Chapter 3 – Affected Environment and Environmental Effects

THIS PAGE INTENTIONALLY LEFT BLANK

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1 Introduction

This chapter describes (1) the existing condition of the environment that could be affected by implementing the Proposed Action and (2) the known and predicted effects on the existing environment that could result from the construction, operation, and maintenance of the proposed 345kV transmission line and associated facilities.

3.1.1 Affected Environment

In accordance with NEPA regulations codified at 40 CFR 1502.15, this section presents a summary of the existing condition of the human and natural environment in the areas that could be affected by the Proposed Action. This information serves as a baseline from which the impacts that are anticipated to result from implementing the proposed Project were assessed. The affected environment is characterized for the following resources, land uses, and social and economic conditions.

- Climate and Air Quality
- Earth Resources
  - Geological Hazards
  - Mineral Resources
  - Soil Resources
- Water Resources
- Biological Resources
  - Wildlife
  - Vegetation
  - Special Status Species
  - Wild Horses and Burros
- Cultural Resources
- Native American Concerns
- Paleontological Resources
- Visual Resources
- Land Use and Recreation Resources
- Special Designations
  - Scenic Byways
  - National Trails
  - Wild and Scenic Rivers
  - Wilderness
- Wildland and Fire Ecology and Management
- Social and Economic Conditions
  - Environmental Justice
- Public Health and Safety
  - EMFs
  - Noise

These topics were selected based on federal regulatory requirements and policies, concerns of the lead and cooperating agencies, and/or issues derived from comments expressed by agencies and the public during scoping.

3.1.1.1 Resource Inventory

Data on the existing condition of each resource were gathered and compiled, between April 2009 and September 2010, from the most recent data available—primarily literature, published and unpublished reports, land use plans, maps, and agency databases. Data gathered for land use and visual resources were verified by field reconnaissance. Also, cultural resource Class II sample surveys were conducted to supplement data for areas lacking secondary data (i.e., recorded historic properties). Following the initial inventory effort, BLM requested other federal, state, and land and resource management agencies to refine and verify the data collected and provide information regarding additional issues, concerns, policies, and regulations. The data were compiled in a Geographic Information System (GIS) at scales of 1:24,000 and 1:100,000.

For most of the resources, inventories were developed to describe the existing environment in the study corridors along the alternative routes in sufficient detail to assess potential impacts that could result from the proposed Project. The width of the study corridor varies for each resource, based on the area that potentially could be affected (Table 3-1). Analysis of air quality is based on regional data. Data used to assess potential impacts on social and economic conditions are county-wide and state-wide and are not extracted for study-corridor-level analysis.

TABLE 3-1
STUDY CORRIDORS BY RESOURCE

Resource	Study-Corridor Width (miles)[1]
Earth Resources	2
Water Resources	2
Biological Resources	2
Cultural Resources	4
Paleontological Resources	2
Visual Resources	6
Land Use and Recreation Resources	2

NOTE:
[1]Data and information used to assess potential social and economic impacts are based on county- and state-wide data and are not extracted for corridor-level assessment. Analysis of air quality is based on regional data.

The alternative routes (and study corridors) are centered on a line referred to as the ―reference centerline." The reference centerlines were mapped and verified by aerial and field reconnaissance in detail sufficient for analysis for the EIS. Precise locations of the centerline would be refined through engineering surveys on the route selected for the transmission line prior to Project construction. The alternative routes are shown on the maps in ―ihks," which are segments of a route sharing common endpoints determined by the point of intersection with other, adjacent links. To facilitate analysis and reference, mileposts are marked along the reference centerline of each link. Resource data collected for the area within a study corridor are input, stored, and retrieved by link number and milepost (to a tenth mile). Where appropriate, resource discussions in this chapter refer to links and mileposts to provide a geographic reference to the resource data. Maps displaying resource inventory data are in Volume II – Maps.

3.1.2 Effects Analysis

The analysis of potential environmental effects predicts how a resource would be affected and the degree of change (impact) that could result from implementation of an action. Potential environmental effects on each resource were determined through a systematic analysis that included assessing the impacts of each alternative route on the environment and how the impacts could be mitigated most effectively. Figure 2-7 provides an overview of this process.

3.1.2.1 Methodology

The first step of the analysis was to determine the types and amount of ground disturbance that could occur based on the design and typical specifications of the proposed facilities, construction techniques (including BMPs [Table 2-6]) and equipment used, extent and duration of the construction, requirements for operation of the transmission line and associated facilities, activities associated with routine maintenance, and activities associated with decommissioning, if or when the facilities are no longer needed. The majority of potential impacts, including ground disturbance, that could occur would result from the following construction activities.

- Upgrading existing roads or constructing new roads for access where needed
- Preparing tower sites, staging areas, a regeneration station site, and a batch plant site
- Assembling and erecting tower structures
- Stringing conductors (e.g., wire-pulling and splicing-sites)

In addition, impacts on some resources would occur following construction from the presence of the transmission lines and access roads. Also, periodic maintenance activities could cause temporary impacts.

The amount of ground that could be disturbed as the result of implementation of the Project was estimated based on the typical design characteristics of the 345kV transmission project (Section 2.3.1), including tower sites, staging areas, batch plant site, etc. The estimated ground disturbance associated with using existing access roads or upgrading or constructing access roads (Table 2-8) also was considered. Table 3-2 summarizes the anticipated ground disturbance in acres associated with construction of each alternative. Temporary ground disturbance during construction would be associated with structure work areas, wire-splicing sites, wire-pulling sites, wire-tensioning sites, construction yards, and a concrete batch plant. Permanent ground disturbance would be associated with H-frame, lattice, and three-pole structure base areas and permanent access roads.

TABLE 3-2
SUMMARY OF ESTIMATED GROUND DISTURBANCE AND VEGETATION CLEARING

Alternative	Temporary Disturbance (acres)[1, 2]	Permanent Disturbance (acres)[1, 3]	Right-of-way Vegetation Clearing (acres)[1, 4]
Alternative N1 (Environmentally Preferred)	1,006.5	319.7	364.6
Alternative N2	987.2	310.5	364.6
Alternative N3	979.5	270.6	421.9
Alternative N4	919.6	309.0	370.4
Alternative N5	895.8	269.0	427.6
Alternative N6 (Proponent's Proposed Action)	889.6	329.3	481.1
Alternative S1	467.2	192.8	328.4
Alternative S2 (Environmentally Preferred)	418.0	158.1	147.0
Alternative S3	479.5	221.4	339.8

TABLE 3-2
SUMMARY OF ESTIMATED GROUND DISTURBANCE AND VEGETATION CLEARING

Alternative	Temporary Disturbance (acres)[1, 2]	Permanent Disturbance (acres)[1, 3]	Right-of-way Vegetation Clearing (acres)[1, 4]
Alternative S4	412.6	202.1	292.1
Alternative S5 (Proponent's Proposed Action)	490.2	194.0	423.8
Alternative S6	533.5	225.9	465.8

NOTES:
[1] 5 percent added to the total acreage for estimating purposes.
[2] Temporary Disturbance: Estimated area of disturbance associated with structure work areas, wire-splicing sites, wire-pulling sites, wire-tensioning sites, construction yards, and a concrete batch plant (refer to Table 2-1).
[3] Permanent Disturbance: Estimated area of disturbance associated with H-frame, lattice, and three-pole structure base areas and permanent access roads (refer to Table 2-2).
[4] Right-of-way Vegetation Clearing: Estimated area of vegetation clearing within the right-of-way for construction (calculations include vegetation types with the potential to grow 12 feet tall: aspen, pinyon-juniper, mountain shrub, and riparian).

Assessment of Initial Impacts

Based on estimated ground disturbance associated with the Project description and resource inventory data reflecting the existing environment, each resource specialist determined the types and amounts of impacts that could occur on the resource (i.e., initial impacts). Computer-assisted models were developed to support this determination, which allowed the method used for each resource to be tailored to specific requirements and assumptions for analysis of each resource. Qualitative and quantitative variables of resource sensitivity, resource quantity, and estimated ground disturbance were considered in predicting the intensity of initial impacts. In this analysis, the intensity of impacts was described in the following levels: high impact—that could cause substantial change or stress to an environmental resource or use (severe adverse or exceptional beneficial effects); moderate impact—that potentially could cause some change or stress to an environmental resource or use (readily apparent effects); low impact—that could be detectable but slight; and no identifiable impact. What constitutes a low, moderate, or high impact on a resource varies by resource and is described in the study methodology for each resource, as are the assumptions for analysis made regarding each resource.

Mitigation Planning

After initial impacts were identified for each resource, selective mitigation measures (Table 2-7) were applied to reduce or minimize moderate or high impacts. Mitigation measures were developed in collaboration with the BLM and cooperating agencies and include measures or techniques recommended or required (depending on land ownership) by BLM and USFS after initial impacts were identified and assessed. As such, mitigation measures provide a planning tool for minimizing potential adverse impacts.

Once an alternative route is selected, the Proponent would coordinate with the BLM and other land-management agencies or landowners, as appropriate, to refine the implementation of mitigation at specific locations or areas. For example, if a road closure was recommended, the Proponent would work with the relevant land-management agency or landowner to determine the specific method of road closure most appropriate for the site or area (e.g., barricading with a locking gate, obstructing access on the road using an earthen berm or boulders, revegetating the roadbed, or obliterating the road and returning it to its natural contour and vegetation). Detailed mitigation will be incorporated into the POD prior to Project construction.

Residual Impacts

Residual impacts are the environmental effects that remain after mitigation measures are applied. The locations of potential residual impacts were identified and the intensities of such potential residual impacts anticipated to occur from implementation of an alternative along the reference centerline were assessed, mapped (Volume II), and discussed in the environmental effects sections for each resource in this chapter.

The description of residual effects anticipated for each alternative should be reviewed in conjunction with the resource inventory maps provided in Volume II. Several of the alternative routes considered in this EIS share common links and would result in similar environmental effects. Rather than repeating information, in most cases the descriptions of alternative routes have been abbreviated, as appropriate, to focus on the effects unique to an alternative.

3.1.2.2 Assumptions for Analysis

In this analysis, the study corridor established for a resource represents the geographic scope of analysis assumed for the resource.

Effects could be temporary (short-term), long-term, or permanent. The assumptions for each resource define temporal scope of analysis. In this analysis, temporary environmental effects predicted to occur during Project construction that would be anticipated to return to a preconstruction condition at or within five years of the end of construction were considered short-term impacts. Environmental effects that would be anticipated to remain for the life of the Project, approximately 50 years, were considered long-term impacts. Permanent impacts are those that would be anticipated to endure beyond the life of the Project, including irreversible and irretrievable commitment of resources.

The intensity of the environmental effect also can vary. What constitutes a low, moderate, or high impact on a resource varies by resource and assumptions made regarding each. The impacts are portrayed in the effects analysis for each resource.

3.2 Resources Analyzed

This section describes the affected environment and known and predicted effects of implementing the Project on resources relevant to the issues and concerns identified during agency and public scoping. The affected environment and effects analysis area were assessed for each alternative. Each resource discussion is generally organized as follows:

- Introduction – A description of the resource and the laws, regulations, and policies related or relevant to management or analysis of the resource
- Regional Setting – A brief description of the region likely to be affected by implementation of the Project
- Study Methodology – Resource-specific methods used to assess the affected environment and initial and residual environmental effects for each alternative
- Results by Alternative
  - Affected Environment
  - Environmental Effects
- Summary of Results – An overview of the results of the effects analysis and general description of how the alternatives compare

A summary of baseline resource inventory and results of the effects analysis is presented in each resource section. Table 2-11 presents a comparison of results of the effects analysis for the alternative routes and Table 2-12 presents a summary of the information presented in Table 2-11.

3.2.1 Climate and Air Quality

Issues raised by the public and agencies during project scoping and preparation of the EIS related to potential effects on climate and air quality include emissions of pollutants from equipment and vehicles used in construction and the generation of fugitive dust during construction activities.

The Utah Air Conservation Act, Title 19, Section 2, of the Utah State Code; the CAA; and implementing regulations for both statutes regulate air pollutant emissions within the state. The EPA has set National Ambient Air Quality Standards (NAAQS) for air pollutants considered harmful to public health and the environment. Standards have been set for six primary pollutants, which are referred to as criteria pollutants: CO, NO_2, SO_2, ozone, lead, and PM_{10} and $PM_{2.5}$. There are two types of standards: primary standards set to protect public health and secondary standards set to protect public welfare, including damage to buildings, animals, and vegetation. The NAAQS are shown in Table 3-3.

An area is deemed an attainment area by EPA when the air quality is monitored and the resultant concentrations for criteria pollutants are consistently below the NAAQS. If an area is monitored and the resultant concentrations for criteria pollutants do not meet the NAAQS, the area is referred to as a nonattainment area. An area that previously was classified as nonattainment but has since reached attainment is referred to as a maintenance area. Areas where air quality is not monitored but are assumed to achieve the NAAQS due to a generally low number and size of emission sources are referred to as unclassified (i.e., neither attainment nor nonattainment). Although some air quality monitoring data are available for the Project area, the entire Project area is designated as unclassified because of the generally low number and size of emission sources in the area.

Certain lands, such as national parks and certain wilderness areas, where existing good air quality is deemed to be of national importance are designated by EPA as Class I areas for prevention of significant deterioration. There are no Class I areas located in the Project area. The nearest Class I areas are Zion National Park (approximately 14 miles), Bryce Canyon National Park (approximately 55 miles), and Capitol Reef National Park (approximately 38 miles).

In addition to the criteria pollutants for which the NAAQS are established, other pollutants, referred to as hazardous air pollutants (HAP), are regulated. HAPs are regulated on an emission basis using National Emission Standards for Hazardous Air Pollutants (NESHAP). NESHAPs regulate emissions from specified emission units and source types. However, no equipment proposed for the construction, operation, and maintenance of the Project is subject to NESHAPs requirements.

TABLE 3-3
NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Primary Standards		Secondary Standards	
	Standard	Averaging Time	Standard	Averaging Time
CO	9 ppm (10 mg/m^3)	8 hour[1]	None	
	35 ppm (40 mg/m^3)	1 hour[1]		
NO_2	0.053 ppb (100 μg/m^3)	Annual Arithmetic Mean	Same as Primary	
	0.100 ppb (188.7 μg/m^3)	1 hour[2]	None	

TABLE 3-3
NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Primary Standards		Secondary Standards	
	Standard	Averaging Time	Standard	Averaging Time
SO_2	0.03 (80 μg/m^3)	Annual Arithmetic Mean	0.5 ppm (1,300 μg/m^3)	3 hour[(1)]
	0.14 (365 μg/m^3)	24 hour[1]		
	75 ppb (196.4 μg/m^3)	1 hour[3]	None	
Ozone	0.075 (2008 standard)	8 hour[4]	Same as Primary	
	0.08 (1997 standard)	8 hour[5]	Same as Primary	
	0.12 μg/m^3	1 hour[6]	Same as Primary	
Lead	0.15 μg/m^3	Rolling 3-Month Average[7]	Same as Primary	
	1.5 μg/m^3	Quarterly Average	Same as Primary	
PM_{10}	150 μg/m^3	24 hour[8]	Same as Primary	
$PM_{2.5}$	15.0 μg/m^3	Annual Arithmetic Mean[9]	Same as Primary	
	35 μg/m^3	24 hour[10]	Same as Primary	

SOURCE: EPA 2010b
NOTES:
mg/m^3 = milligrams per cubic meter
ppm = parts per million
ppb = parts per billion
μg/m^3 = micrograms per cubic meter
[1] Not to be exceeded more than once per year.
[2] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).
[3] (a) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.
[4] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).
[5] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor, within an area over each year, must not exceed 0.08 ppm. (b) The 1997 standard, and the implementation rules for that standard, will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard. (c) EPA is in the process of reconsidering these standards (set in March 2008).
[6] (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard (anti-backsliding). (b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.
[7] Final rule signed October 15, 2008.
[8] Not to be exceeded more than once per year on average over 3 years.
[9] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 μg/m3.
[10] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m3 (effective December 17, 2006).

3.2.1.1 Environmental Setting

Climate

The Project area is located in the south-central and southwestern portions of the State of Utah, along the southeastern edge of the Great Basin. Pacific storms, before reaching Utah, must first cross the mountain ranges of the Sierra Nevada or the Cascades. As the moist air rises over these high mountains, a large portion of the moisture falls as precipitation. Thus, the prevailing westerly winds reaching Utah are comparatively dry, resulting in light precipitation over most of the state (Western Regional Climate Center [WRCC] 2010).There are definite variations in temperature with altitude and latitude. The mountains and elevated valleys have the cooler climates, with the lower areas of the state having higher temperatures. Weather stations in the southern counties generally have average annual temperatures 6 to 8

degrees higher than those at similar altitudes over the northern counties (WRCC 2010). Temperatures below zero during winter and early spring are uncommon in most areas of the state, and prolonged periods of extremely cold weather are rare. This is primarily due to the mountains east and north of the state, which act as a barrier to intensely cold continental Arctic air masses (WRCC 2010). Utah experiences relatively strong insulation during the day and rapid nocturnal cooling, resulting in wide daily ranges in temperature. Even after the hottest days, nights are usually cool over the state (WRCC 2010).

Precipitation varies with elevation. Precipitation over southern Utah ranges from around 30 to 35 inches on the windward mountain slopes to less than 10 inches over lower elevation portions of the Project area. Sunny skies prevail most of the year in Utah (WRCC 2010). Runoff from melting mountain snow usually reaches a peak in April, May, or early June, and sometimes causes flooding along the lower streams. However, damaging floods of this kind are infrequent. Flash floods from summer thunderstorms are more frequent, but they affect only small, local areas (WRCC 2010).

Wind speeds are usually light to moderate, ranging below 20 miles per hour (mph). There are only a few tornadoes in Utah as a rule, and those reported usually result in only slight property or resource damage (WRCC 2010).

Air Quality

Relevant monitoring data for concentrations of criteria pollutants available from EPA's AirData website and from the Utah Department of Environmental Quality (UDEQ) for monitors near the Project area are shown in 3-4 for the most recent year, or years, available. There are no nearby or representative locations that monitor ambient concentrations of lead.

TABLE 3-4
REPRESENTATIVE AIR QUALITY IN THE PROJECT AREA

Pollutant	Averaging Period	State/County					
		Utah/ Salt Lake	Utah/ San Juan	Utah/ Washington	Arizona/ Coconino	Arizona/ Mohave	Arizona/ Navajo
Ozone (ppm)	1 hour 2nd max	0.099	0.078	0.084	0.084	–	0.081
	8 hour 4th max	0.08	0.071	0.071	0.074	–	0.072
PM_{10} ($\mu g/m^3$)	24 hour 2nd max	62	–	–	43	44	–
$PM_{2.5}$ ($\mu g/m^3$)	24 hour 98th percentile	36.5	–	17 (2-year average)	13.5	–	–
	Annual mean	27.9	–	–	6.06	–	–
CO ($\mu g/m^3$)	1 hour 2nd max	3,333	–	–	–	–	–
	8 hour 4th max	92	–	–	–	–	–
SO_2 ($\mu g/m^3$)	1 hour 4th max	100	–	–	–	–	–
	3 hour 2nd max	55	–	–	–	–	–
	24 hour 2nd max	18	–	–	–	–	–
	Annual mean	7.1	–	–	–	–	–

TABLE 3-4
REPRESENTATIVE AIR QUALITY IN THE PROJECT AREA

Pollutant	Averaging Period	State/County					
		Utah/ Salt Lake	Utah/ San Juan	Utah/ Washington	Arizona/ Coconino	Arizona/ Mohave	Arizona/ Navajo
NO_2 ($\mu g/m^3$)	1 hour 98th percentile	143	–	35.8	–	–	–
	Annual mean	36.4	–	6.6	–	–	–

SOURCES: EPA 2010b; UDEQ 2010
NOTES:
ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter

3.2.1.2 Study Methodology

Inventory

Air Quality

Sources of criteria pollutant emissions, including NO_x, CO, SO_2, hydrocarbons (HC) (including VOCs), and PM_{10} and $PM_{2.5}$ particulate matter associated with implementation of the Project are summarized in Table 3-5.

TABLE 3-5
SOURCES OF AIR POLLUTANT EMISSIONS ASSOCIATED WITH PROJECT CONSTRUCTION AND OPERATION

Pollutant	Emissions Source					
	Earth-moving/ Ground Disturbance	Nonroad Equipment Tailpipes	On-Road Vehicle Tailpipes	Helicopter Operation	Paved and Unpaved Road Dust	Construction/ Operation of Concrete Batch Plant
Construction Phase						
$PM_{10}/PM_{2.5}$	✓	✓	✓	✓	✓	✓
SO_2	–	✓	✓	✓	–	✓
NO_x	–	✓	✓	✓	–	✓
CO	–	✓	✓	✓	–	✓
VOCs	–	✓	✓	✓	–	✓
Operation Phase						
$PM_{10}/PM_{2.5}$	✓	✓	✓	–	✓	–
SO_2	–	✓	✓	–	–	–
NO_x	–	✓	✓	–	–	–
CO	–	✓	✓	–	–	–
VOCs	–	✓	✓	–	–	–

Emissions from construction activities would be confined to the daytime hours and would occur only during active construction periods. Also, emissions would be transient as construction progresses, so emissions would not occur in one area for a long duration. BMPs would be applied during construction to reduce particulate matter emissions. BMPs also would be applied to limit particulate matter emissions from ground disturbance, road dust, and vehicle emissions during periodic maintenance or emergency repair activities. Based on professional judgment, emissions related to operation and maintenance activities were assumed to be negligible and were, therefore, not quantified.

Emissions of criteria pollutants (PM_{10}, $PM_{2.5}$, CO, NO_x, SO_2, and VOCs) from construction equipment, vehicles, and facilities and fugitive dust were estimated from the following source activities:

- Fugitive dust from earth-moving activities such as grading and dozing roads, work pads, and substation areas
- Dust from traffic on paved and unpaved roads associated with construction
- Tailpipe and evaporative emissions from construction-phase traffic
- Tailpipe emissions from construction equipment such as dozers, graders, generators, helicopters, etc.
- Construction and operation of a concrete batch plant

The methods for estimating emissions associated with each activity to be used to model air quality impacts are discussed below.

Fugitive Dust from Transmission Line and Substation Construction

For this analysis, uncontrolled fugitive dust emission factors of 0.42 tons PM_{10} per acre per month and 0.042 tons $PM_{2.5}$ per acre per month were used (Countess Environmental 2006, Midwest Research Institute 2005, EPA 2001) to estimate quantities of fugitive dust generated from access road construction. Uncontrolled fugitive dust emission factors of 0.11 tons PM_{10} per acre per month and 0.011 tons $PM_{2.5}$ per acre per month were used (Countess Environmental 2006, EPA 2001, Midwest Research Institute 2005) for other construction activities, including the proposed expansion of the existing substations and construction of the batch plant. Emission factors of 0.11 tons PM_{10} per acre per month and 0.011 tons $PM_{2.5}$ per acre per month were used for the substations. A control efficiency of 61 percent was assumed for watering as needed; application of dust suppressant, if warranted, was applied to uncontrolled emissions based on research sponsored by the Western Regional Air Partnership (WRAP) (Countess Environmental 2006).

Quantities of dust generated from use of paved and unpaved roads during construction were calculated by Project engineers (i.e., Proponent‘s engineers and contracted engineering staff) based on estimates of the number of miles traveled, vehicle counts planned for construction for each alternative route, and the proposed substation expansions. Emissions were calculated using spreadsheets developed by WRAP (2010). In calculating emissions, a speed limit of 25 miles per hour mph was assumed for unpaved roads and all unpaved roads were assumed to have a graveled surface. An average speed of 55 mph was assumed on paved roads. In addition to speed control, mitigation measures would include dust suppressant application on unpaved roads (if warranted), frequent watering of unpaved roads (twice daily assumed), and prompt removal of dirt tracked onto paved roads. Such measures generally would be required under Utah dust-control regulations.

Traffic Emissions

A number of support vehicles would be used during construction, including a fleet of pickup trucks, flatbed trucks, and other supporting vehicles, such as concrete and boom trucks. Each of these vehicles would emit criteria pollutants. Estimated emissions of criteria pollutants were calculated using the EPA-approved Mobile6 emission model (EPA 2003).

The model inputs included use of high-altitude mode and conventional Western gasoline composition. Emissions of mobile source NO_x, CO, VOC, and particulate-related combustion pollutants (SO_2, $PM_{2.5}$) were calculated, and the maximum per class emission rate was used to determine aggregate segment

emissions. Total pound-per-day emissions were based on the Mobile6 emission factor (expressed in grams per mile) and the number of vehicle miles traveled. These emission factors were applied to the various vehicle classes based on size and fuel used. For diesel fueled equipment, 15 ppm sulfur content was assumed (based on federal low-sulfur diesel requirements for nonroad engines effective June 2010).

Construction Equipment Emissions

Nonroad engine exhaust emissions associated with construction of the Project were estimated for each month of construction based on the number and type of equipment and construction schedule provided by Project engineers. Emission factors for diesel engines were obtained from the federal Tier 1-4 emission standards for CO, NO_x, PM, and VOC. The SO_2 emission factor for diesel engines was estimated using methods established in EPA NR-009A (EPA 1998a) and the June 2010 diesel fuel sulfur content standard of 15 ppm. Emission factors for gasoline engines were obtained from EPA 420R-05-019, *Exhaust Emission Factors for Nonroad Engine Modeling: Spark Ignition* (EPA 2005a). The SO_2 emission factor for gasoline engines was estimated using methods established in EPA NR-010b (EPA 1999).

Additional assumptions include:

- Total particulate matter emission factors were used to estimate emissions for PM_{10} and $PM_{2.5}$.
- Where available, nonmethane hydrocarbon (NMHC) emission factors were used to estimate VOC emissions. If NMHC emission factors were not available, HC emission factors were conservatively used to estimate VOC emissions.
- Tier 3 diesel VOC emission factor was assumed to be 0.2 grams per brake horsepower-hour (g/bhp-hr) (EPA 1998a).
- Tier 3 diesel NO_x emission factor was estimated from the difference of the NMHC + NO_x emission standard and the above 0.2 g/bhp-hr emission factor for VOC.
- Tier 2 diesel VOC emission factor was assumed to be 0.6 g/bhp-hr (EPA 1998a).
- Tier 2 diesel NO_x emission factor was estimated from the difference of the NMHC + NO_x emission standard and the above 0.6 g/bhp-hr emission factor for VOC.
- Brake-specific fuel consumption (BSFC) for diesel engines <100 horsepower (hp) was assumed to be 0.408 pound per horsepower-hour (lb/hp-hr) (EPA 1998a).
- BSFC for diesel engines >100 hp was assumed to be 0.367 lb/hp-hr (EPA 1998a).
- Gasoline-fired air compressors were assumed to have phase 2, 4-stroke engines.
- Generators and compactors were assumed to have phase 2, side-valved engines.

Emissions from helicopters to be used in construction were estimated based on hours of operation and the shaft hp of the engines of a Bell UH-1H helicopter. The methods for emission estimation from helicopters were developed by the Swiss Federal Office of Civil Aviation (FOCA) and documented in *Guidance on the Determination of Helicopter Emissions* (FOCA 2009).

Batch Plant Emissions

A temporary concrete batch plant would be constructed and operated to supply concrete for use in construction. Fugitive dust emissions that could result from batch plant construction were scaled using a multiplier based on the relative graded acreage for each. Construction equipment and traffic emissions for construction of the temporary batch plant were assumed to be similar to those from the clearing and grading, foundation, and structure-related tasks associated with the recent expansion of the Red Butte Substation.

Emissions generated from operation of the concrete batch plant during Project construction were estimated using emission factors established in EPA's *Compilation of Air Pollutant Emission Factors* (EPA 2005b) for concrete batching operation. Emissions were based on the planned total output from the batching operation of 3,720 cubic yards of concrete. The concrete was assumed to be truck mixed. Traffic emissions for delivery of raw materials to the plant were based on Mobile6 emission factors and the amount of raw materials required to produce 3,720 cubic yards of concrete.

Impact Assessment and Mitigation Planning

Air quality dispersion modeling was performed using the EPA SCREEN3 model (version 96043) to simulate the dispersion of criteria pollutants generated from construction. For this analysis, it was assumed maximum fugitive dust and emissions from construction equipment would occur during foundation excavation. For the substations, it was assumed maximum particulate-matter emissions would occur during site clearing and grading, while maximum emissions of gaseous pollutants would occur during structure work.

Worst-case daily and hourly emissions were calculated for the criteria pollutants and activities expected (based on professional judgment) to have maximum short-term impacts. Annual modeling was not performed because construction activities would be spread over many miles of the transmission line route over the course of a year, with only limited impact at any given location. Similarly, the dispersion of on-road mobile source emissions (and helicopter emissions) was not modeled because impacts would occur over large distances, and most travel would occur on publically accessible roadways. Vehicle traffic on public roads associated with Project construction would represent a small fraction of the total traffic volume on public roads in the vicinity of the Project.

Model inputs for average daily (for particulate matter) and maximum hourly (for gaseous pollutants) emissions were derived as follows:

- PM_{10} and $PM_{2.5}$ fugitive emissions generated from transmission line construction plus associated PM_{10} and $PM_{2.5}$ emitted by construction equipment involved in foundation excavation and installation were used. Emissions generated from the excavation and installation of a single tower-structure foundation was modeled; thus, emissions for modeling and impacts are the same for all alternative routes. Dispersion of PM_{10} and $PM_{2.5}$ emissions from fugitive dust and construction equipment associated with site clearing and grading also were calculated. The Red Butte Substation expansion PM_{10} and $PM_{2.5}$ emissions were used for dispersion modeling for both substation expansions.

- CO, NO_2, and SO_2 emitted by construction equipment associated with the excavation and installation of a tower structure foundation were used in dispersion modeling. Again, because activities at a single foundation location were modeled, emissions and impact should be the same for any alternative. For the substations, dispersion of emissions generated from the construction

equipment involved in the Red Butte Substation expansion were modeled to represent dispersion associated with both substation expansions. The Red Butte Substation was selected to provide a conservative estimate as the duration of activities proposed at the Red Butte Substation is longer than for the Sigurd Substation expansion and could result in higher overall emissions.

The dispersion of VOCs was not modeled because VOCs are regulated as precursors to other pollutants (ozone, PM_{10}) and typically are modeled only as part of regional studies.

Emissions generated from excavation and installation of tower-structure foundations and clearing, grading, and structure work associated with the substation expansions were modeled in SCREEN3 as area sources. The release height was set to 32.8 feet (10 meters) in accordance with procedures recommended by the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD), for fugitive source with substantial turbulence (e.g., equipment activity) (CDPHE 2005). Area source dimensions were based on the 150-foot by 200-foot disturbance area for foundations. For the substation expansion, a 1-acre disturbance area was used.

A unit emission rate of 1 gram (g) per second was used for all pollutants, and the model was run using full meteorology (including nighttime conditions). Maximum ground level concentrations were calculated, and appropriate averaging period conversions were applied to the maximum SCREEN3 hourly modeled concentration. For 24-hour particulate matter concentrations, the conversion factors were based on Colorado APCD methodology (CDPHE 2005). Other conversion factors commonly used with SCREEN3 results also are listed in CDPHE (2005).

EPA significance impact levels (SIL) for various pollutants and averaging periods are shown in Table 3-6. If modeled concentrations for a given pollutant and averaging period are below the significance levels, the emissions would not be expected to cause or contribute to an exceedance of the NAAQS.

TABLE 3-6
MODELING SIGNIFICANCE LEVELS

Pollutant and Averaging Period	Significance Level ($\mu g/m^3$)
PM_{10}: 24 hour	5
$PM_{2.5}$: 24 hour	1.2
CO: 1 hour	2,000
CO: 8 hour	500
SO_2: 1 hour	8 (recommended interim level)
SO_2: 3 hour	25
SO_2: 24 hour	5
NO_2: 1 hour	7.5 (proposed interim level)
SOURCES: EPA 2010d, 2010e, 2010f, CFR 51.165	

If modeled concentrations were predicted to potentially exceed SILs using the conservative assumptions discussed above, the resulting Project-related pollutant concentrations were added to the most representative background concentrations (Table 3-3) and the totals were compared with the NAAQS.

The concrete batch plant would require an air permit or Approval Order in compliance with UAC R307-401, *Permit: Notice of Intent and Approval Order*. The Approval Order would provide enforceable air pollution mitigation measures to reduce air emission impacts from operation of the batch plant.

Dust generating activities are required to meet general dust-control requirements as specified in UAC R307-205. Mitigation measures, including watering, application of dust suppressant as needed, road sweeping, and speed control would be used to limit particulate emissions. Following construction,

disturbed areas would be reclaimed with native vegetation or seed mix prescribed by the land-management agency.

Most emissions of gaseous pollutant would be generated by diesel equipment used in Project construction. The use of equipment that meets current EPA emission standards and proper maintenance of that equipment would reduce emissions generated from diesel construction equipment.

Standard dust control requirements specified in UAC R307-205 that would apply to Project construction include the following:

- Fugitive emissions should not exceed 20 percent opacity.
- Fugitive dust must be minimized from any aggregate storage or handling activities.
- Watering, chemical stabilization, wind breaks, and other similar measures must be employed to minimize fugitive dust from cleared areas and unpaved roads.
- For any new roads with an average of 150 vehicle trips per day or greater, a notice of intent must be submitted prior to construction.

3.2.1.3 Results

Estimated emissions for criteria pollutants associated with construction and maintenance of all action alternatives are shown in Table 3-7. Ambient impacts on air quality for all alternatives are shown in Table 3-8 and are common to all alternatives.

TABLE 3-7
ESTIMATED EMISSIONS OF CRITERIA POLLUTANTS

Emissions (tons)	Alternative Routes											
	N1[1,2]	N2	N3	N4	N5	N6[3]	S1	S2[1]	S3	S4	S5[3]	S6
Fugitive Dust from Earth-moving Activities (duration activity of 14 months)[4]												
NO_x	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SO_2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM_{10}	89.6	87.4	80.8	84.4	77.2	86.4	48.2	40.8	53.1	47.5	49.3	56.0
$PM_{2.5}$	9.0	8.7	8.1	8.4	7.7	8.6	4.8	4.1	5.3	4.7	4.9	5.6
Travel on Paved Roads (duration activity of 36 months)[3]												
NO_x	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SO_2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM_{10}	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
$PM_{2.5}$	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Travel on Unpaved Roads (duration activity of 36 months)[3]												
NO_x	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SO_2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PM_{10}	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
$PM_{2.5}$	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2

TABLE 3-7
ESTIMATED EMISSIONS OF CRITERIA POLLUTANTS

Emissions (tons)	Alternative Routes											
	N1[1,2]	N2	N3	N4	N5	N6[3]	S1	S2[1]	S3	S4	S5[3]	S6
Construction Equipment (duration activity of 36 months)[3]												
NO_x	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0	140.0
SO_2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
CO	143.0	143.0	143.0	143.0	143.0	143.0	143.0	143.0	143.0	143.0	143.0	143.0
VOC	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
PM_{10}	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
$PM_{2.5}$	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
Traffic (duration of activity of 36 months)[3]												
NO_x	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
SO_2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
CO	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
VOC	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
PM_{10}	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
$PM_{2.5}$	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Helicopters (duration of activity 4 months)[3]												
NO_x	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
SO_2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
CO	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
VOC	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
PM_{10}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
$PM_{2.5}$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Emissions												
NO_x	162.7	162.7	162.7	162.7	162.7	162.7	162.7	162.7	162.7	162.7	162.7	162.7
SO_2	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
CO	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6	161.6
VOC	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
PM_{10}	250.0	247.8	241.2	244.8	237.6	2486.8	208.6	201.2	215.5	207.9	209.7	216.4
$PM_{2.5}$	33.4	33.1	33.5	33.1	32.1	33.0	29.2	29.5	29.7	29.1	29.1	30.0

NOTES:
< = less than
[1]Environmentally Preferred Alternative
[2]Environmentally Preferred Alternative
[3]Proponent's Proposed Action
[4]All activities would begin in December 2012, except helicopter activity, which would begin in July 2013.

TABLE 3-8
AIR DISPERSION MODELING RESULTS

Pollutant and Averaging Period	Concentration ($\mu g/m^3$)[1]	Significant Impact Level ($\mu g/m^3$)	Background Concentrations ($\mu g/m3$)	Project Plus Background ($\mu g/m3$)	NAAQS ($\mu g/m3$)
PM_{10}: 24 hour	5.0	5	43.5	48.5	150
$PM_{2.5}$: 24 hour	3.8	1.2	13.5	17.3	35
CO: 1 hour	1,005	2,000	NA, below SIL	NA, below SIL	40,000
CO: 8 hour	704	500	92	795.8	10,000
SO_2: 1 hour	1.71	8 (recommended interim level)	NA, below SIL	NA, below SIL	196.4
SO_2: 3 hour	1.54	25	NA, below SIL	NA, below SIL	1,300
SO_2: 24 hour	0.69	5	NA, below SIL	NA, below SIL	365
NO_2: 1 hour	See notes below[2]	7.5 (proposed interim level)	35.8	See notes below[2]	188.7

NOTES:
$\mu g/m^3$ = micrograms per cubic meter
[1] Modeled concentrations of criteria pollutants represent impacts on air quality and would be common to all alternatives.
[2] Results are not shown for 1-hour NO_2. The NAAQS limitation is expressed as a concentration of NO_2; however, a mixture of oxides of nitrogen is commonly emitted from combustion sources, such as construction equipment, with the principal components being NO and NO_2. The emitted NO_x reacts (e.g., with ozone) as it is transported downwind, eventually being converted to NO_2. For modeling purposes, the NO_x emissions from diesel equipment typically are assumed to be 90 percent NO and 10 percent NO_2. A further complication is the NAAQS is based on a 98th percentile concentration while screening-level modeling can only estimate maximum impacts. To derive NO_2 impact estimates, it was necessary to assume a rate of conversion from NO_x to NO_2. Oxidation by ozone is typically the main reaction for NO_2 formation, especially in rural areas. While the reaction rate is essentially instantaneous, the total amount of conversion is limited by how quickly the plume entrains surrounding air and the amount of ozone in that air. Therefore, the amount of NO_2 within the NO_x plume increases as the plume travels and disperses downwind of the source. This increase would continue with time (plume travel), until the reactions that create and destroy NO_2 reach quasi-equilibrium, which could be 10 kilometers or more downwind.

EPA recommends a three-tiered approach to estimating NO_2 concentrations. First, the most conservative option is to assume 100 percent of the NO_x converts to NO_2. The second tier approach is to use a default ratio for the conversion (ambient ratio method [ARM]). A default ratio of 75 percent has been commonly used in estimating NO_x conversion rates for the annual NO_2 standard and is based on the tenet that on a long-term (annual average) basis, the final plume NO_2 to NO_x ratio would equal the existing ambient NO_2 to NO_x ratio. The ARM theory applies at distances where the typical NO_x composition within the plume has stabilized. EPA has not developed a conversion ratio appropriate for the 1-hour NO_2 standard. For the type of equipment considered here, 75 percent conversion is likely to produce substantial overestimates of worst-case NO_2 concentrations, in part because maximum plume impacts would occur in the immediate vicinity of the emitting equipment rather than further downwind, as would be expected from a source with a higher release height and greater plume rise. The third-tier, which limits conversion of NO_x to NO_2 based on ambient ozone in the plume, can be implemented in more sophisticated dispersion models if representative ozone data are available but beyond the scope of a simple screening model.

If the default 75 percent ARM is applied to the screening model results, the resulting maximum screening-level impact indicates the 1-hour NAAQS may be exceeded during foundation excavation/installation due to diesel equipment emissions. However, maximum impacts predicted by the model would occur less than 200 meters downwind. At the wind speed assumed by the model, maximum impacts would occur with less than 4 minutes plume travel downwind, limiting the amount of ozone available for conversion. Conversely, if 10 percent of the NO_x emissions are assumed to be emitted as NO_2 and no additional conversion occurs, the resulting maximum impact plus ambient NO_2 background concentration would be well within the standard limitations. An exceedance of the numerical value of the NAAQS does not mean that the standard will be exceeded as the standard is a 3-year average and transmission line construction will only impact a given location at one time.

No Action Alternative

Under this alternative, the environment would remain as it presently exists.

Impacts Common to Alternatives

Regardless of the alternative route selected, construction of the transmission line and associated facilities would result in the dispersion of emissions of criteria pollutants generated from construction equipment, vehicles, and facilities and fugitive dust. The estimated concentrations of emissions generated by implementing the Project would vary by alternative route; however, the dispersion of criteria pollutants and overall impact on air quality would be common to all alternatives. However, impacts on air quality resulting from emissions of criteria pollutants would be short-term (i.e., during Project construction) and the dispersion of criteria pollutants would be limited to the vicinity of construction activity (i.e., maximum impact would occur within 656.2 feet [200 meters] of the emission source). Impacts on air quality would not be anticipated to result in exceedances of the NAAQS with the possible exception of

the 1-hour NO_2 standard (discussed below). Air dispersion modeling results for criteria pollutants are shown in Table 3-7.

Expansion of Existing Sigurd Substation

Estimated emissions for criteria pollutants associated with construction activities for the expansion of the existing Sigurd Substation are shown in Table 3-9.

TABLE 3-9
ESTIMATED EMISSIONS OF CRITERIA POLLUTANTS FOR SIGURD SUBSTATION

Emission Source	Duration of Activity (months)[1]	NO_x (tons)	SO_2 (tons)	CO (tons)	VOC (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)
Fugitive dust from earth-moving activities	0.5	–	–	–	–	0.09	0.009
Travel on paved roads	6	–	–	–	–	1.8	0.2
Travel on unpaved roads	6	–	–	–	–	1.1	0.1
Construction equipment	6	8.0	0.03	22.0	0.8	0.5	0.5
Traffic	6	0.6	0.002	0.9	0.14	0.02	0.02
	Totals:	10.0	0.04	27.0	1.1	3.5	0.8

NOTE: [1]With the exception of earth-moving activities, which would begin December 2012, all activities would begin in December 2013.

Batch Plant

Table 3-10 summarizes emissions for construction and operation of the concrete batch plant. Impacts on air quality (i.e., pollutant concentrations) resulting from construction and operation of the batch plant would be less than estimated for construction of the transmission line or expansion of the substations because overall emissions are lower and the batch plant would be a temporary facility only that would serve portions of the transmission line.

TABLE 3-10
AIR POLLUTANT EMISSIONS – BATCH PLANT

Activity	NO_x (tons)	SO_2 (tons)	CO (tons)	VOC (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)
Construction – all sources	8.7	0.03	18.4	0.9	2.1	0.7
Operation emissions	–	–	–	–	<0.1	<0.1
Operation traffic	0.3	<0.1	0.2	0.1	1.3	0.2
Totals	9.0	0.03	18.6	1.0	3.4	0.9

General Conformity

In 1993, the EPA promulgated a rule requiring federal actions to conform to State Implementation Plans. Conformity means that a federal action would not interfere with strategies to attain the NAAQS. The State of Utah has incorporated the federal conformity requirements in 40 CFR 93 by reference.

Federal actions responsible for air pollutant emissions within a nonattainment or maintenance area must undergo a conformity applicability analysis to determine whether a conformity determination is necessary. The total of Project-related direct and indirect emissions (such as emissions from associated

traffic) is tested against *de minimis* emission levels. Conformity determinations are required for any federal action where the total of direct and indirect emissions exceeds the annual *de minimis* thresholds.

There are no portions of the transmission line alternative routes that would traverse any nonattainment or maintenance areas. Therefore, the conformity requirements are satisfied since no nonattainment or maintenance areas would be affected.

Global Climate Change

The assessment of climate changing pollutant emissions and climate change is in its formative phase; therefore, it is not yet possible to know with confidence the net impact to climate. However, the Intergovernmental Panel on Climate Change (2007) recently concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations."

The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. Currently, BLM does not have an established mechanism to accurately predict the effect of resource management-level decisions from this project-specific effort on global climate change. However, potential impacts on air quality due to climate change are likely to be varied. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated. Due to loss of habitat, or due to competition from other species whose ranges may shift northward, the population of some animal species may be reduced. Less snow at lower elevations would be likely to affect the timing and quantity of snowmelt, which, in turn, could affect aquatic species.

3.2.1.4 Summary

Implementation of the Project on any of the alternative routes would have similar emissions and impacts on air quality. The same construction equipment would be used on any of the alternative routes, and construction would occur over the same timeframe. Therefore, the only differences could be the amount of fugitive dust generated from earth-moving operations because each alternative could have slightly different surface disturbance based on different terrain. However, as discussed below, the differences between the alternatives would be negligible.

Particulate-matter emissions associated with construction of the transmission line would result predominantly from fugitive dust generated by construction vehicles traveling on unpaved roads. Frequent watering, speed control, and possible application of dust suppressant would minimize these emissions.

Gaseous pollutant emissions associated with construction of the transmission line would be anticipated to result predominantly from diesel construction equipment. Proper equipment maintenance and use of equipment that meets current EPA emission standards would reduce these emissions and associated impacts on air quality.

Overall, impacts on air quality from Project construction would be temporary and localized to the vicinity of the activity (i.e., within 200 meters of emission source) and would quickly disperse or settle. The

screening-level air quality model performed to analyze potential impacts on air quality could not rule out a potential exceedance of the 1-hour standard for NO_2 because of emissions from diesel equipment to be used during Project construction. Current modeling methodology is inadequate to accurately characterize these impacts. Based on the conservative assumptions used in estimating the concentrations and dispersion of criteria pollutants generated from construction activities, exceedances of the NAAQS for NO_x or any other criteria pollutant resulting from Project construction would not be anticipated.

3.2.2 Earth Resources

Issues raised by the public and agencies during Project scoping and preparation of the EIS related to potentially significant effects on earth resources include geological hazards that could result in potential risks to Project construction or operation, soil disturbance and increased erosion resulting from construction activities, and conflicts with authorized mineral operations.

Geologic Hazards

Geologic hazards generally consist of Quaternary faults, seismicity (earthquakes), liquefaction, steep terrain, and landslide susceptibility. Earthquakes are the surface expression of large energy releases that result from motion along faults. Quaternary faults are considered active and, therefore, are likely to have earthquakes occur along their length in the future. The U.S. Geological Survey (USGS) measures seismicity as the probability an area would be affected by a damaging earthquake. It is measured as the probability of a certain degree of ground-shaking in terms of the percentage of acceleration due to gravity (9.8 meters per second squared) (Peterson et al. 2008). Liquefaction occurs in areas where soils are fully saturated with water and experience ground-shaking as a result of an earthquake, which is capable of causing great damage to structures in the area. Landslides are the downward and outward movement of earth materials on a slope through the falling, sliding, or flowing of rock or soil that is a result of slope failure (Radbruch-Hall et al. 1982). The slope-failure is a result of ground saturation and/or ground shaking. In the Basin and Range Province, air-fall tuff and shale are the rocks most commonly involved in landsliding (Radbruch-Hall et al. 1982). Landsliding is especially common where tuff and shale are capped by more resistant rocks, which creates steep slopes.

In accordance with the NESC, the Proponent is required to consider the potential for seismic activity in the design of transmission structures and facilities and must construct the transmission structures and substation facilities to withstand seismic forces. Further, avoidance of geological hazards and engineering constraints were criteria in the Proponent‘s feasibility study to identify general corridors where transmission lines could be sited and constructed (GeoEngineers 2007).

Mineral Resources

Mineral resources typically are divided into three broad categories: (1) locatable, (2) leasable, and (3) salable mineral resources. Locatable minerals include a broad category of economically important minerals that include precious and base metals, such as gold, silver, and lead; fissionable products, such as uranium; and industrial minerals. Locatable resources also include rocks that bear precious stones, such as diamonds or sapphires. Leasable resources typically are extracted for use in energy production and include oil, natural gas, coal, and geothermal deposits. Leasable mineral resources on federal lands require a lease of set duration with the government. Salable mineral resources typically are used for construction and industrial purposes and include sand, gravel, stone, pumice, and cinders. Salable mineral

resources may be acquired from federally owned or controlled lands via a permit or contract, or through small-scale collection, such as recreational rock collecting.

NEPA and FLPMA serve as the primary federal legislation requiring assessment and mitigation of potential impacts on mineral resources when considering proposals for major federal actions on federally administered lands.

Soil Resources

Soil is defined as a ―relatively thin, unconsolidated layer of mineral type horizons that are located upon the earth‘s crust." The soil profile usually acquires its unique properties as a direct result of physical and chemical weathering along with the biological alteration of its geologic source materials; in addition, the actual process of soil formation includes a contribution by factors such as climate and topography, along with the simple recognition – that, all soils continue to form over time" (Smith 2005). In addition to the requirements of NEPA and FLPMA, the FPPA requires the assessment of impacts on farmlands from proposed conversion of farmlands to nonagricultural uses.

3.2.2.1 Regional Setting

Geologic Hazards

The Project is located along the eastern margin of the Basin and Range Physiographic Province, a physiographic region characterized by mostly parallel, north-south trending mountain ranges separated by desert basins and valleys (Fenneman 1931). The Basin and Range Physiographic Province is bordered on its eastern margin by the Wasatch Mountains and the Colorado Plateau Physiographic Province. Geological units in the Project area range in age from Proterozoic to Cenozoic (see Table 3-43 in the paleontological resources, Section 3.2.7).

Geologic hazards are common in the Basin and Range Physiographic Province. The eastern portion of the Project area is located in a moderately seismically active region of Utah, which is associated with the transition zone between the Basin and Range Physiographic Province and the Colorado Plateau Physiographic Province. This area is located within an area designated by USGS as seismic zone 3, which means the area has a 1 in 10 chance an earthquake with an active peak acceleration level of 0.03 g (3/100 the acceleration of gravity) will occur within the next 50 years, which translates to 5.5 to 5.9 on the Richter scale. This level of seismicity is due to the many Quaternary faults present along the eastern border of the Basin and Range Physiographic Province. These Quaternary faults are scattered throughout the Project area, with some faults being crossed multiple times by alternative routes. A total of 1,799 earthquakes have been recorded within the Project area between 1962 and 2001, ranging in magnitude between 0.1 and 5.2 on the Richter scale. A 5.2-magnitude earthquake occurred in 1967. The epicenter located in the Marysvale area (University of Utah Seismograph 1967), about 7 miles from the study corridor.

There are numerous areas of landslide susceptibility in the Project area. The areas with the highest concentration of high landslide susceptibility occur in the Richfield and Sulphurdale areas. Historically, most mapped landslides within the Project area are located in an area extending from Richfield to west of the community of Sevier (Hardy 1991). Very few landslides have been mapped in the southern portion of the Project area. The Sevier River valley was identified as an area that has a potential for liquefaction (Anderson et al. 1990), with the highest potential being located within a narrow band bordering either side of the Sevier River, which is associated with a region of shallow groundwater. The Sulphurdale-Cove

Fort area was classified as having low potential for liquefaction due to its deeper groundwater and more dense deposits (Anderson et al. 1990).

Mineral Resources

Mineral resources occur throughout the Project area. A large number of oil and gas leases occur in the transition zone area between the Basin and Range and the Colorado Plateau Physiographic Provinces. Twenty mining districts are present throughout the Project area as shown in Table 3-11.

TABLE 3-11
MINING DISTRICTS IN THE PROJECT AREA

Mining District	Location	Mining Operations
Iron Springs	West of Cedar City along the Iron and Granite Mountains	Iron ore from replacement deposits in the Homestake Limestone of the Carmel Formation
Pinto	Southwest of the Iron Springs district	Iron; precious and base metals
Antelope Range	West of the Iron Springs district near Newcastle	Precious and base metals
Bull Valley	South of Enterprise	Iron
Beaver Lake Mountains	West of Milford	Precious and base metals
Rocky Range	West of Milford	Precious and base metals
Star	West of Milford	Precious and base metals
Bradshaw	North Minersville	Precious and base metals
Lincoln	North Minersville	Precious and base metals
Granite	East of Minersville	Combination of precious and base metals; miscellaneous metals
Roosevelt	North of Minersville	Precious and base metals
Fortuna	North of Minersville	Precious and base metals
Antelope Springs	Southeast of Black Rock	Precious and base metals
Gordon	Near Cove Fort	Precious and base metals
Newton	Between Manderfield and Marysvale	Precious and base metals; radioactive elements
Gold Mountain	Between Manderfield and Marysvale	Precious and base metals; radioactive elements
Henry	Between Manderfield and Marysvale	Precious and base metals; radioactive elements
Marysvale	Between Manderfield and Marysvale	Precious and base metals; radioactive elements
Ohio	Between Manderfield and Marysvale	Precious and base metals; radioactive elements
Mount Baldy	Between Manderfield and Marysvale	Precious and base metals; radioactive elements

SOURCES: Doelling and Tooker 1983; Ege 2005
NOTE: Precious and base metals (gold, silver, lead, copper and zinc); miscellaneous metals (antimony, beryllium, bismuth, manganese, mercury, molybdenum, tungsten, etc.); and radioactive elements (uranium, thorium, and vanadium).

The Project area, located along the eastern margin of the Basin and Range Physiographic Province, west of the Colorado Plateau, does not have large oil and gas fields similar to those located in the Colorado Plateau or the Uinta Basin to the north. There are, however, several smaller oil fields present within the Project area. One such oil field is the newly discovered Covenant Oil Field, which is located east of Richfield and is expected to produce large amounts of oil. The Covenant Oil Field occurs in a fold structure of the Navajo Sandstone that is capped by the Arapien Shale (Sorkhabi 2007).

There are four areas with known geothermal resources occurring within the Project area: (1) Cove Fort-Sulphurdale geothermal area; (2) Roosevelt Hot Springs geothermal area; (3) Newcastle geothermal area; and (4) Monroe-Joseph geothermal area. In Beaver County, Utah, the geothermal resources have been

linked to faults that are a result of both the Mesozoic Sevier Orogeny and the tectonic forces that created the Basin and Range Physiographic province (Barker et al. 2002). The Cove Fort-Sulphurdale geothermal area has been investigated since the 1980s, in which the first power plant to use the local geothermal resources entered service in 1985 (Barker et al. 2002). It is believed a combination of complex geologic structures has localized the geothermal source in the Cove Fort-Sulphurdale area (Blackett and Wakefield 2002). The Roosevelt Hot Springs geothermal area is located west-southwest of the Cove Fort-Sulphurdale area. Production from the Roosevelt Hot Springs area is primarily from highly fractured Tertiary granitic and metamorphic rocks (Blackett and Wakefield 2002). Currently, a geothermal well field and electrical generation plant are operational in this area and within the Project area (Chiasson 2004). The Newcastle geothermal system is a result of thermal fluids rising from fracture zones along the Antelope Range that have created a geothermal aquifer (Blackett 2007).

Soils

The Project area includes the following physiographic subregions: Salt deserts, shadscale-dominated saline basins, sagebrush basins and slopes, and woodland- and shrub-covered low mountains (Woods et al. 2001). The salt deserts and shadscale-dominated saline basins sub-regions typically exhibit clayey, poorly drained soils that may exhibit high concentrations of salt or alkaline deposits. The sagebrush basins and slopes sub-region is an intermediate zone that links the arid and largely flat salt deserts and shadscale-dominated saline basins with the wetter and more rugged woodland- and shrub-covered low mountains. The woodland- and shrub-covered low mountains sub-region exhibits shallow, well-drained, loamy, and neutral to slightly alkaline soils covered by woodlands or mountain brush at higher elevations.

3.2.2.2 Study Methodology

Inventory

Geologic Hazards

Information regarding geologic hazards was obtained from the scientific literature and discussions with resource specialists at the BLM, USFS, UGS, and University of Utah seismograph stations. Geological units within the Project area were identified from geological maps (Hintze et al. 2000; Hintze 2003; Rowley et al. 2005, 2006). Fault data were compiled from USGS Atlas-Digital Library (USGS 2009a). Earthquake data between 1973 and the present were acquired from the National Earthquake Information Center (NEIC) (USGS-NEIC 2009). Seismicity data were obtained from the Geological Hazards Team at the USGS Earthquake Hazard Program (Peterson et al. 2008; USGS-NEIC 2009).

Mineral Resources

Areas with active mining claims, mining material sites, oil and gas leases, coal leases, and geothermal leases in the study corridors were identified using the BLM and USFS Geocommunicator service and LR2000 database (Geocommunicator-National Integrated Land System 2009). Additional information pertaining to mineral resources was obtained from other federal and state sources that include USGS, UGS, and Utah Department of Natural Resources (UDNR) Oil and Gas Mining Division.

Soil Resources

Information for the soil inventory was obtained primarily from the Natural Resources Conservation Service (NRCS) (Web Soil Survey and online Soil Data Mart) and the USFS, both of the USDA. Soils within the Project area were mapped by the NRCS at two different scales of resolution: (1) the smaller-scale State Soil Geographic database (STATSGO) and (2) the larger-scale Soil Survey Geographic database (SSURGO). Additional soil data were also obtained from soil science staff at both the Fishlake and Dixie National Forests, including the Tushar-Pahvant Canyon Soil Survey Area #649. USFS soils data are similar in scale to the SSURGO-level surveys of the NRCS. Four SSURGO soil surveys are relevant to the study corridor and were referenced for information: (1) Beaver-Cove Fort Area Soil Survey, (2) Beaver County (Western Part) Soil Survey, (3) Iron-Washington Area Soil Survey, and (4) Washington County Area Soil Survey. If SSURGO or USFS data were unavailable for portions of the study corridor, smaller-scale data from the STATSGO database were used. These areas only include data for zones susceptible to wind erosion.

Impact Assessment and Mitigation Planning

Geologic Hazards

After compiling resource inventory for geologic hazards, the methodology for assessing the potential impacts on the Project from geological hazards associated with implementation of the Project included (in order) (1) identifying the types of potential effects on the Project from geological hazards; (2) developing criteria for assessing the intensity of potential impacts on the Project from geological hazards; (3) classifying the relative sensitivity (high, moderate, or low sensitivity) of areas to the likelihood of a geologic hazard occurring in the future; (4) assessing initial impacts on the Project; (5) identifying the appropriate selective mitigation measures (Table 2-7) for minimizing potential adverse effects; (6) determining specific areas where selective mitigation should be applied, and (7) disclosing potential residual impacts on the Project.

Types of Potential Effects by Geologic Hazards

Geologic hazards could directly and indirectly affect the construction, operation, and maintenance of the Project. Potential direct effects include direct loss of equipment or injury to personnel as a result of seismic activity or landslides, especially in steep terrain. Potential indirect effects on the operation of the Project could include indirect loss of transmission service as a result of seismic activity or landslides.

Criteria for Assessing Intensity of Impacts

Criteria were developed to assess the intensity of a potential effect from a geological hazard on the Project (Table 3-12). Quaternary faults were assigned a high level of intensity because they are considered active and capable of generating strong earthquakes in the near future. Inactive (pre-Quaternary) faults were assigned a moderate level of intensity because these faults could be reactivated in the distant future. Intensity for landsliding was based on areas with landslide susceptibility, previously mapped landslides, and steep slopes.

TABLE 3-12 CRITERIA FOR ASSESSING INTENSITY OF IMPACTS FROM GEOLOGIC HAZARDS	
Intensity of Impacts	**Description**
High	▪ Areas with steep terrain (30 percent slope or greater) or high landslide susceptibility ▪ Areas where Quaternary faults (most recent and considered active) are present
Moderate	▪ Areas with moderately steep terrain (15-30 percent slope) or moderate landslide susceptibility ▪ Areas with pre-Quaternary faults (inactive) present
Low	▪ Areas without steep terrain (0-15 percent slope) having low landslide susceptibility

Effects Analysis

Assessment of Initial Impacts

Initial sensitivity classifications are the basis for assessing initial impacts of geologic hazards on the Project. The initial sensitivity classifications were assigned using the criteria presented in Table 3-12 and are presented in Table 3-13.

Mitigation Planning

In addition to the BMPs included as part of the Project description in Chapter 2 (Table 2-6), cut and fill of slopes would be minimized to the extent possible (Mitigation Measure 3) during construction of access roads on slopes greater than 8 percent (i.e., Access Levels 4 and 5 [Table 2-8]) to reduce the risk of landslides and associated impacts on the Project.

Residual Impacts

Table 3-13 summarizes the initial sensitivity classifications that provided the basis for assessing initial impacts by geologic hazards on the Project, the mitigation measure applied to mitigate potentially adverse effects by geologic hazards, and residual impacts.

TABLE 3-13 SUMMARY OF SENSITIVITY LEVEL AND RESIDUAL IMPACTS BY GEOLOGIC HAZARDS			
Geological Hazard	**Resource Sensitivity Level**	**Mitigation Measures Applied**	**Residual Impacts**
Quaternary faults	High	None	Moderate
High landslide susceptibility	High	3	Moderate
Pre-quaternary faults	Moderate	None	Low
Moderate landslide susceptibility	Moderate	3	Low

Mineral Resources

After compiling resource inventory for mineral resources, the methodology for assessing the potential impacts on mineral resources associated with implementation of the Project included (in order) (1) identifying the types of effects on the mineral resources that could result from construction, operation, and maintenance of the proposed transmission line and associated facilities; (2) classifying the sensitivity of the mineral resources; (3) developing criteria for assessing the intensity of a potential effect on a

mineral resource; (4) assessing the initial impacts on mineral resources; and (5) selecting mitigation measures to mitigate mineral resources within the Project area.

Types of Potential Environmental Effects

Locatable and salable mineral resources can be exposed at the surface, lie just below the surface, or be located several hundred feet below the surface. Oil and gas leases exist in a number of counties that could be crossed by the Project. Significant petroleum exploration, recovery, and transportation infrastructure exists, or could exist in the future. By avoiding existing oil and gas production facilities, the Project would not interfere with current oil and gas production in the Project area. Furthermore, the Project should not affect future oil or gas production because oil and gas deposits are generally located at depths of more than 1,000 feet.

Active mines and mining operations exist in a number of counties that could be crossed by the Project. Avoidance of land use conflicts, such as mining operations and oil and gas production areas, where possible, was a criteria in the Proponent‘s engineering study to identify locations where transmission lines could be sited and constructed. Where mining operations or mineral resources could not be avoided, the construction and maintenance of the Project could have direct effects to mineral resources that include the following:

- Loss of mineral resources caused by construction activities
- Limiting development and extraction of mineral resources resulting from the presence of permanent facilities (permanent)

There would be no indirect effects to mineral resources as a result of implementation of the Project.

Criteria for Assessing Intensity of Impacts

Criteria were developed to assess the intensity of a potential effect on a mineral resource associated with implementation of the Project (Table 3-14). Criteria developed to assess the intensity of impacts on mineral resources were based on the type of mineral resource and any activities associated with the mineral resource.

TABLE 3-14
CRITERIA FOR ASSESSING INTENSITY OF IMPACTS ON MINERAL RESOURCES

Intensity of Impacts	Description
High	▪ Areas with active mines or mining claims ▪ Areas with oil or gas wells ▪ Areas with mineral resources
Low	▪ Areas with geothermal resources or geothermal leases producing ▪ Oil and gas leases and coal leases ▪ Mineral leases

Effects Analysis

Assessment of Initial Impacts

Initial resource sensitivity classifications are the basis for assessing initial impacts on mineral resources associated with implementation of the Project. The initial resource sensitivity classifications were assigned using the criteria presented in Table 3-14.

Mitigation Planning

In addition to the BMPs included as part of the Project description in Chapter 2 (Table 2-6), mitigation measures were developed to minimize potential high and moderate impacts on mineral resources (Table 2-7). These measures include avoidance of active or potential mines, oil and gas leases and producing wells, and areas with geothermal agreements, leases or producing wells (Mitigation Measure 2), where feasible. If avoidance of active mines were not feasible, the active mines would be spanned (Mitigation Measure 7).

Residual Impacts

Table 3-15 summarizes the initial resource sensitivity classifications that provided the basis for assessing initial impacts on mineral resources, the mitigation measures applied to mitigate potentially high and moderate adverse effects on those mineral resources, and residual impacts.

TABLE 3-15
SUMMARY OF SENSITIVITY LEVEL AND RESIDUAL IMPACTS ON MINERAL RESOURCES

Mineral Resource	Resource Sensitivity Level	Mitigation Measures Applied	Residual Impacts
Active mine	High	2, 7	Low
Geothermal agreements, leases, and producing wells	Moderate	2	Low
Oil and gas leases	Moderate	2	Low
Potential mines	Moderate	2	Low

Soil Resources

After compiling the resource inventory for soil resources, the methodology for assessing the potential impacts of the Project on soil resources included (in order): (1) identifying the types of potential effects on soil resources from the Project; (2) developing criteria for assessing the intensity of potential impacts on soil resources from the Project; (3) classifying the relative sensitivity (high, moderate, or low sensitivity) of areas to accelerated erosion by water or wind and the conversion of designated Prime and Unique Farmlands soils to nonagricultural uses; (4) assessing initial impacts on soil resources; (5) identifying the appropriate selective mitigation measures (Table 2-7) for minimizing potential adverse effects; (6) determining specific areas where selective mitigation should be applied; and (7) disclosing potential residual impacts on soil resources.

Types of Potential Environmental Effects

The construction, operation, and maintenance of the Project would result in both direct and indirect adverse effects on soil resources. Direct effects associated with construction activities could include the following:

- Accelerated soil erosion in areas where construction-related activities have disturbed or altered the land surface by exposing soils (temporary)
- Accelerated soil erosion in areas where construction-related activities have altered the contours of the land surface (temporary)
- Loss of designated Prime and Unique Farmland soils (i.e., conversion to nonagricultural uses) (permanent)

There would be no direct effects associated with the operation of the facilities, presence of the transmission line, or maintenance activities associated with the Project.

Indirect effects associated with the construction, operation, and maintenance of the Project could include the following:

- Construction of permanent access roads, which could be used by the general public to access currently inaccessible areas, potentially resulting in accelerated rates of erosion by water or wind (permanent)
- Degradation of the land surface and loss of soils resulting from accelerated soil erosion (temporary to permanent)
- Loss of soil productivity and negative impacts on water quality if sediment is washed into nearby streams and lakes (temporary)

Compaction and puddling are soil disturbances that result in the loss of soil structure, possibly leading to a decrease in water infiltration rates, soil loss, or environmental degradation. Overland movement of construction equipment during moist conditions is the primary cause of soil compaction or puddling. These two potential soil disturbances would be mitigated by measures and best management practices detailed in the Project‘s final POD, which will include soil tillage and limiting movement of construction equipment over moist soils.

Criteria for Assessing Intensity of Impacts

Criteria were developed to assess the intensity of a potential effect on soil resources associated with implementation of the Project (Table 3-16). Criteria developed to assess the intensity of impacts on soil resources were based on susceptibility of soils to water and wind erosion and potential impact on designated Prime and Unique Farmland.

Soil susceptibilities to water and wind erosion were assessed based on standards from the NRCS. Soils assigned a K_w value of 0.40 or higher have a high susceptibility to water erosion; whereas, soils assigned a K_w value between 0.20 and 0.40 have a moderate susceptibility to water erosion, and soils assigned a K_w value below 0.20 have a low susceptibility to water erosion. The susceptibility of a soil to wind erosion is based on its assignment to a Wind Erodibility Group or WEG. Soils assigned to WEG 1 or 2 are highly susceptible to wind erosion; soils assigned to WEGs 3, 4, or 4L have a moderate susceptibility to wind erosion; soils assigned to WEGs 5, 6, and 7 have a low susceptibility to wind erosion; and soils assigned to WEG 8 are not susceptible to wind erosion.

TABLE 3-16 CRITERIA FOR ASSESSING INTENSITY OF IMPACTS ON SOIL RESOURCES	
Intensity of Impacts	**Description**
High	▪ Disturbance of land surface where soils exhibit high susceptibility to erosion by water or wind ▪ Improvement of existing roads in areas where soils exhibit high susceptibility to erosion by water or wind ▪ Construction of new access roads across designated Prime and Unique Farmland
Moderate	▪ Disturbance of land surface where soils exhibit moderate susceptibility to erosion by water or wind ▪ Improvement of existing roads in areas where soils exhibit moderate susceptibility to erosion by water or wind
Low	▪ Disturbance of land surface where soils exhibit low to no susceptibility to erosion by water or wind ▪ Use of existing roads

Effects Analysis

Assessment of Initial Impacts

Initial resource sensitivity classifications are the basis for assessing initial impacts of soil resources associated with implementation of the Project. The initial resource sensitivity classifications were assigned using the criteria presented in Table 3-17.

Mitigation Planning

In addition to the BMPs included as part of the Project description in Chapter 2 (Table 2-6), mitigation measures (Table 2-7) would be applied to all areas of potential high and moderate (initial) impacts on soils and designated Prime and Unique Farmland, where feasible, to reduce impacts. Mitigation measures applied to reduce impacts on soil resources are summarized in Table 3-17.

Existing access roads or trails would not be widened or otherwise improved for construction or maintenance (Mitigation Measure 1) in areas where soils are moderately to highly susceptible to accelerated erosion (e.g., Link 165 northwest of Cedar City) and where designated Prime and Unique Farmland would be crossed by the Project. This measure would limit new disturbance associated with construction and maintenance of the Project in previously undisturbed areas, which would reduce exposure of soils highly or moderately susceptible to wind or water erosion.

No blading of new access roads in areas with sensitive soils (Mitigation Measure 2) would occur in areas where Project-related activities could affect designated Prime and Unique Farmland soils (e.g., Link 350 west of Cove Fort).

New access roads and overland access routes in areas where soils could be moderately or highly susceptible to soil erosion (i.e., in moderately rolling or steep terrain) would be aligned to follow the landform contours (Mitigation Measure 3), where practicable, to reduce associated soil erosion by maintaining the natural land contours and thereby limiting the rate of water runoff. This mitigation measure was only applied in areas that a slope greater than 3 percent.

Structures would span designated Prime and Unique Farmland (Mitigation Measure 7) to minimize irreversible conversion of agricultural lands to nonagricultural uses by limiting the number of tower sites located on designated Prime and Unique Farmland.

Where no grading would be needed to access work areas, overland access (Mitigation Measure 13) would be used to the extent possible in areas where soils would be moderately to highly susceptible to accelerated erosion and in designated Prime and Unique Farmland, which would avoid or minimize the removal of surface soil and vegetation and limit the exposure of soils susceptible to wind and water erosion.

Residual Impacts

Table 3-17 summarizes the initial resource sensitivity classifications that provided the basis for assessing initial impacts on soil resources, the selective mitigation measures applied to mitigate potentially adverse impacts on soil resources, and residual impacts.

TABLE 3-17
SUMMARY OF SENSITIVITY LEVEL AND RESIDUAL IMPACTS ON SOIL RESOURCES

Soil Resource	Resource Sensitivity Level	Mitigation Measures Applied	Residual Impacts
Soils with a high susceptibility to water erosion	High	1, 3, 13	Moderate
Soils with a high susceptibility to wind erosion	High	1, 3, 13	Moderate
Soils designated Prime and Unique Farmland	High	1, 2, 7, 13	Moderate
Soils with a moderate susceptibility to water erosion	Moderate	1, 3, 13	Low
Soils with a moderate susceptibility to wind erosion	Moderate	1, 3, 13	Low
Soils with a low susceptibility to water or wind erosion	Low	None	Low
Soils not designated Prime and Unique Farmland	Low	None	Low

3.2.2.3 Results

A summary of baseline resource inventory and results of the effects analysis are presented in Tables 3-18 and 3-21 and described in this section. Table 2-11 presents a comparison of results of the effects analysis for the alternative routes, and Table 2-12 presents a summary of the information presented in Table 2-11.

No Action Alternative

Under this alternative, the environment would remain as it presently exists.

Northern Area - Sigurd Substation to South Black Mountains

The geologic hazards crossed, mineral resources crossed, baseline resource inventory and residual impacts for alternative routes considered in the northern area are presented in Tables 3-18, 3-19, and 3-20.

TABLE 3-18
GEOLOGIC HAZARDS CROSSED BY NORTHERN ALTERNATIVE ROUTES

Alternative Routes	Quaternary Faults	Landslide Susceptibility	Seismicity (PGA)
Alternative N1 (Environmentally Preferred)	15	Low to high	50 to 90
Alternative N2	15	Low to high	50 to 90
Alternative N3	17	Low to high	50 to 90
Alternative N4	19	Low to high	50 to 90
Alternative N5	12	Low to high	50 to 90
Alternative N6 (Proponent‘s Proposed Action)	11	Low to high	50 to 90

TABLE 3-19
MINERAL RESOURCES CROSSED BY NORTHERN ALTERNATIVE ROUTES

Alternative Routes	Existing Mining Operations	Number of Potential Mines[1]	Geothermal Resources[2]	Oil and Gas Leases
Alternative N1 (Environmentally Preferred)	48	4	2	46
Alternative N2	54	4	2	46
Alternative N3	48	4	4	40
Alternative N4	51	6	5	46
Alternative N5	45	6	6	40
Alternative N6 (Proponent‘s Proposed Action)	45	6	10	40

NOTES:
[1]Potential mines are areas that have identified mineral resources but have not yet been mined
[2]Leases and producing wells

Alternative N1 – Black Rock Road to IPP North of Milford Wind Farm

Affected Environment

Geologic Hazards

Alternative N1 crosses 15 Quaternary faults over a total distance of 3.9 miles (Table 3-18 and MV-2). Seismicity along the alternative route would range from 50 to 90 peak ground acceleration (PGA) (percent of gravity). Alternative N1 also crosses about 3.5 miles of area with high landslide susceptibility. Also, about 6.5 miles of the route would be located on slopes greater than 30 percent and 11.8 miles on slopes between 15 percent and 30 percent.

Mineral Resources

Alternative N1 crosses 48 mines and mining claims, no authorized geothermal agreements, 2 producing geothermal leases, 46 oil and gas leases, and 4 potential mining areas (Table 3-19 and MV-3). No existing oil and gas production areas would be affected by this alternative route.

Soil Resources

Alternative N1 crosses 5.3 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 13.9 miles of soils highly susceptible to water erosion and 42.9 miles of soils moderately susceptible to water erosion. There are no soils highly susceptible to wind erosion along Alternative N1. This alternative crosses 68.5 miles of soils moderately susceptible to wind erosion.

TABLE 3-20
ALTERNATIVE ROUTE COMPARISON
EARTH RESOURCES INVENTORY DATA AND RESIDUAL IMPACTS

Alternative Route	Total Miles	Geologic Hazards (miles)									Mineral Resources (miles)			Soil (miles)									Residual Impacts (Miles [Percent])											
			Slope (percent)				Landslide Susceptibility							Farmland			Water Erosion			Wind Erosion			Geologic Hazards				Mineral Resources				Soil Resources			
		Faults (miles)	0–8	8–15	15–30	> 30	None	Low	Moderate	High	High Sensitivity	Moderate Sensitivity	Low Sensitivity	High Sensitivity	Moderate Sensitivity	Low Sensitivity	High Sensitivity	Moderate Sensitivity	Low Sensitivity	High Sensitivity	Moderate Sensitivity	Low Sensitivity	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High
Alternative N1 (Environmentally Preferred)	120.7	3.9	90.5	11.9	11.8	6.5	100.8	3.5	12.9	3.5	5.1	19.6	96.0	5.3	–	115.4	13.9	42.9	38.1	–	68.5	40.3	97.8 [81.0]	7.7 [6.4]	13.0 [10.8]	2.2 [1.8]	96.0 [79.5]	20.2 [16.8]	4.5 [3.7]	–	–	96.5 [80.0]	24.2 [20.0]	–
Alternative N2	120.3	4.3	86.5	15.3	12.0	6.5	99.6	3.5	13.7	3.5	5.5	22.7	92.1	4.7	–	115.6	16.3	45.8	46.5	6.4	69.7	32.3	96.2 [80.0]	7.7 [6.4]	14.2 [11.8]	2.2 [1.8]	92.1 [76.6]	23.3 [19.4]	4.9 [4.0]	–	–	87.9 [73.1]	32.4 [26.9]	–
Alternative N3	117.2	5.1	79.2	18.2	13.2	6.6	95.2	4.4	14.1	3.5	4.4	26.3	86.5	5.5	–	111.7	7.9	47.8	50.1	15.8	43.9	38.1	91.0 [77.6]	8.6 [7.3]	15.4 [13.1]	2.2 [1.9]	86.5 [73.8]	27.0 [23.0]	3.7 [3.2]	–	–	74.2 [63.3]	43.0 [36.7]	–
Alternative N4	109.4	3.5	72.8	14.5	14.8	7.3	87.6	4.9	13.4	3.5	5.3	23.0	81.1	0.7	–	108.7	13.7	45.2	38.8	4.9	56.2	34.5	85.0 [77.7]	9.5 [8.7]	12.7 [11.6]	2.2 [2.0]	81.1 [74.1]	23.6 [21.6]	4.7 [4.3]	–	–	80.1 [73.2]	29.3 [26.8]	–
Alternative N5	106.3	4.3	65.5	17.4	16.0	7.4	83.2	5.8	13.8	3.5	4.2	26.6	75.5	1.5	–	104.8	5.3	47.2	42.4	14.3	30.4	40.3	79.8 [75.1]	10.4 [9.8]	13.9 [13.1]	2.2 [2.1]	75.5 [71.0]	27.3 [25.7]	3.5 [3.3]	–	–	66.4 [62.5]	39.9 [37.5]	–
Alternative N6 (Proponent's Proposed Action)	105.5	4.4	61.1	18.5	17.9	8.0	81.5	5.9	14.6	3.5	4.5	27.3	73.7	0.8	–	104.7	5.4	44.6	44.9	15.5	29.0	39.8	78.1 [74.0]	11.0 [10.4]	14.2 [13.5]	2.2 [2.1]	73.7 [69.9]	27.8 [26.4]	4.0 [3.7]	–	–	66.7 [63.2]	38.8 [36.8]	–

Environmental Effects

Geologic Hazards

Following the implementation of BMPs (Table 2-6) and Mitigation Measure 3 (Table 2-7) along Alternative N1, impacts on the Project could include 2.2 miles of high impacts, 13.0 miles of moderate impacts, and 7.7 miles of low impacts from geologic hazards (Table 3-20 and MV-2). High impacts could include loss of equipment, interruption of power, or personal injury. High impacts include Quaternary faults along Links 30, 33, 45, 63, 66, 305, 320,350, 360, 390, 470, 155, and 160, and high landslide susceptibility along Links 30, 33, 64, and 66 Moderate impacts include moderate landslide susceptibility along Links 30, 33, 45, 63, and 66.

Mineral Resources

Following the implementation of BMPs and Mitigation Measures 2 and 7 (Table 2-7) along Alternative N1, there would be no identifiable high impacts, 4.5 miles of moderate impacts, and 20.2 miles of low impacts on mineral resources (Table 3-20 and MV-3). Moderate impacts could include potential impacts on oil and gas leases, and geothermal resources along Links 45, 66, 381.

Soil Resources

The primary impact associated with implementation of Alternative N1 would be on soils that are susceptible to wind erosion, primarily those associated with the Escalante Desert. Following the implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative N1, there would be 24.2 miles of moderate impacts and 96.5 miles of low impacts (Table 3-18 and MV-4). Moderate impacts on designated Prime and Unique Farmland could include irreversible conversion of these soils to nonagricultural uses along Links 75, 305, 330, 350, and 360. Moderate impacts on soils would include potential acceleration of wind erosion along Links 155, 160, 330, 350, 380, and 381, and accelerated water erosion occur along Links 155, 160, 330, 350, 380, and 381.

Alternative N2 – Black Rock Road to IPP South of Milford Wind Farm

Affected Environment

Geologic Hazards

Alternative N2 crosses 15 Quaternary faults, totaling about 4.3 miles (Table 3-18 and MV-2). Seismicity ranges between 50 and 90 PGA (percent of gravity) along the route. Alternative N2 also crosses about 3.5 miles of areas with high landslide susceptibility. There are also 6.5 miles with slopes greater than 30 percent and 12.0 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative N2 crosses 54 mines and mining claims, no authorized geothermal agreements, 2 producing geothermal leases, 46 oil and gas leases, and 4 potential mining areas (Table 3-19 and MV-3).

Soil Resources

Alternative N2 crosses 4.7 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 16.3 miles of soils highly susceptible to water erosion and 45.8 miles of soils moderately susceptible to water erosion. This alternative also crosses 6.4 miles of soils highly susceptible to wind erosion and 69.7 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs (Table 2-6) and Mitigation Measures 3, (Table 2-7) along Alternative N2, impacts on the Project could include 2.2 miles of high impacts,14.2 miles of moderate impacts, and 7.7 miles of low impacts from geologic hazards (Table 3-20 and MV-2). High impacts could include loss of equipment, interruption of power, or personal injury. High impacts include Quaternary faults along Links 30, 33, 45, 63, 66, 305, 320,350, 360, 390, 470, 155, and 160, and high landslide susceptibility along Links 30, 33, 64, and 66. Moderate impacts include moderate landslide susceptibility along Links 30, 33, 45, 63, 66, 345, 348, and 450.

Mineral Resources

Following the implementation of BMPs and Mitigation Measures 2 and7 (Table 2-7) along Alternative N2, there would be no identifiable high impacts, 4.9 miles of moderate impacts, and 23.3 miles of low impacts on mineral resources (Table 3-20 and MV-3). Moderate impacts could include potential impacts on oil and gas leases, and geothermal resources along Links 45, 66, 348, 349.

Soil Resources

The primary impact associated with implementation of Alternative N2 would be on soils susceptible to wind erosion primarily those associated with the Escalante Desert. Following the implementation of BMPs (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative N2, there would be 32.4 miles of moderate impacts and 87.9 miles of low impacts (Table 3-20 and MV-4). Moderate impacts on designated Prime and Unique Farmland could include irreversible conversion of these soils to nonagricultural uses along Links 305, 330, and 350. Moderate impacts on soils would include potential acceleration rates of wind erosion along Links 320, 330, 350, 345, 450, 385, 386, 381, 155, and 160, and acceleration of water erosion along Links 320, 330, 350, 345, 450, 385, 386, 381, 155, and 160.

Alternative N3 – Black Rock Road Parallel to Kern River Pipeline

Affected Environment

Geologic Hazards

Alternative N3 crosses 17 Quaternary faults, totaling about 5.1 miles (Table 3-18 and MV-2). Seismicity ranges between 50 and 90 PGA (percent of gravity) along the route. Alternative N3 also crosses about 3.5 miles of areas with high landslide susceptibility. There are also 6.6 miles with slopes greater than 30 percent and 13.2 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative N3 crosses 48 mines and mining claims, 2 authorized geothermal agreements, 2 producing geothermal leases, 40 oil and gas leases, and 4 potential mining areas (Table 3-19 and MV-3).

Soil Resources

Alternative N3 crosses 5.5 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 7.9 miles of soils highly susceptible to water erosion and 47.8 miles of soils moderately susceptible to water erosion. This alternative also crosses 15.8 miles of soils highly susceptible to wind erosion and 43.9 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure 3 (Table 2-7) along Alternative N3, the Project could have 2.2 miles of high impacts, 15.4 miles of moderate impacts, and 8.6 miles of low impacts from geologic hazards (Table 3-20 and MV-2). High impacts could include loss of equipment, interruption of power, or personal injury. High impacts include Quaternary faults along Links 30, 33, 45, 63, 66, 305, 320,350, 390, 470, 490, and 396, and 160, and high landslide susceptibility along Links 30, 33, 64, and 66. Moderate impacts include moderate landslide susceptibility along Links 30, 33, 45, 63, 66, 345, 348, 390, and 450.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2 and 7 (Table 2-7) along Alternative N3, there would be no high impacts, 3.7 miles of moderate impacts, and 27.0 miles of low impacts on mineral resources (Table 3-20 and MV-3). Moderate impacts could include potential impacts on oil and gas leases, and geothermal resources along Links 45, 66, 348 and 349.

Soil Resources

The primary impact of concern associated with implementation of Alternative N3 would be on soils susceptible to water erosion in mountainous areas and those susceptible to wind erosion, primarily those associated with the Escalante Desert. Following the implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative N3, there would be 43.0 miles of moderate impacts and 74.2 miles of low impacts (Table 3-20 and MV-4). Moderate impacts on designated Prime and Unique Farmland could include irreversible conversion of these soils to nonagricultural uses along Links 305, 330, 350, and 75. Moderate impacts on soils would include potential acceleration of wind erosion along Links 320, 330, 350, 345, 450, 460, 470, 475, 480, and 397. and acceleration of water erosion occur along Links 320, 330, 350, 345, 450, 460, 470, 475, 480, and 397.

Alternative N4 – Mineral Mountains to IPP South of Milford Wind Farm

Affected Environment

Geologic Hazards

Alternative N4 crosses 19 Quaternary faults, totaling about 3.5 miles (Table 3-18 and MV-2). Seismicity ranges between 50 and 90 PGA (percent of gravity) along the route. Alternative N4 also crosses about 3.5 miles of areas with high landslide susceptibility. There are also 7.3 miles with slopes greater than 30 percent and 14.8 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative N4 crosses 51 mines and mining claims, 2 authorized geothermal agreements, 3 producing geothermal leases, 46 oil and gas leases, and 6 potential mining areas (Table 3-19 and MV-3).

Soil Resources

Alternative N4 crosses 0.7 mile of land designated as Prime and Unique Farmland (MV-4). This alternative also crosses 13.7 miles of soils highly susceptible to water erosion and 45.2 miles of soils moderately susceptible to water erosion. This alternative also crosses 4.9 miles of soils highly susceptible to wind erosion and 56.2 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure 3 (Table 2-7) along Alternative N4, the Project could have 2.2 miles of high impacts,12.7 miles of moderate impacts, and 9.5 miles of low impacts from geologic hazards (Table 3-20 and MV-2). High impacts could include loss of equipment, interruption of power, or personal injury. High impacts include Quaternary faults along Links 30, 33, 45, 63, 66, 68, 75, 155, 160 and high landslide susceptibility along Links 30, 33, 64, and 66 Moderate impacts include moderate landslide susceptibility along Links 30, 33, 45, 63, 66, and 75.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2 and 7 (Table 2-7) along Alternative N4, there would be no high impacts, 4.7 miles of moderate impacts, and 23.6 miles of low impacts on mineral resources (Table 3-20 and MV-3). Moderate impacts could include potential impacts on oil and gas leases, and geothermal resources along Links 45, 66, and 381.

Soil Resources

The primary impact of concern associated with implementation of Alternative N4 would be on soils susceptible to wind erosion, primarily those associated with the Escalante Desert. Following the

implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative N4, there would be 29.3 miles of moderate impacts and 80.1 miles of low impacts (Table 3-20 and MV-4). Moderate impacts on designated Prime and Unique Farmland could include irreversible conversion of these soils to nonagricultural uses along Link 75. Moderate impacts on soils would include potential acceleration of wind erosion along Links 455, 385, 386, 381, 155, and 160 and acceleration of +water erosion occur along Links 455, 385, 386, 381, 155, and 160.

Alternative N5 – Mineral Mountains Parallel to Kern River Pipeline

Affected Environment

Geologic Hazards

Alternative N5 crosses 12 Quaternary faults, totaling about 4.3 miles (Table 3-18 and MV-2). Seismicity ranges between 50 and 90 PGA (percent of gravity) along the route. Alternative N5 also crosses about 3.5 miles of areas with high landslide susceptibility. There are also 7.4 miles with slopes greater than 30 percent and 16.0 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative N5 crosses 45 mines and mining claims, 4 authorized geothermal agreements, 2 producing geothermal leases, 40 oil and gas leases, and 6 potential mining areas (Table 3-19 and MV-3).

Soil Resources

Alternative N5 crosses 1.5 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 5.3 miles of soils highly susceptible to water erosion and 47.2 miles of soils moderately susceptible to water erosion. This alternative also crosses 14.3 miles of soils highly susceptible to wind erosion and 30.4 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure 3 (Table 2-7) along Alternative N5, the Project could have 2.2 miles of high impacts, 13.9 miles of moderate impacts, and 10.4 miles of low impacts from geologic hazards (Table 3-20 and MV-2). High impacts could include loss of equipment, interruption of power, or personal injury. High impacts include Quaternary faults along Links 30, 33, 45, 63, 66, 75, 390, 470, 475, and 490 and high landslide susceptibility along Links 30, 33, 64, and 66 Moderate impacts include moderate landslide susceptibility along Links 30, 33, 45, 63, 66, and 75.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2 and 7

(Table 2-7) along Alternative N5, there would be no high impacts, 3.5 miles of moderate impacts, and 27.3 miles of low impacts on mineral resources (Table 3-20 and MV-3). Moderate impacts could include potential impacts on oil and gas leases, and geothermal resources along Links 45, 66, and 349.

Soil Resources

The primary impact of concern associated with implementation of Alternative N5 would be soils susceptible to water erosion primarily associated with mountainous areas. Following the implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative N5, there would be 39.9 miles of moderate impacts and 66.4 miles of low impacts (Table 3-20 and MV-4). Moderate impacts on designated Prime and Unique Farmland soils could include irreversible conversion of these soils to nonagricultural uses along Links 75 and 490. Moderate impacts on soils would include potential acceleration of wind erosion along Links 455, 460, 470, 475, 480, and 397 and acceleration of water erosion occur along Links 455, 460, 470, 475, 480, 490, and 397.

Alternative N6 – Mineral Mountains 1,500 Feet East of Kern River Pipeline

Affected Environment

Geologic Hazards

Alternative N6 crosses 11 Quaternary faults, totaling about 4.4 miles (Table 3-18 and MV-2). Seismicity ranges between 50 and 90 PGA (percent of gravity) along the route. Alternative N6 also crosses about 3.5 miles of areas with high landslide susceptibility. There are also 8.0 miles with slopes greater than 30 percent and 17.9 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative N6 crosses 45 mines and mining claims, 6 authorized geothermal agreements, 4 producing geothermal leases, 40 oil and gas leases, and 6 potential mining areas (Table 3-19 and MV-3).

Soil Resources

Alternative N6 crosses 0.8 mile of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 5.4 miles of soils highly susceptible to water erosion and 44.6 miles of soils moderately susceptible to water erosion. This alternative also crosses 15.5 miles of soils highly susceptible to wind erosion and 29.0 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure 3 (Table 2-7) along Alternative N6, the Project could have 2.2 miles of high impacts, 14.2 miles of moderate impacts, and 11.0 miles of low impacts from geologic hazards (Table 3-20 and MV-2). The impacts are the same as Alternative N5.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2 and 7 (Table 2-7) along Alternative N6, there would be no impacts, 4.0 miles of moderate impacts and 27.8 miles of low impacts on mineral resources (Table 3-20 and MV-3). The impacts are the same as Alternative N5.

Soil Resources

The primary impact associated with implementation of Alternative N6 would be on soils susceptible to water or wind erosion. Following the implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (MV-4) along Alternative N6, there would be 38.8 miles of moderate impacts and 66.7 miles of low impacts (Table 3-20 and MV-4). Moderate impacts on designated Prime and Unique Farmland soils could include irreversible conversion of these soils to nonagricultural uses along Link 75. Moderate impacts on soils would include potential acceleration of wind erosion along Links 349, 390, 475, 395, and 397 and acceleration of water erosion along Links 155, 160, 330, 350, 380, and 381.

Southern Area – South Black Mountains to Red Butte Substation

The geologic hazards crossed, mineral resources crossed, baseline resource inventory and residual impacts for alternative routes considered in the northern area are presented in Tables 3-21, 3-22, and 3-23.

TABLE 3-21
GEOLOGIC HAZARDS CROSSED BY SOUTHERN ALTERNATIVE ROUTES

Alternative Routes	Quaternary Faults	Landslide Susceptibility	Seismicity (PGA)
Alternative S1	4	Low to moderate	30 to 80
Alternative S2 (Environmentally Preferred)	0	Low to moderate	30 to 80
Alternative S3	1	Low to moderate	30 to 80
Alternative S4	4	Low to moderate	30 to 80
Alternative S5 (Proponent‘s Proposed Action)	1	Low to moderate	30 to 80
Alternative S6	1	Low to moderate	30 to 80

TABLE 3-22
MINERAL RESOURCES CROSSED BY SOUTHERN ALTERNATIVE ROUTES

Alternative Routes	Existing Mining Operations	Number of Potential Mines[1]	Geothermal Resources[2]	Oil and Gas Leases
Alternative S1	0	2	0	18
Alternative S2 (Environmentally Preferred)	3	2	0	18
Alternative S3	3	0	0	18
Alternative S4	3	0	0	18
Alternative S5 (Proponent‘s Proposed Action)	6	2	0	42
Alternative S6	6	0	0	30

NOTES:
[1]Potential mines are areas that have identified mineral resources but have not yet been mined
[2]Leases and producing wells

TABLE 3-23
ALTERNATIVE ROUTE COMPARISON
EARTH RESOURCES INVENTORY DATA AND RESIDUAL IMPACTS

Alternative Route	Total Miles	Geologic Hazards (miles)									Mineral Resources (miles)			Soil (miles)									Residual Impacts (Miles [Percent])											
		Faults (miles)	Slope (percent)				Landslide Susceptibility							Unique Farmland			Water Erosion			Wind Erosion			Geologic Hazards				Mineral Resources				Soil Resources			
			0–8	8–15	15–30	> 30	None	Low	Moderate	High	High Sensitivity	Moderate Sensitivity	Low Sensitivity	High Sensitivity	Moderate Sensitivity	Low Sensitivity	High Sensitivity	Moderate Sensitivity	Low Sensitivity	High Sensitivity	Moderate Sensitivity	Low Sensitivity	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High
Alternative S1	56.0	0.9	32.5	11.3	8.2	4.0	43.0	5.6	7.4	–	–	7.9	48.1	11.7	–	44.3	7.0	19.1	8.1	–	30.7	–	42.5 [75.9]	10.8 [19.3]	2.7 [4.8]	–	48.1 [85.9]	7.9 [14.1]	–	–	–	32.5 [58.0]	23.5 [42.0]	–
Alternative S2 (Environmentally Preferred)	49.6	1.1	33.5	8.6	5.4	2.1	41.2	4.1	4.3	–	0.2	8.5	40.9	12.9	–	36.7	7.0	21.9	7.3	–	35.7	–	40.7 [82.1]	7.5 [15.1]	1.4 [2.8]	–	40.9 [82.5]	8.7 [17.5]	–	–	–	25.4 [51.2]	24.2 [48.8]	–
Alternative S3	57.6	1.1	32.8	9.1	8.8	6.9	41.7	3.5	12.4	–	0.2	8.5	48.9	12.9	–	44.7	7.0	22.4	7.1	–	41.9	–	41.2 [23.7]	12.9 [22.4]	3.5 [6.1]	–	48.9 [84.9]	8.7 [15.1]	–	–	–	30.5 [53.0]	27.1 [47.0]	–
Alternative S4	48.9	1.1	27.5	8.0	7.3	6.1	34.4	4.8	9.7	–	0.2	8.5	40.2	11.5	–	37.4	7.0	20.6	6.0	–	30.5	–	33.9 [69.2]	13.6 [27.8]	1.4 [2.9]	–	40.2 [82.2]	8.7 [17.8]	–	–	–	24.7 [50.5]	24.2 [49.5]	–
Alternative S5 (Proponent's Proposed Action)	59.0	0.3	36.5	11.5	7.6	3.4	46.6	6.7	5.7	–	0.5	11.0	47.5	6.9	–	52.1	4.3	22.0	10.9	–	22.3	–	46.3 [78.5]	10.3 [17.5]	2.4 [4.1]	–	47.5 [80.5]	11.5 [19.5]	–	–	–	37.0 [62.7]	22.0 [37.3]	–
Alternative S6	61.9	0.3	36.9	10.1	9.1	5.8	45.7	5.3	10.9	–	0.7	10.8	50.4	8.0	–	53.9	4.3	25.8	10.9	–	34.4	–	45.4 [73.3]	12.8 [20.7]	3.7 [6.0]	–	50.4 [81.4]	11.3 [18.3]	0.2 [0.3]	–	–	36.4 [58.8]	25.5 [41.2]	–

Alternative S1 – Pinto Creek

Affected Environment

Geologic Hazards

Alternative S1 crosses 4 Quaternary faults, totaling about 0.9 mile (Table 3-21 and MV-2). Seismicity ranges between 30 and 80 PGA (percent of gravity) along the route. Alternative S1 would not cross any areas with high landslide susceptibility. There are also 4.0 miles with slopes greater than 30 percent and 8.2 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative S1 crosses no mines and mining claims, no authorized geothermal agreements, no producing geothermal leases, 18 oil and gas leases, and 2 potential mining areas (Table 3-22 and MV-3).

Soil Resources

Alternative S1 crosses 11.7 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 7.0 miles of soils highly susceptible to water erosion and 19.1 miles of soils moderately susceptible to water erosion. This alternative would not cross any soils highly susceptible to wind erosion, but it crosses 30.7 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure3 (Table 2-7) along Alternative S1, the Project would have no identifiable high impacts, 2.7 miles of moderate impacts, and 10.8 miles of low impacts from geologic hazards (Table 3-23 and MV-2). Moderate impacts include moderate landslide susceptibility along Links 220 and 260, and Quaternary faults along Link 220.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2 and 7 (Table 2-7) along Alternative S1, there would be 7.9 miles of low impacts on mineral resources (Table 3-21 and MV-3).

Soil Resources

The primary impact associated with implementation of Alternative S1 would be on soils susceptible to water erosion primarily associated with mountainous areas. Following the implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative S1, there would be 23.5 miles of moderate impacts and 32.5 miles of low impacts (Table 3-21 and MV-4). Moderate impacts on designated Prime and Unique Farmland soils could

include irreversible conversion of these soils to nonagricultural uses along Links 163, 165, 220, and 260. Moderate impacts on soils would include potential acceleration of wind erosion occur along Links 163, 165, 220, and 245 and acceleration of water erosion occur along Links 163, 165, 220, and 245.

Alternative S2 – IPP West

Affected Environment

Geologic Hazards

Alternative S2 crosses no Quaternary faults (Table 3-21 and MV-2). Seismicity ranges between 30 and 80 PGA (percent of gravity) along the route. Alternative S2 would not cross any areas with high landslide susceptibility. There are also 2.1 miles with slopes greater than 30 percent and 5.4 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative S2 crosses 3 mines and mining claims, no authorized geothermal agreements, no producing geothermal leases, 18 oil and gas leases, and 2 potential mining areas (Table 3-22 and MV-3).

Soil Resources

Alternative S2 crosses 12.9 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 7.0 miles of soils highly susceptible to water erosion and 21.9 miles of soils moderately susceptible to water erosion. This alternative would not cross any soils highly susceptible to wind erosion, but it crosses 35.7 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure 3 (Table 2-7) along Alternative S2, the Project would have no identifiable miles of high impacts, 1.4 miles of moderate impacts and 7.5 miles of low impacts from geologic hazards (Table 3-23 and MV-2). Moderate impacts include moderate landslide susceptibility along Links 220, 221, 222, 270, and 275, and Quaternary faults along Links 220 and 221.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2and 7 (Table 2-7) along Alternative S2, there would no moderate impacts and 8.7 miles of low impacts on mineral resources (Table 3-23 and MV-3). Moderate impacts could include potential impacts on oil and gas leases, and geothermal resources along Link 221.

Soil Resources

The primary impact associated with implementation of Alternative S2 would be on soils susceptible to water erosion primarily associated with mountainous areas. Following the implementation of BMPs included as part of the Project description (Table 2-6 and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative S2, there would be 24.2 miles of moderate impacts and 25.4 miles of low impacts (Table 3-23 and MV-4). Moderate impacts on designated Prime and Unique Farmland soils could include irreversible conversion of these soils to nonagricultural uses along Links 163, 165, 220, and 275. Moderate impacts on soils would include potential acceleration of wind erosion along Links 163, 165, 220, and 275 and acceleration of water erosion along Links 163, 165, 220, and 221.

Alternative S3 – Ox Valley

Affected Environment

Geologic Hazards

Alternative S3 crosses 1 Quaternary fault, totaling about 0.3 mile (Table 3-21 and MV-2). Seismicity ranges between 30 and 80 PGA (percent of gravity) along the route. Alternative S3 would not cross any areas with high landslide susceptibility. There are also 6.9 miles with slopes greater than 30 percent and 8.8 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative S3 crosses 3 mines and mining claims, no authorized geothermal agreements, no producing geothermal leases, 18 oil and gas leases, and no potential mining areas (Table 3-22 and MV-3).

Soil Resources

Alternative S3 crosses 12.9 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 7.0 miles of soils highly susceptible to water erosion and 22.4 miles of soils moderately susceptible to water erosion. This alternative would not cross any soils highly susceptible to wind erosion, but it crosses 41.9 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure 3 (Table 2-7) along Alternative S3, the Project could have no identifiable miles of high impacts, 3.5 miles of moderate impacts, and 12.9 miles of low impacts from geologic hazards (Table 3-23 and MV-2). Moderate impacts include moderate landslide susceptibility along Links 220, 221, and 285, and Quaternary faults along Links 220 and 221.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have

moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2and 7 (Table 2-7) along Alternative S2, there would be no moderate impacts and 8.7 miles of low impacts on mineral resources (Table 3-21 and MV-3). Moderate impacts could include potential impacts on oil and gas leases, and geothermal resources along Link 221.

Soil Resources

The primary impact associated with implementation of Alternative S3 would be on soils susceptible to water erosion primarily associated with mountainous areas. Following the implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative S3, there would be 27.1 miles of moderate impacts and 30.5 miles of low impacts (Table 3-22 and MV-4). Moderate impacts on designated Prime and Unique Farmland soils could include irreversible conversion of these soils to nonagricultural uses along Links 163, 165, 220, and 221. Moderate impacts on soils would include potential acceleration of wind erosion occur along Links 163, 165, 220, 285 and 290 and acceleration of water erosion occur along Links 163, 165, and 220.

Alternative S4 – IPP East

Affected Environment

Geologic Hazards

Alternative S4 crosses 4 Quaternary faults, totaling about 1.1 miles (Table 3-21 and MV-2). Seismicity ranges between 30 and 80 PGA (percent of gravity) along the route. Alternative S4 would not cross any areas with high landslide susceptibility. There are also 6.1 miles with slopes greater than 30 percent and 7.3 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative S4 crosses 3 mines and mining claims, no authorized geothermal agreements, no producing geothermal leases, 18 oil and gas leases, and no potential mining areas (Table 3-22 and MV-3).

Soil Resources

Alternative S4 crosses 11.5 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 7.0 miles of soils highly susceptible to water erosion and 20.6 miles of soils moderately susceptible to water erosion. This alternative would not cross any soils highly susceptible to wind erosion, but it crosses 30.5 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure 3 (Table 2-7) along Alternative S4, the Project could have no identifiable miles of high impacts, 1.4 miles of moderate impacts, and 13.6 miles of low impacts from geologic hazards (Table 3-23 and MV-2). Moderate impacts include moderate

landslide susceptibility along Links 220, 221, 222, 270, and 275, and Quaternary faults along Links 220 and 221.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2and 7 (Table 2-7) along Alternative S4, there would 8.7 miles of low impacts on mineral resources (Table 3-23 and MV-3). Moderate impacts could include potential impacts on oil and gas leases, and geothermal resources along Link 221.

Soil Resources

The primary impact associated with implementation of Alternative S4 would be on soils susceptible to water or wind erosion. Following the implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative S4, there would be 24.2 miles of moderate impacts and 24.7 miles of low impacts. Moderate impacts on designated Prime and Unique Farmland soils could include irreversible conversion of these soils to nonagricultural uses along Links 163, 165, and 221. Moderate impacts on soils would include potential acceleration of wind erosion along Links 163, 165, 220, and 275.

Impacts on soil resources specific to the Inventoried Roadless Area (IRA) of the Dixie National Forest will be primarily associated with the creation of new access roads in previously undisturbed areas. As with other parts of the Project, creation of access roads would disturb the land surface and may result in increased rates of soil erosion as a result of water or wind. Furthermore, the creation of new, temporary, roads in a previously roadless area may result in increased public access from motorized vehicles (especially OHVs). Increased OHV traffic may result in increased rates of soil erosion through increased traffic and the associated increase in ground disturbance. Implementation of BMPs would mitigate impacts on the same degree in the IRA of the Dixie National Forest (Table 3-23 and MV-4).

Alternative S5 – Iron Springs and Pinto Creek

Affected Environment

Geologic Hazards

Alternative S5 crosses 1 Quaternary fault, totaling about 0.3 mile (Table 3-21 and MV-2). Seismicity ranges between 30 and 80 PGA (percent of gravity) along the route. Alternative S5 would not cross any areas with high landslide susceptibility. There are also 3.4 miles with slopes greater than 30 percent and 7.6 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative S5 crosses 6 mines and mining claims, no authorized geothermal agreements, no producing geothermal leases, 42 oil and gas leases, and 2 potential mining areas (Table 3-21 and MV-3).

Soil Resources

Alternative S5 crosses 6.9 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 4.3 miles of soils highly susceptible to water erosion and 22.0 miles of soils moderately susceptible to water erosion. This alternative would not cross any soils highly susceptible to wind erosion, but it crosses 22.3 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure 3 (Table 2-7) along Alternative S5, the Project could have no identifiable miles of high impacts, 2.4 miles of moderate impacts, and 10.3 miles of low impacts from geologic hazards (Table 3-23 and MV-2). Moderate impacts include moderate landslide susceptibility along Links 220 and 260, and Quaternary faults along Link 220.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2 and 7 (Table 2-7) along Alternative S5, there would be 11.5 miles of low impacts on mineral resources (Table 3-27 and MV-3).

Soil Resources

The primary impact associated with implementation of Alternative S5 would be soils susceptible to water erosion primarily associated with mountainous areas. Following the implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 7, and 13 (Table 2-7) along Alternative S5, there would be 22.0 miles of moderate impacts and 37.0 miles of low impacts (Table 3-23 and MV-4). Moderate impacts on designated Prime and Unique Farmland soils would include irreversible conversion of these soils to nonagricultural uses along Links 163, 430, 435, 438, 245, and 260. Moderate impacts on soils would include potential acceleration of wind erosion occur along Links 163, 430, 435, and 245and acceleration of water erosion occur along Links 163, 430, 435, 438, and 245.

Alternative S6 – Iron Springs and Ox Valley

Affected Environment

Geologic Hazards

Alternative S6 crosses 1 Quaternary fault, totaling about 0.3 mile (Table 3-21 and MV-2). Seismicity ranges between 30 and 80 PGA (percent of gravity) along the route. Alternative S6 would not cross any areas with high landslide susceptibility. There are also 5.8 miles with slopes greater than 30 percent and 9.1 miles with slopes between 15 percent and 30 percent.

Mineral Resources

Alternative S6 crosses 6 mines and mining claims, no authorized geothermal agreements, no producing geothermal leases, 30 oil and gas leases, and no potential mining areas (Table 3-21 and MV-3).

Soil Resources

Alternative S6 crosses 8.0 miles of lands designated as Prime and Unique Farmland (MV-4). This alternative also crosses 4.3 miles of soils highly susceptible to water erosion and 25.8 miles of soils moderately susceptible to water erosion. This alternative would not cross any soils highly susceptible to wind erosion, but it crosses 34.4 miles of soils moderately susceptible to wind erosion.

Environmental Effects

Geologic Hazards

Following the implementation of BMPs and Mitigation Measure 3 (Table 2-7) along Alternative S6, the Project could have no identifiable miles of high impacts, 3.7 miles of moderate impacts, and 12.8 miles of low impacts from geologic hazards (Table 3-23 and MV-2). Moderate impacts include moderate landslide susceptibility along Links 250, 222, and 285, and Quaternary faults along 430 and 221.

Mineral Resources

Active mines and oil and gas wells are considered to have high sensitivity. Geothermal agreements, producing geothermal leases, oil and gas leases, and potential mining areas are considered to have moderate sensitivity. Following the implementation of BMPs and Mitigation Measures 2 and 7 (Table 2-7) along Alternative S6, there would be 0.2 mile of moderate impacts and 11.3 miles of low impacts on mineral resources (Table 3-23 and MV-3). Moderate impacts could include potential impacts on oil and gas leases, and geothermal resources along Link 221.

Soil Resources

The primary impact associated with implementation of Alternative S6 would be on soils susceptible to water or wind erosion. Following the implementation of BMPs included as part of the Project description (Table 2-6) and Mitigation Measures 1, 2, 3, 17, and 13 (Table 2-7) along Alternative S6, there would be 25.5 miles of moderate impacts and 36.4 miles of low impacts (Table 3-23 and MV-4). Moderate residual impacts on designated Prime and Unique Farmland soils could include irreversible conversion of these soils to nonagricultural uses along Links 163, 430, 435, 438, and 245. Moderate impacts on soils would include potential acceleration of wind erosion occur along Links 163, 430, 435, 438 and 245 and acceleration of water erosion along Links 163, 430, 435, 438, and 245.

3.2.2.4 Summary

Geologic Hazards

A potential for direct impacts on transmission reliability, the integrity of Project structures, and constructability and indirect impacts on public health and safety associated with geologic hazards,

including earthquakes and landslides, would exist regardless of the alternative routes selected. The alternative routes (N1 to N6) with the highest potential for impacts associated with geologic hazards are those located in the Sevier River Valley and Sulphurdale areas. Alternative routes considered for the southern segment of the Project would cross more areas with moderate susceptibility to landslides and some faults. Alternatives routes considered for the northern segment of the Project would be characterized by less landslide susceptibility, but more faults and seismicity.

Because all alternative routes considered for the northern segment of the Project would have Links 24, 25, 26, 27, 30, 33, 45, 63, 64, 66, and 68 in common, the potential impacts on earth resources associated with these links would be common for all alternatives for these links. Along these links, the potential for impacts would be associated with the concentrated areas with high susceptibility for landslides and several faults that occur between the communities of Sigurd and Elsinore (Links 24, 25, 26, 27, 30, and 33), as well as near the community of Sevier (Links 45 and 64). Other areas with higher concentrations of faults occur near Links 75 (Alternatives N4, N5, and N6); 305 and 320 (Alternatives N1, N2, and N3); and 460 and 465 (Alternatives N3, N5, and N6). Alternative N3 has the highest number of Quaternary faults and the second highest amount of area with steep slopes. Alternative N6 has the largest areas with moderate landslide susceptibility. Alternative N1 has the least number of Quaternary faults and the lowest amount of areas with steep slopes. Areas with higher concentrations of faults occur near Links 75, 305, 320, 420, 460, and 465. Overall Alternative N1 would have the least total potential for impacts associated with geologic hazards. The southern alternative routes have fewer areas with geologic hazards; Alternative S5 and Alternative S6 have the smallest number of Quaternary faults. Alternative S5 also has the second lowest amount of area with high impacts from steep slopes. However, Alternative S2 would have the least overall total potential for impacts associated with geologic hazards.

Mineral Resources

Alternatives N1, N2, N3, N4, N5, and N6 share common links (Links 24, 25, 26, 27, 30, 33, 45, 63, 64, 66, and 68) characterized by the concentrated areas of mineral resources, including Links 26, 27, 30, and 33, occurring between Sigurd and Richfield and between Elsinore and Sevier. Alternatives N3 and N5 would be anticipated to result in the lowest impacts on mineral resources. Overall, the southern alternative routes would have less impact on mineral resources than alternative routes in the northern segment. Alternative S1 would be anticipated to have the least potential for impacts on mineral resources, as only low to moderate impacts on mineral resources located in the study corridor were identified.

Soil Resources

Impacts on soil resources would be limited to areas where ground-disturbing activities, access-road cutting and grading; clearing and leveling of tower sites, staging areas, and pulling areas; and tower construction would occur.

The northern alternative routes can be divided into two groups based on the mileage that would have moderate or high impacts. The first group with the smallest amount of moderate or high impact mileage includes Alternatives N1, N2, and N4. The total mileage of moderate impacts these alternatives would have ranges between 24.2 and 32.4 miles. The second group of alternative routes includes Alternatives N3, N5, and N6, which would have moderate impacts ranging from 38.8 and 43.0 miles. The impacts on soil resources for the southern alternative routes only differ by, at most, 5.5 miles of moderate impacts from the shortest alternative (Alternative S5), which would have 22.0 miles of moderate impacts on the longest alternative (Alternative S3), which would have 27.1 miles of moderate impacts). The other alternatives would have intermediate moderate impact mileages, including S1 (Pinto Creek) with 23.5

miles, S2 (IPP West) with 24.2 miles, S4 (IPP East) with 24.2 miles, and S6 (Iron Springs and Ox Valley) with 25.5 miles of moderate impacts.

3.2.3 Water Resources

Issues raised by the public and agencies during Project scoping and preparation of the EIS related to potentially significant effects on water resources include potential impacts of construction activities on surface water quality, groundwater quantity and quality, and community water supplies.

3.2.3.1 Regulatory Framework

Federal

- The Federal Water Pollution Control Act of 1948 was the first major U.S. law to address water pollution. Growing public awareness and concern for controlling water pollution led to sweeping amendments in 1972. As amended in 1977, the law became commonly known as the Clean Water Act (CWA), codified generally as *33 U.S.C. 1251-1387*. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation‘s waters. Individual sections of the Act maintain and protect the nation‘s water resources. The following sections of the Act may influence construction and maintenance of the Project:

    - **Section 301: Effluent Limitations from Point Sources.** The volume of pollutants generated by a known source or Point Source is limited by specific water resources as described in Section 303d. These limitations may affect the Project if a construction related activity discharges a controlled pollutant such as sediment into regulated waters, which would require a permit.

    - **Section 302: Water Quality Related Effluent Limitations.** Under section 302, water quality standards designated by the State set levels of allowable pollutants called Total Maximum Daily Loads or TMDLs. This pollutant allotment criterion is designated for a specific water body relative to its particular usage (e.g., recreation, water supply, aquatic life, agriculture). A water quality criterion (numeric pollutant concentrations and narrative requirements) is also designated to protect particular resource uses. If the Project has the potential to add pollutants to a particular resource that is protected by a TMDL, it may be necessary to mitigate impacts and potentially require the Project to be included into the TMDL permit.

    - **Section 303**: **Water Quality Standards and Implementation Plans, designation of Impaired Waters.** Water bodies not meeting State-mandated Water Quality Standards are presented to the EPA for designation as Impaired Waters and issuance of federal protection under a TMDL. Impaired waters that may potentially be affected by the Project are subject to limitations set forth by the TMDL issued for the particular impaired water. If there is a high probability the Project will affect the impaired water, modification to the Utah Pollutant Discharge Elimination System (UPDES) construction general permit could be required.

    - **Section 319**: **Effluent Limitations from Nonpoint Sources.** Nonpoint source pollution management under Section 319 of the CWA was created following the 1987 amendments to the CWA. Section 319 regulates the discharge of pollutants from various sources, which

culminate to reduce Water Quality Standards set by the state. If the Project has the potential to add nonpoint source pollutants to a particular resource protected by a TMDL, it may be necessary to mitigate impacts and may potentially require the Project to be included into the TMDL permit.

- **Section 401**: **Water Quality Certification.** An application for a federally permitted activity that may result in a discharge into a water of the United States must obtain a Section 401 Water Quality Certification from the state with jurisdiction, certifying the action will not violate state or federal water quality standards. In Utah, the 401 Certificate is issued by the UPDES.

- **Section 402**: **National Pollutant Discharge Elimination System (NPDES).** The State of Utah has been delegated permit authority over the federal NPDES and maintains the UPDES, which regulates water quality standards specifically by issuing and monitoring construction related permits. This is described in more detail under the State Regulatory Framework section.

- **Section 404**: **Dredge or Fill in Waters of the United States.** The CWA regulates the dredging or filling of any material in a water of the United States under the regulatory jurisdiction of the USACE. If the Project requires the dredge or fill in a water of the United States as defined in the CWA, it may be necessary to obtain a federal permit to conduct the work.

- **Utah BLM Riparian Policy (IM 2005-091).** The objective of the policy is to establish an aggressive riparian area management program that will identify, maintain, restore, and/or improve riparian values to achieve a healthy and productive ecological condition for maximum long-term benefits; provide watershed protection while still preserving quality riparian-dependent aquatic and terrestrial species habitats; and, as appropriate, allow for reasonable resource uses.

- **Safe Drinking Water Act (SDWA).** The SDWA is the main federal law that ensures the quality of Americans' drinking water. The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources that include rivers, lakes, reservoirs, springs, and groundwater wells. Under SDWA, the EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards (EPA 2010a). The SDWA does not regulate private wells that serve fewer than 25 individuals (EPA 2010a). The SDWA also mandates a Groundwater Wellhead Protection Program be developed by each state to protect groundwater resources that serve as sources for public drinking water.

- **National Flood Insurance Program (NFIP)**: The NFIP is administered by the Federal Emergency Management Agency (FEMA), a component of the U.S. Department of Homeland Security. In support of the NFIP, FEMA identifies flood hazard areas throughout the United States, including Special Flood Hazard Areas, which are defined as areas of land that would be inundated by a flood having a one percent chance of occurring in any given year (previously referred to as the base flood or 100-year flood). Development may take place within Special Flood Hazard Areas, provided development complies with local floodplain management ordinances, which must meet the minimum federal requirements.

State

- **Utah Pollutant Discharge Elimination System (UPDES).** UAC R317-8 mandates both direct and indirect discharges to waters of the State, including surface water discharges; wastewater discharges; indirect discharges; stormwater discharges from commercial, industrial, and municipal activities; groundwater discharges; and discharges resulting from underground injection, be regulated and permitted by the State Division of Water Quality. Construction General Permits for Stormwater Discharge and Hydrostatic Testing and Dewatering will likely be required during the construction of the Project.

- **Utah State E.O. 11988**: **Floodplain Management.** If structures are to be placed in a FEMA-designated, flood-hazard area, a floodplain modification permit may be required.

- **Utah State Stream Alteration Permit.** Work done to the bed and banks of a named intermittent or perennial stream will require the issuance of a State Stream Alteration Permit and will likely require a USACE Section 404 and 401 permit.

3.2.3.2 Regional Setting

The Project area is located within the eastern portion of the semi-arid Basin and Range Physiographic Province (Fenneman 1931). The Basin and Range Physiographic Province is characterized by north-south trending mountain ranges separated by basins and valleys. Surface water within the area shows a strong relationship to seasonal trends in temperature and precipitation. Following a typical winter, snowpack melts in the spring and fills streams, rivers, and reservoirs, which aids groundwater recharge. Seasonal snowmelt also leads to flooding and ponding in the lower valleys, creating vast tracts of inundated land. Even though these springtime flows can result in rivers, streams, and reservoirs filling to capacity, surface water is temporally limited by seasonal fluctuations of high summer temperatures and strong winds, which can result in rapid evaporation of water that is not supported by groundwater sources or upstream storage facilities. Throughout the summer months, sporadic thunderstorms can produce heavy rainfall, but most of this precipitation is confined to the soil surface where summer heat can rapidly evaporate the water.

Basins, Watersheds, and Drainages

The Project area is located within the Escalante River-Sevier Lake Basin (Hydrologic Unit Code [HUC] 160300) and the Lower Colorado-Lake Mead Basin (HUC150200). Three watersheds exist within the Escalante River-Sevier Lake Basin: Beaver Bottoms-Upper Beaver (HUC16030007 at 1,100,800 acres), Escalante Desert (HUC16030006 at 2,092,800 acres), and Middle Sevier (HUC16030003 at 1,184,000 acres). The Lower Colorado-Lake Mead Basin contains the Upper Virgin Watershed (HUC15010008 at 1,363,200 acres). The combined surface acreage of the four watersheds is approximately 5,740,800 acres (Montana State University 1999).

The Beaver Bottoms-Upper Beaver Watershed encompasses approximately 169,440 acres, where 15.4 percent of the watershed occurs within the Project area. The Escalante Desert Watershed encompasses approximately 161,408 acres, where 7.7 percent of the watershed occurs within the Project area. These two physiographic areas located in southwestern Utah are both part of the Sevier Lake Basin. Included in these watersheds are the Beaver River drainage, Parowan Valley, Cedar Valley, and the Beryl-Enterprise area. Precipitation ranges from more than 40 inches in the Tushar Mountains and Markagunt Plateau to

about 8 inches in the desert areas of the northwestern part of the basin (UDNR Division of Water Resources [DWR] 1995).

The Middle Sevier Watershed is located in south-central Utah, where the Wasatch Mountain Range divides Utah into the Colorado Plateau on the east and the Basin and Range Province on the west. This watershed encompasses approximately 51,351 acres, where 43.4 percent of the watershed occurs within the Project area. The climate of the Middle Sevier Watershed reflects its location in the transition zone from the Basin and Range Province to the Rocky Mountain-Colorado Plateau Province. Precipitation ranges from more than 35 inches in the highest mountain areas to less than 8 inches in the Sevier Desert (DWR 1999).

The Upper Virgin Watershed is located in southwestern Utah and encompasses approximately 33,362 acres, where 2.4 percent of the watershed occurs within the Project area. It includes the Kanab Creek and Virgin River drainages. Mean annual precipitation varies from 17 inches at New Harmony to 8 inches at St. George (DWR 1993).

Rivers and Streams

Several river systems located in the Project area collect and drain water from large areas of local watersheds (Table 3-24). Within the Escalante River-Sevier Lake Basin, the Beaver River forms at the confluences of South Creek, North Creek, and numerous other tributaries originating from the west and south slopes of the Tushar Mountains. The Beaver River flows west until it reaches Minersville Reservoir, where water is impounded for agricultural and recreational purposes. Below the dam, the tail-water is confined to a shallow channelized section of river until it flows through the town of Minersville where it is diverted into multiple irrigation canals and eventually dissipates into the Escalante Desert or is lost to evaporation. The Sevier River originates at the Markagunt Plateau, where it flows northward and terminates in Sevier Lake. Sevier Lake is a hydrologically isolated water body with no outflow. The Santa Clara River originates on the north slopes of the Pine Valley Mountains flowing west, where it ultimately joins the Virgin River. The Virgin River terminates at the confluence with Lake Mead in Nevada (USGS 2009a).

TABLE 3-24
NAMED PERENNIAL AND INTERMITTENT STREAMS IN THE PROJECT AREA

Watershed (HUC)	Perennial Streams	Intermittent Streams
Beaver Bottoms-Upper Beaver (1603007)	Beaver River Cove Creek Indian Creek Jim Reed Creek Little North Creek North Wildcat Creek Pine Creek South Creek Wildcat Creek	Cove Creek Tributary First Spring Creek Little North Creek Tributary Parowan Canyon Wash Pine Creek Tributary South Creek Tributary Sulphur Creek Wildcat Creek Tributary
Escalante Desert (1603006)	Little Pinto Creek Pinto Creek Shinbone Creek South Fork Pinto Creek Spring Creek	Bullrush Creek Calf Springs Creek Iron Springs Creek Little Pinto Creek Shinbone Creek Tributary Spring Creek Tributary Twin Spring Creek

TABLE 3-24
NAMED PERENNIAL AND INTERMITTENT STREAMS IN THE PROJECT AREA

Watershed (HUC)	Perennial Streams	Intermittent Streams
Middle Sevier (1603003)	Clear Creek Dry Creek Fish Creek Joe Lott Creek Mill Creek Sevier River Shingle Creek	Cottonwood Creek Currant Creek Dry Creek Tributary Gooseberry Creek Indian Creek Mortensen Creek North South Creek Sevier River Tributary Whiskey Spring Creek Willow Creek
Upper Virgin (15010008)	Magotsu Creek Santa Clara River	Dan Sill Creek Magotsu Creek Tributary Mahogany Creek

SOURCE:
USGS: National Hydrography Dataset 2009a
NOTES:
[1]HUC = Hydrologic Unit Code
[2]Numerous unnamed intermittent and ephemeral streams also exist within the Project area.

The Beaver, Sevier, and Santa Clara rivers and their associated lakes, reservoirs, and tributaries are valuable ecological and economic components of local environments. Many plants and vegetative communities dependent on continual availability of water are found in the study corridor associated with these waterways. These riparian communities and aquatic plants support important habitat for wildlife, including species listed as sensitive and endangered. The Southwestern willow flycatcher, bald eagle, osprey, and several species of migratory birds (Section 3.2.4; Appendix D) known to utilize areas of the study corridors are dependent on water resources. Mammals, amphibians, and reptiles found in the Project area depend on habitats created by surface water and utilize these areas as travel corridors and nesting, brooding, and foraging habitat. Ranchers use highly productive vegetative communities associated with water resources in the study corridor for grazing livestock. Riparian and wetland systems associated with streams and rivers provide flood attenuation, erosion control, and a vector for groundwater recharge. The aquatic habitat associated with the perennial streams, rivers, lakes, and reservoirs support fish, aquatic plants and invertebrates, and amphibians (Levick et al. 2008). These plants and animals depend on the unique and diverse habitat features supported by water resources in this semi-arid ecological setting.

Several perennial streams exist within the Project area, including Pinto Creek, Jim Reed Creek, Spring Creek, and Joe Lott Creek (Table 3-24). These water features provide landscape hydrologic connections. Streams throughout the Project area typically provide a degree of biological, chemical and physical functionality at a varying degree of scale. Ecosystem functions provided by streams and riparian habitats include (1) stream-energy dissipation during high-water flows that reduces erosion and improves water quality; (2) surface and subsurface water storage and exchange; (3) groundwater recharge and discharge; (4) sediment transport, storage, and deposition to aid in floodplain maintenance and development; (5) nutrient storage and cycling; (6) wildlife habitat and migration corridors; (7) support for vegetation communities that stabilize stream banks and provide wildlife services; and (8) water supply and water-quality filtering (Levick et al. 2008).

The majority of streams in the Project area are intermittent and exhibit only seasonal flow. In the spring, runoff flows through these streambeds until they join perennial waterways or are absorbed into groundwater reservoirs. These streams typically dry out in the spring after the depletion of mountain snowpack. Some streams exhibit ephemeral flow where water may be present only once every few years or on a more consistent pattern, showing a direct response to local precipitation. Ephemeral and intermittent streams provide the same ecological and hydrological functions as perennial streams by

moving water, nutrients, and sediment throughout the watershed, but are limited in their overall biological addition to the surrounding areas by the temporary presence of water (Levick et al. 2008). Dry washes typically do not support any discernable riparian vegetation, yet they commonly promote the establishment of a greater density of upland species that utilize the temporary resource. Examples of named intermittent streams in the study corridors include First Spring Creek, Cove Creek, Bull Rush Creek, and Willow Creek (Table 3-24).

The Project area also contains many man-made canals that convey water from source areas toward municipalities, irrigated cropland, and pastures. These canals were initially created to supply water to areas suitable for agriculture that lack a sufficient water supply. Water from many perennial rivers and streams in the Project area has been diverted into canals and is used for agricultural purposes (USGS 1975).

Reservoirs, Lakes, and Ponds

Several reservoirs, lakes, and ponds exist within the Project area. These natural and manmade surface-water features are used to collect and store water from spring runoff for subsequent municipal and agricultural use. Large reservoirs in the Project area include Rocky Ford Reservoir, Piute Reservoir, Three Creek Reservoir, Minersville Reservoir, Grass Valley Reservoir, and Newcastle Reservoir. Typically, natural lakes are found at higher elevation, where the cooler climate reduces the amount of water lost to evaporation and snowmelt is retained in semi-impermeable basins. Examples of natural lakes in the Project area include Duck Lake, Deep Lake, Hunts Lake, Barney Lake, Puffer Lake, Birch Lake, and Kent‘s Lake. Several manmade lakes, ponds, and small reservoirs are also found within the Project area. These surface-water features are typically used for agricultural purposes and include Helper Ponds, Taylor Pond, Moscow Reservoir, Sand Pond, Mound Pond, and Danish Reservoir (USGS 2009a).

State-Listed Impaired Waters

Several water bodies within the Project area have been identified by the State of Utah and designated as ―impaired waters” by the EPA. These water resources may exceed federal water quality standards for total phosphorus, selenium, dissolved solids, chlorides, and salinity and may harbor noxious aquatic plants, show signs of significant riparian habitat alteration, low dissolved oxygen, increased water temperature, or a suite of these problematic elements. Impairment originates from many sources, including agricultural activities, urban runoff, summer home development, and recreational activities (UDEQ 2010). These impaired waters have received growing attention from state and federal agencies as the understanding of the consequences from under-protected and over-used water resources becomes increasingly apparent.

Understanding from where pollutants originate is a developing science in the field of water quality management. Known sources were initially identified as ―point source pollutants.” These types of pollutants can be traced to a known source. State and federal water quality control agencies, including the Utah State Division of Water Quality and the EPA have identified sources of pollutants and established limits to effluence using TMDLs to identify agency approved maximum allowable discharge. NPDES and UPDES have been integral in the establishment of TMDLs and identification of point source pollutants in the Project area. These actions have significantly improved water quality in Utah and the United States (U.S. General Accounting Office 1999).

Until recently, nonpoint source pollution has been subject to relatively little regulatory attention by the states and EPA. Current management of nonpoint source pollution relies on the use of BMPs and a number of voluntary incentive programs (U.S. General Accounting Office 1999). Determining the source

of a particular type of nonpoint pollution (e.g., sedimentation, discharge of nutrients, or pathogen-harboring effluent) is highly problematic. The State of Utah is responsible for collecting and disclosing data from statistical modeling and physical investigation of potential sources of nonpoint source pollutants used in developing the state list of impaired waters.

When the state recognizes potentially impaired water, modeling and analysis data are sent to the EPA for review and validation. The EPA will often issue a recommended TMDL for the impaired water. The Utah State 303(d) list of impaired waters identifies problematic surface water resources and their TMDL, if one has been issued, as well as the type and source of impairment. Listed impaired waters occurring within the Project area are represented in Table 3-25.

TABLE 3-25
UTAH STATE LISTED IMPAIRED WATERS IN THE PROJECT AREA

Impaired Water	Watershed	Identification Number	Source	State Impairment
Beaver River	Upper Beaver-Beaver Bottoms	UT-R_SEVIER_Beaver_River	Point/nonpoint source	Noxious aquatic plants Riparian habitat alteration Phosphorus Dissolved oxygen Temperature
Minersville Reservoir	Upper Beaver-Beaver Bottoms	UT-L-73	Point/nonpoint source	Noxious aquatic plants Riparian habitat alteration Phosphorus Dissolved oxygen Temperature
Puffer Lake	Upper Beaver-Beaver Bottoms	NA	Point/nonpoint source	Noxious aquatic plants Riparian habitat alteration Phosphorus Dissolved oxygen Temperature
LaBaron Reservoir	Upper Beaver-Beaver Bottoms	NA	Point/nonpoint source	Noxious aquatic plants Riparian habitat alteration Phosphorus Dissolved oxygen Temperature
Kent‘s Lake	Upper Beaver-Beaver Bottoms	NA	Point/nonpoint source	Noxious aquatic plants Riparian habitat alteration Phosphorus Dissolved oxygen Temperature
Sevier River	Lower Sevier	UT-L-16030003-012	Nonpoint source	Total dissolved solids (TDS) Total phosphorus
Santa Clara River	Middle and Lower Sevier	UT15010008-001	Nonpoint source	Salinity TDS Chlorides Selenium
East Fork Sevier River	Middle Sevier	UT 16030002-005	Nonpoint source	Temperature Phosphorus
New Castle Reservoir	Escalante Desert	UT-L-16030006-008	Nonpoint source	Phosphorus Dissolved oxygen

TABLE 3-25
UTAH STATE LISTED IMPAIRED WATERS IN THE PROJECT AREA

Impaired Water	Watershed	Identification Number	Source	State Impairment
Baker Reservoir	Upper Virgin	UT-L-15010008-008	Nonpoint source	Phosphorus

SOURCE: EPA 2010a
NOTE: NA = Not available.

Groundwater and Aquifers

Groundwater in the Project area is controlled by two large basins. The Sevier River Basin contains 6,768,070 acres and includes parts of Beaver, Garfield, Iron, Juab, Kane, Millard, Piute, Sanpete, Sevier, and Tooele counties (DWR 1999). The Project area from Sigurd south to Circleville at the Piute-Garfield County Line is within the Sevier River Basin. The rest of the Project area, including the Black Rock, Milford, Beaver, Cedar City, and Enterprise areas, is located within the Cedar/Beaver Basin. The Cedar/Beaver Basin contains 3.6 million acres and is bordered by, and drains into, the Sevier River Basin to the east and northwest (DWR 1995). The Cedar/Beaver Basin is separated from the Sevier River Basin by the Tushar Mountains and the Pahvant Range. Both of these basins and much of western Utah is part of a wider "Great Salt Lake Desert" subregion of the closed Great Basin (Prudic et al. 1995). For both the Sevier River and Cedar/Beaver basins, the primary use for groundwater is irrigation, followed by municipal and industrial needs and smaller private uses. Groundwater flow in these basins is typically from recharge areas in, and adjacent to mountain ranges, toward discharge areas in the valley lowlands (Prudic et al. 1995). In the Sevier River Basin, groundwater flow varies from area to area, having inflow and outflow throughout most of the area with a general trend to the west as it approaches Sevier Lake. In the Cedar/Beaver Basin, groundwater flow is generally from the eastern margin to the west and to the north.

Groundwater in the Project area occurs mostly in basin-fill deposits between zero and 600 feet below the ground surface. In addition, fractures in carbonate rocks located beneath the basin-fill deposits can also contain groundwater (Harrill et al. 1983; Prudic et al. 1995). The basin-fill deposits formed mostly during the Cenozoic Era and consist of alluvial sand, gravel, and silt with some finer-grained lake deposits. The basin-fill deposits vary in thickness, ranging between 1,000 to 5,000 feet in thickness, but could be greater than 10,000 feet in some areas (Prudic et al. 1995; Harrill and Prudic 1998). Well data show the depth to groundwater in the study corridor averages between 5 and 664 feet below the surface (http://water.usgs.gov/lookup/getwatershed?1603009), becoming shallower the closer the wells are to the center of topographically low parts of a valley or basin (Harrill and Prudic 1998). The underlying carbonate rocks were deposited during the Paleozoic Era and underlie large areas in the eastern portion of the Great Basin. These carbonate rocks (carbonate-rock province of Harrill et al. 1983; Prudic et al. 1995; Harrill and Prudic 1998) are highly permeable, providing conduits for the movement of groundwater (Prudic et al. 1995).

The principal aquifers in the Project area are located in basin-fill deposits, such as those found in the Cedar Valley and Milford areas. Permeable carbonate rocks also act as significant regional aquifers (Harrill et al. 1983). The Cedar/Beaver Basin contains five major aquifers, all of which are within the Project area. The Beaver Valley aquifer stores approximately 4 million acre-feet of water, mostly in the upper 200 feet of the basin-fill deposits (DWR 1995). The Milford Valley aquifer stores approximately 10 million acre-feet of water within the upper 200 feet of the basin-fill deposits. The Parowan Valley aquifer stores approximately 20 million acre-feet of water. The Cedar Valley aquifer stores approximately 20 million acre-feet of water. The Beryl-Enterprise aquifer stores approximately 72 million acre-feet of water

(DWR 1995). The water quality of aquifers in the Cedar/Beaver Basin is generally good, with TDSs typically less than 500 milligrams per liter (mg/l) (DWR 1995).

The Sevier River Basin contains 19 aquifers, two of which are within the Project area. The Junction-Marysvale aquifer stores approximately 30,000 acre-feet of water (DWR 1999). The Sevier-Sigurd aquifer stores approximately 3 million acre-feet of water. The water quality of the aquifers in the Sevier River Basin is generally good, with total dissolved solids typically less than 600 milligrams per liter, but some wells near Richfield have had TDS greater than 2,000 mg/l (DWR 1999).

Springs and Wells

Springs and wells are located throughout the Project area, with concentrations in the Blundell, Milford, and Newcastle areas. Springs are defined as places where groundwater flows naturally from a rock or the soil onto the land surface or into a body of surface water (Bates and Jackson 1987). A seep is a special kind of spring where water percolates slowly to the land surface. These water resources are primarily used for production of agricultural and municipal water. There are 8 springs and 13 wells (Table 3-26) located within 600 feet of the reference centerline for the alternative routes considered in the EIS (USGS 2009a; Utah Automated Geographic Reference Center 2010).

TABLE 3-26
SPRINGS AND WELLS IN THE PROJECT AREA

Location	Milepost	Spring	Well
Link 30	2	Richfield Warm Spring	
Link 66	10		Utah State 31-33
Link 75	15		CalEnergy 28-3
Link 155	2		Dry Well
Link 160	2		Corral Well
Link 260	20	Irvine Spring	
Link 260	22	Mud Spring	
Link 270	10	Yellow Spring	
Link 349	0		Phillips 9-1
Link 365	2		Unnamed
Link 386	2		Unnamed
Link 430	5		Unnamed
Link 438	12	Joel Spring	
Link 444	2	Unnamed spring	
Link 444	3	Highway Spring	
Link 444	3	Abe Spring	
Link 450	1		Unnamed
Link 455	0		Phillips 9-1
Link 455	0		Unnamed
Link 490	4		Unnamed
Link 490	6		Marshall Well

SOURCE: USGS: National Hydrography Dataset 2009a, Utah Automated Geographic Reference Center 2010

3.2.3.3 Study Methodology

Inventory

Information for the water resources inventory was obtained from scientific literature, governmental agencies, and institutions including the BLM, USFS, NRCS, EPA, FWS, FEMA, DWR, UGS, and USGS. Water resources identified during inventory analysis include watersheds, perennial and intermittent streams, lakes, reservoirs, floodplains, shallow groundwater, springs, and wells. Water resources were identified within 600 feet of the reference centerline for the alternative routes considered in the EIS. This buffer was based on Utah BLM's riparian policy (IM 2005-91), which states that no new surface disturbing activities will be allowed within 328 feet (100 meters) of riparian areas. To be conservative, all water resources, including surface water, shallow groundwater, springs/seeps, and wells, were identified within 600 feet of the reference centerline for each alternative route and included in the analysis of potential impacts on water resources in the EIS.

Impact Assessment and Mitigation Planning

For the purpose of the EIS, potential effects were evaluated for all water resources identified during the inventory process. Water resources were divided into surface water, groundwater and aquifers, and wells. Potential Project-related impacts on each category of water resources were evaluated separately.

The methodology for assessing the potential impacts on water resources associated with implementing the Project generally included (in order) (1) identifying the types of potential effects on water resources that could result from construction, operation, and maintenance of the proposed transmission line and associated facilities; (2) use of USACE and EPA approved parameters to identify the functions and values of water resources to classify potential environmental effects; (3) developing criteria for assessing the intensity of a potential effect on a biological resource; (4) assessing the initial impacts on the biological resources; (5) identifying the appropriate mitigation measures (Table 2-7) for minimizing potential adverse effects; (6) determining areas where mitigation should be applied; and (7) disclosing potential residual impacts on water resources

Types of Potential Environmental Effects

Surface Water

Impacts on surface water associated with implementation of the Project could result from placement of tower structures, access roads, or temporary work areas in identified water resources, which could require placement of temporary or permanent fill and removal of riparian vegetation. Other impacts could include accidental spills of environmentally harmful materials, sedimentation, and contamination of surface-water resources from construction-related disturbance, fugitive dust deposition, increased soil erosion from removal of vegetation, or the introduction of herbaceous and aquatic invasive species.

Construction of permanent and temporary access roads would likely require crossing several surface-water resources. These crossings could require the placement of fill into a stream channel along with structures (e.g., bridge pilings, culverts, wing walls, etc.) that support the crossing and protect water resources. All crossings would be constructed with the minimum footprint required to transfer building materials and construction equipment. Work performed within the bed and banks and below the plane of ordinary high water mark in streams determined to be waters of the United States will require a Section 404 CWA permit issued by the USACE. The CWA requires that impacts resulting from these crossings

are avoided or minimized to the extent possible. Any unavoidable impacts must be mitigated. Impacts resulting from permanent crossings would be limited to the structures placed into the streambed and potential loss of riparian vegetation on either side of the crossing.

Temporary crossings typically would be used to cross water resources with little to no stream flow or on temporary access roads. Types of temporary stream crossings would include (1) dry crossings with no bank or channel improvement; (2) mechanically grading banks to a slope sufficient to drive equipment and building materials across the channel (bank recontouring and revegetation would follow the work at the temporary crossing); (3) placement of temporary fill that would be removed following the completion of work at the site; or (4) temporary span structures. While temporary, these crossings would have the potential to affect stream morphology and ecological function. Modification of stream banks could result in removal of vegetation that could take many years to recover. The sedimentation potential would increase with the extent of disturbance and recontouring required. Depending on which type of crossing method is used, it may be necessary to obtain a stream alteration permit from the State of Utah and/or a Section 404 permit from the USACE.

Groundwater

Groundwater and aquifers located within the Project area are used for both municipal and agricultural water supply. Subsurface water resources are typically less susceptible than surface water to impacts associated with the Proposed Action, although, if negatively affected, remedial actions are often problematic and complicated. The Project has the potential to affect subsurface water resources in areas of shallow groundwater where placement of tower structures could come into contact with the water table. As proposed, the Project would not involve placement of hazardous material below ground and would not impede the flow or depth of underground water.

Wells

Wells providing groundwater for municipal and agricultural uses are located within the Project area. Wells also provide connectivity between surface waters and aquifers through which contamination could travel. This potential impact was considered in the impact assessment by examining the distance between each well and project elements. Wells located within 600 feet of project elements could be affected.

Criteria for Assessing Intensity of Impacts

Criteria were developed to assess the intensity of a potential effect on a water resource associated with implementation of the Project (Table 3-27). Criteria developed to assess impact intensity resulting from the construction, operation, and maintenance of the Project focused on the abundance of a particular water resource component; the time in which, if affected, those resources would regenerate; the potential for permanent loss of water resources and/or associated vegetation components; federal and State statutes applicable to particular water resources; and the varying degree of importance a particular water resource has to the greater ecosystem.

TABLE 3-27 CRITERIA FOR ASSESSING INTENSITY OF IMPACTS ON WATER RESOURCES	
Intensity of Impacts	**Description**
High	▪ Permanent loss of Palustrine Forest Overstory Wetlands ▪ Permanent loss of wetlands that support federally endangered, threatened, or candidate species ▪ Construction, operation, and maintenance related activities that lead to deposition of materials into state-listed impaired waters ▪ Construction, operation, and maintenance related activities that impact springs or wells ▪ Placement of tower foundations in areas of shallow groundwater or aquifers
Moderate	▪ Permanent loss of Palustrine Scrub/Shrub Wetlands ▪ Permanent loss of wetland habitat crucial to nesting, brooding, and overwintering wildlife species ▪ Permanent fill in waters of the United States ▪ Construction, operation, and maintenance activities that result in a permanent increase of sedimentation to nearby surface-water resources
Low	▪ Permanent loss of Palustrine Emergent Wetlands ▪ Temporary loss of Palustrine Scrub/Shrub Wetlands ▪ Temporary fill in waters of the United States ▪ Construction, operation, and maintenance activities that result in temporary increases in sedimentation to nearby surface water resources

Effects Analysis

Assessment of Initial Impacts

Initial impacts on water resources were assessed based on the sensitivity of known attributes of each water resource to types of potential effects that could result from implementation of the Project. Water resources identified by this analysis were differentiated into sub-categories to better represent potential impacts. Surface water was broken into three different categories: (1) major rivers, such as the Beaver River, Sevier River, and Santa Clara River; (2) river streams, which incorporate both perennial and intermittent streams with a vegetative component; and (3) water bodies. Groundwater and aquifers used the shallow groundwater dataset for analysis. Wells and springs were analyzed as separate resources that were later combined for ease of discussion.

Based on resource sensitivity classifications, initial impacts on water resources were assigned as high due to the suite of environmental benefits and socioeconomic interests surrounding water resources (i.e., limited water quantity throughout the semi-arid landscape, critical ecological functions, and public and recreational value).

Mitigation Planning

Removal of unique riparian habitat, increased sedimentation, and reduced water quality are among the primary adverse environmental effects on water resources associated with the construction, operation, and maintenance of the proposed transmission line. In addition to the BMPs described as part of the Project description in Chapter 2 (Table 2-6), mitigation measures were developed to minimize adverse impacts on water resources (Mitigation Measures 4 and 7 as defined in Table 2-7). Mitigation measures would be applied to all areas of high initial impact to reduce impact levels where necessary and feasible based on the Project description.

Tree clearing would be minimized (Mitigation Measure 4) within 328 feet of surface-water features, such as major rivers, river streams, and water bodies, because trees associated with water resources in the Project area are typically confined to a specific niche with a hydrologic regime, and associated soil type necessary for the establishment and long-term growth of forested wetlands. Further, because of the unique features associated to these palustrine forested wetlands, the EPA and USACE regard these wetlands as highly valuable commodities due to their functionality for protecting and improving water quality, as well as the layers of habitat provided to a multitude of species that inhabit these wetlands. Due to the infrequency and high value of this wetland type throughout the Project area, minimizing tree clearing (Mitigation Measure 4) would reduce impacts on unique wetlands during the construction, operation, and maintenance of the Project.

Potential impacts on surface-water resources also would be minimized by locating tower structures so as to avoid sensitive features, such as wetlands, riparian areas, perennial rivers, and perennial streams (Mitigation Measure 7). The avoidance of sensitive water resources through spanning, selective tower placement, or realignment of access routes (Mitigation Measure 7) was applied to all major rivers, river streams, shallow groundwater, springs, wells, and water bodies.

Degradation of groundwater resources caused by construction and maintenance activities and the presence of permanent facilities would be the primary adverse environmental effect on groundwater resources associated with the implementation of the Project. Impacts on groundwater resources would be mitigated through spanning and avoidance. The use of Mitigation Measure 7 (span or avoid sensitive features) would be applied to those areas where shallow groundwater, springs, or wells are present.

Access roads would be designed to avoid placement of permanent fill in perennial and intermittent streams, as well as avoiding designs that would lead to the removal of riparian or wetland vegetation (Mitigation Measure 2). Where construction vehicles and equipment would need to access areas within the 328 foot BLM riparian buffer, potential impacts would be avoided in the design stage and anticipated impacts would be adequately mitigated as required by the Utah BLM‘s riparian policy (IM 2005-091). Additionally, an erosion control plan would be implemented to minimize the potential for sedimentation. Spill prevention and containment measures would be implemented, and vehicle refueling and maintenance activities would be limited to designated work areas at least 328 feet away from all creeks. The Project would comply with the requirements of E.O. 11988 (Floodplain Management), E.O. 11990 (Wetland Protection), and Sections 401 and 404 of the CWA.

Residual Impacts

Residual impacts were assessed for potentially affected riparian wetlands and habitats associated with each water resource. This approach is consistent with that used by the EPA and USACE for evaluating wetland functions and values to determine adequate mitigation for actions that affect wetlands and waters of the United States.

Table 3-28 summarizes the initial resource sensitivity classifications that provided the basis for assessing initial impacts on water resources, the mitigation measures (from Table 2-7) applied to minimize potentially adverse effects on those resources, and residual impacts.

TABLE 3-28 SUMMARY OF SENSITIVITY LEVEL AND RESIDUAL IMPACTS			
Water Resource	**Resource Sensitivity Level**	**Mitigation Measures Applied**	**Residual Impacts**
Major Rivers	High	4,7	Low
River Streams	High	4,7	High/Low[1]
Shallow Groundwater	High	7	Low
Springs	High	7	Low
Wells	High	7	Low
Water Bodies	High	4,7	Low

NOTE:
[1] High impacts on those areas of permanently removed PFO wetlands. Low impacts for those areas where vegetation removal is temporary.

3.2.3.4 Results

A summary of baseline resource inventory and results of the effects analysis are presented in Tables 3-27 and 3-28 and described in this section. Table 2-11 presents a comparison of results of the effects analysis for the alternative routes, and Table 2-12 presents a summary of the information presented in Table 2-11.

No Action Alternative

Under this alternative, there would be no construction, operation, or maintenance activities associated with the Project. Current management and use of the area would continue into the reasonably foreseeable future. Impacts on water resources associated with the implementation of the Project would not occur.

Northern Area - Sigurd Substation to South Black Mountains

The baseline resource inventory and residual impacts for alternative routes considered in the northern area are presented in Table 3-29.

TABLE 3-29 ALTERNATIVE ROUTE COMPARISON WATER RESOURCES INVENTORY DATA AND RESIDUAL IMPACTS											
		Water (miles)						**Residual Impacts (miles [percent])**			
Route Alternative	**Total Miles**	**Major River**	**River Stream**	**Shallow Groundwater**	**Springs[1]**	**Wells[1]**	**Water Bodies**	**No Identifiable**	**Low**	**Moderate**	**High**
Alternative N1 (Environmentally Preferred)	120.7	0.6	7.7	13.0	0.7	2.9	–	97.1 [80.4]	23.6 [19.6]	–	–
Alternative N2	120.3	0.5	9.2	6.6	0.9	4.1	–	100.8 [83.8]	19.5 [16.2]	–	–
Alternative N3	117.2	1.7	10.2	–	0.6	3.7	–	101.9 [86.9]	15.3 [13.1]	–	–

TABLE 3-29
ALTERNATIVE ROUTE COMPARISON
WATER RESOURCES INVENTORY DATA AND RESIDUAL IMPACTS

Route Alternative	Total Miles	Water (miles)						Residual Impacts (miles [percent])			
		Major River	River Stream	Shallow Groundwater	Springs[1]	Wells[1]	Water Bodies	No Identifiable	Low	Moderate	High
Alternative N4	109.4	0.2	8.9	6.6	0.9	5.2	–	89.4 [81.7]	20.0 [18.3]	–	–
Alternative N5	106.3	1.4	9.9	–	0.6	4.8	–	90.5 [85.1]	15.8 [14.9]	–	–
Alternative N6 (Proponent's Proposed Action)	105.5	1.1	11.1	–	–	5.6	–	88.5 [83.9]	17.0 [16.1]	–	–

NOTE:
[1]A 600-foot buffer was applied to each well and spring.

Alternative N1 – Black Rock Road to IPP North of Milford Wind Farm

Affected Environment

From the Sigurd Substation to Cove Fort, Alternative N1 crosses six perennial streams, including Joe Lott Creek (Link 63), Clear and Dry Creeks (Link 64), and Mill, Fish, and Shingle Creeks (Link 66). Alternative N1 also crosses four named intermittent streams, including Cottonwood, Gooseberry, Currant, and Indian Creeks (Link 30), as well as 33 unnamed intermittent and ephemeral drainages and three canal crossings. In addition, one spring (Link 30) and one well (Link 66) are located within 600 feet of the reference centerline.

From Cove Fort to the South Black Mountains, Alternative N1 crosses no perennial streams. The alternative crosses the Beaver River along Link 365, but it is considered intermittent at that location. Three additional named intermittent streams are crossed. Cove Creek is crossed in three locations at Links 320, 350, 360, Mud Spring Wash at Link 160, and The Big Wash at Link 381. In addition, 21 unnamed intermittent drainages are crossed by this segment of Alternative N1.

The alternative route crosses 13.0 miles of shallow groundwater (30 meters or less below ground surface) along Links 360, 365, and 380. Three springs (Links 155, 160, and 365) are located within 600 feet of the reference centerline.

Environmental Effects

Residual impacts on water resources associated with Alternative N1 would include no identifiable high or moderate impacts and 23.6 miles of low impacts (Volume II, MV-5).

Alternative N1 potentially would affect perennial and intermittent streams, rivers, canals, springs, wells and shallow groundwater. Impacts on perennial surface water features and canals could include sedimentation from Project-related disturbance, temporary and permanent fill associated with development of access routes, removal of riparian vegetation, bank alteration, and accidental

contamination associated with spills of environmentally harmful material. Impacts on intermittent surface water features are similar to perennial water features, although intermittent features typically have less associated riparian vegetation and subsequently are more prone to sedimentation. Impacts on springs are also similar to those described for perennial surface water features. Impacts on wells could include accidental physical damage to well structures during construction or accidental contamination of groundwater resources. These potential impacts are highly unlikely. Potential impacts on groundwater resources include accidental contamination during tower structure placement or accidental spills of environmentally harmful liquids that have the potential of percolating into shallow groundwater. Implementation of the Project would not require placement of hazardous material below ground, and shallow groundwater will be identified prior to work occurring in those areas. Impacts on groundwater would be highly unlikely due to appropriate avoidance and mitigation measures identified in the POD. Stormwater discharge and quantity of sedimentation to surface water resources are often correlated to Project-related surface disturbance. Alternative N1 would result in 1006.5 acres of anticipated temporary surface disturbance and 319.7 acres of permanent disturbance (Table 3-2). It is estimated that some of this disturbance would affect water resources.

Among the alternatives routes considered for the northern area, Alternative N1 would have the most anticipated temporary surface disturbance and could result in the most sedimentation and stormwater discharge to surface-water resources.

Alternative N2 – Black Rock Road to IPP South of Milford Wind Farm

Affected Environment

From the Sigurd Substation to Cove Fort, Alternative N2 shares the same alignment with Alternative N1. All water resources in this portion of the alternative are the same as described above for Alternative N1.

From Cove Fort to the South Black Mountains, Alternative N2 crosses no perennial streams. The alternative route crosses the Beaver River along Link 386, but it is classified as intermittent at that location. Three additional named intermittent streams are crossed. Cove Creek is crossed in two locations at Links 320 and 350, Mud Spring Wash at Link 160, and The Big Wash at Link 381. In addition, 39 unnamed intermittent drainages are crossed by this segment of Alternative N2.

The alternative route crosses 6.6 miles of area containing shallow groundwater along Links 160, 385, and 386. Four springs (Links 155, 160, 386, and 450) are located within 600 feet of the reference centerline.

Environmental Effects

Residual impacts on water resources associated with Alternative N2 would include no identifiable high or moderate impacts and 19.5 miles of low impacts (Volume II, MV-5).

Alternative N2 potentially would affect the same categories of water resources as Alternative N1. Impacts on these resources would be similar to those described in Alternative N1. Alternative N2 would result in 987.2 acres of anticipated surface disturbance and 310.5 acres of permanent disturbance (Table 3-2). It is estimated that some of this disturbance would affect water resources.

Alternative N3 – Black Rock Road Parallel to Kern River Pipeline

Affected Environment

From the Sigurd Substation to Cove Fort, Alternative N3 shares the same alignment with Alternative routes N1 and N2. All water resources in this segment of the alternative route are the same as described above for Alternative N1.

From Cove Fort to the South Black Mountains, Alternative N3 crosses no perennial streams. The alternative route crosses the Beaver River along Link 475, but it is classified as intermittent at that location. One additional named intermittent stream is crossed, Cove Creek, at two locations (Links 320 and 350) and the Low Line Canal is crossed along Link 475. In addition, 29 unnamed intermittent drainages are crossed by this segment of Alternative N3. This segment of the alternative route crosses no shallow groundwater. Four springs (Links 155, 160, 386, and 450) and one well (Link 490) are located within 600 feet of the reference centerline.

Environmental Effects

Residual impacts on water resources associated with Alternative N3 would include no high impacts, no moderate impacts, 15.3 miles of low impacts, and 101.9 miles of no identifiable residual impacts (Volume II, MV-5).

Alternative N3 potentially would affect the same categories of water resources as Alternative N1, with the exception of shallow groundwater, which would not be affected. Impacts on these resources would be similar to those described in Alternative N1. Alternative N3 would result in 979.5 acres of anticipated temporary surface disturbance and 270.6 acres of permanent disturbance (Table 3-2). It is estimated that some of this disturbance would affect water resources.

Alternative N4 – Mineral Mountains to IPP South of Milford Wind Farm

Affected Environment

From the Sigurd Substation to Cove Fort, Alternative N4 shares the same alignment with Alternative routes N1, N2, and N3. All water resources along this segment of the alternative route are the same as described above for Alternative N1.

From Cove Fort to the South Black Mountains, Alternative N4 crosses no perennial streams. The alternative route crosses the Beaver River along Link 386, but it is classified as intermittent at that location. Cove Creek is avoided by Alternative N4. Two additional named intermittent streams are crossed: Mud Spring Wash at Link 160 and The Big Wash at Link 387. Additionally 27 unnamed intermittent drainages are crossed by this segment of Alternative N4. This segment of the alternative route crosses 6.6 miles of area containing shallow groundwater along Links 160, 385, and 386. Four springs (Links 155, 160, 386, and 455) and one well (Link 455) are located within 600 feet of the reference centerline.

Environmental Effects

Residual impacts on water resources associated with Alternative N4 would include no high impacts, no moderate impacts, 20.0 miles of low impacts, and 89.4 miles of no identifiable residual impacts (Volume II, MV-5).

Alternative N4 potentially would affect the same categories of water resources as Alternative N1. Impacts on these resources would be similar to those described in Alternative N1. Alternative N4 would result in 919.6 acres of anticipated temporary surface disturbance and 309.0 acres of permanent disturbance (Table 3-2). It is estimated that some of this disturbance would affect water resources. Alternative N4 would have less anticipated temporary surface disturbance than Alternative routes N1, N2, and N3 and could result in less sedimentation and stormwater discharge to surface water resources than these alternative routes.

Impacts on water resources associated with implementation of the design alternative along Link 75 would be the same.

Alternative N5 – Mineral Mountains Parallel to Kern River Pipeline

Affected Environment

From the Sigurd Substation to Cove Fort, Alternative N5 shares the same alignment with Alternative routes N1, N2, N3, and N4. All water resources in this portion of the alternative route are the same as described above for Alternative N1.

From Cove Fort to the South Black Mountains, Alternative N5 crosses no perennial streams. The alternative route crosses the Beaver River along Link 475, but it is classified as intermittent at that location. Cove Creek is avoided by Alternative N5. One additional named intermittent stream is crossed, Sulphur Creek (Link 75). Additionally 17 unnamed intermittent drainages are crossed by this segment of Alternative N5. This segment of the alternative route crosses no shallow groundwater. Three wells (Links 75, 455, and 490) are located within 600 feet of the reference centerline. All springs are avoided by Alternative N5.

Environmental Effects

Residual impacts on water resources associated with Alternative N5 would include no high impacts, no moderate impacts, 15.8 miles of low impacts, and 90.5 miles of no identifiable residual impacts (Volume II, MV-5).

Alternative N5 potentially would affect the same categories of water resources as Alternative N1, with the exception of shallow groundwater, which would not be affected. Impacts on these resources would be similar to those described in Alternative N1. Alternative N5 would result in 895.8 acres of anticipated temporary surface disturbance and 269.0 acres of permanent disturbance (Table 3-2). It is estimated that some of this disturbance would affect water resources.

Alternative N5 has significantly less anticipated temporary surface disturbance than alternative routes N1, N2, N3, and N4 and could result in less sedimentation and stormwater discharge to surface water resources than these alternatives.

Impacts on water resources associated with implementation of the design alternative along Link 75 would be the same.

Alternative N6 – Mineral Mountains 1,500 Feet East of Kern River Pipeline

Affected Environment

From the Sigurd Substation to Cove Fort, Alternative N6 shares the same alignment with Alternative routes N1, N2, N3, N4, and N5, with the exception that Alternative N6 follows Links 25 and 27 instead of Link 26 (Volume II, MV-5). The water resources are the same as described above for Alternative N1, with the exception that the same canal crossed by Link 26 is now crossed by Link 25, and there is one less unnamed intermittent stream crossed by the alternative route.

From Cove Fort to the South Black Mountains, Alternative N6 crosses no additional perennial streams. The alternative route crosses the Beaver River along Link 475, but it is classified as intermittent at that location. Cove Creek is avoided by Alternative N5. One additional named intermittent stream is crossed, Sulphur Creek (Link 75). Additionally 35 unnamed intermittent drainages, the Low Line Canal (Link 475), and an unnamed canal (Link 395) are crossed by this segment of Alternative N6. This segment of the alternative route crosses no shallow groundwater. Three wells (Links 75, 455, and 490) are located within 600 feet of the reference centerline. All springs are avoided by this segment of Alternative N5.

Environmental Effects

Residual impacts on water resources associated with Alternative N5 would include no high impacts, no moderate impacts, 17.0 miles of low impacts, and 88.5 miles of no identifiable residual impacts (Volume II, MV-5).

Alternative N6 potentially would affect the same categories of water resources as Alternative N1, with the exception of shallow groundwater, which would not be affected. Impacts on these resources would be similar to those described in Alternative N1. Alternative N6 would result in 889.6 acres of anticipated temporary surface disturbance and 329.3 acres of permanent disturbance (Table 3-2). It is estimated that some of this disturbance would affect water resources.

Alternative N6 would be anticipated to result in less temporary surface disturbance and could result in less sedimentation and stormwater discharge to surface water resources than other alternative routes.

Impacts on water resources associated with implementation of the design alternative along Link 75 would be the same.

Southern Area – South Black Mountains to Red Butte Substation

The baseline resource inventory and residual impacts for alternative routes considered in the southern area are presented in Table 3-30.

TABLE 3-30
ALTERNATIVE ROUTE COMPARISON
WATER RESOURCES INVENTORY DATA AND RESIDUAL IMPACTS

Route Alternative	Total Miles	Water (miles)						Residual Impacts (miles [percent])			
		Major River	River Stream	Shallow Groundwater	Springs[1]	Wells[1]	Water Bodies	No Identifiable	Low	Moderate	High
Alternative S1	56.0	1.0	3.6	–	0.1	0.8	–	50.7 [90.5]	4.0 [7.2]	1.2 [2.1]	0.1 [0.2]
Alternative S2 (Environmentally Preferred)	49.6	–	3.6	–	0.6	0.2	0.1	45.4 [91.5]	4.2 [8.5]	–	–
Alternative S3	57.6	–	3.9	–	–	0.2	–	53.5 [92.9]	4.0 [6.9]	–	0.1 [0.2]
Alternative S4	48.9	–	2.8	–	0.2	0.2	–	45.7 [93.5]	3.2 [6.5]	–	–
Alternative S5 (Proponent‘s Proposed Action)	59.0	1.0	4.3	–	0.5	0.8	–	52.7 [89.3]	5.0 [8.5]	1.2 [2.0]	0.1 [0.2]
Alternative S6	61.9	0.2	4.6	–	0.4	–	–	57.0 [92.1]	4.6 [7.4]	0.1 [0.2]	0.2 [0.3]

NOTE:
[1]A 600-foot buffer was placed around each well and spring.

Alternative S1 – Pinto Creek

Affected Environment

Alternative S1 crosses three perennial streams, including Little Pinto Creek (Link 245), two crossings of the Pinto Creek (Links 245, 260), and the Santa Clara River (Link 260). The alternative route also crosses two named intermittent streams, Iron Springs Creek (Link 165) and Mahogany Creek (Link 260), as well as three unnamed intermittent streams and one canal crossing (Link 260). In addition, the alternative route crosses no areas of shallow groundwater. One spring (Link 260) is located within 600 feet of the reference centerline.

Environmental Effects

Residual impacts on water resources associated with Alternative S1 would include 0.1 mile of high impacts, 1.2 miles of moderate impacts, 4.0 miles of low impacts, and 50.7 miles of no identifiable residual impacts (Volume II, MV-5).

Alternative S1 potentially would affect the same categories of water resources as Alternative N1, with the exception of shallow groundwater and wells, which would not be affected. Impacts on these resources would be similar to those described in N1. Alternative S1 would affect water resources and riparian habitats that support species listed as endangered under the ESA, although these impacts are discussed in the Biological Resources section. Alternative S1 would result in 467.2 acres of anticipated temporary

surface disturbance and 192.8 acres of permanent disturbance (Table 3-2). It is estimated that some of this disturbance would affect water resources.

Alternative S2 – IPP West

Affected Environment

Alternative S2 crosses no perennial streams. The alternative route crosses two named intermittent streams, Iron Springs (Link165) and Pinto Creek (Link 221), and 19 unnamed streams. In addition, the alternative route crosses no areas containing shallow groundwater. Three springs are located within 600 feet of the reference centerline along Link 444.

Environmental Effects

Residual impacts on water resources associated with Alternative S2 would include no high impacts, no moderate impacts, 4.2 miles of low impacts, and 45.4 miles of no identifiable residual impacts (Volume II, MV-5).

Alternative S2 potentially would affect the same categories of water resources as Alternative N1, with the exception of perennial surface water and wells, which would not be affected. Impacts on these resources would be similar to those described in Alternative N1. Alternative S2 would result in 418.0 acres of anticipated temporary surface disturbance and 158.1 acres of permanent disturbance (Table 3-2). It is estimated that some of this disturbance would affect water resources.

Alternative S2 has less anticipated temporary surface disturbance than all southern alternative routes except S4 and could result in less sedimentation and stormwater discharge to surface water resources than these alternative routes.

Alternative S3 – Ox Valley

Affected Environment

Alternative S3 crosses one perennial stream, Spring Creek (Link 285). The alternative route also crosses four named intermittent streams, Bull Rush Creek (crossed twice on Link 285), Iron Springs (Link 165), Magotsu (Link 290), and Pinto (Link 290) Creeks, and 29 unnamed intermittent drainages. No springs or wells are located within 600 feet of the reference centerline.

Environmental Effects

Residual impacts on water resources associated with Alternative S3 would include 0.1 mile of high impacts, no moderate impacts, 4.0 miles of low impacts, and 53.5 miles no identifiable residual impacts (Volume II, MV-5).

Alternative S3 potentially would affect the same categories of water resources as Alternative N1, with the exception of springs, wells, and canals, which would not be affected. Impacts on these resources would be similar to those described in Alternative N1. Alternative S3 would result in 479.5 acres of anticipated temporary surface disturbance and 221.4 acres of permanent disturbance (Table 3-2). It is estimated that some of this disturbance would affect water resources.

Alternative S3 has an average amount of anticipated temporary surface disturbance of the southern alternative routes and could result in more sedimentation and stormwater discharge to surface water resources than some other alternative routes.

Alternative S4 – IPP East

Affected Environment

Alternative S4 crosses no perennial streams or shallow groundwater. The alternative route crosses three named intermittent streams, Dan Sill (Link 270), Iron Springs (Link 165), and Pinto (Link 221) Creeks, and 31 unnamed intermittent drainages. One spring is located within 600 feet of the reference centerline along Link 270.

Inventoried Roadless Areas

Approximately 7.5 miles of Alternative S4 passes through the Cove Mountain and Atchinson Mountain IRA. The area was designated an IRA to preserve the quality habitat currently supported there and sustained by the absence of anthropogenic habitat fragmentation caused by mining and timber harvest activities, construction of roads, and construction of houses.

Cove Mountain and Atchinson Mountain are located in two separate watersheds. Cove Mountain is in the Escalante Desert Watershed (HUC 16030006) and Atchinson Mountain is located in the Upper Virgin Watershed (HUC 15010008). Both areas harbor tributaries that support the agricultural and municipal water needs of multiple communities, including the towns of Enterprise, Pinto, Newcastle, and Modena in the Escalante Desert Watershed and the towns of Central, Pine Valley, Gunlock, and Saint George in the Upper Virgin Watershed (USGS 2009a).

Environmental Effects

Residual impacts on water resources associated with Alternative S4 would include no high impacts, no moderate impacts, 3.2 miles of low impacts, and 45.7 miles of no identifiable residual impacts (Volume II, MV-5).

Alternative S4 potentially would affect the same categories of water resources as Alternative N1, with the exception of wells, perennial streams, shallow groundwater, and canals, which would not be affected. Impacts on these resources would be similar to those described in Alternative N1. Alternative S4 would result in 412.6 acres of anticipated temporary surface disturbance and 202.1 acres of permanent disturbance (Table 3-2). Alternative S4 has the least anticipated temporary surface disturbance and could result in less sedimentation and stormwater discharge to surface water resources than other alternative routes.

Impacts on Inventoried Roadless Areas

Temporary and permanent impacts on water resources in the Cove Mountain and Atchinson Mountain IRA are possible. Both watersheds contain state-listed impaired waters. This could prove problematic in that TMDL limits set by the EPA to protect and improve water quality could limit the amount of ground-

disturbing work that can be done in the upper tributaries of these protected waters, if it is assumed this action would have detrimental effects on the downstream impaired waters.

If Alternative S4 is constructed, ground disturbance related to the construction of the transmission line potentially would increase erosion, which could lead to an increased level of TDS being discharged into the impaired water. Clearing the pinyon-juniper forest along the right-of-way would decrease canopy cover. This clearing activity could result in a decrease in shade over tributaries, effectively heating the water, which could be a source of impairment to the State-listed waters.

Alternative S4 crosses 7.5 miles of the western edge of the Cove Mountain and Atchinson IRAs. If appropriate measures are taken during the construction of the transmission line, most effects on State-listed impaired waters, as well as the municipal and agricultural needs of citizens living downstream, can be avoided and/or mitigated to acceptable levels.

Alternative S5 – Iron Springs and Pinto Creek

Affected Environment

Alternative S5 crosses three perennial streams, including Little Pinto (Link 245) and Pinto Creeks (crossed three times along Links 245 and 260) and the Santa Clara River (Link 260). The alternative route also crosses two named intermittent streams, Iron Springs (Link 435) and Mahogany (Link 260) Creeks, and 23 unnamed intermittent drainages. Three springs are located within 600 feet of the reference centerline along Links 260, 430, and 438.

Environmental Effects

Residual impacts on water resources associated with Alternative S5 would include 0.1 mile of high impacts, 1.2 miles of moderate impacts, 5.0 miles of low impacts, and 52.7 miles of no identifiable residual impacts (Volume II, MV-5).

Alternative S5 potentially would affect the same categories of water resources as Alternative N1, with the exception of wells, shallow groundwater, and canals, which would not be affected. Alternative S5 would affect water resources and riparian habitats that support species listed as endangered under the ESA; these impacts are discussed in the Biological Resources section. Alternative S5 would result in 490.2 acres of anticipated temporary surface disturbance and 194.0 acres of permanent disturbance (Table 3-2), which could affect water resources unless mitigated.

Alternative S5 has the second largest anticipated surface disturbance and could result in more sedimentation and stormwater discharge to surface water resources than other alternative routes.

Alternative S6 – Iron Springs and Ox Valley

Affected Environment

Alternative S6 crosses three perennial streams, including Little Pinto (Link 245) and Pinto Creeks (Link 245) and Spring Creek (285). The alternative route also crosses three named intermittent streams, Iron Springs (Link 435), Magotsu (Link 290), and Bull Rush (crossed twice along Link 285) Creeks, and

24 unnamed intermittent drainages. Two springs are located within 600 feet of the reference centerline on Links 430 and 438. No wells are located within 600 feet of the reference centerline.

Environmental Effects

Residual impacts on water resources associated with Alternative S6 would include 0.2 mile of high impacts, 0.1 mile of moderate impacts, 4.6 miles of low impacts, and 57.0 miles no identifiable residual impacts (Volume II, MV-5).

Alternative S6 potentially would affect the same categories of water resources as Alternative N1, with the exception of wells, shallow groundwater, and canals, which would not be affected. Alternative S6 would affect water resources and riparian habitats that support species listed as endangered under the ESA, although these impacts are discussed in the Biological Resources section. Alternative S6 would result in 533.5 acres of anticipated temporary surface disturbance and 225.9 acres of permanent disturbance (Table 3-2), which could affect water resources unless mitigated.

Alternative S6 has the largest anticipated surface disturbance and could result in more sedimentation and stormwater discharge to surface water resources than other southern alternative routes.

3.2.3.5 Summary

Implementation of the Project would likely affect water resources found within the Project area. The construction of access roads, staging areas, work areas, and stream crossings could affect riparian vegetation and could require the placement of fill into wetlands or waters of the United States.

Impacts on water resources vary little by alternative in the northern area of the Project. Alternatives N1 through N6 share very similar attributes, and impacts on water resources would not differ much across these alternatives. From the standpoint of water resource preservation, Alternatives N5 and N6 would have the lowest impact on water resources as these alternatives have the least surface disturbance and the least overall impacts on all water resource types. Alternative N5 would result in slightly more surface disturbance but does not have the potential for impacting shallow groundwater and, thus, would have the least impacts on water resources overall.

In the southern area of the Project, impacts on water resources would vary more among the alternative routes considered. In some cases, such as with Alternatives S1, S3, S5, and S6, impacts on water resources could be substantial. Within these alternatives, the implementation of the Project would require the clearing of habitat that supports an avian species listed under the ESA, as well as the clearing of old grown palustrine forested overstory wetlands, which is considered by USACE and EPA to be an unique and valuable commodity. These alternative routes could require access roads or overland access routes to be located in proximity to state-listed impaired waters and potentially near the Atchinson and Cove Mountain IRAs. Alternative S2 would have the least overall impact on water resources in the southern area of the Project.

3.2.4 Biological Resources

3.2.4.1 Introduction

Issues raised by the public and agencies during Project scoping and preparation of the EIS related to potential effects on biological resources include impacts on special status species and their habitats, raptor and migratory bird nesting habitat, crucial seasonal habitats for big game species, and potential spread and the management of invasive nonnative species.

3.2.4.2 Regulatory Framework

Implementation of the Proposed Action would be consistent with statutes, regulations, plans, programs, and policies of affiliated tribes, federal agencies, and state and local governments.

Federal

- The ESA (16 U.S.C. 1531 - 1544), as amended, provides broad protection for species of fish, wildlife, and plants that are listed as threatened or endangered by the FWS. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. All federal agencies, in consultation with, and with the assistance of, the FWS, also must use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of listed species. All federal agencies, in consultation with, and with the assistance of, the FWS must ensure any action authorized, funded, or carried out by federal agency is not likely to jeopardize the continued existence of an endangered, threatened, or proposed listed species, or result in destruction or adverse modification of a critical habitat of a species. Agencies are required to use the best scientific and commercial data available to fulfill this charge.

- The MBTA (16 U.S.C. 703 - 712) provides it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess any migratory bird, part, nest, egg or product, manufactured or not.

- The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) prohibits the “taking” or possession or any commerce of bald or golden eagles. The definition of “take” includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.

- The FLPMA, as amended, consolidates and articulates BLM's management responsibilities and governs most uses of the federal public lands, including authorization to grant or renew rights-of-way. In accordance with FLPMA, BLM must make land use decisions based on principles of multiple use and sustained yield. As such, a grant of right-of-way must be limited to its necessary use and must contain terms and conditions that reflect BLM's management responsibilities under FLPMA, including minimizing impacts on fish and wildlife habitat.

- The Wild Free-Roaming Horses and Burros Act of 1971 (P.L. 92-195) declares wild free-roaming horses and burrows are living symbols of the historic and pioneer spirit of the West; they contribute to the diversity of life forms within the Nation and enrich the lives of the American people; and these horses and burros are fast disappearing from the American scene. It is the policy of the Congress wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands.

- The National Forest Management Act of 1976 (NFMA), as amended, and its implementing regulations under 36 CFR 219, consolidate and articulate USFS' management responsibilities for lands and resources of the National Forest System. The NFMA requires each national forest develops a management program based on multiple-use, sustained-yield principles, and implement a RMP for each unit of the National Forest System. The NFMA also requires the identification of Management Indicator Species (MIS). The MIS are used to establish forest plan objectives for important wildlife and fish habitats, and to estimate the effects of forest plans and projects on overall forest health.

- The BLM Instruction Memorandum UT-IM-2005-091 provides the Utah BLM Riparian Management Policy aimed at identifying, maintaining, restoring, and/or improving riparian values to achieve a healthy and productive ecological condition for maximum long-term benefits and overall watershed protection while allowing for reasonable resource uses.

- The BLM Instruction Memorandum UT-IM-2010-071 identifies management actions necessary at some sites to ensure environmentally responsible exploration, authorization, leasing, and development of renewable and nonrenewable energy resources within the ranges of the Gunnison sage-grouse and greater sage-grouse.

- BLM Manual 6840 provides BLM's special status species management policy and guidance for the conservation of special status species and their habitats. Under this policy, special status species include animal and plant species that are listed as threatened or endangered, are proposed for listing, or are candidates for listing under the provisions of the ESA; those listed as sensitive species by a State; and those listed by a BLM State Director as sensitive. The objective of this policy is to ensure actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list any special status species, under provisions of the ESA.

- USFS Manual 2670 directs each Regional Forester to designate sensitive species on public lands administered by USFS. Per the manual, sensitive species are defined "as plant or animal species identified by a Regional Forester for which population viability is a concern, as evidenced by a significant current or predicted downward trend in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce an existing distribution of the species."

- Roadless Area Conservation Rule of 2001 establishes prohibitions on road construction, road reconstruction, and timber harvesting in IRAs on National Forest System lands. The intent of this final rule is to provide lasting protection for IRAs within the National Forest System in the context of multiple-use management. Further, Secretary's Memorandum 1042-155 directs the USFS submit all projects located in IRAs to the Secretary of Agriculture for approval prior to a decision on the project.

- E.O. 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, directs federal agencies to take certain actions to further implement the MBTA (16 U.S.C. 703-711). The federal agencies are directed to develop and implement a Memorandum of Understanding with the FWS to promote conservation of migratory bird populations. Forest Service Agreement #08-MU-1113-2400-264 *Memorandum of Understanding Between the U.S. Department of Agriculture Forest Service and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds* identifies specific activities where cooperation between these parties will contribute to the conservation of migratory birds and their habitats. The BLM *Memorandum of Understanding Between the Bureau of Land Management and the U.S. Fish and Wildlife Service to Promote the*

Conservation of Migratory Birds outlines a collaborative approach to promote the conservation of migratory bird populations and is intended to strengthen migratory bird conservation efforts by identifying and implementing strategies to promote conservation and reduce or eliminate adverse impacts on migratory birds through enhanced collaboration between the BLM and the FWS, in coordination with state, tribal, and local governments.

- E.O. 13112 (Invasive Species) requires federal agencies prevent the introduction and spread of invasive species and prohibits their authorization of actions that would be likely to cause or promote the introduction or spread of invasive species.
- E.O. 11990 (Wetlands) requires federal agencies to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out an agency's responsibilities.

State

- Section 23-14-1 of the Utah State Code directs the UDWR to protect, propagate, manage, conserve, and distribute protected wildlife throughout the state. This statute also authorizes UDWR to identify and delineate crucial seasonal wildlife habitats.
- UAC R657-48 directs the UDWR to maintain a Utah Sensitive Species List that identifies plant and animal species (1) that are listed, or candidates for listing, pursuant to the ESA; (2) for which a conservation agreement is in place; or (3) whose population viability is threatened in Utah (i.e., wildlife species of concern).
- Utah Noxious Weed Act (Rule R68-9) officially designates the list of weeds as noxious for the state of Utah, equipment capable of disseminating those weeds, and treatments considered to prevent dissemination of weed seeds or parts of noxious weed plants that could cause new growth by contaminated equipment, as per the authority vested in the Commissioner of Agriculture and Food under Section 4-17-3.
- Utah Partners in Flight Avian Conservation Strategy, Version 2.0 prioritizes avian species and their habitats and sets objectives designed to determine which species are most in need of immediate and continuing conservation effort. The other purpose of the strategy is to recommend appropriate conservation actions required to accomplish stated objectives.
- Utah Comprehensive Wildlife Conservation Strategy directs the integration and implementation of ongoing and planned management actions that will conserve native species and thereby prevent the need for additional listings.
- UDWR Utah Sensitive Species List identifies species for which conservation actions are needed, and timely and appropriate conservation action implemented on their behalf will preclude the need to list these species under the provisions of the federal ESA.

3.2.4.3 Regional Setting

The Project area occurs within the Central Basin and Range Level III Ecoregion, which is characterized by broad desert valleys bordered by narrow, north-south trending mountain ranges (Woods et al. 2001). The Project area encompasses several small mountain ranges, including the Mineral Mountains, Pahvant

Range, Tushar Mountains, Pine Valley Mountains, the Wah Wahs, and Indian Peak Mountain. The western portion of the Project area lies in the Escalante Desert. Elevations in the study corridor range from approximately 5,000 feet above mean sea level (msl) in the northern valleys to over 7,000 feet msl in the southern mountains.

The primary vegetation communities in the study corridor include desert scrub, grassland, and sagebrush communities in lower elevation valleys; pinyon-juniper and mountain shrub communities on mid-elevation slopes; and mixed conifer and aspen at higher elevations. A portion of the study corridor vegetation was burned during wildfires (e.g., the Milford Flat, Dog Valley, and Twitchell wildfires).

Perennial surface waters in the Project area include two reservoirs (Minersville Reservoir and Newcastle Reservoir), three rivers (Sevier River, Beaver River, and Santa Clara River), and numerous small creeks (i.e., Clear Creek, Indian Creek, North Creek, Pinto Creek). Small wetlands and riparian habitats are present throughout the study corridor adjacent to reservoirs and other perennial waters.

Vegetation Communities

A total of 57 land cover categories identified by the Southwest Regional Gap Analysis Project (GAP) occur within the study corridors. For the purposes of this EIS, these categories were consolidated into 15 primary habitat types. In addition, data on recent wildfires (USGS 2009b), and associated data from BLM restoration and reseeding projects and noxious weed survey data (Fletcher 2010) were incorporated into the vegetation data and used to identify burn, post-burn (reseeded), and noxious weed vegetation communities. Primary habitat types are briefly described below and illustrated on MV-6 (Volume II).

Agriculture

Agriculture habitat consists of both irrigated and nonirrigated agricultural lands. This vegetation community occurs in the Sevier River Valley and the Milford-Minersville area.

Aspen

Aspen habitat consists of the GAP Rocky Mountain aspen forest and woodland land cover categories. This community occurs in montane areas and is dominated by quaking aspen (*Populus tremuloides*) with less than 25 percent conifer species component. The distribution of this land cover type is limited by soil moisture and growing season. The understory vegetation generally includes a complex shrub-herb community or a simple herbaceous layer. Primary shrub species include snowberry (*Symphoricarpos* spp.), thimbleberry (*Rubus parviflorus*), Saskatoon serviceberry (*Amerlanchier alnifolia*), and kinnikinnick (*Arctostaphylos uva-ursi*). This vegetation community originates and is maintained by stand-replacing disturbances, such as avalanches, crown fire, insect outbreak, windthrow, and vegetation management practices.

Barren/Sparsely Vegetated

Barren/sparsely vegetated habitat includes the GAP inter-mountain basins playa land cover type and occurs at lower elevations in the Escalante Desert. This community includes barren or sparsely vegetated playas (less than 10 percent plant cover) that are intermittently flooded. Characteristic plant species include inland saltgrass (*Distichlis spicata*), iodinebush (*Allenrolfea occidentalis*), greasewood

(*Sarcobatus vermiculatus*), sickle saltbush (*Atriplex falcata*), pickleweed (*Salicornia europeae*), spiny hopsage (*Grayia spinosa*), and basin wildrye (*Leymus cinereus*).

Big Sagebrush

Big sagebrush habitat consists of the GAP inter-mountain basins big sagebrush shrubland land cover type. This community occurs on well-drained, nonalkaline soils at middle elevations and is dominated by basin big sagebrush (*Artemisia tridentata ssp. tridentata*) and Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*). Typical codominant species include antelope bitterbrush (*Purshia tridentata*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), and rubber rabbitbrush (*Ericameria nauseosa*). Big sagebrush occurs in valleys and foothills throughout the study corridor.

Desert Shrub

Desert shrub consists of the GAP inter-mountain basins greasewood flat and inter-mountain basins mixed salt desert shrub land cover types. These represent open-canopied shrub communities that occur on alkaline soils in desert basins. Greasewood flat is typically dominated by greasewood with saltbush (*Atriplex* spp.), sagebrush (*Artemisia* spp.), and winterfat (*Krascheninnikovia lanata*). Salt desert shrub is typically dominated by one or more species of saltbush, including shadscale saltbush (*Atriplex confertifolia*), fourwing saltbush (*Atriplex canescens*), cattle saltbush (*Atriplex polycarpa*), and spinescale saltbush (*Atriplex spinifera*). Common codominant species include Wyoming big sagebrush, yellow rabbitbrush, rubber rabbitbrush, winterfat, Mormon tea (*Ephedra nevadensis*), and spiny hopsage. Desert shrub occurs in valley bottoms throughout the study corridors, particularly in the Sevier River Valley and the Escalante Desert.

Disturbed

Disturbed lands consist of the GAP developed, medium high intensity and developed, open space-low intensity land cover types. This vegetation community includes areas in which native vegetation communities have been altered or eliminated as a result of urban land development and construction of roadway infrastructure. Disturbed lands occur throughout the study corridors.

Grassland

Grassland habitat consists of the GAP southern Rocky Mountain montane-subalpine grassland land cover type. This vegetation community typically occurs on flat to gently rolling topography at higher elevations. This habitat often consists of a mosaic of several plant associations with a dominant bunch grass, such as an oatgrass (e.g., *Danthonia intermedia* and *Danthonia parryi*), fescue (e.g., *Festuca idahoensis*, *F. arizonica*, and *F. thurberi*), or slimstem muhly (*Muhlenbergia filiculmis*).

Invasive

The invasive vegetation community consists of the GAP invasive annual and biennial forbland, invasive annual grassland, and invasive perennial grassland land cover types. This habitat is dominated by invasive non-native species, including cheatgrass (*Bromus tectorum*), halogeton (*Halogeton glomeratus*), and Russian thistle (*Salsola* spp.). Invasive habitats occur throughout the study corridors.

Noxious Weed

The Utah Noxious Weed Act defines noxious weeds as ―any plant the commissioner determines to be especially injurious to public health, crops, livestock, land, or other property" (Utah State Code Annotated §4-17-2). The State of Utah currently classifies 27 plant species as noxious weeds (Belliston et al. 2009). Numerous invasive non-native species have been documented in one or more of the counties in the Project area (Table 3-31). Although not prevalent, several noxious weeds (e.g., Scotch thistle) do occur in the study corridor.

Noxious weed mapping has been completed in the Cedar City Field Office portion of the project area. The vegetation community is based on this recent mapping (Fletcher 2010). Noxious weed mapping has not been provided by the Fillmore Field Office. Noxious weed species mapped include black henbane (*Hyoscyamus niger*), broadleaf pepperweed (*Cardaria latifolia*), bull thistle (*Cirsium vulgare*), diffuse knapweed (*Acosta diffusa*), musk thistle (*Carduus nutans*), scotch thistle (*Onopordum acanthium*), spotted knapweed (*Centaurea maculosa*), and white horehound (*Marrubium vulgare*).

TABLE 3-31
NOXIOUS WEED SPECIES IN THE PROJECT AREA

Common Name	Scientific Name	Common Name	Scientific Name
Black henbane	*Hyoscyamus niger*	Hoary cress	*Cardaria draba*
Diffuse knapweed	*Centaurea diffusa*	Musk thistle	*Carduus nutans*
Johnsongrass	*Sorghum halepense*	Perennial pepperweed	*Lepidium latifolium*
Leafy spurge	*Euphorbia esula*	Poison hemlock	*Conium maculatum*
Purple loosestrife	*Lythrum salicaria*	Russian knapweed	*Centaurea repens*
Spotted knapweed	*Centaurea maculosa*	Scotch thistle	*Onopordum acanthium*
Sulphur cinquefoil	*Potentilla recta*	Squarrose knapweed	*Centaurea virgata*
Yellow starthistle	*Centaurea solstitalis*	Canada thistle	*Circium arvense*
Yellow toadflax	*Linaria vulgaris*	Field bindweed	*Convolvulus arvensis*
Bermudagrass[1]	*Cynodon dactylon*	Houndstongue	*Cynoglossum officinale*
Dalmatian toadflax	*Linaria genistifolia*	Quackgrass	*Elytrigia repens*
Dyers wood	*Isatis tinctoria*	Saltcedar	*Tamarix ramosissima*

SOURCE: USDA 2009
NOTE:
[1]Not subject to provision of the Utah Noxious Weed Act in Washington County.

Mountain Shrub

Mountain shrub consists of the GAP mogollan chaparral and Rocky Mountain Gambel oak-mixed montane shrubland land cover types. Mogollan chaparral is associated with xeric, coarse-textured substrates on foothills and mountain slopes. Dominant species include shrub live oak (*Quercus turbinella*), Toumey oak (*Quercus toumeyi*), mountain mahogany (*Cercocarpus montanus*), desert *ceanothus (Ceanothus greggii),* and Stansbury cliffrose (*Purshia stansburiana*). This community occurs in the Bull Valley Mountains northwest of the Red Butte Substation. Gambel oak-mixed montane shrubland occurs on more mesic habitats. Vegetation is dominated by Gambel oak (*Quercus gambelii*) alone or codominant with antelope bitterbrush, serviceberry (*Amelanchier* spp.), and chokecherry (*Prunus virginiana*). This community occurs on mid-elevation slopes in the Tushar Mountains, Mineral Mountains, and Bull Valley Mountains.

Pinyon-Juniper

Pinyon-Juniper vegetation community consists of the GAP Colorado plateau pinyon-juniper woodland, Great Basin pinyon-juniper woodland, and recently chained pinyon-juniper land cover types. These communities occur on dry, mid-elevation foothills and mountain slopes. Utah juniper (*Juniperus osteosperma*) and pinyon pine *(Pinus monophylla* and *P. edulis*) represent the dominant tree species. Common understory species include greenleaf manzanita (*Arctostaphylos patula*), bitterbrush, sagebrush (*Artemisia* spp.), mountain mahogany (*Cercocarpus intricatus* and *C. montanus*), oaks (*Quercus* spp.), Stansbury‘s cliffrose, and various grasses. Pinyon-juniper vegetation communities occur throughout the study corridors.

Ponderosa pine

This vegetation community occurs on a wide variety of slopes and aspects commonly with moderate to steep slopes, rocky areas with good soil aeration and drainage, and periods of drought during the growing season. Ponderosa pine (*Pinus ponderosa*) is the predominant conifer with juniper (*Juniperus* spp.) often present in the tree canopy. The understory is usually shrubby, dominated by sagebrush and Gambel oak. Muhlygrasses (*Muhlenbergia* spp.), and blue grama (*Bouteloua gracilis*) are common grasses. Ponderosa pine occurs within the Project area, but does not occur within the study corridors.

Shrub Steppe

Shrub steppe habitat consists of the GAP Colorado plateau mixed low sagebrush shrubland, Great Basin xeric mixed sagebrush shrubland, inter-mountain basins montane sagebrush steppe, and inter-mountain basins semi-desert shrub steppe land cover types. These communities occur on relatively xeric sites with shallow, rocky, nonsaline soils. While specific species composition varies, common dominant shrub species include sagebrush (*Artemisia nova*, *A. arbuscula*, and *A. bigelovii*), rabbitbrush, Mormon tea, broom snakeweed (*Gutierrezia sarothrae*) and semi-arid grasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*), Indian ricegrass (*Achnatherum hymenoides*), desert needlegrass (*Achnatherum speciosum*), bluegrasses (*Poa fendleriana* and *Poa secunda*), blue grama, and needle and thread (*Hesperostipa comata*). This vegetation community occurs at middle elevations throughout the study corridors.

Riparian

Riparian areas consist of stream channel and vegetated banks with woody overstory vegetation. Riparian habitats typically are associated with the perennial and intermittent drainages listed in Table 3-29. Within the Project area, the majority of this habitat includes Pinto and Little Pinto Creeks, the Beaver, Sevier, and Santa Clara Rivers and their associated reservoirs and tributaries. These riparian corridors support palustrine emergent (PEM), palustrine scrub/shrub (PSS), or palustrine forested overstory (PFO) vegetation.

Wildfire-affected Areas/Reseeded through Emergency Stabilization and Rehabilitation Efforts

This vegetation community is based upon recent wildfire mapping obtained from the Geospatial Multi-Agency Coordination Group (USGS 2009b). The majority of wildfires are re-vegetated to some degree following the Emergency Stabilization and Rehabilitation Efforts. A diverse seed mix, including native

and non-native species, were planted and support herbaceous vegetation, including globe mallow (*Sphaeralcea coccinea*), Indian ricegrass (*Achnatherum hymenoides*), forage Kochia (*Kochia prostrata*), tall wheatgrass (*Agropyron elongatum*), crested wheatgrass (*Agropyron cristatum*), small burnett (*Sanguisorba minor*), alfalfa (*Medicago sativa*), intermediate wheatgrass (*Thinopyrum intermedium*), bluebunch wheatgrass (*Pseudoroegneria spicata*), western wheatgrass (*Pascopyrum smithii*), thickspike wheatgrass (*Elymus lanceolatus* ssp *lanceolatus*), sandberg bluegrass (*Poa secunda*), mountain brome (Bromus marginatus), palmer penstemon (*Penstemon palmeri*), sainfoin (*Onobrychis sativa*), Lewis flax (*Linum lewisii*), Wyoming sagebrush (*Artemisia tridentata* spp. *wyomingensis*), Mountain sagebrush (*Artemisia tridentata*), and Fourwing saltbush (*Atriplex canescens*).

Wildlife

The existing wildlife habitats within the Project area exhibit some fragmentation from roadway development, utility rights-of-way, livestock grazing practices, and wildland fire. However, large blocks of contiguous habitat occur throughout the Project area. Wildlife populations in the vicinity of the existing utility rights-of-way and roadway facilities are likely to have already experienced many of the population changes typically associated with habitat fragmentation (e.g., reduced carrying capacity, lower reproductive success, and higher susceptibility to predation, and reduced mobility within home ranges). Although limited in extent, open-water and riparian habitat in the Project area provides habitat for fishes, amphibians, avian, and mammal species. Although they are limited in size and abundance and widely dispersed in the Project area, these habitat patches provide links within a long network of similar patches along the Beaver, Sevier, and Santa Clara River watersheds.

Fish and Aquatic Invertebrates

A variety of fish and aquatic species are known to occur in the Project area (Table D-4, Appendix D). Bonneville cutthroat trout (*Oncorhynchus clarki Utah*), brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), southern leatherside chub (*Gila copei*), mountain sucker (*Catostomus platyrhynchus*), and speckled dace (*Rhinichthys osculus*) are known to occur in the Fishlake National Forest. Bonneville cutthroat trout, a USFS sensitive and Conservation Agreement species, occurs in Birch Creek. Bonneville cutthroat trout also occurs in Pine Creek and Sam Stowe Creek, but these creeks are located outside of the study corridors. Newcastle Reservoir contains golden shiner (*Notemigonus crysoleucas*), smallmouth bass (*Micropterus dolomieu*), rainbow trout (*Oncorhynchus mykiss*), wipers (*Morone* spp.), and green sunfish (*Lepomis cyanellus*). Little Pinto Creek and Pinto Creek, tributaries to Newcastle Reservoir, also contain aquatic species such as golden shiners (*Notemigonus crysoleucas*), speckled dace (*Rhinichthys osculus*), and rainbow trout (*Oncorhynchus mykiss*). Additionally, the Santa Clara River contains brown trout and potentially the desert sucker (*Catostomus clarkii*). Caddis fly, mayflies, odonates, and chironomids are known to occur in the open-water habitats within the Project area.

Amphibians and Reptiles

A total of 8 amphibian and 25 reptile species (Table D-4, Appendix D) are known or likely to occur in the Project area based on observations during recent surveys, review of available literature, Utah Natural Heritage Program (UNHP) (2009), and UDWR habitat models (UDWR 2009b). Reptile species inhabit a variety of terrestrial and riparian vegetation communities, while amphibian species require aquatic and semi-aquatic habitats for breeding and often utilize adjacent terrestrial habitats during nonbreeding periods. Amphibians likely to occur in the Project area include the northern leopard frog (*Rana pipiens*)

on the Fishlake National Forest, Arizona toad (*Bufo microscaphus*), spotted toad (*Bufo punctatus*), Woodhouse's toad (*Bufo woodhousii*), canyon tree frog (*Hyla arenicolor*), and the Great Basin spadefoot toad (*Spea intermontana*) on the Dixie National Forest. The most frequently observed reptiles observed during surveys conducted for other wildlife species for the Project and previous biology surveys included the common sagebrush lizard (*Sceloporus graciosus*), long-nosed leopard lizard (*Gambelia wislizenii*), common side blotch lizard (*Uta stansburiana*), greater short-horned lizard (*Phrynosoma hernandesi*), western fence lizard (*Sceloporus occidentalis*), gophersnake (*Pituophis catenifer*), desert striped whipsnake (*Masticophis taeniatus taeniatus*), and great basin rattlesnake (*Crotalus oreganus lutosus*).

Birds

A combined list of 90 bird species are known or likely to occur in the Project area based on observations during recent surveys, review of available literature, UNHP (2009) data, and UDWR habitat models (UDWR 2009b) (Tables E-2 and E-3, Appendix D). The vegetation communities in the Project area support a diversity of avian species, including passerines, upland game birds, and raptors. Passerine species expected to occur in the Project area include members of guilds that occupy big sagebrush, riparian, desert shrub, pinyon-juniper, shrub steppe, and mountain shrub communities. Limited aquatic and wetland habitats within the Project area limit the presence of waterfowl and shorebird species, although transient individuals may occasionally occur. Species listed, or candidates for listing, under the ESA, or designated as sensitive by the BLM, USFS, or UDWR are discussed in the special status species section.

Passerines and Aquatic Birds

The most commonly observed passerines during surveys conducted for other wildlife species for the Project and previous biology surveys within the study corridor included the horned lark (*Eremophila alpestris*), sage sparrow (*Amphispiza belli*), black-chinned sparrow (*Spizella atrogularis*), and western meadowlark (*Sturnella neglecta*). Other avian species potentially occurring in the study corridor include vesper sparrow (*Pooecetes gramineus*), lark sparrow (*Chondestes grammacus*), chipping sparrow (*Spizella atrogularis*), sage thrasher (*Oreoscoptes montanus*), loggerhead shrike (*Lanius ludovicianus*), and common raven (*Corvus corax*). As pinyon-juniper habitats are widespread throughout the Project area, avian species associated with this vegetation community, such as ash-throated flycatcher (*Myiarchus cinerascens*), black-throated gray warbler (*Dendroica nigrescens*), gray flycatcher (*Empidonax wrightii*), and juniper titmouse (*Baeolophus ridgwayi*), are also likely to occur. Aquatic bird species associated with reservoirs occurring in the Project area include great blue heron (*Andea herodias*), spotted sandpiper (*Actitis macularius*), and American coot (*Fulica americana*). Riparian species occurring within the study corridor include yellow warbler (*Dendroica petechia*), black-crowned night-heron (*Nycticorax nycticorax*), and yellow-breasted chat (*Icteria virens*). The Southwestern willow flycatcher (*Empidonax traillii extimus*) is an endangered species of riparian habitats known to occur within the study corridors.

Upland Game Birds

Several native upland game bird species are likely to occur in the study corridors, including wild turkey (*Meleagris gallopavo*), blue grouse (*Dendragapus obscures*), band-tailed pigeon (*Patagioenas fasciata*), Gambel's quail (*Callipepla gambelii*), and greater sage-grouse. Sagebrush habitats in the Milford, Minersville, and Horse Valleys and the Mud Springs Bench have been classified as crucial brood habitat for the greater sage-grouse (UDWR 2007b). This species has been designated as a federal candidate species, and is a BLM, State of Utah, and USFS sensitive species. A detailed discussion of the

greater sage-grouse is presented in the special status species section. Introduced game birds in the study corridors include chukar (*Alectoris chukar*) and ring-necked pheasant (*Phasianus colchicus*).

Raptors

A variety of raptor species are known or likely to occur in the study corridors based upon observations during recent surveys, review of available literature, UNHP (2009) data, and UDWR habitat models (UDWR 2009b) (Table D-3, Appendix D). Common raptors include American kestrel (*Falco sparverius*), burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), northern harrier (*Circus cyaneus*), prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), golden eagles, and Swainson's hawk (*Buteo swainsoni*). Bald eagles are also commonly observed throughout the study corridor during winter months (UNHP 2009). The study corridor bisects areas of high raptor quality. Active nest surveys were not completed to support preparation of the EIS, but would be conducted on the selected route prior to construction.

The burrowing owl and ferruginous hawk are designated as a Utah BLM sensitive species. The bald eagle is designated as a Utah BLM sensitive species and USFS sensitive species; these species are discussed in the special status species section.

Mammals

A variety of mammal species that inhabit grassland, riparian, desert shrub, sagebrush, and pinyon-juniper vegetation communities are known or likely to occur in the study corridors. Mammal species known or likely to occur in the study corridor are listed in Table D-1 of Appendix D and briefly described below.

Mammal species likely to occur in the study corridors include several bat species, as well as other species representative of the vegetation communities and land cover types identified in the Project area, including black-tailed jackrabbit (*Lepus californicus*), cottontail (*Sylvilagus* sp.), kangaroo rat (*Dipodomys* sp.), and white-tailed antelope squirrel (*Ammospermophilus leucurus*). The study corridor contains potential foraging habitat for bat species. Ten bat species were identified in the general Project vicinity in previous wildlife surveys (BLM 2008b), including Brazilian free-tailed bat (*Tadarida brasiliensis*), western small-footed myotis (*Myotis ciliolabrum*), little brown myotis (*Myotis lucifugus*), and hoary bat (*Lasiurus cinereus*). There are no known roosts or hibernacula located within the study corridors; however, a known hibernaculum for the Townsend‘s big-eared bat is located near the community of Enterprise. Individuals from this hibernaculum may forage in the study corridor (UNHP 2009). The Utah prairie dog (*Cynomys parvidens*) is a threatened species and the pygmy rabbit is a sensitive species known or likely to occur in the study corridor. These species are discussed in the special status species section.

Carnivorous mammal species likely to occur in the study corridor include badger (*Taxidea taxus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and mountain lion (*Puma concolor*). The kit fox is a special status species known to occur in the study corridors and is discussed in the special status species section.

Big Game

Big game species known to occur in the study corridor include pronghorn, mule deer, and elk. Designated crucial seasonal habitats occur in the study corridors for all three species (UDWR 2009).

Pronghorn are common year-round residents in the valleys in the Project area. Most of the lower elevation habitats between Cove Fort and Cedar City are designated as crucial year-long pronghorn habitat (UDWR 2009b).

Mule deer occupy foothill and montane habitats. The study corridor contains several important seasonal habitats, including crucial winter range, crucial summer range, and crucial year-long range (UDWR 2009b). Crucial winter range for mule deer is widely distributed throughout the Project area with the exception of the Escalante Desert and lower elevations between the Black Mountains and Antelope Range. Crucial summer range occurs in higher elevations along the Interstate 70 (I-70) corridor through the Tushar Mountains and in the Bull Valley Mountains between the communities of Central and Enterprise, Utah. Crucial winter and summer ranges also have been designated as fawning habitat for mule deer. Crucial mule deer year-long range occurs in the vicinity of the Red Butte Substation.

The study corridors also contain crucial elk habitats, including crucial winter range, crucial summer range, and crucial year-long ranges (UDWR 2009b). Crucial elk summer range and calving habitat occurs along the I-70 corridor through the Tushar Mountains. Crucial elk winter range is located along the western foothills of the Tushar Mountains generally between Cove Fort and the Beaver area. Crucial elk year-long range is located west of the Interstate 15 (I-15) corridor generally between Cove Fort and the Milford area.

Special Status Species

A preliminary list of special status species potentially occurring within the study corridor was developed based on (1) county-level lists for federally threatened, endangered, proposed, and candidate species, (FWS 2009), as well as Utah Sensitive species (UDWR 2007a); (2) Utah BLM sensitive plant species list (BLM 2002); (3) the USFS Region 4 list of sensitive species (USFS 2010); and (4) MIS lists for the Dixie and Fishlake National Forests (USFS 1986a, 1986b). Based upon these lists, 172 special status species could potentially occur in the study corridor (Table D-6, Appendix D). These include 18 federally listed species, 154 Utah BLM sensitive species, and 15 USFS sensitive species. Species accounts, including habitat requirements, known distribution, recent and historical observations, and the likelihood of occurrence in the study corridor, were prepared and are presented in Appendix D for those species that may occur, are likely to occur, or are known to occur in the study corridors.

Based upon an assessment of known species distributions and habitats in the Project area, it was determined 58 special status species are likely to occur in the study corridor. These species are listed in Table 3-32 and are briefly summarized below. Full species accounts are presented in Appendix D.

TABLE 3-32
SPECIAL STATUS SPECIES POTENTIALLY OCCURRING IN THE STUDY CORRIDORS

Common Name	Scientific Name	Status[1]	Likelihood of Occurrence[2]
Plants			
Basalt milkvetch	*Astragalus subcinereus var. basalticus*	BLM	May occur
Elsinore buckwheat	*Eriogonum ostlundii*	USFS	Known to occur
Franklin's penstemon	*Penstemon franklinii*	BLM	May occur
Greenwood's goldenbush	*Haplopappus lignumviridis*	BLM	May occur
Pinyon penstemon	*Penstemon pinorum*	BLM, USFS	Known to occur
Sevier townsendia	*Townsendia jonesii var. lutea*	USFS	Likely to occur
Utah phacelia	*Phacelia utahensis*	BLM	Known to occur
Ward beardtongue	*Penstemon wardii*	USFS	Known to occur

TABLE 3-32
SPECIAL STATUS SPECIES POTENTIALLY OCCURRING IN THE STUDY CORRIDORS

Common Name	Scientific Name	Status[1]	Likelihood of Occurrence[2]
Fish			
Bonneville cutthroat trout	*Oncorhynchus clarki utah*	BLM, UT, USFS, CAS	Known to occur
Brown trout	*Salmo trutta*	MIS	Known to occur
Cutthroat trout	*Oncorhynchus clarki*	MIS	Known to occur
Desert sucker	*Catstomus clarkia*	BLM, UT	Known to occur
Rainbow trout	*Oncorhynchus mykiss*	MIS	Known to occur
Southern leatherside chub	*Lepidomeda aliciae*	BLM, USFS, CAS	Likely to occur
Amphibians			
Arizona toad	*Bufo microscaphus*	BLM	Likely to occur
Western toad	*Bufo boreas*	BLM	May occur
Birds			
American white pelican	*Pelecanus erythrorhynchos*	BLM	Not known to breed in study corridor, but suitable habitat is present; foraging habitat and incidental migrants known to occur
Bald eagle	*Haliaeetus leucocephalus*	BLM, USFS	No breeding habitat; known to forage and winter roost
Black swift	*Cypseloides niger*	BLM	No breeding habitat; incidental migrants may occur
Bobolink	*Dolichonyx oryzivorus*	BLM	No breeding habitat; incidental migrants may occur
Brewer‘s sparrow	*Spizella breweri*	MIS	Likely to breed and forage
Burrowing owl	*Athene cunicularia*	BLM	Known to breed and forage
California condor	*Gymnogyps californianus*	FWS E, FWS X	No breeding habitat; foraging may occur
Ferruginous hawk	*Buteo regalis*	BLM	Known to breed and forage
Flammulated owl	*Otus flammeoulus*	USFS	No breeding habitat; foraging may occur
Greater sage-grouse	*Centrocercus urophasianus*	FWS C, BLM, USFS	Known to breed and forage
Hairy woodpecker	*Picoides villosus*	MIS	Likely to breed and forage
Lewis's woodpecker	*Melanerpes lewis*	BLM	No breeding habitat; foraging may occur
Lincoln‘s sparrow	*Melospiza lincolnii*	MIS	No breeding habitat; foraging likely to occur
Long-billed curlew	*Numenius americanus*	BLM	Known to breed and forage
Macgillivray‘s warbler	*Oporornis tolmiei*	MIS	No breeding habitat; foraging may occur
Mexican spotted owl	*Strix occidentalis lucida*	FWS T	No breeding or foraging habitat; transients may occur
Mountain bluebird	*Sialia currucoides*	MIS	Likely to breed and forage
Northern flicker	*Colaptes auratus*	MIS	Known to breed and forage
Northern goshawk	*Accipiter gentilis*	BLM, USFS	Likely to breed and forage
Peregrine falcon	*Falco peregrinus anatum*	USFS	Likely to breed and forage
Sage thrasher	*Oreoscoptes montanus*	MIS	Likely to breed and forage
Short-eared owl	*Asio flammeius*	BLM	Likely to breed and forage

TABLE 3-32
SPECIAL STATUS SPECIES POTENTIALLY OCCURRING IN THE STUDY CORRIDORS

Common Name	Scientific Name	Status[1]	Likelihood of Occurrence[2]
Song sparrow	*Melospiza melodia*	MIS	Likely to breed and forage
Southwestern willow flycatcher	*Empidonax traillii extimus*	FWS E	Known to breed and forage
Three-toed woodpecker	*Picoides tridactylus*	BLM, USFS	No breeding habitat; foraging may occur
Vesper sparrow	*Pooecetes gramineus*	MIS	Likely to breed and forage
Western bluebird	*Sialia mexicana*	MIS	Likely to breed and forage
Wild turkey	*Meleagris gallopavo*	MIS	Likely to breed and forage
Yellow warbler	*Dendroica petechia*	MIS	Known to breed and forage
Yellow-billed cuckoo	*Coccyzus americanus*	FWS C, USFS	No breeding or foraging habitat; incidental migrants may occur
Mammals			
Allen's big-eared bat	*Idionycteris phyllotis*	BLM	No breeding or roosting habitat; foraging may occur
Big free-tailed bat	*Nyctinomops macrotis*	BLM	No breeding or roosting habitat; foraging may occur
Dark kangaroo mouse	*Microdipodops megacephalus*	BLM	Likely to breed and forage
Fringed myotis	*Myotis thysanodes*	BLM	No breeding or roosting habitat; foraging may occur
Kit fox	*Vulpes macrotis*	BLM	Known to breed and forage
Mule deer	*Odocoileus hemionus*	MIS	Known to breed and forage
Pygmy rabbit	*Brachylagus idahoensis*	BLM, USFS	May breed and forage
Rocky Mountain elk	*Cervus canadensis*	MIS	Known to breed and forage
Spotted bat	*Euderma maculatum*	BLM, USFS	No breeding or roosting habitat; foraging may occur
Townsend's big-eared bat	*Corynorhinus townsendii*	BLM, USFS	No breeding or roosting habitat; foraging may occur
Utah prairie dog	*Cynomys parvidens*	FWS T	Known to breed and forage
Western red bat	*Lasiurus blossevillii*	BLM	No breeding or roosting habitat; foraging may occur

NOTES:
[1] FWS E = federal endangered
FWS T = federal threatened
FWS C = federal candidate
FWS X = federal nonessential/experimental
BLM = Animal species designated as sensitive by the state of Utah and Utah BLM and plant species designated as sensitive by Utah BLM
USFS = Species designated as sensitive by USFS Intermountain Region
CAS = Conservation Agreement Species
MIS = Management indicator species for the Dixie and Fishlake National Forests
[2] Probability of species occurrence within the study corridor based upon habitat requirements, distribution, and documented occurrences.

Federally Listed Species

Two federally listed endangered species (California Condor and Southwestern willow flycatcher), two federally listed threatened (Mexican spotted owl and Utah prairie dog), and two federal-candidate species (greater sage-grouse and yellow-billed cuckoo) have the potential to occur within the study corridors (Table 3-32). There are no designated critical habitats for these species within, or adjacent to, the study

corridor. One active Utah prairie dog colony, two known sage-grouse leks, and suitable breeding habitat for the Southwestern willow flycatcher are located within the study corridor. California condor, yellow-billed cuckoo, or Mexican spotted owl may occasionally occur in the study corridor during seasonal migrations or movements, but no designated critical habitat or suitable breeding habitat for these species occurs in the study corridor.

BLM and USFS Sensitive Species

There are 52 species listed as sensitive by either Utah BLM, the state of Utah, or USFS with the potential to occur within the study corridors (Table 3-32). No suitable breeding or nesting habitat occurs in the study corridors for ten of these bird species although they may occur in the study corridors during seasonal migrations or movements. The sensitive bat species included in the list may forage within the Project area, and there is one known hibernacula for Townsend‘s big-eared bat near Enterprise (UNHP 2009). The kit fox and pygmy rabbit are known to occur in suitable habitats within the Project area. The Bonneville cutthroat trout occurs in Birch Creek, Pine Creek, and Sam Stowe Creek and is approved for reintroduction into Shingle Creek and Fish Creek. Fish Creek is also designated a wild and scenic river.

Management Indicator Species

Management indicator species (MIS) are designated by each of the Forests (i.e., Dixie and Fishlake National Forests) as indicators of the forest health. Through monitoring the populations and habitat relationships of MIS species, the effects of management activities on invertebrates, fish, plants, and wildlife species can be evaluated. MIS are selected based on five criteria (1) a strong affinity for a vegetative type, but not exclusive; (2) a life cycle keyed to a vegetative type; (3) sensitivity to habitat change; (4) relative ease of monitoring; and (5) somewhat representative of other species that use the same vegetation types.

There are 21 species and the aquatic invertebrate group designated as MIS by the Dixie and Fishlake National Forests. Within the study corridors, 15 MIS are likely or known to occur, 3 MIS may occur in the study corridor, and 4 MIS occur within the Project area, but do not occur within the study corridor (Table 3-32).

Wild Horses and Burros

No documented wild burros occur in the study corridor (Fletcher 2010). Wild horses documented in the study corridor are managed by BLM within the Chloride Canyon Herd Management Area (HMA). The HMA includes 44,285 acres in the southern part of the Project area. The HMA is centered on the Antelope Range north of Highway 56. BLM data from 2007 indicated an Appropriate Management Level for the Chloride Canyon herd of 30 horses. Currently, there is an estimated population of 59 horses within the HMA.

3.2.4.4 Study Methodology

Inventory

Preliminary biological resource data were collected for the entire Project area. For the purposes of evaluating Project-related impacts on biological resources, more detailed information was collected

within a 2-mile-wide study corridor (i.e., 1 mile on either side of the reference centerline) for each alternative route. General data categories included vegetation and wildlife, including special status plant and wildlife species and big game.

Vegetation Communities

As described in Section 3.2.4.3, the classification of vegetation communities and land cover types in the study corridor was based on GIS data obtained from GAP (Lowry et al. 2005). GAP data were supplemented with data collected from the BLM on inventoried noxious weed locations for the Cedar City Field Office portion of the Project area (Fletcher 2010) and location and perimeters of wildfires occurring between 2001 and 2008 (USGS 2009).

Wildlife

Information on special status species was obtained from a variety of sources, including UDWR (Sutter et al. 2005; UDWR 2007a; UDWR 2009b), FWS (FWS 2009; FWS 2010; Sogge et al. 1997), federal land management plans (Section 1.5.1.3), and previous surveys (e.g., conducted to support the Milford Wind Farm EA). Of the wildlife species mentioned in Section 3.2.4.3, a few wildlife groups were considered to be potentially sensitive to impacts from implementation of the Project and are addressed in the EIS, including raptors, big game, and wild horses and burros.

Raptors

Raptor data identifying high, medium, and low quality areas were obtained from the UDWR (2010). Low quality areas include mostly low and sparse vegetation for nesting, sparse prey, and areas with existing disturbances. Medium quality areas include areas with many documented observations in previously disturbed areas and evidence of nesting, as well as the presence of cliff nesters. High quality areas include forested or riparian areas that are mostly undisturbed with evidence of tree nesting and roosts, cliff nesting with high prey availability, and diverse species representation.

Big game

Data for the crucial habitats (i.e., summer, winter, and year-long ranges) were obtained from UDWR (2008) for elk, mule deer, and pronghorn. Crucial habitats are those ranges on which the local population depends for survival because no alternative range or habitat is available due to climate conditions or other limiting factors. Because crucial habitats are essential to the life history of the species, degradation or the unavailability of crucial habitat could lead to significant decline in populations. Inventory data for crucial habitats (UDWR 2008), including summer, winter, and year-long ranges, were obtained and analyzed in the EIS to determine potential impacts on big game species.

Special Status Species

Federally listed, BLM, and USFS Sensitive

Locality data for special status plant and wildlife species were obtained from the UNHP (UNHP 2009). Additionally, to support consultation with the FWS under Section 7(a)(2) of the ESA, biological surveys were conducted in the spring and summer of 2010 for the federally listed threatened, endangered, and

candidate species with the potential to occur in the study corridor for all alternative routes, including the Utah prairie dog, greater sage-grouse, and Southwestern willow flycatcher. In addition, to be consistent with the Sage-grouse Key Habitat/Core Area Strategies within Wyoming and Idaho, a Project Impact Analysis Area (PIAA) delineation and disturbance density will be calculated for each of the alternatives to evaluate impacts on the species. At the time of the Draft EIS, Utah had not yet determined core areas, which are necessary for the calculation. It is anticipated Utah will designate these areas between the draft and final stages. At this time, a four-step approach will be taken to evaluate impacts, including (1) determining affected leks (2) determining PIAA size and configuration, (3) calculating the density of disturbance and habitat assessment within the PIAA, and (4) determination of existing and allowable suitable habitat disturbance. Surveys for BLM and USFS sensitive species are scheduled to be performed in the spring and summer of 2011.

Management Indicator Species

Information on MIS was primarily obtained from the *Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Fishlake and Dixie National Forests* (Rodrigues 2006, 2008). Additional locality data for wildlife species were obtained from the UNHP (2009) and UDWR (2008).

Wild Horses and Burros

Wild horse and burro data were obtained from the wild horse and burro program within the BLM Utah State Office (BLM 2004). Data collected depict the management units that occur within wild horse herd areas throughout Utah.

Impact Assessment and Mitigation Planning

The methodology for assessing the potential impacts on biological resources associated with implementing the Project generally included (in order) (1) identifying the types of potential effects on which of the biological resources that could result from construction, operation, and maintenance of the proposed transmission line and associated facilities; (2) classifying the relative sensitivity of vegetation communities and sensitive habitats to potential environmental effects; (3) developing criteria for assessing the intensity of a potential effect on a biological resource; (4) assessing the initial impacts on the biological resources; (5) identifying the appropriate mitigation measures (Table 2-7) for minimizing potential adverse effects; (6) determining specific areas where mitigation measures should be applied; and (7) disclosing potential residual impacts on biological resources.

Types of Potential Environmental Effects

The construction, operation, and maintenance of the Project would result in both direct and indirect adverse effects on biological resources. Direct effects associated with construction activities could include the following:

- Behavioral disturbance and displacement of wildlife within, and adjacent to, the right-of-way during construction (temporary)
- Loss and fragmentation of wildlife habitat associated with clearing and grading for access roads, transmission structures, and substations (permanent)

- Potential habitat effects within aquatic habitat (e.g., sedimentation from road construction) (temporary)
- Increased potential for the establishment and spread of noxious weeds in disturbed areas (permanent)
- Long-term displacement of individual animals from the right-of-way due to habitat loss and fragmentation (permanent)
- Potential for mortality for wildlife species with limited mobility or that occupy burrows or nests in work areas (temporary)
- Potential for the spread of noxious weeds and initiation of human-caused wildfires (temporary)

Direct effects associated with operation of the facilities and the presence of the transmission line could include the following:

- Potential for wildlife mortality due to collisions with structures, conductors, or shield wires (permanent)
- Potential for wildlife mortality due to electrocution (permanent)
- Behavioral disturbance and/or abandonment of adjacent habitats in environments that lack existing vertical structure (permanent)
- Beneficial addition of providing perches and nesting structures for raptors (permanent)

Direct effects associated with maintenance activities could include the following:

- Behavioral disturbance and displacement of wildlife within, and adjacent to, the right-of-way during routine inspections and maintenance activities (temporary ,but repeated throughout the life of the Project)
- Potential for the initiation of human-caused wildfires (temporary ,but repeated throughout the life of the Project)
- Potential for effects to aquatic habitat during maintenance activities (temporary, but repeated throughout the life of the Project)

Indirect effects associated with the construction, operation, and maintenance of the Project could result from potential for increased wildlife mortality over the life of the Project due to use of transmission line structures as perches by raptors. Also, the construction of permanent access roads, which could be used by the general public to access currently inaccessible habitats, could result in indirect impacts on biological resources. This additional human presence and activity and vehicle noise could result in displacement, abandonment of habitat, behavioral disruption, and additional stress during critical periods. New access into previously inaccessible habitats also could increase displacement of wildlife and mortality by legal hunting or poaching. Further, public use of access roads could facilitate the spread of noxious weeds and increase the risk of human-caused wildfire. These indirect effects would be permanent.

Criteria for Assessing Intensity of Impacts

Criteria were developed to assess the intensity of a potential effect on a biological resource associated with implementation of the Project (Table 3-33). Criteria developed to assess the intensity of impacts on vegetation communities were based on considerations of abundance; regeneration time; additional protections for vegetation, including laws and statutes; and existing conditions. Criteria developed to assess the intensity of impacts on wildlife and sensitive wildlife habitats were based on considerations of a species legal status, regulatory protection, and susceptibility to temporary or permanent disturbances.

TABLE 3-33 CRITERIA FOR ASSESSING INTENSITY OF IMPACTS	
Intensity of Impacts	**Description**
High	▪ Mortality of a federally endangered, threatened, or candidate wildlife species ▪ Mortality rates that result in population-level effects for sensitive and other nonlisted species ▪ Permanent displacement of individuals from biologically important habitats (i.e., Utah prairie dog colony, Southwestern willow flycatcher breeding habitat, sage-grouse leks) ▪ Permanent loss of habitat that would result in species- or population-wide effects ▪ Permanent loss of habitat for a federally endangered, threatened, or candidate wildlife species
Moderate	▪ Permanent loss of important habitat for sensitive species or crucial habitats ▪ Mortality levels that do not reduce population viability ▪ Permanent loss of biologically important habitats (i.e., core raptor nesting areas) ▪ Disturbance during a critical or sensitive period ▪ Permanent displacement from important habitats that do not have population-level effects (i.e., crucial winter range)
Low	▪ Temporary disturbance of federally listed species ▪ Minimal loss of habitat ▪ Limited mortality of sensitive and common species ▪ Temporary displacement from seasonal habitats

Effects Analysis

Assessment of Initial Impacts

Initial resource sensitivity classifications are the basis for assessing initial impacts on biological resources associated with implementation of the Project. The initial resource sensitivity classifications were assigned using the criteria presented in Table 3-33 and are described below.

Vegetation Communities

Low initial sensitivities were assigned to the disturbed, barren, invasive grassland, and noxious weed habitats because minimal impacts would be expected from short- or long-term activities related to the Project for these vegetation communities.

Moderate initial sensitivities were assigned to wildfire-affected areas/reseeded through emergency stabilization and rehabilitation efforts, desert shrub, big sagebrush, shrub steppe, native grassland, pinyon-juniper, mountain shrub, ponderosa pine, aspen, agriculture, and surface water because moderate impacts may be expected from short-term vegetation and soil disturbance, as well as long term impacts from weeds, increased risk of wildfire, or increased public access.

High initial sensitivities were assigned to riparian vegetation communities because high impacts would be expected from short-term vegetation and soil disturbance (including vegetation trimming or clearing to meet safety standards), as well as long-term impacts from weeds, increased risk of wildfire, or increased public access.

Wildlife

Raptors

High, medium, and low quality raptor habitats were initially assigned a moderate sensitivity level because, without mitigation, impacts associated with construction activities have the potential to disrupt raptors during the breeding season. Project-related permanent facilities and structures could lead to the loss of biologically important habitats, such as removal of trees located in the right-of-way; but also may result in long-term beneficial effects by providing additional perching and nesting structures.

Big Game

Sensitive big game habitats, including crucial year-long for pronghorn and crucial winter and summer ranges for mule deer were initially assigned a moderate sensitivity level because, without mitigation, impacts associated with construction activities have potential to disturb mule deer and pronghorn during crucial periods (e.g., crucial winter and fawning). Disturbances during these sensitive periods could lead to added stress which could reduce reproduction rates. Long-term impacts associated with the presence of the transmission line could include loss of habitat and habitat fragmentation.

Special Status Species

Federally Listed Species

All federally listed or candidate species were assigned an initial sensitivity of high due to federal statutes and added protections. Impacts associated with both construction activities and the location of permanent facilities could lead to mortality of a federally endangered, threatened, or candidate species and should be considered high sensitivity.

BLM and USFS Sensitive Species

Habitat for Ward‘s beardtongue, Elsinore buckwheat, Utah phacelia, and pygmy rabbit was assigned an initial sensitivity of moderate because construction activities and permanent facilities could lead to permanent loss of important habitat for sensitive species. The pinyon penstemon was assigned a high sensitivity because the species is known to occur over a small range, and implementation of the Project without mitigation could result in population-level effects for the species.

Mitigation Planning

In addition to the BMPs included as part of the Project description (Table 2-6), mitigation measures were applied where feasible to reduce potential high and moderate adverse impacts on biological resources, including Mitigation Measures 1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, and 15 (presented in Table 2-7). Table 3-34 presents the mitigation measures applied to specific vegetation communities and habitat types or sensitive habitats.

Vegetation Communities

The use of overland access routes rather than constructing or improving new roads (Mitigation Measure 13) would be applied in areas of flat to rolling terrain (0 to 3 percent slope) where no grading would be needed to access work areas. Sensitive vegetation, such as riparian crossings and agriculture fields, would be avoided or spanned (Mitigation Measures 1 and 7) and vegetation clearing would be limited (Mitigation Measure 4) to minimize potential adverse impacts.

Wildlife

Raptors

Helicopter surveys would be conducted on the selected route prior to construction to identify raptor nests. Construction and maintenance activities associated with the Project would be conducted outside of seasonal periods and spatial buffers for raptor nests (Mitigation Measure 12). Also, trees would be selectively removed in riparian habitat to protect raptor nesting habitats (Mitigation Measure 4).

Big Game

Construction and maintenance activities associated with the Project would be conducted outside of seasonal periods for big game crucial range (Mitigation Measure 12) to limit disturbance in crucial winter and summer range for mule deer. Additionally, locked gates would be built for new roads (Mitigation Measure 15) in crucial seasonal habitats for mule deer.

Special Status Species

Federally Listed Species

Sensitive areas, including known or potential habitat for federally-listed species, would be avoided (Mitigation Measure 2) and occupied habitat would be spanned (Mitigation Measure 7). Construction and maintenance activities associated with the Project would be conducted outside of seasonal periods (Mitigation Measure 12) to minimize disturbance to the Utah prairie dog during inactive seasons and the Southwestern willow flycatcher and sage-grouse during active seasons. Prior to any grant of a right-of-way for construction of the Project, the FWS would make a determination of effect on occupied habitat for the selected route; and mitigation measures for federally listed species would be further refined and a determination of effects would be made by the FWS before the Project could bisect occupied habitat.

BLM and USFS Sensitive Species

BMPs, including a vegetation management plan for weed control and reseeding habitat with approved seed lists, would be applied to minimize habitat fragmentation. Additionally, avoidance of sensitive vegetation (Mitigation Measure 1) and spanning (Mitigation Measure 7) would be applied at potential habitat for Ward‘s beardtongue, Elsinore buckwheat, and Utah phacelia. For pinyon penstemon, limited clearing of trees in occupied habitat (Mitigation Measure 4) would apply in addition to the avoidance and spanning. To mitigate impacts on macro invertebrates and sensitive fish, access roads, wire pulling, and staging areas within 200 feet of a hydrological feature would be designed to limit disturbance, to the extent practicable (Mitigation Measure 2), to limit increased turbidity or sedimentation. Also, tower

structures would be located to allow conductors to span creeks, wetlands, and riparian areas (Mitigation Measure 7), where feasible. Further, construction access roads would not be constructed in perennial streams (Mitigation Measure 2), where practicable, to avoid disturbance.

Effects Analysis

Criteria were developed to assess the intensity of a potential effect on a biological resource associated with implementation of the Project (Table 3-34). The potential impacts were then assessed using these criteria with consideration of mitigation measures relevant to the biological resource (Table 2-7). Impacts on vegetation communities were based on considerations of abundance, regeneration time, and additional protections for vegetation, including laws and statutes, and existing conditions. Criteria developed to assess the intensity of impacts on wildlife and sensitive wildlife habitats were based on considerations of a species legal status, regulatory protection, and susceptibility to temporary or permanent disturbances.

Residual Impacts

Table 3-34 summarizes the initial resource sensitivity classifications that provided the basis for assessing initial impacts on biological resources, the mitigation measures (from Table 2-7) applied to mitigate potentially adverse effects on those resources, and residual impacts.

TABLE 3-34
SUMMARY OF INITIAL AND RESIDUAL IMPACTS BY BIOLOGICAL RESOURCE

Biological Resource	Initial Resource Sensitivity	Mitigation Measure Applied	Residual Impact
Disturbed	Low	None	Low
Invasive grassland	Low	None	Low
Invasive non-native species	Low	None	Low
Barren	Low	None	Low
Burn/Reclamation	Moderate	None	Moderate
Desert shrub	Moderate	None	Moderate
Big sagebrush	Moderate	None	Moderate
Shrub steppe	Moderate	None	Moderate
Native grassland	Moderate	None	Moderate
Pinyon-juniper	Moderate	None	Moderate
Mountain shrub	Moderate	None	Moderate
Ponderosa pine	Moderate	None	Moderate
Aspen	Moderate	None	Moderate
Agriculture	Moderate	7	Low
Riparian	High	4,7	Moderate
Surface water (aquatic habitat)	Moderate	7	Low
Sensitive Habitats			
Crucial year-long range – pronghorn	Low	None	Low
Crucial winter, summer, year-long range – mule deer	Moderate	12,15	Low
Crucial winter, summer, year-long range – elk	Moderate	12, 15	Low
Raptor low, medium, and high quality areas[1]	Moderate	4,12	Low
Ward‘s beardtongue/Elsinore buckwheat[1]	Moderate	7	Low
Suitable habitat – pygmy rabbit	Moderate	2, 12	Moderate
Pinyon penstemon[1]	High	4,7	Moderate

TABLE 3-34
SUMMARY OF INITIAL AND RESIDUAL IMPACTS BY BIOLOGICAL RESOURCE

Biological Resource	Initial Resource Sensitivity	Mitigation Measure Applied	Residual Impact
Sage-grouse brooding area	High	12	High
Sage-grouse lek	Low	12	Low
Utah prairie dog colony	High	2, 7, 12	High
Southwestern willow flycatcher breeding area	High	4, 7, 12	High

NOTE:
[1]Mitigation measures would be refined for specific areas when resource surveys are completed.

3.2.4.5 Results

A summary of baseline resource inventory and results of the effects analysis is presented in Tables 3-35 and 3-36) and described in this section. Table 2-11 presents a comparison of results of the effects analysis for the alternative routes and Table 2-12 presents a summary of the information presented in Table 2-11.

No Action Alternative

Under this alternative, there would be no construction, operation, or maintenance activities associated with the proposed Project. Current management and use of the area would continue into the reasonably foreseeable future. Impacts on biological resources associated with the implementation of the Project would not occur.

Impacts Common to All Action Alternatives

There would be low impacts on aquatic habitats and associated fisheries associated with all of the alternatives. Tower structures would be located to allow conductors to span creeks, wetlands, and riparian areas (Mitigation Measure 7) where feasible (Mitigation Measure 7), and construction access roads and work areas would be designed to avoid riparian habitat and perennial streams (Mitigation Measure 2), where practicable, to avoid disturbance that could increase turbidity and sedimentation. Where construction vehicles and equipment would be required to access areas within the Utah BLM riparian buffer of 600 feet, impacts would be mitigated to be in compliance with Utah BLM Riparian Policy (IM 2005-091). Additionally, an erosion control plan would be developed and approved by the agencies to minimize the potential for sedimentation. Spill prevention and containment measures would be implemented, and vehicle refueling and maintenance activities would be limited to designated work areas at least 328 feet (100 meters) away from all creeks. The Project would be designed to comply with the requirements of E.O. 11988 (Floodplain Management), E.O. 11990 (Wetland Protection), and Sections 401 and 404 of the CWA.

Concern regarding avian electrocutions on transmission lines has resulted in the development of avian-safe (or raptor-safe) design guidelines (APLIC 2006). Research has indicated most avian electrocutions occur on smaller voltage lines (less than 69kV), because the narrow spacing between conductors can be bridged by birds with long wingspans (APLIC 2006). The standard raptor-safe design includes a minimum vertical separation of 60 inches between conductors. Adequate spacing between conductors would be implemented per APLIC recommendations (refer to Section 2.3.1.3). These design features, built in accordance with PacifiCorp‘s *Bird Management Program Guidelines* would minimize the potential for avian electrocutions on any of the transmission lines (PacifiCorp 2006).

Impacts on raptors and migratory birds under all alternative routes could include direct loss of habitat due to placement of tower structures, increased potential of mortality due to collision, potential mortality of species due to abandonment of nests during breeding seasons, potential mortality due to direct loss resulting from construction activities. To minimize impacts on raptors, the FWS seasonal and spatial buffers for raptor nests will be followed (Romin and Muck 1999). To minimize impacts on all other migratory birds, nest surveys will be conducted prior to commencement of any construction activities occurring during the breeding bird season (February 15 through July 15). Where nests are identified, no construction activities will be allowed within 50 feet of any active nest until juveniles either fledge or fail.

Several MIS are common to all alternative routes, including 3 fish species, and 12 bird species. MIS fish species common to all alternative routes include brown trout, cutthroat trout, and rainbow trout. Bird species common to all alternatives include Brewer‘s sparrow, hairy woodpecker, Lincoln‘s sparrow, MacGillivray‘s warbler, mountain bluebird, northern flicker, sage thrasher, song sparrow, vesper sparrow, western bluebird, wild turkey, and yellow warbler. MIS species not common to all alternative routes are discussed by alternative route under USFS sensitive species (i.e., Bonneville cutthroat trout) and the big game (i.e., mule deer and elk).

Impacts on aquatic MIS (i.e., brown trout, cutthroat trout, and rainbow trout) under all alternative routes could include an indirect increase in turbidity and sedimentation in streams providing habitat for these species, easier access to streams leading to higher fishing pressure, and near-stream vegetation removal. Such impacts would be minimized by spanning of riparian areas to avoid disturbance associated with the construction of structures. Also, potential impacts on fish would be minimized by avoiding construction of access roads, wire pulling areas, and staging areas within 200 feet of a hydrological feature (e.g., riparian habitat and streambeds), where practicable.

Impacts on upland MIS could include direct and indirect impacts such as collision with guy wires, structures, or transmission lines, habitat loss, degradation, or fragmentation, and disruption of breeding activity. However, these impacts would be minimized by application of BMPs that avoid constructing during crucial breeding times and minimizing construction of structures near sensitive features.

Likelihood of occurrence of impacts by alternative for all sensitive species can be seen in Table 3-35.

TABLE 3-35
OCCURRENCE OF SPECIAL STATUS SPECIES THAT MAY OCCUR IN THE STUDY CORRIDORS BY ALTERNATIVE

Common Name (Scientific Name)	Group (Status[1)])	N1	N2	N3	N4	N5	N6	S1	S2	S3	S4	S5	S6
Federally Listed Species													
California condor *Gymnogyps californianus*	Bird (experimental population)	NOT LIKELY - No Designated Critical Habitat; transients may occur											
Greater sage-grouse *Centrocercus urophasianus*	Bird (C)	MAY OCCUR - Brood-rearing habitat present but no observations of species		YES - Active lek and brood-rearing habitat present	MAY OCCUR - Brood-rearing habitat present but no observations of species	YES - Active lek and brood-rearing habitat present		NOT LIKELY – No delineated brood-rearing habitat and no observations of species					
Mexican spotted owl *Strix occidentalis lucida*	Bird (T)	NOT LIKELY – No Designated Critical Habitat; transients may occur											
Southwestern willow flycatcher *Empidonax traillii extimus*	Bird (E)	NOT LIKELY – No Designated Critical Habitat or suitable riparian habitats; transient may occur						YES – Known to breed and forage	NOT LIKELY – No Designated Critical Habitat or suitable riparian habitats; transient may occur			YES – Known to breed and forage	
Utah prairie dog *Cynomys parvidens*	Mammal (T)	NOT LIKELY – Suitable habitat present but extensive surveys did not identify any colonies		YES – Colonies identified and habitat present	NOT LIKELY – Suitable habitat present but extensive surveys did not identify any colonies	YES – Colonies identified and habitat present		NOT LIKELY – Suitable habitat present but extensive surveys did not identify any colonies					
Western yellow-billed cuckoo *Coccyzus americanus*	Bird (C)	NOT LIKELY – No suitable dense riparian habitat; transients may occur											
BLM and USFS Sensitive Species													
Allen's big-eared bat *Idionycteris phyllotis*	Mammal (BLM)	NOT LIKELY – No breeding or roosting habitat; foraging may occur											
American white pelican *Pelecanus erythrorhynchos*	Bird (BLM)	NOT LIKELY – No suitable habitat; transient may occur						YES – Not known to breed in any corridor, but suitable habitat is present and transients known to occur					
Arizona toad *Bufo microscaphus*	Amphibian (BLM)	NO – Outside of accepted distribution of species						LIKELY– Suitable habitat and observations within study corridors					

TABLE 3-35
OCCURRENCE OF SPECIAL STATUS SPECIES THAT MAY OCCUR IN THE STUDY CORRIDORS BY ALTERNATIVE

Common Name (Scientific Name)	Group (Status[1)]	N1	N2	N3	N4	N5	N6	S1	S2	S3	S4	S5	S6
Bald eagle *Haliaeetus leucocephalus*	Bird (BLM and USFS)	LIKELY – No breeding habitat; known to forage and winter roost											
Basalt milkvetch *Astragalus subcinereus var. basalticus*	Plant (BLM)	MAY OCCUR – Suitable habitat present, no known occurrences						NOT LIKELY – outside known range of species, although suitable habitat is present					
Big free-tailed bat *Nyctinomops macrotis*	Mammal (BLM)	NOT LIKELY – No breeding or roosting habitat; foraging may occur											
Black swift *Cypseloides niger*	Bird (BLM)	NOT LIKELY – No breeding habitat; transient may occur during migration											
Bobolink *Dolichonyx oryzivorus*	Bird (BLM)	NOT LIKELY – No breeding habitat; transients may occur during migration											
Bonneville cutthroat trout *Oncorhynchus clarki utah*	Fish (USFS)	YES – Known to occur											
Burrowing owl *Athene cunicularia*	Bird (BLM)	YES – Known to breed and forage throughout											
Dark kangaroo mouse *Microdipodops megacephalus*	Mammal (BLM)	LIKELY – Suitable habitat present and observations in vicinity of study corridors											
Elsinore buckwheat *Eriogonum ostlundii*	Plant (USFS)	YES – Suitable habitat present, species known to occur						NO – No suitable habitat present and out of range of species					
Ferruginous hawk *Buteo regalis*	Bird (BLM)	YES – Known to breed and forage throughout											
Flammulated owl *Otus flammeoulus*	Bird (USFS)	NOT LIKELY – No breeding habitat or observation of species. Transients may occur.											
Franklin's penstemon *Penstemon franklinii*	Plant (BLM)	MAY OCCUR – Within known range of the species with suitable habitat present											
Fringed myotis *Myotis thysanodes*	Mammal (BLM)	NOT LIKELY – No breeding or roosting habitat; foraging may occur											
Greenwood's goldenbush *Haplopappus lignumviridis*	Plant (BLM)	NOT LIKLEY – Located within the known range of the species; but no suitable habitat present						NO – outside of known range of the species					
Kit fox *Vulpes macrotis*	Mammal (BLM)	YES – Known to breed and forage throughout						LIKELY – Suitable habitat is present, but no known occurrences				YES – Known to breed and forage throughout	

TABLE 3-35
OCCURRENCE OF SPECIAL STATUS SPECIES THAT MAY OCCUR IN THE STUDY CORRIDORS BY ALTERNATIVE

Common Name (Scientific Name)	Group (Status[1)]	N1	N2	N3	N4	N5	N6	S1	S2	S3	S4	S5	S6
Lewis's woodpecker *Melanerpes lewis*	Bird (BLM)	NOT LIKELY – No breeding habitat; foraging may occur											
Long-billed curlew *Numenius americanus*	Bird (BLM)	LIKELY – Known to breed and forage throughout Project											
Northern goshawk *Accipiter gentilis*	Bird (BLM and USFS)	LIKELY – Suitable mature forest habitats, no species occurrences known											
Peregrine falcon *Falco peregrinus anatum*	Bird (USFS)	LIKELY – Suitable habitat throughout Mineral Mountains; likely to breed and forage						NOT LIKELY – No suitable cliff-like breeding habitat; species may forage					
Pinyon penstemon *Penstemon pinorum*	Plant (BLM and USFS)	NO – No suitable habitat and outside of known range of species						NOT LIKELY – Not known to occur			YES – Known to occur		
Pygmy rabbit *Brachylagus idahoensis*	Mammal (BLM and USFS)	MAY OCCUR – Suitable habitat present throughout corridors, no known populations											
Sevier townsendia *Townsendia jonesii var. lutea*	Plant (USFS)	LIKELY – Suitable habitat present and within range of species						NO – outside of known range for the species					
Short-eared owl *Asio flammeius*	Bird (BLM)	LIKELY – Likely to breed and forage throughout project area											
Southern leatherside chub *Lepidomeda aliciae*	Fish (USFS)	KNOWN – Suitable habitat occurs and observation of species in corridors						POSSIBLE – Suitable habitat occurs, but no observations of the species in corridors					
Spotted bat *Euderma maculatum*	Mammal (BLM and USFS)	NOT LIKELY – No breeding or roosting habitat; foraging may occur											
Three-toed woodpecker *Picoides tridactylus*	Bird (BLM and USFS)	NOT LIKELY – No suitable breeding habitat; foraging may occur											
Townsend's big-eared bat *Corynorhinus townsendii*	Mammals (BLM and USFS)	NOT LIKELY – No breeding or roosting habitat; foraging may occur											
Utah phacelia *Phacelia utahensis*	Plant (BLM)	YES – Known to occur						NO – No suitable habitat and no known occurrences					
Ward beardtongue *Penstemon wardii*	Plant (USFS)	YES – Known to occur						NO – No suitable habitat and no known occurrences					
Western red bat *Lasiurus blossevillii*	Mammal (BLM)	NOT LIKELY – No breeding or roosting habitat; foraging may occur											

TABLE 3-35
OCCURRENCE OF SPECIAL STATUS SPECIES THAT MAY OCCUR IN THE STUDY CORRIDORS BY ALTERNATIVE

Common Name (Scientific Name)	Group (Status[1)]	N1	N2	N3	N4	N5	N6	S1	S2	S3	S4	S5	S6
Western toad *Bufo boreas*	Amphibian (BLM)	MAY OCCUR – No known occurrences, but suitable riparian habitats are present											
Aquatic invertebrates		YES – Known to occur throughout study corridors											
Management Indicator Species													
Brown trout *Salmo trutta*	Fish	LIKELY – Suitable habitat present											
Brewer‘s sparrow *Spizella breweri*	Bird	LIKELY – Suitable habitat present											
Cutthroat trout *Oncorhynchus clarki*	Fish	YES – Suitable habitat present											
Hairy woodpecker *Picoides villosus*	Bird	LIKELY – Suitable breeding and foraging habitat present											
Lincoln‘s sparrow *Melospiza lincolnii*	Bird	NOT LIKELY – No breeding habitat; foraging may occur											
Macgillivray‘s warbler *Oporornis tolmiei*	Bird	NOT LIKELY – No breeding habitat; foraging may occur											
Mountain bluebird *Sialia currucoides*	Bird	LIKELY – Suitable breeding and foraging habitat present											
Mule deer *Odocoileus hemionus*	Mammal	YES – Known to occur throughout Project area											
Northern flicker *Colaptes auratus*	Bird	YES – Known to occur throughout Project area											
Rainbow trout *Oncorhynchus mykiss*	Fish	LIKELY – Suitable habitat present											
Rocky Mountain elk *Cervus canadensis*	Mammal	YES – Known to occur throughout Project area											
Sage thrasher *Oreoscoptes montanus*	Bird	LIKELY – Likely to breed and forage throughout Project area											
Song sparrow *Melospiza melodia*	Bird	LIKELY – Likely to breed and forage throughout Project area											
Vesper sparrow *Pooecetes gramineus*	Bird	LIKELY – Likely to breed and forage throughout Project area											
Western bluebird *Sialia mexic*	Bird	LIKELY – Likely to breed and forage throughout Project area											
Wild turkey *Meleagris gallopa*	Bird	LIKELY – Suitable habitat present											

TABLE 3-35
OCCURRENCE OF SPECIAL STATUS SPECIES THAT MAY OCCUR IN THE STUDY CORRIDORS BY ALTERNATIVE

Common Name (Scientific Name)	Group (Status[1)]	N1	N2	N3	N4	N5	N6	S1	S2	S3	S4	S5	S6
Yellow warbler *Dendroica petechia*	Bird	LIKELY – Likely to breed and forage throughout Project area							YES – Known to breed and forage			LIKELY – Likely to breed and forage throughout Project area	

NOTES:
C = Candidate species, T = Threatened species, E = Endangered species
[1]Explanation for Status note indicated in header.

Northern Area - Sigurd Substation to South Black Mountains

The baseline resource inventory and residual impacts for alternative routes considered in the northern area are presented in Tables 3-36 and 3-37, respectively.

Alternative N1 – Black Rock Road to IPP North of Milford Wind Farm

Affected Environment

Vegetation Communities

Alternative N1crosses a total of 120.7 miles, including 2.5 miles of grassland, 1.2 miles of barren, 5.5 miles of disturbed, 6.5 miles of invasive, 0.5 mile of mountain shrub, 18.6 miles of pinyon-juniper, 19.0 miles of shrub steppe, 30.6 miles of desert shrub, 16.2 miles of wildfire-affected areas/reseeded through emergency stabilization and rehabilitation areas, and 19.9 miles of big sagebrush communities (Table 3-37; MV-6a through MV-6c). No agriculture, riparian, or aspen communities, or identified areas of noxious weeds are crossed by the alternative. However, noxious weed data were unavailable for the study corridors.

Wildlife

Raptors

From Sigurd to Cove Fort, all alternative routes cross 27.8 miles of medium quality areas along Links 24, 26, 33, 30, 45, and 64; and 17.4 miles of high quality areas along Links 64, 63, and 66 (MV-7a). From Cove Fort to the Black Mountains, Alternative N1 crosses 3.8 miles of high quality areas along Link 305, 5.0 miles of medium quality areas along Link 160, and 66.7 miles of low quality areas along Black Rock Road (Links 305, 320, 330, 350, 360, and 365) and the IPP corridor (Links 380, 381, and 155) (MV-7b through MV-7c). Because of colocation with the IPP, Alternative N1 crosses the largest amount of low quality areas.

Big Game

From Sigurd to Cove Fort, all alternative routes cross 24.2 miles of mule deer crucial winter habitat along Links 27, 30, 33, 45, and 64 (MV-8a). From Cove Fort to the Black Mountains, Alternative N1 crosses 8.9 miles of crucial mule deer winter habitat along Links 305 and 320 (MV-8a), and 70.0 miles of crucial year-long pronghorn habitat along Black Rock Road and the exiting IPP transmission line (Links 155, 160, 305, 320, 330, 345, 350, 360, 365, 380, 381, and 386; MV-8b through MV-8c). Alternative N1 does not cross any crucial summer mule deer habitat. None of the alternative routes cross crucial elk habitat.

TABLE 3-36
ALTERNATIVE ROUTE COMPARISON
BIOLOGICAL RESOURCES INVENTORY DATA

Alternative Route	Total Miles	Big Game (miles)			Threatened and Endangered Species (miles)					Sensitive Species – Wildlife and Plants (miles)						Vegetation Community or Habitat Type (miles)												
		Mule Deer		Pronghorn	Utah Prairie Dog		Sage-grouse		Southwestern Willow Flycatcher	Raptor			Pygmy Rabbit	Ward's Beardstongue/ Elsinore Buckwheat	Pinyon Penstemon														
		Crucial Summer	Crucial Winter	Crucial Year–long	Active occupied	Active unoccupied	Leks	Brooding	Occupied Habitat	Low Quality	Medium Quality	High Quality	Suitable Habitat	Suitable Habitat	Suitable Habitat	Grassland	Barren	Disturbed	Invasive Non-native Species	Agriculture	Mountain Shrub	Pinyon–Juniper	Riparian	Shrub Steppe	Aspen	Desert shrub	Noxious	Wildfire-affected Areas[1]	Big Sage
Alternative N1 (Environmentally Preferred)	120.7	–	33.1	70.0	–	–	–	4.1	–	66.7	32.8	21.2	28.7	4.9	–	2.5	1.2	5.5	6.5	–	0.5	18.6	–	19.0	–	30.6	–	16.2	19.9
Alternative N2	120.3	–	42.9	69.6	–	–	–	15.6	–	54.1	32.8	33.4	38.2	4.9	–	1.0	1.2	5.5	5.8	–	0.5	18.6	–	15.9	–	18.7	–	33.2	19.7
Alternative N3	117.2	–	55.0	58.8	0.5	1.6	4.0	37.0	–	13.3	44.0	59.9	51.6	4.9	–	0.8	1.1	5.5	5.9	–	0.5	21.6	–	7.0	–	8.9	–	32.1	33.8
Alternative N4	109.4	–	40.9	48.2	–	–	–	6.6	–	40.8	32.8	35.8	22.4	4.9	–	1.0	1.2	5.5	5.8	0.2	0.5	18.9	–	15.9	–	18.7	2.0	19.8	19.7
Alternative N5	106.3	–	53.0	37.4	0.5	1.6	4.0	28.0	–	–	44.0	62.3	35.8	4.9	–	0.8	1.1	5.5	5.9	0.2	0.5	21.9	–	7.0	–	8.9	2.0	18.7	33.8
Alternative N6 (Proponent's Proposed Action)	105.5	–	56.3	36.8	–	1.5	4.1	27.5	–	–	43.8	61.7	36.2	4.9	–	0.9	1.0	5.6	5.1	0.2	0.5	24.7	–	5.5	–	8.2	2.0	18.9	32.9

NOTE: [1]Reseeded through emergency stabilization and rehabilitation areas.

TABLE 3-37
ALTERNATIVE ROUTE COMPARISON
BIOLOGICAL RESOURCES RESIDUAL IMPACTS

Alternative Route	Big Game[1] (miles [percent])				Threatened and Endangered Species[2] (miles [percent])				Sensitive Habitats[3] (miles [percent])				Vegetation[4] (miles [percent])			
	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High
Alternative N1 (Environmentally Preferred)	21.2 [7.6]	99.5 [82.4]	–	–	116.6 [96.6]	–	–	4.1 [3.4]	–	91.1 [75.5]	29.6 [24.5]	–	–	13.2 [10.9]	107.5 [89,1]	–
Alternative N2	21.2 [7.6]	99.1 [82.4]	–	–	104.7 [97.0]	–	–	15.6 [13.0]	–	81.3 [67.6]	39.0 [32.4]	–	–	12.5 [10.4]	107.8 [89.6]	–
Alternative N3	23.1 [9.7]	94.1 [80.3]	–	–	80.2 [68.4]	–	–	37.0 [31.6]	–	67.6 [57.7]	49.6 [42.3]	–	–	12.5 10.7]	104.7 [89,3]	–
Alternative N4	21.2 [9.4]	88.2 [80.6]	–	–	102.8 [94.0]	–	–	6.6 [6.0]	–	86.0 [78.6]	23.4 [21.4]	–	–	12.7 [11.6]	96.7 [88.4]	–
Alternative N5	23.1 [11.7]	83.2 [78.3]	–	–	78.3 [73.7]	–	–	28.0 [26.3]	–	72.3 [68.0]	34.0 [32.0]	–	–	12.7 [11.9]	93.6 [88.1]	–
Alternative N6 (Proponent's Proposed Action)	22.7 [11.5]	82.8 [78.5]	–	–	78.0 [73.9]	–	–	27.5 [26.1]	–	70.0 [66.4]	35.5 [33.6]	–	–	11.9 [11.3]	93.6 [88.7]	–

NOTE:
[1] Includes impacts on mule deer and pronghorn seasonal habitats.
[2] Includes impacts on Utah prairie dog, greater sage-grouse, and Southwestern willow flycatcher.
[3] Includes impacts on raptor habitat, potential pygmy rabbit habitat, and sensitive plant habitat.
[4] Includes impacts on the following vegetation communities: grassland, barren, disturbed, invasive non-native species, agriculture, mountain shrub, pinyon-juniper, riparian, shrub steppe, aspen, desert shrub, noxious weeds, wildfire-affected areas reseeded through emergency stabilization and rehabilitation areas.

Special Status Species

Federally Listed Species

Alternative N1 crosses 4.1 miles of crucial greater sage-grouse brooding habitat located along Links 320, 330, and 350 (MV-7b), but does not cross within 2 miles of any known active leks. The brood-rearing habitat crossed is located in the vicinity of Black Rock Road where much of the sagebrush habitat has been lost to wildfire.

Alternative N1 does not cross occupied habitat for the Southwestern willow flycatcher or active occupied habitat for the Utah prairie dog.

BLM and USFS Sensitive Species

Alternative N1 crosses 4.9 miles of suitable habitat for Elsinore buckwheat, Ward's beardtongue, and Utah phacelia along Links 30 and 45 (MV-7a). The number of miles of suitable habitat for these sensitive plant species crossed is the same for all alternative routes considered for the northern area.

Alternative N1 crosses 28.7 miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7a through MV-7c).

Other special status wildlife species are known or would likely occur along Alternative N1; however, spatial data were not available for all alternatives so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the American white pelican and bald eagle, could forage, but are not known to nest, within the study corridors. Suitable nesting habitat for the burrowing owl, ferruginous hawk, and long-billed curlew also is present in lower elevation valleys (e.g., Milford Valley). Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox are known to occur in the study corridor for Alternative N1 (UNHP 2009). Sensitive fish, including the Bonneville cutthroat trout and Southern leatherside chub, are known to occur. The likelihood of occurrence of sensitive species is shown by alternative in Table 3-35.

Wild Horse and Burros

Alternative N1 does not cross the Chloride Canyon HMA.

Environmental Effects

Overall, impacts on biological resources with implementation of Alternative N1 would include 200.7 miles of low impacts, 140.1 miles of moderate impacts, and 4.1 miles of high impacts. Alternative N1 would parallel the existing IPP transmission line for 41.5 miles. Benefits of colocation would include reducing new disturbance in previously undisturbed habitats, thereby lessening fragmentation of habitat for some plant and wildlife species.

Vegetation Communities

Alternative N1 would result in an estimated 319.7 acres of permanent ground disturbance from access road and tower construction, 1,006.5 acres of temporary disturbance, and 364.6 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative N1 would include 13.2 miles of low impacts, 107.5 miles of moderate impacts, and no identifiable high impacts (Table 3-37; MV-6a and MV-6b). Moderate impacts would be the same for all alternatives and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative route include 120.7 miles of low impacts on areas designated by UDWR as low, medium, and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts also could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative N1 include 99.5 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. From Sigurd to Cove Fort, low impacts on mule deer crucial winter habitat would occur for 24.2 miles along Links 27, 30, 33, 45, and 64 (MV-8a) and would be the same for all northern alternatives. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

From Cove Fort to the Black Mountains, big game resources that could be affected include 8.9 miles of low impacts on mule deer crucial winter habitat along Links 305 and 320 (MV-8b), and 70.0 miles of low impacts on crucial pronghorn year-long habitat along Links 155, 160, 305, 320, 330, 345, 350, 360, 365, 380, 381, and 386 (MV-8b). Low impacts on mule deer crucial winter habitat and pronghorn crucial year-long habitat associated with construction, operation, and maintenance activities would be the same as described for habitat occurring from Sigurd to Cove Fort.

Special Status Species

Federally Listed Species

Impacts on sage-grouse brood-rearing habitat associated with implementation of Alternative N1 would include 4.1 miles of high impacts along Links 320, 330, and 350. High impacts would include temporary or permanent displacement, as well as foraging and breeding disruption during construction that could result in local population declines. Additional high impacts could include permanent habitat loss, degradation (e.g., from weed introduction or spread of current weed populations), and fragmentation, as well as increased predation by raptors or ravens.

Alternative N1 would have no identifiable impacts on the Southwestern willow flycatcher or Utah prairie dog populations.

BLM and USFS Sensitive Species

Impacts on sensitive plants associated with implementation of this alternative route would include 4.9 miles of low impacts on suitable habitat for Ward‘s beardtongue, Elsinore buckwheat, and Utah phacelia along Links 30 and 45. Impacts on these species could include habitat destruction associated with the construction of temporary access roads, as well as permanent loss of habitat to Project facilities, resulting in decreased population size.

Habitat for sensitive species potentially affected by this alternative route include 28.7 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate

impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Alternative N1 would result in no identifiable impacts on wild horses.

Alternative N2 – Black Rock Road to IPP South of Milford Wind Farm

Affected Environment

Vegetation Communities

Alternative N2 crosses a total of 120.3 miles, including 1.0 mile of grassland, 1.2 miles of barren, 5.5 miles of disturbed, 5.8 miles of invasive, 0.5 mile of mountain shrub, 18.6 miles of pinyon-juniper, 15.9 miles of shrub steppe, 18.7 miles of desert shrub, 33.2 miles of wildfire-affected areas/reseeded through emergency stabilization and rehabilitation areas, and 19.7 miles of big sagebrush communities (Table 3-37; MV-6a through MV-6b). No agriculture, aspen, or ponderosa pine vegetation communities, or identified populations of noxious weeds are crossed by Alternative N2. However, noxious weed data were unavailable for all study corridors.

Wildlife

Raptors

From Sigurd to Cove Fort, all alternative routes cross 27.8 miles of medium quality areas along Links 24, 26, 33, 30, 45, and 64; and 17.4 miles of high quality areas along Links 64, 63, and 66 (MV-7a). From Cove Fort to the Black Mountains, Alternative N2 crosses 16.0 miles of high quality raptor habitat along the Mineral Mountains (Link 345, 450, 455, and 385); 5.0 miles of medium quality habitat along Link 160; and 54.1 miles of low quality habitat along Black Rock Roads and the existing IPP transmission line (Links 385, 386, 381, and 155) (MV-7b).

Big Game

From Sigurd to Cove Fort, all alternative routes cross 24.2 miles of mule deer crucial winter habitat along Links 27, 30, 33, 45, and 64 (MV-8a). From Cove Fort to the Black Mountains, Alternative N2 crosses 18.7 miles of crucial mule deer winter habitat along Links 305, 320, 330, 345, and 450 (MV-8b), and 69.6 miles of crucial year-long pronghorn habitat along Links 320, 330, 350, 345, 450, 385, 386, 381, 155, 160, 165, and 380 (MV-8b). Alternative N2 does not cross any crucial summer mule deer habitat. None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative N2 crosses 15.6 miles of crucial greater sage-grouse brooding habitat located along Links 345, 348, and 350 (MV-7b), but does not cross within 2 miles of any known active leks. The brood-rearing habitat crossed is located in the vicinity of Black Rock Road and the Mineral Mountains where much of the suitable sagebrush habitat has been lost to wildfire.

Alternative N2 does not cross occupied habitat for the Southwestern willow flycatcher or active occupied habitat for the Utah prairie dog.

BLM and USFS Sensitive Species

Alternative N2 crosses 4.9 miles of suitable habitat for Elsinore buckwheat, Ward‘s beardtongue, and Utah phacelia along Links 30 and 45 (MV-7a). The number of miles of suitable habitat for these sensitive plant species crossed is the same for all alternative routes considered for the northern area. Alternative N2 crosses 38.2 miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7a through MV-7b).

Other special status wildlife species are known or would likely occur along Alternative N2; however, spatial data were not available for all alternatives, so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the American white pelican and bald eagle, could forage, but are not known to nest, within the study corridors. Suitable nesting habitat for the burrowing owl, ferruginous hawk, and long-billed curlew also is present in lower elevation valleys (e.g., Milford Valley). Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox are known to occur in the study corridor for Alternative N2 (UNHP 2009). Sensitive fish, including the Bonneville cutthroat trout, are known to occur. The likelihood of occurrence of sensitive species is shown by alternative in Table 3-35.

Wild Horses and Burros

Alternative N2 does not cross the Chloride Canyon HMA.

Environmental Effects

Overall impacts on biological resources associated with implementation of Alternative N2 would include 189.8 miles of low impacts, 149.9 miles of moderate impacts, and 15.6 miles of high impacts. Alternative N2 would parallel the existing IPP transmission line corridor for 36.4 miles (10 fewer miles than Alternative N1). Similar to Alternative N1, benefits of colocation would include reducing new disturbance in previously undisturbed habitats, thereby lessening fragmentation of habitat for some plant and wildlife species.

Vegetation Communities

Alternative N2 would result in an estimated 310.5 acres of permanent ground disturbance from access road and tower construction, 987.2 acres of temporary disturbance from and 364.6 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative N2 would include 12.5 miles of low impacts, 107.8 miles of moderate impacts, and no identifiable high

impacts (Table 3-37; MV-6a and MV-6b). Moderate impacts would be the same for all alternatives and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative include 120.3 miles of low impacts on areas designated by UDWR as low, medium, and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative N2 include 99.1 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. From Sigurd to Cove Fort, low impacts on mule deer crucial winter habitat would occur for 24.2 miles along Links 27, 30, 33, 45, and 64 (MV-8a) and would be the same for all alternative routes considered for the northern area. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Low impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

From Cove Fort to the Black Mountains, big game resources that could be affected include 18.7 miles of low impacts on mule deer crucial winter habitat along Links 305, 320, 330, 345, and 450 (MV-8b), and 69.6 miles of low impacts on crucial pronghorn year-long habitat along Links 320, 330, 350, 345, 450, 385, 386, 381, 155, 160, 165, and 380 (MV-8b). Low impacts on mule deer crucial winter habitat and pronghorn crucial year-long habitat associated with construction, operation, and maintenance activities would be the same as described for habitat occurring from Sigurd to Cove Fort.

Special Status Species

Federally Listed Species

Impacts on sage-grouse brood-rearing habitat associated with implementation of Alternative N2 would include 15.6 miles of high impacts along Links 345, 348, and 350. High impacts would include temporary or permanent displacement, as well as foraging and breeding disruption during construction that could result in local population declines. Additional high impacts could include permanent habitat loss, degradation (e.g., from weed introduction or spread of current weed populations), and fragmentation, as well as increased predation by raptors or ravens.

Alternative N2 would have no identifiable impact on the Southwestern willow flycatcher or Utah prairie dog populations.

BLM and USFS Sensitive Species

Impacts on sensitive plants associated with implementation of this alternative route would include 4.9 miles of low impacts on suitable habitat for Ward‘s beardtongue, Elsinore buckwheat, and Utah phacelia along Links 30 and 45. Impacts on these species could include habitat destruction associated with the construction of temporary access roads, as well as permanent loss of habitat to Project facilities, resulting in decreased population size.

Habitat for sensitive species potentially affected by this alternative route include 38.2 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Alternative N2 would result in no identifiable impacts on wild horses.

Alternative N3 – Black Rock Road Parallel to Kern River Pipeline

Alternative N3 diverts from Alternative N1 to follow the western flank of the Mineral Mountains before bisecting the Black Mountains. The alternative route follows Links 460, 470, 475, 480, and 490 (instead of Links 385, 386, 381, 155, and 160).

Affected Environment

Vegetation Communities

Alternative N3 crosses a total of 117.2 miles, including 0.8 mile of grassland, 1.1 miles of barren, 5.5 miles of disturbed, 5.9 miles of invasive, 0.5 mile of mountain shrub, 21.6 miles of pinyon-juniper, 7.0 miles of shrub steppe, 8.9 miles of desert shrub, 32.1 miles of wildfire-affected areas/reseeded through emergency stabilization and rehabilitation areas, and 33.8 miles of big sagebrush communities (Table 3-37; MV-6a through MV-6b). No agriculture, riparian, or aspen vegetation communities, or identified areas of noxious weeds are crossed by Alternative N3. However, noxious weed data were unavailable for all study corridors.

Wildlife

Raptors

From Sigurd to Cove Fort, all alternative routes cross 27.8 miles of medium quality areas along Links 24, 26, 33, 30, 45, and 64; and 17.4 miles of high quality areas along Links 64, 63, and 66 (MV-7a). From Cove Fort to the Black Mountains, Alternative N3 crosses 42.5 miles of high quality raptor habitat along the Mineral Mountains (Link 345, 450, 460, 470, 475, 480, and 490), 16.2 miles of medium quality habitat along Links 490 and 397, and 13.3 miles of low quality habitat along Black Rock Road (Links 320, 330, 350, and 345) (MV-7b).

Big Game

From Sigurd to Cove Fort, all alternative routes cross 24.2 miles of mule deer crucial winter habitat along Links 27, 30, 33, 45, and 64 (MV-8a). From Cove Fort to the Black Mountains, Alternative N3 crosses 30.8 miles of crucial mule deer winter habitat along Links 305, 320, 330, 345, 450, 460, 460, and 490 (MV-8b), and 58.8 miles of crucial year-long pronghorn habitat along Links 320, 330, 350, 345, 450, 460, 470, 475, 480, 490, and 397 (MV-8b). Alternative N3 does not cross any crucial summer mule deer habitat. None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative N3 crosses 37.0 miles of crucial sage-grouse brooding habitat located along Links 320, 330, 350, 345, 450, 460, 470, 475, 480, and 490. In addition, an active lek has been identified within 2 miles of the reference centerline. Alternative N3 also crosses 0.5 mile of active occupied habitat and 1.6 miles of unoccupied habitat within an active Utah prairie dog colony, which includes 200.0 acres of active burrows and 670.0 acres of inactive burrows.

Alternative N3 does not cross occupied habitat for the Southwestern willow flycatcher.

BLM and USFS Sensitive Species

Alternative N3 crosses 4.9 miles of suitable habitat for Elsinore buckwheat, Ward‘s beardtongue, and Utah phacelia along Links 30 and 45 (MV-7a). The number of miles of suitable habitat for these sensitive plant species crossed is the same for all alternative routes considered for the northern area.

Alternative N3 crosses 51.6 miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7a through MV-7b).

Other special status wildlife species are known or would likely occur along Alternative N3; however, spatial data were not available for all alternatives, so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the American white pelican and bald eagle, could forage, but are not known to nest, within the study corridors. Suitable nesting habitat for the burrowing owl, ferruginous hawk, and long-billed curlew also is present in lower elevation valleys (e.g., Milford Valley). Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox are known to occur in the study corridor for Alternative N3 (UNHP 2009). Sensitive fish, including the Bonneville cutthroat trout, are

known to occur in the Beaver River (crossed by Link 475). The likelihood of occurrence of sensitive species is shown by alternative in Table 3-35.

Wild Horses and Burros

Alternative N3 does not cross the Chloride Canyon HMA.

Environmental Effects

Overall, impacts on biological resources associated with implementation of Alternative N3 would include 168.3 miles of low impacts, 160.2 miles of moderate impacts, and 37.0 miles of high impacts. Unlike Alternatives N1 and N2, Alternative N3 does not parallel the existing IPP transmission line.

Vegetation Communities

Alternative N3 would result in an estimated 270.6 acres of permanent ground disturbance from access road and tower construction, 979.5 acres of temporary disturbance from wire pulling and staging areas, and 421.9 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative N3 would include 12.5 miles of low impacts, 104.7 miles of moderate impacts, and no identifiable high impacts (Table 3-37; MV-6a and MV-6b). Moderate impacts would be the same for all alternatives and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative include 117.2 miles of low impacts on areas designated by UDWR as low, medium, and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative N3 include 94.1 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. From Sigurd to Cove Fort, low impacts on mule deer crucial winter habitat would occur for 24.2 miles along Links 27, 30, 33, 45, and 64 (MV-8a) and would be the same for all alternative routes considered for the northern area. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching

resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

From Cove Fort to the Black Mountains, big game resources that could be affected include 30.8 miles of low impacts on mule deer crucial winter habitat along Links 305, 320, 330, 345, 450, 460, 460, and 490 (MV-8b), and 58.8 miles of low impacts on crucial pronghorn year-long habitat along Links 320, 330, 350, 345, 450, 460, 470, 475, 480, 490, and 397 (MV-8b). Low impacts on mule deer crucial winter habitat and pronghorn crucial year-long habitat associated with construction, operation, and maintenance activities would be the same as described for habitat occurring from Sigurd to Cove Fort.

Special Status Species

Federally Listed Species

Potential impacts on federally listed species associated with implementation of Alternative N3 would include 37.0 miles of high impacts along Links 320, 330, 350, 345, 450, 460, 470, 475, 480, and 490 on sage-grouse and 1.6 miles of high impacts on the Utah prairie dog. High impacts would include temporary or permanent displacement, as well as foraging and breeding disruption during construction that could result in local population declines. Additional high impacts could include permanent habitat loss, degradation (e.g., from weed introduction or spread of current weed populations), and fragmentation, as well as increased predation by raptors or ravens. Development of public access into these important habitat areas may increase poaching pressures and reduce population densities on both species. Additional impacts on the Utah prairie dog could include mortality of a federally threatened species, and impacts on a candidate species could include increased sage-grouse mortality.

BLM and USFS Sensitive Species

Impacts on sensitive plants associated with implementation of this alternative would include 4.9 miles of low impacts on suitable habitat for Ward‘s beardtongue, Elsinore buckwheat, and Utah phacelia along Links 30 and 45. Impacts on these species could include habitat destruction associated with the construction of temporary access roads, as well as permanent loss of habitat to Project facilities resulting in decreased population size.

Habitat for sensitive species potentially affected by this alternative would include 51.6 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that could result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Alternative N3 would result in no identifiable impacts on wild horses.

Alternative N4 – Mineral Mountains to IPP South of Milford Wind Farm

Affected Environment

Vegetation Communities

Alternative N4 crosses a total of 109.4 miles, including 1.0 mile of grassland, 1.2 miles of barren, 5.5 miles of disturbed, 5.8 miles of invasive, 0.2 mile of agriculture, 0.5 mile of mountain shrub, 18.9 miles of pinyon-juniper, 15.9 miles of shrub steppe, 18.7 miles of desert shrub, 2.0 miles of identified areas of noxious weeds, 19.8 miles of wildfire-affected areas/reseeded through emergency stabilization and rehabilitation areas, and 19.7 miles of big sagebrush communities (Table 3-37; MV-6a through MV-6b). No riparian or aspen vegetation communities are crossed by Alternative N4. However, noxious weed data were unavailable for all study corridors.

Wildlife

Raptors

From Sigurd to Cove Fort, all alternative routes cross 27.8 miles of medium quality areas along Links 24, 26, 33, 30, 45, and 64, and 17.4 miles of high quality areas along Links 64, 63, and 66 (MV-7a). From Cove Fort to the Black Mountains, Alternative N4 crosses 18.4 miles of high quality raptor habitat along the Mineral Mountains (Link 75 and 455), 5.0 miles of medium quality habitat along Links 490 and 397, and 40.8 miles of low quality habitat along the existing IPP transmission line (Links 381, 155, and 160) (MV-7b).

Big Game

From Sigurd to Cove Fort, all alternative routes cross 24.2 miles of mule deer crucial winter habitat along Links 27, 30, 33, 45, and 64 (MV-8a). From Cove Fort to the Black Mountains, Alternative N4 crosses 16.7 miles of crucial mule deer winter habitat along Links 75, 455, and 385 (MV-8a), and 48.2 miles of crucial year-long pronghorn habitat along Links 75, 455, 385, 386, 380, 381, 155, 160, and 165 (MV-7b). Alternative N4 does not cross any crucial summer mule deer habitat. None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative N4 crosses 6.6 miles of crucial greater sage-grouse brooding habitat on the west side of the Mineral Mountains (Links 75, 455, 460, and 470) (MV-7b). The brood-rearing habitat crossed is located in areas affected by the Milford Flat Wildfire and currently lacks suitable sagebrush cover in burned areas (MV-6b).

Alternative N4 does not cross occupied habitat for the Southwestern willow flycatcher or active occupied habitat for the Utah prairie dog.

BLM and USFS Sensitive Species

Alternative N4 crosses 4.9 miles of suitable habitat for Elsinore buckwheat, Ward‘s beardtongue, and Utah phacelia along Links 30 and 45 (MV-7a). The number of miles of suitable habitat for these sensitive plant species crossed is the same for all alternative routes considered for the northern area.

Alternative N4 crosses 22.4 miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7a through MV-7b).

Other special status wildlife species are known or would likely occur along Alternative N4; however, spatial data were not available for all alternatives so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the American white pelican and bald eagle, could forage, but are not known to nest, within the study corridors. Suitable nesting habitat for the burrowing owl, ferruginous hawk, and long-billed curlew also is present in lower elevation valleys (e.g., Milford Valley). Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox are known to occur in the study corridor for Alternative N4 (UNHP 2009). Sensitive fish, including the Bonneville cutthroat trout, are known to occur in the Beaver River (crossed by Link 385). The likelihood of occurrence of sensitive species is shown by alternative in Table 3-35.

Wild Horses and Burros

Alternative N4 does not cross the Chloride Canyon HMA.

Environmental Effects

Overall, impacts on biological resources associated with implementation of Alternative N4 would include 184.0 miles of low impacts, 123.0 miles of moderate impacts, and 6.6 miles of high impacts. Alternative N4 would parallel the existing IPP transmission line for 40 miles. Similar to Alternatives N1 and N2, benefits of colocation would include a new corridor, reducing new disturbance in previously undisturbed habitats, thereby lessening fragmentation of habitat for some plant and wildlife species.

As a design alternative to this alternative route, the Project could be colocated with the existing Cove Fort to Blundell 46kV transmission line along Link 75. Short-term disturbance associated with construction and use of new access roads, wire pulling, and staging areas would have the same impacts on biological resources as construction of the Project within a new right-of-way. However, more long-term impacts, such as habitat fragmentation, would be lower if the Project were colocated with the existing transmission line in the same or wider right-of-way.

Vegetation Communities

Alternative N4 would result in an estimated 309.0 acres of permanent ground disturbance from access road and tower construction, 919.6 acres of temporary disturbance, and 370.4 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative N4 would include 12.7 miles of low impacts, 96.7 miles of moderate impacts, and no identifiable high impacts

(Table 3-37; MV-6a and MV-6b). Moderate impacts would be the same for all alternatives and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative route include 109.4 miles of low impacts on areas designated by UDWR as low, medium, and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative N4 include 88.2 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. From Sigurd to Cove Fort, low impacts on mule deer crucial winter habitat would occur for 24.2 miles along Links 27, 30, 33, 45, and 64 (MV-8a) and would be the same for all alternative routes considered for the northern area. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

From Cove Fort to the Black Mountains, big game resources that could be affected include 16.7 miles of low impacts on mule deer crucial winter habitat along Links 75, 455, and 385 (MV-8b), and 48.2 miles of low impacts on crucial pronghorn year-long habitat along Links 75, 455, and 385 (MV-8b). Low impacts on mule deer crucial winter habitat and pronghorn crucial year-long habitat associated with construction, operation, and maintenance activities would be the same as described for habitat occurring from Sigurd to Cove Fort.

Special Status Species

Federally Listed Species

Impacts on sage-grouse brood-rearing habitat associated with implementation of Alternative N4 would include 6.6 miles of high impacts along Links 75, 455, 460, and 470. High impacts would include temporary or permanent displacement, as well as foraging and breeding disruption during construction that could result in local population declines. Additional high impacts could include permanent habitat loss, degradation (e.g., from weed introduction or spread of current weed populations), and fragmentation, as well as increased predation by raptors or ravens.

Alternative N4 would have no identifiable impacts on the Southwestern willow flycatcher or Utah prairie dog populations.

BLM and USFS Sensitive Species

Impacts on sensitive plants associated with implementation of this alternative would include 4.9 miles of low impacts on suitable habitat for Ward‘s beardtongue, Elsinore buckwheat, and Utah phacelia along Links 30 and 45. Impacts on these species could include habitat destruction associated with the construction of temporary access roads, as well as permanent loss of habitat to Project facilities resulting in decreased population size.

Habitat for sensitive species potentially affected by this alternative would include 22.4 miles of moderate impact on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that could result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Alternative N4 would result in no identifiable impacts on wild horses.

Alternative N5 – Mineral Mountains Parallel to Kern River Pipeline

Affected Environment

Vegetation Communities

Alternative N5 crosses a total of 106.3 miles, including 0.8 mile of grassland, 1.1 miles of barren, 5.5 miles of disturbed, 5.9 miles of invasive, 0.2 mile of agriculture, 0.5 mile of mountain shrub, 21.9 miles of pinyon-juniper, 7.0 miles of shrub steppe, 8.9 miles of desert shrub, 2.0 miles of identified areas of noxious weeds, 18.7 miles of wildfire-affected areas/reseeded through emergency stabilization and rehabilitation areas, and 33.8 miles of big sagebrush communities (Table 3-37; MV-6a through MV-6b). No riparian or aspen communities are crossed by Alternative N5. No noxious weed data were unavailable for the all study corridors.

Wildlife

Raptors

From Sigurd to Cove Fort, all alternative routes cross 27.8 miles of medium quality areas along Links 24, 26, 33, 30, 45, and 64, and 17.4 miles of high quality areas along Links 64, 63, and 66 (MV-7a). From Cove Fort to the Black Mountains, Alternative N5 crosses 44.9 miles of high quality areas along the Mineral Mountains (Link 75, 455, 460, 470, 390, 475, 480, and 490), 16.2 miles of medium quality habitat along Links 490 and 397, and no low quality habitat (MV-7b).

Big Game

From Sigurd to Cove Fort, all alternative routes cross 24.2 miles of mule deer crucial winter habitat along Links 27, 30, 33, 45, and 64 (MV-8a). From Cove Fort to the Black Mountains, Alternative N4 crosses 28.8 miles of crucial mule deer winter habitat along Links 75, 455, 460, 370, and 490 (MV-8a), and 37.4 miles of crucial year-long pronghorn habitat along Links 75, 455, 460, 470, 475, 480, 490, and 397 (MV-8b). Alternative N5 does not cross any crucial summer mule deer habitat. None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative N5 crosses 28.0 miles of crucial sage-grouse brooding habitat located along Links 75, 455, 460, 470, 475, 480 and 490. In addition, an active lek has been identified within 2 miles of the reference centerline.

Alternative N5 also crosses 0.5 mile of active occupied habitat and 1.6 miles of unoccupied habitat within an active Utah prairie dog colony, which includes 200.0 acres of active and 670.0 acres of inactive burrows.

Alternative N5 does not cross occupied habitat for the Southwestern willow flycatcher.

BLM and USFS Sensitive Species

Alternative N5 crosses 4.9 miles of suitable habitat for Elsinore buckwheat, Ward‘s beardtongue, and Utah phacelia along Links 30 and 45 (MV-7a). Alternative N3 crosses 35.8 miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7a through MV-7b).

Other special status wildlife species are known or would likely occur along Alternative N5; however, spatial data were not available for all alternatives so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the American white pelican and bald eagle, could forage, but are not known to nest, within the study corridors. Suitable nesting habitat for the burrowing owl, ferruginous hawk, and long-billed curlew also is present in lower elevation valleys (e.g., Milford Valley). Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox are known to occur in the study corridor for Alternative N3 (UNHP 2009). Sensitive fish, including the Bonneville cutthroat trout, are known to occur in the Beaver River (crossed by Link 475). The likelihood of occurrence of sensitive species is shown by alternative in Table 3-35.

Wild Horses and Burros

Alternative N5 does not cross the Chloride Canyon HMA.

Environmental Effects

Overall, impacts on biological resources associated with implementation of Alternative N5 would include 160.1 miles of low impacts, 131.7 miles of moderate impacts, and 29.5 miles of high impacts. Unlike Alternatives N1, N2, and N4, Alternative N5 does not parallel the existing IPP transmission line.

Similar to Alternative N4, a design alternative to this alternative route could include colocation of the Project with the existing Cove Fort to Blundell 46kV transmission line along Link 75. Short-term disturbance associated with construction and use of new access roads, wire pulling, and staging areas would have the same impacts on biological resources as construction of the Project within a new right-of-way. However, more long-term impacts, such as habitat fragmentation, would be lower if the Project were colocated with the existing transmission line in the same or wider right-of-way.

Vegetation Communities

Alternative N5 would result in an estimated 269.0 acres of permanent ground disturbance from access road and tower construction, 895.8 acres of temporary disturbance from wire pulling and staging areas, and 427.6 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative N5 would include 12.7 miles of low impacts, 93.6 miles of moderate impacts, and no identifiable high impacts (Table 3-37; MV-6a and MV-6b). Moderate impacts would be the same for all alternatives, and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative route include 105.5 miles of low impacts on areas designated by UDWR as low, medium, and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative N5 include 83.2 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. From Sigurd to Cove Fort, low impacts on mule deer crucial winter habitat would occur for 24.2 miles along Links 27, 30, 33, 45, and 64 (MV-8a) and would be the same for all alternative routes considered for the northern area. Low impacts associated with

construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

From Cove Fort to the Black Mountains, big game resources that could be affected include 28.8 miles of low impacts on mule deer crucial winter habitat along Links 75, 455, 460, 370, and 490 (MV-8b), and 37.4 miles of low impacts on crucial pronghorn year-long habitat Links 75, 455, 460, 470, 475, 480, 490, and 397 (MV-8b). Low impacts on mule deer crucial winter habitat and pronghorn crucial year-long habitat associated with construction, operation, and maintenance activities would be the same as described for habitat occurring from Sigurd to Cove Fort.

Special Status Species

Federally Listed Species

Impacts on federally listed species associated with implementation of Alternative N5 would include 28.0 miles of high impacts along Links 455, 460, 470, 475, 480 and 490 on sage-grouse and 1.7 miles of high impacts on the Utah prairie dog. High impacts federally listed species would include temporary or permanent displacement, as well as foraging and breeding disruption during construction that could result in local population declines. Additional high impacts could include permanent habitat loss, degradation (e.g., from weed introduction or spread of current weed populations), and fragmentation, as well as increased predation by raptors or ravens. Development of public access into these important habitat areas could increase poaching pressures and reduce population densities on both species. Impacts on the Utah prairie dog could include mortality of a federally threatened species and impacts on a candidate species could include increased sage-grouse mortality.

BLM and USFS Sensitive Species

Impacts on sensitive plants associated with implementation of this alternative would include 4.9 miles of low impacts on suitable habitat for Ward‘s beardtongue, Elsinore buckwheat, and Utah phacelia along Links 30 and 45. Impacts on these species could include habitat destruction associated with the construction of temporary access roads, as well as permanent loss of habitat to Project facilities resulting in decreased population size.

Habitat for sensitive species potentially affected by this alternative route would include 35.8 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native

vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Alternative N5 would result in no identifiable impacts on wild horses.

Alternative N6 – Mineral Mountains 1,500 Feet East of Kern River Pipeline

Affected Environment

Vegetation Communities

Alternative N6 crosses a total of 105.5 miles, 0.9 mile of grassland, 1.0 mile of barren, 5.6 miles of disturbed, 5.1 miles of invasive, 0.2 mile of agriculture, 0.5 mile of mountain shrub, 24.7 miles of pinyon-juniper, 5.5 miles of shrub steppe, 8.2 miles of desert shrub, 2.0 miles of identified areas of noxious weeds, 18.9 miles of wildfire-affected areas/reseeded through emergency stabilization and rehabilitation areas, and 32.9 miles of big sagebrush vegetation communities (Table 3-37; MV-6a through MV-6b). No riparian or aspen vegetation communities are crossed by Alternative N6. No noxious weed data were unavailable for the study corridors.

Raptors

From Sigurd to Cove Fort, all alternative routes cross 27.2 miles of medium quality areas along Links 24, 26, 33, 30, 45, and 64, and 17.4 miles of high quality areas along Links 64, 63, and 66 (MV-7a). From Cove Fort to the Black Mountains, Alternative N6 crosses 44.3 miles of high quality areas along the Mineral Mountains (Link 75, 349, 390, 475, 395, and 396), 16.6 miles of medium quality habitat along Links 396 and 397, and no low quality habitat (MV-7b).

Big Game

From Sigurd to Cove Fort, Alternative N6 crosses 24.1 miles of mule deer crucial winter habitat along Links 27, 30, 33, 45, and 64 (MV-8a). From Cove Fort to the Black Mountains, Alternative N6 crosses 32.2 miles of crucial mule deer winter habitat along Links 75, 349, 390, and 396 (MV-8a), and 36.8 miles of crucial year-long pronghorn habitat along Links 75, 390, 475, 396, and 397 (MV-8b). None of the northern alternatives cross any crucial summer mule deer habitat. None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative N6 crosses 27.5 miles of crucial sage-grouse brooding habitat located along Links 75, 349, 390, and 396. In addition, an active lek has been identified within 2 miles of the reference centerline. Alternative N6 also crosses 1.5 miles of unoccupied habitat within an active Utah prairie dog colony, which includes 200.0 acres of active and 670.0 acres of inactive burrows.

Alternative N6 does not cross occupied habitat for the Southwestern willow flycatcher.

BLM and USFS Sensitive Species

Alternative N6 crosses 4.9 miles of suitable habitat for Elsinore buckwheat, Ward‘s beardtongue, and Utah phacelia along Links 30 and 45 (MV-7a). Alternative N3 crosses 36.2 miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7a through MV-7b).

Other special status wildlife species are known or would likely occur along Alternative N6; however, spatial data were not available for all alternatives so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the American white pelican and bald eagle, could forage, but are not known to nest, within the study corridors. Suitable nesting habitat for the burrowing owl, ferruginous hawk, and long-billed curlew also is present in lower elevation valleys (e.g., Milford Valley). Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox are known to occur in the study corridor for Alternative N6 (UNHP 2009). Sensitive fish, including the Bonneville cutthroat trout, are known to occur in the Beaver River (crossed by Link 475). The likelihood of occurrence of sensitive species is shown by alternative in Table 3-35.

Wild Horses and Burros

Alternative N6 does not cross the Chloride Canyon HMA.

Environmental Effects

Overall, impacts on biological resources associated with implementation of Alternative N6 would include 160.1 miles of low impacts, 133.7 miles of moderate impacts, and 27.5 miles of high impacts. Unlike Alternatives N1, N2, and N4, Alternative N6 does not parallel the existing IPP transmission line.

Similar to Alternatives N4 and N5, a design alternative to this alternative route could include colocation of the Project with the existing Cove Fort to Blundell 46kV transmission line along Link 75. Short-term disturbance associated with construction activities would have the same impacts on biological resources as construction of the Project within a new right-of-way. However, more long-term impacts, such as habitat fragmentation, would be lower if the Project were colocated with the existing transmission line in the same or wider right-of-way.

Vegetation Communities

Alternative N6 would result in 329.3 acres of permanent ground disturbance from access road and tower construction, 889.6 acres of temporary disturbance from wire pulling and staging areas, and 481.1 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative N6 would include 11.9 miles of low impacts, 93.6 miles of moderate impacts, and no identifiable high impacts (Table 3-37; MV-6a and MV-6b). Moderate impacts would be the same for all alternatives, and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative route include 105.5 miles of low impacts on areas designated by UDWR as low, medium, and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

From Sigurd to Cove Fort, low impacts on mule deer crucial winter habitat would occur for 24.1 miles along Links 27, 30, 33, 45, and 64 (MV-8a) and would be the same for all alternative routes considered for the northern area. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

From Cove Fort to the Black Mountains, big game resources that could be affected include 32.2 miles of low impacts on mule deer crucial winter habitat along Links 75, 349, 390, and 396 (MV-8b), and 36.8 miles of low impacts on crucial pronghorn year-long habitat Links 75, 390, 475, 396, and 397 (MV-8b). Low impacts on mule deer crucial winter habitat and pronghorn crucial year-long habitat associated with construction, operation, and maintenance activities would be the same as described for habitat occurring from Sigurd to Cove Fort.

Special Status Species

Federally Listed Species

Impacts on federally listed species associated with implementation of Alternative N6 would include 27.5 miles of high impacts along Links 75, 349, 390, and 396 on sage-grouse and 1.5 miles of high impacts on the Utah prairie dog. High impacts would include temporary or permanent displacement, as well as foraging and breeding disruption during construction that could result in local population declines. Additional high impacts could include permanent habitat loss, degradation (e.g., from weed introduction or spread of current weed populations), and fragmentation, as well as increased predation by raptors or ravens. Development of public access into these important habitat areas could increase poaching pressures and reduce population densities on both species. Impacts on the Utah prairie dog could include mortality of a federally threatened species and impacts on a candidate species could include increased sage-grouse mortality.

BLM and USFS Sensitive Species

Impacts on sensitive plants associated with implementation of this alternative would include 4.9 miles of low impacts on suitable habitat for Ward‘s beardtongue, Elsinore buckwheat, and Utah phacelia along Links 30 and 45. Impacts on these species could include habitat destruction associated with the construction of temporary access roads, as well as permanent loss of habitat to Project facilities resulting in decreased population size.

Habitat for sensitive species potentially affected by this alternative route would include 36.2 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Alternative N6 would result in no identifiable impacts on wild horses.

Southern Area – South Black Mountains to Red Butte Substation

The baseline resource inventory and residual impacts for alternative routes considered in the southern area are presented in Tables 3-38 and 3-39, respectively.

Alternative S1 – Pinto Creek

Affected Environment

Vegetation Communities

Alternative S1 crosses a total of 56.0 total mile, including 0.3 mile of grassland, 1.0 mile of mountain shrub, 16.0 miles of pinyon-juniper, 0.1 mile of riparian, 2.0 miles of shrub steppe, 0.1 mile of aspen, 10.0 miles of desert shrub, and 22.5 miles of big sage communities. Additionally, 0.7 mile of barren lands and 3.3 miles of invasive non-native species are crossed (Table 3-39; MV-6c through MV-6d). No agriculture, known populations of noxious weeds, or wildfire-affected areas/ reseeded through emergency stabilization and rehabilitation areas are crossed by any of the southern alternatives. However, noxious weed data were unavailable for all study corridors.

TABLE 3-38
ALTERNATIVE ROUTE COMPARISON
BIOLOGICAL RESOURCES INVENTORY DATA

Alternative Route	Total Miles	Big Game (miles)			Threatened and Endangered Species (miles)					Sensitive Species – Wildlife and Plants (miles)						Vegetation Community or Habitat Type (miles)													
		Mule Deer		Pronghorn	Utah Prairie Dog		Sage-grouse		Southwestern Willow Flycatcher	Raptor			Pygmy Rabbit	Ward's Beardstongue/ Elsinore Buckwheat	Pinyon Penstemon	Grassland	Barren	Disturbed	Invasive Non-native Species	Agriculture	Mountain Shrub	Pinyon–Juniper	Riparian	Shrub Steppe	Aspen	Desert shrub	Noxious	Wildfire- affected Areas[1]	Big Sage
		Crucial Summer	Crucial Winter	Crucial Year–long	Active occupied	Active unoccupied	Leks	Brooding	Occupied Habitat	Low Quality	Medium Quality	High Quality	Suitable Habitat	Suitable Habitat	Suitable Habitat														
Alternative S1	56.0	9.0	8.7	21.7	–	–	–	–	0.1	–	31.6	24.4	18.1	–	–	0.3	0.7	–	3.3	–	1.0	16.0	0.1	2.0	0.1	10.0	–	–	22.5
Alternative S2 (Environmentally Preferred)	49.6	5.6	10.2	21.7	–	–	–	–	–	–	49.6	–	22.0	–	–	0.3	0.7	0.3	3.3	–	0.7	7.0	0.2	1.8	–	9.5	–		25.8
Alternative S3	57.6	8.0	9.0	21.7	–	–	–	–	–	–	45.4	12.2	21.8	–	–	0.2	0.9	0.3	3.3	–	1.9	15.4	0.3	1.7	0.2	9.7	–	–	23.7
Alternative S4	48.9	5.5	10.6	21.7	–	–	–	–	–	–	48.9	–	16.2	–	5.0	0.2	0.7	–	3.3	–	0.7	14.6	–	1.6	–	9.5	–		18.3
Alternative S5 (Proponent's Proposed Action)	59.0	9.0	3.1	18.4	–	–	–	–	0.1	–	26.8	32.2	20.1	–	5.1	1.5	0.3	–	3.1	–	1.0	21.0	0.1	2.0	0.1	6.2	–	–	23.7
Alternative S6	61.9	8.0	1.8	18.4	–	–	–	–	0.1	–	38.4	23.5	24.5	–	5.1	1.4	0.5	0.3	3.1	–	1.9	22.0	0.3	2.2	0.2	5.9	–	–	24.1

NOTE: [1]Reseeded through emergency stabilization and rehabilitation areas.

TABLE 3-39
ALTERNATIVE ROUTE COMPARISON
BIOLOGICAL RESOURCES RESIDUAL IMPACTS

Alternative Route	Big Game (miles [percent])				Threatened and Endangered Species (miles [percent])				Sensitive Habitats (miles [percent])				Vegetation (miles [percent])			
	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High	No Identifiable	Low	Moderate	High
Alternative S1	16.6 [25.6]	39.4 [70.4]	–	–	55.9 [99.8]	–	–	0.1 [0.2]	–	37.4 [66.8]	18.6 [33.2]	–	–	4.1 [7.3]	51.9 [92.7]	–
Alternative S2 (Environmentally Preferred)	12.1 [24.4]	37.5 [75.6]	–	–	49.6 [100.0]	–	–	–	–	28.3 [57.1]	21.3 [42.9]	–	–	4.3 [8.7]	45.3 [91.3]	–
Alternative S3	18.9 [32.8]	38.7 [67.2]	–	–	57.6 [100.0]	–	–	–	–	36.5 [63.4]	21.1 [36.6]	–	–	4.7 [8.2]	52.9 [91.8]	–
Alternative S4	11.1 [22.7]	37.8 [77.3]	–	–	48.9 [100.0]	–	–	–	–	28.6 [58.5]	20.3 [41.5]	–	–	4.0 [8.2]	44.9 [91.8]	–
Alternative S5 (Proponent's Proposed Action)	28.5 [48.3]	30.5 [51.7]	–	–	58.9 [99.8]	–	–	0.1 [0.2]	–	42.8 [72.5]	16.2 [27.5]	–	–	3.5 [5.9]	55.5 [94.1]	–
Alternative S6	33.7 [54.4]	28.2 [45.6]	–	–	61.8 [99.8]	–	–	0.1 [0.2]	–	43.5 [70.3]	18.4 [29.7]	–	–	4.1 [6.6]	57.8 [93.4]	–

NOTE:
[1] Includes impacts on mule deer and pronghorn seasonal habitats
[2] Includes impacts on Utah prairie dog, greater sage-grouse, and Southwestern willow flycatcher
[3] Includes impacts on raptor habitat, potential pygmy rabbit habitat, and sensitive plant habitat
[4] Includes impacts on the following vegetation communities: grassland, barren, disturbed, invasive non-native species, agriculture, mountain shrub, pinyon-juniper, riparian, shrub steppe, aspen, desert shrub, noxious weeds, wildfire-affected areas reseeded through emergency stabilization and rehabilitation areas.

Wildlife

Raptors

Alternative S1 crosses 31.6 miles of medium quality raptor habitat along Links 163, 165, 220, 240, and 260 (MV-7c through MV-7d) and 24.4 miles of high quality raptor nesting habitat along the Pine Valley route (Links 240, 245, and 260; MV-7c through MV-7d). More medium quality habitat is crossed by this alternative because of colocation with the IPP.

Big Game

Alternative S1 crosses 9.0 miles mule deer crucial summer habitat, located only on the Dixie National Forest (Link 260) and 8.7 miles of crucial winter habitat at the base of the Antelope Range and near the Red Butte Substation (Links 220, 240, and 260; MV-8c through MV-8d). Alternative S1 also crosses 21.7 miles of crucial pronghorn year-long habitat located along the IPP (Links 163 and 165; MV-8c through MV-8d). None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative S1 crosses 0.1 mile of occupied habitat for the endangered Southwestern willow flycatcher. There are 100 acres of suitable breeding habitat for the species within 0.25 mile of the alternative route. Surveys conducted during the breeding season of 2010 indicated at least one pair nested, and up to five other individuals were using the habitat.

Alternative S1 does not cross active occupied habitat for the Utah prairie dog or brood-rearing habitat for the greater sage-grouse.

BLM and USFS Sensitive Species

Alternative S1 crosses 18.1 miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7c through MV-7d). No suitable sensitive plant habitat is crossed by the alternative.

Other special status wildlife species are known or would likely occur along Alternative S1; however, spatial data were not available for all alternatives, so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the burrowing owl and ferruginous hawk could be located along the entire alternative, the Arizona toad potentially occurs along Link 260, the Bonneville cutthroat trout could occur along Link 245, and wintering bald eagles could be located along Link 260. Likelihood of occurrence by alternative for all sensitive species can be seen in Table 3-35.

Wild Horses and Burros

Alternative S1 crosses 9.3 miles in the Chloride Canyon HMA located along Link 220.

Environmental Effects

Overall impacts on biological resources with implementation of Alternative S1 would include 81.4 miles of low impact, 69.0 miles of moderate impact, and 0.1 mile of high impacts. Alternative S1 parallels the existing IPP transmission line for 18.9 miles. Benefits of colocation would include reducing new disturbance in previously undisturbed habitats, thereby lessening fragmentation of habitat for some plant and wildlife species.

Vegetation Communities

Alternative S1 would result in an estimated 192.8 acres of permanent ground disturbance from access road and tower construction, 467.2 acres of temporary disturbance from, and 328.4 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative S1 would include 4.1 miles of low impacts, 51.9 miles of moderate impacts, and no identifiable high impacts (Table 3-39; MV-6c through MV-6d). Moderate impacts would be the same for all alternatives, and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative include 56.0 miles of low impacts on areas designated by UDWR as medium and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching, and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative S1 include 54.8 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. Low impacts on mule deer crucial winter habitat would occur for 8.7 miles along Link 220 and 240 and 9.0 miles in summer habitat along Link 260 (MV-8c through MV-8d). Low impacts on crucial pronghorn year-long habitat would occur for 21.7 miles along Links 163 and 165. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Low impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

Special Status Species

Federally Listed Species

Impacts on Southwestern willow flycatcher associated with implementation of Alternative S1 would include 0.1 mile of high impacts on riparian habitat used for breeding and foraging. High impacts would include mortality of a federally endangered species, loss or modification of habitat from installation of permanent facilities and vegetation clearing to meet operational safety standards, and disruption of breeding and foraging activities resulting in reduced habitat carrying capacity.

Alternative S1 would have no identifiable impact on the Utah prairie dog or greater sage-grouse.

BLM and USFS Sensitive Species

Habitat for sensitive species potentially affected by this alternative route includes 18.1 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens. There would be no identifiable impacts on sensitive plant populations.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate

impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Wild horses and burros potentially affected by this alternative route include 9.3 miles of impacts on the Chloride Canyon HMA along Link 220. Low impacts on wild horses and burros would include temporary herd displacement during construction, resulting in increased grazing pressure on adjacent areas and removal of foraging resources for installation of permanent facilities.

Alternative S2 – IPP West

Affected Environment

Vegetation Communities

Alternative S2 crosses a total of 49.6 total miles, including 0.3 mile of grassland, 0.7 mile of mountain shrub, 7.0 miles of pinyon-juniper, 0.2 mile of riparian, 1.8 miles of shrub steppe, 9.5 miles of desert shrub, and 25.8 miles of big sage communities (Table 3-39; MV-6c through MV-6d). Additionally, 0.7 mile of barren lands, 0.3 mile of disturbed land, and 3.3 miles of invasive non-native species are crossed. No aspen communities are crossed by Alternative S2. No agriculture, known populations of noxious weeds, or wildfire-affected areas/ reseeded through emergency stabilization and rehabilitation areas are crossed by any of the southern alternatives. However, noxious weed data were unavailable for all study corridors.

Wildlife

Raptors

Alternative S2 crosses 49.6 miles of medium quality habitat for all links (MV-7c through MV-7d). Because of colocation with the IPP for the entire alternative route, no high quality raptor habitats are crossed. No low quality habitats are crossed by any of the southern alternatives.

Big Game

Alternative S2 crosses 5.6 miles of mule deer crucial summer habitat, located only on the Dixie National Forest (Link 270), and 10.2 miles of crucial winter habitat at the base of the Antelope Range and near the Red Butte Substation (Links 220, 221, 165, and 441; MV-8c through MV-8d). Alternative S2 also crosses 21.7 miles of crucial pronghorn year-long habitat located along the IPP (Links 163 and 165; MV-8c through MV-8d). None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative S2 does not cross occupied habitat for the endangered Southwestern willow flycatcher, active occupied habitat for the Utah prairie dog, or brood-rearing habitat for the greater sage-grouse.

BLM and USFS Sensitive Species

Alternative S2 crosses 22.0 miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7c through MV-7d). No suitable sensitive plant habitat is crossed by the alternative.

Other special status wildlife species are known or would likely occur along Alternative S2; however, spatial data were not available for all alternatives, so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the burrowing owl and ferruginous hawk, could be located along the entire alternative. The Arizona toad potentially occurs along Link 260, the Bonneville cutthroat trout could occur along Link 245, and wintering bald eagles could be located along Link 260. Likelihood of occurrence by alternative for all sensitive species can be seen in Table 3-35.

Wild Horses and Burros

Alternative S2 crosses 9.3 miles in the Chloride Canyon HMA located along Link 220.

Environmental Effects

Overall impacts on biological resources with implementation of Alternative S2 would include 69.4 miles of low impact and 67.3 miles of moderate impact. Alternative S2 would parallel the existing IPP transmission line the entire alternative route. Benefits of colocation would include reducing new disturbance in previously undisturbed habitats, thereby lessening fragmentation of habitat for some plant and wildlife species.

Vegetation Communities

Alternative S2 would result in an estimated 158.1 acres of permanent ground disturbance from access road and tower construction, 418.0 acres of temporary disturbance from wire pulling and staging areas, and 147.0 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative S2 would include 4.3 miles of low impacts, 45.3 miles of moderate impacts, and no identifiable high impacts (Table 3-39; MV-6c through MV-6d). Moderate impacts would be the same for all alternatives, and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative include 49.6 miles of low impacts on areas designated by UDWR as medium and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching, and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative S2 include 46.9 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. Low impacts on mule deer crucial winter habitat would occur for 10.2 miles along Links 220, 221, 165, and 441 and 5.6 miles in summer habitat along Link 270 (MV-8c through MV-8d). Low impacts on crucial pronghorn year-long habitat would occur for 21.7 miles along Links 163 and 165. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Low impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

Special Status Species

Federally Listed Species

Alternative S2 would have no identifiable impacts on any threatened, endangered, or candidate species.

BLM and USFS Sensitive Species

Habitat for sensitive species potentially affected by this alternative route includes 22.0 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens. There would be no identifiable impacts on sensitive plant populations.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Wild horses and burros potentially affected by this alternative route include 9.3 miles of impacts on the Chloride Canyon HMA along Link 220. Low impacts on wild horses and burros would include temporary herd displacement during construction, resulting in increased grazing pressure on adjacent areas and removal of foraging resources for installation of permanent facilities.

Alternative S3 – Ox Valley

Affected Environment

Vegetation Communities

Alternative S3 crosses a total of 57.6 total miles, including 0.2 mile of grassland, 1.9 miles of mountain shrub, 15.4 miles of pinyon-juniper, 0.3 mile of riparian, 1.7 miles of shrub steppe, 0.2 mile of aspen, 9.7 miles of desert shrub, and 23.7 miles of big sage communities (Table 3-39; MV-6c through MV-6d). Additionally, 0.9 mile of barren lands, 0.3 mile of disturbed land, and 3.3 miles of invasive non-native species are crossed. No agriculture, known populations of noxious weeds, or wildfire-affected areas/reseeded through emergency stabilization and rehabilitation areas are crossed by any of the southern alternatives. However, noxious weed data were unavailable for all study corridors.

Wildlife

Raptors

Alternative S3 crosses 45.4 miles of medium quality raptor habitat along Links 163, 165, 220, 221, 441, 442, 285, and 290 and 12.2 miles of high quality raptor nesting habitat along the Ox Valley route (Links 280, 285, and 290; MV-7c through MV-7d). Because of colocation with the IPP, more medium quality habitat is crossed by this alternative.

Big Game

Alternative S3 crosses 8.0 miles of mule deer crucial summer habitat, located only on the Dixie National Forest (Link 285) and 9.0 miles of crucial winter habitat at the base of the Antelope Range and near the Red Butte Substation (Links 165, 220, 221, and 441; MV-8c through MV-8d). Alternative S3 also crosses 21.7 miles of crucial pronghorn year-long habitat located along the IPP (Links 163 and 165; MV-8c through MV-8d). None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative S3 does not cross occupied habitat for the endangered Southwestern willow flycatcher, active occupied habitat for the Utah prairie dog, or brood-rearing habitat for the greater sage-grouse.

BLM and USFS Sensitive Species

Alternative S3 crosses 21.8 miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7c through MV-7d). No suitable sensitive plant habitat is crossed by the alternative.

Other special status wildlife species are known or would likely occur along Alternative S3; however, spatial data were not available for all alternatives, so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the burrowing owl and ferruginous hawk could be located along the entire alternative, the Arizona toad potentially occurs along Link 260, the Bonneville cutthroat trout could occur along Link 245, and wintering bald eagles could be located along Link 260. Likelihood of occurrence by alternative for all sensitive species can be seen in Table 3-35.

Wild Horses and Burros

Alternative S3 crosses 9.3 miles in the Chloride Canyon HMA located along Link 220.

Environmental Effects

Overall impacts on biological resources with implementation of Alternative S3 would include 79.2 miles of low impact and 74.7 miles of moderate impact. In addition, Alternative S3 would parallel the existing IPP transmission line for 24.5 miles. Benefits of colocation would include reducing new disturbance in previously undisturbed habitats, thereby lessening fragmentation of habitat for some plant and wildlife species.

Vegetation Communities

Alternative S3 would result in an estimated 221.4 acres of permanent ground disturbance from access road and tower construction, 479.5 acres of temporary disturbance from, and 339.8 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative S3 would include 4.7 miles of low impacts, 52.9 miles of moderate impacts, and no identifiable high impacts (Table 3-39; MV-6c through MV-6d). Moderate impacts would be the same for all alternatives, and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative include 57.6 miles of low impacts on areas designated by UDWR as medium and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching, and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative S3 include 54.9 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. Low impacts on mule deer crucial winter habitat would occur for 9.0 miles along Links 165, 220, 221, and 441 and 8.0 miles in summer habitat along Link 285 (MV-8c through MV-8d). Low impacts on crucial pronghorn year-long habitat would occur for 21.7 miles along Links 163 and 165. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Low impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

Special Status Species

Federally Listed Species

Alternative S3 would have no identifiable impacts on any threatened, endangered, or candidate species.

BLM and USFS Sensitive Species

Habitat for sensitive species potentially affected by this alternative route includes 21.8 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens. There would be no identifiable impacts on sensitive plant populations.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Wild horses and burros potentially affected by this alternative route include 9.3 miles of impacts on the Chloride Canyon HMA along Link 220. Low impacts on wild horses and burros would include temporary herd displacement during construction, resulting in increased grazing pressure on adjacent areas and removal of foraging resources for installation of permanent facilities.

Alternative S4 – IPP East

Affected Environment

Vegetation Communities

Alternative S4 crosses a total of 48.9 total miles, including 0.2 mile of grassland, 0.7 mile of mountain shrub, 14.6 miles of pinyon-juniper, 1.6 miles of shrub steppe, 9.5 miles of desert shrub, and 18.3 miles of big sage communities (Table 3-39; MV-6c through MV-6d). Additionally, 0.7 mile of barren lands and 3.3 miles of invasive non-native species are crossed. No riparian or aspen communities are crossed by this Alternative. No agriculture, known populations of noxious weeds, or wildfire-affected areas/ reseeded through emergency stabilization and rehabilitation areas are crossed by any of the southern alternatives. However, noxious weed data were unavailable for all study corridors.

Wildlife

Raptors

Alternative S4 crosses 48.9 miles of medium quality raptor habitat for all links (MV-7c through MV-7d). Because of colocation with the IPP for the entire alternative route, no high quality raptor habitats are crossed. No low quality habitats are crossed by any of the southern alternatives.

Big Game

Alternative S4 crosses 5.5 miles of mule deer crucial summer habitat, located only on the Dixie National Forest (Link 270) and 10.6 miles of crucial winter habitat at the base of the Antelope Range and near the Red Butte Substation (Links 165, 220, 221, and 441; MV-8c through MV-8d). Alternative S4 also crosses 21.7 miles of crucial pronghorn year-long habitat located along the IPP (Links 163 and 165; MV-8c through MV-8d). None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative S4 does not cross occupied habitat for the endangered Southwestern willow flycatcher, active occupied habitat for the Utah prairie dog, or brood-rearing habitat for the greater sage-grouse.

BLM and USFS Sensitive Species

Alternative S4 crosses 5.0 miles of suitable habitat for the sensitive plant species pinyon penstemon along Link 443 (MV-7c through MV-7d). Alternative S4 crosses 16.2 total miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7c through MV-7d).

Other special status wildlife species are known or would likely occur along Alternative S4; however, spatial data were not available for all alternatives, so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the burrowing owl and ferruginous hawk could be located along the entire alternative. The Arizona toad potentially occurs along Link 260, and wintering

bald eagles could be located along Link 260. Likelihood of occurrence by alternative for all sensitive species can be seen in Table 3-35.

Wild Horses and Burros

Alternative S4 crosses 9.3 miles in the Chloride Canyon HMA located along Link 220.

Inventoried Roadless Areas

Alternative S4 is the only alternative route crossing IRAs. Sensitive biological resources identified within the Cove Mountain and Atchinson Mountain IRAs during the inventory process include mule deer summer and year-round range, habitat for the BLM sensitive plant Pinyon penstemon, and low quality raptor habitat. No habitat for threatened, endangered, or candidate species was identified. The most common vegetation type in the IRAs is pinyon-juniper.

Environmental Effects

Overall impacts on biological resources with implementation of Alternative S4 would include 70.0 miles of low impact, 65.6 miles of moderate impact, and 0.1 mile of high impact.

Detailed description of impacts on vegetation; special status species, including threatened, endangered, and candidate species; BLM and USFS sensitive species; sensitive habitats, including big game and raptors; and IRAs are presented below.

Vegetation Communities

Alternative S4 would result in an estimated 202.1 acres of permanent ground disturbance from access road and tower construction, 412.6 acres of temporary disturbance from wire pulling and staging areas, and 292.1 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative S4 would include 4.0 miles of low impacts, 44.9 miles of moderate impacts, and no identifiable high impacts (Table 3-39; MV-6c through MV-6d). Moderate impacts would be the same for all alternatives, and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative include 48.9 miles of low impacts on areas designated by UDWR as medium and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching, and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative S4 include 37.8 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. Low impacts on mule deer crucial winter habitat would occur for 10.6 miles along Links 165, 220, 221, and 441 and 5.5 miles in summer habitat along Link 270 (MV-8c through MV-8d). Low impacts on crucial pronghorn year-long habitat would occur for 21.7 miles along Links 163 and 165. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Low impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

Special Status Species

Federally Listed Species

Alternative S4 would have no identifiable impacts on any threatened, endangered, or candidate species.

BLM and USFS Sensitive Species

Impacts on sensitive plants associated with implementation of this alternative would include 5.0 miles of moderate impacts on suitable habitat for the pinyon penstemon along Link 443. Moderate impacts on the species could include habitat destruction associated with the construction of temporary access roads, as well as permanent loss of habitat to Project facilities resulting in decreased population size.

Habitat for sensitive species potentially affected by this alternative route would include 16.2 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement , as well as foraging and breeding disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Wild horses and burros potentially affected by this alternative route include 9.3 miles of impacts on the Chloride Canyon HMA along Link 220. Low impacts on wild horses and burros would include temporary herd displacement during construction, resulting in increased grazing pressure on adjacent areas and removal of foraging resources for installation of permanent facilities.

Inventoried Roadless Areas

Alternative S4 would affect the biological resources used to identify both the Cove Mountain and Atchinson Mountain IRAs. Implementation of Alternative S4 may reduce the diversity of plant and animal communities in the portions of the IRAs crossed. The diversity and quantity of native and desired non-native communities and species may decline and non-native invasive species may be introduced. This alternative also may result in the loss of habitat for sensitive species of plants, raptors, and big game within the Cove Mountain and Atchinson Mountain IRAs. Specific impacts on these resources are discussed in the Vegetation Communities and Special Status Species sections for Alternative S1.

Alternative S5 – Iron Springs and Pinto Creek

Affected Environment

Vegetation Communities

Alternative S5 crosses a total of 59.0 total miles, including 1.5 miles of grassland, 1.0 mile of mountain shrub, 21.0 miles of pinyon-juniper, 0.1 mile of riparian, 2.0 miles of shrub steppe, 0.1 mile of aspen, 6.2 miles of desert shrub, and 23.7 miles of big sage communities (Table 3-39; MV-6c through MV-6d). Additionally, 0.3 mile of barren lands and 3.1 miles of invasive non-native species are crossed. No agriculture, known populations of noxious weeds, or wildfire-affected areas/reseeded through emergency stabilization and rehabilitation areas are crossed by any of the southern alternatives. However, noxious weed data were unavailable for all study corridors.

Wildlife

Raptors

Alternative S5 crosses 26.8 miles of medium quality raptor habitat along Links 163, 430, 435, 438, and 260 and 32.2 miles of high quality raptor nesting habitat along the Pine Valley route (Links 438, 245, and 260; MV-7c through MV-7d). More high quality habitat is crossed by this alternative because it is not colocated with the IPP; therefore, manmade nesting structures are less prevalent.

Big Game

Alternative S5 crosses 9.0 miles of mule deer crucial summer habitat, located only on the Dixie National Forest (Link 260) and 3.1 miles of crucial winter habitat near the Red Butte Substation (Links 260 and 275; MV-8c through MV-8d). Alternative S5 also crosses 18.4 miles of crucial pronghorn year-long habitat located along the IPP (Links 430, 435, and 438; MV-8c through MV-8d). None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative S5 crosses 0.1 mile of occupied habitat for the endangered Southwestern willow flycatcher. There are 100.0 acres of suitable breeding habitat for the species within 0.25 mile of the alternative route.

Surveys conducted during the breeding season of 2010 indicated at least one pair nested and up to five other individuals were using the habitat.

Alternative S5 does not cross active occupied habitat for the Utah prairie dog or brood-rearing habitat for the greater sage-grouse.

BLM and USFS Sensitive Species

Alternative S5 crosses 5.1 miles of suitable habitat for the sensitive plant species pinyon penstemon along Link 438 (MV-7c through MV-7d). Alternative S5 crosses 20.1 total miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7c through MV-7d).

Other special status wildlife species are known or would likely occur along Alternative S5; however, spatial data were not available for all alternatives, so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the burrowing owl and ferruginous hawk could be located along the entire alternative, the Arizona toad potentially occurs along Link 260, and wintering bald eagles could be located along Link 260. Likelihood of occurrence by alternative for all sensitive species can be seen in Table 3-35.

Wild Horses and Burros

Alternative S5 crosses 8.4 miles in the Chloride Canyon HMA located along Link 438.

Environmental Effects

Overall impacts on biological resources with implementation of Alternative S5 would include 71.8 miles of low impact and 79.0 miles of moderate impact. This includes 0.1 mile of potential impacts on an endangered species habitat (Southwestern willow flycatcher).

Detailed description of impacts on vegetation; special status species, including threatened, endangered, and candidate species; BLM and USFS sensitive species; and sensitive habitats, including big game and raptors are presented below.

Vegetation Communities

Alternative S5 would result in an estimated 194.0 acres of permanent ground disturbance from access road and tower construction, 490.2 acres of temporary disturbance from, and 423.8 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative S5 would include 3.5 miles of low impacts, 55.5 miles of moderate impacts, and no identifiable high impacts (Table 3-39; MV-6c through MV-6d). Moderate impacts would be the same for all alternatives, and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative include 59.0 miles of low impacts on areas designated by UDWR as medium and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching, and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative S5 include 53.3 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. Low impacts on mule deer crucial winter habitat would occur for 3.1 miles along Links 165, 220, 221, and 441 and 9.0 miles in summer habitat along Link 260 (MV-8c through MV-8d). Low impacts on crucial pronghorn year-long habitat would occur for 18.4 miles along Links 430, 435, and 438. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Low impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

Special Status Species

Federally Listed Species

Impacts on Southwestern willow flycatcher associated with implementation of Alternative S5 would include 0.1 mile of high impacts on riparian habitat used for breeding and foraging. High impacts would include mortality of a federally endangered species, loss or modification of habitat from installation of permanent facilities and vegetation clearing to meet operational safety standards, and disruption of breeding and foraging activities resulting in reduced habitat carrying capacity.

Alternative S5 would have no identifiable impact on the Utah prairie dog or greater sage-grouse.

BLM and USFS Sensitive Species

Impacts on sensitive plants associated with implementation of this alternative would include 5.1 miles of moderate impacts on suitable habitat for the pinyon penstemon along Link 438. Moderate impacts on the species could include habitat destruction associated with the construction of temporary access roads, as well as permanent loss of habitat to Project facilities resulting in decreased population size.

Habitat for sensitive species potentially affected by this alternative route would include 20.1 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding

disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Wild horses and burros potentially affected by this alternative route include 8.4 miles of impacts on the Chloride Canyon HMA along Link 438. Low impacts on wild horses and burros would include temporary herd displacement during construction, resulting in increased grazing pressure on adjacent areas and removal of foraging resources for installation of permanent facilities.

Alternative S6 – Iron Springs and Ox Valley

Affected Environment

Vegetation Communities

Alternative S6 crosses a total of 61.9 total miles, including 1.4 miles of grassland, 1.9 miles of mountain shrub, 22.0 miles of pinyon-juniper, 0.3 mile of riparian, 2.2 miles of shrub steppe, 0.2 mile of aspen, 5.9 miles of desert shrub, and 24.1 miles of big sage communities (Table 3-39; MV-6c through MV-6d). Additionally, 0.5 mile of barren lands, 0.3 mile of disturbed land, and 3.1 miles of invasive non-native species are crossed. No agriculture, known populations of noxious weeds, or wildfire-affected areas/reseeded through emergency stabilization and rehabilitation areas are crossed by any of the southern alternatives. However, noxious weed data were unavailable for all study corridors.

Wildlife

Raptors

Alternative S6 crosses 38.4 miles of medium quality raptor habitat (Links 163, 430, 435, 438, 441, 442, 280, and 285) and 23.5 miles of high quality raptor habitat along the Ox Valley route (Links 438, 245, 250, 280, and 285; MV-7c through MV-7d).

Big Game

Alternative S6 crosses 8.0 miles of mule deer crucial summer habitat, located only on the Dixie National Forest (Link 285) and 1.8 miles of crucial winter habitat along Links 250 and 441 (MV-8c through MV-8d). Alternative S6 also crosses 18.4 miles of crucial pronghorn year-long habitat located along the IPP (Links 430, 435, and 438; MV-8c through MV-8d). None of the alternative routes cross crucial elk habitat.

Special Status Species

Federally Listed Species

Alternative S6 crosses 0.1 mile of occupied habitat for the endangered Southwestern willow flycatcher. There are 100.0 acres of suitable breeding habitat for the species within 0.25 mile of the alternative route. Surveys conducted during the breeding season of 2010 indicated at least one pair nested and up to five other individuals were using the habitat.

Alternative S6 does not cross active occupied habitat for the Utah prairie dog or brood-rearing habitat for the greater sage-grouse.

BLM and USFS Sensitive Species

Alternative S6 crosses 5.1 miles of suitable habitat for the sensitive plant species pinyon penstemon along Link 438 (MV-7c through MV-7d X). Alternative S6 crosses 24.5 total miles of suitable habitat for the pygmy rabbit interspersed along the entire alternative (MV-7c through MV-7d).

Other special status wildlife species are known or would likely occur along Alternative S6; however, spatial data were not available for all alternatives, so no quantitative descriptions or assessments could be reasonably portrayed. Wildlife species, including the burrowing owl and ferruginous hawk could be located along the entire alternative and a hibernacula for the Townsend‘s big-eared bat. Likelihood of occurrence by alternative for all sensitive species can be seen in Table 3-35.

Wild Horses and Burros

Alternative S6 crosses 8.4 miles in the Chloride Canyon HMA located along Link 438.

Environmental Effects

Overall impacts on biological resources with implementation of Alternative S6 would include 68.6 miles of low impact and 83.4 miles of moderate impact. This includes 0.1 mile of impacts on an endangered species habitat (Southwestern willow flycatcher). In addition, Alternative S6 parallels the existing IPP transmission line for 9.3 miles. Benefits of colocation would include reducing new disturbance in previously undisturbed habitats, thereby lessening fragmentation of habitat for some plant and wildlife species.

Vegetation Communities

Alternative S6 would result in an estimated 225.9 acres of permanent ground disturbance from access road and tower construction, 533.5 acres of temporary disturbance from areas, and 465.8 acres of vegetation clearing (Table 3-2). Overall, impacts on vegetation associated with implementation of Alternative S6 would include 4.1 miles of low impacts, 57.8 miles of moderate impacts, and no identifiable high impacts (Table 3-39; MV-6c through MV-6d). Moderate impacts would be the same for all alternatives, and would include permanent loss of habitat in some vegetation communities from reduced viability of native plant populations through introduction of invasive, non-native, or noxious weed species. Low impacts would include minimal loss of habitat in disturbed, invasive grassland, invasive non-native species, and barren vegetation communities.

Wildlife

Raptors

Raptor habitats potentially affected under this alternative include 61.9 miles of low impacts on areas designated by UDWR as medium and high quality raptor habitat interspersed along the entire alternative. Low impacts on raptors would be the same for all alternatives. Low impacts associated with construction activities would likely include a temporary decline in prey abundance and disruption of breeding and foraging activities. Long-term impacts could include loss of nesting habitat through conversion to permanent transmission facilities, increased poaching, and/or disturbance associated with the increased access and use of access roads, habitat fragmentation, and collision.

Big Game

Big game resources that could be affected under Alternative S6 include 54.7 miles of low impacts on crucial seasonal habitats for mule deer and pronghorn. Low impacts on mule deer crucial winter habitat would occur for 1.8 miles along Links 250 and 441and 8.0 miles in summer habitat along Link 285 (MV-8c through MV-8d). Low impacts on crucial pronghorn year-long habitat would occur for 18.4 miles along Links 430, 435, and 438. Low impacts associated with construction would include temporary displacement from seasonal habitats, behavioral disruption, and additional stress, which could affect calving success. Low impacts associated with operation and maintenance could include behavioral disturbance and displacement within and adjacent to the right-of-way during routine inspections and maintenance activities, mortality by increased legal hunting and poaching resulting from increased public access, and loss of foraging habitat associated with the presence of permanent access roads.

Special Status Species

Impacts on Southwestern willow flycatcher associated with implementation of Alternative S6 would include 0.1 mile of high impacts on riparian habitat used for breeding and foraging. High impacts would include mortality of a federally endangered species, loss or modification of habitat from installation of permanent facilities and vegetation clearing to meet operational safety standards, and disruption of breeding and foraging activities resulting in reduced habitat carrying capacity.

Alternative S6 would have no identifiable impact on the Utah prairie dog or greater sage-grouse.

BLM and USFS Sensitive Species

Impacts on sensitive plants associated with implementation of this alternative would include 5.1 miles of moderate impacts on suitable habitat for the pinyon penstemon along Link 438. Moderate impacts on the species could include habitat destruction associated with the construction of temporary access roads, as well as permanent loss of habitat to Project facilities resulting in decreased population size.

Habitat for sensitive species potentially affected by this alternative route would include 24.5 miles of moderate impacts on potential pygmy rabbit habitat interspersed along the entire alternative. Moderate impacts on the pygmy rabbit would include temporary displacement, as well as foraging and breeding disruption during construction that may result in local population declines. Permanent impacts could include habitat loss, degradation, and fragmentation, as well as increased predation by raptors or ravens.

Other special status species that could be affected under this alternative include the bald eagle, American white pelican, long-billed curlew, Townsend‘s big-eared bat, dark kangaroo mouse, and kit fox. Moderate impacts on these species associated with construction could include disruption of foraging activities and displacement to adjacent less suitable habitats. Long-billed curlew, dark kangaroo mouse, and kit fox known to breed in the Project area could experience decreased reproductive success. Additional moderate impacts could include permanent habitat loss, modification, and fragmentation from removal of native vegetation, introduction of non-native vegetation, and installation of permanent facilities, as well as displacement from increased human activity.

Wild Horses and Burros

Wild horses and burros potentially affected by this alternative route include 8.4 miles of impacts on the Chloride Canyon HMA along Link 438. Low impacts on wild horses and burros would include temporary herd displacement during construction, resulting in increased grazing pressure on adjacent areas and removal of foraging resources for installation of permanent facilities.

3.2.4.6 Summary

On average, average impacts on biological resources associated with the construction, operation, and maintenance of a new overhead transmission line would be anticipated to be similar among all alternative routes.

IPP Colocation

Alternatives N1, N2, and N4 parallels the IPP transmission line, which would result in less impact on wildlife, due to the area having been disturbed previously by construction of the IPP line, than Alternatives N3, N5, and N6, which do not parallel the IPP transmission line. Similarly, Alternatives S1, S2, S3, and S4 parallel existing transmission lines for a portion of the alternative routes and would result in less impact than Alternative S6, which parallels existing transmission lines for about 5.0 miles, and Alternative S5, which does not parallel any lines at all.

Vegetation Communities

Alternatives N3, N5, N6, S5, and S6 would result in the most acres of vegetation clearing. Alternatives N6 and S6 would result in the most permanent disturbance of vegetation. However, there is not a large variation in area among alternative routes in this category (i.e., ranging from 256.0 to 313.0 acres among the alternative routes considered for the northern segment and from 150.0 to 215.0 acres among alternative considered for the southern segment). Alternative routes were not ranked by quantity of temporary disturbance because impacts would be mitigated by reclamation following the completion of construction activities.

Wildlife

Raptors

In the Project area, the highest quality raptor nesting habitats are found along the Tushar and Mineral Mountains and Pine and Ox Valleys. Medium quality habitats are found on the east side of the Tushar Mountains, the Horse Valley, and south of the Black Mountains along the IPP and Iron Springs routes. The lowest quality habitat is located along Black Rock Road and north of the Black Mountains along the IPP, where existing manmade structures are abundant. Alternatives N3, N5, and N6 would result in the most impacts on high quality raptor habitat among alternatives considered for the northern segment of the Project. Alternatives S2 and S4 would avoid high quality raptor habitat by colocation with the IPP line. All alternative routes would have some impact on raptor habitats.

Big Game

Mule Deer

For the northern alternative routes, Alternatives N3, N5, and N6 cross the most crucial winter habitat because of proximity to the Mineral Mountains. No crucial year-long or summer habitats are crossed by the northern alternatives. For the southern alternative routes, the alternatives colocated with the IPP line, S1, S2, S3, and S4, cross more crucial winter habitats. The Ox and Pine Valley Routes, Alternatives S1, S3, S5, and S6, cross more crucial summer habitats. The Ox Valley Routes, Alternatives S3 and S6 cross the most crucial year-long habitats.

Pronghorn

Crucial year-long habitats are located primarily in the Milford and Horse Valleys south to the Escalante Desert. Northern Alternatives N1 and N2 that follow Black Rock Road, eventually colocating with the IPP line, cross more crucial habitat while Alternatives N5 and N6, going over the Mineral Mountains, cross the least. Impacts along the southern alternative routes do not vary greatly, although the Alternatives colocated with the IPP line to the Antelope Mountains, Alternatives S1, S2, S3, and S4, cross slightly more crucial year-long habitats than the Iron Springs route. There are no crucial winter or summer habitats in the study corridors.

Elk

Crucial winter habitat is located along the Sigurd to Cove Fort segment, but is not crossed by the referenced centerline. Elk are not anticipated to be affected by this Project.

Special Status Species

A summary of Special Status Species by alternative is presented in Table 3-35.

Federally Listed Species

Utah Prairie Dog (Federally threatened)

Alternatives N3, N5, and N6 cross an active Utah prairie dog colony. The other alternative routes would not cross this resource and would not affect this species.

Southwestern Willow Flycatcher (Federally endangered)

Alternatives S1, S5, and S6 would cross habitat where the Southwestern willow flycatcher is known to breed and forage. The other alternative routes would not cross this resource and would not affect this species.

Sage-grouse (Federal candidate)

Alternatives N3, N5, and N6 pass within 2.0 miles of active sage-grouse leks. These same alternative routes would have the most impact on designated brooding habitat. Alternative N2 crosses more brooding habitat than Alternative N1 or N4. All northern alternatives would affect designated brooding habitat.

BLM and USFS Sensitive Species

Sensitive Plants

The Elsinore buckwheat, Utah phacelia, and Ward beardtongue all occur in similar habitats found only along the Sigurd to Cove Fort segment of the study corridors. All alternatives along this segment share the same alignment; therefore all northern alternative routes would result in the same amount of disturbance to sensitive plant populations. For the southern alternative routes, Alternatives S4, S5, and S6 cross suitable sensitive plant habitat for the pinyon penstemon. This habitat is avoided by Alternatives S1, S2, and S3.

Pygmy Rabbit

Impacts on pygmy rabbit habitat are fairly equal among the alternative routes. Of the northern alternative routes, Alternative N3 crosses the most mapped habitat with Alternatives N5 and N6 as second and third. Of the southern alternative routes, Alternative S6 crosses the most mapped habitat with Alternatives S2 and S5 as second and third.

Wild Horses and Burros

All southern alternative routes would affect the Chloride Canyon HMA. Impact on wild horses would be common to all alternative routes.

3.2.5 Cultural Resources

Issues raised by the public and agencies during Project scoping and preparation of the EIS related to potentially significant effects on cultural resources include impacts on archaeological and historic sites.

Specific resources cited were remnants of the Old Spanish Trail, Mountain Meadows Massacre Site, the Cove Fort Historic Site, and the Mineral Mountains obsidian sources.

Cultural resources include archaeological, historical, or architectural sites, districts, buildings, structures, places, and objects. They also include areas of traditional use, referred to as traditional cultural properties. The significance of a cultural resource depends on whether or not it is listed or eligible for listing on the NRHP, with the exception of TCPs, which do not have to be listed on the NRHP to be significant. Properties eligible for listing on the NRHP must demonstrate importance in American history, architecture, archaeology, engineering, or culture. A property is considered significant in these categories if it meets one or more of the following criteria (36 CFR 60.4):

> (a) are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) are associated with the lives of persons significant in our past; or
>
> (c) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) have yielded, or may be likely to yield, information important in prehistory or history.

In addition to demonstrating significance in one or more of the categories listed above, a property must demonstrate integrity. The historic property must be a "preservable entity" that demonstrates the qualities that make it significant. Integrity is judged most often on location, setting, design, materials, workmanship, feeling, and association.

To assist in the identification of historic properties (36 CFR 800.4), a Programmatic Agreement outlining the stipulations that would be followed concerning the identification, assessment, and treatment of cultural resources for the Project, including the cultural resource study conducted for this EIS, is being finalized. The BLM Fillmore Field Office is serving as the lead federal agency for Section 106. The following parties have been participating in development of the Programmatic Agreement.

- Signatory Parties
  - BLM Color Country District Manager
  - Dixie National Forest
  - Utah SHPO
  - ACHP
  - NPS
  - SITLA
  - Utah Department of Transportation
- Invited Signatory Parties
  - Rocky Mountain Power (Proponent)
- Concurring Parties
  - PLPCO
  - Paiute Indian Tribe of Utah
  - Hopi Tribe
  - Navajo Nation
  - Navajo Utah Commission
  - Southern Ute Tribe

- Ute Mountain Ute Tribe
- White Mesa Ute Tribe (Band of the Ute Mountain Ute)
- Church of Jesus Christ of Latter Day Saints
- Milford Archaeological Research Institute
- Mountain Meadows Association
- Mountain Meadows Massacre Descendents
- Mountain Meadows Monument Foundation
- National Trust for Historic Preservation
- Old Spanish Trail Association
- Oregon California Trails Association
- Utah Rock Art Research Association
- We Nooch Society

The Programmatic Agreement outlines a phased approach to the identification, assessment, and treatment of cultural resources for the Project, which includes a combination of Class I, Class II, and Class III cultural resource data collection to be conducted at specific stages of the Project. A Class I cultural resource inventory (literature search) was conducted during preparation of the EIS to identify previously documented cultural resource sites within a distance specified by the BLM of each alternative route. Class I data were used to identify cultural resource intensity zones and areas lacking existing data along proposed routes. Where Class I data were lacking, a Class II cultural resource inventory (reconnaissance) was performed to fill the gap in the Class I data. Class I and Class II cultural resource data collected for the Project were used to identify and assess potential impacts the Project may have on cultural resources and to support the evaluation of the alternative routes for the EIS. The data also will be included in a stand-alone cultural report developed to facilitate consultation, as required by Section 106 of the NHPA.

Cultural resources also would be considered during the post-EIS phase of the Project. Consultation with appropriate land-management agencies, tribal governments, and the SHPO would continue and Class III intensive pedestrian surveys of the selected route, associated access roads, substations, and similar ancillary facilities would be conducted. The results of the Class III inventory would be presented in a separate technical report. The final Class III Technical Report would enable BLM, in consultation with the SHPO, to identify NRHP-eligible properties and make determinations on eligibility of, and potential effects on, those properties. Following completion of the Class III cultural resource inventory, a comprehensive treatment plan addressing the effects of the proposed undertaking on identified historic properties would be prepared and implemented in consultation with the BLM, SHPO, and other involved agencies.

The purpose of this section is to summarize pertinent cultural resource law, present a cultural context of the Project area, identify the methods used in the study, present the study results, and compare each alternative route within the context of the known cultural resource inventory data.

3.2.5.1 Regulatory Framework and Permits

Federal legislation applicable to cultural resources in the Project area includes:

- NHPA (16 U.S.C. 470; 36 CFR 800) directs federal agencies to take into account the effects of their actions on historic properties and provide the ACHP a reasonable opportunity to comment.

- ARPA (16 U.S.C. 470aa to 470ee) authorizes federal land-management agencies to manage through a permit process the excavation and/or and remove of archaeological resources on federal

lands. The land-management agencies must consult with American Indian tribes with interests in resources prior to issuance of permits.

- NAGPRA (25 U.S.C. 3001-3002) provides a process through which federal agencies consult with affected Native Americans regarding the treatment and return of human remains, funerary objects, sacred objects, and items of cultural patrimony identified on federal lands as a result of a federal action.

- The American Antiquities Act of 1906 (16 U.S.C. 432-433) authorizes federal land-management agencies to manage through a permit process the excavation and/or and removal of archaeological resources on federal lands.

- E.O. 13007, issued in 1996, directs federal land-management agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

- Executive Order 11593, issued in 1971, directs federal land-management agencies to (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations, (2) initiate measures necessary to direct their policies, plans and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored, and maintained for the inspiration and benefit of the people, and (3), in consultation with the Advisory Council on Historic Preservation (16 U.S.C. 470i), institute procedures to assure that Federal plans and programs contribute to the preservation and enhancement of non-federally owned sites, structures and objects of historical, architectural or archaeological significance.

State statutes and guidelines include the following:

- UAC Sections 9-8-305 and R 694-1 require a permit be obtained from the Utah PLPCO to survey or excavate on any lands owned or controlled by the state, its political subdivisions, or by SITLA.

- UAC Section R652-40-500 directs the Division of Forestry, Fire, and State Lands, and SITLA to require cultural resource surveys be conducted and procedures for reasonable mitigation actions be submitted for projects that cross state lands.

- UAC Section R212-4 requires that if human remains are discovered in conjunction with a project subject to Section 106 the project proponent is responsible for all efforts associated with the excavation, analysis, curation or repatriation of the human remains and for notifying the Utah SHPO.

- UAC Section 9-8-309 provides a process through which landowner‘s or land management agencies consult with the State regarding the treatment of human remains discovered on nonfederal lands that are not state owned.

3.2.5.2 Cultural Context

Prehistory

The prehistory of the Project area parallels that of Utah and the Great Basin-Colorado Plateau in general. Major cultural changes are currently classified into four general time frames or phases: Paleoindian, Archaic, Formative, and Late Prehistoric. Each of these major phases is marked by distinct cultural patterns and particular adaptations (Table 3-40).

The cultural chronology for the Eastern Great Basin has gone through many variations of interpretation over the last few decades. Two of the most recent, comprehensive treatments available for this region are the 2008 report for the UNEV Pipeline Project (Price et al. 2008:132-188) and the Kern River 2003 Expansion Pipeline Project report (Reed et al. 2005). As the Project overlaps many of the same regions of the state, portions of the chronology have been adapted from these reports.

History

General Historical Overview

Utah state and county histories including railroad, mining, and transportation have been thoroughly documented in several recent reports. Two of the most recent, comprehensive treatments available for this region are the 2008 report for the UNEV Pipeline Project (Price et al. 2008:132-188) and the Kern River 2003 Expansion Pipeline Project report (Reed et al. 2005). As the Project overlaps many of the same regions of the state, portions of the chronology have been adapted from these reports. For further reading into the history of the state or the Project area consult Alder and Brooks, 1996; Bishop, 1997; Black and Metcalf, 1986; Bradley, 1999; Hull and Avery, 1980; Lyman and Newell, 1999; Poll et al., 1978; and Powell, 1994. The history of southern Utah can be divided into five major time periods associated with significant events and activities. The first period is the Exploration Period, ranging from approximately 1776 to 1847, and is characterized by the earliest exploration of the area by Spaniards and Euro-Americans. The second period is the Settlement Period, ranging from 1847 to 1870. The third period, the Community and Business Development, ranges from 1870 to 1929 and includes the development of a vast railroad network and the mining/industrial boom associated with World War I. The fourth period is the Depression Era, which ranges from 1929 to 1940, and is characterized by the bust of the local mining and agricultural industries as a result of the stock market crash. The fifth period, World War II and the Post-War Era, ranges from 1941 to the present and includes the economic recovery resulting from the war overseas, the rise of defense-related industries in Utah, and the increase in urbanization.

Exploration Period (1776 to 1847)

- **1776**. Dominguez-Escalante Expedition: earliest known exploration into the Great Basin by nonindigenous peoples. They were in search of a route from Santa Fe, New Mexico, to the California coast (Black and Metcalf 1986:18; Velez de Escalante 1995:xii).

- **1826**. Jedediah Smith led expeditions through central and southwestern Utah, including Sevier, Millard, and Beaver counties, in search of good trapping territory (Morgan 1953:196-197; Southworth and Farnsworth 2008:151).

TABLE 3-40
CULTURAL RESOURCES CLASS I INVENTORY DATA

Temporal Period	Generalized Lifeways	Diagnostic Artifacts	Local Manifestations	References
Paleoindian (ca. 12,000 to 8,000 B.P. [before the present])	Small groups practicing a highly mobile subsistence strategy with an emphasis on large game mammals, such as giant bison, mammoth, camel, and ground sloth.	Fluted and stemmed projectile points including: Clovis, Folsom, Lake Mojave, and Great Basin Stemmed.	Few surface sites and isolated finds of Clovis, Folsom, and Great Basin Stemmed projectile points.	Grayson 1993; Heizer and Baumhoff 1970; Justice 2002; Madsen 1982; Zier 1984
Archaic (ca. 8000 B.P. to 1500 B.P.) (Early Archaic, Middle Archaic, Late Archaic, and Terminal Archaic)	Increased focus on smaller game and a greater dependence upon plant resources (Early). Growing populations leading to refinement of social organization and settlement and subsistence patterns. Expansion into upland pinyon-juniper communities using milling stones, atlatls, and small game traps, (Middle – Late). Sedentary subsistence patterns; manufacturing of pottery and the introduction of domesticated maize (Terminal).	Elko Corner-notched, Pinto, Bitterroot Side-notched, Northern Side-notched, Humboldt, Gypsum and Gatecliff projectile points, pottery, and coiled basketry.	Lithic, tool, and ceramic scatters and complex campsites.	Aikens and Madsen 1986; Holmer 1978 and 1986; Jennings 1978; Price 2008; Reed et al. 2005; Simms 2008
Formative (ca. 1500 B.P. to 700 B.P.) (Sevier and Parowan Fremont)	Increased sedentism, cultivation of domesticated plants, and the appearance of villages. Semi-subterranean pit houses, and slab or clay lined storage pits.	Uinta Side-notched, Nawthis Side-notched, Eastgate Expanding-stem, Bull Creek, Cottonwood triangular, Rose Spring Corner-notched, and Parowan Basal-notched series points. Earthenware ceramics and basketry.	Small villages situated on alluvial fans near canyon mouths and permanent water sources. Satellite sites and temporary encampments are also common.	Holmer and Weder 1980; Jennings 1978; Madsen 1982; Madsen and Simms 1998; Marwitt 1970 and 1986; Price 2008
Late Prehistoric and Protohistoric (ca. 1300 A.D. to 1776 A.D.)	Small mobile hunting and gathering populations living in temporary wikiups and rockshelters.	Small triangular projectile points such as the Desert Side-notched and Cottonwood Triangular, basketry, and utilitarian and Brownware ceramics.	Lithic, tool, and ceramic scatters and campsites.	Aikens and Witherspoon 1986; Baumhoff and Bettinger1982; Janetski 1986:158; Jennings 1986; Lyneis 1982; Madsen 1975; Rhode and Madsen 1994

- **1829 to 1848**. The Old Spanish Trail was used, primarily during this time, as a commercial trade route between Mexican territories and California (Bradley 1999:42; Crampton 1979:361). The trail followed Indian trails, with local tribes serving as guides, and also portions of the route that the Dominguez-Escalante Expedition followed. The Old Spanish Trail traverses much of the Project area and is recognized as a National Historic Trail near Sigurd, Cedar City, Newcastle, Enterprise, Central, and Veyo.

- **1844**. John C. Fremont, a captain in the Army Corps of Topographical Engineers, was charged with exploring, mapping, and describing the interior West. He journeyed into southern Utah on two of his expeditions: first in 1844 and again a decade later during his winter expedition of 1853 to 1854 (Alder and Brooks 1996:8; Newell and Talbot 1998:54).

Settlement Period (1847 to 1870)

- **1847**. The main group of Mormon pioneers (members of the Church of Jesus Christ of Latter-day Saints [LDS]) arrived in the Salt Lake Valley. Shortly after, their religious leader, Brigham Young, sent a number of families to explore and settle portions of the territory.

- **1851 to 1874**. Parowan and Cedar City were settled in 1851, Beaver in 1856, Minersville in 1859, Richfield in 1863, Circleville in 1864, Milford in 1873, and Sigurd in 1874 (Van Cott 1990).

- **1857**. Mountain Meadows Massacre Mormon militia men, who may have been assisted by surrounding area Native Americans, attacked the Baker-Fancher wagon party at the Mountain Meadows encampment site. The siege lasted for 5 days ending on September 11, 1857, with the murder of approximately 120 men, women, and children (Reed 2010).

- **1857 to 1858**. War of Utah: The Conflict between Utah settlers and the U.S. Government over the issue of territorial governorship where 30,000 residents from northern Utah were ordered south by Young to seek refuge from Johnston's Army in communities farther south (Hull and Avery 1980:50). Many of these refugees remained in the area following the conclusion of the conflict.

- **1865 to 1868**. Black Hawk War: During the course of the war, Mormon settlers banded together in a series of forts established throughout the area. Under the leadership of Black Hawk, the Ute Indians united with the Paiute and Navajo tribes to raid Mormon settlements (Peterson 1994:44). The war ended with the signing of a peace treaty in 1868. One of the forts constructed during the war for the defense of the settlers was Cove Fort, built in 1867 (Van Cott 1990: 94; Southworth and Farnsworth 2008:153).

Community and Business Development (1870 to 1929)

- **1860s to 1900**. In Washington County, the primary industry was cotton production. The cotton industry had been established during the Civil War, but was maintained and thrived through much of the last part of the nineteenth century (Southworth and Farnsworth 2008:182, 183).

- **1870s to 1880s**. Small mines began production in Millard and Beaver counties. These mines produced salt, copper, silver, and gold (Southworth and Farnsworth 2008:174; Bishop 1997:143).

- **1879**. Denver and Rio Grande Railway began to build a line from Colorado to Salt Lake City via Salina (Bishop 1997:133).

- **1880**. Utah Southern Railroad Extension line came to Milford; it established the town as a major import and export hub for the region (Southworth and Farnsworth 2008:173; Bradley 1994:365).

- **1880s to 1900s**. Sevier County saw the construction of small salt and gypsum mining operations. Coal was also an industry that was established in Sevier County and produced several different ventures in coal mining throughout this time period (Bishop 1997: 104, 143, 164).

- **1891**. Sevier County Railway Company began construction of its own line between Salina and Marysvale (Bishop 1997:135).

- **1890s to 1910s**. In Iron County, the iron industry provided the basis for the local economy. This industry was centered in Cedar City and the area immediately surrounding it (Southworth and Farnsworth 2008:184).

- **1900 to 1920s**. Establishment of the Dixie National Forest, Manti La Sal National Forest, and Fishlake National Forest increased government control of lands (Bishop 1997:153; Southworth and Farnsworth 2008:174, 175, 186).

- **1910 to 1920**. Increased use of industrial ores during World War I created an economic mini-boom in mining towns. While miners and mining companies were the obvious beneficiaries of this war-time demand, area ranchers also enjoyed economic prosperity by selling larger quantities of beef to feed mine workers. Many Utah towns reached the height of their social and economic growth during this boom period.

- **1923**. Union Pacific opened a subsidiary that took tourists from the station at Lund and transported them to Cedar City where they then traveled to the various tourist destinations in the area (Southworth and Farnsworth 2008:186).

Depression Era (1929 to 1940)

- **1929**. The stock market crash in October heralded the onset of the Great Depression.

- **1934**. The Taylor Grazing Act of 1934 was intended to stabilize the economically volatile livestock industry and to stop the misuse of public lands through regulatory control of those lands by the Grazing Service. Many ranchers, however, could not afford permit fees to graze their livestock on public lands, and many were forced to sell off their herds (Hull and Avery 1980:56).

- **1935 to 1940**. The U.S. Government established programs of institutional relief. As part of President Franklin Roosevelt‘s New Deal, various forms of federal aid poured into struggling communities. In general, western states received more financial support than eastern states, with Utah ranking ninth overall in federal aid per capita (Holzapfel 1999:215).

World War II and the Post-War Era (1941 to Present)

- **1941 to 1944**. The war produced an increased demand for mineral and agricultural products and southern Utah was able to see a boom in the economy created by that demand (Southworth and Farnsworth 2008:176).

- **1945.** Sevier County saw the establishment of a German prisoner of war camp, which brought in cheap labor and some revenue above the agricultural businesses of the county (Bishop 1997:200).

- **1945 to Present**. Today, much of the economy for these counties is based on tourism and recreation (Southworth and Farnsworth 2008:177, 188). Sevier County, however, is also one of the strongest manufacturing counties in Utah (Bishop 1997:242, 283). With increased tourism and recreational opportunities, there has been a general trend towards population growth in the region in the last 20 years (U.S. Census 2000c). According to the 2000 census data, approximately 7 percent of the state‘s 2.2 million residents live within Sevier, Millard, Beaver, Iron, and Washington counties.

Old Spanish National Historic Trail

The Old Spanish National Historic Trail is a 1,200-mile long network of trails that once was a major caravan trade route that connected Santa Fe, New Mexico, and Los Angeles, California. Approximately one third of the entire trail system is in southern Utah, with more than 100 miles in Washington and Iron counties (Nay 1994). The Old Spanish Trail traverses much of the Project area and is recognized as a National Historic Trail near Sigurd, Cedar City, Newcastle, Enterprise, Central, and Veyo.

The earliest known exploration of this trail system by nonindigenous peoples was the 1776 Dominguez-Escalante expedition (Black and Metcalf 1986:18; Velez de Escalante 1995:xii). The Spanish friars were led by indigenous guides along the pathways that had already been in use for hundreds of years. The expedition passed through the Project area between October 8 and October 11, 1776 (Velez de Escalante 1995:84-90). The route followed by the Dominguez-Escalante expedition enters the Project area north of Milford and proceeds toward Minersville. It then veers west to the hot springs south of Thermo. From here, the route passes east of Lund, then trends south through Horse Hollow and into the valley where Cedar City now stands. The trail exits the Project area south of Cedar City (Velez de Escalante 1995:75-92).

Between 1776 and the 1820s the trail network was used extensively by fur trappers, traders, the U.S. military, and explorers. In 1829, a merchant from Santa Fe named Antonio Armijo, led the first successful round-trip (Santa Fe - Los Angeles - Santa Fe) caravan on the trail network (Warren 2004: 3). After the success of Armijo, commercial pack-mule caravans began making the trek to Los Angeles to trade goods primarily between 1829 and 1848. Highly valued commercial goods, such as raw wool and woven textiles, were transported from the New Mexico province to California where they were exchanged for horses and mules, which were equally highly valued in the deserts of the Southwest (Bradley 1999:42). An existing market for Paiute Indian slaves, supplied by neighboring Ute Indians, as well as the Spaniards and then later Mexican traders, expanded as commerce increased along the Old Spanish Trail. Paiute slaves were sold at markets in both California and New Mexico (Seegmiller 1998:156). It was during this time the trail was earning its namesake.

Some portions of the trail corridor began to see wagon traffic in the late 1840s. Mormon‘s expanding settlement and emigrants traveling west used portions of the Old Spanish Trail to traverse Utah to get to California. From that point, several segments of the trail are commonly referred to as The Mormon Trail and/or The Salt Lake Trail to Southern California (Crampton 1979:14).

In December of 2002, Congress designated The Old Spanish Trail as the fifteenth national historic trail. The Old Spanish National Historic Trail is administered by the BLM in cooperation with the NPS, working with other federal, state, and local government agencies, as well as private landowners. ―Today, only a few remnant traces of the trail can be seen where hundreds of fast trotting mules and their tired

drivers once traversed the high country of the Southwest on their way to California‘s fertile trading fields” (BLM 2010b).

Mountain Meadows Massacre Site

This section has been adapted from several written works on the topic. For further reading from the most current works see:

- 2006 Shannon A. Novak, Remembering Mountain Meadows
- 2008 Shannon A. Novak, House of Mourning
- 2008 Ronald W. Walker et. al., Massacre at Mountain Meadows
- 2010 Paula S. Reed, Mountain Meadows Massacre Site National Landmark Nomination Form

The Mountain Meadows Massacre Site is located approximately 7 miles south of Enterprise, Utah, and about 30 miles north of St. George, Utah, in a high valley in the northern part of the Pine Valley Mountains. The encampment site is situated at the bottom of the valley near a plentiful fresh water spring and adjacent to a small gully. The surrounding area provided abundant bunch grasses for the animals to graze. Mountain Meadows is located along part of The Old Spanish Trail, and was well known by travelers heading to California as a place to rest before embarking on the arduous passing of the Mojave Desert.

In late summer of 1857, a wagon train of approximately 120 emigrants from Arkansas and Missouri, known as the Baker-Fancher wagon train, were traveling through Utah west to California. The wagon party decided to take the southern route from Salt Lake City to ensure a safe passage as the colder months were quickly approaching (Reed 2010). After passing through Cedar City the Baker-Fancher wagon party pushed on and made camp at Mountain Meadows.

Earlier in the same year, the U.S. Government declared the Mormons of Utah as ―rebels” and sent a federal army west to ensure their compliance by replacing the Governor at the time, Brigham Young. The Mormons began to prepare themselves and were told by their leaders not to trade or sell any goods to the wagon parties that passed through their settlements to preserve what provisions they had for the likelihood of confrontation with the U.S. military (Reed 2010). This made travel through Utah very difficult, which raised tensions between the Mormons and the emigrants.

On September 7, 1857, a group of men, Mormon militiamen who may have been assisted by surrounding area Native Americans, attacked the Baker-Fancher encampment at Mountain Meadows (Novak and Rodseth 2006). A defense strategy was employed by the wagon party and members of both sides had been wounded and/or killed. The attack was said to have been due to several factors, including the tensions arising from the forecast of the Utah War. The fight continued for five days and on September 11, Mormon militiamen convinced the desperate emigrants they would lead them to the safety of Cedar City (Reed 2010). The emigrants surrendered their weapons and were separated into groups: those wounded, women and children over the age of six, men and teenage boys, and infants and toddlers. The infants and toddlers, totaling seventeen, were loaded onto a wagon that headed out of the meadow towards Cedar City. The women and remaining older children were sent by foot, escorted by militiamen, shortly after the wagon. A wagon of the wounded emigrants followed the women and the men were paced a couple hundred feet behind the rest, and when they were out of view of each other, an order was given and all but the infants and toddlers were slain at the hands of the Mormon militiamen. The men were shot at close range and the women and children had been bludgeoned to death (Reed 2010). John D. Lee, a respected Mormon leader who spearheaded the settlement of southern Utah, was charged with the responsibility of the massacre, and in 1877, was executed by firing squad at the Mountain Meadows site (Reed 2010).

Initially following the massacre, many of the remains were placed into shallow graves and scattered in the nearby gullies and ravines. Consequently, scavenging animals dug up some of the bones and distributed them elsewhere (Reed 2010). In summer of 1859, Brevet Major J.H. Carleton with his regiment of First Dragoons arrived at the site to bury the remains of the victims with help from Captain Ruben P. Campbell and three additional companies of troops (Reed 2010). After scouring the meadow for human remains, Major Carleton and his troops placed what they had found in a mass grave at the encampment site and built a monument constructed of loosely placed local granite boulders with an inscribed large wooden cross at the top (Reed 2010).

In May of 1864, the original monument had toppled and a replacement one was constructed by the U.S. Army. In the years that followed, the monument was neglected and reduced to a small pile of rubble until 1931 when Frank Beckwith Sr. of Utah wrote several newspaper articles encouraging people to resurrect the monument. On August 25, 1932, local residents constructed a new monument at the same site as the previous two (Reed 2010). In 1990, a monument located on top of Dan Sill Hill overlooking the encampment site and 1932 monument was constructed from a slab of granite inscribed with the known names of the victims. In 1999, the Mountain Meadows Association along with the LDS church erected a new monument over the site of the 1932 monument and the original 1859 mass gravesite (Reed 2010).

The Mountain Meadows Site sits on land currently owned by the LDS church; surrounding parcels of land are managed by the USDA Dixie National Forest or are privately owned. In 1975 a seven-section parcel was nominated to the NRHP and has been managed as a Historic District since. Two parcels of land within the larger Historic District site have been nominated to become a National Historic Landmark (NHL) and a review in Washington, D.C., occurred on November 2, 2010. The status of Mountain Meadows Historical Landmark has yet to be officially determined.

3.2.5.3 Study Methodology

Inventory

Baseline cultural resource data were collected within a 4-mile-wide study corridor (2 miles on either side of the reference centerline) for each alternative route. Baseline data consists of Class I data (previously recorded cultural resource sites on file with the Utah Division of State History, Utah SHPO in Salt Lake City), NRHP-listed properties, NHLs, and Class II data (reconnaissance-level field-survey data). The Class II survey was conducted only on alternative routes with less than 30 percent previous inventory.

Class I Literature Search

A Class I cultural resources inventory for the Project involved obtaining existing information on known sites and previous cultural resource projects and published sources from the files of a number of agencies and institutions, including the SHPO, BLM, and other appropriate land-management agencies. In addition to this information, the NRHP and the county historic files of the SHPO also were reviewed to identify historic properties located within the study corridor.

Class II Cultural Resources Inventory

A Class II cultural resource inventory was conducted for areas where an insufficient body of data existed to complete analysis for comparing the alternative routes for the EIS. Class II data will be incorporated into the Class III inventory, where applicable. Those alternative route link segments identified as having

less than 30 percent acceptable previous cultural resource survey coverage, as determined by the involved land-management agencies, were considered data gaps for the purposes of the present study methodology. These areas were divided into 1-mile-long segments and a random sample of 20 percent of those segments identified as data gaps were selected for inventory. Class II inventory segments were selected randomly from a GIS analysis of federal lands filtered to exclude areas where data gaps have not been identified. The selected segments were inventoried at a Class III level within a 350-foot-wide corridor. This inventory consisted of parallel transects spaced 15 meters apart, centered on the reference centerline along the alternate route. All sites located during the inventory were fully documented and will be reported in the Class II Cultural Resource Report.

Cultural Resource Sites Selected for Cultural-Visual Studies

In addition to identifying cultural resource sites and historic properties associated with alternative routes, a methodology has been developed to identify cultural resource sites that could be visually affected by the Project. Under ACHP guidelines, a visual effect must alter, directly or indirectly, a characteristic of that property that qualifies it for inclusion to the NRHP, and do so in a manner that would diminish that property‘s integrity of setting, feeling, and/or association (ACHP 2010).

Assessment of visual effects on historic properties is based in part upon the NRHP evaluation of integrity. According to the NRHP guidelines, integrity is defined as the ability of an historic property to convey its own significance and evaluations of integrity must always be grounded in an understanding of a property‘s physical features and how they relate to its significance (NPS 1995:44). A historic property‘s integrity encompasses seven unique aspects: location, setting, design, material, feeling, workmanship, and association. Setting, feeling, and association are closely related to a property‘s physical environment and aesthetic character and help convey a property‘s historic character; as such, these aspects of integrity are considered visually sensitive. A historic property‘s setting is the physical environment of that property and refers to the character of the place in which the property played its historic role. A historic property‘s feeling and/or association is the property‘s own expression of the historic sense of a particular period of time and results from the presence of physical features of the property that, taken together, convey the property‘s historic character and association (NPS 1995:44-48).

Based upon these considerations, the following site types are considered visually sensitive:

- Class I Eligible Sites
  - National Historic Sites, Monuments, District, etc.
  - Determined/Recommended NRHP Eligible under Criteria A, B, or C
  - Determined/Recommended NRHP Eligible under Criteria D with surface structures (burials, rock shelter, rock art, antelope traps, etc.)
- Class I Unevaluated Sites
  - Surface structures (rock shelter, rock art, antelope traps, etc.)
- Class II Eligible Sites
  - Determined/Recommended NRHP Eligible under Criteria A, B, or C
  - Determined/Recommended NRHP Eligible under Criteria D with surface structures (burials, rock shelter, rock art, antelope traps, etc.)
- TCP
  - Determined/Recommended NRHP Eligible under Criteria A, B, or C

A summary of sites that could be visually adversely affected by the Project is presented in Section 3.2.5.4. It is important to note that for the purposes of the EIS, classification as a visually sensitive site does not equate with a visual impact. It is unknown at this time if visually sensitive sites will in fact be visually

affected by the Project. Once a route is selected, field visits will be conducted at all visually sensitive sites along the selected route to assess the visual impact of the Project on each site. The results of the field visits will be reported in the Class III Technical Report.

Impact Assessment and Mitigation Planning

As outlined in the Programmatic Agreement, direct and indirect impacts on cultural resources would be assessed after completion of the EIS and addressed in a treatment plan. For the purposes of this EIS, a cultural intensity assessment methodology was developed to identify and evaluate the potential for impacts on cultural resources associated with implementation of the alternative routes considered in this EIS. Once a route has been selected, the BLM would continue to consult with appropriate agencies, tribal governments, and consulting parties. A Class III inventory (intensive pedestrian survey) of the selected route and associated access roads, substations, and ancillary facilities would be conducted. All cultural resources identified during the intensive surveys would be evaluated for eligibility to the NRHP based on criteria set forth in the federal regulation 36 CFR 60.4. The results of the Class III inventory would be presented in a separate technical report. The final Class III Technical Report would facilitate BLM, in consultation with the SHPO, to identify NRHP-eligible properties and make determinations on eligibility of, and potential effects on, those properties. Following completion of the Class III Technical Report, a comprehensive treatment plan addressing the effects of the proposed undertaking on identified historic properties would be prepared and implemented in consultation with the BLM, SHPO, other involved agencies, and consulting parties.

General Observations and Data Gaps

The baseline Class I and Class II data used in this study represent the most current information available regarding known cultural resources within the 4-mile wide study corridors for each alternative. This data is being used for the purposes of the EIS analysis to assess the initial impacts on cultural resources along the alternatives and subsequently apply cultural preference rankings to the proposed alternatives. In this study, initial impacts on cultural resources are defined as those impacts that would occur to cultural resources without the application of mitigation measures such as avoidance or data recovery. The preference rankings are evaluations of the alternatives against each other based upon the overall cultural resource intensity for each alternative.

There are limitations of using the Class I and Class II data in this fashion that should be noted. Most importantly, this is an incomplete data set. The Class I and Class II data represent only the *known* and *documented* cultural resources within the study corridors and are indicative of where cultural resource Class III intensive inventories have occurred. Without additional Class III intensive inventories, which would be required under the Programmatic Agreement in compliance with the Section 106 process, the extent or lack of cultural resources along many miles of each alternative is not known for consideration in the EIS. Comparisons between the alternatives are also limited by the fact that each alternative has a unique amount of previous Class III intensive survey coverage. For example, among the northern alternatives (N1–N6) each of the six alternatives has been fairly well surveyed at a Class III intensive level; the least amount of survey conducted for an alternative is 46 percent (N1) and the most is 65 percent (N6). The southern alternatives (S1–S6), however, are far less equally balanced; less than 5 percent of one alternative (S5) has been surveyed, while another alternative (S2) has been nearly completed with 93 percent of the alternative surveyed.

In addition, there are significant methodological variations in site recordation standards among the more than 1,700 sites in the study area. These sites have been documented over the course of several decades

and professional standards in site recordation methods have changed significantly during this time. Some sort of form has been used to document archaeological sites in Utah since the early 1950s when the University of Utah first initiated broad-ranging statewide surveys using forms created specifically for that project, which were then cataloged at the university. And while the level of documentation was very superficial by today‘s standards, it represented an often drastic improvement over earlier recording practices. In the 1960s, federal agencies and other universities and museums developed different site forms reflecting varying degrees of detail that were then cataloged at different locations. Even though the Smithsonian trinomial site numbering system has been applied in Utah since the 1950s, some entities continued to apply different numbering systems, creating confusion among data managers seeking a uniform clearinghouse for all of Utah‘s archaeological data.

The 1966 passage of the National Historic Preservation Act created a mechanism for each state to designate a state historic preservation officer, who became the impetus for centralized data storage at the state level. In Utah and other western states, these officials repeatedly struggled with the vast array of different site forms, the scattered catalogs of site data at various federal agencies and universities, and inconsistencies in the level of site documentation. In 1981, uniform statewide procedures were established for the documentation of archaeological and historic sites, resulting in the creation of the Intermountain Antiquities Computer System (IMACS). Although it has been standard practice to submit site data to the state for decades, this was not always done, and it is likely there are unidentified site forms with temporary numbers filed away and forgotten in the archives of federal and state agencies and research institutions.

There are hundreds of sites in the area under discussion which pre-date the use of the now standard IMACS site form. Many of the pre-IMACS recordations have neither NRHP recommendations nor any temporal or cultural affiliations. Cultural affiliations aid in the understanding of population settlement patterns and migration patterns within the Project area, and can indicate whether a given site is extremely rare, such as a Paleoindian site, or extremely common, such as a mid-20th century roadside trash scatter. Without this data, it is not possible to demonstrate any general patterns or to allow interpretive discussions, even in general terms. These data are also extremely important for making NRHP recommendations, which then in turn determine the levels of protection sites should be afforded if the Project were to be undertaken. Sites that are recommended eligible for listing in the NRHP receive more protection than those recommended not eligible.

Given the variations in site recordation standards, the most important information that can be obtained from the site forms is locational data, which provides for an understanding of site distribution patterns across the Project area. Understanding site distribution patterns allows for the preparation of a simple map that visually represents the presence of sites throughout the Project area. However, this merely identifies the presence (or absence) of sites in locations that have been surveyed for cultural resources, and it is important to note that the absence of sites in areas where cultural resources surveys have not been conducted does not necessarily mean an absence of cultural resource sites in those locations. The locations are essentially data gaps. As stated elsewhere, once a route is selected, archaeologists will conduct comprehensive Class III studies, eliminating any data gaps that might exist along that route.

Types of Potential Environmental Effects

The construction, operation, and maintenance of the Project would result in both direct and indirect adverse effects on cultural resources. The primary cultural resource impact issue is the loss or degradation of prehistoric and historic archaeological sites. Three types of impacts could affect archaeological sites:

1. Direct and permanent ground disturbance during construction
2. Direct and long-term visual and auditory intrusions
3. Indirect and permanent disturbances due to changes in public accessibility

Criteria for Assessing Intensity of Impacts

The cultural resource methodology for assessing the potential for impacts involved a two step process: assignment of intensity levels and assignment of overall preference rankings. The first step was to identify the extent of cultural resource intensity along each alternative based on the presence of known cultural resource sites. Criteria were developed to evaluate the cultural resource intensity of each alternative route in 0.1-mile segments. Based on location of cultural resources within the Project area, cultural intensity levels (high, moderate, low) were assigned. This information was then compiled, and the length of each intensity level was calculated for each alternative route (refer to Table 3-42). The criteria used to define intensity are as follows:

High Cultural Intensity. Includes any cultural resource site (regardless of NRHP eligibility) or historic property within the proposed 350-foot cultural resource intensive pedestrian survey corridor in the Project APE (i.e., 175 feet on either side of the reference centerline). Based on NRHP eligibility, site complexity, and the location of these resources within the Project APE, this impact level will include three different categories:

a) Sites eligible for the NRHP that are more difficult to avoid by construction, and avoidance may or may not eliminate adverse effects. Data recovery studies, if required, could involve a greater number of features.

b) Sites eligible for the NRHP that are more easily avoided by construction and are expected to result in few, if any, adverse effects. Data recovery studies, if required, would involve fewer features and are unlikely to encounter human remains.

c) Sites not eligible for the NRHP; therefore, no adverse effects would occur to the sites.

Moderate Cultural Intensity. Includes any cultural resource site (regardless of NRHP eligibility) or historic property located within 500 feet of the proposed Project APE (i.e., between 175 feet and 675 feet from either side of the reference centerline).

Low Cultural Intensity. Includes any cultural resource site (regardless of NRHP eligibility) or historic property located more than 675 feet from the centerline up to the extent of the 4-mile-wide study corridor (i.e., to 10,560 feet on either side of the reference centerline).

Overall cultural resource preference rankings were then assigned to all alternative routes based on the calculated mileages of cultural resource intensity. The alternative with the fewest miles of high resource intensity (i.e., the fewest number of known cultural resource sites within the 350-foot-wide cultural resources inventory APE) ranks first, while the alternative with the highest miles of high intensity ranks last. A total of six rankings are provided for the northern and the southern segment alternative routes.

Effects Analysis

Assessment of Initial Impacts

Initial cultural resource intensity levels are the basis for assessing initial impacts on cultural resources associated with implementation of the Project. The initial cultural resource intensity levels were assigned using the criteria presented above. Table 3-41 summarizes the initial cultural resource intensity levels that provided the basis for assessing initial impacts on cultural resources.

TABLE 3-41
SUMMARY OF ESTIMATED CULTURAL RESOURCE IMPACTS[1, 2]

Alternative Route	Alternative length (miles)	Low Impacts	Moderate Impacts	High Impacts
Alternative N1 (Environmentally Preferred)	120.7	98.4	11.6	10.8
Alternative N2	120.3	91.5	12.5	16.5
Alternative N3	117.2	68.3	21.0	28.5
Alternative N4	109.4	87.2	10.9	11.5
Alternative N5	106.3	64.0	19.4	23.4
Alternative N6 (Proponent‘s Proposed Action)	105.5	80.8	11.0	14.2
Alternative S1	56.0	53.8	0.8	2.3
Alternative S2 (Environmentally Preferred)	49.6	41.8	1.4	6.4
Alternative S3	57.6	55.4	1.2	1.0
Alternative S4	48.9	47.6	0.3	1.3
Alternative S5 (Proponent‘s Proposed Action)	59.0	56.4	0.8	2.0
Alternative S6	61.9	59.2	1.2	1.7

NOTES:
[1]All impacts are estimated in miles.
[2]Based on cultural resource intensity.

Mitigation Planning

In consultation with appropriate land-management agencies and SHPO and in accordance with the Programmatic Agreement entered into between the Proponent, BLM, USFS, and the State of Utah (Section 3.2.5), specific mitigation measures for cultural resources would be developed and implemented to mitigate any identified adverse impacts. These may include Project modifications to avoid adverse impacts, monitoring of construction activities, and data recovery studies.

Impacts on significant cultural resource properties can be effectively reduced and, in some instances, eliminated through Project planning. Avoidance is the preferred mitigation for cultural resources. Spanning of the sites and the selective alignment of new access roads would likely provide adequate avoidance and reduce the impacts on cultural properties. If avoidance is not possible, other mitigation efforts would be necessary. All mitigation efforts will be in accordance with the requirements of the Programmatic Agreement negotiated for this Project and documented in a Historic Properties Treatment Plan. The Historic Properties Treatment Plan is confidential. As identified in the Programmatic Agreement, the Historic Properties Treatment Plan will provide information on the following:

- A brief description of the proposed action
- A list of the properties where data recovery is to be carried out
- A list of properties that will require archaeological monitoring during construction
- An archaeological construction monitoring plan
- Research questions to be addressed

- Methods to be used during fieldwork for data recovery
- A cultural resource unanticipated discovery plan
- Methods to be used during analysis
- Reporting and curation of artifacts
- Schedule for the submission of progress reports
- Recommendations for treatment of cultural resources during operation and maintenance of the Project
- Qualifications of consultants employed to undertake the work
- Training protocols for contractors

3.2.5.4 Results

Cultural Resource Sites and Historic Properties

Class I and Class II Inventory

The Class I inventory resulted in the identification of 1,716 previously recorded cultural resources within the 4-mile-wide study corridor. The sites consist of 1,343 prehistoric sites, 265 historic sites, and 108 multi-component sites (prehistoric and historic components). The Class II inventory resulted in the identification of 22 newly recorded cultural resources within the 350-foot APE study corridor. The sites consist of 19 prehistoric sites, 1 historic site, and 2 multi-component sites (prehistoric and historic components). These cultural resources include prehistoric sites such as artifact scatters, lithic quarries, storage sites, short- and long-term habitation sites, rock shelter and cave sites, rock art sites, burials, and villages. Historic sites largely comprise artifact scatters/dumps, short- and long-term habitation sites, rock art, trails and roads, ditches and canals, utility lines, railroads, cemeteries, and town sites. These sites encompass a broad range of cultural occupations spanning the Paleoindian Period thru the historical period (mid-twentieth century). Table 3-42 provides a summary of the Class I and Class II inventory data for each alternative route, and the inventory results for each alternative route is summarized in subsequent paragraphs.

Historic Properties Listed on the National Register of Historic Places

A search of the NRHP records identified 14 historic properties listed on the NRHP within the Project study area. This includes 11 historic buildings and 3 archaeological sites. Archaeological sites listed on the NRHP include the Negro Mag obsidian source (42BE88), a very large obsidian source and lithic quarry with an historic component (The Hot Springs Tuberculosis Sanitarium); the Wildhorse Canyon obsidian source (42BE52), an extensive lithic procurement and reduction area with historic refuse; and the historic Mountain Meadows Massacre Site (42WS2504).

National Historic Trails

There is one National Historic Trail within the Project area. The Old Spanish Trail traverses much of the Project area and is recognized as a National Historic Trail (NHT) near Sigurd, Cedar City, Newcastle, Enterprise, Central, and Veyo. The Old Spanish NHT is a 1,200-mile long network of trails that once was a major caravan trade route that connected Santa Fe, New Mexico, and Los Angeles, California. Approximately one-third of the entire trail system is in southern Utah, with more than 100 miles in Washington and Iron counties (Nay 1994; refer to Section 3.2.5.2 for an Old Spanish Trail history summary).

TABLE 3-42
CULTURAL RESOURCES CLASS I AND CLASS II INVENTORY DATA

Alternative Route	Intensive Pedestrian Inventory Status		National Register Eligible Sites			Not Eligible Sites			Unevaluated Sites			Total Number of Sites
	Inventoried (Percent)	Not Inventoried (Percent)	Number of Prehistoric Sites	Number of Historic Sites	Number of Multi-Component Sites	Number of Prehistoric Sites	Number of Historic Sites	Number of Multi-Component Sites	Number of Prehistoric Sites	Number of Historic Sites	Number of Multi-Component Sites	
Alternative N1 (Environmentally Preferred)	46	54	221	46	34	179	94	13	110	7	9	713
Alternative N2	49	51	227	44	31	276	109	20	128	7	10	852
Alternative N3	59	41	252	38	33	290	107	24	115	7	9	875
Alternative N4	53	47	142	37	25	221	77	6	110	7	2	627
Alternative N5	64	36	167	31	27	235	75	10	97	7	1	650
Alternative N6 (Proponent‘s Proposed Action)	65	35	143	25	22	266	64	7	104	5	2	638
Alternative S1	47	53	28	8	1	15	10	1	35	1	1	100
Alternative S2 (Environmentally Preferred)	93	7	37	9	4	36	15	2	24	0	1	128
Alternative S3	78	22	13	7	1	30	15	2	63	1	1	133
Alternative S4	70	30	15	6	2	25	11	3	13	0	1	76
Alternative S5 (Proponent‘s Proposed Action)	5	95	26	8	2	21	15	0	35	1	1	109
Alternative S6	27	73	13	6	1	31	18	0	62	1	1	133

The Old Spanish Trail is administered by the BLM in cooperation with the NPS, working with other federal, state, and local government agencies, as well as private landowners. The designation as a NHT requires that BLM and USFS ensure project-level decisions comply with management prescriptions established in relevant land use plans (e.g., BLM RMPs, USFS LRMPs, or NPS general management plans).

Three locations of the Old Spanish Trail have been formally recorded as cultural resource sites within the Project area and are included in the Class I data and analysis. It should be noted, however, none of these recorded segments are listed on the NRHP. If a route is selected, field visits will be conducted along the Old Spanish Trail route in all locations where intact trail segments could remain and be visible in the form of swales, ruts, and so forth. If physical evidence of the trail is identified, the trail segment will be documented as an archaeological site, evaluated for NRHP eligibility, evaluated for project affect, and reported in the Class III Technical Report.

National Historic Landmark

As discussed in Section 5.5.3.2, the Mountain Meadows Massacre Site has been nominated to become a NHL and a review in Washington, D.C., occurred on November 2, 2010. The status of Mountain Meadows Historical Landmark has yet to be officially determined. A designation as a NHL requires BLM and USFS, ~~"to~~ the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to any National Historic Landmark that may be directly and adversely affected by an undertaking" (36 CFR 800.10). Additionally, the designation as an NHL requires BLM and USFS ensure project-level decisions comply with management prescriptions established in relevant land use plans (e.g., BLM RMPs, USFS LRMPs, or NPS general management plans).

Cultural Resource Sites with Visual Sensitivity

The cultural visual resource study identified 195 visually sensitive cultural resource sites. These sites are eligible for NRHP listing under criteria A, B, C, or D, or formally listed on the NRHP within the 4-mile-wide study corridors for each alternative route and meet the integrity criteria discussed in Section 3.2.5.3. Prehistoric sites that meet the criteria include mound sites, village sites with surface structures and features, cave complexes and rock shelters, burials, and rock art. Historic sites that meet the criteria include village/town sites with surface structures or features, homesteads, farmsteads and ranch sites with surface features, inscriptions, cemeteries, mines with associated surface features, and General Land Office (GLO) linear features (railroads, canals, roads and trails, utility lines).

Cultural Resource Intensity

Based upon the presence and locations of known cultural resources identified during the Class I and Class II inventories, impacts on cultural resources generally were rated as low to moderate throughout the Project area. BMPs (refer to Table 2-6) incorporated into the Project description would reduce impacts further. The selected route would be subject to Class III (intensive) investigations and a comprehensive treatment plan addressing the effects of the proposed undertaking on historic properties would be prepared and implemented prior to Project construction. A summary of the estimated impacts associated with each alternative route is presented in Table 3-41.

No Action Alternative

Under this alternative, the environment would remain as it presently exists. This option would forego the opportunity to develop cultural resource inventories along the route approved for construction and any collection of cultural resource data that might be discovered during Project construction.

Northern – Sigurd Substation to South Black Mountains

Alternative N1 – Black Rock Road to IPP North of Milford Wind Farm

Affected Environment

Cultural Sites

A total of 713 cultural resource sites were identified in the Class I inventory for Alternative N1, including 510 prehistoric sites, 147 historic sites, and 56 multi-component sites (Table 3-42). The prehistoric sites include nondiagnostic lithic scatters; open campsites or habitation sites, frequently with diagnostic artifacts and artifact concentrations, surface features, and activity areas; rock shelters and cave sites; rock art sites; circular rock alignments (possible wikiups); Fremont villages, including one with burials; two additional burial sites; and Paleoindian and Early Archaic sites (ca. 12,000 B.P. to 5,000 B.P.). Among the historic sites are the Koosharem Band Paiute Indian Reservation Village, the Star Cemetery associated with the North Star Mining District, a bridge associated with the Civilian Conservation Corps, and a variety of can scatters, trash dumps, homesteads, and farmsteads. The multi-component sites include prehistoric rock art and historic inscription panels, prehistoric campsites with historic artifact scatter components, an historic homestead with a prehistoric lithic scatter component and an historic ranch with prehistoric rock art. Of the 713 cultural resource sites, 301 sites are NRHP eligible, 286 sites are not eligible for the NRHP, and 126 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 713 cultural resources sites associated with Alternative N1, a total of 118 sites were identified as visually sensitive. These sites include 75 prehistoric sites, 35 historic sites, and 8 multi-component sites. Prehistoric sites are represented by rock art sites, rock shelter or cave sites, habitation sites with surface features, stone circle (possible wikiup) sites, two burial sites, a mound site, a Fremont village with associated burials, a granary, and a rock cairn. Historic sites include the Koosharem Band Paiute Indian Reservation Village, the Star Cemetery, mine sites associated with the North Star Mining District, homesteads or farmsteads, canals, GLO roads, railroads, and a historic inscription panel. Multi-component sites include prehistoric rock art and historic inscription panels, a historic homestead with a prehistoric lithic scatter component, and a historic ranch with prehistoric rock art panels.

Historic Properties Listed in the National Register of Historic Places

The NRHP records search identified nine historic properties listed on the NRHP along Alternative N1. The nine properties include Cove Fort constructed in 1867, Elsinore Sugar factory constructed in the early 1900s, Elsinore White Rock Schoolhouse built in 1896, Ralph Ramsay pioneer home built in 1873–1874, Richfield Carnegie Library built in 1913, Richfield U.S. Post Office constructed in the early 1900s, Young Block building constructed in 1907, Jen Larson Jenson lime kiln constructed in 1903, and Joseph William Parker Home constructed in 1875.

Environmental Effects

Of the six alternative routes under consideration for the Northern – Sigurd Substation to South Black Mountains Route, Alternative N1 ranks first in the cultural resources preference rankings (Table 2-11). This alternative has the fewest miles of high cultural resource intensity. Alternative N1 would be anticipated to have approximately 98.4 miles of low cultural intensity, 11.6 miles of moderate cultural intensity, and 10.8 miles of high cultural intensity. The 10.8 miles of high cultural intensity is the result of 37 cultural resource sites located within the Project's APE along this alternative. This includes 13 NRHP-eligible sites, 21 not eligible sites, and 3 unevaluated sites. If this alternative were selected, all 37 of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative N2 – Black Rock Road to IPP South of Milford Wind Farm

Affected Environment

Cultural Sites

A total of 852 cultural resource sites are located within the 4-mile-wide study corridor along Alternative N2, including 631 prehistoric sites, 160 historic sites, and 61 multi-component sites (Table 3-42). The prehistoric and historic site types are the same as Alternative N1. The multi-component site types are the same as Alternative N1, with the addition of two NRHP-listed sites, the prehistoric Wildhorse Canyon Obsidian Source with a historic trash scatter, and the prehistoric Negro Mag obsidian source and the historic Hot Springs Tuberculosis Sanitarium. Of the 852 cultural resource sites, 302 sites are NRHP eligible, 405 sites are not eligible for the NRHP, and 145 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 852 cultural resources sites associated with Alternative N2, a total of 133 sites associated were identified as visually sensitive. These sites include 80 prehistoric sites, 43 historic sites, and 10 multi-component sites. Prehistoric and historic site types are the same as Alternative N1. Multi-component site types are the same as Alternative N1, with the addition of the prehistoric Negro Mag obsidian source and historic Hot Springs Tuberculosis Sanitarium site.

Historic Properties Listed in the National Register of Historic Places

Alternative N2 is the same as Alternative N1, with the addition of two archaeological sites, the prehistoric Negro Mag obsidian source and historic Hot Springs Tuberculosis Sanitarium site, and the Wildhorse Canyon obsidian source site.

Environmental Effects

Of the six alternative routes under consideration for the Northern – Sigurd Substation to South Black Mountains Route, Alternative N2 ranks fourth in the cultural resources preference rankings (Table 2-11). This alternative is among the alternative routes with a higher number of miles of high cultural resource intensity. Alternative N2 would be anticipated to have approximately 91.5 miles of low cultural resource intensity, 12.5 miles of moderate cultural resource intensity, and 16.5 miles of high cultural resource intensity on cultural resources. The 16.5 miles of high cultural intensity is the result of 46 sites located within the Project's APE along Alternative N2. This includes 17 NRHP-eligible sites, 24 not eligible sites, and 5 unevaluated sites. If this alternative were selected, all 46 of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative N3 – Black Rock Road Parallel to Kern River Pipeline

Affected Environment

Cultural Sites

A total of 875 cultural resource sites are located within the 4-mile-wide study corridor along Alternative N3, including 657 prehistoric sites, 152 historic sites, and 66 multi-component sites (Table 3-42). The prehistoric, historic, and multi-component site types are the same as Alternative N2. Of the 875 cultural resource sites, 323 sites are NRHP eligible, 421 sites are not eligible for the NRHP, and 131 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 875 cultural resources sites associated with Alternative N3, a total of 123 sites were identified as visually sensitive. These sites include 84 prehistoric sites, 30 historic sites, and 9 multi-component sites. The prehistoric, historic, and multi-component site types are the same as Alternative N2.

Historic Properties Listed in the National Register of Historic Places

Alternative N3 is the same as Alternative N2.

Environmental Effects

Of the six alternative routes under consideration for the Northern – Sigurd Substation to South Black Mountains Route, Alternative N3 ranks last in the cultural resources preference rankings (Table 2-11). This alternative has the highest miles of high cultural resource intensity. Alternative N3 would be anticipated to have approximately 68.3 miles of low cultural resource intensity, 21 miles of moderate cultural resource intensity, and 28.5 miles of high cultural resource intensity. The 28.5 miles of high cultural intensity is the result of 78 sites located within the Project's APE along Alternative N3. This includes 36 NRHP eligible sites, 37 not eligible sites, and 5 unevaluated sites. If this alternative were selected, all 78 of these sites would be visited during Class III studies and updated site information

provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative N4 – Mineral Mountains to IPP South of Milford Wind Farm

Affected Environment

Cultural Sites

A total of 627 cultural resource sites are located within the 4-mile-wide study corridor along Alternative N4, including 473 prehistoric sites, 121 historic sites, and 33 multi-component sites (Table 3-42). The prehistoric, historic, and multi-component site types are the same as Alternative N2. Of the 627 cultural resource sites, 204 sites are NRHP eligible, 304 sites are not eligible for the NRHP, and 119 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

A total of 116 cultural resource sites associated with Alternative N4 were identified in the cultural visual study. These sites include 71 prehistoric sites, 35 historic sites, and 10 multi-component sites. The prehistoric, historic, and multi-component site types are the same as Alternative N2.

Historic Properties Listed in the National Register of Historic Places

Alternative N4 is the same as Alternative N1.

Environmental Effects

Of the six alternative routes under consideration for the Northern – Sigurd Substation to South Black Mountains Route, Alternative N4 ranks second in the cultural resources preference rankings (Table 2-11). It has among the fewest miles of high cultural resource intensity. It would be anticipated to have approximately 87.2 miles of low cultural resource intensity, 10.9 miles of moderate cultural resource intensity, and 11.5 miles of high cultural resource intensity. The 11.5 miles of high cultural intensity is the result of 39 sites located within the Project‘s APE along Alternative N4. This includes 13 NRHP eligible sites, 2 NRHP listed properties, 20 not eligible sites, and 4 unevaluated sites. If this alternative were selected, all 39 of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative N5 – Mineral Mountains Parallel to Kern River Pipeline

Affected Environment

Cultural Sites

A total of 650 cultural resource sites are located within the 4-mile-wide study corridor along Alternative N5, including 499 prehistoric sites, 113 historic sites, and 38 multi-component sites (Table 3-42). The prehistoric, historic, and multi-component site types are the same as Alternative N2. Of the 650 cultural resource sites, 225 sites are NRHP eligible, 320 sites are not eligible for the NRHP, and 105 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 650 cultural resource sites associated with Alternative N5, a total of 106 sites associated were identified as visually sensitive. These sites include 68 prehistoric sites, 29 historic sites, and 9 multi-component sites. The prehistoric, historic, and multi-component site types are the same as Alternative N2.

Historic Properties Listed in the National Register of Historic Places

Alternative N5 is the same as Alternative N1.

Environmental Effects

Of the six alternative routes under consideration for the Northern – Sigurd Substation to South Black Mountains Route, Alternative N5 ranks next to last in the cultural resources preference rankings (Table 2-11). It has among the highest miles of high cultural resource intensity. It would be anticipated to have approximately 64.0 miles of low cultural resource intensity, 19.4 miles of moderate cultural resource intensity, and 23.4 miles of high cultural resource intensity on cultural resources. The 23.4 miles of high cultural intensity is the result of 71 sites located within the Project‘s APE along Alternative N5. This includes 32 NRHP eligible sites, 2 NRHP listed properties, 33 not eligible sites, and 4 unevaluated sites. If this alternative were selected, all 71 of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative N6 – Mineral Mountains 1,500 Feet East of Kern River Pipeline

Affected Environment

Cultural Sites

A total of 638 cultural resource sites are located within the 4-mile-wide study corridor along Alternative N6, including 513 prehistoric sites, 94 historic sites, and 31 multi-component sites (Table 3-42). The prehistoric, historic, and multi-component site types are the same as Alternative N2. Of the 638 cultural resource sites, 190 sites are NRHP eligible, 337 sites are not eligible for the NRHP, and 111 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 638 cultural resource sites associated with Alternative N6, a total of 109 sites associated were identified as visually sensitive. These sites include 68 prehistoric sites, 29 historic sites, and 12 multi-component sites. The prehistoric, historic, and multi-component site types are the same as Alternative N2.

Historic Properties Listed in the National Register of Historic Places

Alternative N6 is the same as Alternative N1.

Environmental Effects

Of the six alternative routes under consideration for the Northern – Sigurd Substation to South Black Mountains Route, Alternative N6 ranks third in the cultural resources preference rankings (Table 2-11). This alternative has among the highest miles of high cultural resource intensity. Alternative N6 would be anticipated to have approximately 80.8 miles of low cultural resource intensity, 11.0 miles of moderate cultural resource intensity, and 14.2 miles of high cultural resource intensity. The 14.2 miles of high cultural intensity is the result of 44 sites located within the Project‘s APE along Alternative N6. This includes 13 NRHP eligible sites, 2 NRHP listed properties, 28 not eligible sites, and 1 unevaluated site. If this alternative were selected, all 44 of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Southern Area – South Black Mountains to Red Butte Substation

Alternative S1 – Pinto Creek

Affected Environment

Cultural Sites

A total of 100 cultural resource sites were identified in the Class I inventory for Alternative S1, including 78 prehistoric sites, 19 historic sites, and 3 multi-component sites (Table 3-42). The prehistoric sites include nondiagnostic lithic scatters; open campsites or habitation sites, frequently with diagnostic artifacts and artifact concentrations, surface features, and activity areas; rock shelters and cave sites; rock art sites; and Paleoindian and Early Archaic sites (ca. 12,000 B.P. to 5,000 B.P.). Among the historic sites are the Laura Clifton Homestead, a pair of lime kilns, and a variety of can scatters, trash dumps, homesteads, and farmsteads. The multi-component sites consist of prehistoric lithic and historic artifact scatters and a prehistoric lithic scatter with an historic rock alignment component.

Cultural Visual Study

Of the 100 cultural resources sites associated with Alternative S1, a total of 11 sites were identified as visually sensitive. These sites include 1 prehistoric rock shelter, 9 historic sites (homesteads, canals, structures, a utility line, a road, and a lime kiln), and 1 multi-component prehistoric lithic scatter and historic rock alignment.

Historic Properties Listed in the National Register of Historic Places

The NRHP records search identified one historic property, the Pine Valley Chapel and Tithing Office, constructed in 1868, listed on the NRHP along Alternative S1.

Environmental Effects

Of the six alternative routes under consideration for the Southern – South Black Mountains to Red Butte Substation Route, Alternative S1 ranks fifth in the cultural resources preference rankings (Table 2-11). This alternative has the highest miles of high cultural resource intensity. Alternative S1 would be anticipated to have approximately 53.8 miles of low cultural resource intensity, 0.8 mile of moderate cultural resource intensity, and 2.3 miles of high cultural resource intensity. The 2.3 miles of high cultural intensity is the result of 9 sites located within the Project's APE along Alternative S1. This includes 5 NRHP eligible sites, 3 not eligible sites, and 1 unevaluated site. If this alternative were selected, all 9 of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative S2 – IPP West

Affected Environment

Cultural Sites

A total of 128 cultural resource sites are located within the 4-mile-wide study corridor along Alternative S2, including 97 prehistoric sites, 24 historic sites, and 7 multi-component sites (Table 3-42). The prehistoric site types are the same as Alternative S1. The historic site types are also the same as Alternative S1, with the additions of the Hamblin Cemetery and three historic trail segments associated with the Old Spanish Trail and the Mormon Trail. The multi-component site types are also the same as Alternative S1, with the addition of the historic Mountain Meadows Massacre Site, which has a prehistoric campsite component, and the historic Hamblin Town site, which also has prehistoric campsite component. Of the 128 cultural resource sites, 50 sites are NRHP eligible, 53 sites are not eligible for the NRHP, and 25 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 128 cultural resources sites associated with Alternative S2, a total of 15 sites were identified as visually sensitive. These sites include 5 prehistoric sites, 7 historic sites, and 3 multi-component sites. Prehistoric sites are represented by 1 rock art site, 1 habitation site with surface features, 1 stone circle (possible wikiup) site, 1 granary, and 1 rock shelter. Historic sites include 2 homesteads or farmsteads, 3 trail/road segments possibly associated with the Old Spanish Trail/Mormon Trail, the Hamblin cemetery, and a utility line. Multi-component sites include the historic Mountain Meadows Massacre Site which has a prehistoric campsite component, the historic Hamblin town site, which also has a prehistoric campsite component and one prehistoric lithic scatter and historic rock alignment.

Historic Properties Listed in the National Register of Historic Places

The NRHP records search identified one historic property, the Mountain Meadows Massacre Site, listed on the NRHP along Alternative S2.

Environmental Effects

Of the six alternative routes under consideration for the Southern – Sigurd Substation to South Black Mountains Route, Alternative S2 ranks last in the cultural resources preference rankings (Table 2-11). This alternative has the highest miles of high cultural resource intensity. Alternative S2 would be anticipated to have approximately 41.8 miles of low cultural resource intensity, 1.4 miles of moderate cultural resource intensity, and 6.4 miles of high cultural resource intensity. The 6.4 miles of high cultural intensity is the result of 25 sites located within the Project's APE along Alternative S2. This includes 18 NRHP eligible sites, 1 NRHP listed site (Mountain Meadows Massacre Site), 3 not eligible sites, and 3 unevaluated sites. If this alternative were selected, all 25 of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative S3 – Ox Valley

Affected Environment

Cultural Sites

A total of 133 cultural resource sites are located within the 4-mile-wide study corridor along Alternative S3, including 106 prehistoric sites, 23 historic sites, and 4 multi-component sites (Table 3-42). The prehistoric and multi-component site types are the same as Alternative S1. The historic site types are also the same as Alternative S1, with the additions of two historic trail segments associated with the Old Spanish Trail and the Mormon Trail. Of the 133 cultural resource sites, 21 sites are NRHP eligible, 47 sites are not eligible for the NRHP, and 65 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 133 cultural resource sites associated with Alternative S3, a total of 12 sites were identified as visually sensitive. These sites include 4 prehistoric sites, 7 historic sites, and 1 multi-component site. Prehistoric sites are represented by 1 rock art site, 1 rock shelter, 1 stone circle site, and 1 habitation site with surface features. Historic sites include 2 homesteads, 2 roads segments possibly associated with the Old Spanish Trail and the Mormon Trail, 1 kiln, 1 utility line, and 1 trail. The multi-component site is a prehistoric lithic scatter and historic rock alignment

Historic Properties Listed in the National Register of Historic Places

The NRHP records search identified one historic property, the Enterprise Meetinghouse, constructed in 1899, listed on the NRHP along Alternative S3.

Environmental Effects

Of the six alternative routes under consideration for the Southern – South Black Mountains to Red Butte Substation Route, Alternative S3 ranks first in the cultural resources preference rankings (Table 2-11). This alternative has the fewest miles of high cultural resource intensity. Alternative S3 would be anticipated to have approximately 55.4 miles of low cultural resource intensity, 1.2 miles of moderate cultural resource intensity, and 1.0 mile of high cultural resource intensity. The 1.0 mile of high cultural intensity is the result of five sites located within the Project‘s APE along Alternative S3. This includes three NRHP-eligible sites and two unevaluated sites. If this alternative were selected, all five of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative S4 – IPP East

Affected Environment

Cultural Sites

A total of 76 cultural resource sites are located within the 4-mile-wide study corridor along Alternative S4, including 53 prehistoric sites, 17 historic sites, and 6 multi-component sites (Table 3-42). The prehistoric and multi-component site types are the same as Alternative S1. The historic site types are also the same as Alternative S1, with the additions of one historic trail segment associated with the Old Spanish Trail and the Mormon Trail. Of the 133 cultural resource sites, 23 sites are NRHP eligible, 39 sites are not eligible for the NRHP, and 14 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 76 cultural resource sites associated with Alternative S4, a total of 9 sites were identified as visually sensitive. These sites include 3 prehistoric sites, 5 historic sites, and 1 multi-component site. Prehistoric sites are represented by 1 rock art site, 1 rock shelter, and 1 granary. Historic sites include 2 homesteads, 2 roads potentially associated with the Old Spanish Trail, and 1 utility line. The multi-component site is a prehistoric lithic scatter and historic rock alignment.

Historic Properties Listed in the National Register of Historic Places

The NRHP records search identified one historic property, the Mountain Meadows Massacre Site, listed on the NRHP along Alternative S4.

Environmental Effects

Of the six alternative routes under consideration for the Southern – South Black Mountains to Red Butte Substation Route, Alternative S4 ranks second in the cultural resources preference rankings (Table 2-11). This alternative has among the fewest miles of high cultural resource intensity. Alternative S4 would be anticipated to have approximately 47.6 miles of low cultural resource intensity, 0.3 mile of moderate cultural resource intensity, and 1.3 miles of high cultural resource intensity. The 1.3 miles of high cultural

intensity is the result of 8 sites located within the Project's APE along Alternative S4. This includes 6 NRHP eligible sites, 1 not eligible site, and 1 unevaluated site. If this alternative were selected, all eight of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative S5 – Iron Springs and Pinto Creek

Affected Environment

Cultural Sites

A total of 109 cultural resource sites are located within the 4-mile-wide study corridor along Alternative S5, including 82 prehistoric sites, 24 historic sites, and 3 multi-component sites (Table 3-42). The prehistoric and multi-component site types are the same as Alternative S1. The historic site types include a lime kiln, canals, roads, homesteads, habitation sites, and a variety of artifact scatters. Of the 107 cultural resource sites, 36 sites are NRHP eligible, 36 sites are not eligible for the NRHP, and 37 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 109 cultural resource sites associated with Alternative S5, a total of 10 sites were identified as visually sensitive. These sites include 2 prehistoric sites and 8 historic sites. The prehistoric sites are rock shelters. The historic sites include 2 structures, 2 canals, 1 kiln, 1 road, 1 homestead, and 1 utility line.

Historic Properties Listed in the National Register of Historic Places

There are no historic properties listed on the NRHP along Alternative S5.

Environmental Effects

Of the six alternative routes under consideration for the Southern – South Black Mountains to Red Butte Substation Route, Alternative S5 ranks fourth in the cultural resources preference rankings (Table 2-11). This alternative has among the highest miles of high cultural resource intensity. Alternative S5 would be anticipated to have approximately 56.4 miles of low impact, 0.8 mile of moderate impact, and 2.0 miles of high impact on cultural resources. The 2.0 miles of high cultural intensity is the result of 11 sites located within the Project's APE along Alternative S5. This includes 5 NRHP eligible sites, 5 not eligible sites, and 1 unevaluated site. If this alternative were selected, all 11 of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

Alternative S6 – Iron Springs and Ox Valley

Affected Environment

Cultural Sites

A total of 133 cultural resource sites are located within the 4-mile-wide study corridor along Alternative S6, including 106 prehistoric sites, 25 historic sites, and 2 multi-component sites (Table 3-42). The prehistoric sites are the same as Alternative S1. The historic site types include canals, a homestead, a kiln, habitation sites, a variety of artifact scatters and roads, including two potentially associated with the Old Spanish Trail. The multi-component site is a prehistoric campsite with a historic artifact scatter component. Of the 131 cultural resource sites, 20 sites are NRHP eligible, 49 sites are not eligible for the NRHP, and 64 sites have not been evaluated for NRHP eligibility.

Cultural Visual Study

Of the 133 cultural resources sites associated with Alternative S6, a total of 12 sites associated were identified as visually sensitive. These sites include 6 prehistoric sites and 6 historic sites. Prehistoric sites include 3 habitations with surface features, 2 rock shelter or cave sites, and 1 stone circle site. Historic sites include 2 roads associated with the Old Spanish Trail, 1 homestead, 1 utility line, 1 kiln, and 1 trail.

Historic Properties Listed in the National Register of Historic Places

The NRHP records search identified one historic property, the Enterprise Meetinghouse, constructed in 1899, listed on the NRHP along Alternative S6.

Environmental Effects

Of the six alternative routes under consideration for the Southern – South Black Mountains to Red Butte Substation Route, Alternative S6 ranks fifth (next to last) in the cultural resources preference rankings (Table 2-11). This alternative has among the highest miles of high cultural resource intensity. Alternative S6 would be anticipated to have approximately 59.2 miles of low cultural resource intensity, 1.2 miles of moderate cultural resource intensity, and 1.7 miles of high cultural resource intensity The 1.7 miles of high cultural intensity is the result of 8 sites located within the Project‘s APE along this alternative. This includes 3 NRHP eligible sites, 3 not eligible sites, and 2 unevaluated cultural resources. If this alternative were selected, all eight of these sites would be visited during Class III studies and updated site information provided in the Class III inventory report that would be reviewed by the agencies and the SHPO. The agencies and the SHPO would then determine if the Project has the potential to have an adverse effect on these sites. Prior to construction activities in the area, any adverse effects to the sites would need to be resolved per 36 CFR Part 800.6.

3.2.5.5 Summary

Based on gathered Class I and II inventory data and in the absence of complete Class III intensive pedestrian inventory data, each alternative was assigned a preference ranking (Table 2-11). The preference rankings are based on the number of miles an alternative passes through areas determined to

have high cultural resource intensity and the number of known cultural resource sites located within the cultural resources Class III survey corridor (i.e., 175 feet of either side of the reference centerline).

The key issues for cultural resources in the northern Project area (Sigurd Substation to South of Black Mountains) are the proximity of the Project to sensitive cultural resource areas, such as Fremont Indian State Park (Alternatives N1 through N6) and the Mineral Mountains obsidian sources (Alternatives N2 through N6). The route passes to the south of Fremont Indian State Park; however, the entire area is expected to have high potential for significant prehistoric cultural resource sites. The Mineral Mountains obsidian sources are listed on the NRHP and the area contains numerous significant prehistoric cultural resource sites.

Alternative N1 would have the lowest number of miles of route through areas of high cultural resource intensity (10.7 miles), and it has the fewest number of recorded cultural resource sites located within the Project APE. The Project APE for nearly half of the alternative routes (46 percent) has been previously inventoried at the Class III intensive pedestrian level. Much of Alternative N1 is located along existing transportation corridors and/or existing corridors for other development projects (e.g., wind farms, pipelines, fiber optic lines, and transmission lines). In addition, Alternative N1 avoids two significant obsidian sources (Negro Mag Wash obsidian source and Wildhorse Canyon obsidian source), which cover large areas and were extensively used during prehistory and therefore have high site densities in their vicinities. Other alternative routes considered for the northern segment of the Project, Alternatives N2 to N6, bisect these two important cultural resource sites.

The key issues for cultural resources on the southern Project area (South of Black Mountains to Red Butte Substation) are the proximity of the Project to sensitive cultural resource areas such as Mountain Meadows Massacre site (Alternative S2), and segments of the Old Spanish Trail (Alternatives S2, S3, S56, and S6). The Mountain Meadows Massacre site is listed on the NRHP and is being considered for designation as a NHL. The Old Spanish Trail has been designated a NHT by Congress.

Alternative S1 is the only alternative that is not in proximity to the significant historic cultural resource sites, the Mountain Meadows Massacre Site or the Old Spanish Trail. It does, however, have among the highest mileage of high cultural intensity, and therefore, ranks poorly in cultural resource preference rankings.

Because Alternative S3 has the lowest number of miles of route through areas of high cultural resource intensity (1.0 mile) and it has the fewest number of recorded cultural resource sites (n=5) located within the Project APE, it is ranked first in cultural resource preference rankings. More than three-quarters of the Project APE for this alternative (78 percent) has been previously inventoried at the Class III intensive pedestrian level. It should be noted, however, there are two historic trail segments potentially associated with the Old Spanish Trail in proximity to the alternative. If this alternative was selected, these historic trail segments would be evaluated during the Class III studies and appropriate avoidance or mitigation methods would be developed in consultation with the SHPO. Some of Alternative S3 is located along existing transportation corridors and/or existing corridors for other development projects (e.g., wind farms, pipelines, fiber optic lines, and transmission lines).

3.2.6 Native American Concerns

3.2.6.1 Area of Analysis

Early in the EIS process, the BLM initiated contact with several Native American Indian tribes in accordance with various environmental laws and E.O.s. While no American Indian reservations or lands

owned in fee by tribes are located within the Project area, BLM identified several American Indian tribes whose traditional territories are within the Project area. These tribes were contacted to inform them of, and determine their interest in, the Project or preparation of the EIS (see Section 5.2.2.2). The tribes also were asked to determine the need for further study related to the identification of TCPs in the Project area that may be affected by the Project. Federal legislation applicable to Native American concerns in the Project area includes:

- AIRFA (42 U.S.C. 1996) requires federal lead agencies and/or federal land-management agencies to consult with affected American Indian tribes regarding federal actions that would pose potential conflicts with freedom to practice traditional American Indian religions.

- Executive Order 13084, issued in 1998, directs federal land-management agencies to establish regular and meaningful consultation and collaboration with Indian tribal governments in the development of regulatory practices on Federal matters that significantly or uniquely affect their communities.

- Executive Order 13175, issued in 2000, directs federal land-management agencies to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications.

- Memorandum on Government-to-Government Relations with Native American Tribal Governments, issued in 1994, directs federal land-management agencies to consult, to the greatest extent practicable and to the extent permitted by law, with Tribal governments prior to taking actions that affect Federally recognized Tribal governments; to assess the impact of Federal government plans, projects, programs, and activities on Tribal trust resources and assure that Tribal government rights and concerns are considered during the development of such plans, projects, programs and activities; and to take appropriate steps to remove any procedural impediments to working directly and effectively with Tribal governments on activities that affect the trust property and/or governmental rights of the Tribes.

3.2.6.2 Current Status

To date, the BLM has received response letters from two tribes, the Navajo Nation and the Hopi Tribe, notifying the BLM of their interest in participating in the Project or preparation of the EIS. In addition, the Paiute Indian Tribe of Utah also contacted the BLM to confirm their interest in participating in the Project. Four of the tribes, the Ute Indian Tribe, the Moapa Band of Paiute Indians, the Kaibab Band of Paiute Indians, and the Northwestern Band of Shoshone Nation, have verbally deferred to the Paiute Indian Tribe of Utah to represent their tribal interests and concerns regarding the Project in the government-to-government consultations with the BLM. These four tribes, however, can resume direct consultations with the BLM at any time during the Project, if they so choose. The BLM will continue on-going consultations with the tribes and, in doing so, will keep the all the tribes informed regarding the current status of Project.

The results of the consultation efforts will be documented in a separate report, along with ethnographic summaries prepared in consultation with tribes. Therefore, only brief ethnographic summaries are presented in Section 3.2.6.2.

3.2.6.3 Regulatory Framework and Permits

Federal legislation applicable to Native American consultations in the Project area includes:

- ARPA (16 U.S.C. 470aa to 470ee) authorizes federal land-management agencies to manage through a permit process the excavation and/or and removal of archaeological resources on federal lands. The land-management agencies must consult with American Indian tribes with interests in resources prior to issuance of permits.

- AIRFA (42 U.S.C. 1996) requires federal lead agencies and/or federal land-management agencies to consult with affected American Indian tribes regarding federal actions that would pose potential conflicts with freedom to practice traditional American Indian religions.

- NAGPRA (25 U.S.C. 3001-3002) provides a process through which federal agencies consult with affected Native Americans regarding the treatment and return of human remains, funerary objects, sacred objects, and items of cultural patrimony identified on federal lands as a result of a federal action.

- E.O. 13007, issued in 1996, directs federal land-management agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

State statutes and guidelines include:

- UAC Section R212-4 requires that if human remains are discovered in conjunction with a project subject to Section 106 the project proponent is responsible for all efforts associated with the excavation, analysis, curation, or repatriation of the human remains and for notifying the Utah SHPO.

- UAC Section 9-8-309 provides a process through which landowners or land management agencies consult with the State regarding the treatment of human remains discovered on nonfederal lands that are not state owned.

3.2.6.4 Native American Ethnographic Summaries

Based on existing ethnographic and historical literature, this ethnographic summary describes the Southern Paiute and Ute cultural groups, two highly mobile Indian populations, prior to sustained Euro-American contact, and describes the effects of socioeconomic, political, and cultural exchanges on traditional lifeways within the study area defined for this Project. In addition, this ethnographic outline identifies the longstanding relationships and dynamics of the Southern Paiute and the Ute with their own, other native groups, and non-native populations. Among the sources of ethnographic information available for the Ute and Southern Paiute, O.C. Stewart‘s (1942) pioneering work, *Culture Element Distributions: XVIII Ute Southern Paiute*, is particularly noteworthy. This ethnography was published in 1942 and is based on fieldwork conducted during the summer of 1936. Earlier and subsequent cultural studies in the two cultural regions have complemented and updated Stewart‘s work. Most are thematic studies or compilations of ethnographic and ethnohistoric data (e.g., Cuch 2000; D‘Azevedo 1986; Inter-Tribal Council of Nevada 1976; Jefferson et al. 1972; Lyman and Denver 1970; Sapir 1930; Smith 1974; Steward 1997).

Southern Paiute

The Southern Paiute Sub-Groups, Language, and Territory

The Southern Paiute refer to themselves in their own language as *nïwï* person or people (Kelly 1934:548). The social and cultural identity of the sub-groups within this large cultural group, known as ―Southern Paiute," was primarily linguistic and geographical. Like their neighbors to the northeast and east, the Ute, and the groups to the north and northwest, the Shoshone, the Southern Paiute speak one of the northern Numic branches of the Ute-Aztecan language (Sapir 1930). A comprehensive discussion of Southern Paiute language is beyond the scope of this summary, but this matter has been documented in several cultural and linguistic works by Edward Sapir (see Bright 1992).

The traditional territory occupied by Southern Paiute extends from the western Colorado Plateaus flowing west and southwest, through large canyons and a succession of mountain ranges and arid valleys. Southern Paiute territory in southern Utah embraces a portion of the Great Basin and the Colorado Plateau (Steward 1997:180). Several rivers, springs, and drainages sprinkled across the region offered a fair habitat for plants and wildlife and a reliable source of local, natural resources. Although some Southern Paiute people adapted to the arid desert environment, part of the population was concentrated along main water sources, such as the Virgin River in the southwestern corner of Utah.

An anthropological account by Isabel T. Kelly (1934:550) reports the Southern Paiute region was divided into 15 sub-groups, bands, or tribes defined as ―dialectic units with political concomitants." Each one of these groups was defined in close connection with the territory they were occupying. The 15 groups mapped by Kelly (1934) are the San Juan, the Kaiparowits, the Panguitch, the Kaibab, the Uinkaret, the Shivwitz, the Saint George, the Gunlock, the Cedar, the Beaver, the Panaca, the Paranigat (Pahraganat), the Moapa, Las Vegas, and the Chemehuevi. Kelly‘s Southern Paiute sub-group structure was revised and updated in Kelly and Fowler (1986:368-369). An additional unit, the Antarianunts group, which Kelly thought was Ute, has been included as unequivocally Southern Paiute by O.C. Stewart (1942:237) and referred to as the sixteenth Southern Paiute group (Kelly and Fowler 1986:368). In an analysis of linguistic and ethnographic data, Kelly and Fowler (1986) have suggested it is possible the Antarianunts group, as well as the Beaver, Cedar, and Kaiparowits groups, should be considered transitional Southern Paiute-Ute, if considering the similarities of the groups‘ common language and cultural traits. Of the 15 Southern Paiute groups, the Panguitch, the Kaibab, the Uinkaret, the Shivwitz, the Saint George, the Gunlock, the Cedar, and the Beaver group are located within the Southern Paiute region, as defined for this Project.

Over the years, social scientists have attempted to come to a consensus on the subject of how many Southern Paiute groups or ―economic clusters" co-existed in the region. Some researchers have focused on several well-organized local groups, while others defined native Southern Paiute by their main area of activity (geographic units) (see Steward 1997; Tom and Holt 2000). Although each recognized group was associated with a specific geographic area within the region, the boundaries separating physical and political territories possibly grew less precise as one moved further away from the core of the group and shared occupancy and use of a specific physical area, making it difficult to identify individual cultural units within the larger Southern Paiute populations.

Southern Paiute Cultural Traits

When the Spaniards and Mormon settlers entered the region, the Southern Paiutes were a relatively peaceful and industrious people. Subsistence practices of the Southern Paiute were similar to those of other native groups contained within the Great Basin cultural region (Kelly and Fowler 1986). The

Southern Paiute subsistence economy, prior to direct contact with non-native populations, was based on a cyclical pattern of hunting and gathering (Kelly and Fowler 1986:370-371; Steward 1997:180-181).

According to Kelly and Fowler (1986: 370-371), small-game hunting and plant foraging were the main dietary sources of the Southern Paiute people. They used most of the varieties of fauna and edible plants found within their territory (Kelly and Fowler 1986: 370-371; Stoffle and Evans 1976:175). They did, however, fish wherever available and hunt large game such as bear and antelope (Kelly and Fowler 1986: 370-371; Tom and Holt 2000). It has been mentioned horticulture was practiced near permanent water sources, but it seems to have been a supplement to the well-established hunting and gathering activities (Steward 1997:180-181; Stoffle and Evans 1976:175-176). Numerous ethnographic accounts chronicled the Southern Paiutes as cultivating the irrigable lands within their territory (Euler 1966:33; Stewarts 1942: 254-256; Stoffle and Evans 1976:175-176). Regarding the use of the horse, the Southern Paiute, in contrast to the Western Ute, apparently lacked horses until more recent times (Steward 1997:181).

Southern Paiute lifestyle appears to have been dominated by the seasons, levels of group mobility, and intensity of cultural exchange. Sharing patterns, and a fairly evident hierarchy, characterized the Southern Paiute sociopolitical organization, which has been labeled, in some instances, as bands (Kelly 1934). The family was the social unit with small groups loosely bound into larger ones by blood relationships. Most marriages were monogamous; however, marriage variants such as sororal polyandry and polygamy have been reported (Stewart 1942). Exchange marriages were fairly common (Kelly and Fowler 1986:377).

Historical data defined Southern Paiute settlements as being composed of three to five households; however, some sources report that ―size varied from one or two households to ‗many,‘ which seems to have meant about 10; the maximum number reported was 20” (Kelly and Fowler 1986:380). Groups were not fixed, due to their highly mobile lifestyle and occasional intermarriages. Even though settlement was mobile, recurrent residence in at least one previously habituated area was common after extended hunting and gathering trips (Kelly and Fowler 1986: 380).

Southern Paiute groups were under no central political control. Instead, there were several leaders or headmen, each of whom was limited in influence to a local group or group of camps (Kelly and Fowler 1986; Inter-Tribal Council of Nevada 1976). Historically, these leaders served as advisors and were consulted for everyday concerns. Leadership roles changed with arrival of the European and Mormon settlers. Major decisions were made in council meetings, with members of the community and other interested parties present; the chief would be identified by each community and would lead by example and through consensus (Tom and Holt 2000:127). As early as 1855, Mormon settlers were appointing leaders to gain better control of the native population (Tom and Holt 2000:127).

Regarding religious beliefs, Kelly and Fowler (1986) mentioned little is known of Southern Paiute world views. Despite the relatively small bulk of information regarding this matter, it is known that, for the Paiutes, there was a highly elaborated supernatural world consisting of a powerful spirit (the creator), mythic animal heroes, and the spirits of all living organisms (Kelly and Flower 1986; Tom and Holts 2000). Stories among the Paiute people played an important role in the diffusion of traditional beliefs, ethnical and ethical values, and maintaining social-cohesion. Shamanism also constituted one of the most important aspects of Southern Paiute religious life. Shamans‘ or Medicine Men‘s principal function was healing; however, they were believed to cause illness (Kelly and Fowler 1986:383).

The nature of the cultural, sociopolitical, and economical structure of the Southern Paiutes appears to have been guided by their natural surroundings, available food supply, and the nature of their intra- and inter-ethnical relationships. When times became difficult, they managed to survive and adjust to new situations to preserve their own identity. New connections with other Paiute and non-Paiute groups, as

well as with the newcomers (e.g., Mexican traders, Mormons, prospectors, soldiers, federal bureaucrats, missionaries), were largely established and manipulated to endure as a cultural unit.

Inter-Cultural Contact and Its Consequences

Southern Paiutes were first recorded by European explorers in 1776 when two Franciscan Friars, Francisco Athanasio Dominguez and Silvestre Velez de Escalante, traveled through Southern Paiute territory to find a route between the missions in Santa Fe to the Spanish settlements at Monterey on the Pacific Coast (Euler 1966; Hafen 1948). At that time, only a few scattered European settlements were in place along the Southern Paiutes‘ land. Father Escalante‘s diary of the expedition contains valuable accounts about the Southern Paiute lifestyle prior to non-native cultural exchange. Following the Dominguez-Escalante exploration, a high number of adventurers, merchants, and prospectors wandered into Southern Paiute territory seeking furs and minerals, as well as other lucrative resources (Hafen 1948). Impacts of direct contact, soon after the Escalante-Dominguez exploration, were notorious; Indian slave trade (both intra- and inter-cultural) and clandestine goods trading were enhanced throughout the entire region; extensive trade networks had moved Spanish horses and goods; and diseases had reduced the native population (Hafen 1948:152; Kelly and Fowler 1986; Tom and Holt 2000:123).

By the mid 1800s, Euro-American incursions into the Southern Paiutes‘ territory had been carried out on an incomprehensible scale. In 1830, The Spanish Trail was definitely opened and extensively used by native and non-native peoples, bringing with it significant changes in the lives of the Southern Paiutes (Hafen 1948; Tom and Holt 2000:129). Because there was so much traffic along the trail, native groups living in an area that is now nearby the study corridors were forced to abandon their traditional lands and/or required to perform forced labor (Hafen 1948; Kelly and Fowler 1986; Tom and Holt 2000).

Mormon emigration onto Southern Paiute country was initiated in 1847. Soon after, their continuous expansion quest caused both positive and negative effects on the Indian people‘s livelihood. Historical references mention active measures were taken by the Mormon Church and the territorial legislature to end slavery practices along the territory and protect Southern Paiutes from the depredations of other non-Paiute native peoples and Euro-American adventurers and settlers (Kelly and Fowler 1986:386-387). Despite the intensions of the Mormons, the expansive wave of settlers obscured this measure and resulted in fierce economic competition, political and judicial control over the native population, military conflict, and intents upon acculturation (Hafen 1948; Kelly and Fowler 1986; Tom and Holt 2000).

In 1865, Utah Superintendent of Indian Affairs, O.H. Irish, suggested problems in southern Utah and southern Nevada might best be solved by removing their traditional inhabitants from their ancestral lands, and placing them on ―Reservations” (Kelly and Fowler 1986:387; Inter-Tribal Council of Nevada 1976:83). Even though a series of negotiations took place between O.H. Irish and Southern Paiute headmen, nothing was accomplished. Constant and bloody inter-ethnical hostilities remained (Kelly and Fowler 1986:387; Inter-Tribal Council of Nevada 1976:83-89). Reservations eventually were instituted in the states of Utah, Nevada, and Arizona: the Moapa River Reservation, located on the Upper Muddy River in Nevada (1872); the Shivwits Reservation, located west of St. George, Utah (1891); the Kaibab Reservation, west of Fredonia, Arizona (1907); the Indian Peaks Reservation, northwest of Cedar City, Utah (1915); the Koosharem Band of Paiutes/Utes, southeast of Richfield, Utah (1928), and the Kanosh Reservation, near Kanosh, Utah (1984) (Inter-Tribal Council of Nevada 1976:83-89; Kelly and Fowler 1986:387-390; Tom and Holt 2000: 139-142).

The Termination Act was passed on February 15, 1954, which set in motion the termination of the federal trust relationship between the federal government and the Indian people (Tom and Holt 2000). The Utah Southern Paiute bands and reservations were scheduled for termination. Although the bands brought suit

against the federal government for compensation for the loss of their lands, they received only 27.3 cents per acre for about 26.4 million acres. Eventually, federal status was restored to the Paiute bands, which united under one tribal government (1976). In 1984, the Paiute Indian Tribe of Utah was provided with a reservation of 4,770 acres of land, a third of what they had been promised as part of their federal restoration status (Tom and Holt 2000).

The Ute Bands

The Ute Peoples Sub-Groups, Language, and Territory

In anthropological literature, a distinction is drawn between Ute and Southern Paiute cultural groups based on linguistic differences, equestrian mobility for the Ute, and agriculture practices for the Southern Paiute. Like their neighbors to the north and northwest, the Shoshone, and the groups to the southwest, the Southern Paiute, the Ute speak one of the northern Numic branches of the Ute-Aztecan languages (Bright 1992; Kroeber 1908). The Ute language forms part of what has been called the Ute-Chemehuevi dialectic division, extending from Colorado to Southern California (Kroeber 1908:74).

Prior to the arrival of the Europeans to the Ute homeland, Ute people occupied an area of about 130,000 square miles between the Oquirrh Mountains to the west, the Salt Lake Desert to the northwest, the Uintah Mountains and the Yampa River to the north, and the San Juan River to the south. The eastern limit is defined by the Colorado Rocky Mountains (Callaway et al. 1986:336-337). Other historic sources defined the Ute‘s cultural region as occupying an area of about 225,000 square miles between Fillmore, Utah, in the west, to Colorado Springs, in the east, and from Baggs, Wyoming, to Abiquiu, New Mexico, from north to south (Duncan 2000:173-174). Historic maps of the area show portions of southern Idaho, northeastern Arizona, northern New Mexico, southwestern Texas and Oklahoma, and western Kansas, as designated ―Indian Hunting Grounds” (Jefferson et al. 1972: xi; Lyman and Denver 1970:viii).

The Utes were widely scattered over the territory in small, loose, and highly mobile family groups or bands with sufficient political and economic independence. As with the Southern Paiute, researchers interested in the Ute cultural region generally agree on the difficulty in assigning a specific territory and name to a specific band due to changes and inconsistencies in group nomenclature and their highly residential mobility, mostly after Euro-American contact and Indian settlement on reservations (Callaway et al. 1986: 338-340; Stewart 1942:235-239).

At the arrival of the Europeans, there were at least 11 distinct bands in what is now the State of Utah and Colorado. The bands are the Moache, Capote (Kapota), Weeminuche, Uncompahgre (Tabaguache), White River (Parusanuch and Yamparika), Uintah, Pahvant, Timanogots, Sanpits or San Pitch, Moanumts, and Sheberetch (Callaway et al. 1986: 338-340; Duncan 2000:176; Stewart 1942:235-239). Of the 11 Ute bands, the Pahvant and the Moanumts bands are located within the Ute region, as defined for the Project area.

The Pahvant band occupied the area along Sevier Lake and the lower Sevier River, just west of the Wasatch Mountains (Callaway et al. 1986:340; Stewart 1942:236). The government moved many to the Uintah Reservation, but small remnants remained in their old territory. In the 1980s, their descendants survived at Kanosh, Koosharem, and other small settlements in Utah, where they were largely intermixed with Southern Paiutes in groups known officially as Utah Paiutes (Callaway et al. 1986:340). Regarding the Moanunts band, they were the inhabitants of the upper Sevier River and Otter Creek region, south of the town of Salina, Utah. They were known as the ―Fish Ute” due to the role of Fishlake as a spring-summer habitation site (Callaway et al. 1986:340). Along with the Pahvant, the Moanunts were relocated to the Uintah Reservation, but small groups of people remained in their territory.

Utes Cultural Traits

The Ute people‘s subsistence economy, prior to contact with Europeans, was based on a cyclical pattern of hunting, gathering, fishing, and well-structured trade. While territorial boundaries were established, access to productive natural resources was communal and equitable (Callaway et al. 1986). Natural resources were processed and stored for winter (Stewart 1942:249-250). Ute peoples acquired horses from the Spanish during the seventeenth century; however, they were especially used in the eastern areas (Callaway et al. 1986:340-341; Jefferson et al. 1972:ix-iix). The acquisition of the horse allowed Ute people to gather in larger bands, increase their trade, increase intra- and inter-ethnical interaction, and enhance mobility in the search for better hunting grounds (Jefferson et al. 1972:ix-iix). Economic interactions were an important measure of the enduring ties between Ute bands and the non-Ute population (Callaway et al. 1986:340).

In contrast with their neighbors, the Southern Paiute, Ute groups usually were composed of several residential units (from 50 to 100 people, all year round) related through matrilineal ties and joined under the leadership of a headman who solicited advice from a council of other kin unit (deme) leaders (Callaway et al. 1986:352, 354). Independent nuclear households were the prevalent habitation form and the predominant form of prenuptial residence was matrilocal. Most marriages among the Western Ute people were monogamous, but marriage variations, such as sororal polygyny have been reported (Stewart 1942:296).

Families were held together by their respect for the deme headman whose status was usually derived from his general knowledge, hunting skills and success, and ability to coordinate the movement of his own people. Ute demes were kin units that demonstrated descent from a common ancestor and share a common residence (Callaway et al. 1986:352-353). Relationships within the deme were purely egalitarian. Anne M. Smith (1974:127), who worked among the Northern Utes during the summers of 1936 and 1937, stated the importance of chiefs or headmen grew during the period of Mormon contact, both because of the influence of the use of horses in the Ute social organization and the need of an intermediary between native and non-native populations.

Regarding tradition and religious beliefs of the Utes, there were three powerful animal-peoples who kept the world in balance before humans were created (Duncan 2000:167). As with the Southern Paiute, stories were the basis of Ute history and culture, and defined the relationships of Ute Indians with all living elements, both spiritually and physically (Duncan 2000:167-168). Historic Ute religion was dominated by shamans who received their supernatural powers through dreams. They were believed to cure illness, lead collective hunts, and often, direct the movements of the local groups (Jefferson et al. 1972:68-71; Smith 1974:152-162). Plants also were used and are still used as medicinal agents. Even though western medicine had largely been introduced, traditional practices were not abandoned (Jefferson et al. 1972:64-65).

Inter-Cultural Contact and Its Consequences

Constant interactions between the Utes, neighboring tribes, and non-native populations in the region began no later than the early 1700s as sporadic encounters with explorers, prospectors, and treasure hunters wandered into eastern Utah (Callaway et al. 1986:354). Earlier days have been reported for the Eastern Paiute (early 1600s). The pace accelerated after the Dominguez-Escalante expedition of 1776-1777 and the entrance of Mormon settlers in the mid 1840s in the area. By the time of the Dominguez-Escalante exploration, the Utes had acquired the horse (mainly those in the Uintah Basin) and reinforced their trade networks (Smith 1974). Additionally, they had engaged in a trading and raiding relationships with other cultural groups identified as Pueblo, Apache, Hopi, and Navajo (Callaway et al. 1986:340).

Escalante's diary provides the first description of the Ute cultural region and its inhabitants. Several accounts of incessant, inter-ethnical conflicts, and sporadic alliances and estrangements, between the Ute people and the Spaniards, and the Ute People and other native groups (e.g., Navajo, Plains groups, Northern and Eastern Shoshone) were reported preceding the Dominguez-Escalante journey. Duncan (2000) cited secondary sources or records of these cultural exchanges and the nature of these encounters.

The Mormons came into Ute traditional territory in 1847 and rapidly settled in the area and beyond its borders. It was there that land-related conflict between the Mormons and the Utes arose and intensified. In 1853 and 1854, two major Mormon-Ute conflicts, the Walker War and the Utah War, erupted in violence (Duncan 2000:188-189) because of retaliation by the Utes to protect their homeland against the control of Euro-American settlers. As a consequence of these waves of violence and failed resolutions, the Mormon settlers pressured the federal government to relocate Indians onto reservations and, in 1861, shortly after the Civil War had begun, the Secretary of the Interior wrote to President Lincoln recommending the Uintah Valley be made an Indian reservation for the Ute people (Lyman and Denver 1970: 45). The Uintah Reservation was established by E.O. in 1864. After the reservation was established, and the Ute people continued to be removed from their traditional lands, crisis among Indians and non-native populations reached great proportions. Soon after, other reservations were established, also by E.O.s. Many other Utes were evicted from their ancestral lands and forced to combine with other groups on the reservation lands (Lyman and Denver 1970:45-48). In 1886, The Uintah Reservation and the Uncompahgre Reservation, which was not conducive to settlement since its creation, were combined into the Uintah and Ouray Reservation, located in Northeastern Utah (Fort Duchesne) (Lyman and Denver 1970:45-48). By the mid 1880s, many Utes had relocated to the reservations and had adopted agriculture and cattle raising as their main productive activities (Lyman and Denver 1970).

During the mid-nineteenth century, Mormon settlers continued to displace Utes from their territory and farms established years earlier by the federal government (Callaway et al. 1986). By the 1870s, through Mormon and governmental persuasion, Utes in Utah became ever more restricted to the Uintah Reservation. By the mid-1870s, these Utes had been restricted to about 9 percent of their aboriginal range (Callaway et al. 1986:356). By 1930, thousands of acres were given to individuals or alienated through sales (Callaway et al. 1986:356).

Following provisions of the Indian Reorganization Act of 1934, the federal government began to purchase Indian land sold to non-Indians to buy land from White farmers as an attempt to undo past wrongs of the federal government (Callaway et al. 1986:356). According to Clifford Duncan (2000:208-212), the Indian Reorganization Act of 1934 allowed the Indians control over taxation, tribal membership, law and order on the reservation, and assured the Indian right to self-government. Nonetheless, the act —stopped short of abolishing the Bureau of Indian Affairs (BIA), which maintained its role of facilitator between the Indian tribes and the federal government. This severely watered down the status of Indian tribes as sovereign nations, ostensibly one of the main goals of the act (Duncan 2000:209)." The author also stated in the twentieth century, the Ute people had gained some money in claims and other payments, as the government finally agreed to fulfill promises it had made through treaties and agreements. Additionally, the government began a —Thirteen Year Program" to prepare the Utes for termination, which was designed to educate and offer plans for economic and social development. Over the next few years, 494 Northern Utes, 27 percent of the tribe, were terminated. The next seven years were spent separating tribal assets between the terminated and non-terminated Utes (Duncan 2000:212-214).

3.2.6.5 Summary

The BLM will continue on-going consultations with the tribes and in doing so will keep the all the tribes informed regarding the current status of Project.

3.2.7 Paleontological Resources

General concern about potential effects on paleontological resources was expressed as an issue during agency and public scoping for the Project. Paleontological resources are any fossilized remains, traces, or imprints of organisms preserved in the Earth‘s crust and provide information about the history of life on Earth. Fossils include bones, teeth, shells, leaves, wood, and trackways originally buried in sedimentary deposits. Paleontological resources include not only the actual fossils, but also the sedimentary deposits that contain the fossils.

Paleontological resources occurring on federal and state lands are afforded protection by federal and state law and regulation. Protections for paleontological resources include requirements for the (1) assessment of areas containing significant paleontological resources that could be directly or indirectly affected, damaged, or destroyed by development prior to, and as a consequence of, authorization of ground-disturbing activities; and (2) formulation and implementation of measures to mitigate potentially adverse impacts, including permanent preservation of the discovered sites and/or permanent preservation of salvaged materials at federal- and state-approved institutions.

3.2.7.1 Regulatory Framework

Federal

The Antiquities Act of 1906 and OPLMA-PRP serve as the primary federal legislation that provides for the protection and conservation of paleontological resources occurring on federally-administered lands. The Antiquities Act of 1906 (16 U.S.C. 431-433) provides for protection of both historic and prehistoric items on federal lands. OPLMA-PRP was enacted as part of the 2009 OPLMA-PRP and codified specific protection for vertebrate fossil resources and scientifically significant plant and invertebrate fossil resources on federal lands. OPLMA-PRP created criteria for the issuance of paleontological collection permits and directed the U.S. Secretaries of the Interior and Agriculture to ensure paleontological resources discovered on federal lands are properly curated into the collections of approved repository institutions. Other laws also may apply in special circumstances.

BLM‘s policy for addressing potential impacts on paleontological resources on lands they administer also applies, which is included in the following documents: (1) *Paleontological Resource Management Handbook* (H-8270), (2) *General Procedural Guidance for Paleontological Resource Management* (H-8270-1), (3) *PFYC System for Paleontological Resources on Public Lands* (WOIM 2008-009), and (4) *Assessment and Mitigation of Potential Impacts to Paleontological Resources* (WOIM 2009-011).

State

Utah State Code (63-73-11 through 63-73-19) requires the preservation of significant fossil resources on state lands and mandates that individuals removing or excavating significant fossils on Utah state lands be qualified and permitted under joint jurisdictional cooperation from the UGS, Utah Museum of Natural History, and SITLA. Utah State Code (53B-17-603) also requires important fossils be curated by an approved and qualified institution.

3.2.7.2 Regional Setting

The Project area is located along the eastern margin of the Basin and Range Physiographic Province, which is characterized by mostly parallel, north-south trending mountain ranges separated by desert basins and valleys (Fenneman 1931). The Basin and Range Physiographic Province is bordered on its eastern margin by the Wasatch Mountains and the Colorado Plateau Physiographic Province. The Project area is bounded by the Pahvant Range, Sevier Desert, Escalante Desert, and Beaver Lake Mountains to the west and by the Sevier Plateau, Parowan Valley, Harmony Mountains, and Pine Valley Mountains to the east. The Pahvant Range and Sevier Desert also form the northern boundary, and the Red Mountains form the southern boundary of the Project area. Mountain ranges traversed by the Project include the Tushar Mountains, Mineral Mountains, and Bull Valley Mountains. Elevation ranges from 4,869 feet above msl in the Beaver Bottoms to over 7,550 feet above msl in the Tushar Mountains.

Geological units in the Project area range in age from Proterozoic to Cenozoic (Table 3-43). There are 16 known fossil localities that occur within these geological units in the study corridor (i.e., within 1 mile of the reference centerline) and 20 known fossil localities that occur within the Project area. Some of these fossil localities are considered to be scientifically significant by the BLM, USFS, and the State of Utah because these localities contain vertebrate fossils and/or scientifically significant invertebrate or plant fossils.

TABLE 3-43
GEOLOGICAL UNITS AND PALEONTOLOGICAL RESOURCES IN THE SIGURD TO RED BUTTE PROJECT AREA

Age	Geological Unit	Lithology	Fossils found in the Project Area	Number of Localities	PFYC	Paleontological Potential
Cenozoic Era						
Quaternary	Terrace and alluvial deposits	Sand, silt, and gravel	*Equus* sp., mammal limb bone	4	2	Low
	Surficial older alluvium and colluvium	Sand, silt, and gravel	None	0	2	Low
Miocene	Sevier River Formation	Sandstone, conglomerate, mudstone, and siltstone	Rodents, rabbits, camelids, carnivores, felids, and gomphotheres	4	4	High
Miocene-Pliocene	Salt Lake Formation and other valley-filling sediments	Siltstone, shale, limestone, sand, silt, conglomerate, tuff, and volcanics	None	0	3	Undetermined
Eocene-Oligocene	Crazy Hollow Formation	Sandstone, siltstone, and shale	None	0	5	Very High
Eocene	Green River Formation	Shale and limestone	None	0	4	High
Cretaceous-Eocene	Wasatch, Flagstaff, and Claron formations	Limestone, shale, sandstone, gypsum, siltstone, and conglomerate	None	0	4	High

TABLE 3-43
GEOLOGICAL UNITS AND PALEONTOLOGICAL RESOURCES IN THE SIGURD TO RED BUTTE PROJECT AREA

Age	Geological Unit	Lithology	Fossils found in the Project Area	Number of Localities	PFYC	Paleontological Potential
Mesozoic Era						
Cretaceous	Iron Springs Formation	Sandstone, conglomerate, siltstone, and mudstone	Indeterminate vertebrate	2	3	Undetermined
Cretaceous	Frontier, Indianola, Mancos, Mowry, Wahweep, and Straight Cliffs formations	Sandstone, shale, mudstone, and limestone	None	0	3	Undetermined
Jurassic	Arapien Shale	Shale, sandstone, limestone, and gypsum	Gastropods	3	3	Undetermined
	Carmel Formation	Silty limestone, mudstone, siltstone, and sandstone	Invertebrates	3	3	Undetermined
Paleozoic Era						
Permian	Kaibab, Toroweap, Park City, and other formations	Dolomitic limestone, gypsiferous siltstone, sandstone, and shale	None	1	2	Low
Pennsylvanian	Unnamed rocks		Unknown	1	3	Undetermined
Devonian	Pilot Shale	Limestone, shale, and conglomerate	Conodonts	1	2	Low
Unknown	Unnamed rocks		*Aviculopecten*, *Spirifer*, *Composita* (bivalves, brachiopods)	1	2	Low
Proterozoic Era						
Proterozoic	Unnamed rocks	Sedimentary and metamorphic rocks	None	0	1	Low

Proterozoic Rocks

The oldest geological units within the study corridors are Proterozoic in age (2,500 to 544 million years ago). Two small outcrops of sedimentary and meta-sedimentary Proterozoic rocks occur along the San Francisco Mountains near Black Rock between Milford and Minersville. Fossils have not been reported from these Proterozoic rocks.

Paleozoic Rocks

The Paleozoic Era occurred from 543 to 250 million years ago, when much of western Utah was covered by a sea. Organisms that lived in this sea during the Paleozoic Era include corals, trilobites, ostracodes, brachiopods, pelecypods, gastropods, conodonts, and primitive fish (Sheehan and Harris 1997). Paleozoic rocks crop out in small areas within the Project area near the communities of Milford, Sulphurdale, Black Rock, and Minersville. The Kaibab, Toroweap, and Park City formations, as well as the Pilot Shale, are Paleozoic in age (Hintze et al. 2000).

Mesozoic Rocks

The Mesozoic Era ranges in age from 250 to 65 million years ago. The study corridor contains several geologic formations of Mesozoic age (Table 3-43). The Arapien Shale and Carmel Formation were deposited in a shallow continental sea during the Jurassic Period. These formations contain fossil ammonoids, crinoids, echinoids, snails, and fish (Hardy 1949; Gillette and Hayden 1997). The Frontier, Indianola, Mancos, Mowry, Wahweep, and Straight Cliffs formations represent a group of formations formed in or along the Cretaceous Interior Seaway during the Cretaceous Period. These formations contain fossil invertebrates, fish, reptiles, amphibians, crocodiles, dinosaurs, and mammals (Cobban et al. 2000; Kirkland et al. 2006; Eaton 2006). The Iron Springs Formation consists of terrestrial deposits that contain fossil dinosaurs and mammals of Cretaceous age (Eaton 1999; Vice et al. 2003; Milner et al. 2006).

Cenozoic Sediments

The Cenozoic Era ranges in age from 65 million years ago to the present. The Project area contains several formations of Cenozoic age, including the Green River, Claron, Flagstaff, Crazy Hollow, Sevier River, and Salt Lake formations, as well as Miocene volcanic and intrusive rocks (Hintze et al. 2000). The Claron Formation consists of lacustrine deposits that contain plant and snail fossils of Cretaceous to Eocene age (Taylor 1993; Rowley et al. 2005). The Flagstaff Formation consists of lacustrine deposits that contain rare fossils of mollusks, turtles, and land mammals (a miacid carnivore) of Eocene age (Fouch et al. 1987; Gillette and Hayden 1997; La Rocque 1951; McCullough 1977; Rich and Collinson 1973). The Green River Formation in Utah consists of lacustrine shale and limestone beds deposited in ancient Lake Uinta (Nelson et al. 1980). Fossils consist of plants, fish, amphibians, reptiles, and land mammals of Eocene age (Gardner 1999; Grande 1984; Hesse 1939; Lucas and Schoch 1989; Nelson et al. 1980; Olson and Matsuoka 2005). The Crazy Hollow Formation consists of fluvial and lacustrine deposits that contain invertebrate fossils of Eocene to Oligocene age (Rasmussen et al. 1999a; Rasmussen et al. 1999b; Weiss 1982). The Sevier River Formation is Miocene in age (13.8 to 6.9 million years old) and consists of fluvial and lacustrine deposits that contain fossil rodents, lagomorphs, camelids, felids, mustelids, and gomphotheres (De Blieux et al. 2002; Kirkland et al. 2006; Korth and De Blieux 2010; Rowley et al. 1979). The Salt Lake Formation consists of lacustrine deposits of limestone and tuff that contain rare fossils of mollusks, fish, beaver, other rodents, lagomorphs, and horse of Miocene to Pliocene age (Tedrow and Robison 1999). Overlying older basin-filling deposits are Quaternary alluvial, fluvial, piedmont, and terrace deposits (Hintze et al. 2000). These deposits locally contain Pleistocene mammals, such as rodents, rabbits, ground sloth, camel, horse, mastodon, mammoth, and carnivores (Gillette and Miller 1999; Larson 1999; Miller 1983). A Pleistocene camel (*Camelops* sp.) was recently found at the Milford Wind farm in Quaternary sediments, which were considered to be ancient Lake Bonneville shoreline deposits (Strauss et al, 2010).

3.2.7.3 Study Methodology

Inventory

Information for the paleontological inventory was obtained from a review of the scientific literature and geological maps and from record searches at paleontological institutions and governmental agencies. Agencies and institutions contacted include the USGS, BLM, UGS, Museum of Northern Arizona, Brigham Young University, Raymond M. Alf Paleontology Museum, and the Paleobiology Database operated by the University of California at Santa Barbara. Fieldwork was not conducted as part of the inventory.

Information about the geological units and known fossil localities in the region were used to identify the paleontological potential of areas within 1 mile of the centerline. Paleontological potential levels were assigned to each geological unit using the PFYC system adopted by the BLM in 2007 for assessing paleontological potential on federal land. The PFYC system is a five-tiered system that classifies geological 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 geological formation, member, or other distinguishable map unit, preferably at the most detailed level possible. This approach was followed in recognition of the direct relationship that exists between paleontological resources and the geological units within which fossils are entombed. By knowing the geology of a particular area and the fossil productivity of particular geological units that occur in the area, it is possible to predict where fossils will likely be found. Each class is briefly defined below:

Class 1 – Very Low Potential. Geological units not likely to contain recognizable fossil remains. These units include igneous, metamorphic, and Precambrian rocks.

Class 2 – Low Potential. Sedimentary geological units not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils. These units include eolian, diagenetically altered, and Holocene sediments.

Class 3 – Moderate or Unknown Potential. Fossiliferous sedimentary geological 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 fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils may be found in the area.

Class 3b – Unknown Potential. Units exhibit geological 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. Geological 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 geological units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils.

Impact Assessment and Mitigation Planning

The primary concern regarding impacts on paleontological resources that could result from implementation of the Project is the loss of scientifically significant fossils and their contextual data. The methodology for assessing the potential impacts on paleontological resources associated with implementing the Project include (1) identifying the types of potential effects on paleontological resources that could result from construction, operation, and maintenance of the proposed transmission line and associated facilities; (2) classifying the sensitivity of geological formations based on PFYC; (3) developing criteria for assessing the intensity of a potential effect on a paleontological resource; (4) assessing the initial impacts on the paleontological resources; and (5) developing a PRMMP to mitigate paleontological resources found as a result of implementing the Project.

Types of Potential Environmental Effects

The construction, operation, and maintenance of the Project would result in both direct and indirect adverse effects on paleontological resources. Direct effects associated with construction activities could include the loss of paleontological resources as a result of excavation and construction of facilities, staging areas, and road construction or road improvement.

There would be no direct effects associated with the operation and maintenance of the facilities and the presence of the transmission line. Indirect effects associated with the construction, operation, and maintenance of the Project include the following:

- Loss of paleontological resources as a result of increased access of the general public to sensitive geological formations and unauthorized collection or vandalism from the construction of permanent access roads.
- Loss of paleontological resources as a result of increased erosion from construction activities.

Criteria for Assessing Intensity of Impacts

Criteria were developed to assess the relative sensitivity on paleontological resources that could result from implementation of the Project. Criteria included PFYC and the resource inventory data of fossil localities. Literature research, institutional record searches, and PFYC provided the information necessary to assign a sensitivity level of high, low, or moderate/undetermined to portions of the study corridors. Mitigation of potentially adverse impacts on scientifically significant paleontological resources exposed during construction-related activities would be based on the determination of sensitivity level and site specific instances whereby chance discoveries of paleontological resources are found in areas with low sensitivity. For this analysis, sensitivity levels were defined as follows:

> **High Sensitivity Level**. Geological units with a high potential for containing significant paleontological resources were determined to have a high sensitivity level. In these cases, the geological unit contains a high density of recorded fossil localities, has produced fossil remains in or near the vicinity of the Project, or is very likely to yield additional remains during construction. Areas identified as having a PFYC 4 or 5 were considered to have a high sensitivity level.
>
> **Moderate/Undetermined Sensitivity Level**. The geological unit has limited exposure in the Project area, is poorly studied, or contains no recorded paleontological resource localities. However, in other areas, the same or similar geological units may contain sufficient

paleontological localities to suggest exposures of the unit in the Project area would have at least a moderate potential for yielding fossil remains. Areas with a PFYC 3 were considered to have a moderate or undetermined sensitivity level.

Low Sensitivity Level. The geological unit contains very low or no density of recorded fossil localities, has produced little or no fossil remains in the vicinity of the Project, or is not likely to yield any fossil remains. Nevertheless, geological units with few or no prior recorded fossil localities could prove fossiliferous during construction. Areas identified as having a PFYC 1 or 2 were considered to have a low sensitivity level.

Effects Analysis

Initial Assessment of Initial Impacts

The initial resource sensitivity classification described above is the basis for assessing initial potential impacts on paleontological resources associated with implementation of the Project.

Mitigation Planning

The loss of paleontological resources due to construction and ground disturbing activities resulting from implementation of the Project is the primary potential adverse environmental effect on paleontological resources. As part of the BMPs included in the Project description (specifically, BMP 19 in Table 2-6), a PRMPP would be developed in consultation with the appropriate land-management agencies to mitigate any potential adverse impacts on paleontological resources.

Residual Impacts

Low residual impacts on paleontological resources would result after implementation of BMP 19 (Table 2-6) and the PRMMP (Table 3-46). Low residual impacts are impacts that are less than significant. For example, applying BMPs to an area with a PFYC of 4 would account for all foreseeable impacts on paleontological resources, resulting in low residual impacts.

3.2.7.4 Results

Paleontological sensitivity ranges from low to high within the study corridors. A summary of the paleontological sensitivity associated with each alternative route is presented in Table 3-44 and shown in Map MV-9. A summary of baseline resource inventory and results of the effects analysis are presented in Tables 3-46 and 3-47 and described in this section. Table 2-11 presents a comparison of results of the effects analysis for the alternative routes and Table 2-12 presents a summary of the information presented in Table 2-11.

The geological units crossed for each alternative are shown in Table 3-45 and discussed in the affected environment section for each alternative.

TABLE 3-44
COMPARISON OF PALEONTOLOGICAL SENSITIVITY (IN MILES)

Route	Total Mileage	Low Sensitivity (miles)	Moderate/ Undetermined Sensitivity (miles)	High Sensitivity (miles)	Number of Fossil Localities Occurring in Study Corridor
Alternative N1 (Environmentally Preferred)	120.7	105.7	4.6	10.4	7
Alternative N2	120.3	105.3	4.6	10.4	7
Alternative N3	117.2	103.4	2.0	11.7	5
Alternative N4	109.4	94.4	4.6	10.4	7
Alternative N5	106.3	92.5	2.0	11.7	5
Alternative N6 (Proponent‘s Proposed Action)	105.5	91.1	2.0	12.3	5
Alternative S1	56.0	50.5	2.3	3.2	1
Alternative S2 (Environmentally Preferred)	49.6	45.5	2.1	2.0	4
Alternative S3	57.6	48.4	8.2	1.0	1
Alternative S4	48.9	41.3	5.6	2.0	4
Alternative S5 (Proponent‘s Proposed Action)	59.0	50.5	2.5	6.0	1
Alternative S6	61.9	48.8	9.1	4.0	1

No Action Alternative

Under this alternative, the environment would remain as it presently exists. This option would forego the opportunity to develop paleontological resource inventories along the route approved for construction and any collection of paleontological data that might be discovered during Project construction.

Northern Area - Sigurd Substation to South Black Mountains

The baseline resource inventory and residual impacts for alternative routes considered in the northern area are presented in Table 3-46.

Alternative N1 – Black Rock Road to IPP North of Milford Wind Farm

Affected Environment

Alternative N1 crosses ten geological units (Table 3-45). Of these geological units, Quaternary surficial alluvium, Miocene volcanics, Oligocene volcanics, Quaternary basalt, Tertiary intrusive rocks, and Permian formations have a low PFYC (Table 3-46). The Flagstaff, Green River, Crazy Hollow, and Sevier River formations have a high PFYC. There are seven fossil localities occurring within 1.0 mile of the reference centerline for this alternative route.

TABLE 3-45
GEOLOGICAL UNITS CROSSED BY ALTERNATIVES

Route	Low PFYC								Moderate PFYC		High PFYC				Fossil Localities within 1 mile
	Permian Formations (P2)[1]	Surficial Alluvium (Qa)	Quaternary Basalt (Qb)	Quaternary Surficial Older Alluvium and Colluvium (Qao)	Tertiary Intrusive Rocks (Ti)	Miocene Volcanics (Tmv)	Oligocene Volcanic Rocks (Tov)	Tertiary Volcanic rocks (Tvu)	Iron Springs Formation and Mancos Shale (K2)	Salt Lake Formation (T4)	Claron and Flagstaff Formations (T1)	Green River Formation (T2)	Crazy Hollow Formation (T3)	Sevier River Formation (T5)	
Alternative N1 (Environmentally Preferred)	✓	✓	✓		✓	✓	✓				✓	✓	✓	✓	7
Alternative N2	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	7
Alternative N3		✓	✓	✓		✓	✓				✓	✓	✓	✓	5
Alternative N4	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	7
Alternative N5		✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	5
Alternative N6 (Proponent's Proposed Action)		✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	5
Alternative S1		✓	✓		✓	✓		✓	✓		✓				1
Alternative S2 (Environmentally Preferred)		✓					✓			✓	✓				4
Alternative S3		✓	✓			✓			✓	✓	✓				1
Alternative S4		✓	✓			✓			✓	✓	✓				4
Alternative S5 (Proponent's Proposed Action)		✓	✓			✓		✓	✓		✓				1
Alternative S6		✓	✓	✓		✓		✓	✓	✓	✓				1

NOTE:
[1]Kaibab, Toroweap, and Park City formations

TABLE 3-46
ALTERNATIVE ROUTE COMPARISON
PALEONTOLOGICAL RESOURCES INVENTORY DATA AND RESIDUAL IMPACTS

Alternative Route	Total Miles	Paleontology (miles)						Residual Impacts (miles [percent])			
		PFYC			Paleontological Density[1]						
		High Sensitivity	Moderate Sensitivity	Low Sensitivity	High Sensitivity	Moderate Sensitivity	Low Sensitivity	No identifiable	Low[2]	Moderate	High
Alternative N1 (Environmentally Preferred)	120.7	9.6	–	111.1	1.5	5.8	–	–	120.7 [100]	0.0	0.0
Alternative N2	120.3	9.6	–	110.7	1.5	5.8	–	–	120.3 [100]	0.0	0.0
Alternative N3	117.2	10.9	–	106.2	1.5	3.2	–	0.1 [0.1]	117.1 [99.9]	0.0	0.0
Alternative N4	109.4	9.6	–	99.8	1.5	5.8	–	–	109.4 [100]	0.0	0.0
Alternative N5	106.3	10.9	–	95.3	1.5	3.2	–	0.1 [0.1]	106.2 [99.9]	0.0	0.0
Alternative N6 (Proponent's Proposed Action)	105.5	11.5	–	93.9	1.5	3.2	–	0.1 [0.1]	105.5 [100]	0.0	0.0

NOTE:
[1]Paleontological Density was based on the number of localities within a square mile of the centerline.
[2]Low residual impacts are impacts that are less than significant. For example, applying BMPs to an area with a PFYC of 4 would account for all foreseeable impacts on paleontological resources, resulting in low residual impacts.

Environmental Effects

Alternative N1 would be anticipated to have 10.4 miles of high paleontological sensitivity and 4.6 miles of moderate/undetermined paleontological sensitivity (based on PFYC and proximity to known fossil localities). If unmitigated, impacts on paleontological resources could be high along portions of the route that cross the Green River, Crazy Hollow, Flagstaff, and Sevier River formations, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, as a BMP incorporated as part of the Project description (BMP 19, Table 2-6), areas with high or moderate/undetermined sensitivity (i.e., PFYC 3, 4, and 5) would be surveyed prior to construction to support development of a PRMMP to be implemented before and/or during construction. The PRMMP could prescribe collecting scientifically significant fossils, monitoring of ground-disturbing activities during construction to collect scientifically significant fossils, curation of any fossils collected during the survey or monitoring, and deposition of the fossils into a federally approved repository for future scientific study and education. The implementation of the PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative N2 – Black Rock Road to IPP South of Milford Wind Farm

Affected Environment

Alternative N2 crosses 11 geological units (Table 3-45). Of these geological units, Quaternary surficial alluvium, Quaternary surficial older alluvium and colluvium, Oligocene volcanics, Miocene volcanics, Quaternary basalt, Tertiary intrusive rocks, and Permian formations have a low PFYC. The Flagstaff, Green River, Crazy Hollow, and Sevier River formations have a high PFYC. There are seven fossil localities occurring within 1.0 mile of this alternative route.

Environmental Effects

The area that would be anticipated to have high and moderate paleontological sensitivity associated with Alternative N2 would be similar to that described for Alternative N1. Implementing BMP 19 (Table 2-6) and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative N3 – Black Rock Road Parallel to Kern River Pipeline

Affected Environment

Alternative N3 crosses nine geological units (Table 3-45). Of these geological units, Quaternary surficial alluvium, Quaternary surficial older alluvium and colluvium, Oligocene volcanics, Miocene volcanics, and Quaternary basalt have a low PFYC. The Flagstaff, Green River, Crazy Hollow, and Sevier River formations have a high PFYC. There are five fossil localities occurring within 1.0 mile of this alternative route.

Environmental Effects

Alternative N3 would be anticipated to have 11.7 miles of high paleontological sensitivity and 2.0 miles of moderate/undetermined paleontological sensitivity (based on PFYC and proximity to known fossil localities). If unmitigated, impacts on paleontological resources could be high along the route in the areas that cross the Green River, Crazy Hollow, Flagstaff, and Sevier River formations, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, implementing BMP 19 (Table 2-6) and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative N4 – Mineral Mountains to IPP South of Milford Wind Farm

Affected Environment

Alternative N4 crosses 11 geological units (Table 3-45). Of these geological units, Quaternary surficial alluvium, Quaternary surficial older alluvium and colluvium, Oligocene volcanics, Miocene volcanics, Quaternary basalt, Tertiary intrusive rocks, and Permian formations have a low PFYC. The Flagstaff, Green River, Crazy Hollow, and Sevier River formations have a high PFYC. There are seven fossil localities occurring within 1.0 mile of this alternative route.

Environmental Effects

The area that would be anticipated to have high and moderate paleontological sensitivity associated with Alternative N4 would be similar to that described for Alternative N1. Implementing BMP 19 and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative N5 – Mineral Mountains Parallel to Kern River Pipeline

Affected Environment

Alternative N5 crosses ten geological units (Table 3-45). Of these geological units, Quaternary alluvium, Quaternary surficial older alluvium and colluvium, Oligocene volcanics, Miocene volcanics, Quaternary basalt, and Tertiary intrusive rocks have a low PFYC. The Flagstaff, Green River, Crazy Hollow, and Sevier River formations have a high PFYC. There are five fossil localities occurring within 1.0 mile of this alternative route.

Environmental Effects

Alternative N5 would be anticipated to have 11.7 miles of high paleontological sensitivity and 2.0 miles of moderate/undetermined paleontological sensitivity. If unmitigated, impacts on paleontological resources could be high along the route in the areas that cross the Green River, Crazy Hollow, Flagstaff, and Sevier River formations, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, implementing BMP 19 and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative N6 – Mineral Mountains 1,500 Feet East of Kern River Pipeline

Affected Environment

Alternative N6 crosses ten geological units (Table 3-45). Of these geological units, Quaternary alluvium, Quaternary surficial older alluvium and colluvium, Oligocene volcanics, Miocene volcanics, Quaternary basalt, and Tertiary intrusive rocks have a low PFYC. The Flagstaff, Green River, Crazy Hollow, and Sevier River formations have a high PFYC. There are five fossil localities occurring within 1.0 mile of the reference centerline for this alternative route.

Environmental Effects

Alternative N6 crosses 12.3 miles of high sensitivity and 2.0 miles of moderate/undetermined sensitivity for paleontological resources (based on PFYC and proximity to known fossil localities). If unmitigated, impacts on paleontological resources could be high along the route in the areas that cross the Green River, Crazy Hollow, Flagstaff, and Sevier River formations, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, implementing BMP 19 and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Southern Area – South Black Mountains to Red Butte Substation

The baseline resource inventory and residual impacts for alternative routes considered in the southern area are presented in Table 3-47.

TABLE 3-47
ALTERNATIVE ROUTE COMPARISON
PALEONTOLOGICAL RESOURCES INVENTORY DATA AND RESIDUAL IMPACTS

Alternative Route	Total Miles	Paleontology (miles)						Residual Impacts (miles [percent])			
		PFYC			Paleontological Density						
		High Sensitivity	Moderate Sensitivity	Low Sensitivity	High Sensitivity	Moderate Sensitivity	Low Sensitivity	No identifiable	Low	Moderate	High
Alternative S1	56.0	3.2	1.3	51.5	–	2.1	–	–	56.0 [100.0]	0.0	0.0
Alternative S2 (Environmentally Preferred)	49.6	0.5	1.1	48.0	1.5	1.0	–	–	49.6 [100.0]	0.0	0.0
Alternative S3	57.6	1.0	7.6	49.0	–	0.8	–	–	57.6 [100.0]	0.0	0.0
Alternative S4	48.9	0.9	4.5	43.5	1.1	1.2	–	–	48.9 [100.0]	0.0	0.0
Alternative S5 (Proponent's Proposed Action)	59.0	6.0	1.5	51.5	–	2.1	–	–	59.0 [100.0]	0.0	0.0
Alternative S6	61.9	4.0	8.5	49.4	–	0.8	–	–	61.9 [100.0]	0.0	0.0

Alternative S1 – Pinto Creek

Affected Environment

Alternative S1 crosses seven geological units (Table 3-45). Of these geological units, Quaternary surficial alluvium, Tertiary volcanics rocks, Miocene volcanics, and Quaternary basalt have a low PFYC. The Iron Springs Formation and Mancos Shale have a moderate PFYC. The Claron and Flagstaff formations have a high PFYC. There is one fossil locality occurring within 1.0 mile of this alternative route.

Environmental Effects

Alternative S1 would be anticipated to have 3.2 miles of high paleontological sensitivity and 2.3 miles of moderate/undetermined paleontological sensitivity (based on PFYC and proximity to known fossil localities). If unmitigated, impacts on paleontological resources could be high along the route in the areas that cross the Iron Springs Formation, Mancos Shale, and Claron and Flagstaff formations, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, implementing BMP19 and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative S2 – IPP West

Affected Environment

Alternative S2 crosses four geological units (Table 3-45). Of these geological units, Quaternary basalt and Miocene volcanics have a low PFYC. The Salt Lake Formation has a moderate PFYC. The Claron and Flagstaff formations have a high PFYC. There are four fossil localities occurring within 1.0 mile of this alternative route along Link 270.

Environmental Effects

Alternative S2 would be anticipated to have 2.0 miles of high paleontological sensitivity and 2.1 miles of moderate/undetermined paleontological sensitivity (based on PFYC and proximity to known fossil localities). If unmitigated, impacts on paleontological resources could be high along the route in the areas that cross the Salt Lake, Claron, and Flagstaff formations, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, implementing BMP 19 and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative S3 – Ox Valley

Affected Environment

Alternative S3 crosses six geological units (Table 3-45). Of these geological units, Quaternary alluvium, Miocene volcanics, and Quaternary basalt have a low PFYC. The Salt Lake and Iron Springs formations and the Mancos Shale have a moderate PFYC. The Claron and Flagstaff formations have a high PFYC. There is one fossil locality occurring within 1.0 mile of this alternative route.

Environmental Effects

Alternative S3 would be anticipated to have 1.0 mile of high paleontological sensitivity and 8.2 miles of moderate/undetermined paleontological sensitivity. If unmitigated, impacts on paleontological resources could be high along the route in the areas that cross the Salt Lake, Iron Springs, Claron, and Flagstaff formations and the Mancos Shale, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, implementing BMP 19 and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative S4 – IPP East

Affected Environment

Alternative S4 crosses six geological units (Table 3-45). Of these geological units, Quaternary alluvium, Miocene volcanics, and Quaternary basalt have a low PFYC. The Salt Lake and Iron Springs formations and the Mancos Shale have a moderate PFYC. The Claron and Flagstaff formations have a high PFYC. There are four fossil localities occurring within 1.0 mile of this alternative route along Link 270.

Environmental Effects

Alternative S4 would be anticipated to have 2.0 miles of high paleontological sensitivity and 5.6 miles of moderate/undetermined paleontological sensitivity (based on PFYC and proximity to known fossil localities). If unmitigated, impacts on paleontological resources could be high along the route in the areas that cross the Salt Lake, Iron Springs, Claron and Flagstaff formations, and the Mancos Shale, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, implementing BMP 19 and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative S5 – Iron Springs and Pinto Creek

Affected Environment

Alternative S5 crosses six geological units (Table 3-45). Of these geological units, Quaternary surficial alluvium, Quaternary basalt, Miocene volcanics, and Tertiary volcanic rocks have a low PFYC. The Iron Springs Formation and Mancos Shale have a moderate PFYC. The Claron and Flagstaff formations have a high PFYC. There is one fossil locality occurring within 1.0 mile of this alternative route.

Environmental Effects

Alternative S5 would be anticipated to have 6.0 miles of high paleontological sensitivity and 2.5 miles of moderate/undetermined paleontological sensitivity (based on PFYC and proximity to known fossil localities). If unmitigated, impacts on paleontological resources could be high along the route in the areas that cross the Iron Springs, Claron and Flagstaff formations, and the Mancos Shale, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, implementing BMP 19 (Table 2-6) and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

Alternative S6 – Iron Springs and Ox Valley

Affected Environment

Alternative S6 crosses eight geological units (Table 3-45). Of these geological units, Quaternary surficial alluvium, Quaternary surficial older alluvium and colluvium, Tertiary volcanic rocks, Miocene volcanics, and Quaternary basalt have a low PFYC. The Salt Lake and Iron Springs formations and the Mancos Shale have a moderate PFYC. The Claron and Flagstaff formations have a high PFYC. There is one fossil locality occurring within 1.0 mile of this alternative route.

Environmental Effects

Alternative S6 would be anticipated to have 4.0 miles of high paleontological sensitivity and 9.1 miles of moderate/undetermined paleontological sensitivity (based on PFYC and proximity to known fossil localities). If unmitigated, impacts on paleontological resources could be high along the route in the areas that cross the Salt Lake, Iron Springs, Claron and Flagstaff formations, and the Mancos Shale, as these areas could contain fossil land mammals or other vertebrates (MV-9). However, implementing BMP 19

(Table 2-6) and the development and implementation of a PRMMP would minimize the potential for impacts on paleontological resources associated with this alternative route.

3.2.7.5 Summary

Alternative routes N1 to N6 have a similar amount of paleontological sensitivity, only varying between 10.4 miles and 12.3 miles in high sensitivity areas and between 2.0 miles and 4.6 miles in moderate/undetermined sensitivity areas. Alternative routes N1, N2, and N4 have the least amount of high sensitivity areas; whereas, Alternative N6 has the most amount of high sensitivity area. Geological units with high sensitivity for paleontological resources along these alternative routes include the Green River, Crazy Hollow, Flagstaff, and Sevier River formations. Alternative routes S1 to S6 vary in their amount of paleontological sensitivity areas, varying between 1.0 mile and 6.0 miles in high sensitivity areas, and between 2.1 miles and 8.2 miles in moderate/undetermined sensitivity area. Alternative S1 has the least amount of high sensitivity area; whereas, Alternative S5 has the most amount of high sensitivity area. Geological units with high to moderate/undetermined sensitivity for paleontological resources along these alternative routes include the Iron Springs Formation, Mancos Shale, Claron Formation, and Flagstaff Formation.

If unmitigated, impacts on paleontological resources could be high along these routes, as many areas could contain scientifically significant fossils, such as fossil land mammals, dinosaurs, and other vertebrates. However, mitigation measures would be implemented in areas with high or moderate/undetermined sensitivity applied before and during construction (i.e., BMP 19 in Table 2-6). These additional mitigation measures would include a preconstruction survey to describe and collect scientifically significant fossils, monitoring of ground-disturbing activities during construction to collect scientifically significant fossils, curation of any fossils collected during the survey or monitoring, and deposition of the fossils into a federally approved repository for future scientific study and education.

3.2.8 Visual Resources

3.2.8.1 Introduction

The following section describes the visual resource inventory and impact assessment based on the construction, operation, and maintenance of the proposed Project. The inventory and impact assessment were focused within a 6-mile-wide visual resource study corridor centered on the reference centerline for each alternative route under consideration within this EIS. Further, the inventory and impact assessment methodologies were developed in consultation with the BLM and USFS and are consistent with, and adhere to, applicable visual resource policy of the BLM and USFS.

Areas of concern that were identified during the scoping period and through consultation with the BLM, USFS, local agencies, and the public include:

- BLM
  - American Discovery Trail (National Millennium Trail)
  - Old Spanish Trail (National Historic Trail)
  - Escalante Trail
  - I-15
  - Landscape aesthetics associated with the Mineral Mountains
- USFS
  - Mountain Meadows Massacre Site

  - Pine Valley Mountain Wilderness
  - Locations where the Project would not be within the utility window designated by the Fishlake National Forest
  - Areas of High and Very High Scenic Integrity within the Dixie National Forest
- Local Agencies
  - Cove Fort Pioneer Historic Place
  - Fremont Indian State Park
- Public
  - Residential views from the communities of Pine Valley, Central, Minersville, and Milford
  - Recreation areas adjacent to Pine Valley
  - Landscape aesthetics associated with the Antelope Range

3.2.8.2 Regulatory Framework

Visual resources on BLM-administered land are managed within the context of the Visual Resource Management (VRM) system as described in the BLM Manual 8400 – Visual Resource Management. The system includes an inventory of scenic values (visual resource inventory [VRI]) based on the following factors: (1) diversity of landscape elements that define and characterize landscapes in a given planning area (scenic quality), (2) public concern for the landscapes that make up a planning area (sensitivity levels), and (3) landscape visibility from public viewing locations (distance zones). Combined, these three factors determine VRI classes, which indicate existing scenic values of BLM-administered lands. Through the resource management planning process, VRM classes are prepared, which provide VRM objectives for planning and project-level activities and are used to demonstrate compliance with the RMP. The VRM system also describes the methodology to assess and demonstrate compliance with VRM objectives (contrast analysis).

The Scenery Management System (SMS) is used to manage visual resources on USFS-administered lands. SIOs are analyzed and prepared during the forest planning process using the SMS (Landscape Aesthetics) Manual. SIOs establish management direction (including appropriate levels of mitigation) for a given landscape based on future desired conditions. Consistency with SIOs is determined by evaluating modifications to scenic integrity generated by a project. Per guidance provided in both the Dixie and Fishlake National Forests LRMPs, a project is considered compliant with the forest plan unless the resulting scenic integrity would not meet the management standard defined for the landscape crossed. The WWEC Programmatic EIS establishes Interagency Operation Procedures (IOPs) for visual resources that apply to both the BLM and USFS. This document states if agency visual management objectives have not been completed, then they should be developed by the proper agency. The field office manager or forest supervisor will determine the role of the Proponent in completing this task (DOE 2008).

BLM WOIM No. 2009-167 reiterates existing VRM policy regarding VRI in the context of renewable energy projects (including transmission lines). All field offices must have current VRI and VRM classes delineated as part of the land use planning process. If a field office does not have VRI data, then an inventory will need to be completed to process permit applications (BLM 2009b).

County

Beaver and Iron counties do not have goals, policies, or objectives identified in their general plans in regards to visual resources. Specific policies regarding visual resources that may affect the construction, operation, and maintenance of the Project are detailed below.

Sevier County

Unincorporated areas of Sevier County in the Project area are managed under the 1998 General Plan. Goals and policies identified in the plan include the following:

> "The Forest Service has identified utility corridors and designated these lands as such. USFS officials must complete a National Environmental Policy Act (NEPA) analysis before giving permits for any utility additions on Forest Service land. The Forest Service also encourages buried utility lines for distribution. The visual aspect of aboveground lines is also considered."

Millard County

Unincorporated areas of Millard County in the Project area are managed under the 1998 General Plan. Objectives identified in the plan include the following:

- "County Objective: Development should be in harmony with the County's character.
- Develop programs to enhance the County's visual quality."

Washington County

Unincorporated areas of Washington County in the Project area are managed under the 2007 Vision Dixie. Goals and policies identified in the plan include the following:

> "Protect unique physical features. The spectacular visual setting of southern Utah is central to our quality of life and helps drive our economic engine drawing residents, businesses, and tourists to Washington County."

City

The incorporated municipalities of Sigurd, Richfield, Elsinore, Joseph, Minersville, and Enterprise do not have specific planning goals, policies, or objectives for visual resources identified in their general plans. Specific policies regarding visual resources that may affect the construction, operation, and maintenance of the Project are detailed below.

City of Milford

Areas in Milford are managed under the 2004 General Plan. Goals identified in the plan include the following:

> "Goal PS1: To achieve a coordinated and efficient infrastructure system which is visually unobtrusive while designed to meet the current and future needs of the planning area."

3.2.8.3 Environmental Setting

The Project is located in the Basin and Range and Colorado Plateau Physiographic provinces, in the Great Basin and High Plateaus of Utah subdivisions, respectively (Fennemen 1931). Major ecosystems in the

Project area include sagebrush basins and slopes, semiarid foothills, woodland- and shrub-covered low mountains, and shadscale-dominated saline basins (Woods et al. 2001). The Great Basin is characterized by steep (often high elevation), north-south oriented mountains bounding broad, gently sloping, arid basins. The High Plateaus of Utah are characterized by large, high-elevation plateaus with steep slopes along their margins.

Regional landscapes range from developed urban and suburban landscapes in the north, to landscapes with intact characteristics to the south. Urban and suburban type landscapes generally parallel I-70 from Sigurd to Joseph to the Fishlake National Forest boundary. Foothills and mountains, including the Pahvant, Tushar, and Mineral mountains, occur in the northern portion of the Project. The central portion of the Project is primarily made up of sagebrush basins surrounded by foothills. The southern portion of the Project consists of foothills and mountains, including the Bull Valley, Atchinson, and Pine Valley mountains.

Agricultural development such as center-pivot farming, dryland agriculture, and grazing lands are integral to the character of the areas around the Sevier River, Escalante Desert, Ox Valley, Mountain Meadow, and along Pinto Creek.

3.2.8.4 Study Methodology

To inventory, characterize, and assess visual resources for all alternatives, regardless of jurisdiction, the following visual components were considered (1) landscape scenery, (2) sensitive viewers, and (3) federal agency visual management objectives. These components are common to both the BLM and USFS visual systems. Planning-level data were used to describe these components except where the data were too general for impact level analysis or data was not available. As such, a Project-level inventory was completed to maintain consistency across multiple jurisdictions as described below.

Landscape Scenery

In the context of this Project, landscape scenery pertains to the natural settings that compose the Project study area. Planning-level data provided by the BLM and USFS were used to develop landscape scenery as described below. For BLM-administered lands, scenic quality and sensitivity levels were considered during the landscape scenery inventory. Scenic quality ratings units (SQRU) relate to an area of interrelated ecosystems (landscapes) that exhibit similar landform, vegetation, water, etc., and exhibit a distinct landscape character. Each SQRU receives a rating that relates to their inherit aesthetics value. Sensitivity level rating units (SLRU) measure public concern for changes within each SQRU (BLM 1986b).

For USFS-administered lands, scenic attractiveness and scenic integrity were considered during the landscape scenery inventory. Scenic attractiveness is a measure of the aesthetic value inherit in a landscape character unit and is based on landform patterns and features, surface water characteristics, vegetation patterns, and land use and cultural features. Scenic integrity is the level of intactness associated with the visual elements that define a particular landscape character unit (USFS 1995).

Sensitive Viewers

Sensitive viewers represent viewing locations (including key observation points [KOPs]) where the public would view the Project. Sensitive viewers typically include residences, travel routes, and recreation areas.

A detailed list, including location and use, of each sensitive viewer is included in Appendix E. The BLM VRM system uses distance zones to account for sensitive viewers in the inventory process and KOPs in the analysis process. The USFS SMS system uses concern levels to describe sensitive viewers.

Distance zones are defined by the BLM as foreground-middleground (less than 5 miles away), background (5 to 15 miles away), and seldom seen (further than 15 miles away or not seen because of vegetation or topographical screening) (BLM 1986b). These distance zones relate to the level of detail in the landscape, or objects being viewed based on the location of viewers.

Federal Agency Visual Management Objectives

Bureau of Land Management

The BLM Manual Handbook 8410-1 established VRM classes, which are assigned through the land use planning process and used to determine management decisions. Compliance with VRM management class objectives is based on a project-specific contrast analysis that compares visual impacts of a proposed project to the class objectives. Visual contrast rating worksheets (BLM Form 8400-4) were prepared from four KOPs to confirm compliance with VRM objectives. The BLM VRM system includes four VRM class objectives to describe the amount of change that is acceptable within each management class as described in Table 3-48.

The Project does not cross Class I or II objective lands.

TABLE 3-48
BLM VISUAL RESOURCE MANAGEMENT CLASSES

Objective Class	Description
Class I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV	The objective of this class is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

SOURCE: BLM 1986b

Forest Service

The Forest Service establishes SIOs through the SMS (Landscape Aesthetics) Manual. SIOs are used to describe the acceptable level of aesthetic change that can be made to the valued landscape character as described in Table 3-49.

The Project does not cross very high, low, or very low SIO lands.

TABLE 3-49 USFS SCENIC INTEGRITY OBJECTIVE LEVELS	
Scenic Integrity Objective Level	**Description**
Very High	This objective refers to landscapes where the valued landscape character ~~is~~" intact and deviations must be minute.
High	This objective refers to landscapes where the valued landscape character ~~a~~ppears" intact. Deviations may be present, but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such a scale the deviations are not evident.
Moderate	This objective refers to landscapes where the valued landscape character ~~a~~ppears slightly altered." Noticeable deviations must remain visually subordinate to the landscape character being viewed.
Low	This objective refers to landscapes where the valued landscape ~~a~~ppears moderately altered." Deviations begin to dominate the valued landscape character being viewed, but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetation type changes, or architectural styles outside the landscape being viewed. Attributes should not only appear as valued character outside the landscape being viewed, but compatible or complimentary to the character within.
Very Low	This objective refers to landscapes where the valued landscape character ~~a~~ppears heavily altered." Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect, and the landscape being viewed. However, deviations must be shaped and blended with the natural terrain (landforms) so elements such as unnatural edges, roads, landings, and structures do not dominate the composition.
SOURCE: USFS 1995	

Inventory

The methodology used to inventory visual resources across all Project alternatives is consistent with the BLM's VRM Manual (VRM 8400 Series) as well as the USFS SMS. Furthermore, the methodology described below addresses IOPs for visual resources as identified in the WWEC Programmatic EIS and BLM WOIM No. 2009-167.

The following tasks were implemented to inventory visual resources on all lands within the Project area:

- Identification of BLM VRI components, including SQRU, SLRUs, distance zones, and VRI classes
- In field offices where VRI components have not been established, a Project-level assessment was completed (i.e., distance zones and SLRUs were represented by sensitive viewers to consider landscape sensitivity)
- Identification of scenic quality/scenic attractiveness (including scenic integrity on USFS-administered lands) in the Project area (where not established by agency)
- Visual sensitivity analysis (where not established by agency [i.e., BLM sensitivity levels])
- Visibility and project specific distance zone mapping
- Identification of pertinent federal agency visual management objectives (BLM VRM classes and USFS SIO levels)

For detailed inventory study methodology, refer to Appendix E.

Impact Assessment and Mitigation Planning

The methodology used to assess the potential impacts on visual resources associated with implementing the Project included (1) identifying the types of potential effects that could result from construction, operation, and maintenance of the proposed Project; (2) comparing visual elements (form, line, color, and texture) found in the existing landscape with the visual elements associated with the proposed Project (project contrast); (3) developing criteria for assessing the intensity of a potential effect; (4) assessing initial impacts; (5) identifying appropriate mitigation measures for minimizing potential adverse affects; and (6) disclosing potential residual impacts. The impact assessment methodology was developed in consultation with BLM and USFS visual resource specialists.

Types of Potential Environmental Effects

The construction, operation, and maintenance of the Project would result in direct effects on visual resources where:

- Landscape scenery (and associated integrity) would be degraded by the presence of vertical elements in the landscape (transmission line structures), areas of cleared vegetation (right-of-way clearing), and exposed soil from the construction of new permanent access roads
- Views from sensitive viewpoints would be adversely modified through the introduction of Project components into the landscape
- The Project would not comply with federal agency visual management objectives where Project components would contrast with, or modify the characteristic landscape to a level that would not be consistent with the established management objectives or applicable planning documents

Project Contrast

To assess project contrast generated by the proposed Project, the visual elements (form, line, color, and texture) associated with the existing condition of the landscape (landform, vegetation, water, and structures) were compared to the visual elements associated with the proposed Project. In this regard, project contrast was characterized along all alternative routes and primarily ranged from strong to weak. Project contrast was used as the baseline level of landscape change, which, when combined with scenery and sensitive viewer data, resulted in initial and residual impacts.

Criteria for Assessing Intensity of Impacts

Criteria were developed to assess the intensity of a potential effects associated with implementation of the Project. The intensity of impacts was based on the level of project contrast as it relates to the quality of existing landscapes (landscape scenery) and the visibility and distance of modifications in the viewshed from identified viewpoints (sensitive viewers) (Table 3-50).

TABLE 3-50
CRITERIA FOR ASSESSING INTENSITY OF IMPACTS

Intensity of Impacts	Description
High	▪ Substantially modify the scenic quality of (Class A or B) landscapes. ▪ Contrast produced by the Project would demand attention from identified viewpoints located within the immediate foreground (0 to 0.25 mile) distance zone. ▪ This impact level would be limited to portions of the Project that transmission lines or similar features (i.e., major roads, mines, and existing utility corridors) do not exist in rugged terrain and/or landscapes with restrictive agency visual management objectives (VRM Class II).
Moderate/High	▪ Moderately dominant in high quality (Class A or B) landscapes. ▪ Contrast produced by the Project would begin to demand attention from identified viewpoints located within the immediate foreground or foreground (0.25 to 0.5 mile) distance zones. ▪ This impact level would occur where the Project would not parallel transmission lines or similar features.
Moderate	▪ Co-dominant in high quality (Class A or B) landscapes. ▪ Contrast produced by the Project would attract attention from identified viewpoints typically located within the foreground or middleground (0.5 to 1 mile) distance zones. ▪ This impact level would occur where the Project would parallel existing linear features.
Low/Moderate	▪ Moderately subordinate in moderate quality (Class B or C) landscapes. ▪ Contrast produced by the Project would begin to attract attention from identified viewpoint typically located within the middleground or background (1 to 2 miles) distance zones. ▪ This impact level generally would occur where the Project would parallel an existing similar transmission line facility.
Low	▪ Subordinate in lower quality (Class C) landscapes. ▪ Contrast produced by the Project would be noticeable from identified viewpoints typically located within the background or seldom seen (more than 2 miles) distance zones. ▪ This impact level would occur where the Project would parallel a major transmission line corridor.

Effects Analysis

Assessment of Initial Impacts

Initial impacts were developed based on project contrast in context with landscape scenery, sensitive viewers, and compliance with federal agency visual management objectives. To assess impacts on landscape scenery, the analysis was based on project contrast as it relates to the scenic quality rating of a given landscape. The sensitivity of each viewer, project specific distance zones, and project contrast were the primary components used to determine visual impacts on sensitive viewers. To determine compliance with BLM VRMs, a contrast analysis was conducted from KOPs. On land managed by the USFS, adherence to the guiding LRMP was evaluated by comparing the definition of the SIO class crossed with the level of project contrast to determine if the scenic integrity would be degraded below the level allowable in forest planning documents.

Mitigation Planning

BMPs would be applied Project-wide and mitigation measures on a case-by-case basis, as described in Chapter 2. For visual resources, a total of seven mitigation measures were proposed for the Project (1, 2, 3, 4, 8, 9, and 10). Mitigation measures were applied to all areas of potential moderate/high and moderate initial impacts to reduce impact levels where necessary and effective, and where feasible based on the

Project description. Potential low/moderate and low initial impact areas also were studied on a case-by-case basis to determine the effectiveness of mitigation to further reduce impacts.

Mitigation Measure 1 was applied where existing access would need to be widened or upgraded for construction and maintenance. Mitigation Measure 1 would reduce line and color landscape contrast generated by the widening and additional clearing of adjacent vegetation for access.

Mitigation Measure 2 was applied where flat terrain and vegetation would allow for cross-country access. The use of Mitigation Measure 2 would reduce landscape contrast by limiting the amount of soil color exposed during the construction process, which limits contrast between the color of the soil and vegetation.

Mitigation Measure 3 was applied in areas of access level 4 and 5. Mitigation Measure 3 would reduce landscape contrast created by new access roads, through the reduction of cut/fill in sloped areas where grading could expose underlying soils.

Mitigation Measure 4 would be applied where the transmission line crosses overstory vegetation (deciduous forest, mixed conifer forest, pinyon-juniper, or oak stand). This mitigation measure would reduce impacts by decreasing landscape contrast created by the removal of overstory vegetation (tree) and the hard visual line created by the cleared right-of-way/forest interface.

Mitigation Measure 8 was applied where an existing line is paralleled to reduce impacts. Use of Mitigation Measure 8 would modify the standard tower spacing, where feasible, to better match that of the existing structures along the adjacent line, thus reducing line and form structure contrast.

Mitigation Measure 9 was applied where the line crosses a sensitive feature at a perpendicular or near perpendicular angle to offset the proposed structure from a trail, road, scenic byway or other sensitive viewpoint to the greatest extent practicable, thereby reducing dominance of the transmission line structures in sensitive viewer‘s viewsheds and/or particular landscape setting.

Mitigation Measure 10, helicopter construction, would be applied in limited locations where access is difficult due to steep terrain. Helicopter construction would reduce landscape contrast particularly in form, line, and color by limiting the amount of landform disturbance and vegetation removal created by the construction of new access roads.

Residual Impacts

After the application of mitigation measures and field observation of site-specific variations in viewing conditions (viewing position, adjacent landscape influence, viewing orientation, etc.), impacts were assigned a residual impact level of moderate/high, moderate, low/moderate, or low. Impacts are anticipated to be reduced one-half level after implementation of mitigation measures: moderate/high to moderate, moderate to low/moderate, etc.

For the detailed impact assessment methodology, refer to Appendix E.

3.2.8.5 Results

The following results are described for each alternative route in terms of the affected environment and environmental effects. The affected environment discussion includes an inventory of landscape scenery,

sensitive viewers, BLM VRM classes and USFS SIO levels, and BLM VRI components. The environmental effects section describes impacts on landscape scenery, sensitive viewers, and compliance with BLM VRM classes and USFS SIO levels. Maps displaying inventory data and residual impacts are included in Volume II (MV-10 to MV-13).

No Action Alternative

Under this alternative, the environment would remain as it presently exists.

Northern Area - Sigurd Substation to South Black Mountains

The baseline resource inventory and residual impacts for alternative routes considered in the northern area are presented in Tables 3-51 and 3-52.

Alternative N1 – Black Rock Road to IPP North of Milford Wind Farm

Affected Environment

Landscape Scenery

The majority of this alternative (portions of all links except Links 64, 63, and 66) would cross Class C landscapes, including the Sagebrush Valley and Basin, which are characterized by limited topography relief and are primarily occupied by sagebrush, grasses, and other desert scrub vegetation (MV-10a-c).

Links 33, 30, and 45 would be located in the Pahvant Range (Class B) and characterized by steep, colorful rock escarpments with predominately pinyon-juniper vegetation (MV-10a). Links 64, 63, and 66 would cross the Tushar Mountains (Class B), which have moderate-to-steep terrain occupied by dense pinyon-juniper vegetation, as well as a small portion of riparian vegetation in Clear Creek Canyon (Class B) (MV-11a-b). Links 68 and 305 cross rolling juniper hills (Class B), which are defined by undulating, low hills that sustain dense to scattered pinyon-juniper vegetation (MV-10b).

This alternative route primarily crosses the Fishlake National Forest adjacent to an existing 138kV transmission line (including a cleared right-of-way [approximately 50 to 80 feet wide]) that has locally modified the setting. Therefore, existing scenic integrity was inventoried as low due to the strong presence of the existing transmission line. When the alternative route deviates from the existing transmission line at two locations, Link 30 (Milepost [MP] 13.7 to 16.8) and Link 64 (MP 1.1 to 5.3) to Link 63 (MP 0.0 to 0.8), scenic integrity was inventoried as moderate based on the network of existing roads, which slightly alter the existing landscape character.

Sensitive Viewers

High sensitivity residential viewers in high concentrations are located in the following municipalities: Sigurd, Richfield, Elsinore, Joseph, and Milford along Links 24, 26, 33, 30, 45, 64, 381, and 155 (MV-13a-b). The Project would be visible from high sensitivity recreation viewers on Links 30, 64, 63, 66, 68, 305, 365, and 381, including Fremont Indian State Park, Cove Fort Pioneer Historic Place, Jens Larson Lime Kiln Interpretive Site, American Discovery Trail, Escalante Trail, and Fish Creek (Wild and Scenic Eligible) (MV-12a-b). High sensitivity travel routes, including the Kimberly/Big John Road Scenic Backway and Clear Creek Canyon Road, would have views of Links 63 and 66 (MV-12a).

The Project would be visible on Links 24, 26, 33, 30, 45, 64, 63, 66, 68, and 381 from moderate sensitivity recreation areas, including the Annabella Wildlife Management Area (WMA), Richfield Canal Trail, Marysvale Canyon Trail, Paiute ATV Trail network, Snow College-Richfield Campus, Castle Rock Campground, Flying U Campground, Cove Fort Campground, Cove View Golf Course, Milford Golf Course, Milford Fairgrounds, and numerous local parks (MV-11a-b). Moderate sensitivity travel routes, including I-15, I-70, U.S. Highway 89, SR 21, SR 24, SR 118, SR 119, SR 120, SR 161, SR 257, SR 258, FR 478, and Beryl Milford Road, would have views of the Project on all links except 330, 350, 380, and 160 (MV-11a-c).

Federal Agency Visual Management Objectives

This alternative route crosses 46.8 miles of BLM-administered land, with 2.2 miles VRM Class III on Link 33 in the Richfield Field Office and 44.6 miles of VRM Class IV (MV-13a-c). There would be 30.6 miles of USFS-administered lands crossed by this alternative, with 2.3 miles in high SIO (Links 30, 64, and 63), which are located southwest of Elsinore and northwest of Joseph, and 28.3 miles in moderate SIO (Links 30, 45, 64, 63, 66, and 68). The Project would be in a USFS-designated utility window from Link 45 (MP 15.0) to Link 66 (MP 0.3) (MV-13a-b). The portion of this alternative that leaves the utility window would be within a moderate SIO. The Project returns to the utility window on Link 66 (MP 2.8) to the USFS boundary on Link 68 (MP 1.5).

BLM Visual Resource Inventory Components

Scenic Quality

Landscapes with B scenic quality crossed by the Project include Cove Creek, Mineral Mountains, and the Shauntie Hills. Class C landscapes crossed include the Escalante Desert and Beaver River Bottoms.

Scenic quality data were not available from the Richfield Field Office, so a Project-level delineation of scenic quality was prepared.

Sensitivity Level Rating Units

The Project predominately crosses areas of low landscape sensitivity with small areas of high and moderate sensitivity. SLRU data were not available from the Richfield and Fillmore Field Offices, so a Project-level identification of sensitive viewers was prepared.

Distance Zones

The Project would be located within the foreground-middleground distance zone. Distance zone data were not available from the Richfield and Fillmore Field Offices, so a Project-level identification of distance zones was prepared.

Visual Resource Inventory Classes

The Project crosses VRI Class III and Class IV lands. VRI Class data were not available from the Richfield and Fillmore Field Offices.

TABLE 3-51
ALTERNATIVE ROUTE COMPARISON
VISUAL RESOURCES INVENTORY AND RESIDUAL IMPACTS

Alternative Route	Total Miles	High Sensitivity Viewers (miles)					Moderate Sensitivity Viewers (miles)					Scenic Quality (miles)			Management Classifications (miles)									Residual Impacts (miles [percent])												Compliance (miles [percent])		
															BLM				USFS					Landscape Scenery					High Sensitivity Viewers				Moderate Sensitivity Viewers				BLM VRM/ USFS SIO		
		0–1/4 mile	1/4–1/2 mile	1/2–1 miles	1–2 miles	More than 2 miles	0–1/4 mile	1/4–1/2 mile	1/2–1 miles	1–2 miles	More than 2 miles	B	C	Developed	Class I	Class II	Class III	Class IV	Very High	High	Moderate	Low	Very Low	Not Identifiable	Low	Low/moderate	Moderate	Moderate/high	Low	Low/moderate	Moderate	Moderate/high	Low	Low/moderate	Moderate	Moderate/high	Compliant	Not Compliant	Not Applicable
Alternative N1 (Environmentally Preferred)	120.7	11.0	15.7	18.9	20.5	54.6	35.8	19.0	13.9	12.3	39.7	32.7	87.8	0.2	–	–	2.2	44.6	–	2.3	28.3	–	–	0.2 [0.2]	0.6 [0.5]	114.1 [94.5]	5.8 [4.8]	–	33.6 [27.8]	67.0 [55.5]	18.9 [15.7]	1.2 [1.0]	60.7 [50.3]	58.2 [48.2]	1.8 [1.5]	–	76.4 [63.3]	1.0 [0.8]	43.3 [35.9]
Alternative N2	120.3	11.0	15.7	19.1	14.8	59.7	35.8	18.9	13.9	12.3	39.4	34.0	86.1	0.2	–	–	2.2	54.4	–	2.3	28.3	–	–	0.2 [0.2]	0.6 [0.5]	113.7 [94.5]	5.8 [4.8]	–	28.5 [23.7]	71.7 [59.6]	18.9 [15.7]	1.2 [1.0]	60.4 [50.2]	58.1 [48.3]	1.8 [1.5]	–	86.2 [71.7]	1.0 [0.8]	33.1 [27.5]
Alternative N3	117.2	11.7	16.4	23.1	21.1	44.9	37.1	9.6	11.3	6.3	52.9	38.0	79.0	0.2	–	–	2.2	62.3	–	2.3	28.3	–	–	0.2 [0.2]	0.6 [0.5]	110.6 [94.4]	5.8 [4.9]	–	1.6 [1.4]	94.8 [80.9]	19.6 [16.7]	1.2 [1.0]	63.9 [54.5]	51.5 [44.0]	1.8 [1.5]	–	94.1 [80.3]	1.0 [0.9]	22.1 [18.8]
Alternative N4	109.4	11.0	15.7	19.1	15.3	48.3	36.2	19.2	13.4	14.7	25.9	39.6	69.6	0.2	–	–	3.1	41.9	–	2.3	28.3	–	–	0.2 [0.2]	0.6 [0.6]	98.7 [90.2]	9.9 [9.0]	–	28.5 [26.1]	60.8 [55.5]	18.9 [17.3]	1.2 [1.1]	45.2 [41.3]	62.3 [57.0]	1.9 [1.7]	–	74.6 [68.2]	1.0 [0.9]	33.8 [30.9]
Alternative N5	106.3	11.7	16.4	23.1	21.6	33.5	37.5	9.9	10.8	8.7	39.4	43.6	62.5	0.2	–	–	3.1	49.8	–	2.3	28.3	–	–	0.2 [0.2]	0.6 [0.6]	95.6 [89.9]	9.9 [9.3]	–	1.6 [1.5]	83.9 [78.9]	19.6 [18.5]	1.2 [1.1]	48.7 [45.8]	55.7 [52.4]	1.9 [1.8]	–	82.5 [77.6]	1.0 [0.9]	22.8 [21.5]
Alternative N6 (Proponent's Proposed Action)	105.5	11.8	15.0	25.5	19.9	33.3	32.7	13.5	10.9	9.2	39.2	57.5	47.9	0.1	–	–	3.1	49.4	–	2.3	28.3	–	–	0.1 [0.1]	0.2 [0.2]	92.6 [87.8]	12.6 [11.9]	–	1.6 [1.5]	79.6 [75.5]	23.1 [21.9]	1.2 [1.1]	43.6 [41.3]	60.0 [56.9]	1.9 [1.8]	–	82.1 [77.8]	1.0 [1.0]	22.4 [21.2]

TABLE 3-52
ALTERNATIVE ROUTE COMPARISON
VISUAL RESOURCES

Route Alternative	Length (miles)	Landscape Scenery (miles crossed)	Sensitive Viewers: High Sensitivity Viewers (miles crossed)	Sensitive Viewers: Moderate Sensitivity Viewers (miles crossed)	Federal Visual Management Objectives	Summary of Residual Impacts
Alternative N1 Black Rock Road to IPP North of Milford Wind Farm (Environmentally Preferred)	120.7	Class B Scenery – 32.7	**Views within 0.25 mile –** 11.0 **Views between 0.25 and 0.5 mile –** 15.7	**Views within 0.25 mile –** 35.8 **Views between 0.25 and 0.5 mile –** 19.0	▪ In compliance with VRM Class III and IV objectives ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Moderate impact on the Pahvant Range, Tushar Mountains, and Juniper Hills landscapes **Residential Views** ▪ Moderate impact on residential viewers in Sigurd, Richfield, Elsinore, Joseph, and Milford **Recreation/Travel Corridor Views** ▪ Moderate/high impact on views from the Fremont Indian State Park ▪ Moderate impact on views from the Jens Larson Lime Kiln, Kimberly/Big John Road Scenic Backway, Fish Creek, Paiute ATV Trail, I-70, Escalante Trail, and American Discovery Trail **Impacts** ▪ 1.2 miles of moderate/high impact **Preference Ranking: 1** ▪ Lowest impact on scenery due to adjacency of existing transmission lines
Alternative N2 Black Rock Road to IPP South of Milford Wind Farm	118.2	Class B Scenery – 340	**Views within 0.25 mile -** 15.7 **Views between 0.25 and 0.5 mile –** 15.7	**Views within 0.25 mile –** 35.8 **Views between 0.25 and 0.5 mile –** 18.9	▪ In compliance with VRM Class III and IV objectives ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Impact on scenery identical to N1 **Residential Views** ▪ Impact on residential viewers identical to N1 **Recreation/Travel Corridor Views** ▪ Impact on recreation/travel corridor viewers identical to N1 **Impacts** ▪ 1.2 miles of moderate/high impact **Preference Ranking: 2** ▪ Similar to N1 except fewer miles are adjacent to existing transmission lines

TABLE 3-52
ALTERNATIVE ROUTE COMPARISON
VISUAL RESOURCES

Route Alternative	Length (miles)	Landscape Scenery (miles crossed)	Sensitive Viewers: High Sensitivity Viewers (miles crossed)	Sensitive Viewers: Moderate Sensitivity Viewers (miles crossed)	Federal Visual Management Objectives	Summary of Residual Impacts
Alternative N3 Black Rock Road Parallel to Kern River Pipeline	117.2	Class B Scenery – 38.0	**Views within 0.25 mile –** 11.7 **Views between 0.25 and 0.5 mile –** 16.4	**Views within 0.25 mile –** 37.1 **Views between 0.25 and 0.5 mile –** 9.6	▪ In compliance with VRM Class III and IV objectives ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Impact on scenery identical to N1 with the addition of moderate impact on the Foothills landscape **Residential Views** ▪ Impact on residential viewers identical to N1 **Recreation/Travel Corridor Views** ▪ Impact on recreation/travel corridor viewers identical to N1 **Impacts** ▪ 1.2 miles of moderate/high impact **Preference Ranking: 3** ▪ Similar to N1 except fewer miles adjacent to existing transmission lines
Alternative N4 Mineral Mountains to IPP South of Milford Wind Farm	109.4	Class B Scenery – 39.6	**Views within 0.25 mile –** 11.0 **Views between 0.25 and 0.5 mile –** 15.7	**Views within 0.25 mile –** 36.2 **Views between 0.25 and 0.5 mile –** 19.2	▪ In compliance with VRM Class III and IV objectives ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Impact on scenery identical to N1 with the addition of moderate impact on the Mineral Mountains landscape **Residential Views** ▪ Impact on residential viewers identical to N1 **Recreation/Travel Corridor Views** ▪ Impact on recreation/travel corridor viewers identical to N1 **Impacts** ▪ 1.2 miles of moderate/high impacts **Preference Ranking: 4** ▪ Third highest impact on scenery due to crossing of Mineral Mountains
Alternative N5 Mineral Mountains to Kern River Pipeline	106.3	Class B Scenery – 43.6	**Views within 0.25 mile –** 11.7 **Views between 0.25 and 0.5 mile –** 16.4	**Views within 0.25 mile –** 37.5 **Views between 0.25 and 0.5 mile –** 9.9	▪ In compliance with VRM Class III and IV objectives ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Impacts on scenery identical to N1 with the addition of moderate impact on the Mineral Mountains and Foothill landscapes **Residential Views** ▪ Impact on residential viewers identical to N1 **Recreation/Travel Corridor Views** ▪ Impact on recreation/travel corridor viewers identical to N1 **Impacts** ▪ 1.2 miles of moderate/high impact **Preference Ranking: 5** ▪ Second highest impact on scenery due to crossing of Mineral Mountains
Alternative N6 Mineral Mountains 1,500 Feet East of Kern River Pipeline (Proponent's Proposed Action)	105.5	Class B Scenery – 57.5	**Views within 0.25 mile –** 11.8 **Views between 0.25 and 0.5 mile –** 15.0	**Views within 0.25 mile –** 32.7 **Views between 0.25 and 0.5 mile –** 13.5	▪ In compliance with VRM Class III and IV objectives ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Impacts on scenery identical to N1 with the addition of moderate impact on the Mineral Mountains and Foothill landscapes **Residential Views** ▪ Impact on residential viewers identical to N1 **Recreation/Travel Corridor Views** ▪ Impact on recreation/travel corridor viewers identical to N1 **Impacts** ▪ 1.2 miles of moderate/high impact **Preference Ranking: 6** ▪ Highest impact on scenery due to crossing of Mineral Mountains and the separation from the existing Kern River pipeline

Environmental Effects

Landscape Scenery

Moderate-to-moderate/strong contrast would result from the construction and operation of permanent new access roads on moderate-to-steep terrain within Class B scenery, including the Pahvant and Tushar Mountains and rolling juniper hills along Links 30, 64, and 63. Additionally, the proposed transmission line would introduce vertical structures into a largely natural landscape setting. Contrast would be reduced by implementing mitigation measures that would limit the amount of permanent vegetation clearing and restore disturbed areas not required for maintenance of the Project. Therefore, residual impacts on landscape scenery would be moderate.

Low-to-low/moderate residual impacts would occur in Class C scenery associated with the broad Sagebrush Valley and Basin landscapes traversed by this alternative. Weak/moderate-to-moderate contrast would result from the introduction of vertical elements (associated with the proposed transmission line structures) in a predominantly horizontal landscape. Additional contrast is anticipated based on vegetation disturbance associated with construction access roads. However, because overland construction is anticipated for this portion of the Alternative N1, vegetation is anticipated to regenerate over time and contrast would be reduced. Therefore, impacts on Class C landscape scenery would be reduced.

Within the Fishlake National Forest, contrast resulting from the Project would range from weak/moderate-to-moderate based on the construction of permanent access roads and right-of-way clearing on moderate-to-steep terrain (Links 30, 45, 64, 63, 66, and 68). The proposed transmission line would parallel an existing transmission line that has locally modified the setting and reduced the integrity of the forest landscape. Therefore, impacts on Class B scenery with moderate scenic integrity would be low/moderate after mitigation, which would reduce contrast generated by the construction of access roads and right-of-way clearing.

Sensitive Viewers

Moderate impacts are anticipated for residential viewers that are located within 0.5 mile of the Project within the municipalities of Sigurd, Richfield, Elsinore, Milford, and Joseph (Links 33, 30, and 155). Contrast generally would range from weak/moderate-to-moderate because the Project would be located immediately adjacent to an existing transmission line, which has similar visual elements as compared to the Project. Mitigation measures would reduce contrast to weak/moderate resulting in low/moderate residual impacts where the Project is located more than 0.25 mile away from the residences.

Moderate/high impacts are anticipated for viewers within the Fremont Indian State Park located within 0.5 mile of the Project on Links 63 and 64. Specifically, views to the south, towards the Tushar Mountains, would be dominated by moderate/strong contrast associated with access road construction and operation in steep terrain occupied by pinyon-juniper vegetation. In addition, the introduction of vertical elements in a largely natural setting would further increase contrast. Mitigation measures would reduce these impacts to moderate levels, except on the steepest terrain, by limiting ground disturbance generated by the construction of access roads.

Moderate impacts would occur on views from high sensitivity recreation viewers, including the Jens Larson Lime Kiln Interpretive Site (Link 30) and Fish Creek (Link 66) located within 0.5 mile of the Project. Low/moderate contrast would occur because the Project would be located directly adjacent to an existing 138kV transmission line, which has similar visual elements as compared to the Project.

Mitigation measures would reduce contrast through the reduction of right-of-way vegetation clearing and ground disturbance generated by the construction of access roads.

Moderate impacts are anticipated for high sensitivity trails, including the American Discovery Trail and Escalante Trail located within 1.0 mile of the Project on Links 365 and 381. Moderate contrast would occur because the Project would not be adjacent to any existing transmission line structures, so the Project would introduce vertical elements in a horizontal, sagebrush-dominated setting. Mitigation measures would not be effective at reducing contrast and therefore impacts at these locations since views toward the Project would be level with the landscape.

Low/moderate impacts would occur on views from Cove Fort Pioneer Historic Place, a high sensitivity recreation viewer, located more than 1.0 mile from the Project along Links 66 and 68. Contrast would be anticipated to be weak/moderate since the Project is immediately adjacent to an existing transmission line, which has modified the local landscape character.

Moderate impacts would occur along Link 66 on views from high sensitivity travel routes. including the Kimberly/Big John Road Scenic Backway and Clear Creek Canyon, within 0.5 mile of the Project. Contrast generally would range from weak/moderate-to-moderate because the Project would be located adjacent to an existing transmission line. Mitigation measures would reduce contrast to weak/moderate resulting in low/moderate residual impacts by limiting ground disturbance from the construction of access roads and clearing of vegetation in the right-of-way. On Link 66 (MP 0.0 to 0.9) where the Project crosses the Kimberly/Big John Scenic Backway, residual impacts would remain at a moderate level.

Moderate impacts are anticipated for the Paiute ATV Trail, a moderate sensitivity recreation viewer, located within 0.5 mile of the Project on Link 64. Moderate-to-moderate/strong contrast would occur because the Project would introduce a strong vertical element in a largely natural setting. Mitigation measures would reduce contrast by limiting ground disturbance generated by the construction of access roads and clearing of vegetation in the right-of-way.

Low-to-low/moderate impacts would occur on views along Links 24, 26, 33, 30, 45, 63, 68, and 381 from other moderate sensitivity recreation viewers. Contrast is anticipated to be weak/moderate because the Project parallels existing transmission lines with similar visual elements as compared to the Project, and limited ground disturbance is expected.

Low-to-low/moderate impacts are anticipated for moderate sensitivity travel routes, including I-15 and I-70 (Links 24, 26, 33, 30, 45, 64, 63, 66, 68, and 305). Contrast would range from weak/moderate-to-moderate because the Project parallels an existing transmission line and the majority of these travel routes are located more than 1.0 mile from the Project in a level, sagebrush-dominated landscape.

<u>Federal Agency Visual Management Objectives</u>

BLM Visual Resource Management Classes

VRM Class III Objective areas are crossed along the edge of the Pahvant Range on Link 33 with a project contrast of weak/moderate. Changes to the characteristic landscape may be moderate in Class III areas, as defined in the BLM VRM manual. The remainder of the Project crosses Class IV Objective areas, which allow strong changes to the characteristic landscape. KOP No. 12 located along I-70, KOP No. 1 in Richfield, and KOP No. 5 at Cove Fort confirm the Project would be compliant with the VRM objectives along this alternative route.

U.S. Forest Service Scenic Integrity Objective Levels

Project contrast was assessed to be weak/moderate-to-moderate/strong in areas of moderate SIO in the Fishlake National Forest (Links 30, 45, 64, 63, 66, and 68). The changes to the landscape in a moderate SIO may appear slightly altered, but must remain subordinate in the landscape. The Project would meet the definition of a moderate SIO since the Project parallels an existing transmission line with similar visual elements. There are also areas of high SIO, but the majority of these areas are located within a USFS-designated utility window, which allows for the construction and operation of transmission line projects (Links 64 and 63). Project contrast ranges from weak/moderate-to-moderate within this utility window after mitigation. A high SIO allows changes to be present, but the landscape must appear intact. In locations of high SIO that occur in a utility window, the Project meets the definition of the SIO because the landscape character has been designated as a utility corridor. A portion of this alternative on Link 30, between MP 14.0 and 15.0, would not be fully consistent with the definition of a high SIO because the landscape character is intact and the introduction of a strong vertical element in the landscape would deviate from the existing character. Since the Project would not reduce scenic integrity below a low level (defined as modification under the older USFS Visual Management System), the Project is compliant with the management standard defined in the existing forest plan for this management area.

Alternative N2 – Black Rock Road to IPP South of Milford Wind Farm

Affected Environment

Landscape Scenery

Landscape scenery crossed is similar to Alternative N1.

Sensitive Viewers

Sensitive viewers are similar to Alternative N1.

Federal Agency Visual Management Objectives

This alternative crosses 56.6 miles of BLM-administered lands with 2.2 miles VRM Class III on Link 33 in the Richfield Field Office and 54.4 miles of VRM Class IV (MV-13a-c). USFS-administered land crossed is similar to Alternative N1.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI classes are similar to Alternative N1.

Environmental Effects

Landscape Scenery

Impacts on landscape scenery are similar to Alternative N1.

Sensitive Viewers

Impacts on sensitive viewers are similar to Alternative N1.

Federal Agency Visual Management Objectives

Compliance with visual management objectives would be similar to Alternative N1.

Alternative N3 – Black Rock Road Parallel to Kern River Pipeline

Affected Environment

Landscape Scenery

Scenic quality crossed is similar to Alternative N1, except this alternative crosses foothills (Class B) on Link 490, which are defined by moderately steep terrain with scattered pinyon-juniper vegetation (MV-10c).

Existing scenic integrity crossed by this alternative in the Fishlake National Forest is similar to Alternative N1.

Sensitive Viewers

Sensitive viewers are similar to Alternative N1, except the addition of the residential areas around Minersville on Link 475 (MV-12b). SR 257, Milford Golf Course, and Milford Fairgrounds are located more than 4.0 miles from Links 345, 450, 460, and 470 (MV-11b).

Federal Agency Visual Management Objectives

This alternative route crosses 64.5 miles of BLM-administered lands with 2.2 miles VRM Class III on Link 33 in the Richfield Field Office and 62.3 miles of VRM Class IV (MV-13a-c). USFS-administered land crossed is similar to Alternative N1.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI classes are similar to Alternative N1 with the addition of crossing the Black Mountains SQRU (Class B).

Environmental Effects

Landscape Scenery

Impacts on landscape scenery are similar to Alternative N1, except low/moderate residual impacts would occur in the foothills (Class B) landscape on Link 490. Contrast ranges from moderate-to-moderate/strong because the Project crosses steep, vegetated slopes, and strong vertical elements would be placed in a

natural landscape. Mitigation would decrease contrast by limiting vegetation clearing in the right-of-way and ground disturbance from the construction of access roads.

Sensitive Viewers

Impacts on sensitive viewers are similar to Alternative N1, except low/moderate-to-moderate impacts would occur along Link 470 on views from residential viewers in Milford and Minersville where the Project is located approximately 1.0 mile away. Contrast is expected to be moderate since there are no adjacent major transmission lines in a flat, sagebrush-dominated landscape, and new access roads would be constructed. Mitigation would not effectively reduce contrast since these residences have level views toward the Project and the structures would be the primary Project component modifying their viewshed.

Federal Agency Visual Management Objectives

Compliance with visual management objectives would be similar to Alternative N1.

Alternative N4 – Mineral Mountains to IPP South of Milford Wind Farm

Affected Environment

Landscape Scenery

Scenic quality crossed is similar to Alternative N1, except this alternative crosses the Mineral Mountains (Class B) on Link 75, which are characterized by rugged mountains with scattered pinyon-juniper vegetation (MV-11b).

Existing scenic integrity crossed by this alternative in the Fishlake National Forest is similar to Alternative N1.

Sensitive Viewers

Sensitive viewers are similar to Alternative N1, except the Project also would be visible on Link 75 from the Beaver County WMA (MV-11b).

Federal Agency Visual Management Objectives

This alternative route crosses 45.0 miles of BLM-administered land with 3.1 miles of VRM Class III on Link 33 in the Richfield Field Office and Link 75 over the Mineral Mountains between MP 12.1 and 13.0 in the Cedar City Field Office and 41.9 miles of VRM Class IV (MV-13a-c). Existing scenic integrity crossed by this alternative in the Fishlake National Forest is similar to Alternative N1.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI classes are similar to Alternative N1.

Environmental Effects

Landscape Scenery

Impacts on landscape scenery are similar to Alternative N1, except low/moderate-to-moderate impacts also would occur along Link 75 in the Mineral Mountains (Class B) landscape. Moderate-to-moderate/strong contrast is anticipated based on the clearing of vegetation within the right-of-way, construction of access roads on steep slopes, and the introduction of new vertical elements into the landscape. Mitigation would decrease contrast to a weak/moderate-to-moderate level by limiting vegetation clearing in the right-of-way and ground disturbance from constructing new access roads.

The design alternative on Link 75 (monopole double-circuit 345/138kV structures) would result in a stronger contrast as compared to the typical design (H-frame) for the Project. Moderate/strong contrast is anticipated based on the introduction of taller structures (as compared to the typical design) and increased number of towers per mile. Mitigation measures would reduce contrast to a moderate level by limiting vegetation clearing and ground disturbance related to the construction of the Project. Therefore, residual impacts on the Mineral Mountains landscape would be moderate.

Sensitive Viewers

Impacts on sensitive viewers are similar to Alternative N1, except low/moderate impacts also are anticipated on views from the Beaver County WMA where the Project would be visible from more than 0.5 mile (Link 75). Moderate-to-moderate/strong landscape contrast would occur based on the occurrence of steep terrain, which would require construction of a new access road. Also, because existing transmission lines or other vertical elements do not exist for this portion of the Project, moderate/strong structure contrast would occur.

Moderate impacts are anticipated on views from the Beaver County WMA along Link 75 for the 345/138kV double-circuit design alternative. Contrast is expected to be stronger than the typical design for the Project due to the increased number of towers per mile and taller structures. Mitigation would reduce contrast to a moderate level by limiting the amount of vegetation cleared in the right-of-way and ground disturbance associated with the construction of access roads. Residual impacts would remain at a moderate level due to the strong influence of the double-circuit structures in the viewer‘s viewshed.

Federal Agency Visual Management Objectives

Compliance with visual management objectives would be similar to Alternative N1, with the addition of areas of moderate project contrast in VRM Class III lands on Link 75 over the Mineral Mountains. The Project also would comply with these VRM objectives.

The design alternative would not be initially compliant with VRM Class III lands on Link 75 due to moderate/strong project contrast. Mitigation measures, including the reduction of vegetation clearing in the right-of-way and minimizing the ground disturbance from the construction of access roads, would reduce contrast to a moderate level and bring the design alternative into compliance with the visual management objectives.

Alternative N5 – Mineral Mountains Parallel to Kern River Pipeline

Affected Environment

Landscape Scenery

Scenic quality crossed is similar to Alternative N1, except this alternative route crosses the Mineral Mountains (Class B) on Link 75, which are characterized by rugged mountains with scattered pinyon-juniper vegetation (MV-10b). The alternative also crosses foothills (Class B) on Link 490, which are defined by moderately steep terrain with scattered pinyon-juniper vegetation (MV-10c).

Existing scenic integrity crossed by this alternative in the Fishlake National Forest is similar to Alternative N1.

Sensitive Viewers

Sensitive viewers are similar to Alternative N1, except the addition of the residential areas around Minersville (Link 475) and the Beaver County WMA (Link 75). SR 257, Milford Golf Course, and Milford Fairgrounds are located more than 4.0 miles from Links 460 and 470 (MV-11b).

Federal Agency Visual Management Objectives

This alternative crosses 52.9 miles of BLM-administered land with 3.1 miles VRM Class III on Link 33 in the Richfield Field Office and Link 75 over the Mineral Mountains between MP 12.1 and 13.0 in the Cedar City Field Office and 49.8 miles of VRM Class IV (MV-13a-c). Existing scenic integrity crossed by this alternative in the Fishlake National Forest is similar to Alternative N1.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI classes are similar to Alternative N1 with the addition of crossing the Black Mountains SQRU (Class B).

Environmental Effects

Landscape Scenery

Impacts on landscape scenery are similar to Alternative N1, except low/moderate-to-moderate impacts also would occur in the Mineral Mountains (Class B) on Link 75 and the foothills (Class B) landscapes on Link 490. Contrast would range from moderate-to-moderate/strong because the Project would require clearing on vegetated, steep slopes and would introduce vertical elements in a rolling pinyon-juniper landscape where none exist. Mitigation would decrease contrast by limiting vegetation clearing in the right-of-way and ground disturbance from the construction of access roads.

Impacts on the Mineral Mountains landscape, associated with the design alternative, are identical to the related discussion for Alternative N4.

Sensitive Viewers

Impacts on sensitive viewers are similar to Alternative N1, except low/moderate-to-moderate impacts would occur along Link 470 on views from residences in Milford and Minersville located approximately 1.0 mile from the Project. Contrast is expected to be moderate because there are no adjacent major transmission lines in a flat, sagebrush-dominated landscape. Mitigation measures would not be effective at reducing contrast from these viewers due to their level views toward the Project.

Low/moderate impacts are anticipated on views from the Beaver County WMA where the Project is viewed from more than 0.5 mile away on Link 75. Contrast is expected to range from moderate-to-moderate/strong since the Project crosses steep terrain, which would require construction of new access roads and clearing of vegetation in the right-of-way. The Project also would introduce new vertical elements into the landscape.

Impacts on the views from the Beaver County WMA, associated with the design alternative, are identical to the related discussion for Alternative N4.

Federal Agency Visual Management Objectives

Compliance with visual management objectives would be similar to Alternative N1, with the addition of areas of moderate Project contrast in VRM Class III lands on Link 75 over the Mineral Mountains. The Project also would comply with these VRM objectives.

Compliance with VRM Class III lands associated with the design alternative are identical to the related discussion for Alternative N4.

Alternative N6 – Mineral Mountains 1,500 Feet East of Kern River Pipeline

Affected Environment

Landscape Scenery

Landscape scenery crossed is similar to Alternative N5.

Sensitive Viewers

Sensitive viewers are similar to Alternative N5.

Federal Agency Visual Management Objectives

This alternative route crosses 52.5 miles of BLM-administered land with 3.1 miles of VRM Class III on Link 33 in the Richfield Field Office and Link 75 over the Mineral Mountains between MP 12.1 and 13.0 in the Cedar City Field Office and 49.4 miles of VRM Class IV (MV-13a-c). Existing scenic integrity crossed by this alternative in the Fishlake National Forest is similar to Alternative N1.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI classes are similar to Alternative N5.

Environmental Effects

Landscape Scenery

Impacts on landscape scenery are similar to Alternative N5.

Sensitive Viewers

Impacts on sensitive viewers are similar to Alternative N5.

Federal Agency Visual Management Objectives

Compliance with visual management objectives would be similar to Alternative N5.

Southern Area – South Black Mountains to Red Butte Substation

The baseline resource inventory and residual impacts for alternatives routes considered in the southern area are presented in Tables 3-53 and 3-54.

Alternative S1 – Pinto Creek

Affected Environment

Landscape Scenery

Every link in this alternative except Link 500 crosses Class C landscapes, including the Sagebrush Basin, which is characterized by limited topography relief and primarily occupied by sagebrush, grasses, and other desert scrub vegetation (MV-10c-d). Link 260 crosses the Atchinson Mountains (Class B), which are characterized by moderate-to-steep terrain with pinyon-juniper vegetation (MV-10d). The remaining portions of this alternative (Links 220, 240, 245, 260, and 500) cross rolling juniper hills (Class B) and foothills (Class B), which are defined by moderately steep terrain with scattered pinyon-juniper vegetation (MV-10d).

This alternative route crosses the Dixie National Forest predominately in high existing scenic integrity landscapes based on intact natural and agrarian landscape character. Landscapes with moderate existing scenic integrity were inventoried on Link 260 (MP 0.0 to 3.0 and 17.0 to 22.5) due to the chaining activities that have altered the existing form, line, color, texture, and pattern of the existing landscape.

Sensitive Viewers

High sensitivity residential viewers in high concentration are located in the municipalities of Newcastle, Pinto, Pine Valley, and Central along Links 240, 245, 260, and 500 (MV-12d). The Project would be visible on Links 220, 240, 260, and 500 from high sensitivity recreation viewers, including the Old

Spanish Trail, Goat Spring Trail, Water Canyon Trail, Summit/Rock Spring Trail, Pine Valley Chapel, and Pine Valley Mountain Wilderness Area (MV-12d). FR 035 is a high sensitivity travel route, which would have views of the Project on Link 260 (MV-12d).

The Project would be visible on Links 240, 245, 260, and 500 from moderate sensitivity recreation areas, including Newcastle Reservoir, Cemetery Trail, Indian Hollow Trail, Hardscrabble Trail, and Baker Dam Reservoir and Campground (MV-11d). Moderate sensitivity travel routes include the Lund Highway, SR 18, SR 56, FR 009, FR 011, and FR 255 (Links 165, 220, 240, 245, 260, and 500) (MV-11c-d).

Federal Agency Visual Management Objectives

This alternative route crosses 13.0 miles of BLM-administered land with 1.3 miles in VRM Class III, south of Central in the St. George Field Office on Link 260, and 11.7 miles in VRM Class IV (MV-13c-d). There would be 20.7 miles of USFS-administered land crossed with 20.2 miles within a SIO of high (Link 260) and 0.5 mile within a SIO of moderate (Links 260 and 500) (MV-13d). For a discussion of the development of the SIOs, refer to Appendix E.

BLM Visual Resource Inventory Components

Scenic Quality

Landscapes with Class B scenic quality crossed by the Project include Antelope Mountain and the Pine Valley Mountains. Class C scenic quality landscapes crossed include the Escalante Desert and Young Basalt Flows.

Sensitivity Level Rating Units

The Project crosses landscapes with high sensitivity in the northern portion of this alternative route while the southern portion has areas of low and moderate landscape sensitivity.

Distance Zones

The Project would be located within the foreground-middleground distance zone.

Visual Resource Inventory Classes

The Project crosses predominately VRI Class IV lands with isolated areas of Class II and III.

Environmental Effects

Landscape Scenery

Moderate-to-moderate/strong contrast would be anticipated from the construction and operation of permanent new access roads on moderate-to-steep terrain within Class B scenery, including the Atchinson Mountains, foothills, and rolling juniper hills (Links 220, 240, 245, and 260). The Project would introduce vertical structures into a largely natural landscape setting. Contrast would be reduced by

TABLE 3-53
ALTERNATIVE ROUTE COMPARISON
VISUAL RESOURCES INVENTORY AND RESIDUAL IMPACTS

Alternative Route	Total Miles	High Sensitivity Viewers (miles)					Moderate Sensitivity Viewers (miles)					Scenic Quality (miles)			Management Classifications (miles)									Residual Impacts (miles [percent])												Compliance (miles [percent])		
															BLM				USFS					Landscape Scenery					High Sensitivity Viewers				Moderate Sensitivity Viewers				BLM VRM/ USFS SIO		
		0–1/4 mile	1/4–1/2 mile	1/2–1 miles	1–2 miles	More than 2 miles	0–1/4 mile	1/4–1/2 mile	1/2–1 miles	1–2 miles	More than 2 miles	B	C	Developed	Class I	Class II	Class III	Class IV	Very High	High	Moderate	Low	Very Low	Not Identifiable	Low	Low/moderate	Moderate	Moderate/high	Low	Low/moderate	Moderate	Moderate/high	Low	Low/moderate	Moderate	Moderate/high	Compliant	Not Compliant	Not Applicable
Alternative S1	56.0	7.6	10.3	13.1	9.2	15.8	11.2	3.6	7.1	8.7	25.4	24.5	31.5	–	–	–	1.3	11.7	–	20.2	0.5	–	–	–	0.8 [1.4]	41.5 [74.1]	13.7 [24.5]	–	12.1 [21.6]	26.6 [47.5]	16.6 [29.6]	0.7 [1.3]	32.6 [58.2]	20.9 [37.3]	2.5 [4.5]	–	13.4 [23.9]	20.2 [36.1]	22.4 [40.0]
Alternative S2 (Environmentally Preferred)	49.6	8.9	11.7	11.9	5.0	12.1	8.4	7.9	6.3	5.2	21.8	14.0	35.6	–	–	–	–	13.3	–	1.9	8.9	–	–	–	–	46.0 [92.7]	3.6 [7.3]	–	12.1 [24.4]	24.2 [48.8]	12.4 [25.0]	0.9 [1.8]	31.4 [63.3]	18.2 [36.7]	–	–	22.1 [44.6]	2.0 [4.0]	25.5 [51.4]
Alternative S3	57.6	8.0	8.0	17.3	10.7	13.6	10.7	6.3	7.4	10.9	22.3	26.5	31.1	–	–	–	–	13.8	–	14.6	5.7	–	–	–	–	43.0 [74.7]	14.6 [25.3]	–	12.1 [21.0]	31.5 [54.7]	13.7 [23.8]	0.3 [0.5]	31.8 [55.2]	22.9 [39.8]	2.9 [5.0]	–	19.0 [33.0]	15.1 [26.2]	23.5 [40.8]
Alternative S4	48.9	4.4	8.5	13.5	10.4	12.1	3.5	6.5	10.3	7.0	21.6	29.1	19.8	–	–	–	–	12.7	–	7.5	7.6	–	–	–	–	36.4 [74.4]	12.5 [25.6]	–	12.1 [24.7]	26.1 [53.4]	10.7 [21.9]	–	31.7 [64.8]	17.2 [35.2]	–	–	21.1 [43.1]	6.7 [13.7]	21.1 [43.2]
Alternative S5 (Proponent's Proposed Action)	59.0	4.6	8.9	10.4	9.2	25.9	11.3	3.9	6.7	11.5	25.6	29.9	29.1	–	–	–	1.3	24.1	–	20.2	0.5	–	–	–	0.8 [1.4]	44.8 [75.9]	13.4 [22.7]	–	0.2 [0.3]	45.1 [76.5]	13.0 [22.0]	0.7 [1.2]	31.6 [53.6]	24.9 [42.2]	2.5 [4.2]	–	25.9 [43.9]	20.2 [34.2]	12.9 [21.9]
Alternative S6	61.9	4.6	3.7	15.1	14.8	23.7	10.8	5.2	9.3	14.1	22.5	28.4	33.5	–	–	–	–	27.5	–	14.6	5.7	–	–	–	–	47.5 [76.7]	14.4 [23.3]	–	0.2 [0.3]	52.0 [84.0]	9.4 [15.2]	0.3 [0.5]	30.8 [49.8]	28.0 [45.2]	3.1 [5.0]	–	32.7 [52.8]	15.1 [24.4]	14.1 [22.8]

TABLE 3-54
ALTERNATIVE ROUTE COMPARISON
VISUAL RESOURCES

Route Alternative	Length (miles)	Landscape Scenery (miles crossed)	Sensitive Viewers: High Sensitivity Viewers (miles crossed)	Sensitive Viewers: Moderate Sensitivity Viewers (miles crossed)	Federal Visual Management Objectives	Summary of Residual Impacts
Alternative S1 Pinto Creek	56.0	Class B Scenery – 24.5	**Views within 0.25 mile –** 7.6 **Views between 0.25 and 0.5 mile –** 10.3	**Views within 0.25 mile –** 11.2 **Views between 0.25 and 0.5 mile –** 3.6	▪ In compliance with VRM Class III and IV objectives ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Moderate impact on the Foothill, Juniper Hills, and Atchinson Mountain landscapes **Residential Views** ▪ Moderate/high impact on residential viewers along Pinto Creek and southeast of Central ▪ Moderate impact on residential views east of Newcastle **Recreation/Travel Corridor Views** ▪ Moderate impact on views from Forest Road (FR) 011, FR 035, and the Old Spanish Trail **Impacts** ▪ 0.7 mile of moderate/high impact **Preference Ranking: 5** ▪ Highest impact on viewers due to proximity to residences along Pinto Creek and southeast of Central. Second highest impact on scenery. The majority of this alternative in the Dixie National Forest is in a high proposed SIO
Alternative S2 IPP West (Environmentally Preferred)	49.6	Class B Scenery – 14.0	**Views within 0.25 mile –** 8.9 **Views between 0.25 and 0.5 mile –** 11.7	**Views within 0.25 mile –** 8.4 **Views between 0.25 and 0.5 mile –** 7.9	▪ In compliance with VRM Class IV objective ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Moderate impact on the Foothill and Juniper Hills landscapes **Residential Views** ▪ Moderate impact on residential viewers in Newcastle, Mountain Meadow, and Central **Recreation/Travel Corridor Views** ▪ Moderate/high impact on views from the Mountain Meadows Massacre Site ▪ Moderate impact on views from the Old Spanish Trail ▪ 0.9 mile of moderate/high impact **Preference Ranking: 1** ▪ Second lowest impact on viewers and lowest impact on scenery due to adjacency of existing transmission lines. The majority of this alternative in the Dixie National Forest is in a moderate proposed SIO.

TABLE 3-54
ALTERNATIVE ROUTE COMPARISON
VISUAL RESOURCES

Route Alternative	Length (miles)	Landscape Scenery (miles crossed)	Sensitive Viewers: High Sensitivity Viewers (miles crossed)	Sensitive Viewers: Moderate Sensitivity Viewers (miles crossed)	Federal Visual Management Objectives	Summary of Residual Impacts
Alternative S3 Ox Valley	57.6	Class B Scenery – 26.5	**Views within 0.25 mile –** 8.0 **Views between 0.25 and 0.5 mile –** 8.0	**Views within 0.25 mile –** 10.7 **Views between 0.25 and 0.5 mile –** 6.3	▪ In compliance with VRM Class IV objective ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Moderate impact on the Foothill, Juniper Hills, and Bull Valley Mountain landscapes **Residential Views** ▪ Moderate/high impact on residential viewers east of Enterprise ▪ Moderate impact on residential viewers in Newcastle, Enterprise, and Ox Valley **Recreation/Travel Corridor Views** ▪ Moderate impact on views from Old Spanish Trail, SR 18, FR 007, and Hardscrabble Trail **Impacts** ▪ 0.3 mile of moderate/high impact **Preference Ranking: 3** ▪ Second highest impact on viewers due to proximity of residences east of Enterprise. Highest impact on scenery due to the crossing the Bull Valley Mountains. The majority of this alternative in the Dixie National Forest is in a high proposed SIO.
Alternative S4 IPP East	48.9	Class B Scenery – 29.1	**Views within 0.25 mile –** 4.4 **Views between 0.25 and 0.5 mile –** 8.5	**Views within 0.25 mile –** 3.5 **Views between 0.25 and 0.5 mile –** 6.5	▪ In compliance with VRM Class IV objective ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Impact on scenery identical to S2 with the addition of moderate impact on the Atchinson Mountain landscape **Residential Views** ▪ Impact on residential viewers identical to S2 **Recreation/Travel Corridor Views** ▪ Impact on recreation/travel corridor viewers identical to S2 except low/moderate impact expected on views from Mountain Meadows Massacre Site and the Old Spanish Trail **Impacts** ▪ 0.0 mile of moderate/high impact **Preference Ranking: 2** ▪ Lowest impact on viewers and second lowest impact on scenery due to adjacency of existing transmission lines. The majority of this alternative in the Dixie National Forest is in a high proposed SIO with portions in an IRA.
Alternative S5 Iron Springs and Pinto Creek (Proponent's Proposed Action)	59.0	Class B Scenery – 29.9	**Views within 0.25 mile –** 4.6 **Views between 0.25 and 0.5 mile –** 8.9	**Views within 0.25 mile –** 11.3 **Views between 0.25 and 0.5 mile –** 3.9	▪ In compliance with VRM Class III and IV objectives ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Impact on scenery identical to S1 **Residential Views** ▪ Impact on residential viewers identical to S1 **Recreation/Travel Corridor Views** ▪ Impact on recreation/travel corridor viewers identical to S1 **Impacts** ▪ 0.7 mile of moderate/high impacts **Preference Ranking: 6** ▪ Similar to S1 except fewer miles adjacent to existing transmission lines
Alternative S6 Iron Springs and Ox Valley	61.9	Class B Scenery – 28.4	**Views within 0.25 mile –** 4.6 **Views between 0.25 and 0.5 mile –** 3.7	**Views within 0.25 mile –** 10.8 **Views between 0.25 and 0.5 mile –** 5.2	▪ In compliance with VRM Class IV objective ▪ Consistent with moderate SIO, not consistent with high SIO	**Landscape Scenery** ▪ Impact on scenery identical to S3 **Residential Views** ▪ Impact on residential viewers identical to S3 **Recreation/Travel Corridor Views** ▪ Impact on recreation/travel corridor viewers identical to S3 **Impacts** ▪ 0.3 mile of moderate/high impact **Preference Ranking: 4** ▪ Similar to S3 except fewer miles adjacent to existing transmission lines

implementing mitigation measures that would limit the amount of permanent clearing of pinyon-juniper vegetation and restore disturbed areas not required for maintenance of the Project. Therefore, impacts on landscape scenery would be moderate.

Low-to-low/moderate impacts would occur in Class C scenery associated with the Sagebrush Basin landscape crossed by this alternative route. Weak/moderate-to-moderate contrast would result from the introduction of vertical elements in a predominantly horizontal landscape. Contrast would be reduced by limited vegetation clearing due to the scattered arboreal vegetation in these landscapes. Impacts on Class C scenery would be reduced.

In the Dixie National Forest, contrast from the construction and operation of the Project would range from moderate-to-moderate/strong. Due to the construction of new access roads and right-of-way clearing on steep terrain, contrast is increased. Therefore, impacts on Class B scenery with high scenic integrity would be moderate after mitigation. Impacts on Class B scenery with moderate scenic integrity would be low/moderate after mitigation.

Sensitive Viewers

Moderate-to-moderate/high impacts are anticipated for residential viewers within the municipalities of Newcastle, Pinto, and Central located within 0.5 mile of the Project on Link 260. Contrast generally would range from moderate-to-moderate/strong because the Project would not be located adjacent to any existing transmission line facilities and new access roads would be constructed. Mitigation measures would reduce contrast to moderate through reducing ground disturbance associated with the construction of new access roads.

Low/moderate impacts would occur along Link 260 on views from residences in Pine Valley because the Project is located more than 2.0 miles away from these residences. Contrast is moderate since the Project would require new access roads to be constructed on moderately steep terrain, and there are no adjacent major transmission lines.

Moderate impacts are anticipated on views from the Old Spanish Trail, a high sensitivity recreation area, where the Project is located within 0.5 mile of the trail on Link 220. Contrast would be moderate due to the construction of new access roads on steep terrain. Mitigation measures would reduce contrast by reducing ground disturbance associated with the construction of access roads.

Low/moderate impacts are anticipated along Link 260 on views from high sensitivity recreation areas, including the Pine Valley Mountain Wilderness, Summit/Rock Springs Trail, Goat Spring Trail, Water Canyon Trail, and Pine Valley Chapel. Project contrast is expected to range from moderate-to-moderate/strong because the Project would introduce strong vertical elements in an undulating, pinyon-juniper dominated landscape. Since these viewers are located more than 2.0 miles away from the Project, the dominance of the Project components in the landscape would be reduced; therefore contrast would be reduced to a weak/moderate-to-moderate level. Mitigation measures would further reduce contrast through the reduction of right-of-way vegetation clearing and ground disturbance generated by the construction of access roads.

Moderate impacts would occur on views from FR 035, a high sensitivity travel route, located within 0.5 mile of the Project on Link 260. Contrast would be expected to range from moderate-to-moderate/strong due to the introduction of strong vertical structures in a natural landscape and the construction of access roads on steep, vegetated slopes.

Moderate impacts would occur along Link 260 on views from FR 011, a moderate sensitivity travel route, located within 0.5 mile of the Project. Contrast would be moderate due to the construction of new access roads on moderately steep terrain with no adjacent major transmission lines. Mitigation would decrease contrast by reducing ground disturbance associated with the construction of the new access roads.

Low-to-low/moderate impacts are anticipated for views from other moderate sensitivity travel routes, including SR 18, SR 56, FR 009, and the Lund Highway (Links 165, 220, 240, 245, and 260). Contrast associated with the Project ranges from weak-to-weak/moderate due to the adjacency of existing major transmission lines, which have locally modified the existing landscapes.

Low-to-low/moderate impacts are anticipated to occur on views from the Newcastle Reservoir (Links 240 and 245) and Baker Dam Reservoir (Link 260), which are both moderate sensitivity recreation viewers. Contrast associated with the Project ranges from weak-to-weak/moderate due to the adjacency of major existing transmissions and the construction of access roads on level terrain with limited vegetation clearing.

Low/moderate impacts would occur on views from other moderate sensitivity recreation areas located more than 2.0 miles from the Project on Links 260 and 500. Contrast would be anticipated to be moderate because new access roads would be constructed on moderately steep terrain and there are no adjacent existing transmission lines.

<u>Federal Agency Visual Management Objectives</u>

BLM Visual Resource Management Classes

Class III Objective areas are crossed south of Central with a weak-to-moderate project contrast on Link 260. Changes to the characteristic landscape may be moderate in VRM Class III Objective areas. The remainder of the Project crosses Class IV objective areas, which allow strong changes to the characteristic landscape. KOP No. 13, located at the Baker Dam Reservoir Campground, confirms the Project would be compliant with the VRM objectives along this route.

U.S. Forest Service Scenic Integrity Objective Levels

In areas of moderate SIO in the Dixie National Forest, project contrast was assessed to be weak (Link 260 and 500). The changes to the landscape in a moderate SIO may appear slightly altered but remain subordinate in the landscape. The Project would meet the definition of a moderate SIO since the Project parallels multiple existing transmission lines. Project contrast was assessed to be moderate-to-moderate/strong in areas of high SIO in the Dixie National Forest on Link 260. The changes to the landscape in a high SIO may be present, but the landscape must appear intact. The Project would not be consistent with the definition of a high SIO since it would alter the landscape through the introduction of strong vertical elements associated with the transmission line structures and the clearing of vegetation in the right-of-way. The Project would be compliant with the forest plan because scenic integrity would not be reduced to an unacceptably low level (management standard for the Dixie National Forest).

Alternative S2 – IPP West

Affected Environment

Landscape Scenery

The majority of this alternative route (all links except 275 and 442) would cross Class C landscapes, including the Sagebrush Basin, which is characterized by limited topography relief, and are primarily occupied by sagebrush, grasses, and other desert scrub vegetation (MV-10c-d). The remaining portions of this alternative route (Links 220, 221, 442, 443, 444, 275, and 500) cross rolling juniper hills (Class B) and foothills (Class B), which are characterized by moderately steep terrain with scattered pinyon-juniper vegetation (MV-10d).

This alternative route crosses the Dixie National Forest adjacent to the major utility corridor for the entire alignment (including a cleared right-of-way [approximately 150 feet wide]) that has locally modified the setting. Therefore, existing scenic integrity was inventoried as low due to the strong presence of the utility corridor.

Sensitive Viewers

High sensitivity residential viewers in high concentration are located in the municipalities of Newcastle, Enterprise, and Central (Links 221, 441, 442, 443, 444, and 275) (MV-12d). The Project would be visible from high sensitivity recreation viewers, including the Mountain Meadows Massacre Site and the Old Spanish Trail along Links 220, 221, 441, 442, 443, and 444 (MV-12d). FR 035 is a high sensitivity travel route, which would have views of the Project on Links 275 and 500 (MV-12d).

The Project would be visible on Links 441, 442, 275, and 500 from moderate sensitivity recreation areas, including the Jefferson Hunt Memorial, Hamblin Town Site, Newcastle Reservoir, Shinbone Trail, Hardscrabble Trail, and Baker Dam Reservoir and Campground (MV-11d). Moderate sensitivity travel routes include the Lund Highway, SR 18, SR 56, FR 009, FR 011, and Bench Road and would have views of the Project on all links except Link 163 (MV-12c-d).

Federal Agency Visual Management Objectives

This alternative route crosses 13.3 miles of BLM-administered lands with all 13.3 miles in VRM Class IV (MV-13c-d). There would be 10.8 miles of USFS-administered lands crossed with 1.9 miles within a SIO of high (Link 444) and 8.9 miles within a SIO of moderate (Links 442, 443, 444, 275, and 500) (MV-13d). For a discussion of the development of the SIOs, refer to Appendix E.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI classes are similar to Alternative S1, except the Pine Valley Mountain and Young Basalt Flows landscapes are not crossed.

Environmental Effects

Landscape Scenery

Weak-to-weak/moderate contrast would result from the limited areas of new access roads constructed through moderate steep terrain in Class B scenery, including the foothills and rolling juniper hills along Links 220, 221, 441, 442, 443, 444, 275, and 500. The adjacent existing transmission lines would reduce contrast through their strong presence in the landscape. Contrast would be further reduced by implementing mitigation measures that would limit the amount of permanent vegetation clearing and restore disturbed areas not required for maintenance of the Project. Therefore, impacts on landscape scenery would range from low/moderate-to-moderate.

Low-to-low/moderate impacts would occur in Class C scenery associated with the Sagebrush Basin landscape traversed by this alternative route. Weak/moderate-to-moderate contrast would result from the introduction of vertical elements (associated with the proposed transmission line structures) in a predominantly horizontal landscape. Limited vegetation clearing, due to the shorter vegetation in this landscape, would reduce contrast.

Within the Dixie National Forest, contrast resulting from this alternative would range from weak-to-moderate based on the strong presence of the existing transmission lines. The proposed transmission line would parallel an existing transmission line, which has locally modified the setting and reduced the integrity of the forest landscape. Therefore, impacts on Class B scenery with low scenic integrity would be low after mitigation measures, which would reduce contrast generated by the construction of access roads and right-of-way clearing.

Sensitive Viewers

Moderate impacts are anticipated for residential viewers within the municipalities of Newcastle and Central on Links 221, 441, 443, 444, and 275 located within 1.0 mile of the Project. Contrast generally would range from low/moderate-to-moderate because the Project would be located adjacent to existing major transmission lines. Mitigation measures would reduce contrast to low/moderate by reducing ground disturbance associated with the construction of new access roads.

Moderate to moderate/high impacts are anticipated for viewers within the Mountain Meadows Massacre Site. Distances from the Project to viewers within the Mountain Meadows Massacre Site would range from 0.375 mile away in the parking lot to 0.25 mile at the Mountain Meadows Memorial on Dan Sill Hill (Link 444). Views of the Project from the parking lot of the memorial would be unobstructed in very close distance to viewers and therefore structure contrast would be strong. Views of the Project from the two memorials sites, one located at the end of the trail on Dan Sill Hill and the other located on the valley floor, would be in the context of the existing utility corridor and therefore structure and landscape contrast would be reduced. Although, the focus of the Mountain Meadows Massacre Site are the two memorial viewing platforms, impacts on viewers from within the memorial parking lot would be moderate/high because the proposed facilities would dominate the view. Further, mitigation would not effectively reduce impacts at this location and therefore moderate/high residual impacts are anticipated. However, moderate impacts are anticipated for views from the memorial viewing platforms because the project would be in context with the existing utility corridor. Mitigation would further reduce contrast by limiting ground disturbance and vegetation. Therefore, overall residual impacts on the Mountain Meadows Massacre Site would be moderate.

Moderate impacts would occur on views from the Old Spanish Trail, where high sensitivity viewers are located within 0.5 miles of the Project on Links 220, 221, 441, 443, and 444. Contrast would range from low/moderate-to-moderate because the Project would be located adjacent to multiple major transmission lines. Mitigation measures would decrease contrast to low/moderate through a reduction of ground disturbance and vegetation clearing. Due to the proximity of the Project to these viewers, impacts would remain at a moderate level.

Low/moderate impacts would occur on views from FR 035; a high sensitivity travel route located approximately 2.0 miles from the Project on Link 275. Contrast is anticipated to be low because the Project is adjacent to multiple major existing transmission lines, which have strongly altered the existing landscape.

Low/moderate impacts are anticipated on views from moderate sensitivity recreation areas on Links 441, 442, 275, and 500, including the Jefferson Hunt Memorial, Hamblin Town Site, Newcastle Reservoir, Shinbone Trail, Hardscrabble Trail, and Baker Dam Reservoir and Campground. Contrast associated with the construction and operation of the Project is expected to range from weak-to-weak/moderate due to strong influence of the multiple existing transmission lines on local landscape.

Low/moderate impacts would occur on views from moderate sensitivity travel routes, including SR 18, SR 56, FR 009, FR 011, Lund Highway, and Bench Road on all links within this alternative except Link 163. Contrast would range from weak-to-weak/moderate because the Project is located adjacent to multiple existing transmission lines.

<u>Federal Agency Visual Management Objectives</u>

BLM Visual Resource Management Classes

All BLM-administered lands crossed by this alternative are VRM Class IV objective and project contrast ranges from weak-to-weak/moderate. Changes to the characteristic landscape may be strong in this objective. The Project would comply with the visual management objectives.

U.S. Forest Service Scenic Integrity Objective Levels

Project contrast was assessed to be weak-to-moderate in areas of moderate SIO in the Dixie National Forest (Links 442, 443, 444, 275, and 500). The changes to the landscape in a moderate SIO may appear slightly altered but remain subordinate in the landscape. The Project would meet the definition of a moderate SIO since the Project parallels multiple existing transmission lines with similar visual elements. There are also areas of high SIO located adjacent to the Mountain Meadows Massacre Site where project contrast ranges from weak/moderate-to-moderate on Link 444. The changes to the landscape in a high SIO may be present, but the landscape must appear intact. The Project would not be consistent with the definition of a high SIO because the Project would extend the influence of the transmission line corridor to a level that would degrade the character of the landscape. The Project would not reduce scenic integrity below an unacceptably low level (management standard for the Dixie National Forest); therefore the Project would be compliant with the forest plan.

Alternative S3 – Ox Valley

Affected Environment

Landscape Scenery

All links within this alternative route except 442, 280, 290, and 500 would cross Class C landscapes, including the Sagebrush Basin, which is characterized by limited topography relief, and are primarily occupied by sagebrush, grasses, and other desert scrub vegetation (MV-10c-d). Link 285 crosses the Bull Valley Mountains, which are characterized by moderate-to-steep terrain with a variety of vegetation types, including pinyon-juniper, oak, and mountain mahogany (MV-10d). The remaining portions of this alternative route cross foothills (Class B), which are defined by moderately steep terrain with scattered pinyon-juniper vegetation (Links 220, 221, 442, 280, 285, 290, and 500).

This alternative route crosses the Dixie National Forest predominately in high existing scenic integrity landscapes based on the intact natural appearing landscape character. Landscapes with moderate existing scenic integrity were inventoried on Link 280 (MP 0.3 to 4.5) and Link 285 (MP 0.0 to 2.4) due to the chaining activities, which have altered the existing form, line, color, texture, and pattern of the existing landscape. In landscapes where the Project would be adjacent to a major existing utility corridor, the existing scenic integrity was inventoried as low due to the strong presence of the existing utility corridor.

Sensitive Viewers

High sensitivity residential viewers in high concentration are located in the municipalities of Newcastle, Enterprise, and Central along Links 221, 280, 285, and 500 (MV-12d). The Project would be visible along Links 220, 221, 441, 442, 280, and 290 from the Old Spanish Trail, a high sensitivity recreation viewer (MV-13d).

The Project would be visible from moderate sensitivity recreation areas along Links 221, 441, 442, 280, 285, 290, and 500, including the Jefferson Hunt Memorial, Newcastle Reservoir, Shinbone Trail, Hardscrabble Trail, Enterprise Rodeo Grounds, Heritage Park, and Baker Dam Reservoir and Campground (MV-12d). Moderate sensitivity travel routes include the Lund Highway, SR 18, SR 56, FR 007, FR 011, and Bench Road and would have views of all links within this alternative except Link 163 (MV-12c–d).

Federal Agency Visual Management Objectives

This alternative route crosses 13.8 miles of BLM-administered lands with all 13.8 miles in VRM Class IV (MV-13c-d). There would be 20.3 miles of USFS-administered lands crossed with 14.6 miles in a SIO of high (Links 280 and 285) and 5.7 miles in a SIO of moderate (Links 285, 290, 442, and 500) (MV-13d). For a discussion of the development of the SIOs, refer to Appendix E.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI classes are similar to Alternative S1, except the Pine Valley Mountain and Young Basalt Flows landscapes are not crossed.

Environmental Effects

Landscape Scenery

Moderate-to-moderate/strong contrast would result from the construction and operation of permanent new access roads on moderate-to-steep terrain within Class B scenery, including the Bull Valley Mountains, foothills, and rolling juniper hills on Links 220, 221, 280, and 285. Additionally, the proposed transmission line would introduce vertical structures into a largely natural landscape setting. Contrast would be reduced by implementing mitigation measures that would limit the amount of permanent vegetation clearing and restore disturbed areas not required for maintenance of the Project. Therefore, impacts on landscape scenery would be moderate.

Low-to-low/moderate impacts would occur in Class C scenery associated with Sagebrush Basin landscape crossed by this alternative route. Weak/moderate-to-moderate contrast would result from the introduction of vertical elements (associated with the proposed transmission line structures) in a predominantly horizontal landscape. Additional contrast is anticipated based on vegetation disturbance associated with construction access roads. Mitigation measures would reduce vegetation clearing in the right-of-way and limiting ground disturbance from the construction of access roads. Therefore, impacts on Class C landscape scenery would be reduced.

In the Dixie National Forest, contrast from the construction and operation of the Project would range from moderate-to-moderate/strong. Due to the construction of new access roads and right-of-way clearing on steep terrain, contrast is increased. Therefore, impacts on Class B scenery with high scenic integrity would be moderate after mitigation. Impacts on Class B scenery with moderate scenic integrity would be low/moderate after mitigation.

Sensitive Viewers

Moderate-to-moderate/high impacts are anticipated along Links 221, 280, and 285 for residential viewers within the municipalities of Enterprise and Newcastle located within 0.5 mile of the Project. Contrast generally would range from moderate-to-moderate/strong because the Project would require new access roads to be constructed on steep terrain, and vegetation clearing would occur within the right-of-way. Mitigation measures would reduce contrast to moderate reducing ground disturbance associated with the construction of new access roads and areas of cleared vegetation.

Low/moderate impacts would occur from residential viewers in Central on Link 500. Contrast would be expected to be low since the Project is located adjacent to multiple major transmission lines, which have strongly modified the existing landscape.

Moderate impacts would be anticipated on views from the Old Spanish Trail, a high sensitivity recreation viewer, located within 0.5 mile of the Project (Links 220, 441, and 280). Contrast would range from low/moderate-to-moderate because the Project would be located adjacent to multiple major transmission lines. Mitigation would decrease contrast to low/moderate by reducing ground disturbance and vegetation clearing. Due to the proximity of the Project to this viewer, impacts would remain at a moderate level.

Moderate impacts would occur on views from SR 18 and FR 007, which are both moderate sensitivity travel routes along Links 280 and 285. Contrast would be moderate/strong because the Project would introduce strong vertical structures into the landscape and access roads would be constructed on steep, vegetated slopes. Mitigation would reduce contrast to moderate by reducing ground disturbance associated with the construction of access roads and vegetation clearing within the right-of-way.

Therefore, impacts would be reduced to a low/moderate level except where the Project is located less than 0.25 mile from these travel routes.

Low/moderate impacts would occur on views from other moderate sensitivity travel routes, including SR 56, FR 011, the Lund Highway, and the Bench Road along Links 220, 221, 280, 441, and 442. Contrast is expected to be weak/moderate because the Project would be located adjacent to an existing transmission line, which has modified the existing character of the landscape.

Low/moderate-to-moderate impacts would occur on views from moderate sensitivity recreation viewers, including the Shinbone Trail, Hardscrabble Trail, Enterprise Rodeo Grounds, and Heritage Park (Links 280 and 285). Contrast associated with the construction and operation of the Project varies from moderate-to-moderate/strong. Since there are no adjacent transmission lines, the construction of access roads on steep terrain and the introduction of strong vertical structures would alter the character of the landscape. Mitigation measures would reduce contrast by limiting ground disturbance generated by the construction of new access roads and limiting vegetation clearing in the right-of-way.

Low-to-low/moderate impacts are anticipated on views from other moderate sensitivity recreation viewers, including the Jefferson Hunt Memorial, Newcastle Reservoir, and Baker Dam Reservoir and Campground (Links 221, 441, 290, and 500). Contrast would be low/moderate because the Project is located adjacent to an existing transmission line, which has modified the existing character of the landscape.

Federal Agency Visual Management Objectives

BLM Visual Resource Management Classes

All BLM-administered lands crossed by this alternative route are VRM Class IV objective and project contrast ranges from weak-to-weak/moderate. Changes to the characteristic landscape may be strong in this objective. The Project would comply with the visual management objectives.

U.S. Forest Service Scenic Integrity Objective Levels

Project contrast was assessed to be weak/moderate in areas of moderate SIO in the Dixie National Forest on Links 285, 290, 442, and 500. The changes to the landscape in a moderate SIO may appear slightly altered but remain subordinate in the landscape. The Project would meet the definition of a moderate SIO since the Project parallels multiple existing transmission lines with similar visual elements. Project contrast was assessed to be moderate-to-moderate/strong in areas of high SIO in the Dixie National Forest (Links 280 and 285). The changes to the landscape in a high SIO may be present, but the landscape must appear intact. The Project would not be consistent with a high SIO since it would alter the landscape through the introduction of strong vertical elements associated with the transmission line structures and the clearing of vegetation in the right-of-way. Since the Project would not lower the scenic integrity of these areas below an unacceptably low level (management standard for the Dixie National Forest), the Project would be compliant with the forest plan.

Alternative S4 – IPP East

Affected Environment

Landscape Scenery

Scenic quality crossed is similar to Alternative S2, except this alternative route crosses the Atchinson Mountain landscape with a scenic quality rating of B on Link 270 (MV-10d).

This alternative route crosses the Dixie National Forest adjacent to a major utility corridor (including a cleared right-of-way [approximately 150 to 200 feet wide]) that has locally modified the setting. Therefore, existing scenic integrity was inventoried as low, outside of the IRA, due to the strong presence of the existing transmission lines. In locations where the Project is located within an IRA, existing scenic integrity was inventoried as high due to limited development and landscape character deviations.

Sensitive Viewers

Sensitive viewers are similar to Alternative S2, except Links 222 and 275 are located further than 0.25 mile from the Mountain Meadows Massacre Site, Old Spanish Trail, Jefferson Hunt Memorial, Hamblin Town Site, and the Bench Road (MV-11d and 12d).

Federal Agency Visual Management Objectives

This alternative route crosses 12.7 miles of BLM-administered public lands with all 12.7 miles of VRM Class IV (MV-13c-d). There would be 15.1 miles of USFS-administered lands crossed with 7.5 miles in a SIO of high (Links 222 and 270) and 7.6 miles in a SIO of moderate (Links 270 and 275) (MV-13d). For a discussion of the development of the SIOs, refer to Appendix E.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI Classes crossed are similar to Alternative S2.

Environmental Effects

Landscape Scenery

Impacts on landscape scenery are similar to Alternative S2, except moderate impacts would occur on Link 270 in the Atchinson Mountains (Class B) landscape. Contrast would range from low/moderate-to-moderate because the Project would require access roads to be constructed on steep, vegetated slopes in a modified landscape setting due to the presence of an existing utility corridor. Contrast would be reduced through limiting disturbances generated by the construction of access roads and clearing of vegetation in the right-of-way. Impacts on Class B scenery with a high scenic integrity would be moderate after mitigation.

Sensitive Viewers

Impacts on sensitive viewers are similar to Alternative S2, except impacts on the Mountain Meadows Massacre Site and the Old Spanish Trail would be reduced to low/moderate because the Project would be seen through the context of multiple existing transmission lines, which would reduce contrast (Link 270).

Federal Agency Visual Management Objectives

Compliance with visual management objectives would be similar to Alternative S2, with the addition of areas of high SIO within IRAs on Link 270. The Project would not be consistent with the definition of a high SIO because the Project would alter intact landscapes in the IRA through the construction of access roads and the clearing of vegetation in the right-of-way. The Project would be compliant with the visual resource direction in the forest plan because scenic integrity would be maintained above an unacceptably low level (management standard for the Dixie National Forest).

Alternative S5 – Iron Springs and Pinto Creek

Affected Environment

Landscape Scenery

Landscape scenery crossed is similar to Alternative S1.

Sensitive Viewers

Sensitive viewers are similar to Alternative S1, except the Project also would be visible from other moderate sensitivity viewers, including the Three Peaks Special Recreation Management Area (SRMA) and County Road (CR) 1740 on Link 435 (MV-11d).

Federal Agency Visual Management Objectives

This alternative route crosses 25.5 miles of BLM-administered lands with 1.3 miles VRM Class III, south of Central in the St. George Field Office on Link 260, and 24.1 miles of VRM Class IV (MV-13c-d). There would be 20.7 miles of USFS-administered lands crossed with 20.2 miles in a SIO of high (Link 260) and 0.5 mile in a SIO of moderate (Links 260 and 500) (MV-13d). For a discussion of the development of the SIOs, refer to Appendix E.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI classes crossed are similar to Alternative S1.

Environmental Effects

Landscape Scenery

Impacts on landscape scenery are similar to Alternative S1.

Sensitive Viewers

Impacts on sensitive viewers are similar to Alternative S1, with the addition of anticipated low impacts on views from the Three Peaks SRMA and CR 1740 located more than 1.0 mile from the Project on Link 435. Contrast would be moderate since new access roads would be constructed on level terrain, but there are no adjacent existing transmission lines so a strong vertical element would be introduced into the landscape.

Federal Agency Visual Management Objectives

Compliance with visual management objectives would be similar to Alternative S1.

Alternative S6 – Iron Springs and Ox Valley

Affected Environment

Landscape Scenery

Landscape scenery crossed is similar to Alternative S3.

Sensitive Viewers

Sensitive viewers are similar to Alternative S3, except the Project also would be visible from other moderate sensitivity viewers, including Three Peaks SRMA and CR 1740 on Link 435 (MV-11d).

Federal Agency Visual Management Objectives

This alternative route crosses 27.5 miles of BLM-administered land with 27.5 miles in VRM Class IV (MV-13c-d). There would be 20.3 miles of USFS-administered lands crossed with 14.6 miles in a SIO of high (Links 280 and 285) and 5.7 miles in a SIO of moderate (Links 442, 280, 285, 290, and 500) (MV-13d). For a discussion of the development of the SIOs, refer to Appendix E.

BLM Visual Resource Inventory Components

SQRUs, SLRUs, distance zones, and VRI classes crossed are similar to Alternative S3.

Environmental Effects

Landscape Scenery

Impacts on landscape scenery are similar to Alternative S3.

Sensitive Viewers

Impacts on sensitive viewers are similar to Alternative S3, except low/moderate residual impacts are anticipated on views from FR 011 where the Project is within 0.5 mile of the road on Link 250. Contrast

would be moderate because the Project would not be parallel with any major existing transmission lines and the construction of new access roads on moderately steep terrain would introduce deviations within the existing landscape character. Mitigation measures would reduce the contrast generated by the construction of new access roads and the clearing of vegetation in the right-of-way.

Low impacts would occur on views from the Three Peaks SRMA and CR 1740 where the Project is located more than 1.0 mile away on Link 435. Contrast would be moderate because the Project would introduce strong vertical elements in a horizontal, sagebrush-dominated landscape. The construction of access roads on level terrain with limited vegetation clearing would reduce contrast.

Federal Agency Visual Management Objectives

Compliance with visual management objectives would be similar to Alternative S3.

3.2.8.6 Summary

Impacts on visual resources are similar between all six Sigurd Substation to South Black Mountains routes. Alternatives N1, N2, and N3 avoid crossing the Mineral Mountains while Alternatives N4, N5, and N6 cross the Mineral Mountains; therefore, these alternatives would have additional impacts on landscape scenery. Alternatives N3, N5, and N6 have stronger project contrast since they do not parallel the IPP transmission line corridor.

Impacts on visual resources are similar between all six South Black Mountains to Red Butte Substation routes from Link 163 to Newcastle. Alternatives S1, S3, S5, and S6 have higher impacts on residences and scenic quality since they traverse intact landscapes with few modifications. Alternative S4 follows an existing transmission line corridor, but also crosses an IRA with a high existing scenic integrity. Alternative S2 also follows the existing transmission line corridor and does not cross into an IRA, but has higher impacts on residences and the Mountain Meadows Massacre Site.

3.3 Land Use and Recreation Resources

3.3.1 Introduction

Existing and future land uses and recreation resources were identified and evaluated for all jurisdictions occurring in the study corridors. Existing land use, future land use (based on generalized zoning), and recreation resources are shown in MV-14, MV-15, and MV-16 (Volume II).

Issues raised by the public and agencies during Project scoping and preparation of the EIS related to potential impacts on land use and recreation resources include the following:

- Conflicts with current land uses, including airports, residential, commercial, industrial, agriculture, agriculture protection areas (APA), existing rights-of-way, and other authorized land uses
- Impacts on recreation areas, including the Freemont Indian State Park, Paiute ATV Trail network, and other OHV and pedestrian trails
- Impacts on recreational values on the Dixie and Fishlake National Forests based on the recreation opportunity spectrum (ROS)
- Impacts on Areas of Potential Wilderness and IRAs on the Dixie and Fishlake National Forests

- Impacts on grazing due to vegetation removal
- Impacts on rangeland infrastructure, such as fences and cattle guards
- Conflicts with low-flying military aircraft (conflicts were not included in the analysis because it was determined the Project would be located outside of military operation areas)

3.3.2 Regulatory Framework

BLM- and USFS-administered lands occurring in the Project area are managed with direction from land use plans that establish the goals and objectives for the management of resources. The relevant approved and proposed management plans (and plan amendments) relevant to the Project area are listed in Section 1.5.1.3.

The *Roadless Area Conservation Rule of 2001* (36 CFR Part 294) was adopted by the USDA to "establish prohibitions on road construction, road reconstruction, and timber harvesting in IRAs on National Forest System lands" (USDA 2001). The rule established criteria for identifying IRAs and prescribed management for road construction and timber harvesting. Pursuant to the *Roadless Area Review and Evaluation (RARE) II of 1979*, the USFS identified IRAs in national forests across the nation, which were incorporated into the *Roadless Area Conservation Rule of 2001*, to prevent the fragmentation of pristine, sensitive, and roadless areas due to road construction or timber harvesting (USDA 2001).

The *National Forest System Land and Resource Management Planning Rule of 1982* (36 CFR §219.17) directs that roadless areas be evaluated and considered for wilderness recommendation during the forest planning process.

Private lands are regulated by local zoning ordinances and general plans. The *Utah Land Use Development Management Act* (10 Utah State Code 09a [municipal] and 17 Utah State Code 27a [county]), requires counties and incorporated municipalities to develop a zoning map, zoning ordinance, and general plan. The following incorporated cities and counties within the study corridors have adopted a zoning ordinance and general plan to protect the health, safety, and welfare of the general public:

- Sevier County
- Richfield City
- Elsinore
- Joseph
- Millard County
- Beaver County
- Milford
- Minersville
- Beaver City
- Iron County
- Enterprise
- Washington County

The *Utah Agricultural and Industrial Protection Areas Act* (17 Utah State Code 41) provides protection to owners of agricultural and industrial lands from nuisance lawsuits from encroaching development that might conflict with agricultural and industrial activities. The act also limits the use of eminent domain by government entities, including publically regulated utilities. Under this act, landowners have the option to place their land in an agricultural or industrial protection area through the county or municipality.

3.3.3 Regional Setting

The study corridors consist of various types of land uses and recreational opportunities. Given the predominately rural character of the Project area, agriculture, specifically livestock grazing, is the primary existing land use. Irrigated agriculture is commonly found near populated areas located along interstate and state highways. The City of Richfield and the surrounding Sevier Valley compose the most urbanized area, with a concentration of residential, industrial, commercial, and quasi-public (e.g., churches, cemeteries, government buildings, etc.) land uses.

Designated recreational areas are predominately located in the Pahvant, Tushar, and Pine Valley mountain ranges. Unimproved, dispersed recreation opportunities occur throughout the Project area on BLM- and USFS-administered lands. Because of the rural character of the Project area, municipal and county parks are not commonly found.

The majority of land occurring within the study corridor is federal land administered by the BLM or USFS.

3.3.4 Study Methodology

Inventory

Existing land uses were inventoried within a 2-mile-wide study corridor (1 mile on each side of the alternative routes) to identify land uses that could be affected both directly and indirectly by Project construction and operation. Existing land uses were inventoried by initially reviewing and interpreting aerial photography and then verifying the data through field reconnaissance.

Future land uses were inventoried by generalizing the zoning maps of each county and city within the study corridors (based on interpretation of each zoning ordinance). Information on planned and proposed projects also was collected from the federal, state, county, and local governments.

Recreation areas such as trails, campgrounds, and opportunity areas were identified using USFS map products, and in BLM and USFS land use plans.

Inventory data also were obtained from, and reviewed by, various federal, state, and local agencies, including the following:

- BLM and USFS land use plans and information concerning land use classifications, SRMAs, active mining sites, existing rights-of-way, IRAs, and other authorized land uses
- Utah State Parks and State Trust Land
- City and county land use plans – existing and future land use
- Private development plans, including energy development projects
- Aerial photographs of the alternative routes using 2009 National Agriculture Imagery Program (NAIP) imagery
- BLM – Legacy Rehost 2000 System

Inventoried Roadless Areas

Pursuant to RARE II of 1979 and incorporated into The *Roadless Area Conservation Rule of 2001*, 36 CFR Part 294, both the Fishlake and Dixie National Forests identified IRAs within the study corridor as

having pristine, sensitive, and roadless characteristics to prevent the fragmentation of these areas by new road construction or improvements (MV-14).

Areas of Potential Wilderness

Pursuant to the *National Forest System Land and Resource Management Planning Rule of 1982* (36 CFR §219.17) the Fishlake and Dixie National Forests identified Areas of Potential Wilderness within the study corridors (MV-14). Areas were identified and inventoried as part of the 2005 plan revision process and evaluated for areas of potential wilderness.

Citizen Proposed Wilderness Areas

Citizen groups have identified citizen-proposed wilderness areas within the study corridors (MV-15) as part of the proposed America‘s Red Rock Wilderness Act. Section 3.4.4.2 discusses the suitability of these areas for wilderness as determined by the BLM and associated impacts.

Forestry and Woodland Products

Collection of firewood, Christmas trees, wood for fence posts, and pine nuts is allowed on 18,802 acres of pinyon-juniper stands on land administered by the BLM Fillmore Field Office (BLM 1986b). Managed stands on land administered by the Cedar City Field Office are used to supply woodland products (by permit) for fuel-wood, posts, pine nuts, and Christmas trees at fair market value (BLM 1986a). The Fishlake National Forest consists of approximately 770,000 acres of forested land, which constitutes 55 percent of the total area within the Forest. Fifty percent of the forested area is considered suitable for timber production, which includes commercial harvesting, firewood, and Christmas trees (USFS 1986a). Within the Dixie National Forest, 331,200 acres are considered suitable for timber production (USFS 1986b).

Minerals

Leasable Minerals

Within the study corridors, there are authorized oil and gas leases on BLM-administered land along I-70 in Sevier County and in Iron County between SR 130 and the Union Pacific railroad line, southwest of the community of Milford to the Nevada state line.

Locatable Minerals

Commercial mining in Utah began in the mid to late 1800s and is still prevalent today. Current active mining claims occurring within the study corridors include the following:

- Martin Marietta Materials, Inc., operates a ballast plant, located approximately 4.0 miles north of the community of Milford. Granite is mined from Rocky Range and transported to a ballast plant where it is crushed into small aggregates predominately used for railroad ballast and paving stones.

- Copper King Mining Corporation merged with Western Utah Copper Company in 2007 and owns mining properties west of Milford, Utah, in Rocky Range, Beaver Lake Mountains, San Francisco Mountains, and Blue Mountain. At full capacity, Copper King can extract 160,000 tons of copper, silver, gold, and magnetite per day.

- Palladon Ventures Ltd. operates the Iron Bull Mining and Milling Facilities, located at the Comstock/Mountain Lion Iron Mine on Iron Mountain. The 6,600-acre property is located approximately 16 miles west of Cedar City. Palladon Ventures aims to mine, process, and export approximately 2 million tons of iron ore to China per year (Palladon Ventures Ltd., 2005).

Other active mining claims in the study corridors are located in the following general locations:

- Sevier County – along I-70
- Beaver County – in the Mineral Mountains, Escalante Desert, Beaver Bottoms, Greenville Bench, and east of I-15
- Iron County – in the Antelope Range and Black Mountains

Salable Minerals

Mineral materials within the study corridors are used for the construction of roads, highways, and commercial and residential development. BLM has active contracts for private extraction of sand, gravel, and building stone and free-use permits, which are agreements between government and nonprofit organizations to extract and use mineral materials for nonindustrial and commercial purposes, with state and local governments. Private individuals also are allowed by permit to remove quantities of landscape rock and building stone in certain areas. In Sevier County, the FHWA holds several authorized mineral site rights-of-way along I-70 (Geocommunicator-National Integrated Land System 2009).

Renewable Energy

In the Project area, there are currently three geothermal plants: Enel (formally called Sulphurdale) in Beaver County, south of Cove Fort; Blundell, operated by PacifiCorp located northeast of the community of Milford in Beaver County; and the Orin G. Hatch plant, operated by Raser Technologies, located south of Milford.

First Wind recently completed construction of the Milford Wind Farm, located north of Milford. Phase II is under construction and Phase III is in the application phase to expand the wind farm into Millard County. EnXco Development Corporation has applied to the BLM for a right-of-way grant for construction of the Mineral Mountains Wind Farm, which is located on BLM, state, and private land in the Mineral Mountains. Wasatch Wind Development holds a pending lease on 7,709 acres in the Antelope Range northeast of the community of Newcastle for the Enterprise East Wind Park. Mormon Mesa Power Partners, LLC, holds pending leases for wind development in Millard, Beaver, and Iron counties.

The State of Utah has initiated an effort to promote and identify Utah‘s utility-scale electrical renewable energy resources and to assess transmission needs to bring those resources to load centers in Utah. As part of this effort, the Utah Renewable Energy Zones (UREZ) Task Force, commissioned by former Governor John Huntsman, completed the *Phase I Report–Renewable Energy Zone Resource Identification* report that identified wind, solar, and geothermal zones with the theoretical potential for utility-scale development in Utah (Berry et al. 2009). Additionally, the *Draft UREZ Phase II Task Force Zone Identification and Scenario Analysis* report was released in April 2010, which identified 27 renewable

energy zones (six in the study corridors) capable of generating geothermal, solar, and wind energy. The report indicated these six zones within the study corridors are capable of generating enough generation to justify a high-voltage transmission line (Black and Veatch 2010). It is anticipated that future transmission lines will be built in the Project area as the UREZs are developed.

Transportation and Access

Highway and Roads

Major interstates and highways occurring in the study corridors are discussed in Appendix E. Existing access for each alternative route was determined through aerial photography interpretation and existing data available from USFS-motorized travel plans (MTPs). Existing access roads, including paved and unpaved roads that parallel or are within 500 feet of the alternative routes were included in the inventory.

Aviation Facilities

FAA registered airports located within the study corridors include:

- Richfield Municipal Airport – located within Richfield city limits, less than 1.0 mile south of the city center
- Milford Municipal Airport (Ben and Judy Briscoe Field) – located less than 1.0 mile north of the community of Milford

Three landing strips are located within the study corridors at the following locations:

- Sulphurdale landing strip – located approximately 0.75 mile southeast of the junction of I-15 and I-70
- Private landing strip – located approximately 1 mile southeast of Newcastle Reservoir
- Dixie Deer landing strip – located west of SR 18, near the community of Central in Washington County

One helipad is located within the study corridor at the Western Electrochemical Company facilities (WECCO), approximately 13 miles northwest of Cedar City.

Linear Facilities and Utility Corridors

Existing linear facilities within the study corridors include transmission lines, major highways, railroads, and pipelines (MV-14).

The Union Pacific Railroad crosses a study corridor in southern Millard County and follows Highway 257 south to Milford where it continues southwest towards the community of Lund. At Lund, the railroad splits into two tracks; one track continues southwest towards the Utah-Nevada border and the other travels southeast towards Cedar City.

Designated utility corridors and major rights-of-way within land administered by the BLM Richfield, Fillmore, Cedar City, and St. George Field Offices and Fishlake and Dixie National Forests are identified in their land use plans. The following are designated utility corridors relevant to the Project study area (MV-14):

- A corridor, containing the Sigurd to Cameron 138kV transmission line, traverses the Fishlake National Forest; corridor width varies between 1 to 3 miles.
- State Highway 257 and Union Pacific Railroad, within land administered by the BLM Fillmore Field Office, is 2,000 feet wide and available to all uses.
- The designated utility corridor containing the IPP 500kV DC transmission line to southern California, within land administered by the BLM Fillmore Field Office, is 1,500 feet wide and available to all uses.
- The designated utility corridor containing the IPP 500kV DC transmission line to southern California, within land administered by the BLM Cedar City Field Office, is 1 mile wide and available to all uses.
- The corridor containing the IPP 500kV DC transmission line to southern California (Newcastle to Veyo, Utah, planning window) is located within the Pine Valley District of the Dixie National Forest. The width of this corridor is not specified in the Dixie National Forest LRMP.
- A DOE WWEC exists, containing the IPP 500kV DC transmission line to southern California, and is 3,500 feet wide. Millard County adopted this WWEC as part of its General Plan.

The following are major rights-of-way relevant to the study corridors (MV-14):

- The IPP 500kV DC transmission line begins north of the community of Delta, Utah, and continues south towards Las Vegas, Nevada.
- The Milford Wind 345kV transmission line parallels the IPP 500kV DC transmission line from Milford Wind Farm to the IPP substation, located north of Delta City.
- The Sigurd to Red Butte No. 1 – 345kV transmission line begins at the existing Sigurd Substation and heads south until exiting the study corridor near the community of Venice in Sevier County. The transmission line re-enters the study corridor west of Cedar City and parallels the IPP 500kV DC transmission line before terminating at the existing Red Butte Substation.
- A138kV transmission line begins at the existing Sigurd Substation and is adjacent to the communities of Richfield, Elsinore, Joseph, Beaver, and Newcastle before terminating at the existing Red Butte Substation.
- 46kV and 138kV transmission lines traverses from the Blundell Geothermal Plant to the Milford Substation, located south of Milford City.
- The Harry Allen to Red Butte 345kV transmission line begins at the Harry Allen Substation north of Las Vegas and parallels the IPP 500kV DC transmission line before terminating at the Red Butte Substation.
- The Red Butte to St. George 345kV and 138kV transmission lines share the same corridor and begin at the Red Butte Substation and terminate at the St. George Substation, located north of St. George City.

- Kern River Gas Transmission Company operates two parallel 36-inch mainline pipelines that traverse in a southwest direction through Pinnacle Pass in the Mineral Mountains and then parallels the IPP 500kV DC transmission line south of the Black Mountains.

- Holly Energy is constructing the UNEV Pipeline, a 400-mile, 12-inch diameter petroleum products pipeline, from Woods Cross, Utah, to a location north of Las Vegas, Nevada. The pipeline parallels the IPP 500kV DC transmission line and Kern River Pipeline.

Existing Land Use

Land Jurisdiction and Ownership

The study corridors contain portions of Sevier, Millard, Beaver, Iron, and Washington counties in Utah and include a variety of landscape types, urban and rural development, and a variety of federal, state, and local land-management agencies. There are eight incorporated cities and towns within the Project area, and seven unincorporated communities. Federal, state, and local land-management agencies include the following:

- Federal
  - United States Department of the Interior
    - Bureau of Land Management – Richfield, Fillmore, Cedar City, and St. George Field Offices
    - BIA
  - United States Department of Agriculture
    - United States Forest Service – Fishlake National Forest (Fillmore and Beaver Ranger Districts) and Dixie National Forest (Pine Valley Ranger District)
- State
  - Utah State Parks
    - Fremont Indian State Park
  - School and Institutional Trust Lands Administration
  - Division of Wildlife Resources
  - Department of Natural Resources – Division of Forestry, Fire, and State Lands
- County
  - Sevier
  - Millard
  - Beaver
  - Iron
  - Washington
- Municipal/Community
  - Sigurd
  - Richfield
  - Elsinore
  - Joseph
  - Sevier (unincorporated)
  - Beaver
  - Milford
  - Minersville
  - Newcastle (unincorporated)
  - Enterprise
  - Pinto (unincorporated)
  - Central (unincorporated)

Agriculture and Grazing

Irrigated agricultural lands and farm complexes (e.g., dairy farms, cattle feedlots, etc.) were determined and mapped from 2009 National Agricultural Imagery Program (NAIP) aerial imagery and field reconnaissance.

Agriculture is a major source of income in Sevier, Millard, Beaver, Iron, and Washington counties and is a predominant land use in the Sevier Valley, near Richfield, the Milford Flat area, between the communities of Milford and Minersville, and in the Escalante Desert near the communities of Newcastle and Enterprise. Types of agriculture found in these counties include irrigated pasture, irrigated croplands, and dry croplands, as well as open-range ranching operations, dairies, and hog and poultry farms.

Under the authority of the *Utah Agricultural and Industrial Protection Areas Act* (17 Utah State Code 41), private landowners within Iron County have placed their land in APA, predominately southwest of the Black Mountains, east of the Antelope Mountains, and west of Newcastle.

Grazing allotments cover the majority of BLM- and USFS-administered land in the areas managed by the BLM Richfield, Fillmore, and Cedar City Field Offices and the Dixie and Fishlake National Forests within the study corridors. Grazing allotments are primarily for grazing cattle and sheep. Grazing is also a major land use on private land. Table 3-55 identifies the grazing periods by jurisdiction.

TABLE 3-55
GRAZING PERIODS BY JURISDICTION

Jurisdiction	Grazing Period[1]
BLM Richfield Field Office	May 16 through June 16 March 1 through April 15
BLM Fillmore Field Office	April 1 through September 30 June 1 through October 24 October 1 through April 30 May 1 through June 15
BLM Cedar City Field Office	April 1 through May 15 October 1 through May 31 October 15 through June 15 March 1 through February 28 April 15 through October 15 May 1 through October 31 September 1 through June 30
St. George Field Office	November 1through March 7 March 23 through May 31 June 1 through October 15
Fishlake National Forest	April 26 through December 31[1]
Dixie National Forest	May 21 through October 15

NOTE: [1]Grazing periods are consolidated. For grazing period by allotment, refer to Table G-1 in Appendix G.

Residential

Residences occur throughout the study corridors. Land in the study corridors is predominately rural (0 to 2 dwelling units per acre) with greater densities (3 to 5 dwelling units per acre) in or near the communities of Richfield, Elsinore, Joseph, Beaver, Milford, Minersville, Newcastle, and Enterprise. The predominant residential types are single- and multi-family homes (most in Richfield and surrounding areas).

Commercial and Industrial

Commercial land uses occur primarily in or near town and city centers and include retail businesses, office buildings, hotels, and mixed-use developments. Some commercial areas also are located on the edge of populated areas along I-70, such as service stations, restaurants, and hotels.

Industrial land uses within the study corridors include light and general industrial areas, mining activities, landfills, salvage yards, and sewage and water treatment plants. Major general and light industrial areas exist in the following locations:

- Sevier County – along I-70
- Beaver County – near the community of Milford
- Iron County – WECCO, a producer of jet fuel, is located approximately 13 miles northwest of Cedar City

Special Management Areas

The Chloride Canyon HMA encompasses 44,285 acres in the southern part of the Project area. The HMA is centered on the Antelope Range north of Highway 56. BLM data from 2007 indicated an appropriate management level for the Chloride Canyon herd of 30 horses. Currently, there is an estimated population of 59 horses within the HMA.

Preservation Areas

Washington County has areas zoned as Open Space Transition and Open Space Conservation. Both zones encourage the preservation of open space through low-density development and agricultural activities.

Superfund and Hazardous Waste Sites

<u>EPA National Priorities List</u>

- There are no superfund sites located within the study corridors.

<u>Other Existing or Potential Hazardous Waste Sites</u>

- Blundell Geothermal Plant (owned and operated by PacifiCorp) – The process of creating geothermal energy requires the use of large amounts of water heated within the earth, often along fault lines. This type of production creates hazardous waste water that could contain arsenic, hydrogen sulfide, or other harmful materials (EPA 2009).

- American Pacific Corporation Utah Operations, WECCO – A chemical manufacturer on WECCO Road, north of Iron Springs, that supplies products to aerospace, national defense, and commercial programs. The site has been used to process the following chemicals: lead compounds, nitric acid, sodium azide, ammonia, and 2,2-Dichloro-1,1,1-Trifuoroethane (EPA 2009).

Future Land Use

Future land uses within the study corridors were based on generalized zoning. Future land uses are predominately grazing and other agricultural activities, with most urbanized uses (e.g., commercial, residential, etc.) occurring in or near Richfield. In addition, there are numerous proposed developments within the study corridors. The proposed developments are listed in Table 3-56 and include both approved and proposed plans.

TABLE 3-56
PROPOSED DEVELOPMENTS IN PROJECT COUNTIES

Jurisdiction	Type of Development	Project Description/Location	Status
BLM Cedar City Field Office	Energy	▪ Solar Energy Development PEIS. Identified solar study areas in the Cedar City Field Office.	▪ Draft EIS phase
Sevier County	Energy	▪ Proposed Sevier Power Company 540 MW gas-fired power plant east of the existing Sigurd Substation.	▪ Construction to begin 2011
	Mining	▪ Green Solutions Pozzolan Mine located east of Fremont Indian State Park	▪ Application submitted to USFS 2010
Millard County	Energy	▪ Phases II and III of First Wind's Milford Wind Corridor are planned to extend into southern Millard County (Millard County Chronicle Progress 2009). ▪ Proposed TransWest Express 600kV transmission line would cross the county in a north-south direction. An alternative route under consideration would parallel the IPP 500kV DC transmission line.	▪ Phase II under construction; Phase III application submittal Fall 2010 ▪ EIS scheduled for completion 2013; in-service date 2015
Beaver County	Energy	▪ Proposed enXco Development Corporation Mineral Mountain Development Wind Project. ▪ Proposed Mormon Mesa Power Partners, LLC wind development located between I-15 and the Mineral Mountains, west of the Milford Wind Farm, east of Minersville, and on the Black Mountains southwest of Minersville. ▪ Planned PacifiCorp 138kV transmission line between the Cameron Substation, east of Beaver City, to the Milford Substation, south of Milford. ▪ Proposed Intermountain Renewable Power 138kV transmission line from Orin G. Hatch Geothermal Plant to Milford Substation, to a proposed substation near the Milford Wind 345kV transmission line.	▪ Application submitted to BLM July 2009 ▪ Application submitted to BLM March 2009 ▪ In-service date 2012 ▪ Construction to begin summer 2011
	Energy	▪ Proposed TransWest Express 600kV transmission line would cross the county in a north-south direction. An alternative route considered would parallel the existing IPP 500kV DC transmission line.	▪ EIS scheduled for completion 2013; in-service date 2015

TABLE 3-56
PROPOSED DEVELOPMENTS IN PROJECT COUNTIES

Jurisdiction	Type of Development	Project Description/Location	Status
Iron County	Industrial	▪ Planned Palladon Ventures aboveground water and slurry pipelines connecting the Iron Mountain open-pit mine with the Granite Mountain mine to the north.	▪ Construction to begin 2011
	Energy	▪ Proposed Mormon Mesa Power Partners, LLC wind farm on the Black Mountains southwest of Minersville. ▪ Proposed TransWest Express 600kV transmission line would cross the county in a north-south direction; alternative routes being considered would parallel the existing IPP 500kV DC transmission line and Union Pacific railroad.	▪ Application submitted to BLM March 2009 ▪ EIS scheduled for completion 2013; in-service date 2015
Washington County	Energy	▪ Proposed TransWest Express 600kV transmission line would cross the county in a north-south direction. An alternative route being considered would parallel the IPP 500kV DC transmission line.	▪ EIS scheduled for completion 2013; in-service date 2015

Parks and Recreation

There are many opportunities for recreation throughout the study corridors, including hunting, fishing, hiking, rock hounding, touring, camping, picnicking, mountain biking, equestrian use, off-road vehicle use, and sightseeing (BLM 1999; 1986a). In addition to unimproved and dispersed opportunities for recreation, the St. George Field Office manages the Baker Reservoir Recreation Area, located approximately 2.5 miles south of Central, Utah. The Fishlake National Forest manages the Castle Rock Campground, located approximately 2.5 miles south of Fremont Indian State Park. The Utah Department of Parks and Recreation manages Fremont Indian State Park and associated hiking trails, picnic areas, and group areas within the park.

Additional recreation opportunities to those described previously include the following:

- Paiute ATV Trails network
- OHV trails identified by the Utah Department of Parks and Recreation on the Mineral and Black Mountains
- Hardscrabble and Shinbone trails located on the Dixie National Forest
- Shooting range located approximately 3 miles north of Richfield, west of I-70

Recreation opportunities on the Fishlake and Dixie National Forests were identified based on the ROS. The purpose of the ROS is to provide for a variety of recreation opportunities on federal lands. Within the study corridor, each forest is divided into the classifications of primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural, and urban. Impacts on each classification were assessed based on the suitability of new access roads.

Baseline data for recreational opportunities, such as the ROS, were not available for use in this analysis on BLM-administered lands.

Impact Assessment and Mitigation Planning

The methodology for assessing the potential impacts on land use and recreation resources associated with implementing the Project generally include (in order) (1) identifying the types of potential effects on which of the land use and recreation resources that could result from construction, operation, and maintenance of the proposed transmission line and associated facilities; (2) classifying the relative sensitivity of land use and recreation resources to potential environmental effects; (3) developing criteria for assessing the intensity of a potential effect on a land use and recreation resource; (4) assessing the initial impacts on the land use and recreation resources; (5) identifying the appropriate selective mitigation measures (Table 2-7) for minimizing potential adverse effects; (6) determining specific areas where selective mitigation should be applied; and (7) disclosing potential residual impacts on land use and recreation resources.

Types of Potential Environmental Effects

The construction, operation, and maintenance of the Project would result in both direct and indirect adverse effects on land use and recreation resources. Direct effects associated with construction, operation, and maintenance activities could include the following:

- Loss of rangeland for livestock grazing associated with clearing pulling and tensioning sites, staging areas, access roads, tower sites, and a batch plant (short- and long-term)
- Trail and scenic backway closures during construction (short-term)
- Increased access into areas not suitable for vehicular travel due to new access roads constructed for the Project (long-term)
- Ground disturbance and diminishment of wilderness characteristics in Areas of Potential Wilderness (long-term)
- Conflicts with future energy facilities, including the design, construction, and operation of these facilities (long-term)
- Limit future development of agricultural, industrial, and residential areas (long-term)
- Diminishment of open space in areas zoned for open space preservation (long-term)

Indirect effects would include degradation of popular recreation destination points on BLM-administered land as the result of increased access. If destination points are made more accessible by new access roads constructed for the Project, these areas could be degraded to the point that the enjoyment of future generations could be diminished.

Criteria for Assessing Intensity of Impacts

Criteria were developed to assess the intensity of a potential effect on a land use and recreation resources associated with implementation of the Project (Table 3-57). Assessment of impacts on each category of existing and future land use and recreation resources was based on the relationship between the sensitivity of each use to estimated disturbance to be associated with Project construction, operation, and maintenance.

TABLE 3-57
CRITERIA FOR ASSESSING INTENSITY OF IMPACTS

Intensity of Impacts	Description
High	▪ Areas of very high or high sensitivity where the Project would create a direct long-term conflict with existing land uses ▪ Areas where the Project would conflict physically with existing residential, commercial, industrial, military, or agricultural uses (i.e., displacement of homes, businesses, center-pivot irrigation agriculture fields) ▪ Areas where the Project would conflict physically with any designated recreation or preservation use area ▪ Areas where the Project would conflict with any applicable adopted policy or goal of the affected land-management agency ▪ Residential areas where the Project would conflict physically with planned subdivisions at the final plat approval stage ▪ Areas where the Project may require extensive efforts beyond standard construction practices to ensure public or worker safety
Moderate	▪ Areas of moderate sensitivity where the Project would create an indirect conflict with residential, commercial, or military uses ▪ Areas where the Project would create short-term impacts on agricultural operations ▪ Areas where the transmission lines would require expansion of the existing right-of-way in a designated recreation area or residential areas (existing and proposed conceptual plans)
Low	▪ Areas of low sensitivity where land use is compatible with a transmission line ▪ Areas where the Project is in a designated (federal or local) utility corridor

IRAs were identified by the Fishlake and Dixie National Forests to protect pristine, sensitive, and roadless areas from fragmentation by roads and timber harvesting. One criterion for identifying IRAs was opportunities for primitive, semi-primitive nonmotorized, and semi-primitive motorized classes of dispersed recreation. Accordingly, potential impacts on IRAs related to land use and recreation were analyzed based on this criterion. Impacts on IRAs related to timber management were assessed on the basis of estimated board feet of timber removed. Additional impacts on IRAs related to earth, biological, visual, and cultural resources are addressed in those resource sections.

Areas of Potential Wilderness were identified using inventory procedures found in the FSH 1909.12, Chapter 71 and are called potential wilderness areas. The inventory was conducted by the Forest Service with the purpose of identifying potential wilderness areas in the National Forest System. The *National Forest System Land and Resource Management Planning Rule of 1982* (36 CFR §219.17) directs that roadless areas be evaluated and considered for wilderness recommendation during the forest planning process.

It is important to note Areas of Potential Wilderness are not a land designation decision, nor do they imply or impart any particular level of management direction or protection. The analysis is not an evaluation of potential wilderness or a preliminary administrative recommendation for wilderness designation. The inventory of Areas of Potential Wilderness does not change the administrative boundary of IRAs or congressionally designated wilderness. It is the intent of the USFS to manage these areas for multiple resource benefits while maintaining their undeveloped character to the extent possible.

An area recommended as suitable for wilderness must meet the tests of capability, availability, and need. The capability of a potential wilderness is the degree to which that area contains the basic natural characteristics that make it suitable for wilderness recommendation without regard to its availability or need as wilderness. These characteristics are described as:

- **Natural**: Substantially free from the effects of modern civilization and generally appear affected primarily by forces of nature.
- **Undeveloped**: Area is without permanent improvements or human habitation.
- **Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation**: Area provides isolation from sights, sounds, and presence of others. Area also provides opportunities such as physical and mental challenge, adventure and self-reliance, feelings of self-awareness and inspiration.
- **Special Features and Values**: Provides values such as those with ecologic, geologic, scientific, educational, scenic, historical, or cultural significance.
- **Wilderness Manageability**: Consideration of the ability to manage an area as wilderness as required by the Wilderness Act, Section 2, which defines Wilderness as an area that —.. has at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unimpaired condition…" Factors such as size, shape, and juxtaposition to external influences were considered.

Impacts on the management of dispersed recreation opportunities on the Fishlake and Dixie National Forests were assessed on the basis of the suitability of transmission line access roads within each ROS classification, with the assumption that these roads would provide full access (i.e., driving a vehicle or ATV without difficulty or challenge). Generally, new transmission line access roads into remote areas would reduce the opportunity for solitude, but enhance the opportunity for socializing and motorized travel. Table 3-58 identifies the suitable access and sensitivity of each ROS classification.

TABLE 3-58
RECREATION OPPORTUNITY SPECTRUM SUITABILITY TO NEW ACCESS ROADS

Classification	Suitable Access	Sensitivity
Primitive	Cross-country (pedestrian)	High
Semi-primitive Nonmotorized	Hiking and equestrian trials	High
Semi-primitive Motorized	ATV trails and two-track roads	Moderate
Roaded Natural	Improved dirt roads	Low
Rural	Improved paved roads	Low
Urban	Improved paved roads	Low

Aesthetic impacts on views from campgrounds, recreation areas, and OHV and pedestrian trails are described in the visual resources section (Section 3.2.8).

Effects Analysis

Assessment of Initial Impacts

Initial resource sensitivity classifications are the basis for assessing initial impacts on land use and recreation resources associated with implementation of the Project. The initial resource sensitivity classifications were assigned using the criteria presented in Table 3-50.

Mitigation Planning

Increased access into areas managed for limited access, ground disturbance and access in potential wilderness areas, and trails closures are among the primary adverse environmental effects on land use and recreation resources associated with the construction, operation, and maintenance of the proposed transmission line. In addition to the BMPs described as part of the Project description in Chapter 2 (Table 2-6), mitigation measures were developed to minimize adverse impacts on land use and recreation resources (Table 2-7), including Mitigation Measures 2, 4, 5, 7, 8, 9,13, and 15. These are described below.

To reduce ground disturbance and access in Areas of Potential Wilderness, Mitigation Measure 2 was applied where flat terrain (0 to 8 percent) and existing access were present.

To minimize vegetation removal in IRAs, Mitigation Measure 4 was applied in IRAs where vegetation, primarily pinyon-juniper, would be cleared for conductor clearance.

To reduce public access into preservation areas (private land), Areas of Potential Wilderness, IRAs, and semi-primitive motorized and semi-primitive nonmotorized areas, Mitigation Measures 5 and 15 were applied. Application of Mitigation Measures 5 and 15 would reduce public access into these areas by either reclaiming the access road (if not required for maintenance) or by placing barriers or gates at the entrances (if required for maintenance).

Spanning sensitive features (Mitigation Measure 7) was applied where the alternative routes would cross zoned residential areas, trails, and semi-primitive motorized and semi-primitive nonmotorized areas could be feasibly spanned and access roads could be routed around to reduce ground disturbance and access.

Maximizing the span between transmission towers (Mitigation Measure 9) was applied where the Project would cross trails or through agriculture areas (e.g., stockyards). Maximizing the span of the transmission line at trail crossings would improve public safety by ensuring the towers are located as far away as possible from the trail. In addition, maximizing the span length would minimize limitations on possible future expansion of stockyard operations by limiting the number of towers adjacent to existing facilities.

Residual Impacts

Table 3-59 summarizes the initial resource sensitivity classifications that provided the basis for assessing initial impacts on land use and recreation resources, the mitigation measures (from Table 2-7) applied to mitigate potentially adverse effects on those resources, and residual impacts.

TABLE 3-59
SUMMARY OF INITIAL AND RESIDUAL IMPACTS BY LAND USE AND RECREATION RESOURCE

Resource[1]	Initial Resource Sensitivity	Mitigation Measures Applied	Residual Impacts
Existing and Future Land Use			
Agriculture	High	5, 9	Moderate/Low
Airport (Conical and Horizontal Zones)	High	6	Low
Commercial	Low	–	Low
Industrial	Low	–	Low
Parks/Preservation	High	5, 15	High
Rangeland (Grazing Allotments)	Low	–	Low

TABLE 3-59
SUMMARY OF INITIAL AND RESIDUAL IMPACTS BY LAND USE AND RECREATION RESOURCE

Resource[1]	Initial Resource Sensitivity	Mitigation Measures Applied	Residual Impacts
Residential	High	7	Moderate
Transportation	Low	–	Low
Areas of Potential Wilderness	Moderate	2, 5, 15	Moderate
IRAs	High	4, 5	High
Wind Farm (Proposed)[2]	Moderate	–	Moderate
Transmission Line (Planned)	Low	–	Low
Geothermal Energy Proposed (Leases)	Low	–	Low
Oil and Gas Proposed (Leases)	Low	–	Low
Solar Study Area (PEIS)[2]	Moderate	–	Moderate
Planned Pipeline	Low	–	Low
Recreation			
Semi-primitive Nonmotorized	High	5, 7, 15	High/Moderate
Semi-primitive Motorized	Moderate	5, 7, 15	Moderate/Low
Roaded Natural	Low	–	Low
Trails	Moderate	7, 9	Low
Scenic Backway	Moderate	7, 9	Low
Wild and Scenic Rivers	Moderate	7, 9	Low
OHV Areas	Moderate	–	Moderate

NOTES:
[1] Only resources crossed by the alternative routes are listed.
[2] None of the mitigation measures were deemed appropriate to reduce the impacts on these future and unknown facilities.

3.3.5 Results

A summary of baseline resource inventory and results of the effects analysis is presented in Tables 3-45 and 3-46 and described in this section. Table 2-11 presents a comparison of results of the effects analysis for the alternative routes and Table 2-12 presents a summary of the information presented in Table 2-11.

No Action Alternative

Under this alternative, there would be no construction, operation, or maintenance activities associated with the proposed Project. Current management and use of the area would continue into the reasonably foreseeable future. Impacts on land use and recreation resources associated with the implementation of the Project would not occur.

Impacts Common to All Action Alternatives

Existing Land Use

All alternative routes would cross grazing and rangeland areas. Impacts on grazing and rangeland areas would be low. Short-term impacts on grazing would result from construction disturbance at tower sites, pulling sites, staging areas, and access roads. Fences and gates could be damaged during construction, but

would be repaired. Long-term impacts on grazing, such as loss of vegetation, would be low due to the minimal extent of disturbance on rangeland from Project construction and operation and could be minimized by soil and vegetation reclamation practices. Table 3-60 identifies the amount of disturbance (acres) anticipated by alternative and the percentage of the grazing allotments disturbed (see Appendix G – Grazing Allotment Supporting Data for detailed information by allotment).

TABLE 3-60
BLM AND USFS GRAZING ALLOTMENTS CROSSED

Alternative	Agency	Total Allotments Crossed	Total Acres of Allotment	Miles Crossed by Project	Temporary Disturbance[1, 2]	Permanent Disturbance[1, 3]	Percent of Allotment Disturbed
Northern - Sigurd Substation to South Black Mountains							
N1	BLM Total	14	482,449.4	78.0	650.4	3,140.3	0.8
	USFS Total	8	166,080.4	31.8	265.2	1,280.3	0.9
	Grand Total	**22**	**648,529.8**	**109.8**	**915.6**	**4,420.6**	**0.8**
N2	BLM Total	15	510,546.0	75.4	629.8	2,943.0	0.7
	USFS Total	8	166,080.4	31.8	265.6	1,241.2	0.9
	Grand Total	**23**	**676,626.4**	**107.2**	**895.4**	**4,184.2**	**0.8**
N3	BLM Total	16	487,381.6	78.1	652.8	2,654.7	0.7
	USFS Total	8	166,080.4	31.8	265.8	1,080.9	0.8
	Grand Total	**24**	**653,462.0**	**109.9**	**918.5**	**3,735.6**	**0.7**
N4	BLM Total	11	246,117.6	60.5	508.6	2,335.0	1.2
	USFS Total	8	166,080.4	31.8	267.3	1,227.3	0.9
	Grand Total	**19**	**412,198.0**	**92.3**	**775.9**	**3,562.3**	**1.1**
N5	BLM Total	12	222,953.2	63.5	535.1	2,128.8	1.2
	USFS Total	8	166,080.4	31.8	268.0	1,066.1	0.8
	Grand Total	**20**	**389,033.5**	**95.3**	**803.1**	**3,194.8**	**1.0**
N6	BLM Total	13	234,219.0	63.3	533.8	2,595.7	1.3
	USFS Total	8	166,080.4	31.8	268.2	1,304.0	0.9
	Grand Total	**21**	**400,299.3**	**95.1**	**801.9**	**3,899.7**	**1.2**
Southern - South Black Mountains to Red Butte Substation							
S1	BLM Total	12	72,556.8	32.2	268.6	781.2	1.4
	USFS Total	4	144,284.5	20.9	174.4	507.1	0.5
	Grand Total	**16**	**216,841.3**	**53.1**	**443.0**	**1,288.3**	**0.8**
S2	BLM Total	12	72,798.3	32.6	274.7	642.1	1.3
	USFS Total	3	105,719.6	13.0	109.6	256.1	0.3
	Grand Total	**15**	**178,517.9**	**45.6**	**384.3**	**898.2**	**0.7**
S3	BLM Total	12	72,798.3	32.6	284.9	867.1	1.6
	USFS Total	3	105,719.6	20.7	180.9	550.6	0.7
	Grand Total	**15**	**178,517.9**	**53.3**	**465.9**	**1,417.7**	**1.1**
S4	BLM Total	12	72,798.3	32.0	270.0	804.9	1.5
	USFS Total	2	63,684.2	15.1	127.4	379.8	0.8
	Grand Total	**14**	**136,482.6**	**47.1**	**397.4**	**1,184.6**	**1.2**
S5	BLM Total	14	110,684.3	35.6	295.8	872.8	1.1
	USFS Total	4	144,284.5	20.9	173.7	512.4	0.5
	Grand Total	**18**	**254,968.8**	**56.5**	**469.5**	**1,385.2**	**0.7**
S6	BLM Total	14	110,925.8	37.6	324.1	1,034.9	1.2
	USFS Total	3	105,719.6	20.7	178.4	569.8	0.7
	Grand Total	**17**	**216,645.4**	**58.3**	**502.5**	**1,604.7**	**1.0**

NOTES:
[1] 5 percent added to the total acreage for estimating purposes.
[2] Temporary Disturbance: Estimated area of disturbance associated with structure work areas, wire-splicing sites, wire-pulling sites, wire-tensioning sites, construction yards, and a concrete batch plant.
[3] Permanent Disturbance: Estimated area of disturbance associated with H-frame, lattice, and three-pole structure base areas and permanent access roads.

Future Land Use

All alternative routes would cross areas planned for grazing and rangeland. Impacts would be similar to those described for existing land use. In addition, all alternatives would cross geothermal and oil and gas leases. Tables 3-61 and 3-62 identify how many miles each alternative route would cross geothermal and oil and gas leases. Impacts on geothermal leases are anticipated to be low because transmission lines and geothermal plants are compatible facilities. Impacts on oil and gas leases would be similar to impacts on geothermal leases, except transmission lines and oil and gas facilities are not as compatible. The Project could impair development of these leases; however, the extent and intensity of these impacts could not be determined since specific projects have not been proposed in the study corridors. It would be anticipated any remaining impacts would be mitigated by engineering design of future facilities.

Recreation

BLM-administered lands offer diverse opportunities for dispersed recreation. Construction, operation, and maintenance of the Project could improve opportunities for dispersed recreation by increasing public access to BLM-administered lands via new access roads; however, increased access to popular destination points could increase their popularity, which could more rapidly degrade these areas and diminish their use and enjoyment by future generations.

Impacts Common to Northern Area Action Alternatives

Existing Land Use

Short- and long-term impacts on operations at the Richfield Airport would be low because of the location of the alternative route (Link 30) against the mountainside of the Pahvant Range. Furthermore, due to the location of the alternative route (approximately 1 mile west of the airport), the FAA may not require markings for the transmission structures or conductors; however, because the alternative route crosses the airport‘s horizontal and conical zones (Link 30, MP 1.2 to MP 7.4), it is anticipated the Proponent will file a Notice of Proposed Construction or Alteration (Form 7460-1) with the FAA. The FAA would then determine if the height of the proposed transmission structures conflict with FAA regulations. After review of the notice, the FAA would issue a Determination of No Hazard to Air Navigation if the structures do not compromise the safe operation of the airport. If the structures are determined to compromise the safe operation of the airport, a Notice of Presumed Hazard would be issued and the Proponent would need to undertake mitigation measures, such as modifying tower heights and/or marking conductors and towers in accordance with FAA standards. To further mitigate potential impacts on the safe operation of the airport, tower designs would be modified or an alternative tower type (Mitigation Measure 6) would be used to address height constraints.

Moderate impacts on Areas of Potential Wilderness would result with the implementation of all northern alternatives. Links 30, 45, 63, and 64 cross 7.8 miles of Areas of Potential Wilderness (Joseph, Joe Lott, Sargent Mountain, and Castle Rock) and would cause approximately 65.5 acres of temporary disturbance and 294.0 acres of permanent disturbance. Short- and long-term impacts associated with construction, operation, and maintenance of all northern alternative routes would diminish the natural appearance and undeveloped character of these areas; opportunities for solitude and primitive recreation would decrease; and the overall manageability of these areas as wilderness would be compromised. Impacts would be minimized along Link 30 by the presence of an existing 138kV transmission line and associated access road and would further be reduced by using the existing access and not blading new access roads (Mitigation Measure 2). Where the alternative routes would not parallel the existing 138kV transmission

line along Links 45, 63, and 64, the impacts would be reduced by reclaiming new access roads, if not needed for maintenance (Mitigation Measure 5), thereby minimizing long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances by other means would limit public access (Mitigation Measure 15).

Additional moderate impacts would occur where a stock yard is located west of the Sigurd Substation along Links 25 and 26. Short-term impacts could include displacement of livestock and removal of fences. Long-term impacts could include impeding movement of farm equipment and livestock. These potential impacts would be reduced by maximizing the span between transmission line towers (Mitigation Measure 9), which would reduce the number of towers in this area. Additional long-term impacts are discussed under Future Land Use.

Future Land Use

Low impacts would occur in an area zoned for agriculture located west of the Sigurd Substation along Links 25 and 26. The current agricultural activity is a stock yard, and the location of new transmission line towers could impair future expansion of this facility or future agricultural activities. These potential impacts would be reduced by maximizing the span between transmission line towers (Mitigation Measure 9), which would reduce the number of towers in this area.

Moderate impacts would occur in an area zoned for residential that would be crossed by Link 30 (MP 3.0 to MP 5.1). The Project could impair future development of this area. The alternative routes parallel an existing 138kV transmission line through this area, which minimize permanent ground disturbance and allow for some future development to occur.

Additional moderate impacts would occur in an area zoned for open space conservation in the Town of Elsinore along Link 30 (MP 8.2 to MP 8.6 and MP 8.8 to 9). The alternative routes may conflict with the purposes of this zone. The alternative routes parallel an existing 138kV transmission and, because of slope, it is anticipated the existing access road would be improved and spur roads would be created to access tower locations. New access roads or spur roads not needed for maintenance would be reclaimed (Mitigation Measure 5) to reduce long-term disturbance and motorized access. If the access roads or spur roads are needed for maintenance, placing gates or blocking entrances would limit public access (Mitigation Measure 15).

Parks and Recreation

All northern alternative routes would have low impacts where the routes cross Paiute ATV trails, the American Discovery Trail, and the Kimberly/Big John Scenic Backway (Links 26, 30, 64, 66, 381, 390, and 470). Short-term impacts on the accessibility to the trails and the scenic backway could result from potential trail closures and access restrictions during construction. Long-term impacts, such as permanent trail closures or modifications, would not be anticipated because the Project would span the trails and the scenic backway allowing for the continued use of these facilities (Mitigation Measure 7). In addition, public safety would be enhanced by maximizing the span between transmission line towers (Mitigation Measure 9), which would place the towers a safe distance from the trails and scenic backway.

Moderate impacts on a user-created OHV area along Link 30 west of Richfield would result from the implementation of all northern alternative routes. Short-term impacts would result from potential trail closures and access restrictions during construction. Long-term impacts, such as permanent trail closures

or modifications, would be anticipated depending on the location of transmission towers. Public safety could decrease as additional towers are placed adjacent to trails.

Impacts on roaded natural areas would be low because prescribed management of roaded natural areas allows for vehicular travel and frequent social interaction. Over the long-term, vehicular and ATV use in the roaded natural areas would likely increase as a result of a new access road.

Depending on the location and application of mitigation measures, low and moderate impacts on semi-primitive motorized areas could result from increased access provided by a new access road, which could exceed the management threshold for ease of access and social interaction. Low impacts also would occur where the alternative routes parallel the 138kV transmission line, but the terrain does not allow for overland access along Links 30 and 66. In these areas, long-term impacts would be reduced by reclaiming new access roads not needed for maintenance (Mitigation Measure 5) to reduce long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances would limit motorized access (Mitigation Measure 15). Moderate impacts would result along Links 30 and 64 where Mitigation Measures 5 and 15 are applied and the alternatives are not parallel to the existing 138kV transmission line. Motorized access could increase during construction, but the application of these mitigation measures would minimize long-term motorized access.

High impacts on semi-primitive nonmotorized areas would result from increased access provided by a new access road that would exceed the management threshold for ease of access and social interaction. The presence of the access road would result in increased motorized use (e.g., ATV and vehicular) and social interaction into areas managed for primitive use (hiking and horseback riding) and limited social interaction (i.e., solitude). High impacts would occur along Links 63 and 64 where new access roads would be constructed due to terrain. Motorized access would likely increase during construction. Long-term motorized access would be minimized by reclaiming new access roads not needed for maintenance (Mitigation Measure 5). If the access roads are needed for maintenance, placing gates or blocking entrances would limit motorized access (Mitigation Measure 15).

Although the Castle Rock Campground is not traversed by the northern alternative routes, short-term impacts would result from potential temporary road closures during construction.

Alternative N1 – Black Rock Road to IPP North of Milford Wind Farm

The baseline resource inventory and residual impacts for alternative routes considered in the northern area are presented in Table 3-61.

Affected Environment

<u>Jurisdiction</u>

Alternative N1 is 120.7 miles in length and crosses 46.8 miles of BLM-administered land (38.7 percent), 30.6 miles of USFS-administered land (25.4 percent), 4.9 miles of state land (4.1 percent), and 38.4 miles of private land (31.8 percent).

TABLE 3-61
ALTERNATIVE ROUTE COMPARISON
LAND USE AND RECREATION INVENTORY DATA AND RESIDUAL IMPACTS

Alternative Route	Total Miles	Jurisdiction (miles)					Parallel Linear Facilities (within 1500 feet) (miles)				Existing Land Use Crossed (miles)														Residences within 0.25 Mile	Recreation Uses Crossed (miles)								Future Land Use Crossed[3] (miles)												Residual Impacts (miles [percent])								
																												Recreation Opportunity Spectrum																		Existing			Future			Recreation		
		BLM	USFS	State	Tribal	Private	500kV	345kV	138kV	Pipeline	Residential	Commercial	Agriculture	Industrial	Airport Influence Zones[1]	Parks/Preservation	Public/Quasi-public	Schools	Recreation	Transportation Facilities	Rangeland and Vacant/Undeveloped[4]	Utility	Inventoried Roadless Areas[2]	Areas of Potential Wilderness[2]	Designated Utility Corridor		OHV	Trails	Primitive	Semi-primitive Nonmotorized	Semi-primitive Motorized	Roaded Natural	Rural	Urban	Residential	Commercial	Agriculture	Industrial	Communication Facilities	Parks/Preservation	Public/Quasi-public	Recreation	Schools	Transportation Facilities	Rangeland	Geothermal Leases	Oil and Gas Leases	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Alternative N1 (Environmentally Preferred)	120.7	46.8	30.6	4.9	–	38.4	41.5	5.5	37.4	1.8	–	–	0.2	0.2	6.2	–	–	–	0.9	0.5	118.8	0.1	–	7.8	55.1	116	0.9	2.0	–	1.4	9.8	19.4	–	–	2.1	0.4	0.6	–	–	0.6	–	–	–	0.3	38.7	5.2	14.5	111.9 [92.7]	8.8 [7.3]	–	48.7 [40.3]	12.7 [10.5]	–	18.9 [15.7]	11.4 [9.4]	1.4 [1.2]
Alternative N2	120.3	56.6	30.6	3.6	–	29.5	36.4	–	37.4	4.8	–	–	0.2	0.2	6.2	–	–	–	0.9	0.5	118.4	0.1	–	7.8	49.5	116	0.9	2.0	–	1.4	9.8	19.4	–	–	2.1	0.4	0.6	–	–	0.6	–	–	–	0.3	29.8	6.1	14.5	111.5 [92.7]	8.8 [7.3]	–	49.4 [41.1]	9.1 [7.6]	–	18.9 [15.7]	11.4 [9.5]	1.4 [1.2]
Alternative N3	117.2	64.5	30.6	6.3	–	15.8	–	–	38.4	39.1	–	–	0.2	0.2	6.2	–	–	–	0.9	0.3	114.0	1.6	–	7.8	26.5	116	0.9	2.0	–	1.4	9.8	19.4	–	–	2.1	0.4	0.6	–	–	0.6	–	–	–	0.3	16.1	9.2	17.4	108.4 [92.5]	8.8 [7.5]	–	36.4 [31.1]	10.2 [8.7]	–	18.9 [16.1]	11.4 [9.7]	1.4 [1.2]
Alternative N4	109.4	45.0	30.6	4.5	–	29.3	36.4	–	38.3	2.1	–	–	0.2	0.2	6.2	–	–	–	0.9	0.5	107.4	0.2	–	7.8	49.7	116	0.9	2.0	–	1.4	9.8	19.4	–	–	2.1	0.4	0.6	–	–	0.6	–	–	–	0.3	29.5	8.8	14.5	100.6 [92.0]	8.8 [8.0]	–	48.9 [44.7]	6.7 [6.1]	–	18.9 [17.3]	11.4 [10.4]	1.4 [1.3]
Alternative N5	106.3	52.9	30.6	7.2	–	15.6	–	–	39.3	36.4	–	–	0.2	0.2	6.2	–	–	–	0.9	0.3	103.0	1.7	–	7.8	26.7	117	0.9	2.0	–	1.4	9.8	19.4	–	–	2.1	0.4	0.6	–	–	0.6	–	–	–	0.3	15.8	9.5	10.0	97.5 [91.7]	8.8 [8.3]	–	35.9 [33.8]	7.8 [7.3]	–	18.9 [17.8]	11.4 [10.7]	1.4 [1.3]
Alternative N6 (Proponent's Proposed Action)	105.5	52.5	30.6	7.0	–	15.4	–	0.3	39.4	32.6	–	–	0.3	0.1	6.2	–	–	–	0.9	0.4	103.5	0.3	–	7.8	26.7	116	0.9	1.9	–	1.4	9.8	19.4	–	–	2.1	0.4	0.6	–	–	0.6	–	–	–	0.4	15.8	10.1	18.2	96.6 [91.6]	8.9 [8.4]	–	36.5 [34.6]	7.6 [7.2]	–	18.8 [17.8]	11.4 [10.8]	1.4 [1.3]

NOTES:
[1] Airport Influence Zones overlap underlying land uses and are not included in the total miles.
[2] IRAs and Unroaded and Areas of Potential Wilderness overlap underlying land uses and are not included in the total miles.
[3] Future Land Use is based on municipal and county zoning maps and does not include BLM, State, or USFS lands.
[4] Vacant/Undeveloped denotes areas delineated as being void of human development and does not refer to BLM or USFS designations. This classification is not to be confused with Areas of Potential Wilderness or is to be construed as having wilderness characteristics. Vacant/Undeveloped lands were identified throughout the study corridors, regardless of jurisdiction.

THIS PAGE INTENTIONALLY LEFT BLANK

Linear Facilities

This alternative route parallels an existing 138kV transmission line for 37.4 miles, the Kern River pipeline for 1.8 miles, the existing Milford Wind Farm 345kV transmission line for 5.5 miles, and the IPP 500kV DC transmission line for 41.5 miles.

Existing Land Use

Table 3-61 identifies the existing land uses crossed by Alternative N1 and the number of residences within 0.25 mile. Most of the residences are in or near Richfield, which represents the most populated area along the alternative route. Portions of IRAs (Joseph, Paiute Indian Reservation, and Fremont Indian State Park) are located within the 2-mile-wide study corridor; however, the transmission line would not cross these areas as part of this alternative route. The Martin Marietta Materials ballast plant and Circle 4 Farms (pig farms) also are located within the study corridor of this alternative route. The alternative route would be located approximately 1 mile from the Richfield Municipal Airport along Link 30 and approximately 1.5 miles from the Milford Municipal Airport along Link 381.

Future Land Use

Table 3-61 identifies the future land uses crossed by Alternative N1. This alternative route would cross 1.7 miles of the proposed Mormon Mesa Wind Farm along Links 380 and 381, 8.3 miles of the proposed Milford Wind Farm Phase III along Links 350 and 360, and 2.2 miles of a citizen-proposed wilderness area on BLM-administered land along Link 33 (MP 0.2 to MP 2.4) west of the Sigurd Substation.

Parks and Recreation

Alternative N1 crosses the Paiute ATV Trails, specifically numbered 1, 4, 11, 10, 15, and 76 (paralleling Trail 76 for 2.9 miles). The route crosses the American Discovery trail west of Milford, and the Kimberly/Big John Scenic Backway southwest of Fremont Indian State Park. The Castle Rock Campground, located 0.6 mile southwest of Fremont Indian State Park, is located within the study corridor but would not be crossed by the transmission line; however, the alternative route crosses the road leading to the campground. Table 3-61 identifies the ROS designations crossed on the Fishlake National Forest by Alternative N1.

Environmental Effects

Existing Land Use

Impacts on existing land use are previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives. Short- and long-term impacts on operations at the Milford municipal airport would be low. It is not anticipated construction and operation of the Project would inhibit the safe operation of the airport, since it would parallel the existing IPP 500kV transmission line and is located approximately 1.5 miles (Link 381) west of the airport; however, because the alternative route crosses the airport‘s horizontal and conical zones (Link 381, MP 0.8 to MP 5.7), it is anticipated the Proponent would file a Notice of Proposed Construction or Alteration (Form 7460-1) with the FAA. In addition, Mitigation Measure 6 would be applied for the same reasons discussed previously for the Richfield Airport.

Future Land Use

In addition to impacts previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives, moderate impacts could include impairing future development of the proposed Mormon Mesa Wind Farm (if approved) located along Links 380 and 381; however, the intensity and extent of impacts could not be determined because a specific project description is not available for the wind farm. It would be anticipated any remaining impacts could be mitigated by engineering design of the wind farm. Similar impacts would occur on the proposed Milford Wind Farm Phase III located along Links 350 and 360. Other proposed project areas were avoided to the extent possible during the identification of alternative routes for the Project, limiting the extent of the areas that could be affected.

Parks and Recreation

Impacts on recreation resources are common to all northern alternatives and were discussed previously.

Alternative N2 – Black Rock Road to IPP South of Milford Wind Farm

Affected Environment

Jurisdiction

Alternative N2 is 120.3 miles in length and crosses 56.6 miles of BLM-administered land (47.4 percent), 30.6 miles of USFS-administered land (25.9 percent), 3.6 miles of state land (3.0 percent), and 29.5 miles of private land (23.7 percent).

Linear Facilities

This alternative route parallels an existing 138kV transmission line for 37.4 miles, the Kern River pipeline for 4.8 miles, and the IPP 500kV DC transmission line for 36.4 miles.

Existing Land Use

Table 3-61 identifies the existing land uses crossed by Alternative N2 and the number of residences within 0.25 mile. Most of the residences are in or near Richfield, which represents the most populated area along the alternative route. Other existing land uses not crossed by the alternative route, but located within the study corridor would be similar to Alternative N1.

Future Land Use

Table 3-61 identifies the future land uses crossed by Alternative N2. This alternative route would cross 2.2 miles of the proposed Mormon Mesa Wind Farm along Links 386 and 381, 4.2 miles of the proposed Milford Wind Farm Phase III along Links 350 and 345, and 2.2 miles of a citizen-proposed wilderness area on BLM-administered land along Link 33 (MP 0.2 to MP 2.4), west of the Sigurd Substation. This alternative route also crosses the proposed route for the Intermountain Renewable Power Technologies 138kV transmission line on Link 386 (MP 2.4 to 2.5).

Parks and Recreation

Alternative N2 crosses the same recreation resources as Alternative N1.

Environmental Effects

Existing Land Use

Impacts on existing land use are previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives. Impacts on the Milford municipal airport would be similar to Alternative N1.

Future Land Use

In addition to impacts previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives, moderate impacts on future land uses would be similar to Alternative N1.

Parks and Recreation

Impacts on recreation resources are common to all northern alternatives and were discussed previously.

Alternative N3 – Black Rock Road Parallel to Kern River Pipeline

Affected Environment

Jurisdiction

Alternative N3 is 117.2 miles in length and crosses 64.5 miles of BLM-administered land (55.0 percent), 30.6 miles of USFS-administered land (26.1 percent), 6.3 miles of state land (5.4 percent), and 15.8 miles of private land (13.5 percent).

Linear Facilities

This alternative route parallels an existing 138kV transmission line for 38.4 miles and the Kern River pipeline for 39.1 miles.

Existing Land Use

Table 3-61 identifies the existing land uses crossed by Alternative N3 and the number of residences within 0.25 mile. Most of the residences are in or near Richfield, which represents the most populated area along the alternative route. Other existing land uses not crossed by the alternative route, but located within the study corridor would be similar to Alternative N1, except Alternative N3 would not cross through the horizontal and conical zones of the Milford municipal airport.

Future Land Use

Table 3-61 identifies the future land uses crossed by Alternative N3. In addition, this alternative route crosses 2.2 miles of a citizen-proposed wilderness area on BLM-administered land along Link 33 (MP 0.2 to MP 2.4) west of the Sigurd Substation, the proposed route for the Cameron to Milford 138kV transmission line on Link 470 (MP 7.6 to 7.7), 4.2 miles of the proposed Milford Wind Farm Phase III along Links 350 and 345, 0.7 mile of the study area for the proposed Milford Flats South solar study area along Link 480, and 2.6 miles of the proposed Mormon Mesa Wind Farm along Link 490.

Parks and Recreation

Alternative N3 crosses the same recreation resources as Alternative N1.

Environmental Effects

Existing Land Use

Impacts on existing land use are previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives.

Future Land Use

In addition to impacts previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives, moderate impacts could include impairing future development of the proposed Milford Flats South solar study area located along Link 480; however, the intensity and extent of impacts could not be determined because a specific project description is not available for the solar study area. Impacts would be limited and isolated to the eastern edge of the solar study area and would not impair development of the rest of the area. It would be anticipated that any remaining impacts could be mitigated by engineering design of the solar study area. Impacts on the proposed Mormon Mesa wind farm along Link 490 and proposed Milford Wind Farm Phase III along Links 350 and 245 would be similar to Alternative N1.

Parks and Recreation

Impacts on recreation resources are common to all northern alternatives and were discussed previously.

Alternative N4 – Mineral Mountains to IPP South of Milford Wind Farm

Affected Environment

Jurisdiction

Alternative N4 is 109.4 miles in length and crosses 45.0 miles of BLM-administered land (41.1 percent), 30.6 miles of USFS-administered land (28.0 percent), 4.5 miles of state land (4.1 percent), and 29.3 miles of private land (26.8 percent).

Linear Facilities

This alternative route parallels an existing 138kV transmission line for 38.3 miles, the Kern River pipeline for 2.1 miles, and the existing IPP 500kV DC transmission line for 36.4 miles.

Existing Land Use

Table 3-61 identifies the existing land uses crossed by Alternative N4 and the number of residences within 0.25 mile. Most of the residences are in or near Richfield, which represents the most populated area along the alternative route. Other existing land uses within the study corridor would be similar to Alternative N1.

Future Land Use

Table 3-61 identifies the future land uses crossed by Alternative N4. This alternative route crosses 2.2 miles of the proposed Mormon Mesa Wind Farm along Links 386 and 381, 2.2 miles of a citizen-proposed wilderness area on BLM-administered land along Link 33 (MP 0.2 to MP 2.4) west of the Sigurd Substation, and 1.8 miles of enXco Development Corporation‘s proposed Mineral Mountains Wind Farm along Link 75. This alternative route also crosses the proposed route for the Intermountain Renewable Power Technologies 138kV transmission line on Link 386 (MP 2.4 to 2.5).

Parks and Recreation

Alternative N4 crosses the same recreation resources as Alternative N1.

Environmental Effects

Existing Land Use

Impacts on existing land use are previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives. Impact on the Milford municipal airport would be similar to Alternative N1.

A design alternative for this route on Link 75 involves locating the new 345kV transmission line on a double circuit mono-pole structure along with the existing 46kV transmission line. When compared to the typical project design, this design alternative would result in less short-term ground disturbance and impacts on grazing activities because the 46kV transmission line would be decommissioned. The long-term impacts also would be less as one right-of-way would be maintained rather than two.

Future Land Use

In addition to impacts previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives, impacts on future land uses would be similar to Alternative N2, except additional moderate impacts could include impairing future development of the proposed Mineral Mountains Wind Farm along Link 75. It would be anticipated any remaining impacts could be mitigated by engineering design of the wind farm. The design alternative (see Existing Land Use for description) for Link 75 would not reduce long-term impacts on the proposed Mineral Mountain Wind

Farm. The design alternative would potentially impair future development of the proposed wind farm similar to the typical project design.

Parks and Recreation

Impacts on recreation resources are common to all northern alternatives and are discussed previously. The design alternative (see Existing Land Use for description) for Link 75 would not affect recreation resources on the Fishlake National Forest and would have similar impacts on dispersed recreation on BLM-administered lands as the typical project design.

Alternative N5 – Mineral Mountains Parallel to Kern River Pipeline

Affected Environment

Jurisdiction

Alternative N5 is 106.3 miles in length and crosses 52.9 miles of BLM-administered land (49.8 percent), 30.6 miles of USFS-administered land (28.8 percent), 7.2 miles of state land (6.8 percent), and 15.6 miles of private land (14.6 percent).

Linear Facilities

This alternative route parallels an existing 138kV transmission line for 39.3 miles and the Kern River pipeline for 36.4 miles.

Existing Land Use

Table 3-61 identifies the existing land uses crossed by Alternative N5 and the number of residences within 0.25 mile. Most of the residences are in or near Richfield, which represents the most populated area along the alternative route. Other existing land uses located within the study corridor would be similar to Alternative N1, except Alternative N5 would not cross through the horizontal and conical zones of the Milford municipal airport.

Future Land Use

Table 3-61 identifies the future land uses crossed by Alternative N5. In addition, this alternative route crosses 2.2 miles of a citizen-proposed wilderness area on BLM-administered land along Link 33 (MP 0.2 to MP 2.4) west of the Sigurd Substation, 1.8 miles of the enXco Development Corporation‘s proposed Mineral Mountains Wind Farm along Link 75, 0.7 mile of the proposed Milford Flats South solar study area along Link 480, and 2.6 miles of the proposed Mormon Mesa Wind Farm along Link 490. The alternative also crosses the proposed route for the Cameron to Milford 138kV transmission line on Link 470 (MP 7.6 to 7.7).

Parks and Recreation

Alternative N5 crosses the same recreation resources as Alternative N1.

Environmental Effects

Existing Land Use

Impacts on existing land use are previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives.

Future Land Use

In addition to impacts previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives, impacts on future land uses would be similar to Alternative N3, except the route could impair future development activities associated with the proposed Mineral Mountains Wind Farm along Link 75.

Parks and Recreation

Impacts on recreation resources are common to all northern alternatives and are described previously.

Alternative N6 – Mineral Mountains 1,500 Feet East of Kern River Pipeline

Affected Environment

Jurisdiction

Alternative N6 is 105.5 miles in length and crosses 52.5 miles of BLM-administered land (49.8 percent), 30.6 miles of USFS-administered land (29.0 percent), 7.0 miles of state land (6.6 percent), and 15.4 miles of private land (14.6 percent).

Linear Facilities

This alternative route would parallel an existing 138kV transmission line for 39.4 miles and an existing 345kV transmission line for 0.3 mile. This alternative route also parallels the Kern River pipeline for 32.6 miles at a distance of 1,500 feet (to the east of the pipeline).

Existing Land Use

Table 3-61 identifies the existing land uses crossed by Alternative N6 and the number of residences within 0.25 mile. Most of the residences are in or near Richfield, which represents the most populated area along the alternative route. Other existing land uses located within the study corridor would be similar to Alternative N1, except Alternative N6 would not cross through the horizontal and conical zones of the Milford municipal airport.

Future Land Use

Table 3-61 identifies the future land uses crossed by Alternative N6. In addition, this alternative route crosses 2.2 miles of a citizen-proposed wilderness area on BLM-administered land on BLM-administered

land along Link 33 (MP 0.2 to MP 2.4) west of the Sigurd Substation, 1.8 miles of the enXco Development Corporation's proposed Mineral Mountains Wind Farm along Link 75, 0.7 mile of the proposed Milford Flats South solar study area along Link 395, and 2.6 miles of the proposed Mormon Mesa Wind Farm along Link 396. The alternative also crosses the proposed route for the Cameron to Milford 138kV transmission line on Link 390 (MP 7.9 to 8.0).

Parks and Recreation

Alternative N6 crosses the same recreation resources as Alternative N1.

Environmental Effects

Existing Land Use

Impacts on existing land use are previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives.

Future Land Use

In addition to impacts previously described under Impacts Common to All Alternatives and Impacts Common to Northern Area Action Alternatives, impacts on future land uses would be similar to Alternative N3, except the route could impair future development activities associated with the proposed Mineral Mountains Wind Farm along Link 75.

Parks and Recreation

Impacts on recreation resources are common to all northern alternatives and are discussed previously.

Southern Area – South Black Mountains to Red Butte Substation

The baseline resource inventory and residual impacts for alternative routes considered in the southern area are presented in Table 3-62.

Alternative S1 – Pinto Creek

Affected Environment

Jurisdiction

Alternative S1 is 56.0 miles in length and crosses 13.0 miles of BLM-administered land (23.2 percent), 20.7 miles of USFS-administered land (37.0 percent), 0.4 mile of state land (0.7 percent), and 21.9 miles of private land (39.1 percent).

TABLE 3-62
ALTERNATIVE ROUTE COMPARISON
LAND USE AND RECREATION INVENTORY DATA AND RESIDUAL IMPACTS

Alternative Route	Total Miles	Jurisdiction (miles)					Parallel Linear Facilities (within 1500 feet) (miles)				Existing Land Use Crossed (miles)															Residences within 0.25 Mile	Recreation Uses Crossed (miles)								Future Land Use Crossed[3] (miles)													Residual Impacts (miles [percent])								
																													Recreation Opportunity Spectrum																												
		BLM	USFS	State	Tribal	Private	500kV	345kV	138kV	Pipeline	Residential	Commercial	Agriculture	Industrial	Airport Influence Zones[1]	Parks/Preservation	Public/Quasi-public	Schools	Recreation	Transportation Facilities	Grazing and Vacant/Undeveloped[4]	Utility	Inventoried Roadless Areas[2]	Areas of Potential Wilderness[2]	Designated Utility Corridor		OHV	Trails	Primitive	Semi-primitive Nonmotorized	Semi-primitive Motorized	Roaded Natural	Rural	Urban	Residential	Commercial	Agriculture	Industrial	Communication Facilities	Parks/Preservation	Public/Quasi-public	Recreation	Schools	Transportation Facilities	Rangeland	Geothermal Leases	Oil and Gas leases	Existing			Future			Recreation		
																																																	Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Alternative S1	56.0	13.0	20.7	0.4	–	21.9	18.9	10.1	4.2	0.1	–	–	–	–	–	–	–	–	–	0.4	55.6	–	–	11.7	2.9	11	–	–	–	2.6	6.7	11.2	–	–	–	–	0.3	–	–	1.6	–	–	–	–	19.9	–	7.7	44.3 [79.1]	11.7 [20.9]	–	25.4 [45.4]	1.9 [3.4]	–	11.3 [20.2]	6.7 [11.9]	2.5 [4.5]
Alternative S2 (Environmentally Preferred)	49.6	13.3	10.8	0.9	–	24.6	29.0	16.6	10.0	16.6	–	–	–	–	–	–	–	–	–	0.1	49.5	–	–	0.6	16.2	1	–	–	–	–	5.4	5.1	–	–	0.2	–	2.8	–	–	2.6	–	–	–	–	19.4	0.8	7.7	49.0 [98.8]	0.6 [0.2]	–	28.5 [57.5]	2.8 [5.6]	–	5.6 [11.3]	4.9 [9.9]	–
Alternative S3	57.6	13.8	20.3	0.9	–	22.6	24.5	16.2	1.9	8.1	–	–	–	–	–	–	–	–	–	0.2	57.3	0.1	–	9.1	11.1	2	–	0.4	–	4.2	14.8	1.3	–	–	–	–	2.8	–	–	0.2	–	–	–	–	19.4	0.8	7.7	48.5 [84.2]	9.1 [15.8]	–	28.5 [49.5]	0.2 [0.3]	–	1.3 [2.3]	14.8 [25.7]	4.2 [7.3]
Alternative S4	48.9	12.7	15.1	0.4	–	20.7	19.8	27.5	2.3	3.1	–	–	–	–	–	–	–	–	–	0.1	48.8	–	7.5	9.8	9.6	0	–	–	–	4.6	6.4	4.1	–	–	0.2	–	1.1	–	–	–	–	–	–	–	19.4	0.8	7.7	38.9 [79.6]	2.5 [5.1]	7.5 [15.3]	25.9 [53.0]	1.1 [2.2]	–	4.5 [9.2]	6.1 [12.5]	4.5 [9.2]
Alternative S5 (Proponent's Proposed Action)	59.0	25.5	20.7	2.2	–	10.6	3.7	1.6	5.2	1.1	–	–	–	–	–	–	–	–	–	0.4	58.6	–	–	11.7	2.3	11	–	–	–	2.6	6.7	11.2	–	–	–	–	0.3	2.2	–	1.6	–	–	–	–	6.4	–	10.8	47.3 [80.2]	11.7 [19.8]	–	17.8 [30.3]	1.9 [3.2]	–	11.3 [19.2]	6.7 [11.4]	2.5 [4.2]
Alternative S6	61.9	27.5	20.3	2.7	–	11.4	9.3	4.5	3.0	7.3	–	–	–	–	–	–	–	–	–	0.2	61.6	0.1	–	9.1	8.4	2	–	0.4	–	4.2	14.8	1.3	–	–	–	–	2.6	2.2	–	0.2	–	–	–	–	6.2	–	10.8	52.8 [85.3]	9.1 [14.7]	–	20.3 [32.8]	0.2 [0.3]	–	1.3 [2.1]	14.8 [23.9]	4.2 [6.8]

NOTES:
[1] Airport Influence Zones overlap underlying land uses and are not included in the total miles.
[2] IRAs and Unroaded and Areas of Potential Wilderness overlap underlying land uses and are not included in the total miles.
[3] Future Land Use is based on municipal and county zoning maps and does not include BLM, State, or USFS lands.
[4] Vacant/Undeveloped denotes areas delineated as being void of human development and does not refer to BLM or USFS designations. This classification is not to be confused with Areas of Potential Wilderness or is to be construed as having wilderness characteristics. Vacant/Undeveloped lands were identified throughout the study corridors, regardless of jurisdiction.

THIS PAGE INTENTIONALLY LEFT BLANK

Linear Facilities

This alternative route parallels an existing 138kV transmission line for 4.2 miles, the Kern River pipeline for 0.1 mile, the Sigurd to Red Butte No.1 – 345kV transmission line for 10.1 miles, and the IPP 500kV DC transmission line for 18.9 miles.

Existing Land Use

Table 3-62 identifies the existing land uses crossed by Alternative S1and the number of residences within 0.25 mile. Most of the residences are in the community of Pinto, which represents the most populated area along the alternative route. The alternative route crosses 9.3 miles of the Chloride Canyon HMA. Portions of IRAs and APAs are located within the study corridor; however, the alternative route would not cross these areas.

Future Land Use

Table 3-62 identifies the future land uses crossed by Alternative S1. Portions of the Antelope Range citizen proposed wilderness area are located within the study corridor; however, the transmission line would not cross these areas.

Parks and Recreation

Alternative S1 crosses areas on the Dixie National Forest designated under the ROS. Table 3-62 identifies which designations are crossed.

Environmental Effects

Existing Land Use

In addition to impacts previously described under Impacts Common to All Alternatives, moderate impacts on Areas of Potential Wilderness (Cove Mountain, Pine Valley Mountain, and Atchinson) would occur along 11.7 miles of Link 260. Approximately 97.1 acres of temporary disturbance and 283.8 acres of permanent disturbance would occur within the Areas of Potential Wilderness. Short- and long-term impacts associated with construction, operation, and maintenance of the alternative route would diminish the natural appearance and undeveloped character; opportunities for solitude and primitive recreation would decrease; and the overall manageability of these areas as wilderness would be compromised. However, in most instances the alternative route is either located on the edge or near an existing road. Where new access roads would be required, the impacts would be reduced by reclaiming new access roads, if not needed for maintenance (Mitigation Measure 5), thereby minimizing long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances by other means would limit public access (Mitigation Measure 15). The presence of the transmission line, however, would diminish the overall wilderness qualities of the Areas of Potential Wilderness for the reasons stated above.

Low impacts are anticipated along Links 220 and 221where the alternative crosses 9.3 miles of the Chloride Canyon HMA. Impacts are anticipated to be low because the overall management of this area

for wild horses would not be modified and the overall disturbance is minimal (0.4 percent) and is along of the edges of the HMA. Wild horses could continue to be managed within the HMA under this alternative.

Future Land Use

Additional moderate impacts would occur in areas zoned for open space conservation in Washington County along Link 260. The alternative route may conflict with the purposes of this zone. To reduce the potential impacts on this area, new access roads not needed for maintenance would be reclaimed (Mitigation Measure 5) to reduce long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances would limit public access (Mitigation Measure 15).

Parks and Recreation

Impacts on recreation resources would range from low to high. Impacts on roaded natural areas would be low because the prescribed management allows for vehicular travel and frequent social interaction. Over the long term, vehicular and ATV use would likely increase as a result of a new access road.

Depending on the location and application of mitigation measures, low and moderate impacts on semi-primitive motorized areas could result from increased access provided by a new access road, which could exceed the management threshold for ease of access and social interaction. Low impacts would occur along Link 260 (MP 25.1 to MP 25.2) where existing roads provide access into a semi-primitive motorized area near the Red Butte Substation. Long-term impacts would be reduced by reclaiming new access roads not needed for maintenance (Mitigation Measure 5) to reduce long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances would limit motorized access (Mitigation Measure 15). Moderate impacts would result along Link 260 where Mitigation Measures 5 and 15 would be applied and the alternative is not in proximity to existing roads. Motorized access could increase during construction, but the application of these mitigation measures would minimize long-term motorized access. Depending on the location and application of mitigation measures, moderate and high impacts on semi-primitive nonmotorized areas could result from increased access provided by a new access road that could exceed the management threshold for ease of access and social interaction. The presence of the access road could result in increased motorized use (e.g., ATV and vehicular) and social interaction into areas managed for primitive use (hiking and horseback riding) and limited social interaction (i.e., solitude). Moderate impacts would occur along Link 260 (MP 17.7 to MP 17.8) where towers would span the semi-primitive nonmotorized area to limit motorized access (Mitigation Measure 7). High impacts would occur along Link 260 where the alternative is not in proximity to existing roads. Long-term motorized access would be minimized by reclaiming new access roads not needed for maintenance (Mitigation Measure 5). If the access roads are needed for maintenance, placing gates or blocking entrances would limit motorized access (Mitigation Measure 15).

Alternative S2 – IPP West

Affected Environment

Jurisdiction

Alternative S2 is 49.6 miles in length and crosses 13.3 miles of BLM-administered land (26.8 percent), 10.8 miles of USFS-administered land (21.0 percent), 0.9 mile of state land (1.8 percent), and 24.6 miles of private land (50.4 percent).

Linear Facilities

This alternative route parallels a 138kV transmission line for 10.0 miles, the Kern River pipeline for 16.6 miles, the Sigurd to Red Butte No.1 – 345kV transmission line for 16.6 miles, and the IPP 500kV DC transmission line for 29.0 miles.

Existing Land Use

Table 3-62 identifies the existing land uses crossed by Alternative S2 and the number of residences within 0.25 mile. The alternative route crosses 9.3 miles of the Chloride Canyon HMA. The alternative route is parallel to the UNEV pipeline through Holt Canyon. Portions of IRAs and APAs are located within the study corridor; however, the transmission line would not cross these areas. The Mountain Meadows Massacre Site is located in the study corridor but would not be crossed by the transmission line.

Future Land Use

Table 3-62 identifies the future land uses crossed by Alternative S2. This alternative route crosses 3.2 miles of a citizen-proposed wilderness area on BLM-administered land along Link 221 and 441 (MP 2.4 to MP 5.2) near Newcastle. Portions of the Antelope Range citizen proposed wilderness area are located within the study corridor along Link 220; however, the transmission line would not cross this area.

Parks and Recreation

Alternative S2 crosses areas on the Dixie National Forest designated under the ROS. Table 3-62 identifies which designations are crossed.

Environmental Effects

Existing Land Use

In addition to impacts previously described under Impacts Common to All Alternatives, moderate impacts on Areas of Potential Wilderness (Moody Wash/Mogotsu) along Link 444 (MP 3.9 to MP 4.5) would result with the implementation of Alternative S2. Approximately 5.0 acres of temporary disturbance and 11.8 acres of permanent disturbance would occur within the area. Short- and long-term impacts associated with construction, operation, and maintenance would diminish the natural appearance and undeveloped character of this area; opportunities for solitude and primitive recreation would decrease; and the overall manageability of these areas as wilderness would be compromised. However, the wilderness

characteristics of this area have been diminished by the Kern River pipeline, SR-18, and other existing roads. Potential impacts would be reduced by reclaiming new access roads, if not needed for maintenance (Mitigation Measure 5), thereby minimizing long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances by other means would limit public access (Mitigation Measure 15).

Impacts on the Chloride Canyon HMA would be similar to S1.

Future Land Use

In addition to impacts previously described under Impacts Common to All Alternatives, impacts would also occur along Links 443 and 444 on areas zoned for open space preservation in Washington County. Mitigation Measures 5 and 15 would similarly be applied to minimize long disturbance and motorized access.

Low impacts along Links 441 and 442 would occur on areas zoned for agriculture in Washington County. The presence of transmission line towers could impair improvements to future use of the land for various agricultural activities, including irrigated agriculture and grazing. It would be anticipated that any remaining impacts could be mitigated by site design of future facilities (e.g., barns).

Moderate impacts along Link 275 (MP 1.7 to MP 1.9) would occur on areas zoned for residential in Washington County. Long-term impacts would include potentially impairing future development of this area. To reduce potential impacts, transmission towers would span this area (Mitigation Measure 7).

Parks and Recreation

Impacts on recreation resources would range from low to moderate. Impacts on roaded natural areas would be low and similar to Alternative S1.

Depending on the location and application of mitigation measures, low and moderate impacts on semi-primitive motorized areas could result from increased access provided by a new access road, which could exceed the management threshold for ease of access and social interaction. Low impacts would occur along Link 443 (MP 2.7 to 2.9) where towers would span the semi-primitive nonmotorized area to limit motorized access (Mitigation Measure 7). Moderate impacts would result on Link 444 where the alternative route is not in proximity to existing roads. Potential impacts would be reduced by reclaiming new access roads, if not needed for maintenance (Mitigation Measure 5), thereby minimizing long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances by other means would limit public access (Mitigation Measure 15).

Alternative S3 – Ox Valley

Affected Environment

Jurisdiction

Alternative S3 is 57.6 miles in length and crosses 13.8 miles of BLM-administered land (24.0 percent), 20.3 miles of USFS-administered land (35.2 percent), 0.9 mile of state land (1.6 percent), and 22.6 miles of private land (39.2 percent).

Linear Facilities

This alternative route parallels an existing 138kV transmission line for 1.9 miles, the Kern River pipeline for 8.1 miles, the Sigurd to Red Butte No.1 – 345kV transmission line for 16.2 miles, and the IPP 500kV DC transmission line for 24.5 miles.

Existing Land Use

Table 3-62 identifies the existing land uses crossed by Alternative S3 and the number of residences within 0.25 mile. The alternative route crosses 9.3 miles of the Chloride Canyon HMA. Portions of IRAs and APAs are located within the study corridor; however, the transmission line would not cross these areas.

Future Land Use

Table 3-62 identifies the future land uses crossed by Alternative S3. This alternative route crosses 3.2 miles of a citizen-proposed wilderness area on BLM-administered land along Link 221 and 441 near Newcastle. Portions of the Antelope Range citizen proposed wilderness area are located within the study corridor along Link 220; however, the transmission line would not cross this area.

Parks and Recreation

Alternative S3 crosses areas on the Dixie National Forest designated under the ROS. Table 3-62 identifies which designations are crossed. This alternative route also crosses the Hardscrabble Trail along Link 285 south of Ox Valley.

Environmental Effects

Existing Land Use

In addition to impacts previously described under Impacts Common to All Alternatives, moderate impacts are associated with Areas of Potential Wilderness (Moody Wash/Mogotsu) crossed by Link 285. Approximately 79.3 acres of temporary disturbance and 241.7 of permanent disturbance would occur within the area. Short- and long-term impacts associated with construction, operation, and maintenance would diminish the natural appearance and undeveloped character of this area; opportunities for solitude and primitive recreation would decrease; and the overall manageability of these areas as wilderness would be compromised. Potential impacts would be reduced by reclaiming new access roads, if not needed for maintenance (Mitigation Measure 5), thereby minimizing long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances by other means would limit public access (Mitigation Measure 15).

Impacts on the Chloride Canyon HMA would be similar to S1.

Future Land Use

Impacts are previously described under Impacts Common to All Alternatives.

Parks and Recreation

Low impacts would occur where the alternative crosses the Hardscrabble Trail along Link 285 (MP 6.5 to MP 6.9). Short-term impacts on the accessibility to the trail could result from potential trail closures and access restrictions during construction. Long-term impacts, such as permanent trail closures or modifications, would not be anticipated because the Project would span the trail allowing for its continued use (Mitigation Measure 7). In addition, public safety would be enhanced by maximizing the span between transmission line towers (Mitigation Measure 9), which would place the towers a safe distance from the trail. Additional low impacts on roaded natural areas would be similar to Alternative S1.

Moderate impacts on semi-primitive motorized areas could result from increased access provided by a new access road, which could exceed the management threshold for ease of access and social interaction. Potential impacts would occur along Links 280 and 285 and impacts would be reduced by reclaiming new access roads, if not needed for maintenance (Mitigation Measure 5), thereby minimizing long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances by other means would limit public access (Mitigation Measure 15).

High impacts on semi-primitive nonmotorized areas could result from increased access provided by a new access road that could exceed the management threshold for ease of access and social interaction. The presence of the access road could result in increased motorized use (e.g., ATV and vehicular) and social interaction into areas managed for primitive use (hiking and horseback riding) and limited social interaction (i.e., solitude). Potential impacts would occur along Links 280 and 285. Long-term motorized access would be minimized by reclaiming new access roads not needed for maintenance (Mitigation Measure 5). If the access roads are needed for maintenance, placing gates or blocking entrances would limit motorized access (Mitigation Measure 15).

Alternative S4 – IPP East

Affected Environment

Jurisdiction

Alternative S4 is 48.9 miles in length and crosses 12.7 miles of BLM-administered land (26.0 percent), 15.1 miles of USFS-administered land (30.9 percent), 0.4 mile of state land (0.8 percent), and 20.7 miles of private land (42.3 percent).

Linear Facilities

This alternative route parallels an existing 138kV transmission line for 2.3 miles, the Kern River pipeline for 3.1 miles, the Sigurd to Red Butte No.1 – 345kV transmission line for 27.5 miles, and the IPP 500kV DC transmission line for 19.8 miles.

Existing Land Use

Table 3-62 identifies the existing land uses crossed by Alternative S4 and the number of residences within 0.25 mile. The alternative route crosses 9.3 miles of the Chloride Canyon HMA. APAs are located within the study corridor; however, the transmission line would not cross these areas. The Mountain Meadows Massacre Site is located in the study corridor but would not be crossed by the transmission line.

Future Land Use

Table 3-62 identifies the future land uses crossed by Alternative S4. This alternative route crosses 3.2 miles of a citizen-proposed wilderness area on BLM-administered land along Links 221 and 441 (MP 2.4 to MP 5.2) near Newcastle. Portions of the Antelope Range citizen proposed wilderness area are located within the study corridor along Link 220; however, the transmission line would not cross this area.

Parks and Recreation

Alternative S4 crosses areas on the Dixie National Forest designated under the ROS. Table 3-62 identifies which designations are crossed.

Environmental Effects

Existing Land Use

In addition to impacts previously described under Impacts Common to All Alternatives, moderate impacts on Areas of Potential Wilderness would result with the implementation of Alternative S4. Links 222 and 270 cross 9.8 miles of Areas of Potential Wilderness (Cove Mountain and Atchinson). Approximately 82.3 acres of temporary disturbance and 247.0 acres of permanent disturbance would occur within the area. Short- and long-term impacts associated with construction, operation, and maintenance would diminish the natural appearance and undeveloped character of this area; opportunities for solitude and primitive recreation would decrease; and the overall manageability of these areas as wilderness would be compromised. Potential impacts would be reduced by reclaiming new access roads, if not needed for maintenance (Mitigation Measure 5), thereby minimizing long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances by other means would limit public access (Mitigation Measure 15). The alternative route is located near the edges of the Areas of Potential Wilderness and is parallel to existing linear facilities, which would minimize impacts.

High impacts would result where the alternative route crosses 7.5 miles of IRAs along Link 270. Approximately 63.0 acres of temporary disturbance and 189.0 acres of permanent disturbance would occur within the IRA. The IRAs crossed by the alternative route provide opportunities for semi-primitive nonmotorized and semi-primitive motorized recreation, and impacts on these areas are described in more detail in the recreation section below. In addition, it is anticipated trees would be removed from the right-of-way. Tree clearing would be minimized to the extent needed to ensure the safe operation of the transmission line (Mitigation Measure 4). Reclaiming new access roads, if not needed for maintenance (Mitigation Measure 5), would minimize long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances by other means would limit public access (Mitigation Measure 15).

Impacts on the Chloride Canyon HMA would be similar to S1.

Future Land Use

Alternative S4 crosses most of the same future land uses as Alternative S2, varying in the distance each land-use type would be crossed. Impacts on future land use under Alternative S4 would be similar to those anticipated under Alternative S2, except this alternative route does not cross open space conservation zones within Washington County.

Parks and Recreation

Impacts on recreation resources would range from low to high. Impacts on roaded natural areas would be low and similar to Alternative S1.

Depending on the location and application of mitigation measures, low and moderate impacts on semi-primitive motorized areas could result from increased access provided by a new access road, which could exceed the management threshold for ease of access and social interaction. Low impacts would occur along Link 270 and 275 where there are existing roads. In these areas, potential impacts would be reduced by reclaiming new access roads, if not needed for maintenance (Mitigation Measure 5), thereby minimizing long-term disturbance and motorized access. If the access roads are needed for maintenance, placing gates or blocking entrances by other means would limit public access (Mitigation Measure 15). Moderate impacts would result along Links 222 and 270 where Mitigation Measures 5 and 15 are applied, and the alternative is not in proximity to existing roads. Motorized access could increase during construction, but the application of these mitigation measures would minimize long-term motorized access.

Depending on the location and application of mitigation measures, moderate and high impacts on semi-primitive nonmotorized areas could result from increased access provided by a new access road that could exceed the management threshold for ease of access and social interaction. The presence of the access road could result in increased motorized use (e.g., ATV and vehicular) and social interaction into areas managed for primitive use (hiking and horseback riding) and limited social interaction (i.e., solitude). Moderate impacts would occur along Link 270 (MP 2.8 to MP 2.9) where towers would span the semi-primitive nonmotorized area to limit motorized access (Mitigation Measure 7). High impacts would result where the alternative is not in proximity to existing roads. Long-term motorized access would be minimized by reclaiming new access roads not needed for maintenance (Mitigation Measure 5). If the access roads are needed for maintenance, placing gates or blocking entrances would limit motorized access (Mitigation Measure 15).

Alternative S5 – Iron Springs and Pinto Creek

Affected Environment

Jurisdiction

Alternative S5 is 59.0 miles in length and crosses 25.5 miles of BLM-administered land (43.2 percent), 20.7 miles of USFS-administered land (35.1 percent), 2.2 miles of state land (3.7 percent), and 10.6 miles of private land (18.0 percent).

Linear Facilities

This alternative route parallels an existing 138kV transmission line for 5.2 miles, the Kern River pipeline for 1.1 miles, the Sigurd to Red Butte No.1 – 345kV transmission line for 1.6 miles, and the IPP 500kV DC transmission line for 3.7 miles.

Existing Land Use

Table 3-62 identifies the existing land uses crossed by Alternative S5 and the number of residences within 0.25 mile. Most of the residences are in the community of Pinto, which represents the most populated area along the alternative route. The alternative route crosses 8.3 miles of the Chloride Canyon HMA. Portions of IRAs and APAs are located within the study corridor; however, the transmission line would not cross these areas.

Future Land Use

Table 3-62 identifies the future land uses crossed by Alternative S5. Portions of the Antelope Range citizen proposed wilderness areas are located within the study corridor; however, the transmission line would not cross these areas.

Parks and Recreation

Alternative S3 crosses areas on the Dixie National Forest designated under the ROS. Table 3-62 identifies which designations are crossed.

Environmental Effects

Existing Land Use

Alternative S5 crosses most of the same existing land uses as Alternative S1, varying in the distance each land-use type would be crossed. Impacts on existing land use under Alternative S5 would be similar to those anticipated under Alternative S1.

Lows impacts are anticipated along Link 438 where the alternative crosses 8.3 miles of the Chloride Canyon HMA. Impacts are anticipated to be low because the overall management of this area for wild horses would not be infringed, and the overall disturbance is minimal (0.4 percent). The alternative route is located near an existing road, which could limit new ground disturbance within the HMA. Wild horses could continue to be managed within the HMA under this alternative.

Future Land Use

Alternative S5 crosses most of the same future land uses as Alternative S1, varying in the distance each land-use type would be crossed. Impacts on future land use under Alternative S5 would be similar to those anticipated under Alternative S1. This alternative route also would have additional low impacts associated with areas zoned for industrial activities. Impacts are anticipated to be low because most industrial uses are compatible with transmission lines; however, segmentation of this area could impair future development. It would be anticipated any remaining impacts could be mitigated by site design of future industrial facilities.

Parks and Recreation

Impacts would be similar to Alternative S1.

Alternative S6 – Iron Springs and Ox Valley

Affected Environment

Jurisdiction

Alternative S6 is 61.9 miles in length and crosses 27.5 miles of BLM-administered land (44.4 percent), 20.3 miles of USFS-administered land (32.8 percent), 2.7 miles of state land (4.4 percent), and 11.4 miles of private land (18.4 percent).

Linear Facilities

The alternative would parallel an existing 138kV transmission line for 3.0 miles, the Kern River pipeline for 7.3 miles, the Sigurd to Red Butte No.1 – 345kV transmission line for 4.5 miles, and the IPP 500kV DC transmission line for 9.3 miles.

Existing Land Use

Table 3-62 identifies the existing land uses crossed by Alternative S6 and the number of residences within 0.25 mile. The alternative route crosses 8.3 miles of the Chloride Canyon HMA. Portions of IRAs and APAs are located within the study corridor; however, the transmission line would not cross these areas.

Future Land Use

Table 3-62 identifies the future land uses crossed by Alternative S6. The alternative route also crosses 3.9 miles of a citizen-proposed wilderness area on BLM-administered land along Link 250 (MP 1.0 to MP 3.3). Portions of the Antelope Range citizen proposed wilderness area are located within the study corridor along Link 220; however, the transmission line would not cross these areas.

Parks and Recreation

The alternative route would cross the same recreation resources as Alternative S3.

Environmental Effects

Existing Land Use

In addition to impacts previously described under Impacts Common to All Alternatives, moderate impacts on Areas of Potential Wilderness would be similar to Alternative S3.

Impacts on the Chloride Canyon HMA would be similar to S5.

Future Land Use

Alternative S6 crosses most of the same future land uses as Alternative S1, varying in the distance each land-use type would be crossed. This alternative route also would have additional low impacts associated with areas zoned for industrial activities and impacts would be similar to Alternative S5.

Parks and Recreation

Impacts would be similar to Alternative S3.

3.3.6 Summary

Impacts on existing land uses would generally be low to moderate, short-term, and common to all alternatives routes considered for the transmission line. Potential impacts on future land use, specifically other proposed energy projects, would include constraints on the development (e.g., placement) of facilities (e.g., wind turbines, solar panels, transmission lines, etc.). The intensity and extent of impacts on specific future development activities could not be assessed due to the preliminary nature of these projects. The study areas for other proposed projects were avoided to the extent possible during the identification of alternative routes for the Project, limiting the extent of the areas that could be affected. It would be anticipated that any remaining impacts could be mitigated by engineering design of the future facilities.

All alternative routes would diminish potential wilderness characteristics, varying by alternative and location, to Areas of Potential Wilderness on USFS-administered lands. Impacts on recreation would result from potential conflicts with the prescribed management for certain ROS designations (e.g., high impact to semi-primitive nonmotorized) on both the Fishlake and Dixie National Forests associated with the increased access to these areas, which are common to all alternatives. Additional recreation impacts would result from OHV trail and scenic backway crossings, which would temporarily limit the use of these facilities during construction of the Project.

3.4 Special Designations

3.4.1 Scenic Byways

The Beaver Canyon Scenic Byway begins east of Beaver and follows Highway 153 into the Fishlake National Forest and passes several campgrounds and trailheads before culminating at the Eagle Point Ski Area, located approximately 15.0 miles east of Beaver City (FHWA, 2009). The Kimberly/Big John Scenic Backway connects with the Beaver Canyon Scenic Byway approximately 11.5 miles east of Beaver City and travels north before terminating at Fremont Indian State Park. The Kimberly/Big John Scenic Backway is aerially crossed by all northern alternatives in the same location as an existing 138kV transmission line. Aesthetic impacts on views from the scenic byways are described in the visual resources section (Section 3.2.8).

3.4.2 National Trails

The Old Spanish Historic Trail travels from northern New Mexico through parts of Colorado, Arizona, Utah, and Nevada to southern California, near Los Angeles. In December 2002, Congress designated the trail a National Historic Trail (NPS 2009, Old Spanish Trail Association 2009). The trail is crossed by all southern alternatives. Indirect impacts on the trail are discussed in the cultural and visual resources section (Section 3.2.5 and 3.2.8, respectively).

3.4.3 Wild and Scenic Rivers

Fish Creek is in the Beaver Ranger District of the Fishlake National Forest and flows northward for approximately 17.0 miles from its source between Mount Belknap and Mount Baldy in the Tushar Mountains until it merges with Clear Creek (USFS 2007). The upper portion of the creek is designated as wild, and the lower portion is designated as recreation (USFS 2007). The recreation section of the creek is aerially crossed by all northern alternatives in the same location as an existing 138kV transmission line. Aesthetic impacts on views from Fish Creek are described in the visual resources section (Section 3.2.8).

3.4.4 Wilderness

3.4.4.1 Wilderness Areas

The Pine Valley Mountain Wilderness Area is located in the southern area of the Project area in Washington County and is approximately 50,232 acres. It is located approximately 2.4 miles from Alternatives S1 and S5; therefore, there are no direct impacts on this area. Aesthetic impacts on views from the wilderness area are described in the visual resources section (Section 3.2.8).

3.4.4.2 Lands with Wilderness Characteristics on BLM-Administered Lands

During the scoping process, the Southern Utah Wilderness Alliance expressed concern that implementation of the Proponent‘s Proposed Action and alternatives could result in impacts on lands with wilderness characteristics (LWCs).

On December 22, 2010, the Secretary of the Interior issued Secretarial Order No. 3310 (Order), which requires the BLM to give high priority to the protection of LWCs. In addition to the Order, USDI issued three manuals (BLM Manuals 6301, 6302, and 6303) to provide further guidance to the BLM on compliance with the Order. In accordance with BLM Manual 6301 (Wilderness Characteristics Inventory) and BLM Manual 6303 (Consideration of LWCs for Project-Level Decisions in Areas Not Analyzed in Accordance with BLM Manual 6302), BLM reviewed the Proposed Action and alternatives and determined areas affected by the Project clearly lack wilderness characteristics. Information regarding the review for wilderness characteristics conducted by each BLM field office is presented in Appendix H. Based on the outcome of field office reviews, the potential for impacts on LWCs from implementation of the Project was not carried forward as an issue for analysis in the EIS.

3.5 Wildland Fire Ecology and Management

3.5.1 Introduction

Issues raised by the public and agencies during project scoping and preparation of the EIS related to potential effects on wildland fire ecology and management included the risk of potential fires caused by construction activities or presence of powerlines and limited ability to manage fire in remote areas. The presence and operation of a transmission line could affect fire risk because wildland fires can be ignited by sparks or heat from construction vehicles or equipment, or from public vehicles using new access roads. Also, a fire can result if a conducting object comes in proximity of the transmission line, resulting in a flashover to ground or if an energized phase conductor were to fall to the ground and remain in contact with combustible material long enough to heat the material to its flashpoint.

The Proponent requested information regarding wildland fire management objectives and understanding the risk of fire and the potential effect on operation of the transmission line. Fires under or near overhead transmission lines create hot ionized gases that can provide a conducting path between conductors and ground and hence initiate flashovers. A fire alongside an overhead transmission line where a light breeze blows the smoke into the conductors may be as likely to affect overhead transmission line operation as a fire directly under an overhead transmission line. Fires can also damage infrastructure such as steel support structures and overhead conductors, as well as destroy wood pole support structures.

More than 1,300 wildland fires were reported in Utah during the period from 2002 through 2009, burning an average of 208,674 acres per year (National Interagency Fire Center [NIFC] 2010). The Utah Division of Forestry, Fire, and State Lands (UFFSL) and a number of federal land-management agencies have joined in a cooperative effort to address the issues of fire management (e.g., suppression, public education and outreach, fuel management) across the state (UFFSL 2009).

Most ecosystems have evolved with, and adapted to, specific fire regimes. A range of natural fire regimes exist within the Project area, which are largely determined by vegetation type. These fire regimes have been altered by human activities, such as fire suppression and livestock grazing, resulting in changes to the historical distribution, composition, and structure of rangeland vegetation. The alteration of natural fire regimes has also facilitated the invasion of exotic annuals such as cheatgrass (*Bromus tectorum)*. An abundance of cheatgrass invading sagebrush understory can alter the fire regime, resulting in more frequent and more consumptive fires due to accumulation of fine dry fuels in the previously open, unvegetated spaces between shrubs (Zouhar 2003, BLM 2005a). Cheatgrass has a competitive advantage over native summer annual grasses, maturing earlier, dropping seed, then completely drying by early summer, just as the high fire risk season commences. Native annuals have not yet matured, so over time, the fire intervals shorten, and fires occur earlier when natives are more fire susceptible (Zouhar 2003).

Many areas have had the fire return interval modified due to fire suppression and livestock grazing. Grazing removes fine fuels and inhibits fire from traveling across the landscape. Longer fire-return intervals have had several effects on the landscape, including (1) conifers expanding into non-forested areas, (2) tree densities increasing in existing stands of juniper, (3) junipers encroaching into upland shrub areas (particularly sagebrush), (4) shrub densities increasing, and (5) herbaceous vegetation decreasing due to shading and competition from increased tree and shrub densities.

In other areas where fire-return intervals are decreasing, the fire frequency increases. The most prevalent vegetation changes are occurring in more arid regions where the introduction of exotic annuals, such as cheatgrass, has increased the fire frequency in areas where fire historically played a minimal role in the natural disturbance regime. The increased fire frequency is advantageous to exotic annuals and while inhibiting native vegetation, it facilitates further invasion of exotics.

3.5.1.1 Fire Management Objectives

Federal Wildland Fire Management Policy and *Review* and *Update of the 1995 Federal Wildland Fire Management Policy* directed that Fire Management Plans (FMPs) be developed for all areas of burnable vegetation on federal lands. The BLM has developed fire management and suppression objectives that comply with Federal Wildland Fire Management Policy and current land use plans. These objectives would be integrated into the implementation of the Project. The fire management and suppression objectives that apply to the study area include the following:

- Safely reintroducing fire into ecosystems to meet desired resource management objectives by using the best science.

- Using wildland fire control and suppression strategies and tactics that emphasize resource management objectives while minimizing total fire management costs.
- Using a fire suppression strategy that balances resource management objectives and goals for protecting values at risk while minimizing fire management costs.
- Keeping fire size as small as possible, and fire intensity as low as possible, in the salt desert shrub ecotype to minimize loss of this sensitive vegetation type.
- Stopping or reducing as much as possible the conversion of healthy ecosystems to cheatgrass.
- Maintaining or improving the health of the sagebrush steppe ecotype.
- Reducing, as much as possible, the juniper encroachment from its historic habitat into adjacent ecosystems.

The Project area includes specific management developed in the Southern Utah Support Area FMP (BLM 2005a), Richfield FMP Environmental Assessment (BLM 2005b), Multi-Agency Coordination Group (USGS 2009b), and the Statewide Annual Operating Plan (UFFSL 2009). Management direction is further organized within the FMP through the use of land area subdivisions called fire management units (FMUs). The FMUs are delineated fire management objectives and constraints, topographic features, values to be protected, political boundaries, fuel types, and fire regime condition classes.

The Southern Utah Support Area FMP Environmental Assessment (UT_040-04-054) integrates resource management goals and objectives and concerns with fire management actions to provide cost effective wildfire management, protection of life and resource, and wildland fire benefits in the ecosystem. The alternative routes fall within three FMUs – Escalante Desert and Mineral Mountain (northern alternatives) and Antelope Range/Parowan Front (southern alternatives). Goals and objectives for each of these units are as follows:

Escalante Desert

This unit is managed as a ―Fire Suppression FMU" to protect important resources. Actions likely to occur include fire and nonfire treatments for pinyon/juniper woodlands, but at a smaller scale than other FMU categories. The Escalante Desert FMU objectives include:

- Use fuels treatments to reduce fuel loads and the possibility of large, severe fires.
- Improve sagebrush with small prescribed and mechanical treatments
- Improve about 500 acres of juniper and convert to sagebrush/grassland over the next 10 years.
- Improve about 1,500 acres of sagebrush community to grassland/forb over the next 10 years.

Mineral Black Mountain

This unit is managed as a, ‗Natural Fire Emphasis FMU' where vegetation conversion and fuel reduction on larger acreages are important considerations. The Mineral Black Mountain FMU objectives include:

- Apply full suppression in native sagebrush dominated areas.
- Apply full fire suppression actions in pinyon and juniper woodland areas if 5,000 acres have burned as a result of wildfire over a five-year period.
- Use fire to maintain or expand Utah prairie dog habitat.
- Convert 54,000 acres of pinyon and juniper woodland to sagebrush/perennial grass using wildfire, prescribed fire (10,000 acres), and non-fire fuel projects (30,000 acres).
- Use wildfire, prescribed, and mechanical treatment to convert 5,000 acres of pinyon to mountain shrub or sagebrush and perennial grass.

- Treat 20,000 acres of sagebrush to improve age class diversity using small prescribed fires and non-fuels treatments (10,000 acres).

Antelope Range/Parowan Front

This unit is managed as a, ―Natural Fire Emphasis FMU" where vegetation conversion and fuel reduction on larger acreages are important considerations. The Antelope Range/Parowan Front FMU objectives include the following:

- Use fire to create a mosaic pattern in the sagebrush vegetation using small burns of 10 to 15 acres in canyon and valley bottoms.
- Use fire to create a desired future condition of 10 percent grass and forb dominated communities and 90 percent sagebrush-dominated communities.
- Use prescribed and nonfire fuels methods to convert 6,200 acres of pinyon and juniper woodland and 4,600 acres of juniper to sagebrush/perennial grass over 10 years.
- Treat 5,400 acres of sagebrush to improve age class diversity and create a mosaic of differing age classes.
- Fully suppress riparian wildfires, especially in the Spring Creek Wilderness Study Area, to prevent damage to Mexican spotted owl habitat.

The alternative routes fall within four FMUs – Twin Peaks/Fillmore, Cricket Mountains, Pahvant, and Tushar Mountains in the Richfield FMP Environmental Assessment. The goals and objectives of the Richfield FMP include:

- Provide for firefighter and public safety.
- Work collaboratively with communities at risk within the wildland urban interface to develop plans for risk reduction.
- Allow fire to function in its ecological role, when appropriate for the site and situation, to help protect, maintain, and enhance public resources.
- Create an integrated approach to fire and resource management across landscape and agency boundaries.
- Provide a program that fosters interagency interaction, cooperation, and effectiveness for all fire management activities.

Twin Peaks/Fillmore

This unit is managed as a ―Fire is desired FMU" to protect important resources. The Twin Peaks/Fillmore FMU does not have FMU specific objectives.

Cricket Mountain

This unit is managed as a ‗Fire is desired FMU' to protect important resources. The Cricket Mountain FMU does not have FMU specific objectives.

Pahvant

This unit is managed as a ―Fire is desired with constraints FMU" to protect important resources. The Pahvant FMU specific objectives include:

- Encourage implementation of defensible space around all high value resources.
- Protect recreational areas.
- Protect communication sites and high voltage powerlines.
- Suppress fires that threaten municipal watersheds.

Tushar Mountains

This unit is managed as a ―Fire is desired with few constraints FMU" to protect important resources. The Cricket Mountain FMU specific objectives include:

- Protect the Kimberley Historic Mining Area.
- Protect the Bullion Canyon interpretive site.
- Protect Fremont Indian State Park, Big Rock Candy Mountain Resort, Big Flat guard station, public campgrounds and private canyons.
- Protect the Deer Trail Mine.
- Protect the Sulphurdale geothermal wells.
- Protect the numerous telecommunication sites.

3.5.2 Environmental Setting

3.5.2.1 Wildland Fire History

The alternative routes considered for the Project occur within six BLM FMUs and range in management objectives from an emphasis on suppression to the use of naturally ignited wildland fire to manage ecosystems (BLM 2005a and b).

The entire Project area is frequented by numerous, small, lightning driven fires. The majority of these fires self-extinguish or are contained at less than 10 acres. However, within the Mineral Black Mountain FMU and Escalante Desert FMU (of which the majority of the corridors are located), several large wind-driven fires have burned a significant number of acres, including the Milford Flat, Cunningham, Honeyboy, and Milford Bench fires. Recent fires within the Project area (Table 3-63) include the largest wildland fire in Utah's history, the 2007 Milford Flat Fire, which burned more than 363,000 acres (NIFC 2010). Portions of alternatives considered for the northern segment of the Project, to varying extents, pass through the Milford Flat burned area. Since 2004, other smaller fires have occurred in the vicinity of the Project area. Of these smaller fires, only the 2005 Neck Fire and 2006 Baboon Fire occurred in alternative routes currently under consideration.

TABLE 3-63
RECENT FIRES WITHIN THE PROJECT AREA

Year	Fire Name	Acres Burned	Alternatives	Links
2010	Twitchell Canyon	44,874	N1, N2, N3, N4, N5, N6	63, 64, 66
2007	Milford Flat	363,052	N1, N2, N3, N4, N5, N6	75, 80, 305, 320, 330, 345, 348, 349, 350, 360, 385, 390, 450, 455, 460, 465, 470

TABLE 3-63 RECENT FIRES WITHIN THE PROJECT AREA				
Year	**Fire Name**	**Acres Burned**	**Alternatives**	**Links**
2006	Baboon	1,318	N3, N5, N6	396, 490
2005	Mound[1]	263	N3, N5	490
2006	Pipeline[1]	190	N3, N5	490
2005	Neck	4,931	N3, N5	490
2007	Antelope Spring[1]	141	S1, S2, S3, S4	220
2004	Cal Hollow[1]	39	S2, S4	275
SOURCES: NIFC 2010, GeoMAC 2009. NOTE: [1]Fires near, but outside the study corridors				

3.5.3 Impacts Common to All Alternatives

Based on fire history data and fire regime condition classes, the potential for small, lightning caused fires within or near any of the alternative routes is high, especially in areas where fires have not already occurred. However, where fires have recently occurred (primarily on the northern end, within the Mineral, Black Mountain, and Escalante Desert Units), emergency stabilization efforts and seeding of fire-tolerant vegetation has significantly reduced the likelihood of fast-moving crown fires. BLM has also taken a pro-active approach to fuels management, and many areas within the Project area and these FMUs have also been altered through the use of mechanical treatments or by the use of prescribed fire, further reducing the likelihood of high intensity fire.

Should a fire occur within these areas, BLM would manage fire with the following overall goals, regardless of the presence/absence of the Project:

- Provide for firefighter and public safety.
- Work collaboratively with communities at risk within the wildland urban interface to develop plans for risk reduction.
- Allow fire to function in its ecological role when appropriate for the site and situation to help protect, maintain and enhance resources.
- Create an integrated approach to fire and resource management across the landscape and agency boundaries.
- Provide a program that fosters interagency interaction, cooperation, and effectiveness for all fire management activities.
- Use fire management actions that take into consideration ecosystem or resource benefits and values to be protected.
- Reseeding of fire tolerant vegetation and transmission corridor maintenance, incorporated as part of any of the proposed transmission line routes, could provide a potential fuel break and/or an opportunity to anchor a fuel break, to help slow or stop the spread of fire. BLM rehabilitates wildfire areas with a diverse seed mix through Emergency Stabilization and Reclamation efforts.

It would not be anticipated that implementation of the Project would have significant impacts on wildland fire ecology and management within the Project area. However, potential fire risk is posed by

construction activities (e.g., welding, vehicle ignition) and the presence of energized transmission lines (e.g., arc ignition). The alternatives do not conflict with the Southern Utah Support Area FMP and Richfield FMP. It would be unlikely the Project facilities would cause fires, except in the rare case of arcing from the power line to the ground or nearby vegetation. In the event of a lightning strike, ground wires on the structures ground the current. However, there would be potential short-term impacts during construction when there is an increased risk of ignitions due to construction activities. Fire-safety mitigation measures and protocols will be addressed in detail in the fire protection section of the POD. Potential indirect effects include increased fire frequency due to increased traffic on access roads. Studies have shown road density may be related to the frequency of human-caused ignitions. Mitigation would be implemented in areas of concern to limit the construction of new access roads or limit access to new roads.

Wildland fires have the potential to affect the operation of the Project facilities and, consequently, the reliability of the transmission system in the region. The alternative routes in the northern segment from Sigurd to Lund Road (Alternatives N1 to N6), in particular, would be susceptible to outages due to the incidence of wildfires in the area. Wildfires generate heat and smoke and have been documented to cause line outages in Utah and other parts of the western United States. The Tushar and Mineral mountains are highly susceptible to lightning strikes, and cheatgrass in the area allows fires to grow and spread rapidly (UFFSL 2009). Wildfires can damage transmission line structures and smoke can cause transmission lines to arc, rendering them out-of-service.

3.6 Social and Economic Conditions

Issues raised by the public and agencies during Project scoping and preparation of the EIS related to potentially significant effects on social and economic conditions included potential impacts personal property values and private businesses, including local tourism.

Alternative routes for the Project are located in five counties in central and southwestern Utah, including Beaver, Iron, Millard, Sevier, and Washington counties. These counties comprise the study area for the socioeconomic analysis and are included in the inventory and impact analysis, unless noted otherwise. The study area is approximately 17,070 square miles. The inventory of social and economic resources includes conditions and trends in each of the study area counties. Data and information has been collected from a variety of sources including the U.S. Census Bureau, the U.S. Bureau of Labor Statistics, and the U.S. Bureau of Economic Analysis (BEA), in addition to state and county resources.

NEPA or CEQ regulations do not provide specific thresholds of significance for socioeconomic impact assessment. This is due to the observation that significance is contextual in nature and varies with the setting of the Proposed Action (40 CFR 1508.27[a]). As such, a set of criteria were developed specifically for this analysis and are summarized as follows. If any of the below occurred, the alternatives were evaluated.

- Displace or require relocation of a substantial number of existing residents
- Generate demand for temporary housing of construction workers that exceeds the supply of local housing or hotel/motel facilities
- Require public service expenditures substantially greater than available approved revenue
- Disproportionally affect minority and/or low-income populations

3.6.1 Regional Setting

3.6.1.1 Geographic Characteristics

As demonstrated in Table 3-64, the number of square miles in study area counties varies considerably. The smallest in terms of land area is Sevier County, which is approximately 1,918 square miles in size. Millard County is the largest of the study area, totaling approximately 6,828 square miles. Study area counties represent approximately 20.8 percent of the total land area in Utah.

TABLE 3-64
GEOGRAPHIC CHARACTERISTICS OF STUDY AREA COUNTIES

Geographic Area	Land Area (millions of acres)	Land Area (square miles)	Population (2008 estimate)	Persons/Square Mile (2008 estimate)
County				
Beaver	1.7	2,592.3	6,162	2.4
Iron	2.1	3,301.9	44,540	13.5
Millard	4.4	6,827.9	12,082	1.8
Sevier	1.2	1,918.3	20,014	10.4
Washington	1.6	2,429.6	137,589	56.6
State				
Utah	52.5	82,102.0	2,736,424	33.3
Nation				
	2,262.7	3,535,451.0	304,059,728	86.0

SOURCES: U.S. Census Bureau, Population Estimates 2010; Environmental Systems Research Institute (ESRI) 2009

The number of persons per square mile is derived from the 2008 American Community Survey population estimates provided by the U.S. Census Bureau. While it is known that some areas (i.e., towns, villages, cities) have a higher density per square mile than more rural areas, the following provides an overview of the numbers of persons per square mile, assuming spatial distribution across each county is equal. Two of the five study area counties (Beaver and Millard) have less than three persons per square mile. Washington County is the most populated of the study area and has the greatest number of persons per square mile. At 56.6 persons per square mile, the population density in Washington County is greater than that of Utah overall.

Land ownership patterns for each of the study area counties are summarized in Table 3-65. Overall, the majority of land in each county is federally owned. At 35.9 percent, Iron County has, at minimum, 15.0 percent more of its land privately or locally owned than other study area counties. Washington County, as compared to other study area counties, has the greatest percentage of land classified as an Indian Reservation. This can be attributed to the Reservation of the Paiute Indian Tribe of Utah located south of Red Butte. For all counties, state-owned land ranges from 4.9 percent to 9.9 percent.

TABLE 3-65
PERCENT OF LAND OWNERSHIP OF STUDY AREA COUNTIES

County	Federal	Private/Local Government	State	American Indian Reservation
Beaver	78.0	12.4	9.6	0.0
Iron	57.3	35.9	6.7	0.1
Millard	76.5	13.6	9.9	0.0
Sevier	76.0	19.1	4.9	0.1
Washington	74.5	17.0	6.7	1.8

SOURCES: Utah Governor's Office of Planning and Budget 2001; Fischer 2010

3.6.1.2 Population Centers

Population centers for each of the study area counties are shown in Table 3-66. At the time of the 2000 Census, Cedar City in Iron County and St. George in Washington County had the greatest population of study area population centers. Population estimates for 2008, as provided by the American Community Survey (a product of the U.S. Census Bureau), indicate these two urban areas are growing at a rate notably faster than other study area counties‘ most populated areas. Population growth in these areas is likely due to retiree migration, increased economic opportunities as a result of increased tourism, and relocation to the area by those seeking amenities provided by Utah‘s southern National Parks and scenic vistas.

The most populated areas in other study area counties either experienced modest growth or declines between 2000 and 2008.

TABLE 3-66
POPULATION CENTERS IN STUDY AREA COUNTIES

County	Most Populated City	2000 Census	2008 Estimate	Percent Change (2000 to July 2008)
Beaver	Beaver	2,454	2,597	5.8
Iron	Cedar City	20,527	28,667	39.7
Millard	Delta	3,209	3,172	-1.2
Sevier	Richfield	6,847	7,217	5.4
Washington	St. George	49,663	72,718	46.4

SOURCE: U.S. Census Bureau, Population Estimates 2010

3.6.1.3 County Summaries

A summary profile for each county is provided below. Each profile includes a brief history of the county, as well as major industries and economic conditions. Information included in this discussion has been collected from a variety of sources, including the U.S. Department of Commerce, the National Association of Counties (NACo), and the Written County Profiles of the Utah Governor‘s Office of Planning and Budget‘s Demographic and Economic Analysis.

Beaver County

Beaver County was created in 1856. In the late 1800s, the mining of lead, silver, gold, copper, and other minerals resulted in an economic boom. Recently, the eastern part of Beaver County has benefited from increased tourism activities associated with Utah‘s National Parks. In 2008, the largest reported employing industries in the county were government services, farming, and retail trade (U.S. Department of Commerce, BEA 2010a). In 2001, major employers included Circle 4 Farms (pig farms), Beaver County School District, Beaver Valley Hospital, Milford Valley Healthcare Services, Union Pacific Railroad, Beaver County, Eagle Point Resort, the federal government, and many tourism-related overnight accommodations and eating establishments (Utah Governor‘s Office of Planning and Budget 2001). In 2008, the largest reported employment sectors in the County were government services, farming, and retail trade (U.S. Department of Commerce, BEA 2010a).

Iron County

Iron County was created in 1850 by the territorial legislature and named in recognition of the area‘s iron deposits, which brought mining and smelting activity to the County in the nineteenth century. Settlers later turned to farming and ranching (Utah Governor‘s Office of Planning and Budget 2001). In 2001, educational institutions, Southern Utah University and Iron County School District, were the largest employers in the county. Convergys (a business marketing firm), the State of Utah, the federal government, and Valley View Medical Center also were major employers. In 2001, there were a number of manufacturing firms in the County, including Metalcraft Technology, O‘Sullivan Industries, and Smead Manufacturing (Utah Governor‘s Office of Planning and Budget 2001). In 2008, the largest reported employment sectors in the county were government services, retail trade, and construction (U.S. Department of Commerce, BEA 2010a).

Millard County

Millard County was first settled in 1851. The establishment of the Union Pacific Railroad through the western part of the county in the early part of the twentieth century led to large-scale production of alfalfa seeds. The development in the 1970s of the IPP, a coal-burning power plant, marked another major economic transition. In 2001, Millard County was ranked sixth in number of farms among Utah counties. In 2001, major employers in Millard County included Intermountain Power Services (electric/gas/sanitary services), Millard County School District, Millard County, Pictsweet Mushroom Farms, Delta Community Medical Center, Brush Wellman Inc., State of Utah, the federal government, Sunrise Engineering, and Fillmore Hospital (Utah Governor‘s Office of Planning and Budget 2001). In 2008, the largest reported employment sectors in the County were government services, farming, and retail trade sectors (U.S. Department of Commerce, BEA 2010a).

Sevier County

Sevier County was established in 1865. Agriculture and more recently gypsum production play an important role in the strength of the county‘s economy. In 2001, Sevier County was the state‘s leading producer of gypsum. The town of Richfield, with a population projected to increase to 10,597 by 2030, is a major regional commercial center. Also in 2001, the largest employer in the county was the Sevier School District (Utah Governor‘s Office of Planning and Budget 2001). Other major employers include Canyon Fuels Company, Moroni Feed (poultry slaughtering and processing), Utah State government, IHC Sevier Valley Hospital, the federal government, Barney Trucking Inc., Six County Association of Government, K-Mart stores, Robinson Transport, Richfield Care Center (skilled nursing care facilities), and Sevier County (Utah Governor‘s Office of Planning and Budget 2001). In 2008, the largest reported employment sectors were government services, retail trade, and transportation and warehousing (U.S. Department of Commerce, BEA 2010a).

Washington County

Washington County was established in 1852 and has been known as Utah‘s Dixie since the 1860s when the area produced large amounts of cotton (Utah Governor‘s Office of Planning and Budget 2001). The establishment of Zion National Park in 1909 and the completion of I-15 have helped Washington County become both a tourist destination and a retirement community. In 1999, Dixie College, formerly a two-year institution with about 2,500 students, was granted four-year status and now plays an important part in Washington County‘s economy. In 2001, Washington School District was the largest employer in the

County, followed by Dixie Regional Medical Center and Wal-Mart. Dixie College, St. George City, the federal government, and Washington County were the largest government employers in the county. In 2001, other major employers included Andrus Trucking, SkyWest Airlines, Lin‘s Thriftway, Sunroc Corporation, McDonald‘s, Albertsons, and Harmons (Utah Governor‘s Office of Planning and Budget 2001). In 2008, the largest reported employment sectors in the county were in the construction, retail trade, and health care industries (U.S. Department of Commerce, BEA 2010a).

Paiute Indian Reservation

Congress created the Reservation for the Paiute Indian Tribe of Utah in April 1980. The Paiute Indian Tribe of Utah consists of five constituent bands: Cedar, Indian Peaks, Kanosh, Koosharem, and Shivwits bands. Each band has an independent identity as a community, which dates back hundreds of years. In 2006, the total number of tribal members among the five bands was 840 (Paiute Indian Tribe of Utah 2009). The Southern Paiutes probably entered Utah about 1100 A.D. The Paiute were mainly foragers, hunting rabbits, deer, and mountain sheep and gathering seeds, roots, tubers, berries, and nuts. They also had some irrigated fields along the banks of the Virgin, Santa Clara, and Muddy Rivers (Paiute Indian Tribe of Utah 2009).

The Reservation is checker-boarded across ten separate land areas located in four southwestern Utah counties. The tribal headquarters of the Southern Paiute is located in Cedar City in Iron County. The Shivwitz Band of the Paiutes is situated on 28,229 acres of Reservation land in Washington County, Utah, approximately 14 miles northwest of Saint George.

3.6.1.4 Transportation

There are two interstate highways located in the study area: I-15 and I-70. Generally traveling in a north-south direction, I-15 enters the study area in the southeastern part of Millard County. I-15 continues south through eastern Beaver County into Iron County west of Dixie National Forest and exits the study area in south central Washington County.

The east-west interstate system running from Baltimore, Maryland to Utah, I-70, enters the Project area near Sigurd in Sevier County. This area is located within proximity to the northernmost point of the Project area. In the southeastern corner of Millard County, I-70 connects with I-15. Other roads traversing the Project area include SR 130, SR 20, SR 153, and SR 89. In 2008, average annual daily traffic (AADT) on SR 130 in the vicinity of Cedar City was between 21,870 and 29,245 vehicles. During the same period, SR 20 had an AADT of 1,635 vehicles (Utah State Department of Transportation, 2008). Other minor arteries connect more rural parts of the study area to the interstate system.

Railroad tracks run through portions of Iron, Beaver, and Millard counties, connecting study area industries to other parts of the region and nation. There are railroad tracks in and around Cedar City in Iron County and the Milford Wind Farm, which straddles the Beaver and Millard county border.

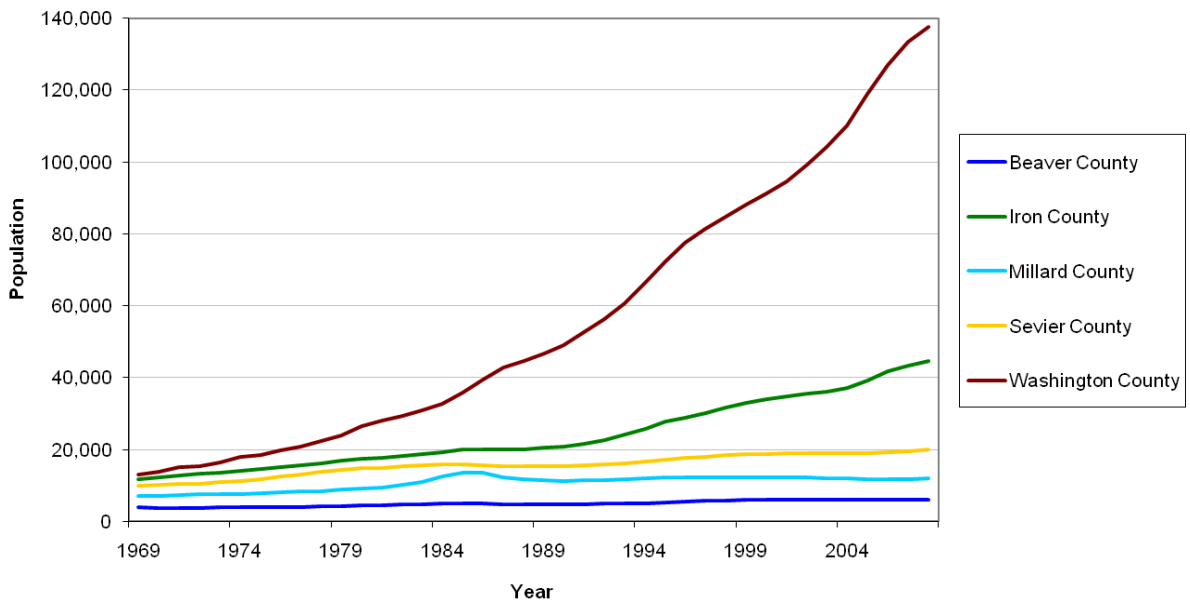
3.6.1.5 Demographics

This section describes demographic characteristics for each of the five study area counties. Included below is information on population growth since 1969, population projections, age distribution, racial and ethnic characteristics, and per capita income. Information has been retrieved from the U.S. Department of Commerce, the U.S. Census Bureau, and the Utah State Governor‘s Office of Planning and Budget.

Population Trends

Population numbers for each county for the years 1969 through 2008 were retrieved from the U.S. Department of Commerce, BEA. The use of population numbers for each year in the almost four-decade time series helps more clearly demonstrate where change (positive or negative) has occurred at the fastest rate.

Population change between 1969 and 2008 is demonstrated in Figure 3-1. Each of the study area counties has increased in population since 1969. Millard County reached its largest population to date in the mid-1980s (approximately 13,500) before declining in 1988. The county has grown at a relatively even rate since that period. Overall, the 2008 population of Millard County is 73.0 percent higher than it was in 1969.



SOURCES: U.S. Department of Commerce, BEA 2010; U.S. Census Bureau 2000a

Figure 3-1 Historical Population and Current Estimates for Study Area Counties, 1969–2008

Iron and Washington counties have grown in size faster than other study area counties. Between 1969 and 2008, Iron County increased in size by approximately 274.0 percent, from 11,900 to 44,540, with its population increasing by about 1,000 to 2,000 residents per year. The most significant growth of all the counties can been seen in Washington County, which has grown from 13,000 in 1969 to 137,589 residents in 2008, an increase of approximately 958.0 percent. Washington County growth began to increase at a notably faster rate than other study area counties in the mid-1980s when the population was increasing between 3,000 and 6,000 residents per year. Almost 9,000 new residents moved to Washington County between 2004 and 2005.

Population Projections

The Governor‘s Office of Planning and Budget for the State of Utah prepares population projections for population centers and counties across the state. Table 3-67 shows population projections for the

population centers as well as study area counties. St. George and Washington County are projected to grow at a pace significantly faster than other population centers and counties in the study area. Growth is projected to be slowest in Millard and Sevier counties. Between 2000 and 2020, the population of Richfield is projected to increase by approximately 22.4 percent while Sevier County is projected to increase by 25.2 percent. Both areas are projected to increase less than 7.0 percent between 2020 and 2030. The City of Beaver and Beaver County are both projected to increase more than 50.0 percent between 2000 and 2020, and increase another 44.8 percent between 2020 and 2030.

TABLE 3-67
POPULATION PROJECTIONS FOR POPULATION CENTERS AND STUDY AREA COUNTIES, 2000-2030

Geographic Area	2000	2020	2030	Percent Change (2000-2020)	Percent Change (2020-2030)
City of Beaver	2,454	3,992	5,782	62.7	44.8
Beaver County	6,005	9,178	13,293	52.8	44.8
Cedar City	20,527	40,376	51,799	96.7	28.3
Iron County	33,779	68,315	87,644	102.2	28.3
Delta	3,209	3,984	4,649	24.2	16.7
Millard County	12,405	16,868	19,682	36.0	16.7
City of Richfield	6,847	8,383	8,951	22.4	6.8
Sevier County	18,842	23,583	25,177	25.2	6.8
City of St. George	49,663	140,268	208,254	182.4	48.5
Washington County	90,354	279,864	415,510	209.7	48.5

SOURCE: State of Utah – Governor‘s Office of Planning and Budget 2010

Age Distribution

Data related to age composition were obtained from the 1990 and 2000 U.S. Census for each of the five study area counties (Table 3-68). From 1990 to 2000, all counties experienced the most significant growth in the 40 to 54 age range, with the largest percent change in Washington County (138.8 percent).

TABLE 3-68
POPULATION CHANGE BY AGE GROUP IN STUDY AREA COUNTIES, 1990 AND 2000

Census Year and 10-Year Change	Total Population	Under 20 Years of Age		Between 40 and 54 Years of Age		65 Years of Age and Over		Median Age
		Number	Percentage	Number	Percentage	Number	Percentage	
Beaver County								
2000	6,005	2,178	36.3	1,090	18.2	835	13.9	30.9
1990	4,765	1,850	38.8	641	13.5	775	16.3	31.9
10-Year Change	1,240	328	-2.6	449	4.7	60	-2.4	-1.0
10-Year Percent Change	26.0	17.7	–	70.0	–	7.7	–	-3.1
Iron County								
2000	33,779	12,582	37.2	5,207	15.4	2,891	8.6	24.4
1990	20,789	8,438	40.6	2,699	13.0	1,980	9.5	24.5
10-Year Change	12,990	4,144	-3.3	2,508	2.4	911	-1.0	-0.1
10-Year Percent Change	62.5	49.1	–	92.9	–	46.0	–	-0.4

TABLE 3-68
POPULATION CHANGE BY AGE GROUP IN STUDY AREA COUNTIES, 1990 AND 2000

Census Year and 10-Year Change	Total Population	Under 20 Years of Age		Between 40 and 54 Years of Age		65 Years of Age and Over		Median Age
		Number	Percentage	Number	Percentage	Number	Percentage	
Millard County								
2000	12,405	5,053	40.7	2,180	17.6	1,529	12.3	29.9
1990	11,333	5,118	45.2	1,340	11.8	1,362	12.0	26.2
10-Year Change	1,072	-65	-4.4	840	5.7	167	0.3	3.7
10-Year Percent Change	9.5	-1.3	–	62.7	–	12.3	–	14.1
Sevier County								
2000	18,842	7,164	38.0	3,337	17.7	2,426	12.9	30.3
1990	15,431	6,452	41.8	2,217	14.4	2,100	13.6	29
10-Year Change	3,411	712	-3.8	1,120	3.3	326	-0.7	1.3
10-Year Percent Change	22.1	11.0	–	50.5	–	15.5	–	4.5
Washington County								
2000	90,354	31,922	35.3	13,731	15.2	15,343	17.0	31.1
1990	48,560	19,558	40.3	5,751	11.8	7,898	16.3	28.4
10-Year Change	41,794	12,364	-4.9	7,980	3.4	7,445	0.7	2.7
10-Year Percent Change	86.1	63.2	–	138.8	–	94.3	–	9.5

SOURCES: U.S. Census Bureau 1990, 2000b

During both Census periods, Iron County reported having a lower median age (24.4 and 24.5 years of age) than any of the other Project area counties. This was followed by Millard County, which had a median age of 26.2 during the 1990 Census and 29.9 at the time of the 2000 Census, an increase of 14.1 percent over the 10-year period.

The percentage share of residents under the age of 20 decreased in each county between 1990 and 2000, the greatest of which was in Washington County where those under the age of 20 decreased in overall percentage share by 4.9 percent. Three of the five counties experienced a decrease in the percentage share of those 65 and over. For those counties that did experience an increase in overall percentage share of those 65 and over (Millard and Washington), the increase ranged from 0.3 percent to 0.7 percent.

Racial and Ethnic Characteristics

The following is based on information from the 2000 Census. A more detailed discussion of those who identify themselves as being of a minority is discussed in Section 3.6.1.8, Environmental Justice.

As demonstrated in Table 3-69, the racial and ethnic composition of study area counties is relatively similar. Between 93.0 percent and 95.6 percent of residents in each county identify themselves as White Alone. When summed, the percentages of those who identify themselves as being of Two or More races or Other are the second highest after White Alone. Minority populations are defined as those who identify themselves as being of a race other than Non-Hispanic White Alone. Between 5.8 percent and 10.0 percent of residents in each of the study area counties identify themselves as being of a minority. The American Indian and Alaskan Native population in each county ranges from 0.9 percent to 2.2 percent.

TABLE 3-69
RACIAL AND ETHNIC COMPOSITION PERCENTAGE FOR STUDY AREA COUNTIES, 2000

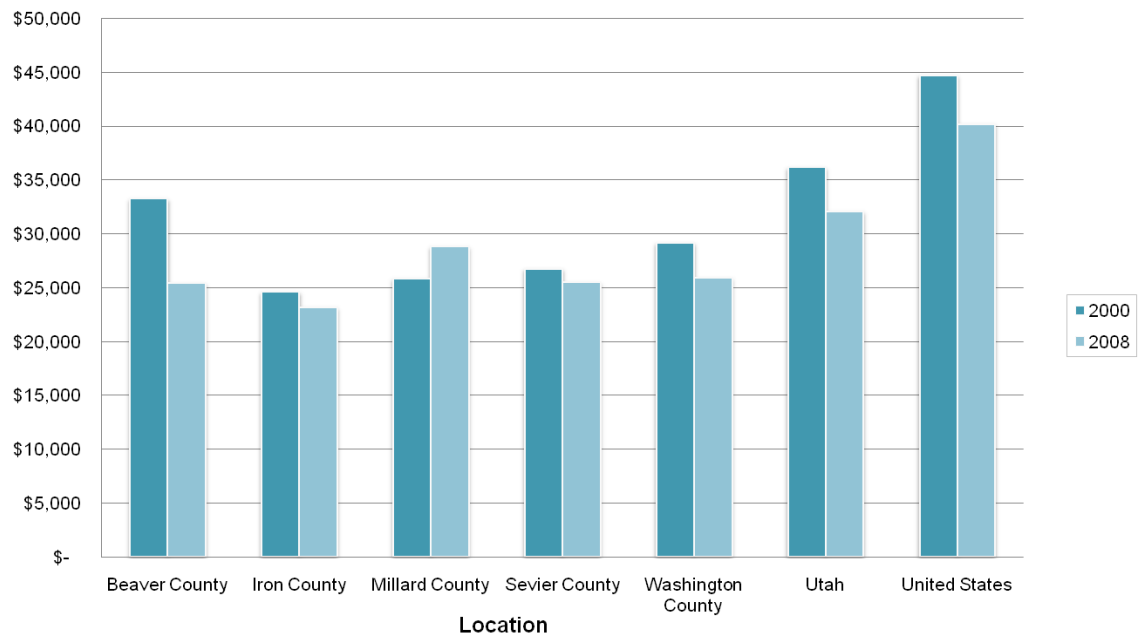
Race	Beaver County	Iron County	Millard County	Sevier County	Washington County
Total	**6,005**	**33,779**	**12,405**	**18,842**	**90,354**
White	93.2	93.0	93.9	95.6	93.6
Non-Hispanic White Alone	98.1	98.1	95.8	98.5	97.3
Hispanic White Alone	1.9	1.9	4.2	1.5	2.7
Black or African-American Alone	0.3	0.4	0.1	0.3	0.2
American Indian and Alaskan Native Alone	0.9	2.2	1.3	2.0	1.5
Asian Alone	0.6	0.7	0.5	0.3	0.4
Native Hawaiian and Other Pacific Islander Alone	0.1	0.3	0.2	0.1	0.4
Two or More Races	3.1	1.8	2.8	0.8	2.2
Other	1.8	1.7	1.2	1.0	1.6
Minority[1]	8.6	8.7	10.0	5.8	8.9
Hispanic Origin	5.5	4.1	7.2	2.6	5.2

SOURCE: U.S. Census Bureau 2000b; SF1 data tables
[1]The total minority population includes all those who have classified themselves as Black, Hispanic White, American Indian or Alaskan Native, Asian, Other Pacific Islander, and Others.

Personal Income

Real per capita income in 2000 and 2008 for study area counties, State of Utah, and the United States is shown below in Figure 3-2. Per capita income from 2000 was adjusted for inflation and is presented in 2008 dollars. As demonstrated below, Millard County was the only county to experience an increase in real per capita income between 2000 and 2008. The real per capita income decreased the most significantly in Beaver County. Sevier County experienced a decrease of approximately $1,300. Both the Utah and the United States experienced a decrease in real per capita income between 2000 and 2008.

In both 2000 and 2008, the per capita income for each county was less than that of Utah and the United States. In 2008, Iron County reported the lowest real per capita income at $23,147, approximately 27.8 percent lower than the real per capita income in Utah. In 2008, Millard County reported the highest real per capita income at $28,796. In 2008, the real per capita income in Utah and the United States was $32,050 and $40,166, respectively.



SOURCE: U.S. Department of Commerce, BEA 2010b

Figure 3-2 2000 and 2008 Real Per Capita Income for Study Area Counties, Utah, and the United States (2008 Dollars)

3.6.1.6 Economic Characteristics

This section discusses the economic characteristics of each county. For certain economic indicators, Project area counties are compared to Utah and/or the United States to demonstrate economic activity in each area. The section includes a discussion of employment by industry, average earnings, unemployment, and economic base analysis.

Employment by Industry

Data were obtained from the U.S. Department of Commerce, BEA on total annual employment for all counties within the study area from 2001 to 2008. This information can be used to understand employment trends as well as current industry employment figures.[1] Tables for total employment by industry for each county are found in the Project Socioeconomic Baseline Assessment (Louis Berger Group 2010).

[1] BEA estimates annual employment for counties nationwide. Data can be incomplete in some counties due to disclosure problems associated in areas where few firms are operating. Estimates of *total* employment, however, do include those numbers that are unreported or omitted at the specific industry level. Total annual employment includes both part-time and full-time jobs. Therefore, individuals having more than one job are counted twice in the totals. The employment estimates include those individuals who are employed by businesses and public entities, as well as those who are self-employed. Since 2001, BEA has employed the North American Industry Classification System (NAICS) to better capture new industries that did not exist under the old Standard Industrial Classification System.

The following section describes employment trends in terms of the number and percentage of jobs gained or lost in each industry sector over the seven-year period as well as the percentage of industry jobs in 2008 as a percent of total employment. Employment by industry is not yet available for 2009. However, it is anticipated that employment numbers have been affected by the recent economic downtown. Annual unemployment rates for 1997 to 2009 (Figure 3-3) confirm that employment across the study area has decreased since 2007. Unemployment figures do not reveal which industries have been affected the most by the economic downturn.

Beaver County

In Beaver County, a significant proportion of the increase in employment occurred in the mining (53 jobs), transportation and warehousing (87 jobs), and retail trade (55 jobs) sectors. In 2008, two of the highest industry employers were government services (20.2 percent) and retail trade (11.5 percent). While the farming industry lost 25 jobs between 2001 and 2008, it was still the second highest industry employer representing 15.3 percent of total county employment. The only other industry to lose jobs was the manufacturing sector, which lost 26 jobs between 2001 and 2008.

Iron County

The considerable increase in Iron County employment can be attributed to the growth of the construction (856 new jobs), retail trade (494 new jobs), real estate and rental and leasing (737 new jobs), finance and insurance (521 new jobs), and health care and social assistance (624 new jobs) sectors. In 2008, administrative and waste services lost 384 jobs, a decrease of approximately 23.0 percent from its 2001 employment base. The notable increase in construction industry employment between 2001 and 2008 has resulted in the industry with the third highest employment in 2008 behind government services (18.1 percent) and retail trade (11.6 percent).

Millard County

There is little employment information available for Millard County. Retail trade added 134 jobs between 2001 and 2008, the most of any industry for which information is available. Construction, manufacturing, and other services except public administration also added between 49 and 64 jobs between 2001 and 2008. Farming lost a total of 154 jobs or 13.6 percent of its 2001 employment base by 2008. Industries with the greatest percentage share of total county employment are government services (16.7 percent), farming (14.4 percent), and retail trade (12.8 percent).

Sevier County

Of all industry sectors, the retail trade and transportation and warehousing sectors gained the most jobs between 2001 and 2008. Between 2001 and 2008, retail trade gained 317 jobs, an increase of 22.8 percent, and the transportation and warehousing sector gained 272 jobs, an increase of 32.0 percent. Professional and technical services also experienced an increase in employment between 2001 and 2008 in the form of 226 new jobs, an increase of 89.0 percent. The considerable growth in the retail trade and transportation and warehousing sectors makes these industries two of the highest employers in the county. At 14.9 percent, government services represent the greatest share of total county employment.

Washington County

There was a considerable amount of job creation in Washington County between 2001 and 2008. More than 25,000 new jobs were gained across the County during this period. The industries that experienced the most growth during this period were construction (3,306 new jobs), health care and social assistance (3,601 new jobs), and real estate and rental and leasing (2,499 new jobs). These industries combined represent approximately 37.0 percent of all new jobs created between 2001 and 2008. Other industries that experienced considerable employment growth include the retail trade, finance and insurance, administrative and waste services, accommodation and food services, and government services sectors. Farming was the only industry that experienced job loss between 2001 and 2008 with a loss of approximately 26 jobs. In 2008, the three industries with the greatest percentage share of total county employment were construction, retail trade, and health care and social assistance.

Average Earnings

Average annual wages by industry are provided by the Utah Department of Workforce Services. As demonstrated in Table 3-70, the average annual earnings for many industries are lower in study area counties than in the State of Utah. In the utilities sector, two of the five counties report average annual earnings higher than the state average while two report earnings lower than the state average. Information is not available for Sevier County. In the State of Utah, average annual earnings in the transportation and warehousing sector are $40,551. Beaver County reports average annual earnings in this sector to be almost $20,000 higher than the state average. Millard County reports earnings slightly higher than the state average. The remaining three counties report earnings of between $34,640 and $37,710.

TABLE 3-70
2008 AVERAGE ANNUAL EARNINGS BY INDUSTRY IN DOLLARS

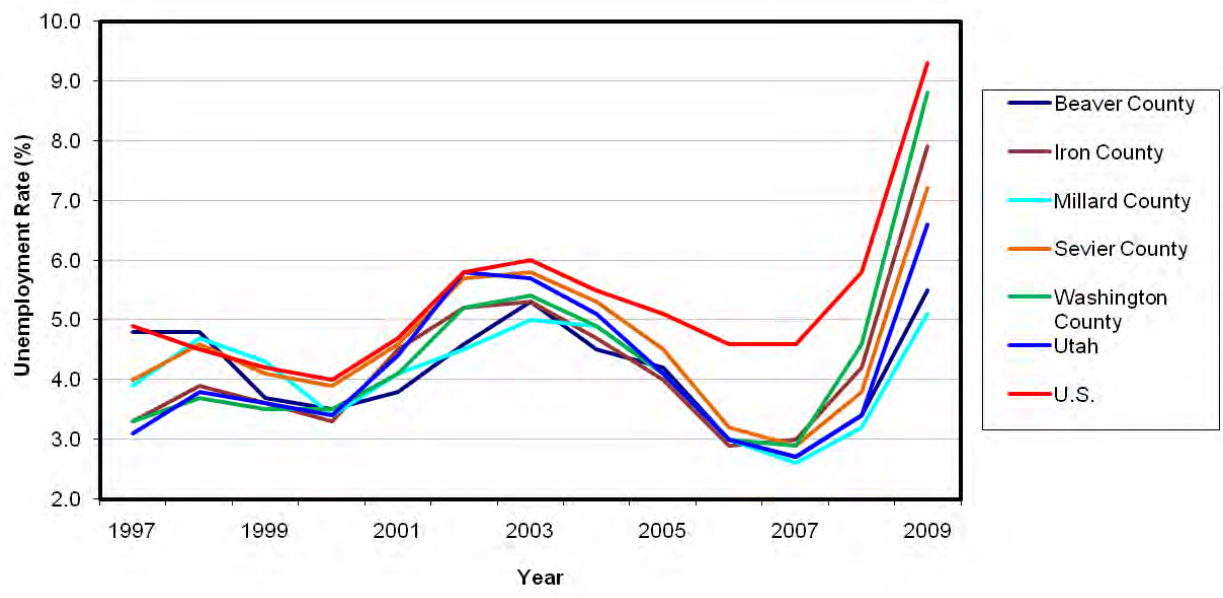
Industry	Beaver County	Iron County	Millard County	Sevier County	Washington County	Utah
Mining	41,893	18,724	53,295	50,765	23,170	69,481
Utilities	93,322	71,393	74,129	N/A	59,909	79,032
Construction	27,808	28,586	23,162	24,629	31,100	39,312
Manufacturing	38,411	35,633	38,850	33,414	33,886	46,440
Wholesale trade	25,672	31,072	30,705	29,465	37,393	53,661
Retail trade	14,656	21,617	15,303	20,885	23,698	25,381
Transportation and warehousing	60,053	32,640	41,969	37,555	37,710	40,551
Information	N/A	21,952	35,069	29,007	30,243	46,754
Finance and insurance	26,845	45,385	26,664	35,120	38,089	50,723
Real Estate and rental and leasing	12,843	19,959	9,570	18,280	26,129	34,881
Professional scientific and technical services	23,481	28,827	47,074	38,396	38,437	58,481
Management of companies and enterprises	N/A	40,027	N/A	N/A	49,198	62,510
Administrative, support, waste management, remediation	N/A	18,423	30,424	21,633	24,223	26,672
Education services	N/A	19,979	N/A	28,074	18,118	26,413
Health care and social assistance	23,774	27,106	32,783	28,516	35,574	35,782
Arts, entertainment, and recreation	N/A	11,720	9,462	6,508	15,466	21,787
Accommodation and food services	10,625	11,371	9,360	10,620	14,309	14,396
Other services (except public administration)	24,423	26,251	27,420	26,701	23,479	27,917
Government	39,616	35,799	29,684	31,914	35,855	40,167

SOURCE: Utah Department of Workforce Services 2010

Unemployment

Annual unemployment rates from 1997 to 2009 for each of the study area counties, the State of Utah, and the United States were retrieved from the Bureau of Labor Statistics. Figure 3-3 shows that while unemployment rates among the geographic areas differs, the similar ebbing and flowing of the rates over time demonstrates the correlation of county unemployment to those of the state and nation. As demonstrated in Figure 3-3, over the past ten years, counties in the study area have generally had unemployment levels below the national average.

Unemployment in all areas was relatively low in the year or two before the attacks of September 11, 2001. The economic aftermath of the attacks may have contributed to increased unemployment rates in 2002 and 2003. Within a few years, the markets began to stabilize and unemployment rates began to decrease. In 2006 and 2007, unemployment in all counties was lower than it had been in the previous 10 years. However, with the onset of the current economic recession unemployment rates have increased. As demonstrated in Figure 3-5, unemployment rates went up in each geographic area presented. Unemployment rates increased notably in both 2008 and 2009. The recession has severely affected the cost and availability of credit to both households and businesses, which has in turn affected the housing market and construction industries nationwide (Bernanke 2009). Such an affect can be felt across a variety of industries and markets throughout the country and can contribute to increases in unemployment rates.



SOURCE: U.S. Department of Labor, Bureau of Labor Statistics 2010

Figure 3-3 Study Area Counties, State of Utah, and the U.S. Unemployment Rates, 1997 to 2009

Economic Base Analysis

An area‘s economic base comprises industries that are primarily responsible for bringing outside income into the local economy. These industries typically export their goods and services outside the region and, in turn, support ancillary industries such as retail trade, housing construction, and personal services. The

location of industries in certain areas has traditionally been tied to such factors as natural resource base, cost factors (transportation and labor), and existing transportation infrastructure. Recently, technology has affected these location factors.

Economic base analysis provides an assessment of which industries an area (i.e., community, county, etc.) may be more heavily dependent on change within these industries or new areas trying to compete for the same consumer base can present a challenge for existing industries. To assess the degree of localized specialization of specific industries, location quotients (LQs) were calculated for 20 industries. LQs are ratios that provide a convenient way to examine the specialization of economic activity in an area. The LQs were calculated for employment by industry type for each of the counties and compared each industry‘s share of total employment to Utah and the United States as a whole. Employment data were obtained from the U.S. Census Bureau for 2000 since more recent employment data have considerable nondisclosed information with missing observations.

The LQ generally yields a value between zero and two, where one indicates the area of examination has the same percentage of employment in that industry as experienced in the reference region. LQs greater than two indicate a strong industry concentration in the area of examination, while those having less than 0.5 indicate a weak industry concentration in the area of examination. The LQ for each industry was calculated as shown below.

$$LQ = \frac{\text{Local employment in industry } y}{\text{total local employment}} \div \frac{\text{reference area employment in industry } y}{\text{total employment in reference area}}$$

LQ tables for each county as compared to Utah and the United States are found in the Project Socioeconomic Baseline Assessment (Louis Berger Group 2010).

Generally, LQs in agriculture, forestry, farming, and hunting are considerably higher than LQs for other industries, indicating the study area is heavily dependent on jobs in these industries to support the economic base. In the counties, mining is another industry where the LQ is often higher than 2.0. The presence of jobs in finance and insurance and professional, scientific, and technical services is relatively low in the counties.

The size of the economic base in Washington County, as compared to other counties, enables employment to be more dispersed across varying industries. As a result, the majority of LQs when compared to the state and the nation are between 0.5 and 2.

3.6.1.7 Local Resources

Property Valuation and Taxation

Local and state government entities generate a portion of their tax revenues by assessing and taxing certain categories of property. This section describes the property tax information for each county in the study area.

In the State of Utah, property classified as real property includes land and buildings, while personal property refers to property that can be geographically moved (Utah State Tax Commission 2008). Utah counties have the authority to assess and tax real and personal property located within their jurisdiction. The State of Utah assesses and taxes utilities and natural resources located anywhere within the state‘s borders. The amount of taxes owed to either the county or the state is determined by applying an

appropriate tax rate to the taxable value for a particular property category. Taxable value is equal to the fair market value of the property minus tax exemptions.

Electric transmission lines are considered unitary energy properties,[2] which includes units that cross county lines. Such properties are assessed centrally through the state. The state also assesses natural resources, while real and personal property are assessed by county governments.

In 2009, total taxable valuation for both state and locally assessed property was approximately $224.7 billion. With an effective statewide tax of 1.1 percent, approximately $2.4 billion in total property tax revenue was collected (Utah State Tax Commission 2010a). Table 3-71 summarizes the total tax and utility tax revenues collected for each county in the study area during the 2009 Fiscal Year (FY) ending June 30, 2009. During FY 2009, tax revenues collected in Washington County represented approximately 5.6 percent of all tax revenue in Utah. Tax revenue generated by counties with little population and economic base have less taxable property. Beaver County represents less than 0.4 percent of all tax revenue collected during FY 2009.

TABLE 3-71
PROPERTY TAX REVENUE FOR STUDY AREA COUNTIES AND UTAH, 2009

County	Total Tax Revenue	Tax Revenue (as a percentage of Utah total)	Utility Tax Revenue	Utility Tax to Total Tax Revenue (in percent)
Beaver	$6,358,883	0.3	$1,473,920	23.2
Iron	$41,695,354	1.7	$1,904,596	4.6
Millard	$19,977,916	0.8	$12,137,559	60.8
Sevier	$13,658,861	0.6	$708,194	5.2
Washington	$135,907,899	5.6	$3,907,389	2.9
Utah	$2,425,078,378	100.0	$111,344,084	4.6

SOURCE: Utah State Tax Commission 2010a
NOTE: Information is for FY 2008-2009, which ended on June 30, 2009.

Utility tax revenues account for $111.3 million or approximately 4.6 percent of the state‘s total tax revenue. PacifiCorp, a utility company, was Utah‘s largest centrally assessed company in 2009. In Millard County, utility tax revenue accounts for approximately 60.8 percent of total county tax revenues. Beaver County received the second highest percentage of its tax revenue from utilities. The three other counties in the study area can attribute less than 10.0 percent of their total tax revenue to utilities.

Housing and Construction

Construction spending and housing characteristics can act as indicators when determining the health of a local and/or regional economy. The construction of the Project would help support the construction industry within the study area. This section includes a discussion of construction spending by county from 2000 through 2009. Construction spending totals provided in Table 3-72 include both residential and nonresidential construction, including public utility buildings, structures other than buildings, and public projects. Using the Consumer Price Index published by the U.S. Department of Labor, annual construction spending was adjusted for inflation and is presented in Table 3-73 in 2009 dollars. This information is provided by the Bureau of Economic and Business Research at the University of Utah.

[2]Energy properties include the operating property of natural gas pipelines, natural gas distribution companies, liquid petroleum products pipelines, and electric corporations, including electric generation, transmission, and distribution companies and other similar entities (Utah State Tax Commission 2010).

TABLE 3-72
CONSTRUCTION INDUSTRY SPENDING, 2001 TO 2009 (IN MILLIONS, 2009 DOLLARS)

Area	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Percent Change (2000 to 2009)
Beaver County	1,197.8	757.6	971.6	820.9	478.3	983.9	2,356.7	1,708.7	3,352.3	684.2	-42.9
Iron County	11,069.5	7,057.8	6,553.7	7,078.6	12,123.8	17,498.1	17,545.3	15,930.9	5,802.2	3,079.4	-72.2
Millard County	2,693.0	830.9	1,321.3	1,818.7	1,073.0	1,860.4	1,146.8	1,368.1	1,465.0	1,570.6	-41.7
Sevier County	2,252.1	2,427.3	2,892.1	3,411.6	3,223.0	3,314.1	4,479.7	5,677.9	3,099.0	2,328.3	3.4
Washington County	32,768.0	29,149.4	42,108.6	45,624.4	68,340.8	85,093.1	67,920.8	57,211.8	27,764.8	16,774.8	-48.8
Utah	490,579.7	470,953.8	451,236.7	548,220.3	603,405.9	750,005.2	813,926.3	754,335.6	457,169.2	338,701.5	-31.0

SOURCE: The University of Utah 2010
NOTE: Values were adjusted for inflation using the Consumer Price Index published by the U.S. Department of Labor, Bureau of Labor Statistics and are reported in 2009 in dollars.

TABLE 3-73
HOUSING CHARACTERISTICS FOR STUDY AREA COUNTIES, 2000

Housing Characteristics	Beaver County	Iron County	Millard County	Sevier County	Washington County	Study Area Counties	Relevant Percentage for Study Area Counties	Utah
Total housing units	2,660	13,618	4,522	7,016	36,478	67,806	–	768,594
Occupied	1,982	10,627	3,840	6,081	29,939	54,554	80	701,281
Vacant	678	2,991	682	935	6,539	13,252	20	67,313
Percentage of owner-occupied housing units	78.9	66.3	79.6	82.0	74.0	74.2	74	501,659
Percentage of renter-occupied housing units	21.1	33.7	20.4	18.0	26.0	25.8	26	199,622
Median Gross Rent	$490	$468	$388	$477	$594	$534	–	$597
Median value of owner-occupied housing (1999)	$89,200	$112,000	$84,700	$95,700	$139,800	$121,254	–	$146,100
Median monthly owner mortgage costs	$745	$888	$758	$781	$1,033	$933	–	$1,102

SOURCE: U.S. Census Bureau 2000d

The section also provides an overview of housing characteristics for each county at the time of the 2000 Census. More recent housing information is available from the American Community Survey for counties having more than 20,000 residents; however, only two counties classify as such. As a result, the housing characteristics are presented in Table 3-72 using 2000 Census information.

Beaver County

Construction spending in Beaver County was at its highest in 2006 and 2008. Construction spending decreased approximately 42.9 percent between 2000 and 2009 and was at its lowest in 2009. At the time of the 2000 Census, approximately 78.9 percent of the 1,982 occupied housing units were owner-occupied. The median value for owner occupied housing was $89,200 with median monthly mortgage payments of $745.

Iron County

As demonstrated in Table 3-75, construction spending in Iron County decreased 72.2 percent between 2000 and 2009. Construction spending increased considerably between 2002 and 2006, and the most significant period of growth was between 2003 and 2005. In 2008, construction spending plummeted and further decreased in 2009. Approximately two-thirds of occupied housing units are owner-occupied, the lowest rate of any county. At the time of the 2000 Census, the median value of owner-occupied housing was $112,000, the third highest of the counties. Median monthly mortgage payments of $888 also were the third highest.

Millard County

In Millard County, construction spending was at its highest in 2000. By 2001, construction spending was less than half of what it had been the previous year. Beginning in 2002, construction spending began to rise again and has increased each year since 2006. Renter occupied units in Millard County account for approximately 20.4 percent of occupied units. At $388 per month, median gross rent payments are lower in Millard County than in any of the other counties.

Sevier County

Sevier County is the only county that experienced an increase in construction spending between 2000 and 2009. Such spending was at its highest in 2007. Sevier County had the second highest percentage of owner-occupied units. Median monthly rent payments, value of owner-occupied housing, and monthly mortgage payments are all well below the Utah average and fall in the middle of total study area housing costs.

Washington County

Construction spending in Washington County changed significantly between 2000 and 2009. Construction spending decreased 48.8 percent during this period. Spending was at its highest in 2005 when construction spending topped $85.093 million. By 2009, this number was barely 20 percent of what it had been in 2005. Median monthly rent and mortgage payments, as well as median home values for

owner-occupied units were higher in Washington County than in any of the other counties. Such costs are more closely related to Utah averages than other study area counties.

Schools

There are 101 schools located in the study area. During the 2007-2008 academic year, these schools had a total enrollment of 46,348 students (U.S. Department of Education 2010). The number of schools per capita is calculated by dividing the number of schools in each county by the total county population. Since enrollment figures and the number of schools are based on the 2007-2008 academic year, it was appropriate to use 2008 population estimates provided by the American Community Survey for this calculation. As demonstrated in Table 3-74, the greatest number of schools per capita was in Beaver County (0.11 per capita) and the lowest number of schools per capita was in Washington County (0.04 schools per capita).

TABLE 3-74
SCHOOLS IN STUDY AREA COUNTIES

County	School/District	Number of Schools	Enrolled Students (2007-2008 academic year)	Population (2008 estimate)	Number of Schools per Capita
Beaver	Beaver District	7	1,654	6,162	0.11
Iron	Iron District	21	9,418	44,540	0.06
	Success Academy	1	173		
Millard	CBA Center	1	24	12,082	0.10
	Millard District	11	3,167		
Sevier	Sevier District	14	5,028	20,014	0.07
Washington	George Washington Academy	1	421	137,589	0.04
	Washington District	44	26,260		
	Tuacahn High School for the Performing Arts	1	203		

SOURCE: U.S. Department of Education: Institute of Education Sciences 2010

Police Protection and Emergency Services

As demonstrated in Table 3-75, a total of 12 police departments and sheriff‘s offices providing police protection and law enforcement services are located in the study area. Iron County has the greatest number of law enforcement units (four units) while Beaver and Millard counties are each served by one sheriff‘s office (USACE 2010).

TABLE 3-75
POLICE PROTECTION IN STUDY AREA COUNTIES

County	Unit
Beaver	Beaver County Sheriff‘s Office
Iron	Iron County Sheriff‘s Office
	Cedar City Police Department
	Enoch Police Department
	Parowan Police Department
Millard	Millard County Sheriff‘s Office

TABLE 3-75
POLICE PROTECTION IN STUDY AREA COUNTIES

County	Unit
Sevier	Sevier County Sheriff's Office
	Richfield Police Department
	Salina Police Department
Washington	Washington County Sheriff's Office
	Hurricane Police Department
	St. George Police Department

SOURCE: USACE 2010

In addition to county police protection, residents, employees, and visitors also are protected by the Utah Department of Public Safety (the state law enforcement agency with statewide jurisdiction). The department works closely with the Utah Highway Patrol and Office of the State Fire Marshal.

As demonstrated in Table 3-76, there are 53 professional and volunteer-run fire stations located in the study area. There are a total of 1,019 paid and volunteer firefighters at these locations. Washington County, which has the largest population of the study area counties, also has the greatest number of fire stations and personnel.

TABLE 3-76
FIREFIGHTING SERVICES IN STUDY AREA COUNTIES

Region	Number of Fire Stations	Personnel	2008 Population Estimates	Population Per Emergency Service Personnel
Beaver County	5	50	6,162	123
Iron County	10	275	44,540	162
Millard County	8	142	12,082	85
Sevier County	7	113	20,014	177
Washington County	23	439	137,589	313

SOURCE: National Fire Department Census, U.S. Fire Administration 2010

The population per emergency service personnel is calculated by dividing 2008 county population estimates by the number of firefighting personnel in each county. Since the U.S. Fire Administration continuously updates the National Fire Department Census, it was appropriate to use 2008 population estimates provided by the American Community Survey rather than 2000 Census information for this calculation. Of study area counties, Washington County has the highest number of residents per single emergency service personnel (313 residents for every one emergency service personnel). This far exceeds the number of residents per emergency personnel for other study area counties. Millard County has the fewest residents per emergency service personnel (85 residents for every one emergency service personnel). A complete list of fire and emergency services can be found in the Project Socioeconomic Baseline Assessment (Louis Berger Group 2010).

There are seven hospitals and emergency medical centers located in the study area (Table 3-77). Each county has either one or two facilities. The name and location of these facilities is shown in the Project Socioeconomic Baseline Assessment (Louis Berger Group 2010).

Since the U.S. Department of Health and Human Services (DHHS) continuously updates its Health Resources and Service Administration (HRSA) Geospatial Data Warehouse – Report Tool, it was appropriate to use 2008 population estimates provided by the American Community Survey rather than

2000 Census information for this calculation. Data currently reported by the HRSA Geospatial Data Warehouse – Report Tool are from late September 2009.

As demonstrated in Table 3-77 based on 2008 population estimates, Iron County has the greatest number of residents per available bed (1,060 residents per available bed). Beaver County is the only county that has fewer than 100 residents per available bed.

TABLE 3-77
HOSPITALS AND MEDICAL CENTERS IN STUDY AREA COUNTIES

County	Number of Hospitals/ Medical Centers	Number of Patient Beds	2008 Population Estimates	Population per Available Patient Bed
Beaver County	2	82	6,162	75
Iron County	1	42	44,540	1,060
Millard County	2	40	12,082	302
Sevier County	1	42	20,014	477
Washington County	1	167	137,589	824
Total	**7**	**373**	**220,387**	**591**

SOURCE: DHHS 2010a

Three of the five study area counties have been designated as medically underserved areas[3] (DHHS 2010a). They are Beaver, Iron, and Washington counties (DHHS 2010b). Residents from these counties must travel to neighboring counties to receive the medical attention they need.

3.6.1.8 Environmental Justice

E.O. 12898, issued in 1994, directs federal agencies to incorporate environmental justice as part of their mission by identifying and addressing the effects of programs, policies, and activities on minority and low-income populations. The fundamental principles of E.O. 12898 are as follows:

- Ensure full and fair participation by potentially affected communities in the decision-making process.
- Prevent the denial of, reduction, or significant delay in the receipt of benefits by minority or low-income populations.
- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- Encourage meaningful community representation in the NEPA process through the use of effective public participation strategies and special efforts to reach out to minority and low-income populations.
- Identify mitigation measures that address the needs of the affected low-income and minority populations.

[3]Medically Underserved Areas/Populations are areas or populations designated by the HRSA of the DHHS as having too few primary care providers, high infant mortality, high poverty, and/or high elderly population.

An environmental justice assessment requires an analysis of whether minority and low-income populations (i.e., populations of concern) would be affected by a proposed federal action and whether they would experience adverse impacts from the proposed action. If there are adverse impacts, the severity and proportion of these impacts on populations of concern must be assessed in comparison to the larger majority population or populations not classified as low-income. At issue is whether such adverse impacts fall disproportionately on minority and/or low-income members of the community and, if so, whether they meet the threshold of disproportionately high and adverse. If disproportionately high and adverse effects are evident, the EPA guidance advises that it should trigger consideration of alternatives and mitigation actions in coordination with extensive community outreach efforts (EPA 1998b).

The EPA defines a community with potential populations of concern as one that has a greater percentage of minority and/or low-income populations than does an identified reference area. Areas with high concentrations of minority residents are defined as those populations having (1) 50 percent or more of their population identifying themselves as being of a minority or (2) a significantly greater minority population than the reference area (EPA 1998b). Low-income populations are defined as those individuals that are considered living below the poverty line. The U.S. Census Bureau defines poverty level thresholds for individuals and a family of four as income levels below $10,991 and $22,025, respectively (U.S. Census Bureau 2008).

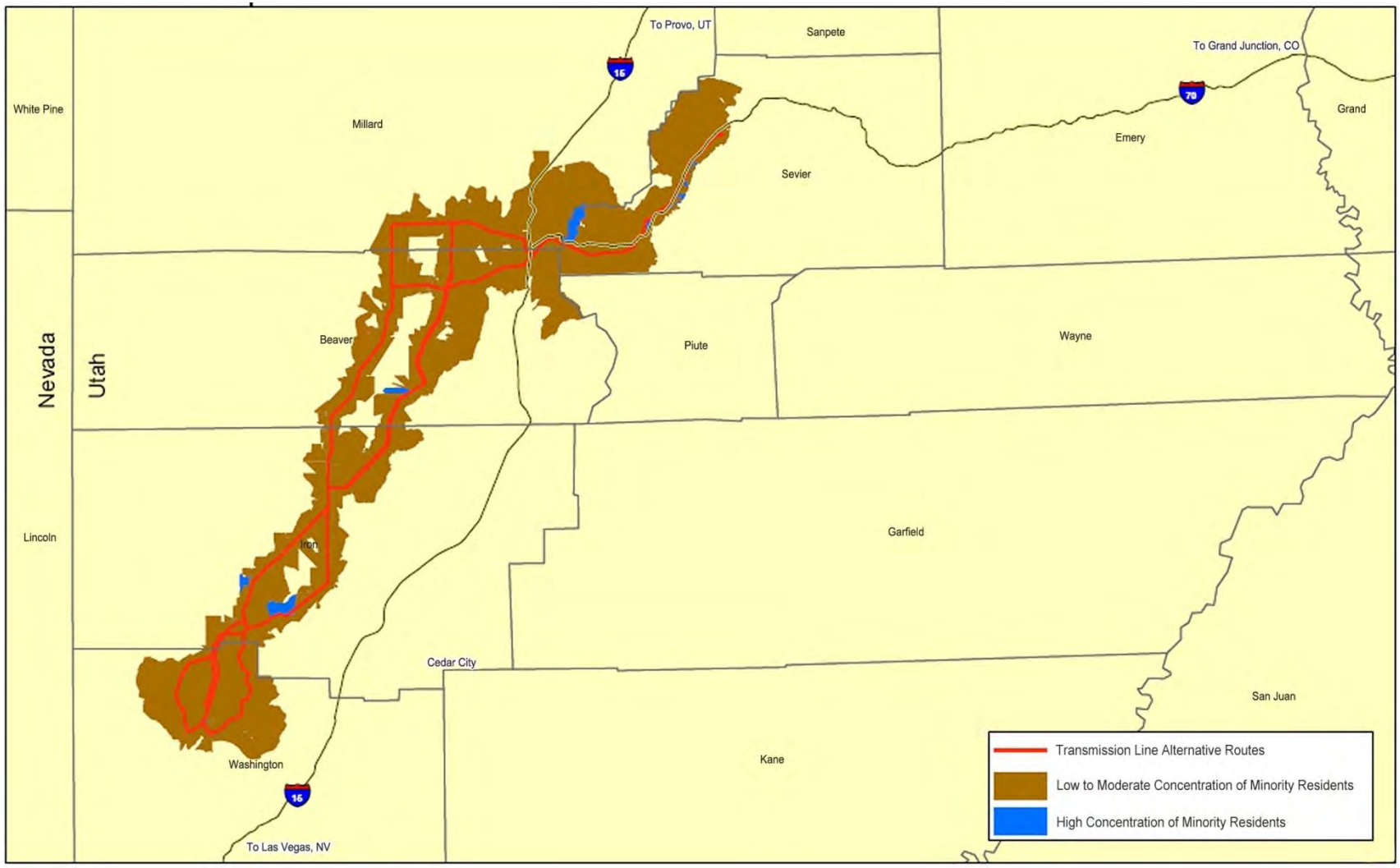
The EPA has not specified any percentage of the population that can be characterized as significant to identify the presence of minority and/or low-income populations in an area. For purposes of this study, a conservative approach is used to identify areas having high concentrations of minority and/or low-income residents. It is assumed that if the affected area has a minority and/or low-income population more than 10 percentage points higher than the reference area, further analysis is necessary to determine if these populations would receive a disproportionately higher share of adverse Project impacts.

The environmental justice assessment is undertaken at both the Census Block and Block Group level. The presence of minority populations is evaluated on the Block level, the smallest geographic area for which Census information is available. The smallest geographic area for which the presence of low-income populations can be evaluated using Census data is the Block Group level. The study area for the environmental justice assessment includes all those Blocks (for minority presence) and Block Groups (for low-income presence) within one mile of the proposed transmission line routes. Figure 3-4 and Figure 3-5 show all Blocks or Block Groups in the study area and identifies which are identified as either having a high concentration of minority and/or low-income populations.

The county in which each affected Block or Block Group is located is used as the reference area to determine the presence of minority and/or low-income populations. Racial, ethnic, and poverty data have been retrieved from the U.S. Census. For each of the affected Blocks or Block Groups, the percentages discussed do not include the 10 percentage points added to determine the presence of minority and/or low-income populations. However, when 10 percent is added to each listed Block or Block Group the total percentage exceeds the county average, making it an area of concern and thus warranting the further consideration of potential impacts borne by identified populations of concern.

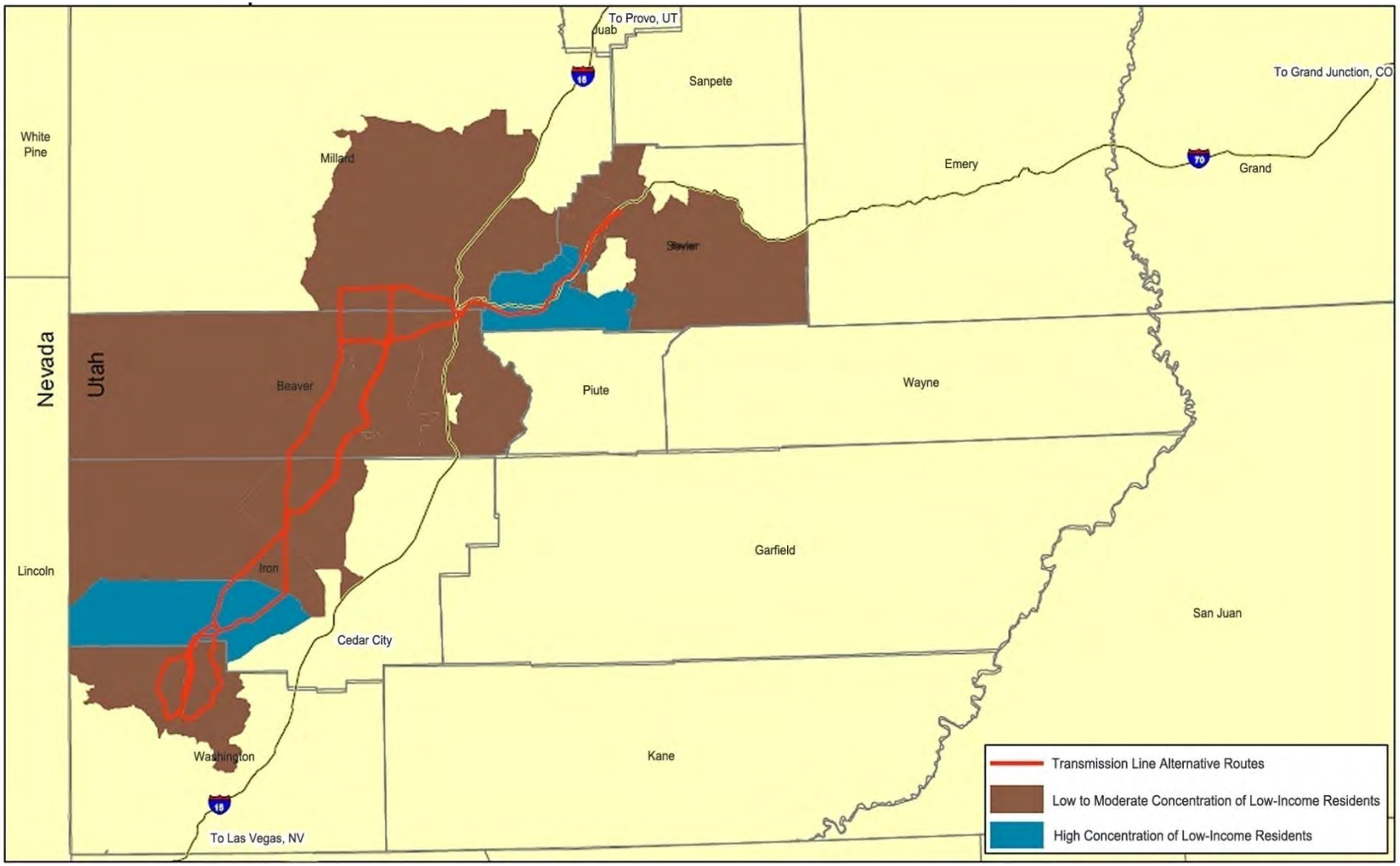
3.6.1.9 Census Blocks with High Concentrations of Minority Populations

Minority populations are defined as those who identify themselves on U.S. Census forms as being of a race other than Non-Hispanic White Alone. This includes those who identify themselves as Black or African-America, Asian, Hispanic White, American Indian or Alaskan Native, Pacific Islander, Two or More Races, or Other. Figure 3-4 shows where those Blocks that have been identified as having a high concentration of minority residents within 1 mile of the Project. County thresholds and those Census



SOURCE: ESRI 2009

Figure 3-4 Census Blocks with High Concentrations of Minority Populations within 1 Mile of the Transmission Line Alternative Routes



SOURCE: ESRI 2009

Figure 3-5 Census Block Groups with High Concentrations of Low-Income Populations within 1 Mile of the Transmission Line Alternative Routes

Blocks exceeding these thresholds are shown in the Project Socioeconomic Baseline Assessment (Louis Berger Group 2010).

Beaver County

There is one Census Block in Beaver County that has a greater percentage of those who identify themselves as being of a minority. Figure 3-4 shows this Block is located adjacent to the Project corridor. As demonstrated in the Project Socioeconomic Baseline Assessment (Louis Berger Group 2010), there are five people living in this Block who identify themselves as being of a minority.

Iron County

There are four Blocks in Iron County whose minority population exceeds the County average by more than 10 percentage points. Figure 3-4 demonstrates that these Blocks are located adjacent to the Project.

Millard County

There are no Census Blocks in Millard County where the percentage of those who identify themselves as being of a minority exceeds the County average (17.1 percent) by more than 10 percentage points.

Sevier County

Of all counties, Sevier County has the greatest number of Blocks that exceed the County average by more than 10 percentage points. As demonstrated in Figure 3-4, these Blocks are located in proximity to the Project alternative routes and I-70.

Washington County

There are only two Blocks in Washington County whose percentage of minority residents exceeds the county average by more than 10 percentage points.

3.6.1.10 Census Block Groups with High Concentrations of Low-Income Populations

Only Iron and Sevier counties report having Census Block Groups with concentrations of low-income populations that exceed county averages by more than 10 percentage points (see Figure 3-5). The Project would traverse through each of the affected Block Groups. For Iron and Sevier counties, low-income thresholds as determined by the percent of county residents living below the poverty line are shown in the Project Socioeconomic Baseline Assessment (Louis Berger Group 2010). While per-capita and median household incomes are important indicators when understanding poverty levels, they are not used in determining the presence of those living below the poverty line and are shown below as a reference point.

There is one Census Block Group in Iron County that exceeds the county threshold for those living below the poverty line by more than 10 percentage points. The percent of those living in poverty is notably higher than the county average of 19.2 percent. The per capita and median household earnings in this Block Group are considerably lower than for Iron County overall.

At the time of the 2000 Census, the Sevier County average of those living below the poverty line was 10.8 percent. There are two Census Block Groups in the county that exceed this average by more than 10 percentage points. In Census Tract 9755, Block Group 1, the per capita and median household incomes are well below the Sevier County average. Census Tract 9755, Block Group 2, reports a median household income just slightly less than the county average.

3.6.1.11 Construction

Project Expenditures and Workforces

Estimated Project Expenditures

The estimated construction costs associated with each alternative route are summarized in Table 3-78.

TABLE 3-78
ESTIMATED CONSTRUCTION COSTS

Alternative Route	Total Construction Cost
Alternative N1 (Environmentally Preferred)	$169,630,562
Alternative N2	$171,954,112
Alternative N3	$167,880,881
Alternative N4	$160,090,083
Alternative N5	$156,016,853
Alternative N6 (Proponent‘s Proposed Action)	$153,309,081
Alternative S1	$86,856,718
Alternative S2 (Environmentally Preferred)	$75,401,814
Alternative S3	$93,301,707
Alternative S4	$81,799,056
Alternative S5 (Proponent‘s Proposed Action)	$84,404,448
Alternative S6	$91,178,681

SOURCE: Pike Engineering/Shaw Engineering 2010

Workforce Requirements

The construction of the proposed line and facilities would require a number of specialized skill sets. An estimate of the number of individuals and specialties are summarized in Tables 2-9. Construction of the Project is expected to start in June of 2012 and be in service by June 2014. It is estimated that the maximum number of total personnel required during the construction period considering all tasks would range between 160 and 255 persons. However, at any point in time, the actual personnel would be fewer.

3.6.2 Results

3.6.2.1 No Action Alternative

If no action were taken, the Project would not be granted a right-of-way and the transmission lines and substations would not be constructed. The human environment would remain as is and management direction from the current management plans would continue. The advantages of the No Action Alternative would be the avoidance of any of the socioeconomic impacts described below that would occur with the construction of the transmission lines. However, the projected electricity demands in

southwestern Utah would not be met. This could lead to increased cost of energy and continued dependence on a system at capacity. Also, without the Project to strengthen the electrical system, reliability of the electrical system could be jeopardized and could result in power outages, the duration and severity of which cannot be accurately predicted for analysis.

3.6.2.2 Impacts Common to All Alternatives

Impacts on Employment

The construction, operation, and maintenance of the proposed transmission line and related facilities are expected to have a minimal impact on local employment. The largest potential impact from the Project on employment would occur during the construction phase. The construction of facilities for the entire Project is expected to employ at maximum a few hundred laborers (refer to Table 2-9). However, construction is expected to be staggered over two years, so average direct employment is not expected to exceed 200 laborers at any one time with dispersal across the study area. It is anticipated that a large percentage of the construction workforce would commute to the Project site from their residences rather than relocate. This is due to the facts of construction employees typically being willing to commute up to two hours from their homes to construction sites (Electric Power Research Institute 1982) and the proximity of the population base in southwestern Utah. However, some positions would likely have to be filled by others coming from outside the area. The addition of new residents to the area also would have an added effect of increasing economic activity, which would create new jobs in the area. This indirect impact on employment is expected to be small and relative to the study area. The change in employment is expected to be short-term and dissipate upon completion of construction. Operation of the new facilities would have negligible impacts on local employment.

Impacts on Population

The proposed Project and alternatives are expected to cause a slight increase in employment due to construction of the Project. The slight increase in employment is not expected to cause any measurable impacts on population trends. Iron and Washington counties have been experiencing high levels of population growth, which is expected to continue in the future. Any changes in population due to the Project would be small and would not affect these projected trends.

Impacts on Housing

Any small, short-term changes in population due to the Project are not expected to have any measureable impact on available housing in the study area. Available permanent and temporary housing are adequate to supply any new residents to the area.

Impacts on Government-Provided Services

The Project and all of its alternatives are expected to have negligible impacts on government-provided services in the study area. This is due to the fact that changes in employment and population are predicted to be small with the construction, operation, and maintenance of the Project. Therefore, it is not anticipated that there would be a measurable change in supply or demand of relevant government services throughout the study area.

Facility Impacts on Property Values

The development or upgrade of electric transmission line facilities has received a great deal of public scrutiny regarding the impacts of the facilities on private property values. As such, a number of studies have been conducted to determine the impact of transmission lines on property values. The results of the studies are mixed. In general, the impacts are difficult to measure, vary among individual properties, and are influenced by a number of interplaying factors, including the following:

- Proximity of residential properties to transmission line structures
- Type and size of high-voltage transmission line structures
- Appearance of easement landscaping
- Surrounding topography (Pitts and Jackson 2007)

Pitts and Jackson (2007) summarize the following conclusions on the impacts of high-voltage transmission lines.

- When negative impacts are present, studies report an average decline of prices from 1 to 10 percent.
- Value diminution is attributable to the visual unattractiveness of the lines, potential health hazards, disturbing sounds, and safety concerns.
- Impacts diminish as the distance between the high-voltage transmission lines and the affected properties increase, and disappear completely at a distance of 200 feet from the lines.
- Where views of transmission lines and towers are completely unobstructed, negative impacts can extend up to 0.25 mile.
- If high-voltage transmission-line structures are at least partially screened from view by trees, landscaping, or topography any negative effects are reduced considerably.
- Value diminution attributed to high-voltage transmission-line proximity is temporary and usually decreases over time, disappearing completely in 4 to 10 years.

Facility Impacts on Rates and Ratepayers

Capital expenditures for improvements to electric-utility infrastructure are investments made to serve customers. The expenditures are passed on to the customers served in the form of increased rates. However, as a regulated utility, the Proponent can increase rates only on approval by state utility commissions. Such rate-increase requests are subjected to rigorous analysis by regulators and others, and to public process. At this time, not all costs for development of the Project are known; therefore, the Proponent cannot project what the rate increase may be.

Environmental Justice

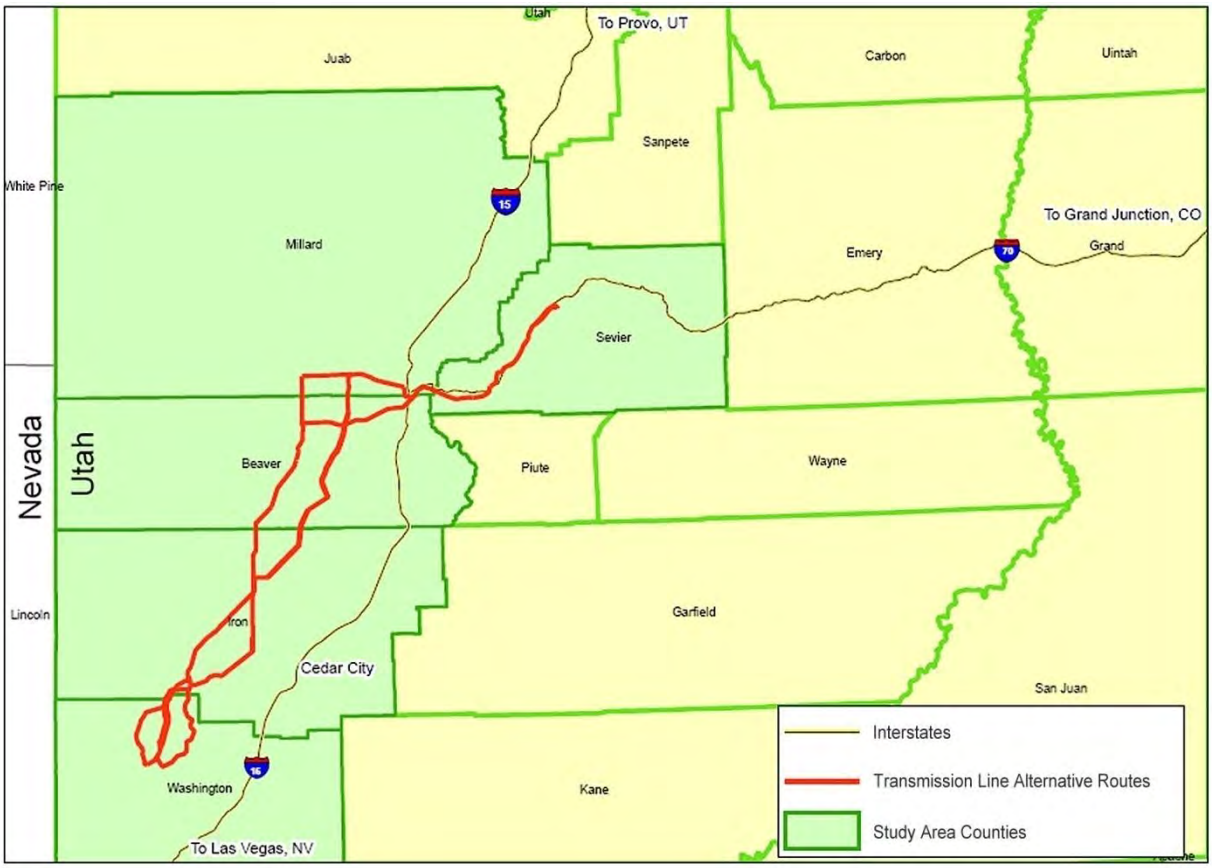
Potential minority or low-income populations within the study area are discussed in Section 3.6.1.8. The analysis indicates that potential environmental justice populations (minority or low-income) exist adjacent to the Project in all the counties except Washington County. It is not known whether these environmental justice populations are located closer than 3.5 miles from the alternative transmission line routes and facilities where it is most likely impacts from the Project would occur. However, it is not expected that these potential environmental justice populations would be disproportionately affected by the development or operation of the Project.

3.6.2.3 Impacts by Alternative

Affected Environment

Alternative routes for the Project are located in five counties in central and southwestern Utah, including Beaver, Iron, Millard, Sevier, and Washington counties. These counties compose the study area included in this assessment, unless noted otherwise. The study area, as shown in Figure 3-6 encompasses an area approximately 17,070 square miles.

The following discussion provides an overview of existing socioeconomic conditions and trends in each of the study area counties. Data and information have been collected from a variety of sources including the U.S. Census Bureau, the U.S. Bureau of Labor Statistics, and the BEA, in addition to state and county resources.



SOURCE: ESRI 2009

Figure 3-6 Sigurd to Red Butte No. 2 Transmission Line Study Area Counties

Environmental Effects

The construction, operation, and maintenance of the transmission line would generate additional property taxes to counties where the line would be located. The magnitude of these tax revenues for each alternative was estimated and summarized in Table 3-79. The property taxes for the first year the transmission line would be in service were estimated by applying an average tax rate of 1.6 percent to the

construction cost of each segment of the line and are summarized in the second column from the left (Patterson 2009). The average tax rate for utilities was estimated by dividing total taxes charged against utilities in Utah by the total assessed value of utilities in 2009 (Utah State Tax Commission 2010a). It is anticipated that tax revenues would fall after the first year of service as assessed values would consider cost of operation. To estimate an average cash flow for each segment of the line, a capitalization rate of 9.74 percent (Utah State Tax Commission, 2010b) was applied to cost of construction and is summarized in the third column from the left. The annual tax revenue was then estimated by applying the 1.6 percent average tax rate to the annual cash flow and is summarized in the column on the right.

TABLE 3-79
PROPERTY TAX ESTIMATES OF ALTERNATIVES

Alternative Route	First Year Property Taxes	Estimated Annual Cash Flows	Annual Property Taxes Remaining Years in Service
Alternative N1 (Environmentally Preferred)	$1,971,256	$16,522,017	$192,000
Alternative N2	$1,998,258	$16,748,330	$194,630
Alternative N3	$1,950,923	$16,351,598	$190,020
Alternative N4	$1,860,388	$15,592,774	$181,202
Alternative N5	$1,813,053	$15,196,041	$176,591
Alternative N6 (Proponent‘s Proposed Action)	$1,781,586	$14,932,304	$173,527
Alternative S1	$1,009,351	$8,459,844	$98,311
Alternative S2 (Environmentally Preferred)	$876,235	$7,344,137	$85,345
Alternative S3	$1,084,248	$9,087,586	$105,606
Alternative S4	$950,577	$7,967,228	$92,586
Alternative S5 (Proponent‘s Proposed Action)	$980,854	$8,220,993	$95,535
Alternative S6	$1,059,576	$8,880,804	$103,203

Tables 3-80 and 3-81 present a rough estimate of tax revenue by county in the Project area. The estimate of tax revenue based on the assumption that the amount of capital applied to each county would correspond with the length of the transmission line (or ancillary facilities) that is constructed in each county.

TABLE 3-80
ESTIMATED FIRST YEAR PROPERTY TAX REVENUES

Alternative Route	Counties				
	Beaver	Iron	Millard	Sevier	Washington
Alternative N1 (Environmentally Preferred)	$584,681	$179,651	$563,449	$643,476	$0
Alternative N2	$760,767	$182,717	$400,316	$654,459	$0
Alternative N3	$615,906	$277,990	$401,171	$655,857	$0
Alternative N4	$918,290	$187,059	$85,027	$670,012	$0
Alternative N5	$770,931	$284,835	$85,280	$672,006	$0
Alternative N6 (Proponent's Proposed Action)	$754,852	$287,080	$84,435	$655,218	$0
Alternative S1	$0	$574,970	$0	$0	$434,382
Alternative S2 (Environmentally Preferred)	$0	$630,677	$0	$0	$245,558
Alternative S3	$0	$672,008	$0	$0	$412,240
Alternative S4	$0	$676,484	$0	$0	$274,093

TABLE 3-80 ESTIMATED FIRST YEAR PROPERTY TAX REVENUES					
Alternative Route	**Counties**				
Alternative S5	$0	$580,200	$0	$0	$400,654
Alternative S6	$0	$684,702	$0	$0	$374,874

TABLE 3-81 ANNUAL PROPERTY TAXES FOR REMAINING YEARS IN SERVICE					
	Counties				
Alternative Route	**Beaver**	**Iron**	**Millard**	**Sevier**	**Washington**
Alternative N1 (Environmentally Preferred)	$56,948	$17,498	$54,880	$62,675	$0
Alternative N2	$74,099	$17,797	$38,991	$63,744	$0
Alternative N3	$59,989	$27,076	$39,074	$63,880	$0
Alternative N4	$89,441	$18,220	$8,282	$65,259	$0
Alternative N5	$75,089	$27,743	$8,306	$65,453	$0
Alternative N6 (Proponent's Proposed Action)	$73,523	$27,962	$8,224	$63,818	$0
Alternative S1	$0	$56,002	$0	$0	$42,309
Alternative S2 (Environmentally Preferred)	$0	$61,428	$0	$0	$23,917
Alternative S3	$0	$65,454	$0	$0	$40,152
Alternative S4	$0	$65,890	$0	$0	$26,697
Alternative S5	$0	$56,511	$0	$0	$39,024
Alternative S6	$0	$66,690	$0	$0	$36,513

3.6.3 Summary

The construction, operation, and maintenance of the proposed transmission line and related facilities under all alternatives would be expected to have a minimal impact on local employment. The largest potential impact from the Project on employment would occur during the construction phase. However, construction is expected to be staggered over approximately two years, so average direct employment is not expected to exceed 200 people at any one time and would be dispersed across the study area. It is anticipated that a large percentage of the construction workforce would commute to the Project site from their residences rather than relocate. Impacts on population, housing, and government services are expected to be minimal due to the construction and operations of the transmission line.

For all alternative routes, construction and operation of the Project could affect private property values. The impacts are difficult to measure, would vary among individual properties, and would be influenced by a number of interplaying factors such as proximity of residential properties to towers and lines, types and size of lines, and locations of landscaping and surrounding topography. Impacts would tend to decline with distance from a particular line and over time (i.e., less impact on private property values after the transmission line has been constructed and is in operation).

While there is existence of potential environmental justice populations in the study area near all the alternative route locations, it does not appear that these populations would be disproportionately affected by the development or operation of the Project.

The construction and operation of the transmission line would generate additional property taxes to counties where the line would be located. The magnitude of these tax revenues range by alternative from $0.88 million to $2.0 million in the first year of operation and $85,000 to $198,000 in following years the line is in operation. The counties would each receive their proportional share of such tax revenues.

3.7 Public Health and Safety

Issues raised by the public and agencies during Project scoping and preparation of the EIS related to potentially significant effects on public health and safety included potential effects of EMF on humans and animals (including the use of a pacemaker) and concerns with spark-gap transmissions.

3.7.1 Electromagnetic Fields and Corona Effects

As proposed, the Project would be a new single-circuit 345kV AC transmission line between the existing Sigurd Substation and the existing Red Butte Substation.

The existing and proposed circuits between the Sigurd and Red Butte substations are sources of 60 Hertz (Hz) EMF, audible noise, and radio noise. To characterize the potential effect of the proposed Project on the existing levels of EMF, audible noise, and radio noise, the levels of these parameters under existing and proposed conditions were modeled at representative locations (identified as cross-sections 1 through 5) accounting for existing and proposed circuits. Conditions where alternative routes parallel existing transmission lines, but are separated by several hundred feet, were not modeled because there would be no perceptible effect on levels of EMF, audible noise, or radio noise. Appendix I includes profiles and tables for cross-sections 1 through 5.

3.7.1.1 Magnetic Fields

The current flowing in the conductors of a transmission line generates a magnetic field near the transmission line. The strength of Project-related magnetic fields is expressed as magnetic flux density in units of milligauss (mG), where 1 Gauss (G) = 1,000 mG[4]. It is important to remember that because load current, expressed in units of amperes (A), generates magnetic fields around transmission-line conductors. Measurements of the magnetic field present a snapshot of the load conditions at a point in time. On a given day, throughout a week, or over the course of months and years, the magnetic field can change depending upon the patterns of power demand within the surrounding region.

3.7.1.2 Electric Fields

The voltage on the conductors of transmission lines generates an electric field in the space between the conductors and the ground. The strength of Project-related electric fields is expressed in units of kilovolts per meter (kV/m), which is equal to 1,000 volts per meter (V/m)[5]. Most objects, including fences,

[4] Scientists more commonly refer to magnetic flux density at these levels in units of microtesla (µT). Magnetic flux density in mG units can be converted to µT by dividing by 10, i.e., 1 mG = 0.1 µT.

[5] The strength of an electric field increases with voltage of the source, and decreases with distance from the source. Typical electric field levels in the home and at work are less than 0.1 kV/meter (m). Electric fields within 1 foot of small appliances are in the range of 0.02 to 0.2 kV/m, while the field immediately adjacent to the heating wires of some electric blankets can be considerably higher.

shrubbery, and buildings, block electric fields. Around transmission lines, measurable electric fields at ground level typically are highest in outdoor areas on the right-of-way that are cleared of vegetation.

3.7.1.3 Audible Noise

At the surface of high-voltage powerline conductors, the electric field may become concentrated on surface irregularities to cause an electrical breakdown of the insulating properties of the air, resulting in power loss at the site of breakdown (a phenomenon called corona). Corona can result in audible noise, particularly when the surrounding air contains numerous water droplets or snowflakes. If there is sufficient corona activity, audible noise can be noticeable within a few hundred feet of the transmission line. The intensity is most pronounced directly underneath the line conductors and decreases with distance from the transmission line.

Corona activity depends on a number of factors: altitude, line voltage, conductor size, conductor geometry, and weather conditions. Corona activity is most likely near transmission lines at higher altitudes and is most pronounced during foul weather. The breakdown strength of air is 30 kilovolts per centimeter (kV/cm) at sea level and decreases with increasing altitude. A transmission line is designed so that at a particular altitude, conductor size, and line voltage, the electric field at the conductor surface does not exceed the breakdown potential. Nevertheless, any irregularities on the conductor surface (e.g., nicks, water droplets, or debris) will create points where the electric field is intensified sufficiently to produce corona. In foul weather, raindrops or snowflakes accumulating on the conductor surface will also act as points for corona inception.

When corona occurs on 345kV transmission line conductors, it is accompanied by an audible snapping sound. If there is enough corona activity on the line, many small snaps from corona sources along a conductor may be sufficient, in combination, to produce discernable audible noise (‗sizzling‘ or ‗crackle‘) at the edge of the right-of-way.

Sound level is measured in decibels (dB) referenced to 20 micropascals, which is approximately the pressure threshold of human hearing at 1 kilohertz (kHz). The range of audible frequencies for the human ear is from approximately 20 Hz to 20 kHz, with peak sensitivity near 1 kHz. The change in sensitivity of the human ear with frequency is reflected in measurements by weighting the contribution of sound at different frequencies. Sound at 20 Hz or 20 kHz, where the ear is less sensitive, is given much less weight than at frequencies near 1 kHz, where the ear is most sensitive. The weighting of sound over the frequency spectrum to account for the sensitivity of the human ear is called the A-weighted sound level.

When the A-weighting scale is applied to a sound-pressure measurement, the level is often reported as dBA, referenced to the audible pressure threshold. The sound level of typical human speech is approximately 60 dBA, and background levels of noise in rural and urban environments are about 30 to 40 dBA. Specific identifiable noises such as birdcalls, neighborhood activity, and traffic can produce audible noise levels of 50 to 60 dBA. Table 3-82 lists the sound intensities of common acoustic sources.

TABLE 3-82
COMMONLY ENCOUNTERED ACOUSTIC AND AUDIBLE NOISE LEVELS

Source	A-weighted sound level (decibel [dBA])
Auto horn	110
Inside subway	95
Traffic	75
Conversation	65
Office	55
Living Room	45
Library	35
Bedroom	24

Corona-generated audible noise varies in time. To account for fluctuating sound levels, statistical descriptors are used to describe environmental noise. Exceedence levels (L levels) refer to the A-weighted sound level that is exceeded for a specified percentage of the time. Thus, the L_5 level refers to the noise level that is exceeded only 5 percent of the time. L_{50} refers to the sound level exceeded 50 percent of the time. Sound-level measurements are expressed in the L_{50} level (median level) in fair and foul (steady rain) conditions.

3.7.1.4 Radio Noise

Overhead transmission lines can generate radio noise in the bands used for the reception of radio signals. Two potential mechanisms for interference are gap discharges and corona. Corona activity, described above as a source of audible noise, also induces impulsive currents along a transmission line. These induced currents, in turn, cause wide-band radio frequency noise fields that can affect radio and television reception. Radio noise can produce interference to an amplitude-modulated (AM) signal such as a commercial AM radio audio signal (520-1720 kHz) or the video portion of an analog television signal. Frequency-modulated (FM) radio stations and the audio portion of an analog television signal (which is also FM) are generally not affected by electromagnetic noise from a transmission line.

Gap discharges are an intermittent phenomenon that is more common in distribution lines and low-voltage transmission lines. Electrical discharges on these lines can occur where small gaps develop between metallic line hardware, such as insulators, clamps, or brackets. Discharge across these gaps can cause incidental interference to radio-communication services; in which event, the sources of gap-type interference can be located and repaired. Gap discharges occur less frequently on high-voltage transmission lines, and the proposed line will be constructed with modern hardware that eliminates gap-type interference.

Radio noise levels are expressed as dB above 1 microvolt per meter (dBμV/m) to describe the electric field intensity incident upon a reference antenna at 500 kHz, as recommended by the Institute of Electrical and Electronics Engineers (IEEE) (1971). Weather has a large influence on corona-generated radio noise, as it does for audible noise. As with audible noise, corona-generated radio noise also varies in time. To account for fluctuating noise levels, statistical descriptors are used to describe radio noise. Radio noise levels below are expressed as 50 percent exceedance values (median or L_{50} values) during fair or foul (steady rain) conditions. Radio noise, like audible noise, is also more pronounced at higher altitudes.

3.7.2 Regulatory Framework

3.7.2.1 Electric and Magnetic Fields

Neither the federal government nor the State of Utah has enacted standards for magnetic fields or electric fields from powerlines or other 60-Hz sources. Several other states have statutes or guidelines that apply to fields produced by new transmission lines, but these guidelines are not health-based. Florida and New York, for example, have enacted standards to limit magnetic fields at the edge of the right-of-way from transmission lines (Florida Department of Environmental Regulation 1989, Florida Department of Environmental Protection 1996, New York Public Service Commission 1978, 1990). For 345kV transmission lines, these limits are 200 mG at the edges of new right-of-ways. The basis for limiting magnetic fields from transmission lines in Florida and New York was to maintain the status quo so fields from new transmission lines would be no higher than those produced by existing transmission lines.

More relevant EMF assessment criteria are the exposure limits recommended by scientific organizations. These exposure limits were developed to protect health and safety and are based upon reviews and evaluations of relevant health research. These guidelines include exposure limits for the general public recommended by the International Committee on Electromagnetic Safety (ICES) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) to address health and safety issues (ICES, 2002, ICNIRP 1998). These standards and guidelines are discussed in further detail in the section below.

Recommended Exposure Limits

The only confirmed relationship between electric fields or magnetic fields and an adverse biological or health effect are the effects of electric currents in the body that may be experienced as a shock-like effect at very high levels of exposure. The levels at which these short-term effects occur are typically much higher than levels found under power lines, and higher than levels found in most homes or commercial establishments. Scientific organizations have recommended exposure limits to protect against the occurrence of these acute adverse effects from short-term exposures. The table below shows the recommended exposure limits.

TABLE 3-83
REFERENCE LEVELS FOR WHOLE BODY EXPOSURE TO 60 HZ FIELDS: GENERAL PUBLIC

Organization Recommending Limit	Magnetic Fields[1]	Electric Fields[1]
International Commission on Non-ionizing Radiation Protection	833 mG	4.2 kV/m
International Committee on Electromagnetic Safety	9,000 mG	5 kV/m 10 kV/m[2]

NOTES:
[1]Both organizations judged that evidence for effects from long-term exposure was insufficient for setting exposure standards.
[2]Exception within transmission line right-of-way

3.7.2.2 Audible Noise

The EPA has established a guideline of 55 dBA for the annual average day-night level (L_{dn}) in outdoor areas (EPA 1974). In computing this value, a 10 dB correction (penalty) is added to nighttime noise between the hours of 10 p.m. and 7 a.m. Outdoor noise generally does not contribute to indoor levels, which are dominated by activities within a building or residence (EPA 1974).

The predictions of audible noise below are presented as median levels (L_{50} exceedance levels) during foul weather. To convert these levels to EPA day-night (L_{dn}) levels requires information or assumptions regarding ambient noise, percentage of foul weather, and the statistical distribution of foul-weather audible noise. The correction factors used to obtain L_{dn} levels from foul-weather L_{50} levels are shown in Table 3-84 for various frequencies of foul weather and ambient noise level.

TABLE 3-84
CORRECTION FACTORS TO OBTAIN EQUIVALENT SOUND LEVELS (L_{EQ}) AND DAY-NIGHT SOUND LEVEL (L_{DN}) FROM MEDIAN (L_{50}) FOUL WEATHER TRANSMISSION LINE SOUND LEVEL

	L_{eq}-L_{50} Foul		L_{dn}-L_{50} Foul	
Frequency	**40 dBA ambient**	**No ambient**	**40 dBA ambient**	**No ambient**
0	-14.0	-24.0	-7.6	-17.6
1	-13.0	-18.4	-6.6	-12.0
5	-10.4	-12.4	-4.0	-6.0
10	-8.4	-9.6	-2.0	-2.9
100	+0.3	+0.3	+6.7	+6.7

SOURCE: Dietrich 1982

The appropriate correction factor from Table 3-84 can be applied to the calculated L_{50} level to yield an L_{dn} level. A correction factor of -2.9 dBA, corresponding to 10 percent occurrence of foul weather, was used in this report.

3.7.2.3 Radio Noise

Utah has no limit for radio noise. Likewise, the Federal Communication Commission (FCC) Rules and Regulations (2008) contain no guidelines regarding radio noise levels near high-voltage transmission lines. Power transmission lines fall into the FCC category of incidental radiator, which is defined as a device that generates radio frequency energy during the course of its operation, although the device is not intentionally designed to generate or emit radio frequency energy. Operation of an incidental radiator is subject to the conditions that no harmful interference is caused and interference must be accepted that may be caused by the operation of an authorized radio station; by another intentional or unintentional radiator; by industrial, scientific, and medical equipment; or by an incidental radiator. Section 15.1(m) of the FCC regulations defines harmful interference as any emission, radiation, or induction that endangers the functioning of a radio navigation service or other safety services, or seriously degrades, obstructs, or repeatedly interrupts a radio communications service operating in accordance with this chapter.

Historically, transmission-line operators have not had difficulty operating under the present FCC rules since most sources of harmful interference are due to gap-type discharges that can be identified and repaired (Bonneville Power Administration [BPA] 1980). Residences very near transmission lines, however, may be affected by corona-type radio noise in foul weather. For this reason, the IEEE *Radio Noise Design Guide* (IEEE 1971) identifies an acceptable limit of average fair-weather radio noise of 40 dBμV/m at 100 feet (30 meters) from the outside conductor.

3.7.2.4 Pacemakers

Implanted cardiac pacemakers are designed to detect abnormal electrical signals from the beating heart and administer therapy in the form of electrical pulses through implanted electrodes to maintain or restore

normal heart function. Many sources of EMFs at a variety of frequencies have been reported to affect pacemaker function, including IPods and other personal MP3 players, cell phones, wireless phones, electric pencil sharpeners, power tools, anti-theft and security devices in stores, libraries and airports, video games, ordinary magnets (i.e., on refrigerators or kitchen cabinets), escalators, electric vehicle ignitions and motors, etc. If pacemaker wearers, however, avoid proximity to these devices, then their pacemakers will not be subject to potential interference from EMFs.

Literature suggests pacemakers also can be affected by EMF from utility power sources and may be somewhat more sensitive to 60-Hz electric fields than 60-Hz magnetic fields. In the case of electric fields, but not magnetic fields, buildings, walls, shrubbery, and vehicles, among other conductive objects, can effectively shield electric fields under most circumstances, thereby lessening the potential for electric fields affecting pacemakers. The manufacturers of pacemakers also have designed their devices in various ways to minimize potential interference from endogenous sources (e.g., muscle potentials) and interference by conducted currents from exogenous sources (e.g., touching electrical appliances). These measures also serve to minimize potential interference by electric fields. To protect the patient, most pacemakers (particularly new pacemakers) are designed to filter out external electrical signals and go into an automatic pacing mode for the period of time interference is detected.

The expected EMF levels at the edge of the proposed right-of-way for the Project are less than 1.8 kV/m, without taking into account any shielding provided by objects in the environment, and 262 mG, respectively (Appendix I, Tables I-2 and I-3). While there is no universal guidance as to acceptable levels of EMF for pacemakers, the American Conference of Governmental Industrial Hygienists (ACGIH) has recommended guidelines for occupational exposures, including EMF. These guidelines are designed to identify levels that nearly all workers may be exposed repeatedly without adverse effect and, for EMF, suggest patients with pacemakers or similar devices limit their exposure to electric fields to 1 kV/m and magnetic fields to 1,000 mG (ACGIH 2009). Thus the expected levels of magnetic fields on the right-of-way and electric fields just outside the edge of the right-of-way would be less than the ACGIH guideline levels.

3.7.2.5 Induction and Field Perception

Short-term effects from transmission-line electric fields are associated with perception of induced currents and voltages or perception of the field. Under certain conditions, the electric field can be perceived through hair movement on an upraised hand or arm of a person standing on the ground under high-voltage transmission lines. This perception is most likely at midspan under a high-voltage line and less likely in locations where the electric field is less than 2 kV/m. Therefore it is unlikely the field would be perceived beyond the edge of the right-of-way. The presence of vegetation may shield the field and prevent perception. Persons in the cabs of trucks or other vehicles are shielded by the conductive metal of the vehicle from the electric field and induced effects such as shocks.

Induced current or spark discharge shocks can be experienced under certain conditions when a person contacts objects in an electric field. Such effects occur in the fields associated with transmission lines that have voltages of 230kV or higher. Shocks of a magnitude that could be harmful from induced currents would not occur under the existing or proposed lines because clearances aboveground required by the NESC preclude such shocks from large vehicles, and grounding practices eliminate large stationary objects as sources of such shocks.

Minor shocks that produce no harm, but can be annoying or unexpected, can occur under higher voltage transmission lines when making contact with ungrounded conducting objects, such as vehicles or equipment. These shocks would be uncommon and mostly perceived as a nuisance when they occur.

Shocks from electric field induction on large metal objects next to the right-of-way, or magnetic induction on fences, irrigation pipes, pipelines, electrical distribution lines, or telephone lines that form a conducting loop for long distances parallel to a transmission line, can be prevented by utility policies for routinely grounding such installations located on or near the right-of-way.

Limiting the possibility of induced currents flowing from farm machinery and large vehicles under transmission lines to persons is accomplished by maintaining sufficient conductor clearance above vehicles in the final design so the induced short-circuit current in the largest anticipated vehicle under the line is limited to 5 milliamperes (mA) or less per the NESC.

Vehicles should not be refueled under the proposed line unless specific precautions are taken to ground the vehicle and the fueling source.

3.7.3 Environmental Setting

3.7.3.1 Existing Lines and Structures

Existing transmission lines in the vicinity of the Project alternative routes include:

- IPP 500kV DC transmission line
- Sigurd to Red Butte No. 1 345kV transmission line (Sigurd to Three Peaks 345kV and Three Peaks to Red Butte 345kV circuits)
- Sigurd to Cameron 138kV transmission line (Sections 3-5)
- Milford to Cove Fort 46kV sub-transmission line (Section 2)

Existing 500kV Transmission Lines

The Project area includes the existing IPP 500kV transmission line. Unlike the other transmission lines in the Project vicinity, the IPP line is a DC line rather than an AC line. The difference between AC and DC systems is how power moves through the transmission-line conductors. In AC systems, current and voltage reverse polarity, oscillating back and forth 60 times per second (60 Hz). The polarity of a DC line does not oscillate, but remains constant or ―static" like the current flowing from a battery. Hence, the magnetic field from the IPP line is static, like the earth‘s magnetic field that aligns the needle of a compass. For this reason, the IPP line was not modeled in this EMF study.[6]

Existing 345kV Transmission Lines

The existing 345kV transmission lines include the existing Sigurd to Red Butte No. 1– 345kV transmission line, which consists of the Sigurd to Three Peaks 345kV transmission line and the Three Peaks to Red Butte 345kV transmission line. Operation of the Project would carry a portion of the load between the Sigurd and Red Butte substations that is presently carried by these circuits. For modeling purposes, the conductor, bundling, structure type, and ground clearance of both existing lines is the same as for the H-frame tangent structure described in Section 2.3.1.

[6] Electric-field interactions between AC and DC sources will occur in a small area where the proposed 345kV AC line crosses the IPP DC line. Since this configuration does not persist along the preferred route – and only accounts for the fields where AC and DC conductors cross – the IPP crossings were not modeled as part of this EMF study.

The Sigurd to Three Peaks 345kV transmission line is not adjacent to the Project and does not intersect Sections 1-5. The Three Peaks to Red Butte 345kV transmission line, while parallel to the proposed route in Links 275, 444, 441, 221, and 220, is typically located at least 1,500 feet from the Project centerline.[7] At these distances, the interaction between the proposed and existing 345kV transmission lines amounts to less than 0.01 mG change in modeled profiles. For this reason, the existing 345kV circuits were modeled in isolation, rather than as a part of Sections 1-5, to demonstrate how operation of the Project would affect magnetic fields in area transmission corridors.

Existing 138kV Transmission Lines

The existing 138kV transmission lines include the Sigurd to Cameron 138kV transmission line, which consists of the Sigurd to Sevier Tap 138kV circuit and Sevier Tap to Cameron 138kV transmission line. These lines are supported on horizontal H-frame structures (Figure 2-2) and are located between 100 and 150 feet on either side of, and parallel to, the proposed Project. In Sections 3 and 4, all 138kV lines were modeled with 28-foot ground clearance, 13.5-foot horizontal conductor spacing, and single 397.5 kcmil 26/7 ACSR Ibis conductors. Phasing for the existing 138kV lines was supplied by Pike Energy Solutions and is depicted in the EMF profiles for Sections 3 through 5, Appendix I.

Existing 46kV Sub-transmission Line

The existing 46kV circuits include the Milford to Cove Fort 46kV transmission line, which approaches the proposed route in Link 75. In portions of Link 75, the Milford to Cove Fort 46kV transmission line could be rebuilt on the south side of a double-circuit mono-pole tangent structure (Figure B-8). In Section 2, the rebuilt Milford to Cove Fort 46kV was modeled with single No. 6 phase conductors and 345kV transmission line clearances with 30-foot ground clearance and 25-foot vertical separation between phases. Other 46kV transmission lines in the Project vicinity, such as the Sevier to Sulphurdale 46kV transmission line and the Sigurd to Richfield 46kV transmission line, are located at distances of greater than 1,000 feet from the proposed 345kV transmission line. These 46kV circuits were not modeled since, at these distances, the interaction between the proposed 345kV transmission line and existing 46kV transmission lines amounts to less than 0.01 mG change in modeled profiles.

3.7.3.2 Modeled Cross Sections

The modeled sections are longitudinally uniform and located between tangent structures on the Project route. Dead-end or strain structures at points where the proposed 345kV transmission line terminates or changes direction abruptly were not modeled. As with line crossings, regions with abrupt turns alter EMF, audible noise, and radio noise levels in the span of a few hundred feet and are not representative of the EMF and noise levels encountered along the majority of the proposed 160-mile route. Schematic depictions of Sections 1 through 5 are shown in Figure 3-7.

Section 1

This section depicts the proposed Sigurd to Red Butte No. 2 – 345kV transmission line when adjacent lines are located at distances greater than 1,000 feet from the reference centerline. Section 1 is

[7] This excludes crossings, which were not modeled. In the vicinity line crossings, fields from two or more lines alter EMF, audible noise, and radio noise levels in the span of a few hundred feet over the length of the 160-mile route preferred by the Proponent.

representative of the majority of the Project, including the majority of Links 25, 45, 64, 63, 349, 390, 475, 395, 396, 397, 163, 444, 441, 221, and 220. Magnetic-field profiles for the existing Sigurd to Red Butte No. 1 – 345kV transmission lines are modeled on this same structure.

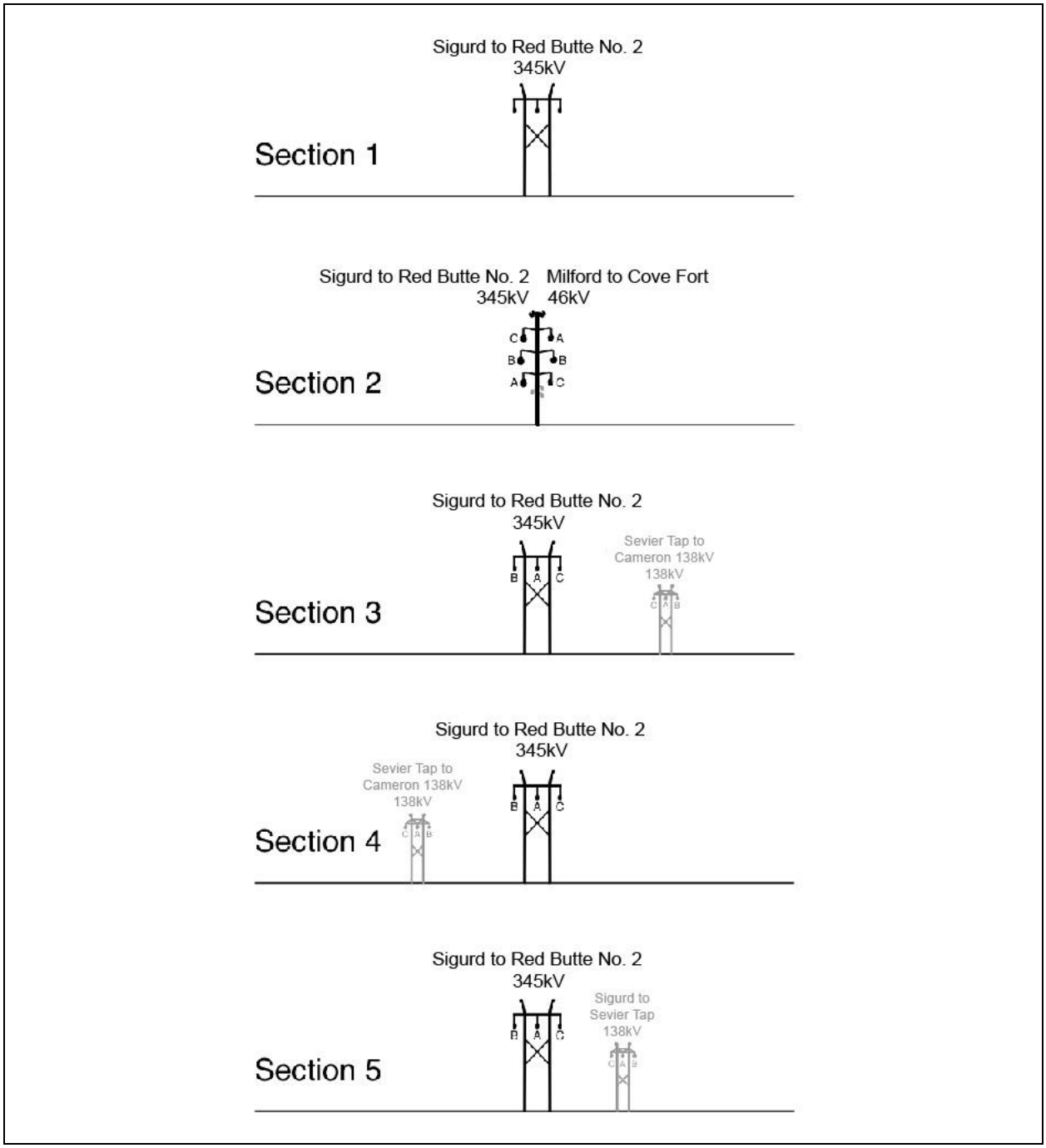


Figure 3-7 Modeled Cross Sections on the Preferred Route of the Project

Section 2

This section depicts the proposed Sigurd to Red Butte No. 2 – 345kV transmission line on the north side (figure left) of a double-circuit structure, with the Milford to Cove Fort 46kV transmission line rebuilt on davit arms on the south side of the structure. The depicted phasing of the 345kV transmission line was selected to minimize average-load magnetic fields at 75 feet on either side of the double-circuit centerline.

Section 3

This section depicts the proposed Sigurd to Red Butte No. 2 – 345kV transmission line 150 feet north of the existing Sevier Tap to Cameron 138kV transmission line. The depicted 345kV phasing was selected to minimize average-load magnetic fields at 75 feet south (right) of the 138kV centerline and 75 feet north (left) of the 345kV centerline.

Section 4

This section depicts the proposed Sigurd to Red Butte No. 2 – 345kV transmission line 140 feet south of the existing Sevier Tap to Cameron 138kV transmission line, with the same phasing selected to minimize average-load magnetic fields at plus or minus 75 feet.

Section 5

This section depicts the proposed Sigurd to Red Butte No. 2 – 345kV transmission line 100 feet north of the existing Sigurd to Sevier Tap 138kV transmission line. The same 345kV phasing was selected to minimize average-load magnetic fields at 75 feet north (left) of the 345kV centerline.

3.7.4 Study Methodology

3.7.4.1 Calculations

Pre- and post-construction EMF, audible noise, and radio noise levels were calculated using computer algorithms developed by the BPA (BPA 1991). The inputs to the program include data regarding voltage, current flow, circuit phasing, and conductor configurations. The resultant fields and noise levels associated with powerlines were estimated along transects perpendicular to the transmission centerline at midspan. These midspan profiles model the transmission lines at the point of greatest conductor sag with a uniform cross-section.[8] Existing and proposed lines were modeled with balanced currents on the phase conductors.

3.7.4.2 Electric and Magnetic Fields

EMFs were calculated at a height of 1 meter (3.28 feet) aboveground in accordance with the standard method for measuring EMF near powerlines (IEEE Standard 1308-1994). EMFs are expressed as the

[8] A "uniform cross-section" means the BPA algorithms model the transmission conductors at a uniform height above flat terrain for the entire distance between adjacent structures.

resultant (root mean square) of magnetic-field components measured in the x, y, and z axes.[9] The electric-field calculations assumed an overvoltage condition of 5 percent for 345kV transmission lines.

Magnetic fields around the existing and proposed transmission lines depend on current, which increases with increasing load. Loadings on existing and proposed lines were provided by PacifiCorp Transmission Planning and are summarized in Tables 3-86, 3-87, and 3-88 (Section 3.7.4.5) as average and peak A per phase. Since magnetic-field exposures at peak loading would be expected to occur only for a limited number of hours on a limited number of days each year, the calculated field levels at annual average loading provide a better estimate of typical potential exposures. Magnetic fields calculated at annual average loading are depicted in the graphical profiles in Appendix I.

3.7.4.3 Audible Noise

Audible noise levels across the right-of-way, L_{50} fair and L_{50} rain, are reported for the existing and proposed 345kV transmission lines at a height of 5 feet aboveground at 6,000 feet msl. The 5-foot height estimates the sound-pressure level that would be perceived by a standing listener. When computed according to the BPA methods used in this EIS, the median audible noise levels during average fair weather are 25 dBA lower than foul weather (stable rain values).

3.7.4.4 Radio Noise

Radio noise levels are expressed as median values for fair or foul weather (steady rain) conditions for a 1-meter high antenna and a signal at 500 kHz. When computed according to the BPA methods used in this EIS, median radio noise levels during average fair weather values are 24 dBμV/m lower than median radio noise levels calculated during foul weather (stable rain values).

3.7.4.5 Loads

PacifiCorp Transmission Planning provided a list of the transmission and sub-transmission lines that could be on the same corridor as the proposed Sigurd to Red Butte No. 2 – 345 kV transmission line and current estimates for the year 2014, the in-service date of the proposed transmission line. Loads were supplied with and without the proposed 345kV transmission line in service, and power flows and historical data were used to estimate the maximum and average current flows on these lines for normal operating conditions.

The peak line currents are shown below in Tables 3-86 and 3-87. These currents assume the imports from (Table 3-85) or exports to (Table 3-86) Nevada Energy‘s southern system were at their rated limits and assume peak summer loads in southwestern Utah. The maximum current estimates in Tables 3-85 and 3-71 are for normal operating conditions, with all lines in service. For all peak-load magnetic-field modeling, currents for the north to south (export) tie-line-schedule in Table 3-87 were used since export conditions resulted in higher transfer between the Sigurd and Red Butte substations.

[9] Root-mean-square refers to a common method of reporting the effective magnitude of voltage, current, or electromagnetic fields of an AC system. The x, y, and z axes refer to the vertical, transverse, and longitudinal directions relative to the transmission centerline. The BPA algorithms assume a uniform right-of-way cross-section with no longitudinal component of the magnetic field.

TABLE 3-85
CURRENT FLOWS DURING MAXIMUM IMPORT CONDITIONS FROM NEVADA ENERGY'S SOUTHERN SYSTEM (SOUTH-NORTH TIE LINE SCHEDULES)

Transmission Line	Project In-service		Project Not In-service	
	Currents (A)	Phase Angle (deg)	Currents A	Phase Angle (deg)
Sigurd[1] to Three Peaks 345 kV line	126	51.5	153	45.5
Three Peaks[1] to Red Butte 345 kV line	74	27.8	37	30.3
Sigurd[1] to Red Butte No. 2 345 kV line	113	71.9	–	–
Sigurd[1] to Sevier Tap 138 kV line	135	2.3	139	3.1
Sevier Tap[1] to Cameron 138 kV line	61	22.9	65	23.1
Milford[1] to Cove Fort 46 kV line	18	77.9	17	77.0
Sigurd[1] to Richfield 46 kV line	187	26.1	186	26.1

NOTE: [1] Currents measured from indicated bus.

TABLE 3-86
CURRENT FLOWS DURING MAXIMUM EXPORT CONDITIONS TO NEVADA ENERGY'S SOUTHERN SYSTEM (NORTH-TO-SOUTH) TIE LINE SCHEDULES

Transmission Line	Project In-service		Project Not In-service	
	Currents (A)	Phase Angle (deg)	Currents A	Phase Angle (deg)
Sigurd[1] to Three Peaks 345 kV line	955	8.1	1643	0.2
Three Peaks[1] to Red Butte 345 kV line	840	6.3	1593	9.1
Sigurd[1] to Red Butte No. 2 345 kV line	1053	5.0	–	–
Sigurd[1] to Sevier Tap 138 kV line	157	6.7	204	3.5
Sevier Tap[1] to Cameron 138 kV line	89	23.7	130	15.5
Milford[1] to Cove Fort 46 kV line	15	70.1	19	42.3
Sigurd[1] to Richfield 46 kV line	187	26.1	186	26.1

NOTE: [1]Currents measured from indicated bus.

For purposes of magnetic-field modeling, the average currents during normal operating conditions are presented in Table 3-87. The average currents for the 345kV transmission lines are derived from peak currents (Table 3-86) and the historical relationship between peak and average flows on the existing Sigurd to Three Peaks to Red Butte 345kV transmission line.[10]

TABLE 3-87
AVERAGE CURRENT FLOWS DERIVED FROM MAXIMUM EXPORT CONDITIONS TO NEVADA ENERGY'S SOUTHERN SYSTEM (NORTH-TO-SOUTH TIE LINE SCHEDULES)

Transmission Line	Project In-service		Project Not In-service	
	Currents (A)	Phase Angle (deg)	Currents A	Phase Angle (deg)
Sigurd[1] to Three Peaks 345 kV line	598	26.8	1003	19.7
Three Peaks[1] to Red Butte 345 kV line	510	15.5	924	18.2
Sigurd[1] to Red Butte No. 2 345 kV line	648	33.8	–	–
Sigurd[1] to Sevier Tap 138 kV line	145	4.4	169	3.3
Sevier Tap[1] to Cameron 138 kV line	74	23.3	95	19.5
Milford[1] to Cove Fort 46 kV line	17	74.2	18	60.7
Sigurd[1] to Richfield 46 kV line	187	26.1	186	26.1

NOTE: [1]Currents measured from indicated bus.

[10]In the historical data considered, there was no load at the Three Peaks Substation.

3.7.5 Results

3.7.5.1 Magnetic Fields

Figures I-1 to I-7 in Appendix I depict calculated magnetic-field profiles for average load in Sections 1 to 5, as well as in area transmission corridors off the Project route. Calculated magnetic-field values are tabulated at the end of Appendix I for the average-load case (Table I-1) and peak-load case (Table I-2).

In Section 1 (Figure I-1), the calculated magnetic-field level at the edge of the right-of-way is 34.0 mG under average-load conditions. Under peak-load conditions, corresponding to projected peak summer loads in 2014, the highest calculated magnetic field at the right-of-way edge is 58.8 mG.

Because the proposed 345kV transmission line increases transfer capability between the Sigurd and Red Butte substations, operation of the Project decreases magnetic fields on the route of the existing Sigurd to Three Peaks and Three Peaks to Red Butte 345kV transmission lines. At 75 feet from the centerline of the Sigurd to Three Peaks 345kV circuit, operation of the Project decreases calculated magnetic-field levels (53 mG) by approximately 45 percent under average-load conditions (Figure I-2). Likewise, at 75 feet from the centerline of the Three Peaks to Red Butte 345kV circuit, operation of the Project is anticipated to decrease magnetic fields (49 mG) by approximately 40 percent (Figure I-3).

In Section 2 (Figure I-4) the magnetic-field levels are dominated by current on the 345kV circuit. Under modeled loading conditions, little cancellation of fields is realized by phasing selection. Nevertheless, the depicted 345kV phasing was selected to minimize average-load magnetic fields at 75 feet on either side of the double-circuit centerline.

In Sections 3 to 5 (Figure I-5 to I-7), the phasing of the proposed circuit (BAC) was designed to maximize cancellation of magnetic fields. On the 345kV side of the widened corridor, the calculated magnetic field levels under average-load conditions range between 33.5 and 33.9 mG.[11] On the 138kV side of widened corridor, operation of the Project results in small changes in the calculated magnetic field (<0.3 mG) compared to the existing case, assuming average load.

3.7.5.2 Electric Fields

Figures I-8 to I-12 in Appendix I depict calculated electric-field profiles for average line heights in Sections 1 to 5. Calculated electric-field values are tabulated at the end of Appendix I for average and minimum conductor heights (Table I-3). At peak-load conditions and a minimum ground clearance of 30 feet, the highest calculated electric field beneath the conductors of the proposed 345kV transmission line is 6.6 kV/m. This value of the electric field will be encountered for a few hours each year during periods of peak load, and only at the point of lowest wire sag within some spans. The highest calculated electric-field level at the edge of the right-of-way associated with the operation of the Project is below limits recommended by the ICNIRP and the ICES for the general public.

[11] See Appendix I. Because of the cancellation of fields between adjacent 345kV and 138kV circuits, calculated fields on the 345kV side of the corridor are less than magnetic field levels (34.0 mG) calculated for the 345kV transmission line in isolation.

3.7.5.3 Audible Noise

Figures I-13 to I-17 in Appendix I depict calculated audible-noise profiles for average line heights in Sections 1 to 5. Calculated audible-noise levels are tabulated at the end of Appendix I for average conductor heights (Table I-4). The levels of audible noise from AC transmission lines are higher in foul weather than fair weather. In fair and foul weather, the existing lines are not significant sources of audible noise. In fair weather, the audible noise from the additional line would be hard to detect. Assuming 10 percent occurrence of foul weather and no ambient noise, the calculated levels of foul-weather audible noise outside the right-of-way are lower than the EPA‘s guideline of 55 dBA (EPA 1974).

3.7.5.4 Radio Noise

Figures I-18 to I-22 in Appendix I depict calculated radio-noise profiles for average line heights in Sections 1 to 5. Calculated radio-noise levels are tabulated at the end of Appendix I for average conductor heights (Table I-5). The existing and proposed transmission lines meet the criterion for fair-weather radio noise recommended in the IEEE Radio Noise Design Guide (IEEE 1971).

3.7.6 Summary

The existing and proposed circuits between the Sigurd and Red Butte substations are sources of EMFs, audible noise, and radio noise. This section includes calculated levels of EMF, audible noise, and radio noise at representative locations along the Project route, accounting for existing and proposed circuits.

3.7.6.1 Magnetic Fields

The calculated magnetic field levels associated with the operation of the Project would be below limits for the general public recommended by ICNIRP and ICES. Along the majority of the Project route, where the Project centerline is more than 500 feet distant from existing transmission facilities, the calculated magnetic-field level at the edge of the right-of-way[12] is 34 mG under average-load conditions.[13] Under peak-load conditions, corresponding to projected peak summer loads in 2014, the highest calculated magnetic field at the right-of-way edge is 59 mG.

Because the Project would increase transfer capability between the Sigurd and Red Butte substations, operation of the Project would decrease magnetic fields on the route of the existing Sigurd to Three Peaks and Three Peaks to Red Butte 345kV transmission lines. At 75 feet from the centerline of the Sigurd to Three Peaks 345kV circuit, operation of the Project decreases calculated magnetic-field levels (53 mG for existing lines operating in 2014) by approximately 45 percent under average-load conditions. Likewise, at 75 feet from the centerline of the Three Peaks to Red Butte 345kV circuit, operation of the Project is anticipated to decrease magnetic-field levels at the edge of the right-of-way (49 mG for existing lines operating in 2014) by approximately 40 percent.

In portions of the Project where the transmission line parallels existing 138kV circuits within 300 feet, the phasing of the proposed circuit was designed to maximize the mutual cancellation of magnetic fields from

[12] The proposed Sigurd to Red Butte No. 2 – 345kV transmission line is modeled in the center of a proposed right-of-way with 150-foot nominal width.

[13] See discussion of loading cases, below. Average load refers to the projected average currents for a 2014 in-service date, assuming north-to-south tie-line schedules (i.e., export to the Nevada Energy southern system).

adjacent circuits. In widened corridors containing both existing 138kV transmission lines and the proposed 345kV circuit, the change in magnetic field is confined largely to the side of the corridor nearest the proposed circuit. On the 345kV side of the widened corridor, the calculated magnetic field levels under average-load conditions range between 33.5 and 33.9 mG.[14] On the 138kV side of widened corridor, operation of the Project would result in small changes in the calculated magnetic field (<0.3 mG) compared to the existing case, assuming average load.

3.7.6.2 Electric Fields

The highest calculated electric-field level associated with the operation of the Project is below limits recommended by the ICNIRP and the ICES for the general public outside the right-of-way. At peak-load conditions and a minimum ground clearance of 30 feet, the highest calculated electric field beneath the conductors of the proposed 345kV transmission line is 6.6 kV/m. This value of the electric field would be encountered for a few hours each year during periods of peak load, and only at the point of lowest wire sag within some spans.

3.7.6.3 Audible Noise

The levels of audible noise from AC transmission lines are higher in inclement/stormy weather than fair weather. In fair weather, the audible noise from the additional line would be hard to detect. Assuming 10 percent occurrence of foul weather and no ambient noise, the calculated levels of audible noise outside the right–of-way are lower than the EPA‘s guideline of 55 dBA (EPA 1974).

3.7.6.4 Radio Noise

The existing and proposed transmission lines meet the criterion for fair-weather radio noise recommended in the IEEE Radio Noise Design Guide (IEEE 1971)

[14] See Appendix I. Because of the cancellation of fields between adjacent 345kV and 138kV circuits, calculated fields on the 345kV side of the corridor are less than magnetic field levels (34.0 mG) calculated for the 345kV line in isolation.