental justice concerns were addressed by determining whether low-income and/or minority populations reside within the study area. Census data for counties and census block tracts were examined, and GIS tools were used to identify and examine the distribution of minority and low-income populations in the vicinity of the study area.

Areas are considered to contain environmental justice populations per Council of Environmental Quality guidelines if minority or low-income populations:

- Represent over 50 percent of population; or
- Are meaningfully greater than the general population of other appropriate unit of geographic analysis. For the purpose of this analysis, a 20 percent difference from a reference population is considered to be meaningfully greater.

Any potential disproportionately high human health, environmental, and/or social and economic effects to these groups (relative to total population effects) as a consequence of the alternative was identified and characterized.

## 3.23.3 Affected Environment

On February 11, 1994, President Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations. This executive order requires federal agencies to identify and address disproportionately high or adverse human health and environmental effects of federal programs, policies, and activities on minority and low-income populations. Consideration of environmental justice concerns includes race and ethnicity data and the poverty status of populations.

Persons are included in the minority category if they identify themselves as belonging to any of the following racial groups: (1) Hispanic, (2) Black or African American, (3) American Indian or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander. The Council on Environmental Quality guidance proposes that minority populations should be identified where either (1) the minority population of the affected area exceeds 50 percent, or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. For this analysis, meaningfully greater is defined as 20 percent or more higher than the reference population of the relevant state (i.e., Colorado or New Mexico) for county population levels and relevant county (La Plata or San Juan) for census tracts.

Exhibit 3-152, Study Area Race and Ethnicity – County, shows the study area population broken down by racial and ethnic background at the county level. The total percentage of people of white non-Hispanic origin is 42.5 percent; therefore the remaining combined percentage of people of any minority race or ethnic background in San Juan County, New Mexico is 57.5 percent, meaning that there is a minority population in San Juan County based on Council on Environmental Quality standards. It should be noted, however, that the population of New Mexico,(40.5 percent white non-Hispanic origin, the remaining 59.5 percent minority race and/or or ethnicity), the reference population, also meets CEQ standards as a minority population.

In addition to the county level, the planning area was examined at the census tract level. Based on 2010 census data, census tracts containing or within 1 mile of the proposed transmission line include three minority populations when compared to the county reference population (one in La Plata County and two in San Juan County). These minority populations are due primarily to the high percentage of Native Americans in these tracts.

**Exhibit 3-152**
## Study Area Race and Ethnicity – County

| | La Plata County | | Colorado | | San Juan County | | New Mexico | |
|---|---|---|---|---|---|---|---|---|
| | **Number** | **Percent** | **Number** | **Percent** | **Number** | **Percent** | **Number** | **Percent** |
| **Total Population** | **51,334** | **100** | **5,029,196** | **100** | **130,044** | **100** | **2,059,179** | **100** |
| Hispanic or Latino Origin (any race) | 6,056 | 11.8 | 1,038,687 | 20.7 | 24,776 | 19.1 | 953,403 | 46.3 |
| White | 3,301 | 6.4 | 568,409 | 11.3 | 11,794 | 9.1 | 574,066 | 27.9 |
| Black or African American | 28 | 0.1 | 12,959 | 0.3 | 139 | 0.1 | 7,088 | 0.3 |
| American Indian and Alaskan Native | 433 | 0.8 | 24,766 | 0.5 | 1,319 | 1.0 | 17,854 | 0.9 |
| Asian | 20 | <.1 | 3,464 | 0.1 | 39 | <.1 | 1,903 | 0.1 |
| Native Hawaiian and Other Pacific Islander | 1 | <.1 | 962 | <.1 | 10 | <.1 | 564 | <.1 |
| Some Other Race | 1,622 | 3.2 | 356,518 | 7.1 | 9,384 | 7.2 | 304,753 | 14.8 |
| Two or More | 651 | 1.3 | 71,609 | 1.4 | 2,091 | 1.6 | 47,175 | 2.3 |
| White (non-Hispanic/Latino origin) | 41,245 | 80.3 | 3,520,793 | 70.0 | 55,254 | 42.5 | 833,810 | 40.5 |
| Black or African American (Non-Hispanic/Latino origin) | 176 | 0.3 | 188,778 | 3.8 | 617 | .05 | 35,462 | 1.7 |
| American Indian or Alaskan Native (Non-Hispanic/Latino Origin) | 28 | 0.1 | 31,244 | 0.6 | 46,321 | 35.6 | 175,368 | 8.5 |
| Asian (Non-Hispanic/Latino Origin) | 20 | 0.0 | 135,564 | 2.7 | 445 | 0.3 | 2,630 | 1.3 |
| Native Hawaiian or Other Pacific Islander (Non-Hispanic/Latino Origin) | 1 | 0.0 | 5,661 | 0.1 | 64 | 0.0 | 1,246 | 0.1 |
| Some Other Race (Non-Hispanic/Latino Origin) | 58 | 0.1 | 7,622 | 0.2 | 117 | .1 | 3,750 | 0.2 |
| Two or More Races (Non-Hispanic/Latino Origin) | 949 | 1.8 | 100,847 | 2.0 | 2,450 | 1.9 | 29,835 | 1.4 |

*Source: US Census 2010a*

Exhibit 3-153, Study Area Low Income Populations (2010), shows the percentage of individuals and families living at or below the federally determined poverty level. When the population for whom poverty status has been determined is examined, no study area county or census tract contains a population with greater than 50 percent of the population in poverty or a poverty level more than 20 percent above the reference state or county population. As such, there are no low income populations at the county level per Council on Environmental Quality guidelines.

**Exhibit 3-153**
**Study Area Low Income Populations (2010)**

| | Percentage of individuals Below Poverty Level |
|---|---|
| La Plata County | 10.2 |
| Colorado | 12.2 |
| San Juan County | 12.2 |
| New Mexico | 18.4 |

*Source: US Census 2010b*

## 3.23.4 No Action Alternative

With the No Action Alternative, the SJBEC Project would not be developed; therefore, no effects to low-income or minority populations would occur with this alternative.

## 3.23.5 Preferred Alternative

Based on an analysis of potential environmental justice communities within the study area, BLM does not anticipate any disproportionate adverse effects to low income or tribal communities from the Preferred Alternative or the Proposed Action. Details for permanent and temporary impacts are discussed below.

### 3.23.5.1 Permanent Effects

Minority populations were identified in the study area for San Juan County and three census tracts in the study area, as discussed in Section 3.23.3. In general, no permanent population changes would occur in the planning area and minimal impacts would occur to other land uses in the long term. Permanent effects to minority populations would be the same as described for the general population above in Section 3.22.5.1, and, therefore, there would be no disproportionate adverse effects to minority populations.

#### 3.23.5.2 Temporary Effects

The types of temporary effects on minority populations would be the same as described for the general population in Section 3.22.5.2, Temporary Effects. Staggered construction and the relatively small number of construction employees required would reduce the likelihood of a strain on local communities' housing or public services. There would be no disproportionate effects to minority populations.

#### 3.23.5.3 Mitigation

No mitigation measures are proposed.

### 3.23.6 Proposed Action

#### 3.23.6.1 Permanent Effects

Minority populations were identified in the study area as discussed in Section 3.23.3, Affected Environment. Permanent effects would be the same as described for the general population above in Section 3.22.5.1, Permanent Effects. There would be no disproportionate effects to minority populations.

#### 3.23.6.2 Temporary Effects

The types of temporary effects on minority populations would be the same as described for the general population in Section 3.22.5.2, Temporary Effects. There would be no disproportionate effects to minority populations.

#### 3.23.6.3 Mitigation

No mitigation measures are proposed.

## 3.24 Potential Effects from Intentional Destructive Acts and Natural Disasters

The Department of Energy requires that reasonably foreseeable effects of intentional destructive acts (IDA) be addressed in environmental documents. Intentional destructive acts include sabotage, terrorism, vandalism, and theft. In addition to potential social and economic effects from loss of electrical service, destructive acts could have environmental effects. This discussion addresses the potential effects generally since the exact nature of an IDA is not easily predicted and the potential effects are highly variable for the reasons given in the discussion. Most persons are aware of the types of social, economic, and environmental effects associated with damage to high voltage electrical systems since they may have experienced it or read about it after natural disasters including hurricanes, floods, ice storms, tornadoes, and so on. Whether the destruction is intentional or the result of a natural disaster, the effects are similar.

The most likely direct effects of intentional destructive acts or natural disasters are oil spills, fire, loss of electrical service, and loss of property. Indirect effects may include loss of life and disruption of health and community services including communication. The potential magnitude of effects from the loss of electrical service depend on a variety of situation- specific factors including the numbers and types of customers served by the electrical facility; the response of the connected electrical facilities to the disturbance; the available options to reroute power without adversely affecting other electrical systems; whether redundant or replacement equipment is available; the capability of electrical crews to respond; and the response of local emergency providers.

Fire is a likely effect if transmission equipment faults to ground and automatic trip devices do not respond as expected or automatic equipment tries to re-energize the line. Vegetation below the conductors may catch fire and, depending on local factors, cause wildfires. Sometimes electrical fires may cause explosions in some equipment or may cause damaged oil-filled equipment such as transformers to ignite. The potential effects of the fires depend on the location of the incident, the amount of fuel, and the capability of local responders to contain and put out fires.

In some substations, including the substations proposed for the SJBEC Project, intentional damage to oil-filled equipment can cause an oil spill and would likely disrupt electrical power. Many substations, including the proposed Three Rivers Substation; Kiffen Canyon Substation; and Iron Horse Substation, must have spill control and countermeasure plans in place and hazard contingency plans. They also may be required under the Clean Water Act to have secondary containment to reduce the potential effects of oil spills to surface water, and they may have to report oil quantities annually to local, state, and federal emergency response agencies so they can plan with the utility for emergency response. Oil spill notification, response, cleanup, and appropriate disposal are generally part of the hazard contingency planning of electrical substations.

Loss of electrical service can be caused by intentional destructive acts to transmission lines or at substations. The potential effects depend on the voltage, the interconnections of the affected facility with other electrical facilities, the capability of dispatch and switching to isolate affected equipment and reroute power, and a variety of other contingencies that are typically in place in interconnected electrical systems. Regardless, the general types of effects are known and include disruption to commercial customers, residential customers, medical facilities, emergency response facilities, public works, and telecommunications. The magnitude of the disruption depends on many factors already mentioned including the location, response capability, and contingency planning.

Loss of property is a potential effect from explosion and fire in particular. The extent of the damage depends on the location of the incident and other factors described above, such as the capability of local emergency responders, the relative magnitude of the incident, and the characteristics of the affected property.

Intentional destructive acts and natural disasters, although relatively uncommon, have foreseeable potential effects when high voltage equipment and systems are involved. Vandalism and theft are probably more common intentional destructive acts. Thefts and related vandalism sometimes increase as the prices of metals such as copper and aluminum rise. In addition to the costs related to the vandalism and the need to replace materials; these incidents have related costs in labor and repair of facility damage. Effects from vandalism and theft do not generally disrupt electrical service. Stealing or damaging equipment in electrical substations can be extremely dangerous, not only to the perpetrator of the crime but to the operation of the facility. Persons have been electrocuted while attempting to steal copper or other materials from energized facilities. Other vandalism that occurs is related to shooting at equipment, in particular insulators on transmission lines. This could cause a disruption of electrical service and fires if the conductor falls and ignites vegetation before the line trips off.

Substations are protected from theft and vandalism by fencing, alarm systems and other measures. The presence of high voltage should deter casual attacks or crimes of opportunity. Transmission lines are located on unfenced rights-of-way. Their locations tend to reduce the likelihood of vandalism, because of the small number of persons who normally encounter them and because most persons are not intent on causing damage. On the other hand, the remoteness might encourage opportunistic vandalism, such as shooting at insulators. In general these incidents are infrequent and would be vigorously investigated and prosecuted. The likelihood of IDAs or natural disasters is difficult to predict but these events are not common. The effects are generally described above and the potential magnitude of a single act is unlikely to have a significant, long term effect on the transmission system. Tri-State, public and private utilities, and emergency responders incorporate security measures to help prevent these acts and to respond quickly if they do occur.

## 3.25 Unavoidable Adverse Effects

As described in Chapter 2, the Preferred Alternative and the Proposed Action have been designed to parallel existing disturbance to the greatest extent feasible to avoid and minimize effects; however, both alternatives will result in unavoidable adverse effects. This section describes unavoidable adverse effects caused by the Preferred Alternative and the Proposed Action that cannot be avoided or minimized through the application of EPMs or mitigation measures. These include short-term construction-related effects and long-term operational effects.

Unavoidable adverse effects for the Preferred Alternative and the Proposed Action are described below. Effects for the two alternatives would be similar, and would differ in the specific location or size of the area that would be affected. These differences were highlighted throughout the effects analysis in this chapter, and are summarized in Exhibit S-7, Comparison of Effects.

For both action alternatives, uavoidable adverse effects would last only as long as the construction period, and would include the following:

- Disturbance to grazing areas
- Increased construction traffic on existing roads
- Increased risk of landslides and disturbance to existing landforms
- Preclusion of surface mineral development (coal, sand, gravel, and aggregate) within right-of-way and substation boundaries
- Soil compaction, erosion, soil disturbance, and potential for increased sedimentation and stream sedimentation
- Possible production loss on potential farmland areas
- Vegetation disturbance and loss
- Disturbance, displacement, or loss to individual animals
- Minor air quality effects due to fugitive dust
- Disturbance (noise, visual) to nearby residents and recreational users
- Increased risk of hazardous materials spills

For both action alterantives, unavoidable adverse effects related operation and maintenance would last at least as long as the life of the project (an expected 50 years) and would include the following:

- The presence of transmission line support structures and access roads in grazing areas and areas that may be suitable for farmland. These uses are not mutually exclusive, but may require coordination.
- The addition to the visual landscape of transmission lines, substations, and access roads.

- Increased risk of landslides and disturbance to existing landforms.
- Removal of fossils found in the proposed right-of-way or substation boundaries. Any fossils would be removed and curated prior to construction, but the effect of moving the fossils would be considered a permanent effect.
- Preclusion of surface mineral development (coal, sand, gravel, and aggregate) within right-of-way and substation boundaries.
- Soil compaction, erosion, soil disturbance, and potential for increased sedimentation and stream sedimentation.
- Increased risk of collision or electrocution for birds due to the presence of the transmission lines.
- Effects to cultural resources. Mitigation for possible effects to cultural resources would occur prior to or as part of construction; however, some effects may be permanent.
- Electric and magnetic fields produced mostly within the proposed right-of-way.

## 3.26 Relationship Between Local Short-Term Uses of the Environment and Long-Term Productivity

The BLM must consider the degree to which the action alternatives would sacrifice a resource value that might benefit the environment in the long-term, for some temporary benefit to the proponent or the public. This section compares the potential temporary effects of the Preferred Alternative and the Proposed Action with the potential effects on long-term productivity. Effects for the two alternatives would be similar, and would differ in the specific location or size of the area that would be affected. These differences were highlighted throughout the effects analysis in this chapter, and are summarized in Exhibit S-7, Comparison of Effects.

Implementation of the action alternatives would use the environment and existing lands to construct, operate, and maintain substations, access roads, and the transmission line. Most land disturbance would be temporary and would be concurrent with site preparation and construction. Temporary construction effects include soil disturbance, increased erosion potential, vehicle and equipment emissions, fugitive dust, noise, and habitat disturbance. Measures would be employed to minimize disturbances and reclaim or improve vegetation cover, soil, and wildlife habitat on these lands. To the extent that disturbances can be reclaimed, other productive use of these lands would not be precluded in the long term.

Effects to the environment during operations would constitute a long-term use of the environment; however, the Preferred Alternative or the Proposed Action would not conflict with land uses established by the BLM, NMSLO, SUIT, or La Plata County. The Preferred Alternative or the Proposed Action would be built in areas where energy-related land uses are prevalent, including oil and gas development and energy transmission and distribution. Overall productivity of the affected lands would remain similar to existing conditions. There is potential for mitigated permanent loss of cultural and paleontological resources. There would be some loss of existing vegetation, soil, and quality of habitat available for wildlife, but most of the study area has vegetation cover and habitat that is common to the region. The placement of transmission lines could cause visual effects. These resources would be committed along the length of the corridor and at the substations for the life of SJBEC Project. If no longer needed, these lands would be restored to a suitable condition consistent with zoning or adjacent land use.

The SJBEC Project would help meet electrical power distribution infrastructure needs in the region, maintain and enhance productivity, and provide permanent economic benefits. Overall, use of the environment is not expected to adversely affect long-term productivity. Implementation of the No Action Alternative would not affect resources but would be associated with future infrastructure deficiencies and the reduced ability to provide electrical power for residential, commercial, and industrial uses regionally.

# 3.27 Irreversible and Irretrievable Commitment of Resources

An irreversible commitment of resources, for the purposes of this section, has been interpreted as resources that, once committed to the proposed project, would continue to be committed throughout the life of the SJBEC Project. An irretrievable commitment of resources has been interpreted as resources used, consumed, destroyed, or degraded during the construction and operation of the proposed SJBEC Project, and that could not be retrieved or replaced for future use. The types of resources that would be committed to the building and operating the Preferred Alterantive or Proposed Action would be similar, though the two alterantives would differ in the specific location or size of the area that would be affected. These differences were highlighted throughout the effects analysis in this chapter, and are summarized in Exhibit S-7, Comparison of Effects. Irreversible and irretrievable commitments of resources for both of the action alternatives are summarized in Exhibit 3-154, Irreversible and Irretrievable Commitment of Resources.

**Exhibit 3-154**
**Irreversible and Irretrievable Commitment of Resources**

| Resource | Type of Commitment/Reason for Commitment | Irreversible | Irretrievable |
|---|---|---|---|
| Archaeological and Historical Sites | Disturbance or removal of sites, interference with setting<br>Construction and operation | Yes | Yes |
| Traditional Cultural Places | Disturbance or removal of sites, interference with visual setting<br>Construction and operation | Possible[1] | Possible[1] |
| Paleontological Resources | Disturbance or removal of fossils if encountered during pre-construction surveys or unexpectedly during construction | Yes | No |
| Social and Economic Conditions | Financial resources used to construct and operate the proposed SJBEC Project<br>Construction and operation | Yes | Yes |
| Construction Materials and Fuels | Use of: | | |
| | Aggregate | Yes | Yes |
| | Water | Yes | Yes |
| | Steel | Yes | Yes |
| | Aluminum | Yes | Yes |
| | Concrete | Yes | Yes |
| | Aggregate | Yes | Yes |
| | Fossil fuels | Yes | Yes |

1 *At this time it is unknown if the project would affect traditional cultural places, this determination will be made as part of Section 106 consultation that is underway.*

# Chapter 4 – Cumulative Effects

# 4 Cumulative Effects

*Chapter 4 describes the cumulative effects analysis conducted and the results of the analysis. Cumulative effects are effects that result from the incremental effect of the SJBEC Project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the actions. Cumulative effects can result from individually minor but collectively significant actions that take place over a period of time (40 CFR §1508.7).*

## 4.1 Methods

The cumulative effects analysis conducted involved a series of steps that are summarized below:

- Issues or resources were identified for cumulative effects analysis.
- The study area and timeframe for analysis were determined for each resource.
- A range of past, present, and reasonably foreseeable future actions were identified that could have an effect on the issues or resources of concern within the study area and timeframe established.

The cumulative effects of the SJBEC Project in conjunction with other actions were then analyzed for each resource. The methods used to assess cumulative effects are resource-dependent, and include:

- Trend analysis was used qualitatively and quantitatively where data allowed.
- GIS overlays and effects analysis were used to understand spatial and temporal relationships of the SJBEC Project with past, present, and reasonably foreseeable future actions.

### 4.1.1 Study Area

The cumulative effects study area for each issue or resource was established to help bound the description of the affected environment and assess direct and indirect effects. For purposes of cumulative effects analysis, the analysis area for each resource is the same as the area studied for direct and indirect effects and described in Chapter 3, Affected Environment and Environmental Effects.

### 4.1.2 Timeframe

The timeframe for the cumulative effects analysis extends from the history of effects to each resource through the anticipated life of the project (and beyond, for resources having more permanent effects). The effects of past and present actions and trends over time for each resource are discussed below. The timeline for reasonably foreseeable future actions is defined by the term of the proposed right-of-way grants, which is up to 50 years.

### 4.1.3 Past and Present Actions

Past and present actions are described in the affected environment sections for each resource in Chapter 3. Past and present actions are generally accounted for in the analysis of direct and indirect effects for each resource and are carried forward to the cumulative effects analysis. The text below for each resource, summarizes trends of how past and present actions have affected each resource over time.

### 4.1.4 Reasonably Foreseeable Future Actions

For this cumulative effects analysis, reasonably foreseeable actions were defined as:

- Projects where permit applications have been submitted
- Projects or actions where funding has been identified
- Projects or actions that have begun or completed the NEPA process

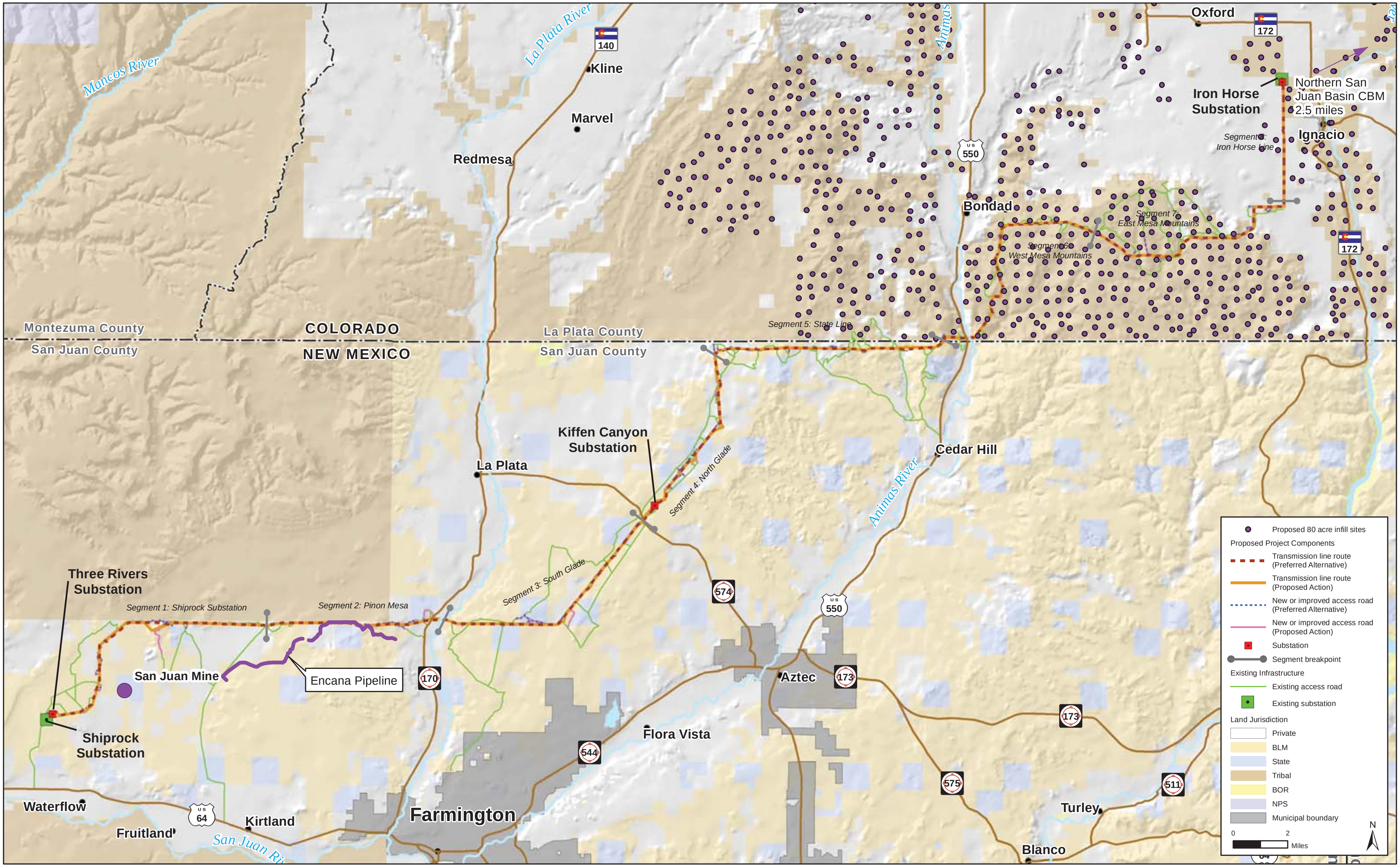
Reasonably foreseeable actions or projects for this cumulative effects analysis were identified through:

- EIS scoping
- Consultation with the BLM FFO and cooperating agencies

Based on this input, the following projects or actions provided in Exhibit 4-1, Reasonably Foreseeable Projects Near the SJBEC Study Area, were identified as reasonably foreseeable. Exhibit 4-2, Map of Reasonably Foreseeable Projects Near the SJBEC Study Area, shows the general location of projects.

**Exhibit 4-1**
## Reasonably Foreseeable Projects Near the SJBEC Study Area

| Reasonably Foreseeable Project | Description | Status |
|---|---|---|
| Encana Proposed Natural Gas Pipelines | These two connecting proposed natural gas pipelines would be built on lands managed by the BLM FFO along Western's power line near the proposed SJBEC route. | Project not expected until after 2014. |
| Encana Proposed Natural Gas Wells | Encana has proposed to construct 4 to 5 new wells on lands managed by the BLM FFO near the proposed SJBEC route. | Project not expected until after 2014. |
| Oil and Gas Well Development on Lands Managed by the BLM FFO | The 2001 RFD for the 2003 Farmington RMP predicted 16,615 subsurface completions in the NM portion of the San Juan Basin over a 20-year period. In the township areas containing the proposed route, the prediction for average well locations per section ranged from 2 to 3 on the western end of the proposed route to >6 in T30N, R12W. | Since the release of the 2003 RMP, 3,351 wells have been drilled. |
| San Juan Mine Reclamation Project | Reclamation of a closed surface mine involving backfilling, grading, and revegetation. Total mine disturbance covered approximately 5,000 acres. A portion of this mine is located on lands managed by the BLM FFO. | Over 2,000 acres have been reclaimed. Reclamation is ongoing. |
| Northern San Juan Basin Coalbed Methane Project on USFS Lands in the San Juan National Forest | Six companies proposed to drill 284 coalbed methane wells in Archuleta and La Plata Counties, 185 of which would be on federal mineral estate. | ROD released in 2007; construction is ongoing at a rate of 1–2 wells per year. |
| Oil and Gas Well Development on USFS and BLM lands in Colorado | San Juan Public Lands Supplemental Draft EIS/Draft LMP Revision (released in August 2011) predicted 2,954 new wells in the San Juan Public Lands Planning Area in southwestern Colorado. Spacing could vary from 40 acres to 320 acres. | Ongoing. |
| San Juan Public Lands Land Management Plan Revision | Land Management Plan revision for USFS- and BLM-managed lands in Archuleta, Conejos, Dolores, La Plata, Mineral, Montezuma, Rio Grande, and San Juan Counties, Colorado. | Proposed decision date of May 2013. |
| Oil and Gas Well Development on SUIT lands in Colorado | The 2002 Final EIS analyzed a preferred alternative involving the drilling or recompletion of 636 production wells at 160-acre spacing. | Final EIS released in 2002; construction is ongoing at a rate slower than anticipated by the FEIS. As of December 15, 2007, 86 wells had been drilled. |
| SUIT Oil and Gas Infill Development | Infill development of 770 coalbed methane wells at 80-acre spacing/density that involves expansion and drilling on existing well pads throughout the Mesa Mountains. | Programmatic EA finalized in August 2009. Construction is ongoing. |




Source: GIS BLM 2012, GIS Tri-State 2013, GIS SUIT 2012b

Exhibit 4-2 Map of Reasonably Foreseeable Projects Near the SJBEC Study Area

## 4.2 Land Ownership and Use

### 4.2.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Existing land use conditions within and directly adjacent to the study area are influenced by decades of oil and gas development, coal mining, and electrical transmission line development. Access roads with associated right-of-way authorizations connect these land uses and traverse many parts of the study area. Land use planning documents continue to support oil and gas development and the addition of new right-of-way for transmission infrastructure.

**Land Use Study Area**

The proposed study area for Land Ownership and Use is described for the affected environment in Section 3.2, Study Area.

Urban land uses are present near the study area but are a less-dominant feature. The nearest urban areas are the cities of Farmington and Aztec in New Mexico and the Town of Ignacio in Colorado. These areas have experienced modest population growth over the past several decades.

Due to the arid, desert southwest climate, non-urban residential and agricultural land uses have historically located near perennial water sources. The proposed SJBEC Project would encounter residential and agricultural land uses at the La Plata River, Animas River, and in dispersed areas in Colorado.

### 4.2.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Lands in the San Juan Basin support a variety of activities including recreation, agriculture, urban development, and grazing. Land use planning policies guide activities related to these uses. Effects of reasonably foreseeable actions without the SJBEC Project are discussed below.

The San Juan Basin contains significant natural gas reserves. Oil and gas exploration and development began in the basin in the 1920s and have since shaped land use patterns. The basin remains one of the nation’s most important gas suppliers. The primary market for natural gas from the San Juan Basin is California; San Juan Basin natural gas is California’s largest single source. Demand for natural gas is expected to rise in California and nationally, resulting in continued extraction and exploration activities.

As shown in Exhibit 4-1, oil and gas development is expected to continue, and there are several specific projects identified. Between 2002 and 2022, up to 16,615 new wells are expected on BLM-managed lands.[1] Since the 2003 release of the BLM FFO's Resource Management Plan (RMP), 3,351 of those wells have been drilled. A 2002 Final EIS analyzed a preferred alternative that allows for drilling or recompleting 636 oil and gas wells on SUIT lands in Colorado. A 2011 BLM and US Forest Service (USFS) EIS[2] predicted an additional 2,954 wells in the San Juan Public Lands Planning Area in southwestern Colorado. In addition, a 2009 Programmatic EA was completed authorizing up to 770 coalbed methane wells on SUIT lands.[3] A 2007 ROD authorized 284 coalbed methane wells in Archuleta and La Plata Counties.[4]

In order to accommodate and distribute the projected increase in recovered gas resources, an additional 3,600 miles of pipeline is expected throughout the basin.[5] As demand for natural gas increases, new pipelines, access roads, and development sites will create disturbances and result in new right-of-way. Due to a long history of gas extraction and the probability that the majority of new wells will be drilled from existing well pads, additional effects to land uses in the region will likely be minimal.

In addition, northwestern New Mexico, specifically the area surrounding the Shiprock Substation near Farmington, contains several major electrical transmission lines with associated right-of-way grants and easements. Additional upgrades of and expansions to the existing network may be considered in the future, though there are no known specific proposals at this time. Proposed infrastructure expansions could provide improved connections to the energy market in Albuquerque, New Mexico.[6] New solar energy development throughout New Mexico and Arizona may also prompt the need for additional transmission capacity in the

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[1] BLM 2001

[2] BLM 2011

[3] SUIT 2009

[4] BLM 2007

[5] BLM 2001

[6] New Mexico Task Force on Statewide Electricity Transmission Planning 2010

San Juan Basin. Due to the variety of existing utility easements, added transmission capacity may be accommodated in proximity to existing utility corridors, thereby minimizing the effects to land uses.

### 4.2.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The Preferred Alternative would be consistent with applicable land use planning policies. Lands in northwestern New Mexico and southwestern Colorado are heavily dedicated to and affected by oil and gas development, gas pipelines, electrical transmission lines, and related access road right-of-way. The Preferred Alternative would minimally contribute to the cumulative effects to existing land uses in the region.

### 4.2.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.2.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.3 Special Designation Lands

### 4.3.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

There are two specially designated areas in the study area, the Hogback and Cedar Hill Areas of Critical Environmental Concern (ACECs). BLM management prescriptions for the Hogback ACEC are in place to protect sensitive plant species unique to the region. Surface disturbance presents the greatest threat to the plant species; as a result, surface development and off-highway-vehicle use have been historically limited within the ACEC boundary.

**Special Designation Lands Study Area**

The proposed study area for special designation lands is described for the affected environment in Section 3.2, Study Area.

Surface disturbances in the Hogback ACEC have mostly been due to the development of electrical transmission lines, access roads, and the Shiprock Substation. Demand for electricity in the Southwest market has resulted in the construction of new transmission infrastructure and expansion of existing electrical transmission infrastructure. The Shiprock Substation, located in the eastern portion of the Hogback ACEC is a major hub for transmission lines in the region.

Management prescriptions in the Cedar Hill ACEC are designed to protect sensitive cultural resources. Since the ACEC boundary and management prescriptions did not exist prior to 2003, ground-disturbing activities, mainly oil and gas development, are prevalent in the ACEC.

### 4.3.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Lands within and surrounding the Hogback and Cedar Hill ACECs would continue to be influenced by oil and gas development. Since the 1920s, the San Juan Basin has been one of the nation's leading suppliers of natural gas. Oil and gas development activities are more prominent in the Cedar Hill ACEC than in the Hogback ACEC. Many of the wells in the Hogback ACEC are temporarily or permanently abandoned.

Oil and gas development in the Cedar Hill ACEC would continue. To minimize new surface disturbance, management prescriptions for the ACEC require access be accommodated on existing roads. Effects from new drilling are likely to be minimal since most new wells are expected to be drilled from existing well pads.[7]

Threats to sensitive plant species in the Hogback ACEC would continue to be largely from soil-disturbing activities such as off-highway-vehicle use and construction. These effects would be considered to be minimal, since as shown in Exhibit 4-1, soil-disturbing activities in the ACEC are not expected.

### 4.3.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The Preferred Alternative would minimally contribute to the cumulative effects on the ACECs. Within the Hogback ACEC, there are nearly existing access roads, transmission lines, and 26 acres of surface disturbance associated with the existing Shiprock Substation. Approximately 21.3 acres of new surface disturbance would be necessary as part of the Preferred Alternative. Of the total acres that would be disturbed, 20 acres would be for the new Three Rivers Substation. The site of the proposed substation is directly

[7] BLM 2001

north of the existing Shiprock Substation and would be accessible via a network of existing access roads. Management prescriptions in the ACEC require that transmission line projects be considered on a case-by-case basis to minimize effects to sensitive plant species. The Preferred Alternative will follow these management prescriptions to minimize any possible direct, indirect, or cumulative effects to the ACEC.

No new surface disturbance is proposed in the Cedar Hill ACEC as part of the Preferred Alternative; therefore, there is no potential for cumulative effects.

### 4.3.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.3.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative. The only difference is that the Proposed Action would affect 21.6 acres of land in the Hogback ACEC as compared to 21.3 acres with the Preferred Alternative.

## 4.4 Recreation

### 4.4.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Existing conditions have been primarily affected by energy infrastructure, including transmission lines, well pads, and associated access roads. Many of these access roads are used for recreational activities, such as off-highway vehicle use; to gain access to smaller trails for mountain biking and other non-motorized uses; and for hunting.

**Recreation Study Area**

The proposed study area for recreation is described for the affected environment in Section 3.2, Study Area.

### 4.4.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

If the reasonably foreseeable actions directly disturbed recreation areas or altered permanent access to recreation areas, they could permanently affect recreation in the study area. In the study area, there are two designated recreation areas on BLM lands: the Pinon Mesa and the Glade Run Recreation Areas. There are no formally designated recreation areas in the rest of the study area.

A portion of Encana's proposed pipelines would cross the Pinon Mesa Recreation Area. Specific effects are unknown at this time, but it is expected that recreation activities would continue as they do today in the Pinon Mesa area. Additional oil and gas development in BLM-designated recreation areas could increase the number of access roads in the study area. These roads have generally improved recreational access, allowing users to access more remote destinations and providing multiple access points for trails and other routes. New oil and gas development in these areas would likely increase vehicular traffic and the number of people accessing the area to operate and maintain the wells. Noise and disruption from the presence of workers, equipment, and materials could indirectly affect the recreational setting. These activities, however, are infrequent and localized. Therefore these indirect effects to recreational users are not expected to be substantially different than what recreational users experience today from existing energy development.

### 4.4.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The cumulative effects of reasonably foreseeable actions with the Preferred Alternative would be similar to the effects described above. Changes in recreational access and activities resulting from the Preferred Alternative would likely be unnoticeable to the average recreational user, because these recreation areas house similar transmission line infrastructure. The Preferred Alternative would add a transmission line within the Pinon Mesa and Glade Run Recreation Areas; however, the addition of the transmission line would not be expected to reduce recreational opportunities or use in the study area. Permanent indirect effects to recreation could involve noise and disruption of the recreation setting from the presence of workers, equipment, and materials during regular line maintenance. The activities would be infrequent and localized and would not be expected to alter the recreational experience for users.

### 4.4.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.4.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.5 Grazing and Livestock

### 4.5.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

**Grazing and Livestock Study Area**

The cumulative effects study area for livestock grazing is the same area described for the affected environment in Section 3.2, Study Area.

Grazing, which was one of the earliest uses of public lands when the West was settled, continues to be an important use of those same lands today. Livestock grazing now competes with more uses than it did in the past, as other industries and the public look to public lands as sources of both conventional and renewable energy and as places for outdoor recreational opportunities, including off-highway-vehicle use.

Over time there has been a gradual decrease in the amount of grazing that takes place on BLM-managed land, and that trend continues today. Grazing use on public lands has declined from 18.2 million animal unit months (AUMs) in 1954 to 8.3 million AUMs in 2011. In most years, the actual use of these forage areas is less than the amount authorized because forage amounts and demands depend on several factors, such as drought, wildfire, and market conditions.[8] Grazing trends on SUIT and private lands are unknown.

Existing conditions in the study area have been primarily affected by energy infrastructure, including transmission lines, well pads, and associated access roads as well as recreational uses.

### 4.5.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Cumulative effects to livestock grazing are those that permanently affect available forage, water, and land suitable for grazing. Reasonably foreseeable future actions and conditions within the planning area that would likely affect livestock grazing include loss

[8] BLM 2012

of grazing lands to other resource uses such as oil and gas development. In addition, climate change could cause an increase or decrease in temperatures and precipitation, which would affect soil conditions, vegetative health, and water flows and temperature. Such changes would potentially alter forage available for livestock grazing and the AUMs that public lands could support. Specific effects from reasonably foreseeable local projects include:

- **Encana Proposed Natural Gas Wells and Pipelines** – The Encana-proposed gas wells and pipelines fall within the Shumway Arroyo Allotment Management Plan (AMP) on BLM land. The project would temporarily reduce forage during pipeline and well construction and would permanently reduce forage at well sites and access roads. It is not likely that AUMs would decrease from these actions.

- **Oil and Gas Well Development on Lands Managed by the BLM** – Oil and gas well development locally affects grazing where the oil and gas wells, pads, and access roads are constructed. Wells and associated access roads would be constructed in a different study area and at different times then the SJBEC Project. Close coordination with livestock permittees could reduce any localized effects to AUMs.

- **Northern San Juan Basin Coalbed Methane Project on USFS and BLM Lands in Colorado** – The Northern San Juan Basin Coalbed Methane Project is located 2.5 miles outside of the SJBEC study area. Cumulatively, the coalbed methane project would not directly affect grazing within the study area. The coalbed project could indirectly affect grazing operators that graze inside and outside of the study area. Effects in the coalbed area would be similar to those described for oil and gas development on BLM lands.

- **San Juan Public Lands Land Management Plan Revision** – Management plan revisions could provide updated management of grazing on public lands.

- **Oil and Gas Well Development on SUIT Lands** – Cumulative effects to livestock grazing from oil and gas development on

SUIT lands would be similar to those described for oil and gas development on BLM lands.

- **San Juan Mine Reclamation Project** – The San Juan Mine Reclamation Project, located on BLM lands, would provide an opportunity for grazing operators to resume grazing in specific areas within the mine's boundary once the surface is re-vegetated. Grazing would only resume based on BLM and mine concurrence in areas safe for grazing.[9]

### 4.5.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The effect to livestock grazing from the reasonably foreseeable projects and the Preferred Alternative would primarily be the same as identified under the Section 4.5.2, Effects of Reasonably Foreseeable Actions Without the SJBEC Project, above. As discussed in Chapter 3, the forage areas that would be permanently lost as a result of the Preferred Alternative would be small and would have no measurable effects upon grazing capacity (AUMs) or a change in the authorized uses for the allotments.

### 4.5.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.5.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.6 Visual Resources

### 4.6.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

The study area contains a variety of landscapes. It includes elongated bluffs with steep cliffs, rolling hills incised by draws, broad valleys, and table mesas. Dark green pinon and juniper and gray-green shrubs (such as sagebrush) and grasses are found throughout the area. Soil color (browns, beiges, oranges, and grays) varies by location. Power lines and oil and gas pads are common in

**Visual Resources Study Area**

The cumulative effects study area for visual resources is described in Section 3.7.1, Study Area.

[9] BLM 2009

the area. The low, flat alluvial valleys contain substantial rural residential and commercial development.

Past and present actions within and directly adjacent to the study area that have affected visual resources include oil and gas development, coal mining, and electrical transmission line development located in Segments 1 through 4 and Segment 8 (segments are shown in Exhibit 3-3, Study Area). Access roads with associated right-of-way authorizations connect these land uses and traverse many parts of the study area. These actions occur on lands owned and managed by various entities and, therefore, have varying requirements for managing visual resources. All of these actions involve adding artificial elements to the landscape or altering the condition of major landscape features (land, water, vegetation, and structures). Urban land uses are present near the study area but are a less-dominant feature. The nearest urban areas are Farmington and Aztec, New Mexico, and Ignacio, Colorado.

### 4.6.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Reasonably foreseeable projects likely to have the greatest future cumulative effect on visual resources in the study area are those associated with oil and gas development and the San Juan Public Lands Land Management Plan Revision. The San Juan Public Lands Land Management Plan Revision influences land management, which, in turn, affects the preservation and alteration of visual resources. These actions would occur on lands owned and managed by various entities that have varying requirements for managing visual resources. The plan would cover a variety of actions that would involve adding artificial elements to the landscape or altering the condition of major landscape features. It is assumed, however, that the San Juan Public Lands Land Management Plan Revision would maintain or improve the condition of visual resources and would not include land management decisions that allow visual resources to degrade.

Planned oil and gas development in the study area would continue the trend of well pad development that is prevalent in the area.

Development that would occur on BLM lands would be subject to BLM's visual resource management classes[10] and visual requirements which would help to minimize effects to the visual landscape. In general, reasonably foreseeable projects planned in the study area would result in similar effects to visual resources that exist today; only the number of oil and gas wells is expected to continue to increase over time. Specific effects to the key observation points considered in Chapter 3 are unknown, since the locations of future oil and gas wells are unknown.

### 4.6.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The Preferred Alternative combined with other reasonably foreseeable projects would increase the number, density, and visibility of artificial elements in the study area. The incremental effect of altering the visual setting, when combined with similar effects created by other reasonably foreseeable projects, would increase the total area of land affected by energy development projects in the study area.

### 4.6.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.6.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.7 Transportation and Access

### 4.7.1 Existing Conditions and How They Have Been Affected by Past and Present Activities

Existing conditions for the transportation network within and directly adjacent to the study area are influenced by decades of ranching, homesteading, mining, exploration, settlement, and farming. In the twentieth century, oil and gas, coal, and electrical transmission line development has also contributed to the expanding network of highways, county roads, and service roads that crisscross the area. As discussed in the land use section,

**Transportation and Access Study Area**

The cumulative effects study area for transportation and access is described in Section 3.2, Study Area.

[10] See Section 3.7.3.1, BLM Lands, for more information on visual resource management classes.

planning documents for the greater San Juan region continue to provide for oil and gas development and the addition of new right-of-way for transmission line infrastructure.

As is typical for industry-dominated communities of the inter-mountain West, the study area for the SJBEC Project has a diversity of federal, state, county, tribal, and private service roads that connect communities. In addition, secondary routes and main arterial service roads are likely co-located in areas of early ranching, mining, and timber harvesting.

One federal, interstate highway is located within the study area: US 550. Expanded to a four-lane road in the 1990s and early 2000s, this highway services commercial and non-commercial traffic throughout northern New Mexico and southwestern Colorado. State highways include NM 170 and NM 574 and connect the urban communities of Farmington and Aztec to smaller towns and villages in the region. County roads in this area also provide important connections between communities, ranches, and tribal lands.

In addition to numbered and regulated roadways, are hundreds of miles of native-surface, unimproved roads used by ranchers, oil and gas providers, recreationalists, and utility companies. Maintenance schedules and management is highly variable for the majority of these roadways. Due to population growth and the expansion of industry throughout the San Juan Basin, over time, the number of surface roads and their use has increased.

### 4.7.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

As indicated in Exhibit 4-1, most of the reasonably foreseeable development in the study area includes additional oil and gas development. It can be expected that this development would require improvements to existing access roads or construction of new access roads. Within the study area, however, there is a well-developed network of existing roadways. In many cases, oil and gas developers would try to use or modify existing roadways to limit the need for new roadway construction.

Additional effects of increased traffic to existing roads and highways in the region would likely be minimal since roadway congestion is not a substantial issue.

### 4.7.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

Approximately 86 percent of the access roads needed to support the Preferred Alternative could be fulfilled by existing roads that need little or no improvement. This minimizes the need to disturb undisturbed areas. The 14 percent that would be new roads are mostly short spurs that average 250 to 500 feet in length that would generally dead-end at structure locations. Further, lands in northwestern New Mexico and southwestern Colorado are heavily dedicated to, and affected by, oil and gas development, gas pipelines, electrical transmission lines, and related access road right-of-way. Therefore, the Preferred Alternative would minimally contribute to the cumulative effects to transportation uses in the region.

During operation, maintenance crews and vehicles would conduct periodic inspection and maintenance activities. Detailed ground inspections of the entire transmission line system would take place on a semi-annual or annual basis. A crew with a service vehicle, typically a bucket truck, and four-wheel-drive trucks or all-terrain vehicles would patrol the line and make necessary repairs. In addition, access roads would be used to access the transmission line in instances where emergency repairs are required. These activities would have no measurable effect on long-term traffic volumes in the study area.

### 4.7.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.7.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

# 4.8 Geology and Geologic Hazards

## 4.8.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

The study area has been heavily influenced by decades of oil and gas development, coal mining, and electrical transmission line development. Energy infrastructure that has had an effect on the study area's geology primarily includes wells and mines. Oil and natural gas wells tend to be very deep and may cross many geologic layers. Underground mining in the San Juan Mine near Segment 1 (segments are shown in Exhibit 3-3, Study Area) has created the potential for subsidence. There are also regions near the project area where surface mining removed portions of the outcropping rock, although much of the land is being reclaimed. There are no indications of large scale disturbance from these activities.

**Geology and Geologic Hazards Study Area**

The study area is the same as described in Section 3.2, Study Area.

## 4.8.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

New wells are planned in the study area for the Encana Proposed Natural Gas Wells Project, Northern San Juan Basin Coalbed Methane Project, and oil and gas well development on USFS, BLM, BLM FFO and SUIT lands. Exhibit 4-1 lists the status and number of wells covered in these proposals. The exact locations of these wells are unknown. In addition, as shown in Exhibit 4-2, coalbed methane wells are expected to be drilled in southwestern Colorado on USFS and SUIT lands in southwestern Colorado. Depending on the number of wells and their relationships with nearby landforms, they could destabilize portions of the underlying bedrock. Additionally, new access roads may be required, and maintenance equipment and drill rigs would increase the load on the subsurface. As more projects are sited to avoid geological hazards, suitable siting locations may become increasingly occupied, thereby forcing future projects towards areas of greater geological hazard.

## 4.8.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The Preferred Alternative would disturb some portions of the underlying bedrock during construction. The transmission line structure foundations are expected to extend 20 feet below the ground surface, which is relatively shallow in comparison with the gas and oil wells from the abovementioned projects. The Preferred Alternative would not pose a hazard to the stability of landforms, since the project would be designed and built to minimize potential hazards.

### 4.8.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.8.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.9 Paleontology

### 4.9.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Past and present actions have potentially affected paleontological resources in the vicinity of the project study area by disturbing paleontologically sensitive geologic units. Direct effects to paleontological resources can be caused by ground-disturbing activities such as road construction, clearing and leveling well pad or transmission tower sites, pipeline trenching, or mine excavation. These activities can damage paleontological specimens and lead to the loss of associated data. Permanent indirect effects include increased potential for vandalism or unauthorized collection of paleontological resources from increased access.

**Paleontology Study Area**

The cumulative effects study area for paleontology is the same as described for the affected environment in Section 3.2, Study Area.

### 4.9.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Reasonably foreseeable actions that include ground-disturbing activities on geologic units with moderate to very high sensitivity (PFYC 3, 4, or 5)[11] for paleontological resources would occur with or without the SJBEC Project. Reasonably foreseeable actions that could have cumulative effects to paleontological resources include the Encana pipeline, oil and gas well development on lands managed by the BLM FFO, oil and gas well developments on BLM

[11] Please see the Section 3.10, Paleontology, for more information on the Potential Fossil Yield Classification (PYFC) numbers.

lands in Colorado, oil and gas well development on SUIT lands in Colorado, and SUIT oil and gas infill development. These projects could have similar effects to paleontological resources as described above in Section 4.9.1, Existing Conditions and How They Have Been Affected by Past and Present Actions.

### 4.9.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The effects to paleontological resources from the reasonably foreseeable projects and the Preferred Alternative would be similar to those identified above in Section 4.9.2, Effects of Reasonably Foreseeable Actions Without the SJBEC Project. Environmental Protection Measures (EPMs) will be implemented to avoid or minimize possible effects to paleontological resources, which will reduce the potential for cumulative effects to paleontological resources.

### 4.9.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.9.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.10 Minerals

### 4.10.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

As described in detail in Section 3.11, Minerals, mineral resources have long been important to the economic and employment base of the Four Corners area and San Juan Basin. More than 30,000 oil and gas wells have been drilled, millions of tons of coal extracted, and hundreds of thousands of cubic yards of aggregate and construction materials (rock, gravel, sand) extracted. In addition, more than 300 miles of high-voltage electric transmission lines have been constructed to export generated electric power out of the region. Many of these and past and present actions or activities have occurred near, but not within, the SJBEC Project right-of-way. Mineral rights along much of the SJBEC Project right-of-way have been leased to mining companies (in Segment 1) or to oil and gas operators (Segments 2 through 7), and much of the proposed

**Minerals Study Area**

The study area for cumulative effects is the same as described in Section 3.2 Study Area.

transmission line route follows existing access roads built and maintained to support oil and gas operations. Approximately half of the proposed transmission route parallels existing 345 kV and 115 kV transmission lines, each of which has accommodated mineral and mining industry use of access roads.

### 4.10.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

There are many proposals and plans for additional development of mineral resources within the San Juan Basin, including some located near the study area. The following proposed projects could potentially add to cumulative effects of past and present actions as identified in Exhibit 4-1.

- Encana Proposed Natural Gas Wells and Pipelines
- Oil and Gas Well Development on Lands Managed by the BLM FFO
- San Juan Mine Reclamation Project
- Northern San Juan Basin Coalbed Methane Project on USFS Lands in the San Juan National Forest
- Oil and Gas Well Development on USFS and BLM Lands in Colorado
- Oil and Gas Well Development on SUIT Lands in Colorado
- SUIT Oil and Gas Infill Development

The cumulative result of these proposed projects would involve greater extraction of mineral resources (especially coal, oil, and natural gas) from the San Juan Basin, along with the added economic stimulus to local, regional, and state economies. These projects would also further deplete existing reserves of mineral resources, since all are finite, and once extracted cannot be replaced.

### 4.10.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

As described in detail in Section 3.11, Minerals, construction of the Preferred Alternative would involve temporary disturbance or occupancy of approximately 800 acres along the proposed right-of-way for construction of the transmission line, substations, and access roads, making this area briefly unavailable for mineral resource development. Permanent displacement or disruption and use of potential mineral resource surface area resulting from the Preferred Alternative would total approximately 182 acres. The Preferred Alternative would not directly or indirectly encourage expansion of mineral resources, increase mineral or mining use or extraction, or significantly reduce use of these resources.

Compared with the hundreds of thousands of acres currently used and millions of acres potentially available for future mineral resource development within the San Juan Basin, the Preferred Alternative would minimally contribute to cumulative effects of past, existing, and foreseeable future resource use within the San Juan Basin.

### 4.10.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.10.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative. The only difference is that Proposed Action would temporarily affect 827 acres during construction and 183 acres permanently. As described in Section 4.10.3, this would minimally contribute to cumulative effects to minerals.

## 4.11 Soils

### 4.11.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

The study area has been heavily influenced by decades of oil and gas development, coal mining and electrical transmission line development. Energy development is primarily composed of pipelines and well heads. Pipelines are typically buried at a shallow depth and only require excavation that is slightly wider than the pipe diameter. Wells extend to great depths, but the surface footprints are relatively small with limited soil disturbance. Along with the existing transmission lines in the area, the wells and pipelines require access roads for construction and maintenance, which also disturb area soils.

**Soils Study Area**

The study area is the same as described for the affected environment in Section 3.2, Study Area.

Effects to soils from these actions include soil loss and erosion. The underlying soil has been compacted, and drainage routes and runoff rates may have been altered over time.

### 4.11.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

New wells are planned in the study area for the Encana Proposed Natural Gas Wells Project, Northern San Juan Basin Coalbed Methane Project, and oil and gas well development on USFS, BLM, BLM FFO and SUIT lands. Exhibit 4-1 lists the status and number of wells covered in these proposals. The exact locations of these wells are unknown. In addition, as shown in Exhibit 4-2 coalbed methane wells are expected to be drilled in on USFS and SUIT lands in southwestern Colorado. Depending on the number of wells and their locations, their construction could disturb soil in the study area. In addition, new access roads may be required and would result in soil disturbance.

A portion of the Encana Proposed Natural Gas Pipelines is planned to be constructed in the study area. This would disturb soil and require excavation for the pipe. Over time, the natural conditions are expected to be restored, but the pipeline could be unearthed for maintenance. Effects could include erosion and soil compaction from construction vehicles on access roads; however, since the surface footprint is relatively small, no long-term effects to the soil environment are expected.

The San Juan Mine Reclamation Project is being developed in the study area and includes backfilling, grading, and revegetating approximately 5,000 acres of surface mines. This will help restore the land to its original condition.

### 4.11.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The Preferred Alternative is not expected to have an adverse cumulative effect to soils. The Preferred Alternative proposes to share existing access roads where feasible to minimize development and soil disturbance. In addition, EPMs listed in Exhibit 2-23, Environmental Protection Measures, will be employed during project design and construction to minimize possible soil effects related to erosion and ground disturbance.

### 4.11.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.11.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.12 Farmlands

### 4.12.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Existing conditions in the study area have been primarily affected by energy development infrastructure including well pads, transmission lines, and access roads. These activities have affected farmlands through farmland fragmentation, permanent farmland loss through conversion into non-farmland uses, restriction of farmland access or operation, and farmland soil degradation from erosion or compaction.

**Farmlands Study Area**

The cumulative effects study area for farmlands is the same as described for the affected environment in Section 3.2, Study Area.

### 4.12.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Oil and gas well development on SUIT lands may affect area farmlands, depending on where the development is located. Potential effects include removing farmland from production, fragmenting farmland parcels, restricting access to or farmland activities on farmland parcels, and erosion or compaction of farmland soils. In addition to oil and gas well development, associated access roads, well pads, and other infrastructure could affect farmland.

As more projects are developed in the area, siting to avoid farmland could become increasingly difficult, and suitable siting locations may become increasingly occupied, thereby limiting future siting location options.

### 4.12.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The effect on farmland from the reasonably foreseeable projects and the Preferred Alternative would primarily be the same as identified above under Section 4.12.2, Effects of Reasonably Foreseeable Actions Without the SJBEC Project. The Preferred Alternative would not affect a large area of productive farmland, nor would it preclude agricultural operations in the area; so the potential for cumulative effects is minimal.

### 4.12.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.12.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.13 Water Resources and Wetlands

### 4.13.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

The effects of past and present activities in the study area to surface waters include reduced water quality likely as a result of irrigation runoff from agricultural activities, inadequate septic systems located near the rivers, organic wastes from ranching activities, roads, residential areas, and oil and gas and energy development located close or adjacent to the rivers. Sedimentation and siltation in the La Plata, Animas, and San Juan Rivers come from a combination of natural erosion processes and soils disturbed by developments in the region. Section 3.14.3.5, Water Quality, describes impaired surface waters in the study area.

**Water Resources and Wetlands Study Area**

The proposed study area for Water Resources and Wetlands is described in Section 3.14.1, Study Area.

Access roads to existing gas well pads, electrical transmission lines, substations, power generation facilities and other infrastructure in the San Juan River Basin frequently pass through the floodplains of the numerous arroyos located in Segments 1 through 4 of the study area (segments are shown in Exhibit 3-3, Study Area). These access roads are designed in such a manner as to allow flood events to occur naturally without causing noticeable effects.

Wetlands located in Segments 7 and 8 have been somewhat fragmented by roads and ditches. These wetlands appear to be healthy and functional and to have experienced little degradation from past and present actions in and around the study area.

### 4.13.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Future gas well development on BLM and SUIT lands and the ground disturbance associated with their construction and operation are the predominant reasonably foreseeable activities in the region that might contribute effects to surface waters and wetlands. The potential effects to surface waters would be increased sedimentation and siltation from soil disturbance and an increased potential for contamination by chemicals, such as fuel and lubricants, used by equipment and vehicles during construction and operation. The effects of these projects would be reduced by siting roads and well pads to avoid waterbodies and wetlands. Access roads would be designed to maintain natural drainage patterns in the area to allow flood events to occur without causing noticeable effects. These activities are not expected to affect groundwater or floodplains.

The regulatory requirements in place for these future developments have a demonstrated record of success in reducing these effects to negligible in nearby perennial waters, when compared to the effects of natural processes and sampling data in the La Plata, Animas, and San Juan Rivers (see Section 3.14.3.5, Water Quality, for a description of water quality.)

### 4.13.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The potential effects to water resources in the region from other reasonably foreseeable actions, when combined with the Preferred Alternative, may have some potential to contribute to the impairment of surface water resources. With the high degree of erosion protection measures that are applied to projects as a standard practice in the region, the effects of the Preferred Alternative, when combined with these other future projects in the region, would not be expected to contribute noticeably to the impairment of area surface waters. Contamination of water resources by accidental spills of hazardous fluids would not be expected to result in measurable adverse effects. Possible cumulative effects to groundwater would not occur, since the project would not permanently affect groundwater.

Floodplains would not be noticeably affected by the project and therefore would have no cumulative effect when combined with other reasonably foreseeable actions in the study area.

The Preferred Alternative would not result in any loss of wetlands and therefore would have no cumulative effect when combined with other reasonably foreseeable actions in the study area.

### 4.13.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.13.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.14 Vegetation

### 4.14.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Oil and gas development, coal mining, and electric power transmission are the past and present actions that have had the greatest effect on vegetation. Critically, this has included clearing vegetation for roads, wells, mines, and other infrastructure, resulting in habitat loss and fragmentation, along with the spread of noxious weeds along access roads and in disturbed areas. The San Juan Coal Mine alone occupies approximately 5,000 acres, much of which has been cleared of vegetation. Several special status plants such as the Mesa Verde cactus, Aztec gilia, and Brack's hardwall cactus may have been affected by these past actions. Human-caused fires can lead to habitat loss and consequent increases in invasive species. Grazing, farming, and increased use of previously remote areas due to access roads have also caused direct loss of habitat and habitat fragmentation. In general, however, a large majority of the study area and region remains relatively undisturbed with native vegetation.

**Vegetation Study Area**

The proposed study area for Vegetation is described in Section 3.2, Study Area.

### 4.14.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Future oil and gas well development—along with the accompanying loss of native plants, potential habitat fragmentation, and the potential for increasing the distribution of noxious weeds—is the primary reasonable foreseeable activity in the region that would affect vegetation. These effects would be similar to those described above in Section 4.14.1, Existing Conditions and How They Have Been Affected by Past and Present Actions. Known populations of Mesa Verde cactus and its habitat in the general area would continue to be protected from development by the BLM's Hogback ACEC located just west of Segment 1 (segment locations are shown in Exhibit 3-3, Study Area). Reclamation of the San Juan Mine, however, would ultimately reestablish native vegetation across nearly 5,000 acres that are presently disturbed or void of plants.

### 4.14.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The cumulative effects of the Preferred Alternative combined with other past, present, and reasonably foreseeable actions within the study area would be similar to those discussed above in Section 4.14.1, Existing Conditions and How They Have Been Affected by Past and Present Action. The Preferred Alternative would incrementally reduce and fragment vegetation in the study area. These reductions would permanently affect approximately 182 acres and temporarily affect approximately 800 acres, which would not be expected to lead to substantial loss of plant communities. Further, the plant communities that would be affected in the study area are common across the region. A major factor offsetting these effects is siting the transmission line adjacent to previously disturbed areas, including other transmission lines, oil and gas facilities, and existing access roads, for example. Locating the Preferred Alternative near existing infrastructure would limit effects to special status plant species and those that may result from the spread of noxious weeds.

### 4.14.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.14.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative. The only difference is that the Proposed Action would permanently affect approximately 183 acres (as compared to 182 for the Preferred Alternative) and temporarily affect 827 acres (as compared to 800 for the Preferred Alternative).

These differences are minor, and the potential for cumulative effects would be similar for the two alternatives.

## 4.15 Fish and Wildlife

### 4.15.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

**Fish and Wildlife Study Area**

The proposed study area for cumulative effects for fish and wildlife is described in Section 3.16.1, Study Area.

Fish species and fish habitats would not be permanently affected by the SJBEC Project and are, therefore, not described in detail below. Wildlife and special species habitat in the study area consists of large expanses of scrub-shrub habitat, pinon and juniper woodlands, wetlands and riparian areas, rivers, and agricultural areas.

Wildlife, including special species, found in the study area is currently subject to the effects of existing transmission lines and considerable development related to oil, gas, and mining. Infrastructure development includes both linear features such as power lines, access roads, and oil and gas pipelines, and nonlinear features such as fossil fuel exploration and extraction. Linear features have resulted in irretrievable losses of habitat, habitat fragmentation, and the spread of invasive species along access roads and disturbed areas. Transmission lines increase risks to bird species from electrocution and collisions. Power line structures also provide perches and nesting substrates for avian species, which can benefit raptors and ravens, and facilitate predation of other species such as prairie dogs. The presence of access roads is associated with increased risk of mortality from collisions with vehicles, which can lead to the loss of habitat and introduction of invasive species. Changes in habitat and other environmental variables, such as noise resulting from human disturbance and presence, may also influence wildlife behavior during key periods such as breeding, rearing, and overwintering.

Nonlinear features can disrupt wildlife behavior due to associated disturbance from human activities and direct loss of habitat. Finally, grazing, farming, and residential development, though limited in the study area, have caused direct loss of habitat and habitat fragmentation.

### 4.15.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Future gas well development on BLM and SUIT lands and the ground disturbance associated with construction and operation are the predominant reasonably foreseeable activities in the region that would contribute effects to wildlife and habitat. Considerable oil and gas development is planned for the coming years. The effects to wildlife and habitat from future linear and nonlinear infrastructure would be similar to the effects described in 5.15.1, Existing Conditions and How They Have Been Affected by Past and Present Actions. While most of the these reasonably foreseeable actions would likely lead to a reduction in wildlife and wildlife habitat, the planned closure and restoration of the San Juan Mine would reestablish approximately 5,000 acres of previously disturbed habitat, which would likely draw wildlife to the area.

### 4.15.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The Preferred Alternative would contribute effects to wildlife and habitat in similar ways for linear features as described above in Section 4.15.1. When combined with other reasonably foreseeable projects, the Preferred Alternative would contribute to continued loss of wildlife and habitat in the region. In relation to past development and future proposed development, the footprint of the proposed project is relatively small; it is estimated that 800 acres would be temporarily disturbed, and 182 acres would be permanently disturbed. The disturbance and habitat loss is offset somewhat by siting a large portion of the proposed transmission line immediately adjacent to existing transmission lines and existing oil and gas development to minimize the need to construct new roads. The transmission line will be co-located near other transmission line features in Segments 1through 4, and it will be built on existing poles in Segment 8 (segments are shown on Exhibit 3-3, Study Area). Co-located transmission lines may also have lower collision rates for birds than isolated transmission lines, as the overall visibility of multiple lines in proximity aids visual detection and avoidance of the lines by birds.[12, 13] The Preferred Alternative is not expected to present a detriment to any species at the population level.

### 4.15.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.15.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.16 Cultural Resources

### 4.16.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

**Cultural Resources Study Area**

The study area for cumulative effects on cultural resources is the same as described in Section 3.17.1, Study Area.

Much of the study area has been heavily developed by industry. This means the study area already contains well pads, pipelines, access roads, and transmission lines which may have affected the cultural resources within it. The past actions that have had the most effect on cultural resources are likely the development of access roads needed to support existing industrial development including well pads, pipelines, and transmission lines. In some cases, access roads have been constructed within archaeological sites. Although the major prehistoric features and structures have rarely been affected, some roads cross areas containing cultural materials, resulting in diminished historic integrity. These past actions—particularly road construction—may have also resulted in increased traffic and visitation to archaeological sites, some of which exhibit evidence of vandalism or inappropriate collection and excavation.

### 4.16.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

A number of ongoing and future projects have the potential to affect cultural resources in the study area even if the SJBEC Project is not completed (see Exhibit 4-1). These projects are related to natural gas exploration and expansion, construction of new gas infrastructure, and mine reclamation. While agencies and project proponents will, in most cases, have to consider the effects of these

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[12] PSC 2011

[13] RUS 2013

projects on cultural resources under federal and state statutes, these projects serve to illustrate the degree to which the study area is, and will continue to be, affected by the expansion of industry infrastructure. Most importantly, access roads that cross archaeological sites are used by a wide variety of users including the public and various entities associated with electrical transmission, mining, and oil and gas development. As a result, many of these access roads will require ongoing upgrades or maintenance associated with other users and undertakings. In addition, new oil and gas development related to well pads or new pipelines proposed in the area would require additional ground disturbance and additional roads to access the sites. Given the number of potential cultural sites in the study area, it is likely that reasonably foreseeable projects could affect cultural resources in the area. These effects could include direct effects, such as construction within the boundaries of a cultural site. Most of the proposed development, however, is expected on federal lands managed by the BLM or the SUIT, and would be subject to requirements of the National Historic Preservation Act, which would likely serve to avoid, minimize, or reduce potential effects to cultural resources.

### 4.16.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The construction of new roads and possibly transmission structures may affect a number of cultural resources in the area. These effects would be mitigated as discussed in Section 3.17, Cultural Resources, and include a variety of monitoring and avoidance measures to be determined on a site-by-site basis, as well as testing or data recovery along access roads. In general, the Preferred Alternative would continue the trend that energy development has had on cultural sites as described above in Section 4.16.1, Existing Conditions and How They Have Been Affected by Past and Present Actions.

### 4.16.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have similar effects as described in Section 4.16.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative. The only difference is that the Proposed Action would affect 48 cultural sites as compared to 36 for the

Preferred Alternative, so the Proposed Action would have a greater effect to the cultural landscape than then Preferred Alternative.

## 4.17 Air Quality, Climate Change, and Greenhouse Gases

### 4.17.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Air quality in the region remains in attainment with federal ambient air quality standards for all regulated criteria pollutants. The region has seen increases, however, in ozone, nitrogen oxides, and particulate matter over the past decade. These increases are attributed to oil and gas operations, power plants, and general growth in the region. According to a programmatic environmental assessment for an oil and gas project on SUIT lands, over 30,000 natural gas and oil wells have been drilled in the San Juan Basin in Colorado and New Mexico.[14] The area contains natural gas processing, refining and treatment plants; several large coal-fired generating stations and other non-coal-fired power plants. These sources all contribute criteria pollutant and greenhouse gas emissions to the region. The Four Corners Air Quality Task Force, which was formed in 2005 to address air quality issues in the study area, identified rapid industrialization from increased development of oil, gas, and coal resources as a major cause of rising levels of these pollutants, including ozone concentrations that are approaching the national ambient air quality standard. Additional concerns include visibility impairment in Class I[15] areas and mercury emissions from coal-fired power plants.[16] While no correlation between specific greenhouse gas–producing actions and climate change effects can be made, sources such as these have contributed to increasing global levels of greenhouse gases and global climate change.

**Air Quality, Climate Change, and Greenhouse Gases Study Area**

The cumulative effects study area for air quality and climate change is the same as described in Section 3.18.1, Study Area, and includes air pollution sources that affect air quality within the study area: primarily oil and gas activities and power generation.

[14] SUIT 2009

[15] See Section 3.18, Air Quality, Climate Change, and Greenhouse Gases, for more information on Class I areas.

[16] Four Corners Air Quality Task Force 2007

### 4.17.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

The reasonably foreseeable actions in the region, listed in Exhibit 4-1, would result in a cumulative increase in fugitive dust from surface disturbances and criteria pollutants from vehicle and equipment emissions associated with construction and operation. These activities would produce temporary, localized, and intermittent effects. These actions would occur over a wide area at varying times and are unlikely to produce cumulatively localized fugitive dust emissions. The large number of oil, natural gas, and coalbed methane wells proposed or under development would contribute to the ongoing air quality trends described above under existing conditions. These actions would have the potential to cumulatively increase ambient air concentrations of regulated pollutants.

In addition to the reasonably foreseeable actions described in Exhibit 4-1, a number of actions are being proposed in the region to reduce air pollutant emissions from oil and gas production and power plants and reverse air quality trends described above. The BLM has placed emission limits on new and replacement internal combustion gas field engines for oil and gas development on lands within its jurisdiction. Colorado has implemented regulations requiring retrofitted controls on oil and gas emission sources and stringent emissions standards for new and relocated reciprocating internal combustion engines. In addition, the Arizona Public Services Company is proposing to shut down three units at the Four Corners Coal-Fired Power Plant, one of the largest power plants in the US, by 2014 and install pollution control upgrades on two other units.[17] Similarly, the Public Service Company of New Mexico plans to shut down two units at the San Juan Generating Station by the end of 2017 and install nitrogen-oxide reducing technology on the remaining two units by 2016.[18] Actions such as these would help reduce emissions and visibility impairment at Class I areas in the study area.

While it is not possible to directly correlate emissions of greenhouse gases to specific local or regional impacts on climate change, energy

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[17] Federal Register 2012.

[18] PNM 2013

generation has been identified as one of the major contributors of greenhouse gas emissions in Colorado and New Mexico and in the US. Reasonably foreseeable actions that contribute toward Colorado or New Mexico greenhouse gas reduction goals may have a beneficial climate change effect while cumulative actions that increase greenhouse gas emission levels may have a negative effect on climate change.

### 4.17.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The Preferred Alternative would not have an appreciable long-term direct or indirect cumulative effect to air quality in the study area. Construction and maintenance activities associated with the Preferred Alternative would introduce short-term temporary sources of fugitive dust and equipment emissions. The long-term emissions would have a negligible incremental effect to air quality in relation to ongoing and proposed oil and gas development and power plant operations in the region. The transmission line and substations associated with the Preferred Alternative would not produce emissions because the Preferred Alternative does not include new generation.

The Preferred Alternative would not have an appreciable long-term direct or indirect cumulative effect on climate change.

### 4.17.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.17.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.18 Noise and Vibration

**Noise and Vibration Study Area**

The cumulative effects study area for noise and vibration is described in Section 3.19.1, Study Area.

### 4.18.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Current sources of noise and vibration within and directly adjacent to the study area include:

- Oil and gas development
- Electrical transmission lines and substations

- Highway traffic and heavy vehicle traffic on the network of access roads providing access to well pads, transmission line tower structures, and substations

These noise and vibration sources have existed for several decades. Accordingly, noise effects from each of these sources are long established and would likely continue to affect the noise and vibration environment within the study area well into the future.

#### 4.18.1.1 Oil and Gas Development

Oil and gas exploration and development in the San Juan Basin began in the 1920s and affected the ambient noise conditions throughout northern New Mexico and southern Colorado since then. Permanent noise produced from oil and gas development includes noise from operating compressors and from vehicle traffic traveling to and from the well pad sites. Demand for natural gas is expected to rise nationally, resulting in continued extraction and exploration activities.

#### 4.18.1.2 Existing Transmission Lines

Northwestern New Mexico, specifically the area surrounding the Shiprock Substation near Farmington, contains several major electrical transmission lines. High voltage transmission lines produce corona noise, which is a crackling sound emanating from the line. Corona noise levels are greater for higher voltage lines, in wet conditions, and at higher elevations. Noise effects to sensitive noise receptors adjacent to large lines are most prominent during rain events and during nighttime hours when ambient noise levels are lower. In this area, there are, on average, 56 days per year with measureable precipitation.[19] Assuming 50 percent are nighttime rain events, corona noise from the 345 kV line could exceed existing background noise levels 28 nights per year on average, equivalent to less than 8 percent of all nighttime hours in a given year. An existing 345 kV line that originates at the Shiprock Substation and travels northeast before crossing into Colorado is capable of producing audible noise from corona. Two residences are in proximity to the line where it crosses NM 170 and may experience corona noise effects from the transmission line, especially during precipitation events.

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[19] Western Regional Climate Center 2012

Transmission lines also produce Aeolian noise when wind blows through structures. Receptors that could experience Aeolian noise effects are located where an existing 345 kV line crosses NM 170 and along the existing Iron Horse Line in La Plata County, Colorado. Cumulative effects from Aeolian noise on sensitive receptors are more infrequent and generally fewer than effects from corona noise.

#### 4.18.1.3 Transportation and Access Routes

Highway traffic is a significant noise source, especially when a route is heavily used by trucks. Three major highways are present in the study area: NM 170, NM 574, and US 550. Sensitive noise receptors located adjacent to these routes experience higher average ambient noise levels than do receptors located further away from the routes.

County, local, tribal, and various access roads also contribute to area noise, and to a lesser extent, vibration levels. Heavy vehicle travel to oil and gas wells and industrial land uses are prominent noise sources.

### 4.18.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

For the foreseeable future, cumulative noise effects have and will result mainly from the construction, operation, and maintenance of oil and gas wells, transmission line infrastructure, and transportation routes. Cumulative vibration effects are more limited to the construction of oil and gas wells and heavy vehicle traffic on uneven roads during construction and maintenance activities.

As shown in Exhibit 4-1, new oil and gas development and extraction activities are planned in the San Juan Basin area, so noise effects from compressors and vehicle traffic would continue and likely increase in number in the future.

Vibration effects from oil and gas development are expected to be minimal, since vibration effects above the threshold of human perception are generally temporary and confined to construction activities such as drilling and blasting. Heavy vehicles travelling on rough roads can produce vibration levels above 65 VdB if access roads are not properly maintained. Because of this, possible cumulative effects from vibration are expected to be minimal and similar to current conditions.

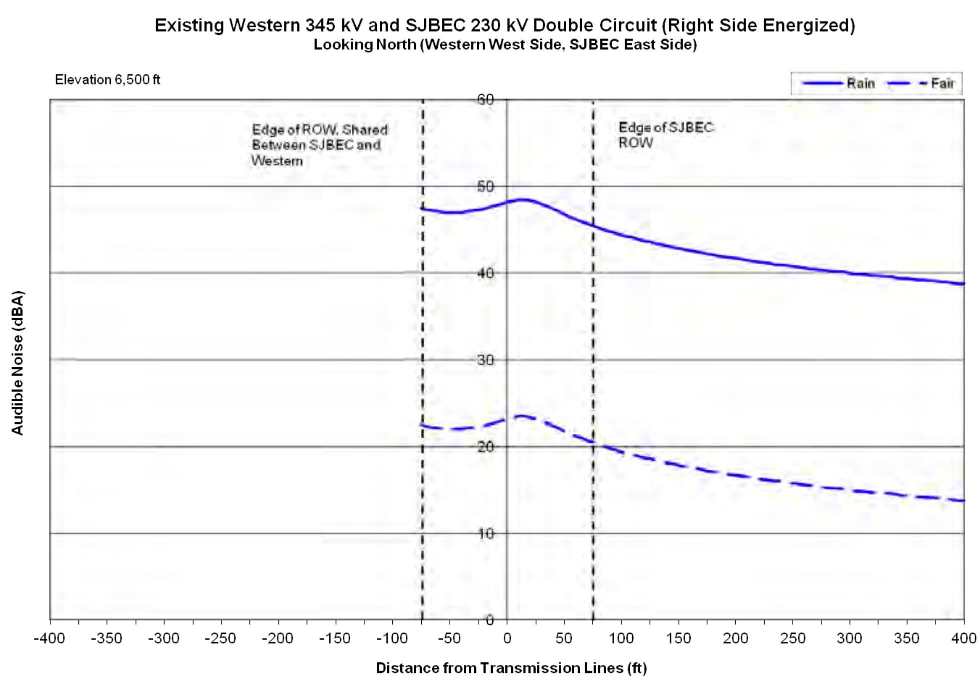
### 4.18.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The Preferred Alternative would minimally contribute to the existing noise and vibration environment.

During operation, the Preferred Alternative would generate corona noise. Cumulative effects from corona noise would be negligible in most portions of the study area because of existing higher voltage lines and other noise sources. For Segments 1 through 3 (segments are shown in Exhibit 3-3, Study Area), the line would parallel Western's existing 345 kV line; any corona noise from the proposed 230 kV line would be less than corona noise from the existing 345 kV line, as shown in Exhibit 4-3, Corona Audible Noise for Segments 1 through 3 with Western 345 kV Line and Proposed 230 kV Lines for the Preferred Alternative.

**Exhibit 4-3**

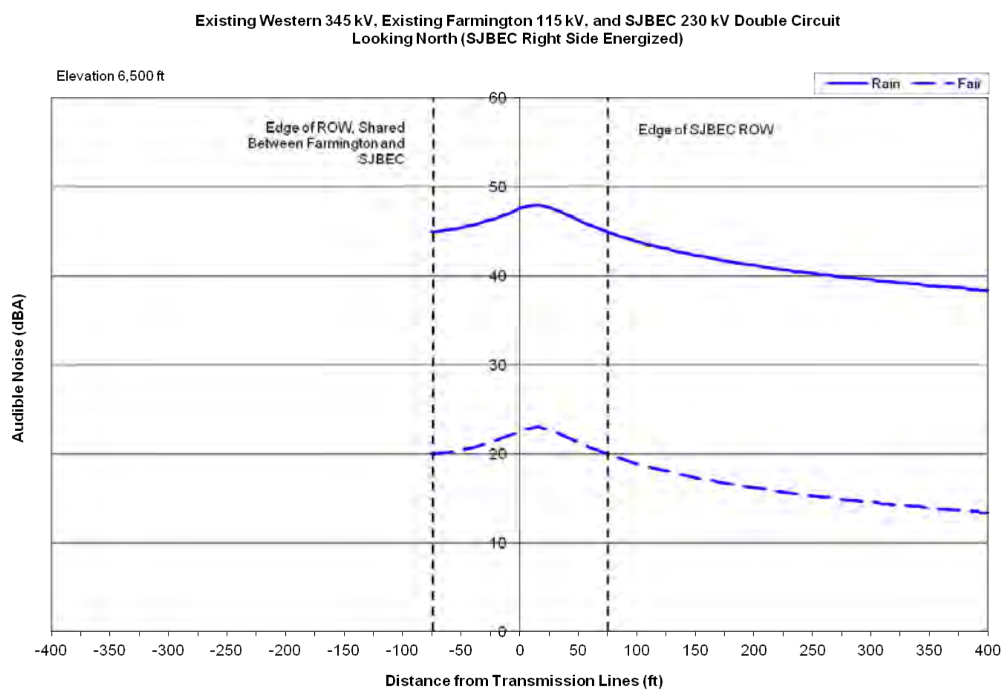
**Corona Audible Noise for Segments 1 through 3 with Western's 345 kV and Proposed 230 kV Lines for the Preferred Alternative**




For Segment 4, the line would also parallel an existing City of Farmington 115 kV line as well as Western's 345 kV line. The proposed 230 kV transmission line for the Preferred Alternative would be located adjacent to the City of Farmington's 115 kV line. The corona noise from Western's existing 345 kV line would be greater than the corona noise from the proposed 230 kV line. The expected noise level at the edge of the shared right-of-way is shown in Exhibit 4-4, Corona Audible Noise for Segment 4 and Western's 345 kV, City of Farmington's 115 kV, and Proposed 230 kV Lines for the Preferred Alternative.

**Exhibit 4-4**

**Corona Audible Noise for Segment 4 and Western's 345 kV, City of Farmington's 115 kV, and Proposed 230 kV Lines for the Preferred Alternative**




Corona noise along Segment 8, where the 230 kV line would share the same poles as the existing 115 kV line, is evaluated and discussed in Section 3.19, Noise and Vibration.

Noise sources from maintenance activities could include truck traffic, repair activities on the line, and helicopter operation. Maintenance activities associated with the Preferred Alternative could contribute to temporary cumulative noise effects to sensitive receptors. The combination of maintenance traffic for expanding oil and gas well operations and the numerous existing and proposed transmission lines could result in higher and more sustained noise levels along key access roads. Because maintenance-related noise-generating activities associated with the Preferred Alternative overlap with comparable activities already taking place in the area, cumulative effects would likely be minimal.

Maintenance activities associated with the Preferred Alternative could also produce cumulative vibration effects on sensitive receptors. Heavy vehicle traffic on an uneven road has a vibration level of 72 VdB, which is above the threshold of human perception. On a paved road, vibration from a moving truck is below the typical level of human perception.[20] The combination of equipment needed to construct and maintain expanding oil and gas well operations and the numerous existing and proposed transmission lines could cause more frequent vibration effects along key access roads. Vibration effects would likely be greater along access roads that are not properly maintained.

### 4.18.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.18.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.19 Electric and Magnetic Fields

### 4.19.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Existing substations and transmission and distribution power lines are existing sources of electric and magnetic fields in the study area. These sources were described in Section 3.20, Electric and Magnetic Fields, and create localized electric and magnetic fields. The levels of the electric and magnetic fields decrease dramatically with distance beyond the right-of-way for transmission or distribution lines and beyond the fence line of substations.

**Electric and Magnetic Fields Study Area**

The study area for cumulative effects is the same as described for electric and magnetic fields in Section 3.2, Study Area.

As additional sources of electric and magnetic fields have been developed over the years in the study area, electric and magnetic

[20] FTA 2006

interactions may have occurred between new and existing power lines and substations. When conductors of like phase are close together, the interaction between the conductors can be additive producing higher levels of electric and magnetic fields. Where the conductors are of different phases, the interaction could be subtractive due to the phase cancellation between the lines. Phase cancellation results in lower levels of electric and magnetic fields. Since power lines typically have three different phase conductors, the interactions between two power lines can be complex.

Where two power lines cross at about a right angle, there would be little potential for interaction of electric and magnetic fields between the two power lines since the conductors are close together for only a short distance. Where two power lines run parallel and are close together, the electric and magnetic fields produced from one power line could interact with the electric and magnetic fields produced from the other power line. Depending on the physical arrangement of the two lines (e.g., separation distance and phase conductor arrangements) and the operating conditions (e.g., the level of power flowing in each line), the cumulative effects may be either an increase or a decrease in the electric and magnetic fields that would be produced by each line operating separately. Existing transmission lines in the study area, such as the Western Area Power Administration’s (Western) 345 kV line or the City of Farmington’s 115 kV line, are separated by distance due to their respective right-of-ways. Since the levels of the electric and magnetic fields decrease dramatically with distance beyond the right-of-way for transmission lines, it is unlikely that the electric and magnetic field levels would exceed established guidelines for electric or magnetic fields.

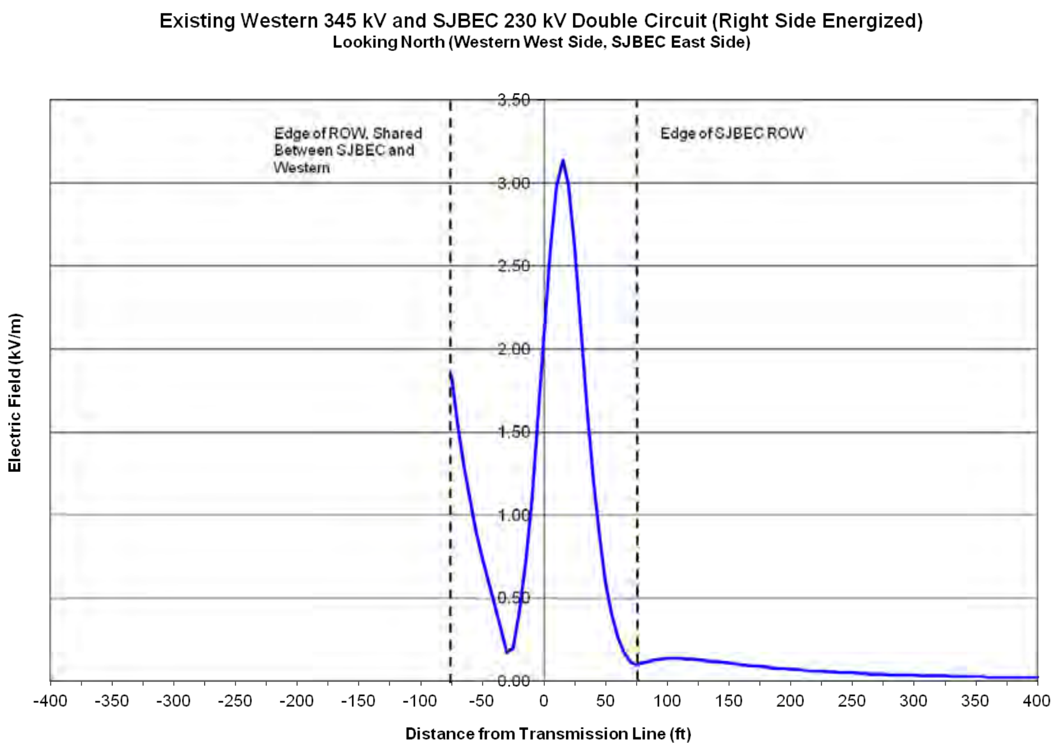
### 4.19.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Cumulative effects to electric and magnetic fields from other reasonably foreseeable actions are not expected, since there are no substations or transmission lines proposed.

### 4.19.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The transmission line for the Preferred Alternative would parallel Western's 345 kV transmission line and the City of Farmington's 115 kV line in some areas. The proposed transmission line for the Preferred Alternative would parallel Western's 345 kV transmission line in Segments 1 through 3. In these segments, the two lines would share a right-of-way edge. The estimated electric fields for shared right-of-way edge for Segments 1 through 3 are shown in Exhibit 4-5, Electric Field for Segments 1 through 3 with Western's 345 kV and Proposed 230 kV Lines for the Preferred Alternative. The calculated electric field is 0.1 kV/m at the right edge of the right-of-way and 1.78 kV/m at the left edge of the shared right-of-way. These values are well below established exposure limits of the ICNIRP general public exposure limit of 4.2 kV/m, the IEEE general public limit of 5 kV/m, and various established limits for occupational exposure.

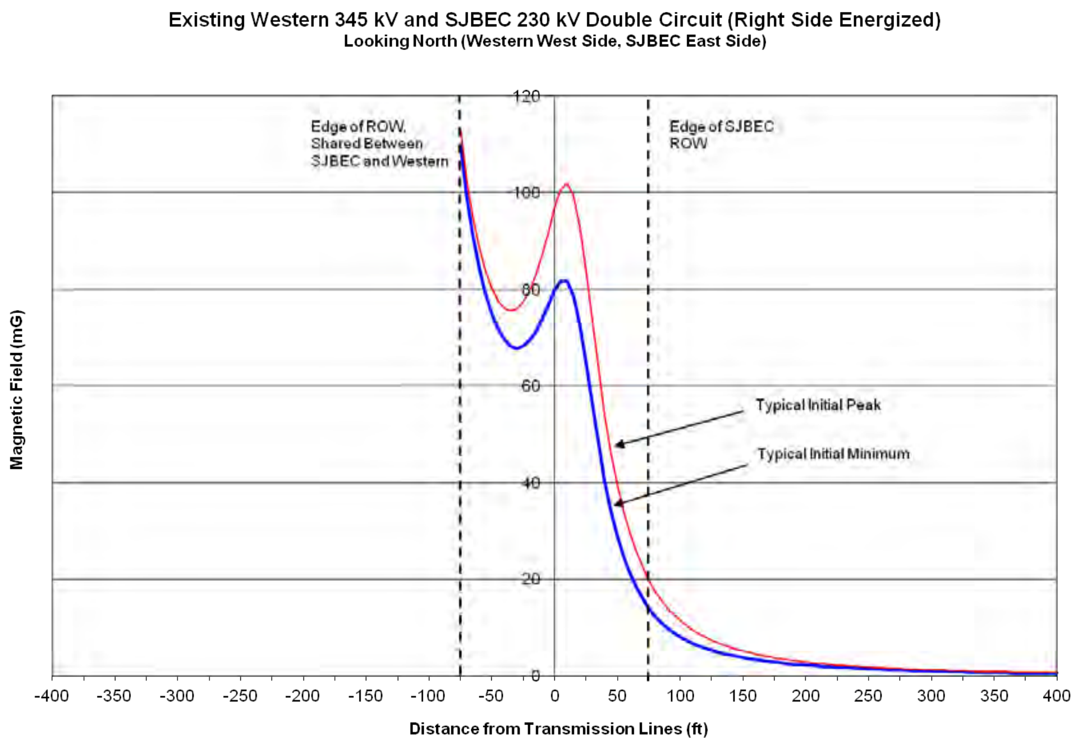
**Exhibit 4-5**
**Electric Field for Segments 1 through 3 with Western's 345 kV and Proposed 230 kV Lines for the Preferred Alternative**



The values of the magnetic field in Segments 1 through 3, where the new 230 kV line would parallel Western's 345 kV transmission line, are shown in Exhibit 4-6, Magnetic Field for Segments 1 through 3 with Western's 345 kV and Proposed 230 kV Lines for the Preferred Alternative. At the right-of-way edges under these initial peak conditions, the calculated magnetic field is approximately 101 mG on the left, shared Western and SJBEC right-of-way edge and 20 mG on the right, SJBEC right-of-way edge. The actual level of magnetic field would vary with current loading, conductor temperature, and ground clearance. These values are below the ICNIRP general public exposure limit of 833 mG, the IEEE general public limit of 9,040 mG, and the ACGIH occupational exposure of 10,000 mG.

**Exhibit 4-6**

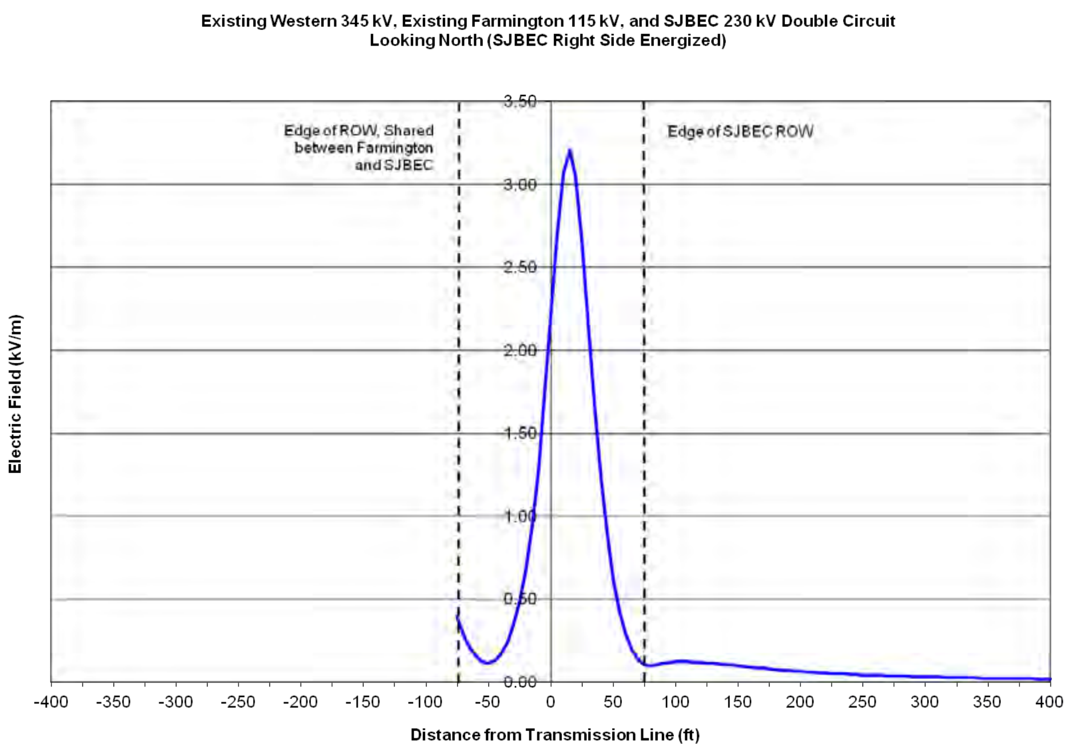
## Magnetic Field for Segments 1 through 3 with Western's 345 kV and Proposed 230 kV Lines for the Preferred Alternative




In Segment 4, the proposed transmission line for the Preferred Alternative would parallel the City of Farmington's 115 kV transmission line that is located adjacent to Western's 345 kV line.

The three lines share right-of-way edges. The values of the electric field where these three lines would be co-located are shown in Exhibit 4-7, Electric Field for Segment 4 with Western's 345 kV, City of Farmington's 115 kV, and Proposed 230 kV Lines for the Preferred Alternative. The calculated electric field is 0.1 kV/m at the right edge of the right-of-way (looking north, the SJBEC right-of-way edge) and 1.79 kV/m at the left edge of the right-of-way. These values are well below established exposure limits of the ICNIRP general public exposure limit of 4.2 kV/m, the IEEE general public limit of 5 kV/m, and various established limits for occupational exposure.

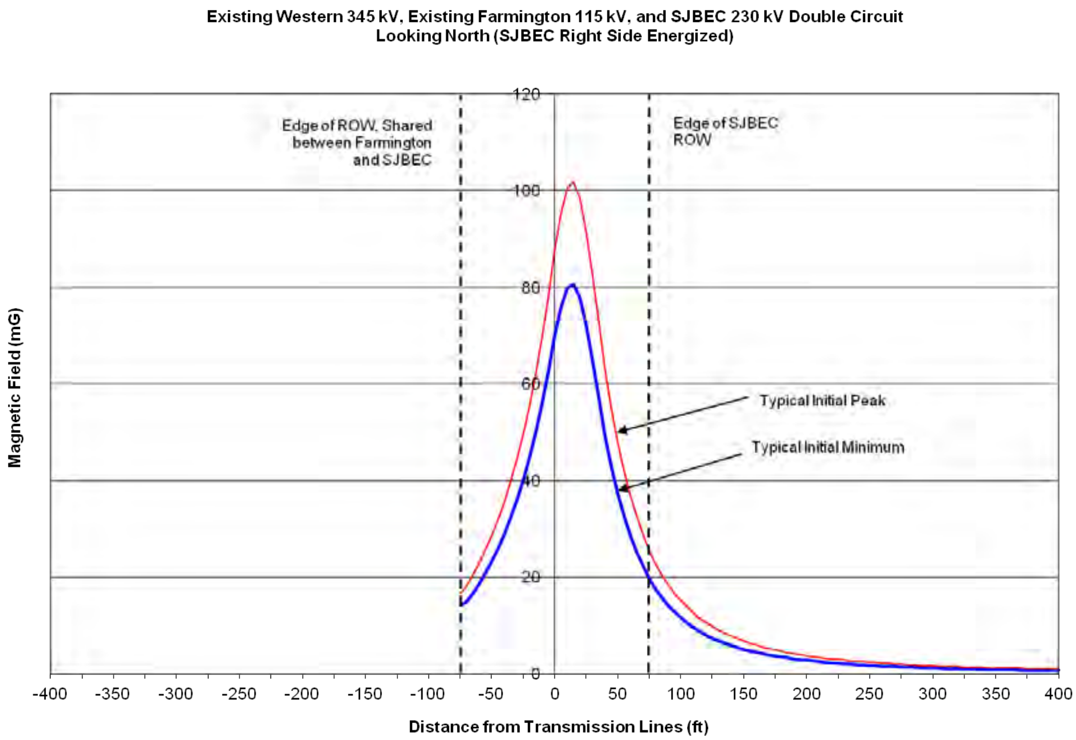
**Exhibit 4-7**
## Electric Field for Segment 4 with Western's 345 kV, City of Farmington's 115 kV, and Proposed 230 kV Lines for the Preferred Alternative




The values of the magnetic field for the lattice steel configuration of Segment 4 are shown in Exhibit 4-8, Magnetic Field for Segment 4 with Western 345 kV, City of Farmington 115 kV, and Proposed 230 kV Lines for the Preferred Alternative. At the right-of-way edges under initial peak conditions the calculated magnetic field is approximately 99 mG on the left and 26 mG on the right. The actual level of magnetic field would vary with current loading, conductor temperature, and ground clearance. These values are below the ICNIRP general public exposure limit of 833 mG, the IEEE general public limit of 9,040 mG, and the ACGIH occupational exposure of 10,000 mG.

**Exhibit 4-8**

### Magnetic Field for Segment 4 with Western's 345 kV, City of Farmington's 115 kV, and Proposed 230 kV Lines for the Preferred Alternative




In addition, the proposed Three Rivers Substation would be located near the existing Shiprock Substation; and the proposed Kiffen Canyon substation would be located near the existing City of Farmington Substation. Tri-State's new 230 kV line and substations would produce low levels of electric and magnetic fields. As described above, these new sources of low-level electric and magnetic fields can have a cumulative effect when combined with other existing sources of electric and magnetic fields. The proposed substations and transmission line, however, would be located in their own right-of-way, and the levels of electric and magnetic fields at the edge of the right-of-way are expected to be very low.

Because of this, the potential for a cumulative effect with existing transmission and substation facilities in the study area is expected to be low, and it is unlikely that the electric and magnetic field levels would exceed established guidelines.

### 4.19.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.19.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.20 Hazardous Materials

### 4.20.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Much of the study area supports industrial uses, like oil and gas development, that have the potential for releases of hazardous materials. One site was found during the database search for historical and current environmental effects.[21,22] The listing was a former leaking underground storage tank site located adjacent to an access road in Segment 1 (segments are shown in Exhibit 3-3, Study Area). The site currently has a no further action status, so no additional remedial action or assessment is required at this time. The site still has two existing storage tanks; however, it is not known if the existing tanks are affecting the subsurface.

**Hazardous Materials Study Area**

The cumulative effects study area for hazardous materials is the same study area as described for the affected environment in Section 3.21.1, Study Area.

### 4.20.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

There are currently numerous proposals and plans for future actions in the study area as identified in Exhibit 4-1.

The construction and operation of these projects could increase the potential for hazardous waste spills in the study area. It is unlikely, however, that the proposed projects would affect the existing hazardous material site discussed above in Section 4.20.1, Existing

[21] During the database search, two sites were found to be listed at the same location (76 County Road 6500 in Kirtland, New Mexico). It is assumed that these are the same site, but have different titles in two different databases.

[22] EDR 2012

Conditions and How They Have Been Affected by Past and Present Actions. The underground storage tank site has two existing storage tanks; however the tanks are not known to be affecting the surrounding area. In the future, these tanks could leak into surrounding soils and tank product could possibly migrate into the ground underneath the access road.

Potential temporary and permanent direct effects from the projects listed in Exhibit 4-1 could involve spills or minor releases of hazardous, non-hazardous, or potentially hazardous materials that may be used as part of the construction (gasoline, diesel, etc.). Another possible temporary direct effect is the discovery of potentially hazardous materials that could be found during construction.

With proper pollution prevention measures and hazardous waste disposal practices, effects in the vicinity of the study area would likely be prevented or mitigated, so the potential for cumulative effects would be low.

### 4.20.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The Preferred Alternative would have similar effects as described above in Section 4.20.2, Effects of Reasonably Foreseeable Actions Without the SJBEC Project. The risk of encountering hazardous materials during construction or the risk of potential spills during construction or operation is low, and potential cumulative effects are not expected.

### 4.20.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.20.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

# 4.21 Socioeconomics

## 4.21.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

The effects from past and present activities in the study area are generally accounted for in the baseline socioeconomic environment characterized in Section 3.22, Socioeconomics. Population growth in the area has followed trends seen in the respective states, and unemployment rates increased between 2000 and 2011, similar to state and national trends. In addition to traditional industries (ranching and farming), the economic base of the area includes operation of existing transmission lines and other linear projects, development and operation of energy generation projects, past and present oil and gas operations, other residential and commercial development, as well as retail businesses and tourism. Mining and energy development, specifically oil and gas development, represents a substantial source of employment.

**Socioeconomics Study Area**

The proposed study area for Socioeconomics is described in Section 3.22.1, Study Area.

## 4.21.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Section 4.1.4, Reasonably Foreseeable Future Actions, identifies reasonably foreseeable projects proposed within the study area, including other transmission lines, oil and gas development, natural gas pipelines, and coalbed methane development.

As a result of reasonably foreseeable projects, there would be an increase in the projected influx of temporary and permanent workers into the area and an associated increased demand for housing resources and other goods and services. The degree of effect would depend on multiple factors including the percentage of workers relocating to the area from outside the region and the number of workers required by projects at a given time.

Reasonably foreseeable projects may also result in an increase in direct and indirect spending in the region as well as short-term increases in tax revenues in the counties in which projects are located, with the amount contributed varying depending on the size and nature of the project. In general, reasonably foreseeable projects in the study area would continue the long-term trend in the region of a high percentage of employment coming from oil and gas and related support industries.

### 4.21.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

Local project-related expenditures, employment, and construction-related earnings from the Preferred Alternative and other reasonably foreseeable projects would have a minor effect on the local economy and employment.

Operation of the Preferred Alternative would not require any additional permanent staff. As a result, the Preferred Alternative would not result in any permanent changes in population and would have no effect on short- or long-term population trends.

Long-term economic impacts from the proposed project would be primarily associated with operation and maintenance-related expenditures on materials and supplies. These impacts would be small, and the incremental addition of these impacts to other ongoing and reasonably foreseeable projects would be relatively minor.

### 4.21.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.21.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

## 4.22 Environmental Justice

### 4.22.1 Existing Conditions and How They Have Been Affected by Past and Present Actions

Data compiled by the US Census at the block group level indicate the potential presence of minority and low-income communities in the vicinity of the study area as described in Section 3.23, Environmental Justice.

**Environmental Justice Study Area**

The proposed study area for Environmental Justice is described in Section 3.22.1, Study Area.

### 4.22.2 Effects of Reasonably Foreseeable Actions Without the SJBEC Project

Development in the planning area is expected to continue as described in Section 4.21, Socioeconomics. Conflict between extractive operations and other land uses, such as residential, has the potential to occur throughout the planning area. These incompatibilities could occur widely and affect residents in the planning area, including low-income and minority groups. Development on non-federal land would need to comply with requirements of local jurisdictions or tribes. Where local controls are minimal, there would be an increased possibility for incompatible development.

### 4.22.3 Effects of Reasonably Foreseeable Actions With the Preferred Alternative

The proposed project is not expected to generate high or adverse human health or environmental effects on nearby communities. The Preferred Alternative does not appear to exhibit systematic bias toward placing the project in minority or low-income communities (see Section 3.23, Environmental Justice). As a result, the proposed project is not anticipated to add to cumulative impacts on minority or low-income populations.

### 4.22.4 Effects of Reasonably Foreseeable Actions With the Proposed Action

The Proposed Action would have the same effects as described in Section 4.22.3, Effects of Reasonably Foreseeable Actions With the Preferred Alternative.

# Chapter 5 – Public Coordination

# 5 Public Coordination

*Chapter 5 provides an overview of public involvement activities and government coordination and consultation that has occurred as part of this EIS process.*

## 5.1 Public Involvement and NEPA Scoping

The SJBEC Project was initiated in 2008 when Tri-State submitted an application for right-of-way to the BLM. The BLM has engaged the public throughout the life of the SJBEC Project to solicit input on the EIS and the alternatives that would be considered.

### 5.1.1 EA Scoping

When the SJBEC Project began, the BLM initiated an Environmental Assessment (EA) to determine the appropriate level of documentation to comply with NEPA. Public scoping for the SJBEC Project EA occurred from September 17 through November 9, 2009. Scoping meetings were held with the public and local, state, and federal agencies on October 7 and 8, 2009, in Farmington, New Mexico, and Ignacio, Colorado. The meetings were used to gather input on issues for consideration in the SJBEC Project EA. In addition to information regarding the federal environmental process, general project information and information on preliminary transmission corridors were also available for review and comment at the scoping meetings.

**2009 EA Scoping Report**

The 2009 EA Scoping Report is incorporated by reference and is located at:

http://www.blm.gov/nm/st/en/prog/more/lands_realty/san_juan_basin_energy.html

A total of 82 individuals signed in as attendees to the EA scoping meetings. Comments were received from 91 individuals. Issues of primary concern identified by the public during the scoping period were:

- Proximity of the transmission line to residences
- Land use issues
- Impacts to visual resources
- Health and safety concerns
- Impacts related to noise

Public input received during the scoping period suggested that an EIS-level analysis would be more appropriate than the proposed EA. As a result, the BLM decided in December 2009 to prepare an EIS instead of an EA.

### 5.1.2 Alternatives Development Process

After the scoping meetings in October 2009, numerous meetings were held with various agencies and stakeholders to develop specific transmission line route segments. In addition, three route refinement workshops were conducted to discuss preliminary routes with the public, agencies, and the oil and gas industry on September 21 and 22, 2010, in Farmington and Aztec, New Mexico, and Ignacio, Colorado. A total of 129 individuals signed in as attendees to the three route refinement workshops.

Common themes among comments received from the public and agency representatives included concerns with:

- Visual impacts
- Property value loss
- Electric and magnetic fields
- Proximity to residences
- Impacts from noise
- Impacts to wildlife

### 5.1.3 EIS Scoping

The EIS scoping process began when the BLM published the Notice of Intent in the Federal Register on January 25, 2011,[1] and continued to April 1, 2011. Three public scoping meetings and one agency scoping meeting were held on March 16 and 17, 2011, in Farmington and Aztec, New Mexico, and Ignacio, Colorado, to solicit comments on the scope of the EIS. People were informed of the meetings through newspaper advertisements; legal notices; public service announcements; mailed invitations to landowners, stakeholders, agencies, and tribes; email notices; and a dedicated project website.

**2011 EIS Scoping Report**

The 2011 EIS Scoping Report is incorporated by reference and is located at:

http://www.blm.gov/nm/st/en/prog/more/lands_realty/san_juan_basin_energy.html

A total of 140 individuals signed in as attendees to the three public scoping meetings. A total of 71 individuals, agencies, and non-governmental organizations submitted comments on the SJBEC Project. Comments were received regarding a wide variety of issues, but largely fell into the following categories:

- Land use
- Effects on resources and resource use
- Public health and safety
- Socioeconomics and environmental justice
- Alternatives
- Mitigation measures

A summary of the key issues identified as part of EIS scoping are discussed in Section 1.9, Issues Raised During Scoping.

[1] Federal Register 2011

## 5.2 Cooperation, Consultation, and Coordination

The BLM invited 21 tribes, federal, state, and local agencies to participate in the preparation of the EIS as cooperating agencies. The seven entities listed below accepted the invitation and are working with the BLM as cooperating agencies:

- Bureau of Indian Affairs (BIA)
- La Plata County
- Navajo Nation
- New Mexico State Land Office
- Rural Utilities Service
- Southern Ute Indian Tribe (SUIT)
- Western Area Power Administration (Western)

Each entity signed a Memorandum of Understanding with the BLM indicating its commitment to participating as a cooperating agency. The Memorandum of Understanding also outlines specific milestones where the BLM will formally engage cooperating agencies.

Interactions with the cooperating agencies have included periodic meetings and briefings; reviews of preliminary, internal drafts of the EIS; and input on specific issues such as alternatives development, the project study area, and EIS methodologies. In addition, many of the cooperating agencies provided GIS data and background information used to prepare this EIS.

The BLM has also coordinated with other federal agencies throughout the preparation of this EIS. These agencies include:

- Environmental Protection Agency
- National Resource Conservation Service

- US Army Corps of Engineers
- US Fish and Wildlife Service (USFWS)

As required by Section 106 of the National Historic Preservation Act, the BLM is coordinating with and soliciting input from the Colorado and New Mexico State Historic Preservation Officers.

As required by Section 7 of the Endangered Species Act, the BLM is working with the USFWS to ensure that the Proposed Action would not jeopardize the continued existence of any listed threatened or endangered species. These consultations are ongoing and will result in a biological assessment and biological opinion for the SJBEC Project.

## 5.3 Government-to-Government Consultation

The BLM works with Native American tribes on a government-to-government basis. As a matter of practice, the BLM coordinates with all tribal governments, associated native communities, native organizations, and tribal individuals whose interests might be directly affected by activities on public lands. Section 106 of the National Historic Preservation Act requires federal agencies to consult with Native American tribes for undertakings on tribal lands and for undertakings that may affect historic properties of significance to the tribes. As part of the ongoing consultation process for the SJBEC Project, the BLM provides opportunities for tribes to receive information, provide comments, and consult on the project.

In accordance with Executive Order 13175, the BLM initiated the Section 106 process and government-to-government consultation as part of the EA in November 2009. The BLM reinitiated consultation with the tribes in March 2011, after the Notice of Intent for the EIS was published. The BLM sent the following 24 tribes scoping notifications and invitations to consult on the SJBEC Project:

- Cochiti Pueblo
- Hopi Tribe
- Isleta Pueblo
- Jemez Pueblo
- Jicarilla Apache Nation
- Kewa Pueblo
- Laguna Pueblo
- Nambe Pueblo
- Navajo Nation
- Ohkay Owingeh Pueblo
- Pojoaque Pueblo
- Pueblo of Acoma
- Pueblo of Picuris
- Pueblo of Taos
- San Felipe Pueblo
- San Ildefonso Pueblo
- Sandia Pueblo
- Santa Ana Pueblo
- Santa Clara Pueblo
- Southern Ute Indian Tribe (SUIT)
- Tesuque Pueblo
- Ute Mountain Ute Tribe
- Zia Pueblo
- Zuni Pueblo

In August 2012, the BLM sent letters to the Colorado and New Mexico State Historic Preservation Offices, tribes, and other interested parties to receive input on the proposed area of potential effects for the undertaking, traditional cultural properties, and the Old Spanish Trail.

In addition to these formal communications, BLM managers and staff have participated in in-person meetings with the BIA, Hopi Tribe, Navajo Nation, SUIT, and Zia Pueblo. Government-to-government consultation for the SJBEC Project is ongoing via phone calls, emails, and mail correspondence. The BLM will continue to consult with interested tribes and will continue to keep tribal entities informed throughout the NEPA and Section 106 processes.

## 5.4 List of Preparers

The team involved with preparing this EIS is listed below.

### List of Preparers – Agencies and Tribes

| Name | Affiliation | Responsibility |
|---|---|---|
| **LEAD AGENCY** | | |
| Amanda Nisula | BLM | Planning & Environmental Specialist |
| Barney Wegener | BLM | Natural Resource Specialist |
| Bill Liess | BLM | Surface Compliance Division |
| Bill Papich | BLM | Public Relations |
| Chris O'Melia | FWS | Conservation Planning |
| Darlene Horsey | BLM | Realty Specialist |
| Gary Torres | BLM | Field Office Manager |
| Janelle Alleman | BLM | Recreation/VRM |
| Jeff Tafoya | BLM | Rangeland Management Specialist |
| Jim Copeland | BLM | Archaeologist |
| John Hansen | BLM | Wildlife Specialist |
| John Kendall | BLM | T&E and Wildlife Specialist |
| Marcy Romero | BLM | Project Manager |
| Maureen Joe | BLM | Assistant Field Manager |
| Patrick Parks | BLM | GIS |
| Sarah Scott | BLM | Riparian Division |
| Scott Hall | BLM | Lands Team Lead |
| Shannon Hoefeler | BLM | Solid Minerals Division |
| Sherrie Landon | BLM | Paleontologist |
| Thetis Gamberg | FWS | Liaison, BLM Pilot Project |
| **COOPERATING AGENCIES AND TRIBES** | | |
| Courtney Roseberry and Leslie Jakoby | LaPlata County | Cooperating Agency |
| Jim Hartman | Western | Cooperating Agency |
| John Tasheck | NM State Land Office | Cooperating Agency |
| John Waconda | Bureau of Indian Affairs | Cooperating Agency |
| Stephanie Strength | Rural Utilities Service | Cooperating Agency |
| Steve Whiteman | Southern Ute | Tribe and Cooperating Agency |
| Tony Joe | Navajo Nation | Tribe and Cooperating Agency |
| Adam Okun<br>Parametrix | Cultural Resources | MA Anthropology |
| Amy Cordle<br>EMPSi | Air Quality, Climate Change, and Greenhouse Gases | BS Civil Engineering<br>Certificate, Engineer-in-Training |

## List of Preparers – Consultants

| Name and Affiliation | Responsibility | Education |
|---|---|---|
| **COOPERATING AGENCIES AND TRIBES (Continued)** | | |
| Andrew Gentile<br>*EMPSi* | Noise and Vibration | MS Environmental Management<br>BS Biochemistry<br>Certificate, ASTM (All Appropriate Inquiry and Consequences on the Phase 1 Environmental Site Assessment Process) |
| Angie Adams<br>*EMPSi* | Land and Realty | BA Biology<br>Minor in English<br>Certificate, Technical Writing and Editing |
| Barbara Everett<br>*Kleinfelder* | Hazardous Materials | MS Geology – Water Resources<br>BS Geological Sciences |
| Becky Mellinger<br>*Parametrix* | Editor | MS Geosciences<br>BA Geology |
| Chad Ricklefs<br>*EMPSi* | Physical Resources Lead | MURP Environmental Planning<br>BA Political Science and Environmental Conservation<br>Certificate, American Institute of Certified Planners; ePlanning 2.0 |
| David Batts<br>*EMPSi* | EIS Development Lead | MS Natural Resource Planning<br>BS International Development<br>Certificate, Wetland Delineation Certificate; National Environmental Dispute Resolution and Consensus Building Professional; Proper Ecological Functioning Condition Assessment Technique |
| Derek Holmgren<br>*EMPSi* | Visual Resources | MS Environmental Science<br>MPA Environmental Policy and Natural Resources Management<br>BS Environmental Science<br>BA International Studies<br>Minor in Spanish |
| Devin Kennemore<br>*Parametrix* | Vegetation, Water Resources and Wetlands | MS Biology<br>BS Biology |
| Drew Vankat<br>*EMPSi* | Recreation | MS Environmental Policy and Planning<br>BPh Urban and Environmental Planning |
| Eileen Shannon<br>*Kleinfelder* | Hazardous Materials, Geology and Geologic Hazards | BA Geology |
| Emily Gibson<br>*Kleinfelder* | Geology and Geologic Hazards, Soils | MS Geotechnical Engineering<br>BS Civil Engineering |
| Holly Prohaska<br>*EMPSi* | Grazing and Livestock | MS Environmental Management<br>BA Marine Science/Biology |
| Jenna Jonker<br>*EMPSi* | GIS | BA Geography<br>Minor, Geology<br>Certificate, eGIS; ePlanning; Adobe Acrobat Accessibility and 508 Compliance |
| Jennifer Thies<br>*EMPSi* | Farmlands | MS Resource Management<br>BS Conservation and Resource Studies |

## List of Preparers – Consultants

| Name and Affiliation | Responsibility | Education |
|---|---|---|
| **COOPERATING AGENCIES AND TRIBES (Continued)** | | |
| Jennifer Whitaker<br>*EMPSi* | Recreation | MS Project Management<br>BS Public Affairs, Concentration Natural Resource Management<br>Certificate, ePlanning 2.0; Recreation Planning |
| Jill Czarnecki<br>*Parametrix* | EIS coordinator and author | BS Geology<br>Certificate, Technical Writing and Editing |
| Jordan Tucker<br>*EMPSi* | Farmlands | BS Environmental Sciences<br>Minor in Geology<br>AAS Certificate, ESRI Online Training |
| Karin Hagan<br>*Kleinfelder* | GIS Mapping | MS Geographical Information Systems<br>MS Geology<br>BS Geology |
| Kate Krebs<br>*EMPSi* | Special Designation Lands | BA Environmental Studies and Spanish<br>Minor in Political Science<br>Certificate, ePlanning 2.0; BLM VRM training |
| Katie Patterson<br>*EMPSi* | Cumulative Effects | JD Environmental Law<br>BA Environmental Policy<br>Certificate, licensed to practice law in Colorado |
| Keith Julian<br>*Kleinfelder* | Geology, Soils, and Mineral Resources | PhD Environmental Geography<br>BA Regional Economics |
| Matt Sauter<br>*Environmental Planning Group* | Paleontology | MS Paleontology<br>BA Geology |
| Mike Pasenko<br>*Environmental Planning Group* | Paleontology | MS Paleontology<br>BA Anthropology |
| Nick Parker<br>*P3 Planning* | Field Co-Lead, QA/QC | MA Archaeology<br>BA Geography |
| Peter Gower<br>*EMPSi* | Noise and Vibration | MS Land Use Planning<br>BS Geography<br>BA Political Science<br>Minor, Environmental Studies<br>Certificate, AICP; Leadership in Energy and Environmental Design, Green Associate; Professional Certificate in Green Building and Sustainable Development |
| Phillip Rust<br>*Kleinfelder* | Geology and Geological Hazards | MS Hydrogeology<br>BS Forest Management<br>BS Geology |
| Robert Pearson<br>*CH2MHill* | Electric and Magnetic Fields | PhD, MS Satellite Remote Sensing<br>Professional Engineer Geophysical Engineering<br>Registered Professional Engineer |
| Sheila Rygwelski<br>*CH2MHill* | Electric and Magnetic Fields | BS Environmental Engineering<br>Registered Professional Engineer |

## List of Preparers – Consultants

| Name and Affiliation | Responsibility | Education |
|---|---|---|
| **COOPERATING AGENCIES AND TRIBES (Continued)** | | |
| Stephanie Miller<br>*Parametrix* | Project Manager | BA Biology |
| Steve Albert<br>*Parametrix* | Fish and Wildlife | MS Wildlife Ecology<br>BA English<br>BA Spanish |
| William Penner<br>*P3 Planning* | GIS Lead, Field Co-Lead, Roads and Traffic | BA English and Anthropology |
| Zoe Ghali<br>*EMPSi* | Socioeconomics, and Environmental Justice | MS Environmental Physiology<br>Interdisciplinary Certificate in Environmental Policy<br>BS Biology<br>Certificate, ePlanning 2.0 |

# 5.5 EIS Distribution List

The EIS Distribution List is itemized below.

## EIS Distribution List

| Elected Officials | |
|---|---|
| **New Mexico** | **Colorado** |
| Governor Susana Martinez | Governor John Hickenlooper |
| US Representative Ben R. Lujan | US Representative Scott Tipton |
| US Senator Martin Heinrich | US Senator Michael Bennet |
| US Senator Tom Udall | US Senator Mark Udall |
| State Representative Paul Bandy | State Representative Mike McLachlan |
| State Representative Sharon Clahchischilliage | State Senator Ellen Roberts |
| State Representative Thomas Taylor | |
| State Representative James Strickler | **La Plata County** |
| State Senator Steven Neville | Gwen Lachelt, County Commissioner |
| State Senator John Pinto | Robert Anthony Leib, Jr., County Commissioner |
| State Senator William Sharer | Julie Westendorff, County Commissioner |
| | |
| **San Juan County** | **City of Durango** |
| Kim Carpenter, County Executive Officer | Ron LeBlanc, City Manager |
| GloJean Todacheene, Commissioner, District 1 | Dick White, Mayor |
| Margaret McDaniel, Commissioner, District 2 | Sweetie Marbury, Mayor Pro-Tem |
| Scott Eckstein, Commissioner, District 3 | Dean Brookie, Council Member |
| Jack Fortner, Commissioner, District 4 | Christina Rinderle, Council Member |
| Keith Johns, Commissioner, District 5 | Keith Brant, Council Member |

# EIS Distribution List

## Elected Officials (Continued)

| City of Farmington | Town of Ignacio |
|---|---|
| Robert Mayes, City Manager | Michael Lee, Town Manager |
| Dan Darnell, City Council District 1 | Stella Cox, Board of Trustees |
| Mary Fischer, City Council District 2 | Thomas Atencio, Board of Trustees |
| Gayla McCulloch, City Council District 3 | Lawrence Bartley, Board of Trustees |
| Jason Sandel, City Council District 4 | Alison DeKay, Board of Trustees |
| | Ray Larsen, Board of Trustees |
| **City of Aztec** | Linda Moore, Board of Trustees |
| Joshua Ray, City Manager | |
| Roberta S. Clover, District 1 | |
| Sally Burbridge (Mayor), District 2 | |
| Sherri Sipe, District 3 | |
| Eugene L. Current, District 4 | |
| Jim Crowley (Mayor Pro-Tem), District 5 | |

## Federal Agencies

| | |
|---|---|
| Bureau of Land Management, Washington D.C. | United States Department of Agriculture, Rural Utility Service |
| Bureau of Land Management, New Mexico State Office | United States Department of Interior, Office of Environmental Policy and Compliance |
| Bureau of Land Management, Farmington Field Office | United States Environmental Protection Agency, Region 8 |
| United States Army Corps of Engineers | United States Fish & Wildlife Service |
| United States Department of Agriculture, Natural Resources Conservation Service | Western Area Power Administration |

## State Agencies

| | |
|---|---|
| Colorado Parks and Wildlife | New Mexico State Land Office, Commissioner of Public Lands |
| Colorado Historical Society, State Historic Preservation Officer | New Mexico Energy, Mineral & Natural Resources |
| Colorado Department of Transportation | New Mexico Environment Department |
| New Mexico Department of Cultural Affairs, State Historic Preservation Officer | New Mexico Highway & Transportation Department |
| New Mexico Department of Game and Fish | |

## Local Agencies

| | |
|---|---|
| La Plata County | City of Aztec |
| San Juan County | City of Ignacio |
| City of Farmington | City of Durango |

## Tribes

| | |
|---|---|
| Bureau of Indian Affairs, Navajo Regional Office Director | Navajo Nation Historic Preservation Department |
| Bureau of Indian Affairs, Southern Ute Agency Superintendent | Southern Ute Indian Tribe |
| Hopi Cultural Preservation Office, Director | Ute Mountain Ute Tribe |
| Navajo Nation, President Ben Shelly | |

## EIS Distribution List

| | |
|---|---|
| **Organizations (Libraries)** | |
| Aztec Public Library | Farmington Public Library |
| Durango Public Library | Ignacio Community Library |
| **Other Organizations** | |
| CH2MHill | Old Spanish Trail Association |
| Colorado Wild | P3planning |
| Dine Citizens Against Ruining Our Environment | Parametrix |
| EMPSi | San Juan Citizen’s Alliance |
| Kleinfelder | Sierra Club, Rio Grande Chapter |
| Natural Resources Defense Council | Tri-State Generation and Transmission Association |
| New Mexico Wildlife Federation | WildEarth Guardians |

## EIS Distribution List

| Landowners | |
|---|---|
| Albert Lee Bell | Joan M. McCarthy |
| Alton K. Brown Living Trust | Joe P. Trujillo |
| Andrew Ortiz | John and Faye Waller Estate |
| Ashcroft Investments | John Austin Decker |
| Beemer Peterson Trust | John L. Gardner |
| Bob M. & Gwyneth H Browning Trust | Kennon Allen Decker |
| BP America Production Co. | La Plata Electric Association, Inc. |
| Brice F. Jr. & Phyllis J. Lee | Leroy Frame |
| Bryan Doherty | Loraine B. Simpson Trust & Farrell Family Trust |
| Carol P. Whitlock | Louie Heick Jr. Estate & Winifred Heick |
| Caroll V. Fisk Trust & Elizabeth L. Fisk Trust | Louis W. Rhodes |
| Cash for Contracts | Luis A. Salazar & Miriam Seda |
| Christopher E. & Francie M. Lee | Maddox Properties LLC |
| Clement Koogler | Marian Nobles |
| Corp. of the Presiding Biship LDS & Patron De La Plata, LLC & Jerry C. Tankersley | Mark J. Huff |
| Crandall J. Bates | Mark Webber |
| Dannie W. & Martha D. Johnson | Melannie E. & Monty C. Cundiff |
| Danny R. Jaques | Montoya Sheep and Cattle Co |
| Dennis Egan Decker | Nickles Brothers Inc. |
| Derril Gliem | Norman J. Rathmell |
| Donald C. Adams Trust | Old and Bold LLC |
| Donald E. & Nancy G. Adams | Pascetti Investments LLC |
| Dugan Production | R. McGee Ranches LTD (Dwight McGee) |
| Elliott A. Riggs | Robert F. & Susan R. Hutchings |
| Erick Daniel Ericson Trust & Cetha Ericson Trust | Robert Stanley Ramey |
| Estate of Cordy M. Jaques | Roger Baer Trust |
| Estate of LL Stallings & Frances Mahoney Trust | Ronald M. Miller |
| Farmer Family Trust Dated | Sam Arn |
| George A. Jackson, Jr. | San Juan Coal |
| GFD Ignacio LLC | Shirley May Holmberg |
| Glen A. Leyshon | Stan Maynes |
| Glennette Gliem | Steven R. & Susan L. Banwart |
| Gordon N. Crane Jr. & Diane Crane | Sunbelt Mining Company Inc. |
| Helen M. O'Rourke | Tochee Traders (Skip & Beverly McGee) |
| J. Paul & Debra A. Brown | Tommy Bolack Revocable Trust |
| J. Paul Brown | Virginia P. Samuel |
| Jack William Fassett Qualified Domestic Trust | Wagon Rod Ranch LLC |
| James F. & Sandi C. Piper Trust | Willo Jean Brown |
| Jaye Elmer Decker | Worthington Betty Trustee |
| Jerald T. Marcotte | |
| Jerome F. Sczezney | |

# Chapter 6 – References

# 6 References

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