Chapter 3

AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing environment, including the physical environment, natural environment, and human-made resources and uses that would be affected by the action alternatives. The affected environment in this Final EIS has been updated to include additional data on the existing conditions for the route variations new to the Final EIS (P7a–d and U3aPC).

3.1.1 General Setting of the Project

The proposed Project is located on private and public lands in Arizona and New Mexico. Land managing agencies include BLM, Coronado National Forest (Dragoon Mountains near the town of Dragoon), Reclamation, BIA (the San Xavier District of the Tohono O'odham Nation in Arizona), NMSLO, and ASLD. In New Mexico, the proposed Project and action alternatives would be located within Doña Ana, Grant, Hidalgo, and Luna counties; in Arizona, the proposed Project and action alternatives would be located in Cochise, Pima, Pinal, Graham, and Greenlee counties.

The four counties in New Mexico are located in the southwest corner of the state. This region can be characterized as a rural, relatively unfragmented landscape. Historically, this part of southwestern New Mexico has had natural resource–dependent, extractive use–based economies with activities like ranching, farming, and mining. In southeastern Arizona, this region includes pockets of extractive uses such as mining and agriculture; it also includes unfragmented rural landscapes and recreation and urban activity centers (i.e., Tucson).

The New Build Section of the Project would be located within the Mexican Highland Subprovince of the Basin and Range Physiographic Province. The Basin and Range Physiographic Province is characterized by numerous elongated, subparallel mountain ranges and intervening broad alluvial basins that formed during Late Cenozoic extension. The Upgrade Section of the Project would be located in the eastern edge of the Sonoran Desert Subprovince of the Basin and Range Physiographic Province. The Basin and Range Physiographic Province is a region dominated by basins filled with sediments separated by uplifted mountain blocks. Major basins include the Avra Valley, Tucson Basin, San Pedro Valley, and Willcox Playa (Trapp and Reynolds 1995). The San Pedro River drains the San Pedro Basin. Mountain ranges include the Tucson Mountains, west of Tucson; the Tortolita Mountains, northwest of Tucson; the Santa Catalina Mountains, northeast of Tucson; and the Rincon Mountains, east of Tucson.

The proposed Project would cross six biotic communities of the Southwest (Brown and Lowe 1980), including Semidesert Grassland, Chihuahuan Desertscrub, Playa, Arizona Upland Subdivision of Sonoran Desertscrub, Lower Colorado River Subdivision of Sonoran Desertscrub, and Madrean Evergreen Woodland.

3.1.2 Resource Values and Uses Brought Forward

Based on internal (agency and cooperator) and external (public) scoping, a number of issues and concerns were identified for analysis in this EIS (see section 1.13 and table 1-9 in chapter 1). The following resource values and uses are described (Chapter 3, "Affected Environment"), in order to analyze and respond to the issues and concerns (Chapter 4, "Environmental Consequences"):

- Air quality, sections 3.2 and 4.2
- Noise and vibration, sections 3.3 and 4.3
- Geology and mineral resources, sections 3.4 and 4.4
- Soil resources, sections 3.5 and 4.5
- Paleontological resources, sections 3.6 and 4.6
- Water resources, sections 3.7 and 4.7
- Biological resources, sections 3.8 and 4.8
- Cultural resources, sections 3.9 and 4.9
- Visual resources, sections 3.10 and 4.10
- Land use, including farm and range resources and military operations, sections 3.11 and 4.11
- Special designations, sections 3.12 and 4.12
- Wilderness characteristics, sections 3.13 and 4.13
- Recreation, sections 3.14 and 4.14
- Socioeconomics and environmental justice, sections 3.15 and 4.15
- Public health and safety (including electromagnetic interference), sections 3.16 and 4.16
- Hazardous materials and hazardous and solid waste, sections 3.17 and 4.17
- Transportation, sections 3.18 and 4.18
- Intentional acts of destruction, sections 3.19 and 4.19
- National Scenic and Historic Trails, appendix F

3.1.3 Analysis Area

The analysis area varies for the New Build and Upgrade sections of the Project and by resource value or use in the following resource sections.

Affected Environment

In describing the affected environment and existing conditions (here in chapter 3) across the proposed Project, for the New Build Section and action alternatives, the geographic direct impact analysis area for all resources except those listed below is 1 mile on either side of a representative centerline(s), or a 2-mile-wide corridor analysis area. For the Upgrade Section of the Project and alternatives, the geographic area of analysis for all resources except those listed below is 500 feet (200 feet off the existing 100-foot corridor).

New Build Section analysis area exceptions for chapter 3 (affected environment):

1. Air quality: based on regional airshed (approximately 31 miles off centerline).
2. Visual resources: 5 miles off centerline; 10-mile corridor.
3. Transportation: 5 miles off centerline; 10-mile corridor (needs to include all new access roads).
4. Socioeconomics: county level only; no "corridor."

Upgrade Section analysis area exceptions:

1. Air quality: based on regional airshed (approximately 31 miles off centerline).
2. Visual resources: 5 miles off centerline; 10-mile corridor.
3. Cultural resources: 1 mile off centerline; 2-mile corridor.
4. Transportation: 5 miles off centerline; 10-mile corridor (needs to include all new access roads).
5. Socioeconomics: county level only; no “corridor.”

In the following sections of chapter 3, current conditions are characterized within these analysis areas. The analysis areas were determined to allowing routing flexibility for final design, to allow adequate geographic coverage for where direct and indirect impacts could occur, and to characterize the broader environment where the proposed Project would be located.

Environmental Consequences

Chapter 4 will discuss the environmental consequences of the direct impacts of the proposed project within a 150- to 200-foot-wide representative ROW. A representative ROW was identified for the Project’s New Build and Upgrade sections, where the majority of ground disturbance resulting from the proposed Project is expected to occur.

Based on Southline’s request for a 200-foot ROW for the New Build Section (see table 2-1 in chapter 2), the representative ROW for the New Build Section of the proposed Project is 200 feet wide. This 200-foot representative ROW applies to all segments, subroutes, local alternatives, and route variations in the New Build Section.

Based on Southline’s request to expand Western’s existing 100-foot ROW to up to 150 feet in places, the representative ROW for the Upgrade Section of the project is 100 to 150 feet wide, except between the Del Bac and Rattlesnake substations and across Bar V Ranch where the ROW would not be expanded (see chapter 2). This 100- to 150-foot representative ROW applies to all segments, subroutes, local alternatives and route variations in the Upgrade Section.

This EIS has been developed based on available information deemed adequate to characterize expected impacts to the extent that the intensity, context, magnitude, and duration are understood for each affected resource. Any ROW relocation, additional construction, or use that is not analyzed in this EIS, in accordance with the approved POD, or addressed in the ROW grant, would not be initiated without the prior written approval of the appropriate authorized officer (see section 2.4.7, “Project Design Refinements (Variance Process)”). Requests not covered by the analysis in the EIS will be considered in the context of guidance at 40 CFR 1502.9(c) regarding when supplementation is appropriate.

3.2 AIR QUALITY

The primary factors that influence regional ambient air are the locations of air pollution sources, the quantity and chemical characteristics of the pollutants emitted by those sources, the topography of the region, and the local meteorological conditions. Some of the information provided in the following subsections is taken from a report titled “Southline Transmission Project Resource Report 01: Air Quality and Climate Change” (CH2M Hill 2013a). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

3.2.1 Analysis Area

The air quality analysis area for both the New Build and Upgrade sections and the alternative routes and segments is a 50-kilometer (km) radius (approximately 31 miles) along the centerline. The 50-km radius was used in order to be consistent with minimum air quality analyses required by prevention of significant deterioration (PSD) guidelines, if applicable, and the Arizona Department of Environmental Quality (ADEQ) and NMED modeling guidelines. While the proposed Project and alternatives are not a PSD source, two of the purposes of the PSD program are to prevent violations of the National Ambient Air Quality Standards (NAAQS) and the environment and to protect the air quality and visibility in special designated areas. Figure 3.2-1 shows the air quality analysis area for the proposed Project.

3.2.2 Laws, Ordinances, Regulations, and Standards

The following section provides a summary of Federal, State, and local laws, regulations, and standards that govern activities that could affect air quality resources across the air quality analysis area.

Federal

CLEAN AIR ACT AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Since 1963, the Clean Air Act (CAA) and subsequent amendments in 1970, 1977, and 1990 have provided the authority and framework for EPA regulation of air emission sources. Regulations have been promulgated pursuant to the CAA to serve as requirements for the monitoring, control, and documentation of activities that will affect ambient concentrations of pollutants that may endanger public health or welfare.

Title I of the CAA requires the EPA to establish NAAQS for pollutants considered harmful to public health and the environment. The EPA established NAAQS for six common principal pollutants (“criteria” pollutants) found all over the United States (EPA 2013). Those criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone (O_3), lead (Pb), and particulate matter (PM), including PM equal to or less than 10 microns in diameter (PM_{10}) and PM equal to or less than 2.5 microns in diameter ($PM_{2.5}$).

The CAA identifies two types of NAAQS: primary and secondary. Primary standards provide public health protection, including protecting the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. These standards are defined in terms of threshold concentration measured as an average for specified periods of time. Pollutants with acute health effects were given short-term standards, and pollutants with chronic health effects were given long-term standards. The NAAQS are presented in table 3.2-1.

The EPA assigns classifications to geographic areas based on monitored ambient air quality conditions. Areas that meet both the primary and secondary standards of a pollutant subject to NAAQS are classified as being in attainment for that pollutant. Areas that do not meet the NAAQS for a pollutant are designated as being in nonattainment for that pollutant. Areas that cannot be classified based on available information for a pollutant are designated as being unclassified. An area’s attainment status is designated separately for each criteria pollutant; one area may have all three classifications. Previously designated nonattainment areas for one of the NAAQS that have since met the NAAQS standards are referred to as attainment areas with a maintenance plan. To ensure that the air quality in those areas continues to meet the standards, a maintenance plan is developed and implemented.

Table 3.2-1. National Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards	
	Averaging Time	Level	Averaging Time	Level
CO	1 hour [a] 8 hour [a]	35 ppm 9 ppm	– –	– –
Pb	3 months (rolling) [b]	0.15 µg/m^3	3 months (rolling) [b]	Same as primary
NO_2	Annual [c] 1 hour [d]	0.053 ppm 0.100 ppm	Annual [c]	Same as primary
O_3	8 hour [e]	0.075 ppm	8 hour [e]	Same as primary
PM_{10}	24 hour [f]	150 µg/m^3	24 hour [f]	Same as primary
$PM_{2.5}$	24 hour [g] Annual [h]	35 µg/m^3 12 µg/m^3	24 hour [g] Annual [h]	Same as primary 15 µg/m^3
SO_2	1 hour [i]	0.075 ppm	3 hour [j]	0.5 ppm

Source: EPA (2013).

Notes:

µg/m^3 = micrograms per cubic meter.

ppm = parts per million.

[a] Not to be exceeded more than once per year.

[b] Not to be exceeded.

[c] Annual mean.

[d] The 3-year average of the 98th percentile of the daily maximum 1-hour average must not exceed this standard.

[e] The 3-year average of the 4th-highest daily maximum 8-hour average O_3 concentration measured at each monitor within an area over each year must not exceed this standard.

[f] Not to be exceeded more than once per year on average over 3 years.

[g] The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed this standard.

[h] The 3-year average of the annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed this standard.

[i] The 3-year average of the annual 99th percentile of the 1-hour daily maximum must not exceed this standard.

[j] Not to be exceeded more than once per year.

Various air pollutants did not meet the specific criteria for development of a NAAQS and are labeled hazardous air pollutants (HAPs). HAPs are known or suspected to cause cancer or other serious health effects such as reproductive health or birth defects, or adverse environmental impacts. Section 112 of the CAA lists 187 HAPs to be regulated by National Emission Standards for Hazardous Air Pollutants (NESHAPs). The EPA approaches HAPs with control technologies rather than set standards, because developing risk-based standards for each HAP is a difficult task. Therefore, NESHAPs regulate emissions from specific emission units and source types. The proposed Project and alternatives would not have stationary sources of HAPs and therefore would not be subject to NESHAPs.

The EPA promulgated the Exceptional Events Rule to address events that result in exceedances of the NAAQS that are exceptional in nature in 40 CFR Parts 50 and 51 on March 22, 2007. Exceptional events affect air quality, are not reasonably controllable or preventable, and are either caused by human activity unlikely to recur in a particular location or are natural events.

PREVENTION OF SIGNIFICANT DETERIORATION AND CLASS I AND II AREAS

New projects within attainment or unclassified areas must demonstrate conformance with limits defined under the PSD program. Two of the purposes of the PSD program are to prevent violations of the NAAQS and the environment and to protect the air quality and visibility in special designated areas.

While the proposed Project and alternatives are not a PSD source, the PSD requirements provide maximum allowable increases in pollutant concentrations for areas that are already in compliance with the NAAQS. These limited increases are designated increments, and as a new PSD source is permitted, the amount of available increment in an airshed is reduced. Certain sensitive areas, defined as Class I areas under the CAA, have a smaller allowable incremental increase in new emissions than Class II and III areas. Areas such as international parks, national parks greater than 6,000 acres, national memorial parks larger than 5,000 acres, and national wilderness areas larger than 5,000 acres are granted Class I status and the highest level of air quality protections under section 162(a) of the CAA. Class II areas are allowed more moderate pollution increases. Class III areas are areas that do not have any air quality standards, and the air quality may be degraded to levels in line with the NAAQS. To date, no Class III areas have been designated; therefore, all areas not established as Class I areas are designated as Class II areas. The maximum allowable PSD increments over baseline, significant impact levels (SILs), and monitoring de minimis concentrations are presented in appendix B.

In 1999, the EPA announced an effort to improve air quality and visibility in 156 national parks and wilderness areas designated as Class I, known as the Regional Haze Rule (EPA 1999). Regional haze reduces long-range visibility over a wide region. Section 169A of the CAA sets forth a national goal for visibility. States are required by the rule to demonstrate reasonable progress towards the “prevention of any future, and the remedying of any existing, impairment in Class I areas which impairment results from manmade air pollution.”

New Mexico and Arizona have Class I and II areas that could be affected by the proposed Project. There are 9 Class I areas in New Mexico and 12 in Arizona. Because emissions from activities related to the proposed Project and alternatives would be temporary and localized to the immediate vicinity of the proposed Project and alternatives, only those Class I areas that would be located closest to such activities are of concern. The Class I area in New Mexico that would be closest is the Gila Wilderness in northern Grant County, located approximately 40 miles from the proposed Project route, and outside the analysis area. There are four Class I areas within the analysis area in Arizona. The closest Class I areas in Cochise County are the Chiricahua National Monument and the Chiricahua Wilderness Area, which are 15 and 20 miles south, respectively, of the New Build Section proposed route and 20 miles east of the Upgrade Section proposed route. The Saguaro Wilderness Area in Pima County is 5 miles north of the Upgrade Section. Saguaro National Park–West is the closest Class I area to the proposed Project and alternatives and is located approximately 1 mile west of the Upgrade Section, northwest of Tucson. Figure 3.2-1 shows the Class I and special designation areas closest to the proposed Project and alternatives.

State and Local Regulations

Under the provisions of the CAA, any state can have requirements that are more stringent than those of the national program. In addition to the NAAQS established by the EPA, New Mexico has additional ambient air quality standards (AAQS) that apply. This section discusses State and local regulations and possible required permits that may be applicable to the proposed Project.

NEW MEXICO

The New Mexico Air Quality Control Act is codified in NMSA, Chapter 74, Article 2. Rules pertaining to air quality are found in Title 20, Chapter 2, of the NMAC, administered by the NMED Air Quality Bureau in all areas of the state except Bernalillo County and tribal lands. The State of New Mexico has additional AAQS in addition to the NAAQS established by the EPA. The New Mexico Ambient Air Quality Standards (NMAAQS) are shown in table 3.2-2.

Table 3.2-2. New Mexico Ambient Air Quality Standards

Pollutant	Averaging Time	Level
CO	1 hour 8 hour	13.1 ppm 8.7 ppm
NO_2	1 hour Annual	0.10 ppm 0.05 ppm
Total Suspended Particulates	24 hour 7 day 30 day Annual [a]	150 µg/m^3 110 µg/m^3 90 µg/m^3 60 µg/m^3
SO_2	24 hour Annual	0.10 ppm 0.02 ppm
Hydrogen sulfide (H_2S)	1 hour [b]	0.010 ppm
Total reduced sulfur	½ hour	0.003 ppm

Notes: µg/m^3 = micrograms per cubic meter.
ppm = parts per million.
[a] Annual geometric mean.
[b] Not to be exceeded more than once per year.

At the New Mexico State level, temporary sources, such as concrete batch plants, can obtain an NOI for a CGP from the State if the facility meets certain regulatory thresholds. Emission rates above 10 tons per year (tpy) of any regulated air pollutant (with the exception of lead), require submittal of an NOI to the State for the facility; emission rates greater than 25 tpy of criteria pollutants require a permit to construct. A CGP for concrete batch plants is available from the State if the facility meets certain siting, sizing, and regulatory requirements (e.g., facility is not subject to any NESHAP or Maximum Achievable Control Technology standards; facility has production rates equal to or less than 2,400 cubic yards per day) (20.2.72 New Mexico Administrative Code (NMAC)).

Doña Ana County and Luna County have additional ordinances that apply to the proposed Project and alternatives. Grant and Hidalgo counties have no additional county-specific air quality regulations that apply to the proposed Project and alternatives. County-specific regulations for Doña Ana County and Luna County are discussed below.

ARIZONA

In Arizona, air quality statutes are codified in Arizona Revised Statutes (ARS), Title 49, Chapter 3. Air quality regulations in Arizona are codified in the Arizona Administrative Code (AAC), Title 18, Chapter 2. The State of Arizona has incorporated the NAAQS by reference and does not have any additional ambient air quality standards. Two Arizona counties (Pima and Pinal) associated with the proposed Project and alternatives have their own air pollution control programs and operate pursuant to ARS 49-402.

As stated in section 2.4.3 in chapter 2, existing concrete batch plants will be used where available, and new concrete batch plants will obtain the appropriate permits. For concrete batch plants, regulations at the State of Arizona level provide an application to permit the source under a concrete batch plant general permit in lieu of an individual permit. The concrete batch general permit allows for portable concrete batch plants to move to other locations statewide. For attainment areas, concrete batch plants producing less than 1,280 cubic yards on generator power or 1,310 cubic yards on commercial electric power may be permitted under the general permit. For nonattainment areas, concrete batch plants producing less than 930 cubic yards on generator power or 960 cubic yards on commercial electric power can apply for a general permit.

Air quality regulations governing general construction activities are codified at AAC R18-2-604(A) and (B), R18-2-605, and R18-2-804. These regulations require that reasonable precautions be made to limit excessive amounts of PM from becoming airborne from sites or activities such as open areas, roadways and streets, and site cleaning machinery.

Cochise, Pima, and Pinal counties have additional county-specific ordinances and/or air quality regulations that apply to the proposed Project and alternatives. Greenlee and Graham counties have no additional county-specific air quality regulations that apply to the proposed Project and alternatives. County-specific regulations for Cochise, Pima, and Pinal counties are discussed below.

COUNTY

Table 3.2-3 presents air quality–related laws, ordinances, regulations, and standards that have been adopted at the county level.

Table 3.2-3. Applicable County Plans, Laws, Ordinances, Regulations, and Standards Related to Air Quality

Jurisdictional	Laws, Ordinances, Regulations, and Standards	Project Consistency with Laws, Ordinances, Regulations, and Standards
Doña Ana County, New Mexico		
Ordinance 194-2000 on Erosion Control Regulations (Doña Ana County 2000)	Requires an erosion control plan approved by the county planning director to minimize the creation or aggravation of erosive forces. Further information regarding the requirements of an erosion control plan is provided in appendix B.	Expected
Luna County, New Mexico		
Ordinance 75 on Buildings (Luna County 2010)	Requires a plan approved by the officer to prevent soil, sand, dust, building materials, construction waste, and other materials from being blown by the wind from the land.	Expected
Cochise County, Arizona		
Ordinance 00-030 on Land Clearing (Cochise County 2000)	Any activity that includes the clearing of more than 1 acre of land is required to have a clearing permit from the county. Further information regarding the requirements of a clearing permit is provided in appendix B.	Expected
Pima County, Arizona		
Pima County Air Quality Control District Code of Regulations, Title 17, Air Quality Control (Pima County 2013)	Pima County incorporates the NAAQS by reference. Specific permitting and emission limitations regulations apply for Class I areas and nonattainment areas. The county has dust control regulations associated with the permitting program. Further information on county dust control regulations are discussed in appendix B.	Yes
Pinal County, Arizona		
Pinal County Air Quality Control District Code of Regulations (Pinal County 2010b)	The Pinal County air quality standards are similar to the NAAQS. The county also has dust control regulation associated with the permitting program. The requirements of the dust control regulation in relation to the proposed Project are discussed further in appendix B.	Yes

3.2.3 Issues to Be Analyzed

Conformity

States and local authorities have the responsibility for bringing their regions into compliance with the NAAQS or the more stringent AAQS that they may adopt. State Implementation Plans (SIPs) are EPA-approved plans that set forth the pollution control requirements applicable to the various sources addressed by each SIP. Section 176(c) of the CAA (42 USC 7506(c)) prohibits Federal agencies from taking actions in nonattainment and maintenance areas unless the emissions from the actions conform to the SIP or Tribal Implementation Plan for the area. Federal actions must be evaluated for conformity to the local SIP if the project: (1) is located within an EPA-designated nonattainment or maintenance area, (2) would result in emissions above major source threshold quantities of criteria pollutants, (3) is not a listed exempt action, and (4) has not been accounted for in an EPA-approved SIP.

All Federal actions require a general conformity analysis unless otherwise exempt. Actions covered by the separate transportation conformity, actions with clearly de minimis emissions, actions listed as exempt in the rule, or actions covered by a presumed-to-conform approved list are exempt from a general conformity analysis. The BLM has issued a fact sheet on general conformity, released September 29, 2014 (BLM 2014a). In an area with a SIP, conformity can be demonstrated as follows: (1) by showing that emission increases are included in the SIP, (2) by demonstrating that the State agrees to include increases in the SIP, (3) by offsetting the action's emissions in the same or nearby area; (4) through mitigation to reduce the emission increase, or (5) through an air quality modeling demonstration in some circumstances. Some emissions are excluded from conformity determination, such as those already subject to new source review, those covered by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or compliance with other environmental laws, actions that are not reasonably foreseeable, and those for which the agency has no continuing program responsibility.

Attainment/Nonattainment Areas

The New Build Section of the proposed Project and alternatives would cross four counties in New Mexico and between one to three counties in Arizona, depending on the subroute and alternatives chosen. None of the New Build Section segments would cross a nonattainment, maintenance, or Class I area.

The Upgrade Section of the proposed Project and alternatives would cross three counties in Arizona. Part of the section would pass through the Rillito area (a nonattainment area for PM_{10}) and the Tucson area (a maintenance area for CO). Figures 3.2-2a and 3.2-2b show the nonattainment and maintenance areas applicable to the proposed Project and alternatives.

DOÑA ANA COUNTY, NEW MEXICO

Presently, a nonattainment area for PM_{10} is next to the city of Anthony, New Mexico. However, the New Build Section of the proposed Project and alternatives close to Afton, New Mexico, would be located a few miles west of the nonattainment zone of the city of Anthony.

In 1995, the EPA declared a 42-square-mile region in the southeast corner of Doña Ana County (including Sunland Park and adjacent areas) as a marginal nonattainment area for the 1-hour O_3 standard (EPA 1995). The 1-hour O_3 standard was revoked by the EPA in 2004 with the adoption of a new 8-hour O_3 standard; Sunland Park was redesignated to maintenance for this new standard (NMED 2004). In March 2008, the Federal Government lowered the NAAQS for O_3 from 0.08 parts per million (ppm) to 0.075 ppm (EPA 2008). Because of the lowering of the Federal standard, the State has recommended that Sunland Park (including the communities of Santa Teresa and La Union) be designated as being in nonattainment for the revised 8-hour O_3 standard (EPA 2008). The New Build Section would be located a few miles north of this area.

LUNA COUNTY, NEW MEXICO

Luna County is presently an attainment area for all pollutants.

GRANT COUNTY, NEW MEXICO

In Grant County, there is presently one SO_2 attainment area with a maintenance plan. In September 2003, the EPA approved a redesignation request and maintenance plan for the Grant County SO_2 nonattainment area (EPA 2003). The proposed Project and alternatives would not pass through this area. The proposed route between Deming and Lordsburg would be 30 miles south of the maintenance area. The portion of the alternative route in Grant County would be even farther away from the maintenance area.

HIDALGO COUNTY, NEW MEXICO

Hidalgo County is presently an attainment area for all pollutants.

COCHISE COUNTY, ARIZONA

The Douglas area, in southern Cochise County, has both a moderate PM_{10} nonattainment area and a former SO_2 nonattainment area that was redesignated as being in attainment/maintenance in 2006 (EPA 2012b). The proposed route and local alternative segments E, F, and G would be located at least 40 miles north of the Douglas area. The Upgrade Section proposed route and local alternative segment H would be at least 50 miles north of the Douglas area.

GRAHAM COUNTY, ARIZONA

Graham County is presently an attainment area for all pollutants.

GREENLEE COUNTY, ARIZONA

Greenlee County is presently an attainment area for all pollutants.

PIMA COUNTY, ARIZONA

The Ajo area in eastern Pima County has both an SO_2 attainment area with a maintenance plan and a PM_{10} nonattainment area. The proposed route would be more than 60 miles east of this area. The proposed route would be approximately 20 miles west of this area.

The Tucson area was redesignated from nonattainment to attainment/maintenance for CO in 2000 (EPA 2000). The original nonattainment designation was primarily because of vehicular emissions, which have decreased over time as Federal tailpipe emissions standards have been strengthened. A portion of the Upgrade Section (route group 4 and alternatives) proposed route would cross the Tucson CO attainment/maintenance area.

The Rillito area is designated as being in nonattainment for PM_{10}. In 2006, the EPA determined that the Rillito nonattainment area had met the PM_{10} standard and qualified for redesignation to attainment (ADEQ 2008). In 2008, a maintenance plan and request for redesignation was submitted to the EPA (ADEQ 2008). The EPA has not yet acted on this request. A portion of the Upgrade Section (route group 4 and alternatives) proposed route would cross the Rillito nonattainment area, as shown in figure 3.2-2b.

PINAL COUNTY, ARIZONA

Presently, one 8-hour O_3 nonattainment area surrounds the Phoenix urban area, an SO_2 attainment area with a maintenance plan surrounds San Manuel, an SO_2 and lead nonattainment area surrounds Hayden, a $PM_{2.5}$ nonattainment area surrounds Maricopa and Stanfield, and three PM_{10} nonattainment areas surround Hayden, Miami, and the Phoenix urban area (Maricopa Association of Governments (MAG) 2009). The proposed Project and alternatives would not pass through any of these areas, and the proposed routes would be at least 20 miles from them.

3.2.4 Analysis Area Conditions

This section describes existing climate, meteorology, and existing background air quality in and near the analysis area in New Mexico and Arizona. Existing regional air sources and cumulative effects are discussed, as well as global climate change.

Climate and Meteorology

NEW MEXICO

Mean annual temperatures range from 64 degrees Fahrenheit (°F) in the extreme southeast to 40 °F or lower in high mountains and valleys of the north; elevation is a greater factor in determining the temperature of any specific locality than its latitude. This is shown by only a 3 °F difference in mean temperature between stations at similar elevations, one in the extreme northeast and the other in the extreme Southwest. However, at two stations only 15 miles apart, but differing in elevation by 4,700 feet, the mean annual temperatures are 61 °F and 45 °F—a difference of 16 °F, or a little more than a 3 °F decrease in temperature for each 1,000-foot increase in elevation. Blowing dust and the re-entrainment of particulate matter into the ambient air may be a problem during dry spells and high wind events and may contribute to ‘exceptional events’ as defined by the EPA. Climate and meteorology for the state of New Mexico are discussed further in appendix B.

ARIZONA

Cold air masses from Canada sometimes penetrate into the state, bringing temperatures well below zero in the high plateau and mountainous regions of central and northern Arizona. The lowest readings can dip to −35 °F. High temperatures are common throughout the summer months at the lower elevations. Temperatures higher than 125 °F have been observed in the desert area. Great extremes occur between day and night temperatures throughout Arizona. The daily range between minimum and maximum temperatures sometimes runs as much as 50 °F to 60 °F during the drier portions of the year. During winter months, daytime temperatures may average 70 °F, with night temperatures often falling to freezing of slightly below in the lower desert valleys. In the summer, the pine-clad forests in the central part of the State may have afternoon temperatures of 80 °F, while night temperatures drop to 35 °F or 40 °F. Summer rains occur as thunderstorms and are often accompanied by strong winds and brief periods of blowing dust prior to the onset of rain. Exceptional events (as defined by the EPA) often occur in the form of intense dust storms (also known as haboobs) in the analysis area. Climate and meteorology for the state of Arizona are discussed further in appendix B.

Background Air Quality

Numerous monitoring stations were identified within or near the approximately 50-km (31-mile) vicinity of the air quality analysis area. Background air quality monitoring and data from the nearest monitoring stations to the proposed Project and alternatives are presented and discussed further in appendix B.

Regional Air Emission Sources

While existing conditions can be described by the ambient air quality monitoring values and attainment statuses of the region, there may be regional sources of air emissions near the proposed Project that are located too far or downwind of monitoring stations. Therefore, point sources of air-pollutant emissions located within the air quality analysis area with emissions greater than major source thresholds are identified in table 3.2-4. A major source is categorized as a source that has the potential to emit more than 100 tpy of a criteria pollutant, or more than 10 tpy of any single HAP, or 25 tpy of any combination of HAPs. Major sources are normally considered to have the potential for significant impacts, and more restrictive permitting requirements are generally imposed.

Table 3.2-4. Major Sources Located within the Air Quality Analysis Area

Facility Name	Facility Type	State	County
EPEC Rio Grande Generating Station	Electric utility	NM	Doña Ana
Public Service Company of New Mexico (PNM) Afton Generating Station	Electric utility	NM	Doña Ana
PNM Luna Energy Facility	Electric utility	NM	Luna
Freeport-McMoRan Chino Mines	Mining	NM	Grant
Freeport-McMoRan Tyrone Mine	Mining	NM	Grant
Tri-State Pyramid Generating Station	Electric utility	NM	Hidalgo
PNM Lordsburg Generating Station	Electric utility	NM	Hidalgo
El Paso Natural Gas San Simon Compressor Station	Pipeline compression	AZ	Cochise
SouthWestern Power Group Bowie Power Station	Electric utility	AZ	Cochise
El Paso Natural Gas Bowie Compressor Station	Pipeline compression	AZ	Cochise
Arizona Electric Power Cooperative Apache Station	Electric utility	AZ	Cochise
Unisource Energy H Wilson Sundt Generating Station	Electric utility	AZ	Pima
TEP De Moss Petrie Generating Station	Electric utility	AZ	Pima
TEP North Loop Generating Station	Electric utility	AZ	Pima
CalPortland Rillito Cement Plant	Cement plant	AZ	Pima
APS Saguaro Power Plant	Electric utility	AZ	Pinal
TransCanada Coolidge Generating Station	Electric utility	AZ	Pinal
APS Sundance Power Plant	Electric utility	AZ	Pinal
Salt River Project Desert Basin	Electric utility	AZ	Pinal

Reasonably foreseeable and future projects are described in more detail in chapter 4, section 4.21, “Cumulative Impacts.”

Global Climate Change

Climate change is a global problem that results from global greenhouse gas (GHG) emissions. Climate change may be affected by numerous factors, including solar radiation, ocean circulation, and human activities such as burning fossil fuels or altering the Earth’s surface through deforestation or urbanization (EPA 2012a). There are more sources and actions emitting GHGs (in terms of both absolute numbers and types) than are typically encountered when evaluating the emissions of other pollutants. These emissions are often categorized as either anthropogenic (human-caused) or nonanthropogenic (naturally occurring). From a quantitative perspective, there is no single dominating anthropogenic source and fewer sources that would even be close to dominating total GHG emissions. Global climate change is much more the result of numerous and varied sources, each of which might seem to make a relatively small addition to global atmospheric GHG concentrations. Currently, there are no sites within the air quality analysis area that are collecting ambient GHG data. Ambient background data that exist are parametrically derived from fossil fuel combustion and other industrial sources.

Projected climate change impacts include air temperature increases; sea level rise; changes in the timing, location, and quantity of precipitation; and increased frequency of extreme weather events such as heat waves, droughts, and floods. These changes will vary regionally and affect renewable resources, aquatic and terrestrial ecosystems, and agriculture. Although uncertainties will remain regarding the timing and magnitude of climate change impacts, the scientific evidence predicts that continued increases in GHG emissions will lead to increased climate change. According to the Intergovernmental Panel on Climate Change (IPCC), increased atmospheric levels of carbon dioxide (CO_2) are correlated with rising temperatures. Climate models indicate that temperatures will likely increase by 1.1 to 6.4 degrees Celsius (°C) (2.0 to 11.5 °F) by 2100 (IPCC 2007).

The BLM recognizes the importance of climate change and the potential effects it may have on the environment. Activities within the air quality analysis area that may generate emissions of climate changing pollutants (i.e., CO_2, methane (CH_4), and N_2O (nitrous oxide)) include, as examples, urban development, agricultural, large wildfires, and recreational activities using combustion engines. Other activities may sequester CO, such as managing vegetation and forests, which may function as carbon sinks (BLM 2009a).

Preliminary GHG emissions inventories have been prepared for each state in a cooperative effort between the Center for Climate Strategies (CCS) and the environmental departments for each state. According to the inventory for New Mexico, the GHG emissions for reporting year 2000 were 83 million metric tons of carbon dioxide equivalents (CO_2e). The reference case GHG emissions for year 2020 were estimated at 80.8 million metric tons of CO_2e (CCS 2006). According to the inventory for Arizona, the GHG emissions for reporting year 2000 were 89 million metric tons of CO_2e. The reference case GHG emissions for year 2020 were estimated at 153.5 million metric tons of CO_2e (CCS 2005).

GHG emissions are quantified in CO_2e. CO_2e is calculated using an EPA-defined formula that assigns a global warming potential (GWP) to GHGs. The GWP has been calculated to reflect how long a GHG compound remains in the atmosphere, on average, and how strongly it absorbs energy. Gases with a higher GWP absorb more energy per pound than gases with a lower GWP, contributing more to warming. CO_2 has a GWP of 1, whereas CH_4 has a GWP of 25 (meaning that 1 ton of CH_4 emissions is equal to 25 tons CO_2e). Sulfur hexafluoride (SF_6), is a potent GHG, has a GWP of 23,900. This method allows all GHG compounds to be considered in aggregate.

3.3 NOISE AND VIBRATION

Some of the information provided in the following subsections is taken from a report titled “Southline Transmission Project Resource Report 08: Noise” (CH2M Hill 2013b). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

3.3.1 Noise

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Although prolonged exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise; the perceived importance of the noise, and its appropriateness in the setting; the time of day and the type of activity during which the noise occurs; and the sensitivity of the individual. Additional information, including sound levels of representative noises and sounds, can be found in appendix C.

Noise could also disrupt wildlife life-cycle activities of foraging, resting, migrating, and other patterns of behavior. While wildlife already existing in proximity to human development may already be habituated to noise from land use and human disturbance, changes to these baseline activities may still result in wildlife disruption. Additionally, sensitivity to noise varies from species to species, making it difficult to identify how a noise source would affect all flora and fauna in an area.

3.3.2 Vibration

Ground-borne vibration may be induced by traffic and construction activities, such as pile driving and earthmoving. The effects of ground-borne vibration may include perceptible movement of building floors, interference with vibration-sensitive instruments, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. The rumbling sounds heard is the noise radiated from the motion of the room surfaces. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance would be well below the damage threshold for normal buildings. Ground-borne vibration is almost never annoying to people who are outdoors; without the effects associated with the shaking of a building, the rumble noise of vibrations are not perceptible.

Unlike noise, human response to vibration is not dependent on existing vibration levels. Humans respond to a new source of vibration based on the frequency of such events.

3.3.3 Analysis Area

The analysis area for noise and vibration for both the New Build Section and the Upgrade Section of the proposed Project is 1 mile on either side of the centerline and any substation or access roads outside that corridor. The analysis area for the evaluation of proposed Project noise impacts is depicted in figures 3.3-1 and 3.3-2.

3.3.4 Laws, Ordinances, Regulations, and Standards

Federal

There are no Federal regulations that limit overall environmental noise levels. However, there are Federal guidance documents that address environmental noise and regulations for specific sources (for example, aircraft or federally funded highways). While there are no Federal regulations or guidance that specifically addresses the types of activities that would occur from the proposed Project, these guidance documents can be used as a proxy to determine what impacts the proposed Project would have. Table 3.3-1 presents a summary of Federal agency guidelines and regulations for exterior noise.

Table 3.3-1. Summary of Federal Guidelines/Regulations for Exterior Noise (dBA)

Agency	L_{eq}	L_{dn}
U.S. Department of Transportation— Federal Rail Administration (FRA) and Federal Transit Administration (FTA) [1, 2]	Sliding scale [3]	Sliding scale [3]
EPA [4]	[49]	55
U.S. Department of Housing and Urban Development [5]	[59]	65

Notes:
dBA = A-weighted decibels.
Brackets [59] indicate a calculated equivalent standard.
[1] U.S. Department of Transportation (2012).
[2] U.S. Department of Transportation (2006).
[3] Refer to appendix C.
[4] EPA (1974).
[5] 24 CFR 51 Subpart B.

A review of existing Federal, State, county, and local noise laws, regulations, ordinances, and guidelines was conducted for the proposed Project and alternatives. The proposed Project and alternatives cross two states, nine counties, and several municipalities and unincorporated territory. If noise laws, regulations, ordinances, or guidelines are identified that limit noise or hours of operation for the proposed Project as part of the development of special use permitting processes, the proposed Project would address these requirements at that time. The following discussion identifies Federal, State, and local laws, regulations, ordinances, and guidelines that are pertinent to the proposed Project and alternatives.
The Noise Control Act and the U.S. Department of Housing and Urban Development (HUD) guidelines are the Federal regulatory criteria against which proposed Project noise is compared in chapter 4. Additional Federal laws, regulations, ordinances, and guidelines with tangential proposed Project applicability are discussed in appendix C.

U.S. ENVIRONMENTAL PROTECTION AGENCY, NOISE CONTROL ACT OF 1972

The Federal Noise Control Act of 1972 and subsequent amendments (42 U.S.C. 4901 et seq.) established a requirement that all Federal agencies must administer their programs in a manner that promotes an environment free from noise that jeopardizes public health or welfare. The EPA was given the responsibility for providing information to the public regarding identifiable effects of noise on public health or welfare, publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety, coordinating Federal research and activities related to noise control, and establishing Federal noise emission standards for selected products distributed in interstate commerce (construction equipment; transportation equipment; motors and engines; and electrical or electronic equipment). States and political subdivisions of States retain the right to establish and enforce controls on environmental noise through the licensing, regulation, or restriction of the use, operation, or movement of products or combinations of products. The Federal Noise Control Act also directed all Federal agencies to comply with Federal, State, interstate, and local noise control and abatement requirements to the same extent that any person is subject to such requirements.

In order to establish Federal noise emission control requirements and to ensure assistance and guidance to States and localities, the EPA has published guidelines that address the issue of community noise and contains goals for noise levels affecting residential land use of day-night level (L_{dn}) of less than 55 A-weighted decibels (dBA) for exterior levels and L_{dn} of less than 45 dBA for interior levels (EPA 1974). Table 3.3-2 presents the noise levels identified as requisite to protect public health and welfare with an adequate margin of safety.

Table 3.3-2. Noise Levels Identified to Protect Public Health and Welfare with an Adequate Margin of Safety

Effect	Level	Area
Hearing loss	$L_{eq(24)} \leq 70$ dB	All areas
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{dn} \leq 45$ dB	Indoor residential areas
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: EPA (1974).

Note: $L_{eq(24)}$ = The continuous sound pressure level integrated over a 24-hour time period.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Chapter 2 of the HUD Noise Guidebook lists a goal that outdoor residential areas follow the EPA guideline of 55 dBA L_{dn} (24 CFR 51.101(a)(8)). However, for the purposes of meeting this regulation, sites with an L_{dn} of 65 dBA and below are acceptable and allowed.

State and Local Regulations

There are no State-level standards for noise in Arizona or New Mexico. However, the New Mexico Public Regulation Commission has jurisdiction on proposed transmission lines in New Mexico and the ACC has jurisdiction on proposed aboveground transmission lines designed for 115 kV or greater locating in Arizona. Utilities are required to make an application to the applicable commission when locating within their jurisdiction. In New Mexico, the New Mexico Public Regulation Commission may consider "noise emission levels and interference with communication signals" in determining if the proposed location of the transmission line will unduly impair important environmental values (NMSA 62-9-3(M)(3)).
The ACC's "Rules of Practice and Procedure" (R14-3-219 in Title 14, Chapter 3, AAC) describes the form of the application to submit. In addition, exhibits to the application must be submitted. Exhibit I mentions a requirement to "describe the anticipated noise emission levels and any interference with communication signals which will emanate from the proposed facilities."

The Arizona Division of Safety and Health, a division of the Industrial Commission of Arizona, administers and enforce the requirements of the Arizona Occupational Safety and Health Act of 1972, which provides safety and health protection for employees in Arizona. With respect to noise exposure to workers, the Arizona Occupational Safety and Health Act regulations are identical to the Federal Occupational Safety and Health Act regulations and are considered to be equivalent.

The New Mexico Occupational Health and Safety Bureau (NMOHSB) is a State regulatory agency that is part of the NMED. It has the responsibility of enforcing OSHA regulations within New Mexico. New Mexico has adopted the Federal OSHA regulations and has promulgated some state-specific regulations. There are no state-specific regulations concerning noise.

Pinal County has an excessive noise ordinance that addresses construction of buildings and other projects in relation to noise between different land use districts (Pinal County Ordinance No. 050306-ENO, as amended by 031611-ENO-01). Table 3.3-3 presents the limiting sound levels for land use districts in Pinal County.

Table 3.3-3. Pinal County Limiting Sound Levels for Land Use Districts

Residential		Commercial or Business		Industrial		Rural	
7 a.m. to 8 p.m.	60 dBA	7 a.m. to 10 p.m.	65 dBA	7 a.m. to 10 p.m.	70 dBA	7 a.m. to 9 p.m.	65 dBA
8 p.m. to 7 a.m.	55 dBA	10 p.m. to 7 a.m.	60 dBA	10 p.m. to 7 a.m.	65 dBA	9 p.m. to 7 a.m.	60 dBA

Source: Pinal County Ordinance No. 050306-ENO, as amended by 031611-ENO-01.

In addition to the limiting of sound levels by land use district, Pinal County's excessive noise ordinance includes construction start and stop times that are identical to Pima County's limited construction start and stop times, as presented in table 3.3-3.

The City of Sierra Vista in Cochise County, Arizona, has noise regulations between land use districts for both day and night. The maximum noise levels are listed in table 3.3-4.

Table 3.3-4. City of Sierra Vista Limiting Sound Levels for Noise Between Land Use Districts

	Residential to Any Other District	Commercial to Residential	Commercial to Industrial	Commercial to Commercial	Industrial to Residential	Industrial to Industrial	Industrial to Commercial
Day	55 dBA	55 dBA	70 dBA	60 dBA	55 dBA	70 dBA	60 dBA
Night	50 dBA	50 dBA	65 dBA	55 dBA	50 dBA	65 dBA	55 dBA

Source: City of Sierra Vista (2009).

With the exceptions of Pinal County and the City of Sierra Vista, no other county, city, or local laws, regulations, ordinances, or guidelines were identified with specific sound level restrictions limiting the decibel (dB) levels of noise. Additional county, city, and local laws, regulations, ordinances, and guidelines with tangential proposed Project applicability are discussed in appendix C.

3.3.5 Issues to Be Analyzed

Potential effects of the proposed Project and alternatives include changes in the ambient noise levels at sensitive noise receptor sites, including residences and the adjacent national monument, wilderness, and recreation areas.

Noise would be generated during construction and operational activities of the proposed Project and alternatives. These noises need to be analyzed to determine the effect they would have on baseline conditions. During construction, equipment would generate noise. During operation, substations would produce transformer noise. Corona noise, which results from changes in electric charges, is a source of intermittent noise. Maintenance activities during operation associated with substations and transmission lines are another source of noise to be analyzed. Vibration impacts from construction activities are an issue to be analyzed. Pile-driving and earthmoving activities generate both noise and vibrations.

A significant impact from noise would result if any of the following were to occur from construction or operation of the proposed Project and alternatives:

- Exceedance of local, State, or Federal noise regulations or guidelines. If there are no local guidelines, then State guidelines will be followed. If there are no State guidelines, then Federal guidelines will be used;
- Increased noise levels impose restrictions on land currently planned for residential development; or

- Increased noise levels directly or indirectly affect any places of traditional use that are NRHP listed or eligible, or identified as important to tribes.

Potential noise-related environmental impacts and their intensity are evaluated in chapter 4, section 4.3.

3.3.6 Analysis Area Conditions

Existing noise conditions are evaluated based on land use. Unlike noise, human response to vibration is not dependent on existing vibration levels (U.S. Department of Transportation (USDOT) 2006). Humans respond to a new source of vibration based on the frequency of such events.

Local conditions such as traffic, topography, and winds characteristic of the region can alter background noise conditions. In general, the L_{dn} sound levels at outdoor quiet urban nighttime noise levels range from 40 to 50 dBA (EPA 1974). However, given that most of the proposed Project and alternatives pass through largely undeveloped, sparsely populated areas, the majority of the analysis area would be expected to have background noise L_{dn} of about 35 dBA or less. In addition to natural background, noise sources could include agricultural activities, oil and gas development, coal mining, trains, low-density traffic on rural roads, high-density traffic on city streets and freeways (i.e., near I-10), recreational activities, and aircraft overflights. Additional information on anticipated background noise levels based on land use, vehicle travel on roadways, and current baseline noise conditions at proposed substation and substation upgrades is presented in appendix C.

Existing noise levels were estimated from land use type and available reference documents. Expected baseline noise levels by route groups, local alternatives, and route variations of the proposed Project are listed below in table 3.3-5.

Table 3.3-5. Baseline Noise Levels Expected

Section	Route/Segment	Description of Analysis area	Expected Baseline Noise Levels
Route group 1	All	The majority of the analysis area for the New Build Section from the Afton Substation to east of Lordsburg is considered rural with limited development. The area is predominantly desert open space.	Desert open space: Day: 8–45 dBA Night: 20–40 dBA
	Subroute 1.1, Segments P1–P3, P4a	Predominantly surrounded by desert open space. Follows and crosses several highways. These highways are largely within the rural open space area and represent a source of existing noise.	Traffic noise at 250 feet: Day/Night: 44–64 dBA
		Small pockets of agricultural areas exist.	Agricultural areas: Day: 30–52 dBA Night: 30–40 dBA
		Bypasses Lordsburg, New Mexico, to the west and several small and medium-sized towns.	Lordsburg: Day: 33–66 dBA Night: 43–61 dBA
		Bypasses Deming, New Mexico, to the north.	Deming: Day: 40–67 dBA Night: 33–55 dBA

Table 3.3-5. Baseline Noise Levels Expected (Continued)

Section	Route/Segment	Description of Analysis area	Expected Baseline Noise Levels
Route group 1, cont'd.	Subroute 1.2 and Local Alternatives A–D, DN1	Predominantly surrounded by desert open space. Follows and crosses several highways or various sizes. These highways are largely within the rural open space area.	Traffic noise at 250 feet: Day/Night: 44–64 dBA
		Small pockets of agricultural areas exist.	Agricultural areas: Day: 30–52 dBA Night: 30–40 dBA
		Several small towns, including Lordsburg and Columbus to the south.	Lordsburg and Columbus: Day: 33–66 dBA Night: 43–61 dBA
Route group 2	All	The majority of the analysis area for the New Build Section from Lordsburg to Apache Substation is considered rural with limited development. The area is predominantly desert open space.	Desert open space: Day: 8–45 dBA Night: 20–40 dBA
	Subroute 2.1, Segments P4b, P4c, P5a, P5b, P6a, P6b, P6c, P7, and P8	Predominantly surrounded by desert open space. Follows several highways or various sizes. These highways are largely within the rural open space area and represent a source of existing noise.	Traffic noise at 250 feet: Day/Night: 44–64 dBA
		Small pockets of agricultural areas exist.	Agricultural Areas: Day: 30–52 dBA Night: 30–40 dBA
		Bypasses several small and medium-sized towns, including the town of Bowie to the north.	Bowie and other small and medium-sized towns: Day: 33–66 dBA Night: 43–61 dBA
	Subroute 2.2, Segments E, F, Ga, Gb, Gc, I, and J	Predominantly surrounded by desert open space. Follows and crosses several highways or various sizes. These highways are largely within the rural open space area and represent a source of existing noise.	Traffic noise at 250 feet: Day/Night: 44–64 dBA
		Small pockets of agricultural areas exist.	Agricultural areas: Day: 30–52 dBA Night: 30–40 dBA
		Bypasses several small and medium-sized towns, including the town of Bowie to the north.	Bowie, Cochise, San Simon, and other small and medium-sized towns: Day: 33–66 dBA Night: 43–61 dBA
		Passes west of the city of Willcox, which is larger than Bowie and other small to medium-sized towns.	City of Willcox Day: 40–67 dBA Night: 33–55 dBA
	Local Alternatives LD1, LD2, LD3a, LD3b, LD4, LD4 Option 4, and LD4 Option 5	Predominantly surrounded by desert open space.	Vary from less than 20 to more than 40 dBA
	Local Alternative WC1	WC1 predominantly parallels I-10 and pass just north of the city of Willcox.	Day: 40–67 dBA Night: 33–55 dBA
	Route Variations P7a, P7b, P7c, and P7d	P7a. P7b, P7c, and P7d are located primarily in agricultural areas, south and east of the city of Willcox and the Willcox Playa.	Agricultural areas: Day: 30–52 dBA Night: 30–40 dBA

Table 3.3-5. Baseline Noise Levels Expected (Continued)

Section	Route/Segment	Description of Analysis area	Expected Baseline Noise Levels
Route group 3	Subroute 3.1: Segments U1a, U1b, U2, and U3a	Small pockets of agricultural areas exist.	Agricultural areas: Day: 30–52 dBA Night: 30–40 dBA
		Bypasses several small towns, including Sonoita Ranch, Cortaro, and Vail.	Sonoita Ranch, Cortaro, Vail, and other small and medium-sized towns: Day: 33–66 dBA Night: 43–61 dBA
		Passes through the city of Tucson. The city of Tucson has a major airport (Tucson International Airport).	City of Tucson near major airport: Day: 48–92 dBA Night: 45–88 dBA
		Passes through the city of Tucson. The city of Tucson has a major airport (Tucson International Airport).	City of Tucson 6 miles from major airport: Day: 44–69 dBA Night: 40–66 dBA
		Passes through the city of Tucson, paralleling I-19 and I-10.	City of Tucson at city outskirts / Near transportation corridors: Day: 40–67 dBA Night: 33–55 dBA
	Local Alternative H	Besides being predominantly surrounded by desert open space, the representative ROW follows and crosses I-10. Traffic will result in additional noise.	Traffic noise at 250 feet: Day/Night: 44–64 dBA
		Small pockets of agricultural areas exist.	Agricultural areas: Day: 30–52 dBA Night: 30–40 dBA
		Bypasses one small town of Mescal, northwest of Benson.	Mescal: Day: 33-66 dBA Night: 43–61 dBA
Route group 4	Subroute 4.1: U3b, U3c, U3d, U3e, U3f, U3g, U3h, U3i, U3j, U3k, U3l, U3m, and U4	Passes through the city of Tucson. The city of Tucson has a major airport (Tucson International Airport).	City of Tucson near major airport: Day: 48–92 dBA Night: 45–88 dBA
		Passes through the city of Tucson. The city of Tucson has a major airport (Tucson International Airport).	City of Tucson 6 miles from major airport: Day: 44–69 dBA Night: 40–66 dBA
		Passes through the city of Tucson, paralleling I-19 and I-10.	City of Tucson at city outskirts / Near transportation corridors: Day: 40–67 dBA Night: 33–55 dBA
		Small pockets of agricultural areas exist.	Agricultural areas: Day: 30–52 dBA Night: 30–40 dBA
	Local Alternatives TH1a, TH1b, TH1c, TH1-Option	TH1a, TH1b, TH1c, and TH1-Option travel through the outskirts of the city of Tucson.	City of Tucson at city outskirts: Day: 40-67 dBA Night: 33–55 dBA
	Local Alternatives TH3-Option A, TH3-Option B, TH3-Option C, TH3a, TH3b	TH3-OptionA, TH3-OptionB, TH3-OptionC, TH3a, and TH3b more closely parallel I-19 and I-10 than the proposed routes they would replace.	Traffic noise at between 50 to 2,500 feet: Day/Night: 34-71 dBA
	Local Alternative MA1	MA1 travels through rural agricultural land adjacent to an airstrip. Baseline noise levels do not include aircraft activity.	Agricultural areas: Day: 30–52 dBA Night: 30–40 dBA
	Route Variation U3aPC	Passes along the edge of Summit, Arizona.	Summit: Day: 33–66 dBA Night: 43–61 dBA

3.3.7 Noise-Sensitive Receptors

The New Build Section of the proposed Project and alternatives passes by approximately five population centers with scattered residential areas and unique noise-sensitive receptors (i.e., Deming, Lordsburg, Columbus, and Hachita in New Mexico and Willcox in Arizona). This section consists predominantly of open space and has very few noise-sensitive receptors. No wilderness areas or other public recreation spaces that require low noise limits are within the area of analysis for the New Build Section.

The Upgrade Section passes by the population centers around Benson and Tucson, Arizona, including incorporated and unincorporated cities and towns (e.g., the cities of Sierra Vista, South Tucson, and Marana, and the unincorporated territory of Vail, around Tucson). Moving from east to west along the proposed transmission line corridor, this section initially consists predominantly of open spaces with few noise-sensitive receptors with increasingly dense concentrations of residences and other noise-sensitive receptors as one moves into the Tucson area.

In chapter 4, noise-sensitive receptors are identified and proposed Project impacts to these noise-sensitive receptors are analyzed.

3.4 GEOLOGY AND MINERAL RESOURCES

Some of the information provided in the following subsections is taken from a report titled “Southline Transmission Project Resource Report 4: Geology and Minerals” (CH2M Hill 2013c). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

3.4.1 Analysis Area

The analysis area for the proposed Project is different for the New Build and Upgrade sections. Because the Upgrade Section already includes existing transmission lines, this portion of the analysis area does not need to be as geographically extensive as for the New Build Section.

New Build Section

The analysis area for the New Build Section is a 2-mile-wide corridor along each of the alternatives and any substations or access roads outside that corridor. This area is sufficient to identify resources that could be directly impacted by ground disturbance and where construction materials, equipment, and workers may be present.

Upgrade Section

The analysis area for the Upgrade Section is 500-foot corridor (200 feet on either side of the existing 100-foot corridor).

3.4.2 Laws, Ordinances, Regulations, and Standards

Permitted activities that may affect or be affected by geological resources and geological hazards are governed primarily by local jurisdictions. The conservation elements and seismic safety elements of city and county general plans often contain policies for protection of geological features and avoidance of hazards, but generally do not specifically address transmission line construction projects. Local grading ordinances may establish detailed procedures for excavation, blasting, or construction. The following section provides a summary of international, Federal, State, and local laws, regulations, and standards that govern permitted activities that may affect or be affected by geology and minerals in the analysis area. There are no Federal laws, ordinances, regulations, or standards for geological hazards and resources.

Federal Laws, Ordinances, Regulations, and Standards

On the Federal level, NEPA and the FLPMA serve as the primary legislation requiring assessment and mitigation of potential impacts to geological resources on federally administered land. NEPA (42 U.S.C. 4321–4347) directs Federal agencies, including the BLM, to assess impacts, adverse and otherwise, to the environment.

The FLPMA incorporated the Mining Law of 1872, which governs prospecting and mining for economic minerals on Federal public lands, with several provisions to aid in managing resources on public land (PL 94-579). The FLPMA dictates how BLM regulates mineral resources extraction on BLM land. The BLM requires an excavation permit for excavations and grading on land under its jurisdiction.

Additional Federal legislation related to the proposed Project include laws and acts that changed the development of deposits such as coal, petroleum, and natural gas from claim staking to leasing (Mineral Leasing Act of 1920), and provided for multiple uses of the surface of the same tracts of the public lands (Multiple Mineral Development Act of 1954, Multiple Surface Use Mining Act of 1955, PL 167 of 1955, and Classification and Multiple Use Act of 1964). Additionally, 43 CFR governs mining operations for coal mining (Part 3400), non-coal mining (Part 3500), and stone/sand/gravel (Part 3600). Title 3 CFR Part 3715 relates to the use or occupancy of unpatented mining claims, and Parts 3802 and 3809 relate to hardrock mining and prevent unnecessary or undue degradation of public lands by operations authorized by the mining laws.

State Laws, Ordinances, Regulations, and Standards

In New Mexico, the Minerals Group of the NMSLO is responsible for leases on State land for commodities such as sand and gravel, limestone, coal, and geothermal resources. NMSA Title 19, Chapter 2, includes applicable laws for governing minerals, mines, and leases on New Mexico State land.

In Arizona, the ASLD is responsible for mining activities and mineral resources on State land. ARS 12, 27, and 37 are the applicable State laws for governing minerals, mines, leases, and geothermal resources on Arizona State land.

3.4.3 Issues to Be Analyzed

Potential environmental changes are described in terms of the temporal scale, spatial extent, and significance to facilitate the comparison of alternatives. The extent to which the proposed Project could result in such effects is addressed in chapter 4, where potential effects with regard to geology and minerals are evaluated.

Potential effects could include changes (positive or negative) to the ability to access areas of recognized unique geological importance (e.g., caves, rock outcroppings, mineral collection areas of recreational or scientific importance) and the ability to access, explore, or extract locatable, leasable, and/or saleable minerals or existing mineral leases (including oil, gas, coal, geothermal, etc.). Other effects could include the effects of existing geological hazards (seismicity/geologic faults, land subsidence/fissures, volcanism, debris flows, landslides) on the proposed Project; and the potential for new or increased geological hazards from Project activities such as blasting foundations.

A significant impact to geology and mineral resources would occur if:

- areas of geological importance are lost or made inaccessible for future use;
- important State-identified rock outcroppings are adversely affected;
- known mineral resources of economic value are lost or made inaccessible;
- Project activity (construction, operation, or maintenance) would locate the ROW over a mining claim located on or before July 23, 1955 or otherwise affect a valid existing mineral right;
- the proposed Project would occur in an area of known geological hazard;
- structures fail or create hazards due to slope instability, the effects of earthquakes, or land subsidence; or
- the proposed Project creates geological hazards, particularly increases in the probability or magnitude of mass wasting events.

While many of the potential impacts are difficult to quantify, "units of change" for the items above include the locations and number of claims, leases, oil/gas wells, geological features, or locatable, leasable, and/or saleable mineral areas within the analysis area, as well as a binary determination of whether or not they are likely to be lost or occluded.

3.4.4 Analysis Area Conditions

This section details the current conditions of the analysis area as they relate to existing geology and known mineral resources of economic value. The New Build Section is described first, followed by the Upgrade Section. Resources are described by route group, working from east to west.

New Build Section – Geological Resources

REGIONAL GEOLOGICAL SETTING

The New Build Section is located within the Mexican Highland Subprovince of the Basin and Range Physiographic Province. The Basin and Range Physiographic Province is characterized by numerous elongated, subparallel mountain ranges and intervening broad alluvial basins that formed during the Late Cenozoic extension. The Mexican Highland Subprovince extends from north-central New Mexico to southeastern Arizona.

Basins of the Mexican Highland include the Mesilla, Mimbres, and Animas basins. These basins contain thick sequences of Pliocene-Pleistocene alluvial, eolian, and lacustrine deposits, and several have old playas. The Animas Basin, near Lordsburg, is a remnant of the Pleistocene Lake Animas. It is bounded by the Peloncillo Mountains to the west and the Animas and Pyramid mountains to the east. The Mimbres Basin is bounded by the Black Range to the north, the Goodsight Mountains and West Potrillo Mountains to the east, and the Cedar Mountain Range to the west. The Mesilla Basin is bounded by the Robledo and the Doña Ana mountains to the north, the East and West Potrillo mountains and the Aden Hills to the west, and the Santa Fe River to the east. The intervening mountain ranges consist of a wide variety of rock units of Proterozoic through Cenozoic age, and include the East and West Potrillo mountains, Florida Mountains, Tres Hermanas Mountains, Hatchet Mountains, Peloncillo Mountains, and Burro Mountains.

Geological units underlying the New Build Section analysis area are listed below in table 3.4-1.

Table 3.4-1. Geological Units Mapped in the New Build Section Analysis Area

Map Unit	Name	Description
Route Group 1 Afton Substation to Hidalgo Substation		
Kbm	Mancos Formation and Beartooth Quartzite	Shale, sandstone, and medium-grained mixed clastic
Kl	Lower Cretaceous, undivided	Clastic, mixed clastic/carbonate rocks
Pys	Yeso, Glorieta, and San Andres formations, undivided	Sandstone, carbonate, and fine-grained mixed clastic; evaporite
Qa	Alluvium	Upper and middle Quaternary alluvium
Qb	Basalt and andesite flows and vent deposits	Andesite and basalt
Qbo	Basalt or basaltic andesite	Basalt; mafic and intermediate volcanic rock
Qp	Piedmont alluvial deposits	Piedmont alluvial deposits: upper and middle Quaternary
QTg	Gila Group	Conglomerate, sandstone, and basalt Summary Mimbres Formation
QTp	Older piedmont alluvial deposits and shallow basin fill	Alluvium and unconsolidated deposits
QTs	Upper Santa Fe Group	Basal conglomerate and interbedded sand and clay beds; cobbles and boulders are mainly andesite on north and east sides of Cristo Rey and mainly felsite on south side. Basal conglomerate forms most of unit in map area.
Qy	Holocene surficial deposits	Unconsolidated deposits associated with modern fluvial systems.
Ti	Intrusive rocks	Tertiary intrusive rocks; undifferentiated
Tla	Andesite and basaltic andesite flows and associated volcaniclastic units	Lower Tertiary (Lower Oligocene and Eocene) andesite and basaltic andesite flows, and associated volcaniclastic units
Tli	Quartz monzonites, intermediate intrusives, and other intermediate felsic dikes and plugs	Quartz monzonites (Eocene) in the Silver City and Los Pinos Range, intermediate intrusives of the Cooke's Range (Oligocene), and other intermediate to felsic dikes and plugs of Oligocene and Eocene age
Tlrf	Silicic flows, domes, and associated pyroclastic rocks	Lower Oligocene silicic (or felsic) flows, domes, and associated pyroclastic rocks and intrusions; includes Mimbres Peak Formation
Tlrp	Silicic pyroclastic rocks	Pyroclastic, tuff, felsic volcanic rock; volcanic rock (aphanitic); mixed clastic/volcanic
Tnb	Basalt and andesite flows, Neogene	Basalt and andesite flows; Neogene. Includes flows interbedded with Santa Fe and Gila Groups.
Tnv	Volcanic rocks, Neogene	Neogene volcanic rocks; primarily in Jemez Mountains
Tos	Sedimentary and volcaniclastic sedimentary rocks	Mostly Oligocene and upper Eocene sedimentary and volcaniclastic sedimentary rocks with local andesitic to intermediate volcanic
Tpb	Basalt and andesite flows, Pliocene	Basalt and andesite flows, Pliocene
Tual	Andesites and basaltic andesites	Upper Oligocene andesites and basaltic andesites
Turf	Silicic flows and masses and associated pyroclastic rocks	Upper Oligocene silicic (or felsic) flows and masses and associated pyroclastic rocks

Table 3.4-1. Geological Units Mapped in the New Build Section Analysis Area (Continued)

Map Unit	Name	Description
Route Group 1 Afton Substation to Hidalgo Substation, cont'd.		
Tus	Upper Tertiary sedimentary units	Upper Tertiary sedimentary units. Clastic, mixed clastic/volcanic, and volcanic rock (aphanitic); unconsolidated deposit.
Tv	Middle Miocene to Oligocene volcanic rocks	Lava, tuff, fine-grained intrusive rock, and diverse pyroclastic rocks. These compositionally variable volcanic rocks include basalt, andesite, dacite, and rhyolite.
Yp	Plutonic rocks, middle Proterozoic	Middle Proterozoic plutonic rocks
Route Group 2 Hidalgo Substation to Apache Substation		
Q	Quaternary surficial deposits, undivided	Unconsolidated to strongly consolidated alluvial and eolian deposits
Qa	Alluvium	Upper and middle Quaternary alluvium
Qe	Eolian deposits	Eolian deposits
Qo	Early Pleistocene to latest Pliocene surficial deposits	Coarse relict alluvial fan deposits that form rounded ridges or flat, isolated surfaces that are moderately to deeply incised by streams
Qp	Piedmont alluvial deposits	Piedmont alluvial deposits: upper and middle Quaternary
Qpl	Lacustrine and playa-lake deposits	Lacustrine and playa-lake deposits; includes associated alluvial and eolian deposits of major lake basins
QTg	Gila Group	Conglomerate, sandstone, and basalt Summary Mimbres Formation
Qy	Holocene surficial deposits	Unconsolidated deposits associated with modern fluvial systems.
TKav	Andesitic volcanic	Andesitic volcanic
TKi	Intrusive rocks, Paleogene and Upper Cretaceous	Paleogene and Upper Cretaceous intrusive rocks; includes Hanover, Fierro, Tyrone, and Lordsburg granodiorite-quartz monzonite porphyries
Tla	Andesite and basaltic andesite flows and associated volcaniclastic units	Lower Tertiary, (Lower Oligocene and Eocene) andesite and basaltic andesite flows, and associated volcaniclastic units
Tli	Quartz monzonites, intermediate intrusives, and other intermediate felsic dikes and plugs	Quartz monzonites (Eocene) in the Silver City and Los Pinos Range, intermediate intrusives of the Cooke's Range (Oligocene), and other intermediate to felsic dikes and plugs of Oligocene and Eocene age
Tlrf	Silicic flows, domes, and associated pyroclastic rocks	Lower Oligocene silicic (or felsic) flows, domes, and associated pyroclastic rocks and intrusions; includes Mimbres Peak Formation
Tlrp	Silicic pyroclastic rocks	Lower Oligocene silicic pyroclastic rocks (ash-flow tuffs)
Tsy	Pliocene to middle Miocene deposits	Moderately to strongly consolidated conglomerate and sandstone deposited in basins during and after late Tertiary faulting. Includes lesser amounts of mudstone, siltstone, limestone, and gypsum.
Tual	Andesites and basaltic andesites	Upper Oligocene andesites and basaltic andesites
Turp	Rhyolitic pyroclastic rocks	Upper Oligocene rhyolitic pyroclastic rocks (ash-flow tuffs)

Table 3.4-1. Geological Units Mapped in the New Build Section Analysis Area (Continued)

Map Unit	Name	Description
Route Group 2 Hidalgo Substation to Apache Substation, cont'd.		
Tv	Middle Miocene to Oligocene volcanic rocks	Lava, tuff, fine-grained intrusive rock, and diverse pyroclastic rocks. These compositionally variable volcanic rocks include basalt, andesite, dacite, and rhyolite.
Xm	Early Proterozoic metamorphic rocks	Undivided metasedimentary, metavolcanic, and gneissic rocks
Yg	Middle Proterozoic granitic rocks	Mostly porphyritic biotite granite with large microcline phenocrysts, with local fine-grained border phases and aplite
Yp	Plutonic rocks, middle Proterozoic	Middle Proterozoic plutonic rocks

Source: U.S. Geological Survey (2013a).

POTENTIAL GEOLOGICAL HAZARDS

Potential geological hazards within the New Build Section of the proposed Project and alternatives are described in the following sections. Potential hazards are evaluated further in chapter 4 with regard to their potential impacts on the proposed Project. As described below, identified geological factors that were determined not to be potential hazards include earthquakes, volcanoes, mapped areas of geological importance, and important State-identified rock outcroppings. Mapped areas of geological importance and important State-identified rock outcroppings are not "hazards," but are rather geological features that could potentially be impacted. Each potential hazard, along with its relationship to the proposed Project, is described in further detail below.

Land Subsidence and Earth Fissures

Ground subsidence and earth fissures are typically caused by groundwater depletions. Earth fissures are open surface and subsurface tension cracks in unconsolidated and semiconsolidated sediment. Some also exhibit vertical displacement. Most earth fissures are thought to result from the groundwater withdrawals, where the declining water table causes the aquifer sediments to compact, which leads to ground subsidence. In areas of differential subsidence, fissures form where extensional horizontal stress is the greatest. Basin-fill sediments also may be subject to fissures where evaporites such as anhydrite, gypsum, and halite (salt) are present.

Although no areas of land subsidence are known to be present in route group 1 – Afton Substation to Hidalgo Substation, large areas of land subsidence are mapped in the Willcox, Arizona, area and in the areas around San Simon, Arizona (Arizona Department of Water Resources (ADWR) 2013). The 2-mile-wide analysis area of the New Build Section crosses through approximately 32,000 acres of the Bowie San Simon subsidence feature, approximately 12,900 acres of the Fort Grant subsidence feature, and approximately 39,000 acres of the Kansas Settlement subsidence feature.

No earth fissures are documented in the analysis area for route group 1. Areas of earth fissures have been documented in Cochise County, Arizona, near Apache, and east of the town of Bowie in New Mexico, and the analysis area crosses a number of known fissures (Arizona Geological Survey (AZGS) 2013). Route group 2 crosses approximately 227 fissures.

Geological Faults

Ground surface displacement along an active surface fault can damage structures and highways when located near the fault zone or straddling the fault trace. The amount of lateral and vertical movement during a single earthquake can range from several inches to tens of feet. Another aspect of fault displacement comes not from the violent movement associated with earthquakes but from the barely perceptible movement along a fault called "fault creep." Damage by fault creep is usually expressed by the rupture or bending of buildings, fences, railroads, streets, pipelines, curbs, and other such linear features.

The U.S. Geological Survey (USGS) quaternary fault and fold database (USGS 2012a) was used to determine the presence of active faults within the analysis area. Although no "active faults" (surface rupture within the past 11,000 years) have been mapped in the analysis area, the analysis area for route group 1 overlies 38 faults, and route group 2 – Hidalgo Substation to Apache Substation crosses a total of 9 faults.

Earthquakes

The seismic hazard assessment is based on the potential for regional and local seismic activity as described in the existing scientific literature, and on anticipated subsurface soil and groundwater conditions within the boundary of the proposed Project. The seismic hazard analysis included a review of literature and databases that describe historical seismicity in the Project vicinity (figure 3.4-1).

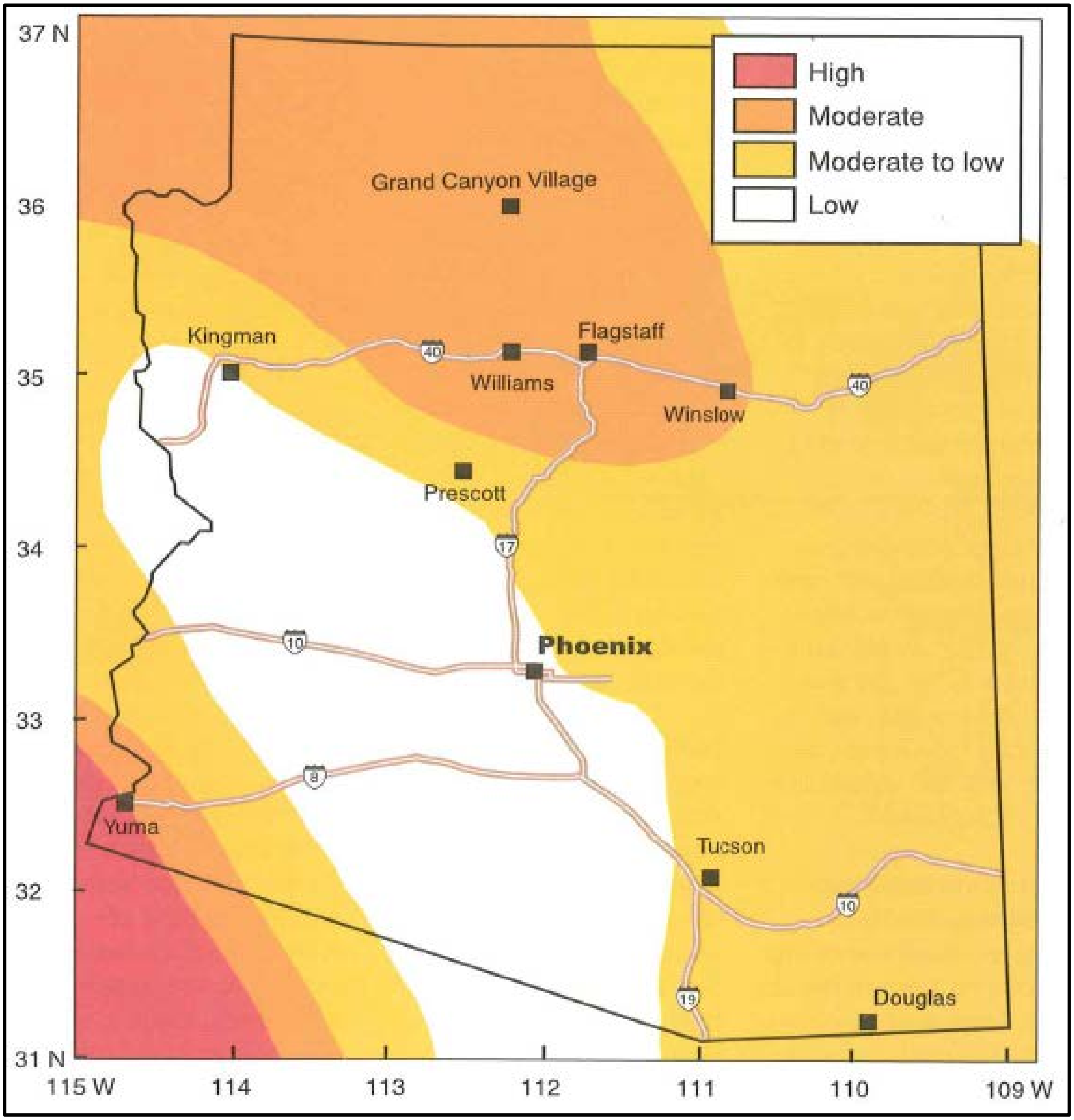
Overall, the seismic hazard is relatively low throughout the entire New Build Section. Most of New Mexico's historical seismicity has been concentrated in the Rio Grande Valley between Socorro and Albuquerque. Very few earthquakes and little historical seismicity have occurred in the vicinity of the New Build Section in the Arizona portion of the proposed Project. The largest damaging historical earthquake in the vicinity of route group 2 was a magnitude 7.4 earthquake that occurred in Sonora, Mexico, in 1887. No damaging historical earthquakes have been recorded in the New Build Section analysis area (USGS 2015b). Based on the USGS seismic hazard analysis mapping (USGS 2015a), the probabilistic ground motion in the vicinity of the proposed New Build Section is between 0.04 and 0.05 g, where g is the acceleration due to gravity equaling 32 feet per second squared, for a 10 percent probability of exceedance in 50 years (500-year return period), which is generally considered the maximum credible (design) earthquake.

Landslides

Geological hazard impacts that the proposed Project could potentially create or for which it could increase the potential to occur include mass wasting and increased instability resulting from steep cuts and fills and blasting. Surface access roads would be required to reach each transmission line tower, substation, and regeneration site. Existing road improvements could include blading, widening of the road, or installing of drainage structures, such as culverts.

Areas where the proposed Project could potentially lead to increased erosion and mass wasting are primarily steeper areas that would require cut slopes and embankment fills for access roads and foundation construction. Where bedrock is very shallow and durable in mountainous areas, blasting may be required to achieve road grades, construct cut slopes, and excavate foundations. Figures 3.4-2 and 3.4-3 show the locations in the New Build Section where the analysis area crosses steeper slopes (greater than 25 percent) that could potentially require excavations, cut slopes, fill slopes, and blasting.

Figure 3.4-1. Seismicity in the analysis area.



Overall, steeper slopes along route group 1 are located where the alignment crosses the Potrillo and Florida Mountains and through the Camel Mountains, Tres Hermanas Mountains, Cedar Mountains, and isolated hills southeast of Lordsburg. In general, the proposed route avoids areas of steep slopes. The total land area with slopes greater than 25 percent within this route group is approximately 1,600 acres.

Route group 2 would cross through the Pyramid Mountains and Peloncillo Mountains. There are numerous steep slopes in this portion of the New Build Section. These areas are primarily where the proposed route would cross the Peloncillo Mountains. The total land area with slopes greater than 25 percent within this route group is approximately 8,800 acres.

Volcanoes

The USGS has established a volcano hazards program that provides advice on the status of volcanic activity through the United States (USGS 2012b). No potentially active volcanoes have been identified or are being monitored in the Project vicinity. The closest potentially active volcano monitored by the USGS is Mammoth Mountain, in east-central California. Therefore, potential hazards to the proposed Project and alternatives from volcanic eruptions appear to be nonexistent.

AREAS PRONE TO HIDDEN GEOLOGICAL HAZARDS

When new projects are constructed, they may be unwittingly routed over geologically stable areas that could be made unstable or unsafe by construction activities such as blasting or extreme weight loads. Areas with the potential for geological hazards to be created by construction activities include “karst and cave” areas that may have the potential to contain fissures, tubes, and caves.

“Karst” typically involves dissolution of carbonate rock that results in caves and voids that could collapse. For the purposes of this report, karst also refers to the large areas of volcanic rock in the analysis area that could contain fissures, tubes, and caves in the lava. The karst is thus likely to be primarily related to lava tubes and caves that could influence the placement and construction of the alignment. Construction of the proposed Project or alternatives in karst areas could potentially expose area lava tubes and caves, which could collapse, damage equipment, or cause injuries. Rarely, the ground overlying karst areas can collapse suddenly and damage aboveground structures.

Route group 1 crosses approximately 738 acres mapped as karst; route group 2 does not cross any. Figures 3.4-2 and 3.4-3 show the distribution of karst areas in the New Build Section.

MAPPED AREAS OF GEOLOGICAL IMPORTANCE AND IMPORTANT STATE-IDENTIFIED ROCK OUTCROPPINGS

No unique geological features were identified within the analysis area of the New Build Section. No areas of unique geological interest, caves, rock outcroppings, or mineral collection areas of recreational or scientific importance were identified within the New Build Section analysis area.

New Build Section – Mineral Resources

MAPPED AREAS OF MINERAL RESOURCES OF ECONOMIC VALUE

Common-variety minerals include aggregates, sand and gravel, volcanic cinders, basalt, and building stone. In the analysis area for the New Build Section, common-variety mineral resources include primarily sand and gravel pits likely used for crushed rock and fill materials. Figures 3.4-2 and 3.4-3 show the locations of these resources in the New Build Section and, where data are available, the type of resource.

Southern New Mexico and southeastern Arizona have long and productive mining histories. Hardrock mineral resources in the area that have been historically mined or with the potential for extraction include beryllium, bismuth, vanadium, copper, germanium, gold, iron, lead-zinc, manganese, molybdenum, niobium, silver, thorium, tin, and tungsten. Active and inactive mines in the Project analysis area are producing or have produced manganese, gold, silver, copper, lead, vanadium, and zeolites. Figures 3.4-2 and 3.4-3 show the locations of these resources in the New Build Section and, where data are available, the type of resource. Some of these are producers, some are past producers, and some are prospects.

Route group 2 would cross the Lordsburg Mining District south of Lordsburg, New Mexico, and therefore is likely to cross over mineral resources, including lead, copper, silver, gold, and zinc. There are 23 metal occurrences in the vicinity of the analysis area. However, most of these are classified as “past producers,” and none is within the analysis area.

Southwestern New Mexico and southeastern Arizona produce or could potentially produce numerous non-metallic mineral resources, including calcite, gypsum, perlite, volcanic rock, agate, fire clay, barite, fluorite, garnet, gemstones, limestone/marble, pumice, kyanite, silica, and talc.

EXISTING MINING DISTRICTS / MINING CLAIMS (ESPECIALLY PRE-1955 CLAIMS)

Route group 1 crosses over the Fluorite Ridge, Deming, Aden, Carrizalillo Hills, Potrillo Mountains, and Camel Mountain–Eagle Nest mining districts. Route group 2 – Hidalgo Substation to Apache Substation of the proposed New Build Section would cross the Lordsburg Mining District south of Lordsburg, New Mexico, which is known to produce lead, copper, silver, gold, and zinc; and the Bowie Mining District in Arizona, currently producing industrial zeolite minerals. These are used mostly as molecular sieves, for such purposes as removing ammonia from natural gas. Other mining districts in this route group include the Lordsburg Mesa, Kimball, and McGhee Peak districts.

Prior to 1955, claimants had certain surface rights associated with their mining claim. PL 84-167 required BLM to publish each Township in each state where the United States wished to acquire complete surface management rights. Most Townships were published between 1955 and 1968. The Master Title Plat for a particular Township (and the Historical Index) will show whether the Township was published, give the date of publication, and list the claims (by claim name) that responded or were adjudicated surface rights under this act. To maintain surface rights under this determination, the chain of title cannot be broken. There are very few of these claims in Arizona (BLM 2012b).

Using the online BLM tool (BLM’s Land and Mineral Legacy Rehost 2000 System – LR2000 (BLM 2012b)), mining claim locations can be narrowed down to 1–square mile sections of land. The mining claims are inventoried by the section (1 square mile) in which they are located. Using this online tool (BLM 2012b), a search for mining claims within the analysis area that were staked on or before July 23, 1955 did not yield any results. Therefore, no known pre-1955 mining claims are present within the analysis area of the proposed New Build Section.

EXISTING OIL/GAS WELLS

The possibilities of commercial oil and natural gas occurring in southwestern New Mexico are good, as indicated by the thick section of Paleozoic and Cretaceous sedimentary rock, by the oil and gas “shows” in completed test wells, and by favorable geological structures. However, the development of these potentially commercially exploitable oil and gas resources would be difficult due to the presence of igneous intrusions and adverse geological structures (Wengerd 1970).

Nine active oil and gas leases are located within the 2-mile-wide corridor of the analysis area. However, only six oil and gas wells exist and they are all inactive. No wells in the New Build Section are currently producing oil or gas (personal communication, S. Rauzi, AZGS, 2012).

According to the BLM, there are no active coal leases in the Las Cruces or Pecos Districts in New Mexico. Most coal production in New Mexico occurs in the northwestern part of the State, well outside the analysis area (personal communication, M. Smith, BLM, 2012). There are no coal leases or known coal resources on BLM lands under the jurisdiction of the Tucson Field Office (personal communication, D. Moore, BLM, 2012).

GEOTHERMAL RESOURCE POTENTIAL AREAS

Because of natural hot springs and wells with elevated water temperatures in the San Simon Valley, the area is classified in Arizona as being prospectively valuable for geothermal resources from near the State line to a few miles west of Bowie, New Mexico (Witcher 1979). But as with oil and gas, there has never been any commercial production in or near the analysis area.

Witcher (1979) showed about 15 water wells with elevated temperatures in the analysis area from San Simon to Bowie, with discharge temperatures between 35 °C and 49 °C. However, the waters are much hotter about 30 miles to the north, where the Gillard Hot Springs along the Gila River has the hottest surface water in Arizona at about 82 °C, and an area near Clifton, Arizona, a few miles east of there has hot water at about 70 °C. This is the area on which research and commercial interest has focused through the years, resulting in the establishment in 1974 of the Gillard Hot Springs and Clifton Hot Springs Known Geothermal Resource Areas (KGRAs). A KGRA is defined by the USGS as an area that has the necessary geothermal potential to justify spending money for development and is based on the level of interest for competitive leasing by the private sector.

These temperatures are only considered to be moderate by geothermal standards, and each of the KGRAs is apparently of limited extent, each being a deep-water convection system controlled by local faulting, with the water coming to the surface along these faults (Richter et al. 1982; Witcher et al. 1982).
The moderate temperatures and limited geographic area likely preclude the potential for generating electricity, leaving only direct-use applications, like heating greenhouses (Richter et al. 1982; Witcher et al. 1982). Interest in this resource has waned through the years. The leases that established the KGRAs expired with insufficient further interest in leasing to justify the continued existence of the KGRAs, which were therefore revoked by the BLM in the early 1980s. Richter et al. (1982) rates the potential for geothermal development in this area as "low to very low." Today, there is just one company showing an interest, Gradient Resources, which maintains a lease on the Clifton site. As mentioned, no geothermal leases have ever been established on or near the subject land. No commercially viable geothermal resources are located on the Arizona portion of the analysis area. A number of small-scale geothermal systems are in use throughout New Mexico for greenhouses or aquaculture (Idaho National Engineering Laboratory 2003), but none were identified within the analysis area.

Upgrade Section – Geological Resources

REGIONAL GEOLOGICAL SETTING

The Upgrade Section is located in the eastern edge of the Sonoran Desert Subprovince of the Basin and Range Physiographic Province. The Basin and Range Physiographic Province is a region dominated by basins filled with sediments separated by uplifted mountain blocks. Major basins include the Avra Valley, Tucson Basin, San Pedro Valley, and Sulphur Springs Valley (Trapp and Reynolds 1995). The San Pedro River drains the San Pedro Basin. Mountain ranges include the Tucson Mountains, west of Tucson; the Tortolita Mountains, northwest of Tucson; the Santa Catalina Mountains, northeast of Tucson; and the Rincon Mountains, east of Tucson.

Large-scale detachment faulting and regional subsidence occurred in the mid-Tertiary period (ca. 32 million to 20 million years ago (mya)), and sediments began to accumulate in ancestral basins. Basin and Range faulting occurred from 13 mya to 5 mya, where the basins were down-dropped and mountains were left as upthrown fault blocks. Some of these basins are deep, with up to 8,000 feet of sediment infill.

Bedrock units that form the mountains include Proterozoic-age granitic and metamorphic rocks, as well as shallow-water carbonates and clastic sedimentary rocks that were deposited during the Paleozoic era on an extensive erosion surface across the older rocks. More recent geological activity included plutonism (intrusion of large igneous rocks) and volcanism. There was a major pulse of volcanism in the late Oligocene and Miocene time.

The sediments in the basins have been modified by repeated cycles of dissection and deposition during the Quaternary. The sediments tend to be coarser grained near the source areas in the mountains and finer grained in the basin centers. The basin-fill sediments, therefore, include stratified gravel sand, silt, clay, mudstone, and evaporites (i.e., gypsum).

The Precambrian geological units crossed by the Upgrade Section include the unnamed intrusive and metasedimentary rocks (Richard et al. 2000; USGS 2013a). The Cambrian geological units crossed by the Upgrade Section include the Abrigo Formation and Bolsa Quartzite. These rocks represent a shallow marine depositional environment (Richard et al. 2000; USGS 2013a).

The Cretaceous geological units crossed by the Upgrade Section include the Bisbee Group, Amole Arkose, Recreation Red Beds, and unnamed intrusive and rhyolitic to andesitic volcanic rocks. These rocks record the transition from marine to terrestrial depositional environments (Richard et al. 2000; USGS 2013a).

The Tertiary (Paleocene, Eocene, Oligocene, Miocene, and Pliocene epochs) geological units crossed by the Upgrade Section include the Gila Group and unnamed intrusive and rhyolitic to basaltic volcanic rocks. These deposits represent terrestrial depositional environments associated with mountain building and basin infilling, as well as widespread volcanism associated with a tectonic shift from compression to extension during the late Oligocene to early Miocene (Richard et al. 2000; USGS 2013a).

Quaternary (Pleistocene and Holocene epochs) geological units crossed by the Upgrade Section consist of unnamed older and younger surficial sediments consisting of lacustrine, floodplain, alluvial fan, eolian, and piedmont alluvial deposits (Richard et al. 2000; USGS 2013a).

In route group 3 – Apache Substation to Pantano Substation, the Proponent Alternative runs through a flat area filled with mixed sediments and sedimentary rocks. Closer to Pantano is an outcrop formed by Cretaceous-age andesitic lava flows and tuffs.

Because the Upgrade Section primarily overlies mixed alluvial basin-fill materials and because the existing Western ROW was presumably designed to avoid major hazards, potential geological hazards and effects on geological resources are limited in the Upgrade Section.

Table 3.4-2 provides a summary of geological units along the proposed Upgrade Section. Figures 3.4-4 and 3.4-5 show the distribution of the geological units in the Upgrade Section.

Table 3.4-2. Geological Units Mapped in the Upgrade Section Analysis Area

Map Unit	Name	Description
Route Group 3 Apache Substation to Pantano Substation		
Mo	Mississippian, Devonian, and Cambrian sedimentary rocks	Brown to dark gray sandstone grades upward into green and gray shale, overlain by light to medium gray or tan limestone and dolostone
Pz	Paleozoic sedimentary rocks	Undivided Paleozoic limestone, dolostone, quartzite, shale, and related sedimentary rocks
Q	Quaternary surficial deposits, undivided	Unconsolidated to strongly consolidated alluvial and eolian deposits

Table 3.4-2. Geological Units Mapped in the Upgrade Section Analysis Area (Continued)

Map Unit	Name	Description
Route Group 3 Apache Substation to Pantano Substation, cont'd.		
Qo	Early Pleistocene to latest Pliocene surficial deposits	Coarse relict alluvial fan deposits that form rounded ridges or flat, isolated surfaces that are moderately to deeply incised by streams
Qr	Holocene river alluvium	Unconsolidated to weakly consolidated sand and gravel in river channels and sand, silt, and clay on floodplains
Qy	Holocene surficial deposits	Unconsolidated deposits associated with modern fluvial systems
Tsy	Pliocene to middle Miocene deposits	Moderately to strongly consolidated conglomerate and sandstone deposited in basins during and after late Tertiary faulting. Includes lesser amounts of mudstone, siltstone, limestone, and gypsum.
Tv	Middle Miocene to Oligocene volcanic rocks	Lava, tuff, fine-grained intrusive rock, and diverse pyroclastic rocks. These compositionally variable volcanic rocks include basalt, andesite, dacite, and rhyolite.
Xg	Early Proterozoic granitic rocks	Wide variety of granitic rocks, including granite, granodiorite, tonalite, quartz diorite, diorite, and gabbro
Yg	Middle Proterozoic granitic rocks	Mostly porphyritic biotite granite with large microcline phenocrysts, with local fine-grained border phases and aplite
Ys	Middle Proterozoic sedimentary rocks	Red-brown shale and sandstone, buff to orange quartzite, limestone, basalt, black shale, and sparse conglomerate
Route Group 4 Pantano Substation to Saguaro Substation		
KJs	Cretaceous to Late Jurassic sedimentary rocks with minor volcanic rocks	Sandstone and conglomerate, rarely forms prominent outcrops; massive conglomerate is typical near base of unit and locally in upper part.
Kv	Early Tertiary to Late Cretaceous volcanic rocks	Rhyolite to andesite and closely associated sedimentary and near-surface intrusive rocks.
Q	Quaternary surficial deposits, undivided	Unconsolidated to strongly consolidated alluvial and eolian deposits.
Qo	Early Pleistocene to latest Pliocene surficial deposits	Coarse relict alluvial fan deposits that form rounded ridges or flat, isolated surfaces that are moderately to deeply incised by streams
Qr	Holocene river alluvium	Unconsolidated to weakly consolidated sand and gravel in river channels and sand, silt, and clay on floodplains
Tsm	Middle Miocene to Oligocene sedimentary rocks	Conglomerate, sandstone, mudstone, limestone, and rock-avalanche breccia (sheet-like deposits of crushed rock) deposited and tilted during widespread normal faulting and basin development
Tsy	Pliocene to middle Miocene deposits	Moderately to strongly consolidated conglomerate and sandstone deposited in basins during and after late Tertiary faulting. Includes lesser amounts of mudstone, siltstone, limestone, and gypsum.
Tv	Middle Miocene to Oligocene volcanic rocks	Lava, tuff, fine-grained intrusive rock, and diverse pyroclastic rocks. These compositionally variable volcanic rocks include basalt, andesite, dacite, and rhyolite.
Xm	Early Proterozoic metamorphic rocks	Undivided metasedimentary, metavolcanic, and gneissic rocks
Yg	Middle Proterozoic granitic rocks	Mostly porphyritic biotite granite with large microcline phenocrysts, with local fine-grained border phases and aplite

Source: USGS (2013a).

POTENTIAL GEOLOGICAL HAZARDS

Potential geological hazards within the Upgrade Section of the proposed Project and alternatives are described in the following sections. Potential hazards are evaluated further in chapter 4 with regard to their potential impacts on the proposed Project. Identified geological factors that were determined not to be potential hazards include earth fissures, geological faults, earthquakes, volcanoes, mapped areas of geological importance, and important State-identified rock outcroppings. Each potential hazard, along with its relationship to the proposed Project, is described in further detail below.

Land Subsidence and Earth Fissures

The causes of land subsidence and earth fissures and their related geological hazards were described above under the New Build Section description.

Route group 3 crosses through 73.5 acres of subsidence areas: the Fort Grant (37.2 acres) and Kansas Settlement (36.3 acres) subsidence features. In the corridor of the Pantano to Saguaro route group 3, large areas of groundwater-level declines have been documented along the alignment in the Avra Valley and Tucson area (Schuman and Guinaldi 1986). The water table has been lowered by as much as 150 feet in the Avra Valley and up to several hundred feet in the Tucson Basin (Pearthree et al. 2000). Continuing subsidence has been documented as water levels decline in the Tucson area. Measurements in the Tucson Basin suggest that the rate of subsidence has increased markedly since 1980. Two large areas of land subsidence are documented in the Tucson area; the ROW passes through one, located south of I-10 and east of I-19. Route group 4 crosses through 16.1 acres of land identified as the Tucson subsidence area.

Areas of large groundwater-level declines could potentially be subject to further land subsidence and formation of earth fissures in these areas. However, active groundwater management areas in the Tucson Basin have been formed, with the goal of reducing groundwater withdrawals and their associated impacts.

The Upgrade Section is not located within an AZGS earth fissure study area, and AZGS mapping does not depict any earth fissures in the Upgrade Section of the analysis area (AZGS 2013).

Geological Faults

Geological hazards associated with possible surface fault ruptures are the same as those described above for the New Build Section.

The proposed Project would be constructed within the Basin and Range Physiographic Province, which formed by normal faulting (i.e., primarily vertical displacement) over a period of millions of years. Although most of the faulting has ceased, several Quaternary-age faults (with activity within the past 1.6 million years) have been recognized and mapped in the vicinity of the proposed Project and alternatives.

The USGS quaternary fault and fold database (USGS 2012a) was used to determine the presence of active faults within the analysis area. No “active faults” (surface rupture within the past 11,000 years) have been mapped in the Upgrade Section. The Upgrade Section does not cross any Quaternary-age faults.

Earthquakes

Geological hazards associated with earthquakes for the Upgrade Section are the same as those described above for the New Build Section. More than 20 earthquakes with magnitudes greater than 5 have occurred in or near Arizona since 1850. The largest earthquake in the vicinity of the proposed Upgrade Section is a magnitude 7.4 quake that occurred in Mexico in 1887, approximately 40 miles southeast of

Douglas, Arizona. This earthquake caused property damage throughout southeastern Arizona. However, no earthquakes have been recorded within the project analysis area.

Based on USGS (2012b) seismic hazard analysis mapping, the probabilistic ground motion in the vicinity of the Upgrade Section is between 0.03 and 0.04 g, where g is the acceleration due to gravity equaling 32 feet per second squared, for a 10 percent probability of exceedance in 50 years (500-year return period), which is generally considered the maximum credible (design) earthquake. Figure 3.4-1 shows that the analysis area in southeastern Arizona is rated as a “moderate to low” to “low” earthquake hazard (Dubois and Smith 1980).

Landslides

Geological hazards associated with landslides for the Upgrade Section are the same as those described above for the New Build Section. Figures 3.4-4 and 3.4-5 show areas along the Upgrade Section where slopes are steeper than 25 percent that could potentially require excavations, cut slopes, fill slopes, and blasting.

Because the Upgrade Section runs primarily through broad alluvial valleys, few areas along the proposed route are steeper than 25 percent. These areas are primarily near the Dragoon Mountains, terrace surfaces around Benson, and through the Twin Peaks area west of Tucson. Route group 3 crosses approximately 201 acres of land with slopes greater than 25 percent. Route group 4 crosses approximately 24 acres of land with slopes greater than 25 percent.

Volcanoes

According to the USGS volcano hazards program, no active volcanoes are listed in the proposed Project vicinity (USGS 2012b). The closest potentially active volcano monitored by the USGS is Mammoth Mountain, in east-central California. No volcanic hazards are anticipated in the Upgrade Section.

AREAS PRONE TO HIDDEN GEOLOGICAL HAZARDS

When new projects are constructed, they may be unwittingly routed over geologically stable areas that could be made unstable or unsafe by construction activities such as blasting or extreme weight loads. Areas with the potential for geological hazards to be created by construction activities include “karst and cave” areas that may have the potential to contain fissures, tubes and caves. As previously described, karst typically involves dissolution of carbonate rock that results in caves and voids that could collapse. For the purposes of this analysis, karst also refers to the large areas of volcanic rock in the analysis area that could contain fissures, tubes, and caves in the lava.

Route group 3 crosses approximately 110 acres mapped as karst; route group 4 does not cross any karst areas.

Figures 3.4-4 and 3.4-5 show the distribution of karst areas in the Upgrade Section.

MAPPED AREAS OF GEOLOGICAL IMPORTANCE AND IMPORTANT STATE-IDENTIFIED ROCK OUTCROPPINGS

No unique geological features were identified within the analysis area of the Upgrade Section. No areas of unique geological interest, caves, rock outcroppings, or mineral collection areas of recreational or scientific importance were identified within the Upgrade Section analysis area.

Upgrade Section – Mineral Resources

Because the Upgrade Section runs primarily through broad alluvial basins, there are very few mineral resources within the 500-foot-wide analysis area corridor of the Upgrade Section.

MAPPED AREAS OF MINERAL RESOURCES OF ECONOMIC VALUE

Common-variety minerals include aggregates, sand and gravel, volcanic cinders, basalt, and building stone. No other common-variety mineral resources are identified within the Upgrade Section.

Southern Arizona has a long and productive mining history. Metal resources in the area that have been historically mined or with potential for extraction include beryllium, bismuth, copper, germanium, gold, iron, lead-zinc, manganese, molybdenum, niobium, silver, thorium, tin, and tungsten. However, no metal resources are specifically identified within the Upgrade Section.

Southern Arizona produces or could potentially produce non-metallic mineral resources, including calcium, gypsum, perlite, volcanic rock, agate, fire clay, barite, fluorite, garnet, gemstones, limestone/marble, pumice, silica, and talc. No non-metallic mineral resources are specifically identified within the Upgrade Section.

EXISTING MINING DISTRICTS / MINING CLAIMS (ESPECIALLY PRE-1955 CLAIMS)

The significance of pre-1955 mining claims is described above (see New Build Section). Essentially, pre-1955 claims convey certain surface rights that post-1955 claims do not have. Using the online LR2000 BLM tool (BLM 2012b), mining claim locations can be narrowed down to 1-square-mile sections of land. The mining claims are inventoried by the section (1 square mile) in which they are located. Using the online LR2000 BLM tool, a search performed for mining claims within the analysis area that were staked on or before July 23, 1955 did not yield any results. No known pre-1955 mining claims are present within the analysis area of the proposed Upgrade Section.

EXISTING OIL/GAS WELLS

Nations et al. (1989) state that the area with perhaps the greatest potential for future petroleum discoveries is the Pedregosa Basin in Cochise County, which includes the analysis area. This potential is based on the stratigraphic similarity of the Paleozoic and Mesozoic sedimentary rocks of this area to the Permian Basin of west Texas and eastern New Mexico, which is a well-known prolific producer of oil and gas.
The Pedregosa Basin has the same sort of source rocks, reservoir rocks, and stratigraphic and structural traps as the Permian Basin. However, as described by Greenwood et al. (1977), the volcanism and plutonism of the Basin and Range area of southeastern Arizona probably had a negative effect on petroleum accumulations; plus, many of the sedimentary rocks are covered by thick sequences of more recent (Tertiary) volcanic rocks. Greenwood et al. (1977:1464) also note that “the apparent lack of oil and gas seeps in the highly faulted Basin and Range province has prompted some geologists to doubt the presence of significant petroleum accumulations.” Rauzi (2001:figure 1), however, reports that some petroliferous shales are found near Tombstone and that a rancher reported some oily material coming initially from a fresh spring in the Swisshelm Mountains in 1934. These were the only reports of surface petroleum occurrences in Cochise County.

From the 1920s through the 1980s, there were about 20 exploratory oil and gas wells drilled in southern Graham County and northern Cochise County, and all have been plugged and abandoned as dry holes, with no production. An Arizona well location map prepared by the Arizona Oil and Gas Conservation Commission (1987) shows the location of these dry holes. Showings of oil or gas were reported in one well drilled in 1971 in the San Simon Valley (the Ivan Tenney No. 3 State well, about 10 miles north of the analysis area) by Rauzi (2001:35), and in several holes drilled in the late 1920s (about 5 miles southeast of the Tenney well), as reported by Wilson (1996:18), who noted that all these holes from the 1920s were “ultimately unsuccessful.”

As stated by Peirce (1982:5), “Thus far, southern Arizona continues to be ore-deposit country, not petroleum. Petroleum very likely existed here prior to a series of disruptive geological events that may have dispersed much pre-existent oil and/or natural gas. Some petroleum could remain, perhaps in highly unusual places, but finding it is proving elusive and costly.” And with that, exploratory drilling for oil and gas in southern Arizona has been nonexistent since the 1980s (Arizona Oil and Gas Conservation Commission 1987; Greenwood et al. 1977; Nations et al. 1989; Rauzi 2001).

There are no oil or gas wells or any known oil or gas resources on BLM lands under the jurisdiction of the Tucson Field Office (personal communication, D. Moore, BLM, 2012). One inactive oil and/or gas well is located within route group 3 at the Adams Tap Substation (personal communication, S. Rauzi, AZGS, 2012).

There are no coal leases or any known coal resources on BLM lands under the jurisdiction of the Tucson Field Office (personal communication, D. Moore, BLM, 2012).

GEOTHERMAL RESOURCE POTENTIAL AREAS

No geothermal leases have ever been established on or near the analysis area. No commercially viable geothermal resources are located on the Arizona portion of the analysis area. GIS data obtained from the USGS Mining Resource Data System indicate that there are no geothermal resources within the existing Western ROW of the Upgrade Section. No commercially viable geothermal resources are located on the Arizona portion of the analysis area (personal communication, Larry Thrasher, BLM, 2013).

3.5 SOIL RESOURCES

This soil resource inventory presents an overview of the soils within the analysis area and addresses potential impacts to these resources from the implementation of the proposed Project or its alternatives and associated components. The primary reason to define impacts to soils is to reduce, minimize, or mitigate effects from all phases of the proposed Project. This section analyzes the current conditions within the analysis area with regard to sensitive soils, including wind and water erosion, compaction, soil biotic crusts, and soil productivity.

Some of the information provided in the following subsections is taken from a report titled “Southline Transmission Project Resource Report 12: Soils” (CH2M Hill 2013d). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

3.5.1 Analysis Area

New Build Section

The analysis area for the New Build Section for the proposed Project and its alternatives is 1 mile on either side of the centerline. The analysis area is used to identify the soil resources that have the potential to be directly impacted by ground disturbance associated with the Project.

Upgrade Section

The analysis area for the Upgrade Section for the proposed Project and its alternatives is a 500-foot-wide corridor centered on the existing Western ROW (200 feet off the centerline of the existing 100-foot corridor).

3.5.2 Issues to Be Analyzed

The extent to which the proposed Project could result in potential impacts to sensitive soils is addressed in chapter 4, where potential effects with regard to soil are evaluated. Sensitive soils within this context are those where biological soil crusts exist, are susceptible to high rates of wind and/or water erosion, and have a high potential for productivity losses. In order to address these potential impacts, wind erodibility group values are analyzed in chapter 4, along with changes in soil productivity values and sustainable soil loss (T factor). These values give a good indication of the acreage of sensitive soils within the analysis area. Potential effects related to soil resources during Project construction, operation, and maintenance activities could include:

- Loss of topsoil due to construction, operation, and maintenance activities (i.e., removal or mixing of topsoil);
- Soil compaction from vehicular traffic;
- Soil erosion due to wind and water; and
- Changes in soil productivity that could result from topsoil disturbance after construction and reclamation:
  - Disturbance of sensitive soils (soils which may be difficult to reclaim); and
  - Disturbance of biotic soil crusts due to surface disturbance during proposed Project activities.

Impacts to soil resources would be considered significant if any of the above potential effects results in major direct or indirect negative consequences. The extent to which the proposed Project could result in such effects is addressed in chapter 4, where potential changes to soil resources are described in terms of spatial extent, temporal scale, and significance, to facilitate the comparison of alternatives.

3.5.3 Analysis Area Conditions

This section details the current conditions of the analysis area as they relate to the existing soil resources. The New Build and Upgrade sections are combined in this discussion, since both are found within the Basin and Range Physiographic Province (Fenneman 1931) of New Mexico and Arizona. This physiographic province is characterized by basins separated by north-south-trending mountain ranges. The basins are filled with alluvium of Pliocene-Pleistocene age. Playas within the basins are remnant ancient lake beds. The soil resources found within the analysis area vary by landscape; therefore, diverse soil types are found throughout both the New Build and Upgrade sections. For example, it would be expected that soils within river and stream bottoms would be highly susceptible to water erosion, while the soils found on playa plains would be more subjected to wind erosion.

The analysis area for both the New Build and Upgrade sections contains six different soil orders and over 120 different soil mapping units. The most common soil order found within the analysis area is aridisols, followed by entisols and mollisols. Other soil orders represented by a single mapped soils series within the area of the proposed Project and alternatives (based on U.S. generalized soil mapping (Natural Resources Conservation Service (NRCS) 2013a, 2013b) include vertisols, inceptisols, and alfisols.

The dominant soils, aridisols, form under arid conditions, contain subsurface horizons in which clay, calcium carbonates, silica, and salts accumulate, and they contain very little organic matter, making them more prone to erosion and harder to reclaim. Revegetation of aridisols can be difficult due to lack of moisture and organic matter and therefore should be initiated during wet times of the year. All soil orders within the analysis area have the ability to support soil biotic crust; however, exact distribution of these crusts is unknown.

The 10 soil mapping units with the most coverage by area found within the New Build and Upgrade sections, and their general descriptions, are listed below in tables 3.5-1 and 3.5-2. The majority of the soils within the analysis area are of loamy or sandy textures with deep profiles, and are typically well drained. Because soils in a given area typically have similar parent materials, other area soils not listed in the tables are mostly similar in composition.

Construction of the proposed Project could result in disturbance to soils susceptible to high rates of wind and/or water erosion, and have a high potential for productivity losses. Identifying these areas would help contractors plan for appropriate erosion conservation practices during construction, such as stormwater run-on and runoff prevention, silt fences and/or retention basins, and topsoil management. It would also help to plan for appropriate reclamation and revegetation activities following construction, and would identify priority areas that may warrant extra precautions. One of the priority areas is the Lordsburg and Willcox playas due to the highly erosive soils found in and around the analysis area.

Figures 3.5-1 and 3.5-2 highlight the different proposed routes as well as the soil erosion properties in relationship to the playas. Routing of the proposed Project considered sensitive environmental features, such as minimizing disturbance by avoiding areas of highly erosive soils. In this context, table 3.5-3 characterizes the erosivity and productivity of soils in both the New Build and Upgrade sections.

The T-factor is an estimated soil loss tolerance, measured in tons per acre (integer values of from 1 to 5 tons per acre per year [t/a/y]). It is defined as the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. This quality of the soil to be maintained is threefold in focus. It includes maintaining the surface soil as a seedbed for plants, the atmosphere–soil interface to allow the entry of air and water into the soil and still protect the underlying soil from wind and water erosion, and the total soil volume as a reservoir for water and plant nutrients, which is preserved by minimizing soil loss. Extremely shallow or otherwise fragile soils have a T-factor of 1 t/a/y, and very deep soils that are least subject to damage by erosion have a T-factor of 5 t/a/y (NRCS 2013c).

Wind Erodibility Groups (WEGs) are a set of classes given integer designations from 1 through 8, based on the properties of the soil surface that are considered to affect susceptibility to wind erosion. The major criteria are texture, presence of carbonate, and the degree of decomposition of organic material in the soils. Associated with each WEG is a wind erodibility index. The wind erodibility index is the theoretical, long-term amount of soil lost per year through wind erosion, but assumes the soil is bare, lacks a surface crust, occurs in an unsheltered position, and is subject to the weather. Because appropriate soil management conservation practices would be used during and following constructions, it is assumed that occurrences of bare unprotected soils would be infrequent and temporary. Therefore, only the WEG is analyzed herein (NRCS 2013c).

Rangeland health is thought of as the degree to which the integrity of the soil and ecological processes of rangeland systems are maintained (National Research Council 1994). In areas of similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation are closely related to the kind of soil and therefore the condition of that soil. Rangeland productivity can be measured in total dry-weight production, in pounds per acre of air-dry vegetation. This is the amount of vegetation that can be expected to grow annually in a well-managed area that is supporting the potential natural plant community.

Table 3.5-1. Summary of Top 10 Soil Mapping Units within the New Build Section

Soil Unit	Percent of Analysis Area	Description
Hondale-Verhalen association	9.74	0–3% slopes, well drained, very deep soils with loam surface over clay and loam subsoil
Tres Hermanos-Upton complex	7.23	0–8% slopes, well drained, very deep soils with a gravelly sandy clay loam over gravelly clay loam subsoil
Wink-Pintura complex	7.14	0–8% slopes, well drained, very deep soils with a fine sandy loam surface and subsoil over weakly to moderately cemented caliche
Stellar-Mohave association	6.59	0–5% slopes, well drained, very deep soils with a clay loam surface and clay subsoil
Pintura-Berino complex, eroded	5.03	1–20% slopes, excessively drained, very deep soils with a loamy find sand surface over fine sand subsurface
Mohave sandy clay loam	5.00	0–8% slopes, well drained, very deep soils that have a sandy loam surface over a clay loam and loam subsurface
Signal gravelly loam	2.77	0–30% slopes, well drained, deep soils with a very gravelly loam and very gravelly clay loam surface over very gravelly sandy clay
Sonoita complex	2.65	0–20% slopes, excessively drained, deep soils with a gravelly sandy loam throughout
Tubac soils	2.17	0–8% slopes, well drained, very deep soil with a fine sandy loam and gravelly sandy loam surface over gravelly clay loam and loam
Atascosa-Graham-Rock outcrop complex	2.12	5–70% slopes, well drained shallow to very shallow soils with very gravelly sandy loam surface over very gravelly sand clay loam subsoil over bedrock

Table 3.5-2. Summary of Top 10 Soil Mapping Units within the Upgrade Section

Soil Unit	Percent of Analysis Area	Description
Anthony sandy loam	6.67	0–15% slopes, well drained, very deep soil with a sandy loam surface texture and a fine sandy loam subsurface texture
Grabe soils	6.01	0–3% slopes, well drained, very deep soils with a loam surface texture and loam and fine sandy loam subsurface textures
Delnorte-Stagecoach complex	4.51	0–30% slopes, excessively drained, deep soils with a gravelly sandy loam texture throughout
Calcigypsids-Contention-Redo complex	4.45	5–45% slopes, well drained, very deep soils with a very gravelly sandy loam to sandy surfaces textures and very to extremely gravelly loam to sand subsurface textures
Comoro sandy loam	4.03	0–8% slopes, excessively drained, very deep soils with a sandy loam surface texture and sandy loam and fine sandy loam subsurface texture
Cave-Rillito complex	3.98	0–35% slopes, very shallow, well drained soils with a gravelly sandy loam surface texture over a gravelly loam and calcium carbonate hardpan subsurface
Courtland-Sasabe-Diaspar complex	3.83	0–8% slopes, well drained, very deep soils with a sandy loam surface texture over a sand clay loam subsurface texture
Libby-Gulch complex	3.42	0–10% slopes, well drained, deep soils with a very gravelly loamy sand and very gravelly and gravelly fine sandy loam surface textures over gravelly and very gravelly sandy loams and sandy clay loams subsurface textures
Rillito gravelly sandy loam	3.30	0–5% slopes, excessively drained, very deep soils with a gravelly sandy loam surface texture over a gravelly loam to sandy loam subsurface texture
Cowan loamy sand	2.72	0–3% slopes, excessively drained, very deep soils with a sandy loam surface texture and a loamy sand subsurface texture

Table 3.5-3. Soil Resources Inventory Data

Project Section	Total Acreage	Water and Wind Erosion		Productivity		Corrosivity	
		T-factor* (percent of area)	WEG† (percent of area)	RngProdNY‡ (percentage of area)	RngProdFY§ (percentage of area)	Steel	Concrete
New Build	808,085	48.2%	63.6%	40.2%	33.0%	2% (17,954 acres)	0.1% (1,208 acres)
Upgrade	429,757	8.7%	6.5%	7.4%	5.2%	0.6% (2,406 acres)	0.06% (262 acres)

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

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

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

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

It includes all vegetation, whether or not it is palatable to grazing animals, and includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. For each soil type, estimates are provided for favorable, normal, and unfavorable years (above average, average, and below average growing conditions, based on how precipitation and temperatures affect available soil moisture) (NRCS 2003a).

Corrosion of steel and concrete is the potential of soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

3.6 PALEONTOLOGICAL RESOURCES

Some of the information provided in the following subsections is taken from a report titled "Southline Transmission Project Resource Report 9: Paleontology" (CH2M Hill 2013e). The contents of that report are used herein without specific reference. Additional explicit "in text" references to scientific and other sources relied upon for conclusions in the analysis are included.

Paleontological resources consist of fossilized remains and imprints of vertebrates, invertebrates, and plants, as well as trace fossils such as footprints. Paleontological resources are non-renewable resources that allow scientists to answer questions about what the Earth was like in the past and how it has changed over time. They include fossils themselves and the geological deposits in which the fossils are found. When assessing the significance of paleontological resources, care must be taken to consider the entire geological unit and not simply known fossil locations within the analysis area.

Two areas of concern are present within the analysis area, both of which are located in New Mexico:

- the Mojado, U-Bar (Aptian), Hell-to-Finish formations and the Gila Group in the East Potrillo Mountains in southwestern New Mexico; and
- the Santa Fe Group in the Mesilla and Mimbres basins in New Mexico.

3.6.1 Analysis Area

The analysis area for the New Build Section of the proposed Project is 1 mile on either side of the centerline of all alternatives. This is to identify resources that could be directly impacted by ground disturbance. The analysis area for the Upgrade Section of the proposed Project is a 500-foot corridor (200 feet on either side of existing 100-foot corridor).

3.6.2 Laws, Ordinances, Regulations, and Standards

Paleontological resources are considered fragile and non-renewable resources important to scientific knowledge. Several Federal and State laws, regulations, policies, and standards are applicable to paleontological resources in the analysis area.

Federal

The following provides a summary of the relevant Federal regulations besides NEPA that concern paleontological resources on Federal land, or that are on land that is included in a Federal project. The most important of these regulations are the Antiquities Act of 1906 and the Paleontological Resources Preservation Act of 2009.

The Antiquities Act of 1906 (16 U.S.C. 431–433) regulates “objects of antiquity” found on Federal land, which includes fossils, by establishing a permitting system for excavations on Federal land. It also establishes criminal sanctions for those who remove or destroy said objects.

The FLPMA of 1976 (43 U.S.C. 1701–1782) requires that Federal land be managed in a manner that will protect the quality of their scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values. Under the FLPMA, paleontological resources fall under the category of resources of scientific value.

Title 43 CFR 8365.1–5 permits the collection of common invertebrate and common plant fossils on public lands but prohibits the collection of fossils for commercial reasons without a permit.

The Paleontological Resources Preservation Act (Title 6 of the Omnibus Public Land Management Act (H.R. 146, Subtitle D)) requires the DOI and USDA Secretaries to “manage and protect paleontological resources on Federal land using scientific principals and expertise” and to “develop appropriate plans for inventory, monitoring, and the scientific and educational use of paleontological resources.” It also puts in place permitting requirements for collection of specimens from public land, and criminal and civil penalties for unauthorized collection.

Several BLM handbooks deal with the management of paleontological resources on Federal lands: H-8270 – “Paleontological Resource Management Handbook” (BLM 1998a); H-8270-1 – “General Procedural Guidance for Paleontological Resource Management” (BLM 1998b); IM 2008-009, “Potential Fossil Yield Classification System for Paleontological Resources on Public Lands” (BLM 2008c); and IM 2009-011, “Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources” (BLM 2009b).

The “Coronado National Forest Land and Resource Management Plan” (Forest Service 1986a), which is currently under revision, sets a goal for managing paleontological resources found in caves. Caves are to be preserved and protected “for their unique environmental, biological, geological, hydrological, archaeological, paleontological, cultural and recreational values.”

State

NEW MEXICO

In New Mexico, paleontological resources are under the jurisdiction of the Commissioner of Public Lands, who is responsible for managing assets on State Trust lands. Assets on State Trust land are protected from unauthorized appropriation, damage, removal, or use.

ARIZONA

ARS 41-841, "Archaeological and Vertebrate Paleontological Discoveries," states that on State land individuals "shall not knowingly excavate in or upon any . . . vertebrate paleontological site, or site including fossilized footprints," nor shall they collect vertebrate paleontological specimens unless authorized by the State.

Professional Standards

The Society of Vertebrate Paleontology has established guidelines and professional standards for best practices in research, analysis, publication, and curation (Society of Vertebrate Paleontology 2008), as well as guidelines for impact analysis to paleontological resources (Society of Vertebrate Paleontology 1995).

3.6.3 Issues to Be Analyzed

Several issues are to be analyzed for potential impact to paleontological resources:

- What are the effects of ground-disturbing activities from tower, substation, and access road construction on scientifically significant fossil-bearing geological units?
- Is there potential for damage to or loss of scientifically significant fossils due to construction?
- Will the proposed Project limit access to scientifically significant fossil-bearing geological units?

3.6.4 Analysis Area Conditions

This section discusses the gathering of data for determining the paleontological sensitivity of the analysis area for the proposed Project, as well as the application of those data to the BLM's Potential Fossil Yield Classification (PFYC).

Data Sources

Sources consulted to develop a paleontological inventory of the analysis area include geological maps, published and unpublished reports, and museum records. Primary maps used for geological mapping were Scholle (2003) and AZGS (2000), both of which are available online. The fossil locality and Miomap databases at the University of California Museum of Paleontology (UCMP) at Berkeley, the New Mexico Museum of Natural History and Science (NMMNH) paleontological database, the Paleobiology Database (Paleobiology) maintained by the University of California at Santa Barbara, and fossil locality data provided by the BLM Las Cruces Field Office (confidential) were consulted to identify known fossil localities in or near the analysis area. The Tucson and Safford BLM Field Offices, AZGS, New Mexico Bureau of Geology and Mineral Resources, and Arizona Museum of Natural History were also contacted for information on known fossil localities.

Paleontological Sensitivity and Potential Fossil Yield Classification

The BLM uses the PFYC system to determine the potential for the presence of fossils within certain geological formations, or its "paleontological sensitivity." The PFYC was initially developed to provide guidance in predicting and assessing paleontological resources by the FS and was adopted by the BLM (BLM 2008c). The PFYC system classifies geological units "based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential." Guidelines issued by the Society of Vertebrate Paleontology (1995) state that paleontological "sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical and (b) the importance of recovered evidence for new and significant [taxonomic], phylogenetic, ecologic, or stratigraphic data."

The classification is "applied to the geological formation, member, or other distinguishable unit, preferably at the most detailed mappable level" (BLM 2008c:attachment 1-1). By applying classifications to geological units, the system acknowledges that it is the geological unit itself that is the source of the fossils, regardless of whether or not known fossil localities are present within the analysis area, and allows scientists to predict whether or not a geological unit will be fossiliferous. Table 3.6-1 defines each PFYC class.

Table 3.6-1. Potential Fossil Yield Classes

Classification	Description	Management Concern
Class 1 – Very Low	Geological units that are not likely to contain fossils, such as igneous, metamorphic, or Precambrian-age rocks.	Negligible or not applicable
Class 2 – Low	Sedimentary geological units that are not likely to contain vertebrate or significant invertebrate or plant fossils, such as those younger than 10,000 years, recent eolian deposits, and those that have undergone physical or chemical changes.	Generally low
Class 3 – Moderate or Unknown	Sedimentary units with variable fossil content and significance or units with unknown potential.	Moderate or cannot be determined
Class 4 – High	Geological units with known fossils but with variable occurrence and predictability. The units may be at risk from human disturbance.	Moderate to high
Class 5 – Very High	Geological units that consistently and predictably produce fossils of significant scientific value and are at risk from human disturbance.	High to very high

Source: BLM (2008c).

3.6.5 Regional Overview

The analysis area is located in the southeastern portion of the Basin and Range Physiographic Province, which is typified by north-south-trending or northwest-southeast-trending mountain ranges separated by valleys (basins) and which extends across western and southern Arizona and into southwestern New Mexico. The mountains were formed primarily as a result of Middle and Late Tertiary period extensional tectonic events. The mountain ranges consist of a variety of rock types reflecting the complex geological history of the region. The oldest rocks are Precambrian metamorphic rocks brought to the surface by later tectonic events. Paleozoic marine sedimentary rocks reflect a time when warm shallow seas covered much of the region. Mesozoic volcanic and plutonic rocks are the result of the Laramide Orogeny, a mountain-building event affecting the western North American cordillera that resulted from the collision of tectonic plates. Middle Tertiary period extensional tectonics were accompanied by the emplacement of large magmatic intrusions, resulting in large granitic plutons and widespread caldera-style silicic volcanism. This was followed by Early Tertiary high-angle extensional faulting, resulting in the classic basin and range physiography observed today. Quaternary period volcanism is evidenced by the numerous cinder cone volcanoes and basaltic lava flows of the San Bernardino volcanic field of southeast Arizona and the Potrillo volcanic field south and west of Afton. Most of the sediments found in the valleys are Late Tertiary and Quaternary basin-fill piedmont alluvium, as well as localized fluvial, alluvial, and eolian deposits. Animas Playa and Willcox Playa are dry lake beds that are the remnants of much larger Pleistocene lakes, specifically Lake Animas and Cochise Lake. Late Quaternary lacustrine deposits are preserved on the valley floors around the modern-day playas. Within the analysis area, the primary landforms are small mountain ranges, pediments, alluvial fans, bajadas (coalescing alluvial fans), arroyos (dry drainage channels), bolsons (internally drained flat valley bottoms), and playas. Table 3.6-2 provides a summary of the geological formations and deposits within the analysis area that have the potential to contain fossils. For further information on the geology of the analysis area, see Section 3.4, “Geology and Mineral Resources.”

Table 3.6-2. Geological Units and Paleontological Resources in the Analysis Area

Geological Age	Geological Unit	Fossil Types Found near the Analysis Area	Number of Known Fossil Localities within the Analysis Area	PFYC	Paleontological Sensitivity
Quaternary	Surface alluvial and eolian deposits and young volcanic deposits	None	None	1 to 2	Low to Moderate or Unknown
Tertiary–Early Quaternary	Quemada Formation, Upper Santa Fe Group, St. David Formation	Mammals, birds reptiles, amphibians, fish	None	1 to 2 (AZ) to 4 (NM)	Very Low to High
Mesozoic	Mojado, U-Bar, Hell-to-Finish Formations, Bisbee Group, Mancos Shale and Beartooth and Sarten Formations	Dinosaurs, dinosaur trackways, marine reptiles, reptiles, amphibian, fish, invertebrates, plants, microfossils,	1	1 (AZ) to 4 (NM)	Very Low to High
Paleozoic	Upper Naco Group, Lower Naco Group, Paradise Formation, Escabrosa Limestone, Abrigo Formation, and Bolsa Quartzite	Fish and invertebrates	None	2	Low

3.6.6 Paleontological Potential and Fossil Localities

The following discussion of geological formations and fossil localities is presented from oldest to youngest formations.

New Mexico

Paleozoic Era (532.0–251.0 mya) deposits in southwestern New Mexico consist of the Permian San Andres, Glorieta, and Yeso Formations. During the Paleozoic, southwestern New Mexico was covered by a shallow sea, and fossils found in these formations include marine invertebrates (trilobites, echinoderms, cephalopods, gastropods, brachiopods, bivalves, anthozoans, bryozoans, and sponges) and the teeth of cartilaginous fish (Carrasco et al. 2005; NMMNH 2012; Paleobiology 2012; UCMP 2012).

Mesozoic Era (251.0–65.5 mya) formations within southwestern New Mexico include the Mancos Shale, Beartooth, and Sarten Formations and the Mojado, U-Bar, and Hell-to-Finish Formations. The Mancos Shale, Beartooth, and Sarten Formations have produced marine invertebrate (ostracods, echinoids, cephalopods, anthozoans, gastropods, and bivalves) and vertebrate fossils (selachin fish teeth) (Carrasco et al. 2005; Lucas et al. 1988; NMMNH 2012; Paleobiology 2012; UCMP 2012).

The Mojado, U-Bar, and Hell-to-Finish Formations have produced terrestrial vertebrate fossils, including trackways, as well as invertebrates and plant fossils. Footprints of ornithopod and theropod dinosaurs, reptilian swimming traces, and possible trackways of an ankylosaurian dinosaur have been recorded in the formations. Invertebrates recorded include cephalopods and bivalves, and plants include remains of tree-like ferns (Carrasco et al. 2005; Kappus et al. 2003; NMMNH 2012; Paleobiology 2012; UCMP 2012). One bivalve fossil locality was reported within the analysis area within the Mojado, U-Bar, and Hell-to-Finish Formations (confidential fossil locality data obtained from the BLM District Office in Las Cruces, New Mexico, 2012).

Cenozoic Era (65.5 mya to present) deposits are represented by Tertiary–Early Quaternary period and Quaternary period deposits. Tertiary–Early Quaternary deposits consist of the Santa Fe group in the Mimbres and Mesilla Basins of southwestern New Mexico. The Santa Fe Group has produced mammalian, avian, and reptilian fossils from Blancan- and Irvington-age (Late Pliocene to Early Pleistocene–age) deposits (table 3.6-3) (Carrasco et al. 2005; Morgan and Lucas 2003; NMMNH 2012; Paleobiology 2012; UCMP 2012).

Table 3.6-3. Fauna from the Santa Fe Group

Age	Mammals	Birds	Reptiles
Irvington (Early Pleistocene)	Gomphothere, camel, horse, ground sloth, beaver, wolf, coyote, cervid, deer	–	land tortoise
Blancan (Late Pliocene)	Gomphothere, ground sloth, glyptodont, bobcat, sabercat, horse, llama, camel, deer, rabbit, skunk, tapir, mole, ground squirrel, pocket gopher, cotton rat, and grasshopper mouse	small passerine bird	softshell turtle, emydid (pond turtle), land tortoise, snake, lizard

Sources: Carrasco et al. (2005); Morgan and Lucas (2003); NMMNH (2012); Paleobiology (2012); UCMP (2012).

Quaternary deposits include Pleistocene (1.6 mya–11,700 years before present (BP)) and Holocene (11,700 years BP to present) deposits. Holocene deposits are generally too young to contain fossils, and Pleistocene deposits in New Mexico are not favorable for preservation of fossils or have been shown to be non-fossiliferous.

Arizona

Paleozoic Era deposits in southeastern Arizona include the Cambrian-age Abrigo Formation and Bolsa Quartzite, Mississippian-age Paradise Formation and Escabrosa Limestone, and the Pennsylvanian to Permian-age Upper and Lower Naco Group. Marine vertebrate (teeth of cartilaginous fish) and invertebrates (trilobites, echinoderms, cephalopods, gastropods, brachiopods, bivalves, anthozoans, bryozoans, and sponges) have been reported from these formations (Carrasco et al. 2005; NMMNH 2012; Paleobiology 2012; UCMP 2012).

Mesozoic Era deposits in southeastern Arizona include the Bisbee Group, Amole Arkose, and Recreation Red Beds. Bisbee Group deposits have produced plant fossils (petrified wood), invertebrates (bivalves and gastropods), reptiles (crocodilians and turtles), and dinosaurs (ornithopods and sauropods) (Carrasco et al. 2005; Lucas and Heckert 2005; NMMNH 2012; Paleobiology 2012; UCMP 2012). The Amole Arkose within the Tucson Mountains has produced a partial hadrosaur (Lucas et al. 2005). The Recreation Red Beds, which underlie the Amole Arkose, have produced plant fossils, such as fern and horsetail, as well as raindrop impressions and trackways (Collins 2006; Ratkevich 2012).

Cenozoic Era (Tertiary–Quaternary) deposits in southeastern Arizona consist of the Gila Group, including the fossil-bearing St. David Formation in the Benson area. Overall, the Gila Group in Arizona is mostly unfossiliferous; only a few short stratigraphic internals, such as the St. David Formation near Benson and the 111 Ranch beds north of the analysis area in Graham County contain significant vertebrate fossils from near the beginning of the Ice Age, including a frog, a salamander, turtles, a lizard, birds, and mammals (Morgan and White 2005; NMMNH 2012; Paleobiology 2012).

Like Quaternary deposits in New Mexico, Quaternary deposits in Arizona are generally not favorable for preservation of fossils or have been shown to be non-fossiliferous. However, some limited areas of southeastern Arizona in the San Pedro Valley, Willcox Playa, and San Simon Valley, have produced mammoth, horse, bison, camel, dire wolf, peccary, and tapir remains (Haury et al. 1959; Lindsay 1984; Tegowski and White 2000). Archaeological materials have been found with four mammoth localities in southern Cochise County (Haury et al. 1959; Lindsay 1984). A mammoth skull and mud turtle remains were found during construction of the Apache Power Station (Bryan and Gidley 1926; Waters 1989). However, none of these localities would be affected by the transmission line.

3.6.7 Potential Fossil Yield Classification

New Mexico

In New Mexico, the Paleozoic San Andres, Glorieta, and Yeso Formations and the Mesozoic Mancos Shale, Beartooth, and Sarten Formations have been assigned a PFYC of 2, Low Potential. The Mesozoic Mojado, U-bar, and Hell-to-Finish Formations and the Tertiary-Quaternary Santa Fe Group have been assigned a PFYC of 4, High Potential. Quaternary deposits have been assigned a PFYC of 1 to 2, Very Low to Low Potential.

Arizona

In Arizona, the Paleozoic and Mesozoic formations all have a PFYC of 1, Very Low Potential. Only some areas of Tertiary sedimentary rocks and Quaternary sediments have a PFYC of 2 to 3, Low to Moderate Potential, with the rest of these sediments having a Very Low Potential.

3.6.8 Summary of Inventory Results

Only one fossil locality has been reported for the analysis area in New Mexico. No fossil localities have been reported within the analysis area in Arizona. PFYC classifications range from PFYC 1, Very Low, to 4, High Potential (table 3.6-4, figures 3.6-1a through 3.6-1d).

Table 3.6-4. Potential Fossil Yield Classifications in the Analysis Area by Route Group

Route Group	PFYC 1 (acres)	PFYC 2 (acres)	PFYC 3 (acres)	PFYC 4 (acres)	No. of Fossil Localities within the Analysis Area
1: Afton to Hidalgo	300,003 (64%)	15,269 (3%)	0 (0%)	154,944 (33%)	1
2: Hidalgo to Apache	397,892 (94%)	22,006 (5%)	73 (0%)*	2,147 (0%)*	0
3: Apache to Pantano	5,681 (98%)	0 (0%)	92 (2%)	0 (0%)	0
4: Pantano to Saguaro	3,805 (100%)	0 (0%)	0 (0%)	0 (0%)	0

* Represents less than 1% of total route group acreage.

3.6.9 New Build Section

Route Group 1 – Afton Substation to Hidalgo Substation

Route group 1 – Afton Substation to Hidalgo Substation consists of segments of the proposed Project (Proponent Preferred and Proponent Alternative) and local alternatives. More than 75 percent of the Proponent Preferred alternative is routed along or adjacent to existing facilities and infrastructure such a pipelines, railroads, and transmission lines and would be routed along portions of the yet to be constructed SunZia Transmission Line route. Forty-four percent of the Proponent Alternative is routed along existing roads and transmission lines and the yet to be constructed SunZia transmission line. Local alternatives are also routed along existing linear infrastructure.

One fossil locality is found within the Afton to Hidalgo route group 2-mile-wide analysis area in the East Potrillo Mountains. The majority of the route group 1 analysis area has been assigned a PFYC of 1 to 2, with the exception of the Upper Santa Fe Group, and the Mojado, U-bar, and Hell-to-Finish Formations, which have a PFYC of 4.

Route Group 2 – Hidalgo Substation to Apache Substation

Route group 2 – Hidalgo Substation to Apache Substation consists of segments of the Proponent Preferred, Proponent Alternative, route variation, as well as local alternatives. Approximately 85 percent of the route group 2 Proponent Preferred alternative and 55 percent of the Proponent Alternative is routed along or adjacent to existing linear infrastructure or the yet to be constructed SunZia transmission line. Over 80 percent of route variations and local alternatives are routed along existing infrastructure.

No fossil localities were reported from the route group 2 analysis area. The majority of the route group 2 deposits have been assigned a PFYC of 1; a very small amount of Quaternary deposits which have been assigned a PFYC of 2 to 3 are present in the Hidalgo to Apache route group; and, less than 1 percent of the total acreage in the Analysis Area is within the Gila Group formation with a PFYC of 4.

3.6.10 Upgrade Section

Route Group 3 – Apache Substation to Pantano Substation

Route group 3 – Apache Substation to Pantano Substation consists of segments of the Proponent Preferred and a local alternative. The Proponent Preferred alternative consists entirely of an existing Western transmission line. No fossil localities have been reported within the 500-foot-wide analysis area for route group 3. Most of the analysis area has been assigned a PFYC of 1; some Quaternary sediments within the analysis area have been assigned a PFYC of 3.

Route Group 4 – Pantano Substation to Saguaro Substation

Route group 4 – Pantano Substation to Saguaro Substation route group consists of segments of the Proponent Preferred, route variation, and local alternatives. The Proponent Preferred alternative consists of the existing Western transmission line; almost all the route variation and local alternatives follow existing roads or pipelines.

No fossil localities have been recorded within the 500-foot-wide analysis area for route group 4. All of the analysis area for route group 4 has been assigned a PFYC of 1.

3.7 WATER RESOURCES

3.7.1 Groundwater, Surface Water, and Wetlands

This section describes the existing environmental conditions associated with water resources. Water resources encompass both groundwater and surface water, including WUS that are jurisdictional under the CWA, wetlands, and floodplains. Characteristics of water resources within the analysis area include the presence/absence of water, the extent of water features, quantity of water or amount of flow, and water quality.

Some of the information provided in the following subsections is taken from a report titled “Southline Transmission Project Resource Report 17: Water Resources” (CH2M Hill 2013f). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

3.7.2 Analysis Area

New Build Section

The analysis area for water resources for the New Build Section extends 1 mile on either side of the centerline of alternatives carried forward and any substation or access roads outside that corridor. This is to identify resources that could be directly impacted by ground disturbance and where construction materials, equipment, and workers may be present.

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

Upgrade Section

The analysis area for water resources for the Upgrade Section encompasses a 500-foot corridor, which represents 200 feet off the existing 100-foot corridor. Similar to the New Build Section, the analysis area also includes downstream drainages and aquifers.

3.7.3 Laws, Ordinances, Regulations, and Standards

Federal

CLEAN WATER ACT (33 U.S.C. 1251–1376)

The CWA and the Water Quality Act of 1987 form the major Federal legislation governing water quality. The objective of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the nation’s waters.” Important sections of the CWA are as follows.

Clean Water Act Section 401

Section 401 (Water Quality Certification) requires an applicant for any Federal permit who proposes an activity that may result in a discharge to a WUS to obtain from the appropriate State a certification that the discharge will not result in a violation of State surface water quality standards. In New Mexico, State water quality certification is outlined in NMSA Chapter 74, Article 6, and is administered by the NMED. In Arizona, State water quality certification is outlined in ARS 49-202(B)–(H) and is administered by the ADEQ. The NMED and ADEQ may certify, deny, or waive water quality certification. No Federal permit or action may be approved if the State denies certification. For most Nationwide Permits (NWPs) issued by the USACE under Section 404 of the CWA, NMED and ADEQ have conditionally certified the NWPs, and additional certification is not needed.

Clean Water Act Section 402/Arizona Pollutant Discharge Elimination System

Section 402 of the CWA establishes the NPDES, a permitting system for the discharge of any pollutant (except for dredged or fill material) into WUS. In New Mexico, authority for Section 402 permitting lies with Region 6 of the EPA, although assistance is provided by NMED. Since 2002, the ADEQ has had primacy in Arizona over Section 402 through implementation of the Arizona Pollutant Discharge Elimination System (AZPDES) (ARS 49-255.01).

Both the NPDES and AZPDES programs regulate discharge of pollutants into WUS. Historically, in New Mexico and Arizona virtually all waterways, including dry washes, fall under the jurisdiction of the NPDES and AZPDES programs. Both the NPDES and AZPDES programs regulate point sources of discharge. The most common source regulated is stormwater runoff from construction activities and industrial sites. Coverage under the NPDES or AZPDES programs may be obtained either through issuance of an individual permit or a general permit. There are five general permits that historically have been issued: de minimis discharges, stormwater runoff from construction activities (known as the CGP), stormwater runoff from concentrated animal feeding operations, stormwater runoff from industrial sites (known as the multisector general permit), and discharge of stormwater from municipal stormwater systems.

Linear construction activities, including road building, utility line construction, and other ground disturbance performed, including batch plants and staging areas provided the disturbance exceeds acreage limits (typically 1 acre), would qualify for the NPDES 2012 CGP through the EPA for construction activities in New Mexico and the AZPDES CGP (AZG2013-001) through the ADEQ for construction activities in Arizona.

Clean Water Act Section 404

Section 404 of the CWA establishes a permit program for the discharge of dredged or fill material into WUS, including wetlands. This permit program is jointly administered by the USACE and EPA. The immediate regulatory decision regarding which activities fall under Section 404 of the CWA lies with the USACE Albuquerque District in New Mexico and the USACE Los Angeles District in Arizona. Other land managers, such as the ASLD, also may need to be contacted during the submittal of Section 404 permit applications. Typically in the desert Southwest, including New Mexico and Arizona, major dry washes are considered to be under the jurisdiction of the USACE as WUS, in addition to flowing streams, lakes, and other water bodies. Further, the definition of WUS was changed by a Clean Water Rule published by the EPA in the Federal Register on June 29, 2015 (80 FR 37054). Southline would coordinate with the USACE as part of their required Section 404 permitting process to determine what criteria should be followed for identifying WUS for their 404 permit application. The 404 permit would contain any necessary conditions required for compliance with the rule.

In general, there are three methods for obtaining a permit under Section 404: authorization under an NWP, authorization under a regional general permit, and issuance of an individual permit. Linear construction activities are often handled under NWP 12 – "Utility Line Activities." NWPs are issued every 5 years by the USACE for commonplace activities that impact WUS. Based on the magnitude and type of disturbance and the conditions of the specific NWP, a preconstruction notification may or may not be required to be submitted to the USACE prior to conducting activities within a WUS.

The ability to obtain an NWP 12 for the proposed Project largely depends on the ability to meet the general conditions of the permit and any regional conditions imposed. The following are the most likely common conditions to be of concern:

- **Endangered species (NWP General Condition 18).** NWPs cannot be used when impacts are likely to directly or indirectly jeopardize the continued existence of a threatened, endangered, or candidate species under the ESA, or when they would directly or indirectly destroy or adversely modify critical habitat of those species. For impacts that "may affect" species, consultation with the FWS under Section 7 of the ESA must be completed prior to issuance of an NWP.
- **Cultural resources (NWP General Condition 20).** If Project impacts may affect properties listed, or eligible for listing, in the NRHP, an NWP cannot be used until consultation with the applicable SHPO under Section 106 of the NHPA is completed.
- **Magnitude and type of impact.** In general, for NWP 12 impacts may not exceed 0.5 acre for each "single and complete project." A single and complete project is typically interpreted as limiting impacts to any individual WUS to no more than 0.5 acre. Thus, with a linear utility line, each crossing of a wash or stream would be limited to no more than 0.5 acre of surface disturbance.
- **Special aquatic sites in Arizona (Los Angeles District Regional Condition 2).** Within the Los Angeles District of the USACE, an NWP 12 cannot be used to authorize losses of special aquatic sites. Special aquatic sites include wetlands, mudflats, vegetated shallows, or riffle and pool complexes.
- **Perennial water bodies in Arizona (Los Angeles District Regional Condition 4).** Within the Los Angeles District of the USACE, authorization of impacts to perennial water bodies requires submittal and approval of preconstruction notification to the USACE prior to disturbance.
- **Special aquatic sites, intermittent and perennial water bodies in New Mexico (Albuquerque District New Mexico Regional Condition A).** Within the Albuquerque District of the USACE, authorization of impacts of special aquatic sites and intermittent and perennial water bodies in New Mexico require submittal and approval of preconstruction notification to the USACE prior to disturbance.

Clean Water Act Section 303

The NMED and ADEQ have both developed surface water quality standards, including both numeric and narrative limitations, to define water quality goals for New Mexico and Arizona streams and lakes and provide the basis for controlling discharge of pollutants to surface waters. The 303(d) list, as required by Section 303(d) of the CWA, is a list of water bodies that have a designated beneficial use that are impaired by one or more pollutants. Water bodies included on this list are referred to as "impaired waters." New Mexico and Arizona must take appropriate action to improve impaired water bodies by establishing total maximum daily loads and reducing or eliminating pollutant discharges. In addition, potential discharges of stormwater into or near impaired water bodies have special consideration under both NPDES and AZPDES permitting.

FLOODPLAIN AND WETLAND ENVIRONMENTAL REVIEW

Portions of the proposed Project may affect floodplains and wetlands. In accordance with DOE floodplain and wetland environmental review requirements (10 CFR part 1022), the EIS includes a floodplain and wetlands assessment. A floodplain statement of findings is included in this EIS (10 CFR 1022.14(c))– see section 4.7 in chapter 4.

EXECUTIVE ORDER 11990 (PROTECTION OF WETLANDS)

EO 11990 (May 24, 1977) directs Federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial value of wetlands in carrying out programs that affect land use.

EXECUTIVE ORDER 11988 AMENDED BY EXECUTIVE ORDER 12148 (FLOODPLAIN MANAGEMENT)

EO 11988 (May 24, 1977) directs each Federal agency to take action to avoid the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. Agencies are required to avoid direct or indirect support of floodplain development whenever there is a practicable alternative. EO 11988 also requires Federal agencies funding or permitting critical facilities to either avoid the 500-year floodplain or require facility design that withstands the 500-year flood. A critical facility is a structure or other improvement that has the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Critical facilities include health and safety facilities, utilities, government facilities and hazardous materials facilities. Electrical substations are considered critical facilities.

INTERNATIONAL BOUNDARY AND WATER COMMISSION

If a route is selected near the international boundary with Mexico, the proposed Project would be designed to ensure that structures or disturbance do not increase, concentrate, or relocate overland drainage flows into Mexico. This requirement is overseen by the U.S. International Boundary and Water Commission (USIBWC) and is intended to ensure that developments in one country will not cause damage to lands or resources in the other country. Copies of any hydrologic or hydraulic studies and site specific drawings for work proposed in the vicinity of the international boundary, particularly if culverts or other structures are proposed to be constructed in any drainage courses that cross the boundary, would need to be submitted for review.

BUREAU OF LAND MANAGEMENT GUIDANCE

The BLM manages the majority of the Federal lands within the analysis area. Two RMPs within the analysis area contain water resource features that require special management.

Mimbres Resource Management Plan

The Mimbres RMP includes all New Mexico portions of the New Build Section. Within the RMP, specific management areas are outlined, including the Lordsburg Playa Research Natural Area (RNA). The Lordsburg Playa RNA, located 10 miles west of Lordsburg, is the central of three playa lakes that encompass a total of 4,510 acres. This area is known for biological significance related to a State sensitive saltbush, as well as being an important migratory wintering site for shorebirds and waterfowl. This area is characterized topographically as a flat, relatively pristine dry lakebed, and soils in the Lordsburg Playa RNA are known for intermittent periods of inundation during periods of high runoff. One of the significant management goals and actions defined within the Lordsburg Playa RNA excludes authorizations for new ROWs, in accordance with conditions outlined in the Lands Program. This exclusion could affect one of the local alternatives for route group 2.

Riparian and Aquatic Habitat Management Plan

In August 2000, the Las Cruces Field Office proposed a Habitat Management Plan (HMP) specific to riparian and aquatic habitat. The purpose of the HMP is to provide guidance for the restoration and protection of riparian and aquatic habitats that fall under the jurisdiction of the Las Cruces Field Office. Specific management goals are to maintain, restore, improve, protect, and expand riparian areas so that they are in proper functioning condition for productivity, biological diversity, and sustainability. While applicable to all riparian habitats, the plan focuses on specific riparian areas of greater concern. The only area mentioned in the HMP applicable to the proposed Project is Lordsburg Playa. Restrictions are similar to those described for the Mimbres RMP. Specific actions include retaining public land, keeping the area closed to vehicles, mineral leasing, and mineral sales, and ensuring the development and maintenance of natural vegetation.

Safford Resource Management Plan

The Safford RMP includes the Arizona portions of the New Build Section. Within the RMP, specific management areas are outlined, including the Willcox Playa National Natural Landmark (NNL).
The Willcox Playa NNL, located 5 miles southwest of Willcox, contains about 2,475 acres of the Willcox Playa. This area is occasionally visited by endangered whooping cranes (*Grus americana*) and has several rare endemic species of insects and crustaceans. This area is characterized topographically as a flat, relatively pristine dry lakebed. One of the special management prescriptions defined within the Willcox Playa NNL excludes authorizations for new ROWs. This exclusion could affect one of the Proponent Alternative segments for route group 2.

State

STATE OF NEW MEXICO AQUIFER PROTECTION REGULATIONS AND AQUIFER WATER QUALITY STANDARDS

Any discharge of a pollutant so that it may move directly or indirectly into groundwater requires a groundwater discharge permit from NMED. Poor-quality groundwater with concentrations of total dissolved solids (TDS) over 10,000 milligrams per liter (mg/L) are exempt from this regulation. Unless the discharge is specifically exempted (NMAC 20.6.2.3105), the discharge requires issuance of a groundwater discharge permit from NMED. Aquifer water quality standards have been also specified by the State of New Mexico (NMAC 20.6.2.3103).

STATE OF NEW MEXICO SURFACE WATER QUALITY STANDARDS

Surface water quality standards have been developed by the State of New Mexico (NMAC 20.6.4). These regulations provide specific guidance for applicable surface water quality standards for each watershed by water use. In addition, these regulations identify Outstanding National Resource Waters within the State of New Mexico; these waters have strict antidegradation standards.

STATE OF ARIZONA AQUIFER PROTECTION REGULATIONS AND AQUIFER WATER QUALITY STANDARDS

Any discharge of a pollutant from a facility either directly to an aquifer or to the land surface or the vadose zone in such a manner that there is a reasonable probability that the pollutant would reach an aquifer requires issuance of an aquifer protection permit by the ADEQ. Unless the discharge is either specifically exempted by statute (ARS 49-250), or unless the discharge is authorized under one of the general aquifer protection permits issued by the ADEQ (AAC R18-9, article 3), the discharge requires issuance of an individual aquifer protection permit by the agency. Aquifer water quality standards have been also specified by the State of Arizona (AAC R18-11, article 4).

STATE OF ARIZONA SURFACE WATER QUALITY STANDARDS

Surface water quality standards have been developed by the State of Arizona (AAC title 18, chapter 11, article 1). These regulations provide specific guidance for applicable surface water quality standards for each water body by water use. In addition, these regulations identify Outstanding Arizona Waters within the State of Arizona; these waters have strict antidegradation standards.

Local

PIMA COUNTY RIPARIAN AND FLOODPLAIN REGULATIONS

The Pima County Regional Flood Control District regulates flooding and erosion hazards on private property within unincorporated areas of Pima County through the “Floodplain and Erosion Hazard Management Ordinance” (2010). The goal of the ordinance is twofold. The first goal is to ensure that new development within floodplains is safe from flooding and erosion hazards and does not adversely impact adjacent property. This is accomplished through implementation of the floodplain use permit process and conformance with the National Flood Insurance Program, as administered by the Federal Emergency Management Agency (FEMA). The second goal of the ordinance is to protect natural resources within flood-prone areas. These riparian areas are recognized by the County for their importance in mitigating flood hazards, providing natural erosion control, and promoting recharge into underground aquifers.

In 2001, the Pima County Board of Supervisors adopted the Conservation Lands System (CLS) regional plan policy, which applies the science-based policies and principles of conservation developed in the Sonoran Desert Conservation Plan (SDCP) (Pima County 2009). Riparian areas are one of the five elements considered for conservation in the plan. As such, the Pima County Board of Supervisors has adopted maps of RRH throughout the county. As part of the floodplain use permit process, proposed developments are subject to review for impacts to mapped RRH if more than 0.3 acre of a property’s RRH is disturbed. In some instances where disturbed RRH is classified as Hydroriparian, Mesoriparian, and/or Important Riparian Area (IRA), a mitigation plan needs to be approved by the Pima County Board of Supervisors. The mitigation plan will be developed as part of the Plant and Wildlife Species Conservation Measures Plan.

3.7.4 Issues to Be Analyzed

The issues to be analyzed generally encompass any potential for degradation of water quality, obstruction or degradation of water flow, or loss of waters. These issues include the following:

- The potential for contamination of surface water from erosion, stormwater runoff, or other pollutants that would result in a violation of State surface water quality standards.
- The potential for degradation of surface water quality that would cause a long-term loss of use either by humans or by aquatic wildlife and plants.
- The potential for any alteration of the existing drainage pattern to result in offsite erosion or siltation that would result in adverse effects on adjacent properties or existing water rights, or at the international border with Mexico.

- The number, acreage, and type of WUS that are regulated under Section 404 of the CWA that would be impacted, and whether these impacts would be temporary or permanent. These may include jurisdictional waters (washes, streams, lakes, or rivers), wetlands, special aquatic sites, and sensitive aquatic habitats.
- Within Pima County, the acres of RRH impacted within the categories of Hydroriparian, Mesoriparian, and/or IRAs.
- The potential for an increase in scouring or erosion during a flood event that would result in structural or property damage.
- The modification of any floodplain that would impede or redirect flood flows that would result in offsite property damage, adversely affect the flood-carrying capacity of the floodplain, or alter the pattern or magnitude of flood flow.
- The potential for degradation of groundwater quality that would exceed State aquifer water quality standards.
- The amount of groundwater to be used and whether this would deplete groundwater resources or interfere with groundwater recharge in a way that affects existing or proposed water rights or uses of a groundwater aquifer.
- The potential to impact any highly sensitive areas or watersheds.
- The potential to impact any specially designated waters, including impaired waters, Outstanding National Resource Waters (in New Mexico), and Outstanding Arizona Waters.

3.7.5 Analysis Area Conditions

New Build Section

SURFACE WATER HYDROLOGY

Route groups associated with the New Build Section cross six surface hydrologic subbasins, which are identified by their eight-digit hydrologic unit codes (HUCs). Major linear water features within each subbasin are summarized in table 3.7-1. Surface water subbasins and major linear water features are shown in figures 3.7-1a through 3.7-1d.

Table 3.7-1. Major Linear Water Features within the Analysis Area

Project Section	Route Group	Subbasin (HUC-8)	Water Feature	Length in Study Corridor (feet)	Flow Status	Special Status
New Build	1-Afton Substation–Hidalgo Substation	Mimbres (13020202)	Mimbres River	48,381	Intermittent	None
			Wamel Canal	1,621	Intermittent	None
			Walnut Creek	31,008	Ephemeral	None
New Build	1-Afton Substation–Hidalgo Substation	Animas Valley (15040003)	Burro Cienega	67,766	Ephemeral	None
			Ninetysix Creek	22,697	Ephemeral	None
			Shakespeare Arroyo	11,038	Ephemeral	None

Table 3.7-1. Major Linear Water Features within the Analysis Area (Continued)

Project Section	Route Group	Subbasin (HUC-8)	Water Feature	Length in Study Corridor (feet)	Flow Status	Special Status
New Build	2-Hidalgo Substation–Apache Substation	Upper Gila-Mangas (15040002)	Horseshoe Wash	12,308	Ephemeral	None
New Build	2-Hidalgo Substation–Apache Substation	San Simon (15040006)	Vanar Wash	14,793	Ephemeral	None
			Steins Creek	15,611	Ephemeral	None
			San Simon River	63,321	Ephemeral	None
			Willow Springs Wash	40,889	Ephemeral	None
			Owl Wash	3,461	Ephemeral	None
			Dial Wash	26,721	Ephemeral	None
			Happy Camp Wash	38	Ephemeral	None
			Buckeye Wash	14,908	Ephemeral	None
			Railroad Wash	56,715	Ephemeral	None
			Smith Wash	17,548	Ephemeral	None
New Build	2-Hidalgo Substation–Apache Substation	Willcox Playa (15050201)	Bee Canyon Wash	3,768	Ephemeral	None
Upgrade	3-Apache Substation–Pantano Substation	Upper San Pedro (15050202)	Jordan Wash	598	Intermittent	None
			Dragoon Wash	1,571	Ephemeral	None
			Sheep Wash	1,113	Ephemeral	None
			Pomerene Canal	551	Intermittent	None
			San Pedro River	2,195	Perennial	Impaired
			Cadillac Wash	565	Ephemeral	None
Upgrade	3-Apache Substation–Pantano Substation	Rillito (15050302)	Cienega Creek	508	Intermittent	Outstanding Arizona Water
Upgrade	4-Pantano Substation–Saguaro Substation	Upper Santa Cruz (15050301)	Santa Cruz River	33,648	Ephemeral	None
			Julian Wash	795	Ephemeral	None
			West Branch Santa Cruz River	1,649	Ephemeral	None
Upgrade	4-Pantano Substation–Saguaro Substation	Brawley Wash (15050304)	Los Robles Wash	464	Ephemeral	None
Upgrade	4-Pantano Substation–Saguaro Substation	Lower Santa Cruz (15050303)	Santa Cruz River	623	Effluent-dominated	None

El Paso–Las Cruces Subbasin (HUC 13030102)

The Afton Substation and the far eastern portions of route group 1 lie within the El Paso–Las Cruces Subbasin. This area drains to the east toward the Rio Grande and the Mesilla Valley. However, in point of fact the area has little topographic relief, and there are relatively few extended drainage systems. Most washes occur along the alluvial fan of the West Potrillo Mountains or immediately adjacent to the Rio Grande. No major linear water features were identified within the analysis area within this subbasin.

Mimbres Subbasin (HUC 13030202)

The Mimbres Subbasin extends approximately from the West Potrillo Mountains to the Continental Divide, encompassing about 65 miles of route group 1. The area drains generally to the Mimbres River, which passes through the analysis area. The Mimbres River is a closed-basin desert stream that originates from the slopes of the Black Range and flows southward into the Mimbres Valley near Deming, eventually terminating in the Chihuahuan Desert. Upper reaches of the Mimbres River are perennial but are intermittent within the analysis area, with all flow eventually infiltrating or evaporating east of Deming. In addition to the Mimbres River, the Wamel Canal and Walnut Creek both pass through the analysis area. Wamel Canal takes water from the Mimbres River and delivers it southward to agricultural land west of Deming. Walnut Creek is similar in nature to the Mimbres River. It arises on the east flank of the Burro Mountains and flows southward before eventually terminating through infiltration or evaporation west of Deming.

Surface flow data have been measured historically (period 1963 to 1968) on the Mimbres River, both near Spalding (USGS Gage No. 08477530) and below the Wamel Canal (USGS Gage No. 08478400). Data from both gages show that the Mimbres River flows seasonally, with the lowest flow and even no flow during the late spring and early summer (May–July) and during the fall (October–November). Higher flows occur during the winter (December–April) due to frontal storms, and during the late summer (August through September) due to convective thunderstorms during the Southwest’s monsoon season (USGS 2013b, 2013c).

Playas Lake Subbasin (HUC 13030201)

Approximately 40 miles of route group 1 is located within the Playas Lake Subbasin. This is a closed basin, and the area generally drains to the south toward Laguna los Moscos. No major linear water features were identified within the analysis area within this subbasin. However, there was one spring feature identified within the analysis area: Corrizalillo Spring. No flow data or water quality data were identified for this spring.

Animas Valley Subbasin (HUC 15040003)

The Lordsburg Substation is located in the Animas Valley Subbasin, as are the western portion of route group 1 and the eastern portion of route group 2. This is a closed basin, with washes and streams generally terminating in mid-basin playas. Burro Cienega arises near the Continental Divide and flows southward where it crosses the analysis area, as does Ninetysix Creek, which is a tributary to Burro Cienega. Burro Cienega terminates at a playa in the Lordsburg Valley, just southeast of Lordsburg. Shakespeare Arroyo also crosses the analysis area; it arises just southwest of Lordsburg and flows northward into Lordsburg Draw before terminating in a playa in the Animas Valley. All three of these features are ephemeral.

Upper Gila–Mangas Subbasin (HUC 15040002)

Approximately 11 miles of route group 2 group is located within the Upper Gila–Mangas Subbasin. The area drains generally to the Gila River, which is located approximately 14 miles to the north. Horseshoe Wash is an ephemeral tributary to Railroad Wash that crosses the analysis area; it arises in the Peloncillo Mountains and ultimately flows north toward the Gila River.

San Simon Subbasin (HUC 15040006)

Approximately 40 miles of route group 2 is located within the San Simon Subbasin. The area drains generally to the San Simon River, which crosses the analysis area. The San Simon River was historically perennial in some locations but now is ephemeral. The San Simon River flows to the northwest, eventually joining with the Gila River near Safford. Eight other major linear water features are located within the analysis area within the San Simon Subbasin. Vanar Wash and Steins Creek are ephemeral tributaries to the San Simon River that arise in the Peloncillo Mountains. Buckeye Wash, Railroad Wash, Smith Wash, and Happy Camp Wash arise in the Dos Cabezas Mountains and flow northeast toward the San Simon River but typically terminate through infiltration and evaporation prior to joining the San Simon River. Willow Springs Wash and Dial Wash both arise in the Pinaleño Mountains and flow northeast toward the San Simon River. Happy Camp Wash and Buckeye Wash are intermittent in their higher reaches in the Dos Cabezas, but all of these linear water features are ephemeral where they cross the analysis area.

Surface flow data have been measured historically on the San Simon River near San Simon, Arizona (USGS Gage No. 09456000, period 1919–1941), and near Spalding, Arizona (USGS Gage No. 09456200, period 1951–1955). Data from both gages show that the San Simon River flows seasonally, with the lowest flow and even no flow during the winter and spring (December through May) and with higher flows during the summer and fall (June through November) (USGS 2013d, 2013e).

Willcox Playa Subbasin (HUC 15050201)

The Apache Substation is located in the Willcox Playa Subbasin, as is the western portion of route group 2. This is a closed subbasin, with ephemeral washes that flow toward and terminate in Willcox Playa. Only one major linear water feature was identified within the New Build Section analysis area within the subbasin. Bee Canyon Wash is an ephemeral wash that rises from the Winchester Mountains and terminates in the Sulphur Springs Valley. One spring was identified within the analysis area: Croton Springs, located close to Willcox Playa. No flow data or water quality data were identified for this spring.

SURFACE WATER QUALITY

No surface waters have been identified as impaired within the New Build Section.

WETLANDS AND WATERS OF THE UNITED STATES

Wetlands and special aquatic sites within the New Build Section will likely be classified as WUS. A full delineation of WUS would be conducted for the selected alternative, and WUS would be avoided if possible through micro-siting. If WUS are not avoidable and are impacted, these would require protection or compensatory mitigation, pursuant to the CWA. An inventory of all wetlands within analysis area boundary from National Wetlands Inventory (NWI) maps indicates that approximately 6,978 acres of wetlands occur within the New Build Section analysis area, consisting of 71 freshwater ponds (typically stock tanks), 10 lakes, 2 freshwater forested/shrub wetland, 1 riverine wetlands, and 7 other wetland areas. Total wetland acreage, type, and number of sites within each route group are summarized in table 3.7-2. Wetland areas are shown in figures 3.7-2a through 3.7-2d. The inventory based on NWI maps is being used as an estimate of potential impacts to wetlands; as noted above, a full field delineation of WUS, including wetlands, would be conducted for the selected alternative to map wetland features in detail.

Table 3.7-2. Wetlands and Special Aquatic Sites within the Analysis Area

Project Section	Route Group	Area within Analysis Area (acres)	Number and Type of Wetland Sites	
New Build	1-Afton Substation–Hidalgo Substation	98	Freshwater pond	67
			Lake	1
			Riverine	1
New Build	2-Hidalgo Substation–Apache Substation	6,880	Lake	9
			Freshwater pond	4
			Other	7
			Freshwater forested/shrub wetland	2
Upgrade	3-Apache Substation–Pantano Substation	15	Freshwater pond	3
			Riverine	1
Upgrade	4-Pantano Substation–Saguaro Substation	117	Riverine	11
			Other	1

In addition to wetlands, numerous ephemeral arroyos and drainages exist within the analysis area. As with wetlands, these WUS would be avoided if possible through micro-siting of the selected alternative. If these are not avoidable and are impacted, these would also likely require protection or compensatory mitigation, pursuant to the CWA. Major linear water features that are likely to require permitting under Section 404 of the CWA are summarized in table 3.7-1.

FLOODPLAINS

The 100-year floodplain areas are defined as the area having a 1 percent annual chance of being inundated by a flood event. Floodplains were identified throughout the analysis area and are mostly associated with rivers, tributaries, and ephemeral washes. Most of the analysis area lies within rural areas within large, flat, alluvial valleys. These areas can be subject to shallow flow or ponding, typically 1 to 3 feet deep and spread out over extensive areas. Shallow flooding occurs primarily due to overflows of stream channels when flows exceed the capacity of the channels. However, areas of localized flooding can occur due to heavy rains and may not be represented in the 100-year floodplains mapped by FEMA. The 500-year floodplain is not consistently mapped across the analysis area; the 500-year floodplain is important with respect to siting of critical facilities, including substations.

Major floodplain areas within the New Build Section are associated with Mimbres River, Burro Cienega, Ninetysix Creek, Black Mountain Draw, Seventysix Draw, Wamels Draw, the San Simon River, Railroad Wash, and the Willcox Playa. However, many delineated floodplain areas are not associated with any named wash or stream, and many represent areas of sheetflow. Floodplain acreage in the New Build Section is summarized in table 3.7-3.

Table 3.7-3. 100-year Floodplains within the Analysis Area

Project Section	Route Group	Area within Analysis Area (acres)
New Build	1-Afton Substation–Hidalgo Substation	43,681
New Build	2-Hidalgo Substation–Apache Substation	41,008
Upgrade	3-Apache Substation–Pantano Substation	278
Upgrade	4-Pantano Substation–Saguaro Substation	1,186

GROUNDWATER HYDROLOGY AND GROUNDWATER QUALITY

Route groups associated with the New Build Section cross five groundwater basins, which have been either declared by the State Engineer in New Mexico or designated by the ADWR in Arizona.
The number of groundwater wells within the New Build Section analysis area is shown in table 3.7-4. Groundwater basins for both the New Build and Upgrade sections are shown in figures 3.7-3a and 3.7-3b.

Table 3.7-4. Number and Type of Production Wells within the Analysis Area

Project Section	Route Group	Number of Wells			
		Domestic/ Livestock*	Commercial/ Industrial†	Irrigation‡	Municipal Supply§
New Build	1-Afton Substation–Hidalgo Substation	411	44	134	4
New Build	2-Hidalgo Substation–Apache Substation	931	34	624	11
Upgrade	3-Apache Substation–Pantano Substation	34	2	8	3
Upgrade	4-Pantano Substation–Saguaro Substation	19	7	9	14

* Includes New Mexico use codes: DOL, DOM, MUL, PDL, PLS, STK, REC; Arizona use codes: DOMESTIC, STOCK.

† Includes New Mexico use codes: COM, IND, MIN, SAN; Arizona use codes: COMMERCIAL, INDUSTRIAL, MINING, OTHER-PRODUCTION.

‡ Includes New Mexico use code: IRR; Arizona use code: IRRIGATION.

§ Includes New Mexico use code: MUN; Arizona use codes: MUNICIPAL, UTILITY (WATER CO).

Lower Rio Grande Basin

The Afton Substation and the far eastern portions of route group 1 lie within the Lower Rio Grande groundwater basin. Groundwater use varies throughout the basin, with the majority of groundwater withdrawal for agricultural use (60 percent) and public water supply (28 percent) (Terracon 2003). Groundwater levels vary widely across the basin, with some very shallow groundwater levels immediately adjacent to the Rio Grande. However, groundwater levels beneath the analysis area are relatively deep, ranging from approximately 200 to 400 feet below ground surface (bgs) (New Mexico Office of the State Engineer (NMOSE) 2013a). No water quality data in the analysis area within the Lower Rio Grande groundwater basin were identified.

Mount Riley Basin

A small section of route group 1 lies within the Mount Riley groundwater basin. Relatively little information is known for this basin, either water levels or water quality. Conditions are likely similar to the adjacent Lower Rio Grande Basin.

Mimbres Basin

The Mimbres groundwater basin is geographically similar to the Mimbres surface water subbasin and extends approximately from the West Potrillo Mountains to the Continental Divide, encompassing about 65 miles of route group 1. Groundwater use varies throughout the basin, with the majority of groundwater withdrawal for agricultural use (84 percent) and mining (9 percent) (Daniel B. Stephens and Associates, Inc. 2005). Groundwater levels vary widely across the basin but tend to be relatively deep, averaging 130 feet bgs. Groundwater levels beneath the analysis area are similar, ranging from approximately 80 to 160 feet bgs (NMOSE 2013b).

Shallow groundwater quality is generally good throughout the basin, although certain areas have been impacted by septic systems and industrial contamination (Daniel B. Stephens and Associates, Inc. 2005).

Hatchita Basin

The Hatchita groundwater basin extends from the Cedar Mountains to the Little Hatchet Mountains, including the Hachita Valley, and encompasses about 26 miles of route group 1. Groundwater use and groundwater quality are similar to that described for the Mimbres groundwater basin. Relatively few groundwater-level measurements are available in the Hatchita groundwater basin, but several groundwater levels beneath the analysis area indicate that water levels range from approximately 260 to 380 feet bgs (NMOSE 2013c).

Animas Basin

The Animas groundwater basin is geographically similar to the Animas surface water subbasin. The Lordsburg Substation is located in the Animas groundwater basin, as are the western portion of route group 1 and the eastern portion of route group 2. Groundwater use and groundwater quality are similar to that described for the Mimbres groundwater basin. Relatively few groundwater-level measurements are available within the analysis area in the Animas groundwater basin, although there are substantial data available farther south in the basin. Several groundwater levels beneath the analysis area indicate that groundwater levels range from approximately 180 to 260 feet bgs (NMOSE 2013d).

Duncan Valley Basin

The Duncan Valley Basin (along with the Gila–San Francisco Basin in New Mexico) is geographically similar to the Upper Gila–Mangas surface water subbasin. A small portion of route group 2 crosses the south side of the Duncan Valley Basin. Groundwater use is predominantly for agriculture (92 percent), with minor uses for public supply and industrial (ADWR 2010a). Groundwater levels vary widely, but in the southern part of the basin, groundwater levels measured within the last decade indicate that depth to water is more than 100 feet bgs (ADWR 2011a). Groundwater quality in the analysis area is good, with TDS concentrations generally less than 500 ppm (ADWR 2011b).

Safford Basin

The Safford groundwater basin is geographically similar to the San Simon surface water subbasin. Approximately 40 miles of route group 2 is located within the Safford groundwater basin. Groundwater use is almost completely for agriculture (96 percent), with minor uses for public supply (3 percent) and industrial (ADWR 2010b). Groundwater levels vary widely, with very deep groundwater levels in the middle of the basin and very shallow groundwater levels near the Gila River in the northern part of the basin. Recent groundwater levels measured within the last decade indicate that there are areas of relatively shallow groundwater beneath the analysis area, with a depth to water of 30 to 60 feet bgs, as well as areas of very deep groundwater levels beneath the analysis area that are more than 500 feet deep (ADWR 2011c). Groundwater generally flows from the margins toward the center of the basin and from southeast to northwest, toward the Gila River. Groundwater quality in the analysis area is of moderate quality, with TDS concentrations ranging from 500 to 600 ppm (ADWR 2011d). However, there are areas within the basin with relatively high levels of fluoride, arsenic, and nitrate (ADWR 2010b).

Willcox Basin

The Willcox groundwater basin is geographically similar to the Willcox Playa surface water subbasin. The Apache Substation is located in the Willcox groundwater basin, as is the western portion of route group 2. Groundwater use is predominantly for agriculture (95 percent), with minor uses for industrial (4 percent) and public supply (ADWR 2010c). Although there are some shallow groundwater levels in the basin, for the most part groundwater levels are relatively deep, more than 200 feet bgs. Recent groundwater levels measured within the last decade indicate that there are areas of relatively shallow groundwater beneath the analysis area, with depth to water of 30 to 70 feet bgs, as well as areas of relatively deep groundwater, from 100 to 200 feet bgs (ADWR 2011e). Groundwater generally flows toward the center of the basin. Groundwater quality is good in some parts of the analysis area (less than 500 ppm TDS), but some water quality measurements near Apache Substation indicate poorer water quality, with TDS concentrations greater than 1,500 ppm (ADWR 2011f).

Upgrade Section

SURFACE WATER HYDROLOGY

Route groups associated with the Upgrade Section cross six surface hydrologic subbasins, which are identified by their eight-digit HUCs. Major linear water features within each subbasin are summarized in table 3.7-1.

Willcox Playa Subbasin (HUC 15050201)

The Apache Substation is located in the Willcox Playa Subbasin, as is the eastern portion of route group 3. No major linear features were identified within the analysis area for the Upgrade Section within this subbasin.

Upper San Pedro Subbasin (HUC 15050202)

The Adams Tap Substation is located in the Upper San Pedro Subbasin, as is approximately 24 miles of route group 3. This area drains to the San Pedro River, which flows northward, eventually joining the Gila River near Hayden, Arizona. The San Pedro River crosses the analysis area. Along its length, the San Pedro varies between a perennial and intermittent stream; it is considered a perennial stream where it crosses the analysis area.

Six other major linear water features were identified within the analysis area. Dragoon Wash and Sheep Wash arise from the west faces of the Dragoon and Little Dragoon Mountains, respectively. They are ephemeral tributaries to the San Pedro River, although Sheep Wash now is intercepted by the Pomerene Canal before reaching the San Pedro River. Jordan Wash is a tributary to Dragoon Wash; it arises from the Dragoon Mountains and is considered to be an intermittent stream within the analysis area. Cadillac Wash is an ephemeral wash that arises from the Whetstone Mountains on the west side of the San Pedro Valley and tributary to the San Pedro River, joining it near Pomerene. Pacheco Wash is an ephemeral wash that is tributary to Ash Creek, which then joins the San Pedro River. The Pomerene Canal is also located within the analysis area. The Pomerene Canal takes water from the San Pedro River near Saint David and transports it northward, flowing roughly parallel to the river before terminating in Pomerene.

Surface flow data are currently being measured on the San Pedro River near Benson, Arizona (USGS Gage No. 09471800, period 2005–2011). Data show that the San Pedro River flows seasonally, with the lowest flow and even no flow during the winter and spring (October through June) and with higher flows during the late summer (July through September) due to convective thunderstorms during the Southwest’s monsoon season (USGS 2013f).

Rillito Subbasin (HUC 15050302)

The Pantano Substation is located in the Rillito Subbasin, as is the western portion of route group 3 and the eastern portion of route group 4. This area drains to Cienega Creek, which crosses the analysis area. Cienega Creek is a perennial stream both upstream and downstream of the analysis area but is intermittent or ephemeral where it crosses the analysis area. Cienega Creek within the analysis area has been designated an Outstanding Arizona Water (AAC R18-11-112).

Surface flow data have been historically measured on Cienega Creek near Pantano (USGS Gage No. 09484560, period 1968–1975). Data show that Cienega Creek flows seasonally, with the lowest flow and even no flow during the winter and spring (October through June) and with higher flows during the late summer (July through September) due to convective thunderstorms during the Southwest’s monsoon season (USGS 2013g).

Upper Santa Cruz Subbasin (HUC 15050301)

The Vail, Nogales, DeMoss Petrie, and Tucson substations are located within the Upper Santa Cruz Subbasin, as is approximately 40 miles of route group 4. This area drains to the Santa Cruz River, which flows northward toward the Gila River. The Santa Cruz River is ephemeral, but in the northern part of the subbasin it is effluent-dominated due to releases of wastewater from several Tucson-area treatment plants. The west branch of the Santa Cruz River and Julian Wash also cross the analysis area and are tributaries to the Santa Cruz River, joining near South Tucson.

Surface flow data are currently being measured on the Santa Cruz River near Continental (USGS Gage No. 09482000, period 1940–2012). Data show that in the past few decades, the Santa Cruz typically has flowed seasonally, with the lowest flow and even no flow during the winter and spring (October through June) and with higher flows during the late summer (July through September) due to convective thunderstorms during the Southwest’s monsoon season (USGS 2013h). Surface flow data are also currently being measured on the Santa Cruz River near Cortaro (USGS Gage No. 09486500, period 1939–2012). These data show the effluent flow that is introduced into the river from several wastewater treatment plants and show consistent flow throughout the year (USGS 2013i).

Brawley Wash Subbasin (HUC 15050304)

The Rattlesnake and Marana substations are located within the Brawley Wash Subbasin, as is approximately 18 miles of route group 4. Surface water in this area drains to Los Robles Wash, which passes through the analysis area and is an ephemeral tributary to the Santa Cruz River.

Lower Santa Cruz Subbasin (HUC 15050303)

The Saguaro Substation is located within the Lower Santa Cruz Subbasin, as is the terminus of route group 4 Pantano to Saguaro route group. The Santa Cruz River passes through the analysis area within this subbasin and is effluent-dominated at this location.

SURFACE WATER QUALITY

Within the analysis area for the Upgrade Section, the San Pedro River is listed as an EPA 303(d) Category 5 Impaired Water (ADEQ 2015) between Dragoon Wash and Tres Alamos Wash (approximately near the city of Benson). This portion of the river is listed as impaired because of high nitrate levels. Nitrate impairment is associated with a nitrogen-based chemicals plant located southeast of Benson that has been undergoing active remediation since 2005.

WETLANDS AND WATERS OF THE UNITED STATES

An inventory of all wetlands within the analysis area boundary from NWI maps indicates that approximately 132 acres of wetlands occurs within the Upgrade Section analysis area, consisting of 3 freshwater ponds, 12 riverine wetlands, and 1 other wetland area. Total wetland acreage within each route group is summarized in table 3.7-2. The inventory based on NWI maps is being used as an estimate of potential impacts to wetlands; a full field delineation of WUS, including wetlands, would be conducted for the selected alternative to map wetland features in detail.

In addition to wetlands, numerous ephemeral arroyos and drainages exist within the analysis area. If determined to be WUS and if these are unable to be avoided during micro-siting of the selected alternative, these would require protection or compensatory mitigation, pursuant to the CWA. Major linear water features that are likely to require permitting under Section 404 of the CWA are summarized in table 3.7-1.

Portions of the Upgrade Section are located within Pima County and could impact RRH. If impacted, certain of these areas could require protection or compensatory mitigation, pursuant to the Pima County Floodplain and Erosion Hazard Management Ordinance. The following acreage of RRH occurs within the analysis area: 173 acres designated as Important Riparian Areas; an additional 9 acres designated as Hydroriparian habitat; and an additional 226 acres designated as Xeroriparian habitat of varying class or quality. Areas that could require protection or compensatory mitigation (designated as Hydroriparian or IRA) are shown in figures 3.7-1c and 3.7-1d.

FLOODPLAINS

The 100-year floodplains within the Upgrade Section are similar in nature to those within the New Build Section, and are often not associated with named washes or streams. Major floodplain areas within the Upgrade Section are associated with Sheep Wash, the San Pedro River, Cornfield Canyon, Cienega Creek, Davidson Canyon, and the Santa Cruz River. Floodplain acreage in the Upgrade Section is summarized in table 3.7-3. The 500-year floodplain is not consistently mapped across the analysis area, but is always smaller in area than the 100-year floodplain; the 500-year floodplain is important with respect to siting of critical facilities, including substations.

GROUNDWATER HYDROLOGY AND GROUNDWATER QUALITY

Route groups associated with the Upgrade Section cross four groundwater basins that have been designated by the ADWR. The number of groundwater wells within the Upgrade Section analysis area is shown in table 3.7-4.

Willcox Basin

The Apache Substation is located in the Willcox groundwater basin, as is the eastern portion of route group 3. The Willcox groundwater basin is described above for the New Build Section.

Upper San Pedro Basin

The Upper San Pedro groundwater basin is geographically similar to the Upper San Pedro surface water subbasin. The Adams Tap Substation is located in the Upper San Pedro groundwater basin, as is approximately 24 miles of route group 3. Groundwater use is primarily for municipal supply such as that for Sierra Vista (60 percent) and agriculture (34 percent) (ADWR 2010d). There are areas of extremely shallow perched groundwater levels, as well as artesian groundwater levels, associated with the San Pedro River. Other areas, including around Sierra Vista, Arizona, have relatively deep groundwater levels (greater than 500 feet bgs) (ADWR 2010d). Beneath the analysis area, recent measurements indicate fairly deep groundwater levels at the margins of the basin (200 to 500 feet bgs) but extremely shallow water levels or flowing water near Benson and Pomerene, Arizona (ADWR 2011g). Groundwater quality in the analysis area is good, with TDS concentrations generally less than 500 ppm (ADWR 2011h). There are areas within the basin with relatively high arsenic concentrations (ADWR 2010d).

Cienega Creek Basin

The Cienega Creek groundwater basin is somewhat geographically similar to the Rillito surface water basin. The Cienega Creek groundwater basin has the same eastern boundary along the Whetstone Mountains but does not extend quite as far west as the Rillito surface water basin. The Pantano Substation is located in the Cienega Creek groundwater basin, as are the western portion of route group 3 and the eastern portion of route group 4. There is relatively little groundwater use in the Cienega Creek Basin, with some municipal and agricultural use (ADWR 2010e). Groundwater levels are fairly deep at the basin margins (250 to 350 feet bgs) but shallower in the middle of the basin around Cienega Creek (40 to 60 feet bgs) (ADWR 2011i). Groundwater quality is variable; measurements in the analysis area range from good quality (less than 500 ppm TDS) to poor (more than 1,500 ppm TDS) (ADWR 2011j).

Tucson Active Management Area

The Tucson Active Management Area (AMA) encompasses a large area that incorporates much of the Santa Cruz River valley, Avra Valley, and the Rillito watershed and includes the Tucson metropolitan area. The Tucson AMA is also a jurisdictional designation established by the Arizona Groundwater Management Act of 1980 within which water use is heavily regulated. The Saguaro Substation is located within the Lower Santa Cruz Subbasin, as is the terminus of route group 4. Groundwater use is varied, with approximately half of groundwater pumped for municipal supply and the remainder for agricultural (30 percent) and industrial (20 percent) uses (ADWR 2010f). As would be expected, groundwater levels vary greatly throughout the Tucson AMA as a whole. Within the analysis area, groundwater levels are relatively deep, ranging generally from 150 to 200 feet bgs. However, along the Santa Cruz River, there are also relatively shallow water levels of less than 50 feet bgs (ADWR 2011k). Groundwater quality is generally good, but there are also areas of known contamination within the analysis area, particularly along the Santa Cruz River near downtown Tucson.

3.8 BIOLOGICAL RESOURCES

3.8.1 Vegetation

This section describes natural vegetation communities/associations, special status species (i.e., endangered, threatened, sensitive) and noxious and exotic invasive weeds that occur across the Project.

Some of the information provided in the following subsections is partially taken from a report titled "Southline Transmission Project Resource Report 15: Vegetation" (CH2M Hill 2013g). The contents of that report are used herein without specific reference. Additional explicit "in text" references to scientific and other sources relied upon for conclusions in the analysis are included.

Analysis Area

The analysis area for vegetation resources is divided into four route groups: route group 1 – Afton Substation to Hidalgo Substation, route group 2 – Hidalgo Substation to Apache Substation, route group 3 – Apache Substation to Pantano Substation, and route group 4 – Pantano Substation to Saguaro Substation. Within these route groups, the area is further subdivided into sections according to the type of construction: New Build Section and Upgrade Section. The route groups 1 and 2 are within the New Build Section, whereas route groups 3 and 4 are within the Upgrade Section. Proposed access roads, substations and staging areas are included within this analysis area. The analysis for this proposed Project will be conducted by route group and thus construction type.

NEW BUILD SECTION

The analysis area for vegetation resources of the New Build Section of the proposed Project includes 1 mile on either side of the centerline of alternatives carried forward and any substation or access roads outside that corridor. This is to identify resources that could be directly impacted by ground disturbance and where construction materials, equipment, and workers could be present. This perimeter represents the interface between long-term and temporary disturbance to soil surfaces and vegetation communities, including special status plant species, plant community composition, and vegetation structure and species diversity, and where noxious and invasive plant species are most likely to become established and spread into adjacent habitats. Within the New Build Section the proposed line would be located alongside existing and planned infrastructure such as roads, railroads, pipelines, transmission lines, and the yet to be constructed SunZia Transmission Line. Approximately 502.8 miles (over 63 percent) of the New Build Section alternatives would be located next to existing and planned infrastructure.

UPGRADE SECTION

The analysis area for vegetation resources of the Upgrade Section includes a 500-foot corridor (200 feet off of existing 100-foot corridor) of each alternative. The analysis area for the Upgrade Section includes the proposed Project footprint perimeter (i.e., area of disturbance perimeter) in linear feet because this perimeter represents the interface between long-term and temporary disturbances to soil surfaces and vegetation communities, including special status plant species, plant community composition, and vegetation structure and species diversity, and where noxious and invasive plant species are most likely to become established and spread into adjacent habitats. Within the Upgrade Section the proposed line would be located in the ROW for the existing Western transmission line and alongside other existing infrastructure such as roads, railroads, pipelines, and transmission lines. Approximately 157.1 miles (98 percent) of the Upgrade Section alternatives would be located next to existing infrastructure.

Laws, Ordinances, Regulations, and Standards

Various Federal, State, and local government laws and regulations apply to the vegetation that exists across the analysis area.

SPECIAL STATUS SPECIES (ENDANGERED, THREATENED, SENSITIVE)

The category of special status species includes several different designations of sensitivity and levels of protection. The FWS maintains a listing of plant and animal species that are listed as endangered or threatened, or are proposed or candidates for listing, under the Federal ESA. Other Federal agencies, including the BLM and the Forest Service, have lists of plant and animal species that are considered sensitive on lands under their respective jurisdictions. The State of Arizona maintains a list of plant species that are highly safeguarded or salvage restricted within their Heritage Database Management System (HDMS). These are afforded protection under the Arizona Native Plant Law (ANPL). Local jurisdictions may also designate sensitive species, such as those listed in the SDCP in Pima County, Arizona (Pima County 2009). Special status plant species lists are presented in appendix D, table D-1.

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

- None – Analysis area is well outside the known geographic and elevational range, or lacks suitable habitat necessary for the species, or both. Plants with highly restricted ranges are considered to have no potential to occur if the proposed Project is outside its known range, even if the required habitat characteristics are present on-site.
- Unlikely – Analysis area may contain suitable habitat for this species but is outside its known geographic and/or elevational range.
- Possible – Analysis area is within the geographic and elevational range and has suitable habitat for the species.
- Present – The species was observed during limited field investigations conducted by CH2M Hill in 2012 for this proposed Project (CH2M Hill 2013g) or during surveys for Chihuahua scurfpea (*Pediomelum pentaphyllum*) in 2010 (Baker and Pavliscak 2011) and 2014. A listing of special status plant species that have the potential to occur within the analysis area is presented in table D-1 in appendix D.

FEDERAL

Endangered Species Act

Species afforded protection under the Federal ESA are classified as either endangered or threatened and are regulated by the FWS. Other species identified under the ESA are those that are proposed for listing as either threatened or endangered, are candidate species, or are included in a conservation agreement. “Endangered” is defined under the ESA as a species that is in immediate danger of becoming extinct and that needs protection to survive. “Threatened” is defined as a species that is likely to become endangered if it is not protected. Primary factors leading to a species becoming threatened or endangered include loss of habitat, illegal or unregulated hunting or collection, competition from nonnative species, and pollution. Candidate species are those believed to meet the criteria as threatened or endangered but for which a formal listing document has not been prepared or published. For certain species, FWS has identified critical habitat that also is provided a level of protection under the ESA. Critical habitat is a specific geographic area defined by FWS as being essential for the survival and recovery of a listed species.

Any potential destruction or adverse modification of critical habitat by a Federal action requires formal consultation with FWS under Section 7 of the ESA.

The Arizona Ecological Services Field Office and the New Mexico Ecological Services Field Office maintain lists of endangered, threatened, and candidate species by county (FWS 2013a, 2013b, 2014a, 2014b). All plant species in these categories for Graham, Greenlee, Pinal, Pima, and Cochise counties in Arizona and Hidalgo, Grant, Luna, and Doña Ana counties in New Mexico are included in table D-1 in appendix D, which summarizes habitat requirements, geographic and elevational ranges, and the potential of listed species to occur within the analysis area. Based on this screening analysis, only two of the 11 species in table D-1 have some potential to occur within the analysis area of any of the route groups.

In 2012, the AGFD and their HDMS provided a list of special status species recorded within 3 miles of the New Build Section and 2 miles from the Upgrade Section within the Arizona portion of the proposed Project footprint (AGFD HDMS 2013a). In 2013, AGFD provided an updated list for a 3-mile buffer for both the Upgrade and New Build Sections (AGFD HDMS 2013b). This included a list of known occurrences of special status plants within specific segments.

Bureau of Land Management Sensitive Plant Species

The New Mexico and Arizona offices of the BLM maintain lists of sensitive species that are known to occur on BLM lands and are listed by BLM districts that are managed by various field offices. These species are believed to be declining in numbers and may need special conservation measures. Potential threats to these species are likely to include those for the ESA-listed species. BLM Sensitive Species in the Safford and Tucson Field Offices, which include Pinal, Pima, and Cochise counties, Arizona, are listed in the Arizona Sensitive Species List (BLM 2010). Lists for the Las Cruces District, which includes Hidalgo, Grant, Luna and Doña Ana counties, New Mexico, were obtained from information compiled by the New Mexico Rare Plant Technical Council (NMRPTC) (2013). All BLM Sensitive Species for these counties in which the proposed Project lies, with information on habitat requirements, geographic and elevational ranges, and potential to be present within the analysis area are presented in table D-1 in appendix D. Based on this screening analysis, 8 of the 29 species in table D-1 have the possibility for occurring within the analysis area. Of the eight potential species, four are listed for Arizona and four are listed for New Mexico.

Forest Service Sensitive Species

The Coronado National Forest maintains a list of sensitive species that are known to occupy Coronado National Forest lands, which include numerous isolated units on mountain ranges in southeastern Arizona and the Peloncillo Mountains of extreme southwestern New Mexico. Potential threats to these species are likely to include those listed above for the ESA-listed species. The list of Coronado National Forest sensitive plant species was obtained from the U.S. Forest Service Southwestern Region (Forest Service 2007) and is presented in table D-1. The only area of Coronado National Forest land within the analysis area is in Upgrade Section segment U1, where it passes through about 0.5 mile of Coronado National Forest land at the north end of the Dragoon Mountains in Cochise County, Arizona. Table D-1 lists Coronado National Forest sensitive species for this county, with notes on habitat requirements and geographic distribution and an evaluation of potential presence in the portion of the analysis area within Coronado National Forest. Based on this screening analysis, 2 of the 40 species listed by the Coronado National Forest have potential to occur within Coronado National Forest in Upgrade Section route group 3 analysis area and are listed in table D-1.

STATE

New Mexico Endangered Plants Act

The New Mexico Endangered Plants Act (New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) 1995) directs the EMNRD to create a list of endangered plants within the State. This act prohibits activities including the taking, possession, transportation, exportation, processing, or sale of listed plants, except those authorized by permits. The New Mexico Department of Natural Resources may issue permits for scientific research or propagation. The endangered plants list was published in title 19, chapter 21, part 2 (19.21.2.9) of the NMAC (EMNRD 1995). Permits may be granted by the State forester for scientific studies or for collection of voucher specimens. Permits may also be granted by the State forester for transplanting of individual endangered plants in areas of land use conversion. Plant species on this list that could be present in Hidalgo, Grant, Luna, or Doña Ana counties are listed in table D-1. Four of the 11 species in table D-1 have some potential to occur in the analysis area, all of which are also considered BLM Sensitive.

Arizona Native Plant Law

The ANPL (Arizona Department of Agriculture (ADA) 2013a) and Revised Statutes (ADA 2013b) regulate the destruction and transportation of native plants that are growing wild in Arizona. This law establishes a list of protected plants in Arizona and prohibits removal or destruction of wild-growing, protected plants without a permit, whether on public, State, or private land. Parties interested in removing native plants in Arizona must complete an application with the ADA to receive a permit.

The ADA maintains a list of sensitive species separated into the categories of highly safeguarded, salvage restricted, salvage assessed, and harvest restricted (ADA 2013c). Highly safeguarded (HS) species are those “whose prospects for survival in this State are in jeopardy or which are in danger of extinction throughout all or a significant portion of their ranges, and those native plants which are likely within the foreseeable future to become jeopardized or in danger of extinction throughout all or a significant portion of their ranges” (ARS 3-903.B.1) (ADA 2013b). Salvage restricted (SR) species are those “which are not included in the highly safeguarded category but are nevertheless subject to a high potential for damage by theft or vandalism” (ARS 3-903.B.2) (ADA 2013b). Salvage assessed (SA) species are those “which are not included in either the highly safeguarded or salvage restricted categories but nevertheless have a sufficient value if salvaged to support the cost of salvage tags and seals” (ARS 3-903.B.3) (ADA 2013b). Harvest restricted species are those “which are not included in the highly safeguarded category but are subject to excessive harvesting or overcutting because of the intrinsic value of their by-products, fiber, or woody parts” (ARS 3-903.B.4) (ADA 2013b). Permitting procedures for collection or salvage of protected plants are provided in ARS 3-906. Table D-1 in appendix D provides a list of HS and SR plants that are known to be present in Pinal, Pima, and Cochise counties, and it notes which have been recorded within 2 miles of the Upgrade Section or within 3 miles of the New Build Section, according to the HDMS (AGFD 2013). Twenty-four of the 75 species with an ANPL status have some potential to occur in the analysis area.

TRIBAL

BLM and Western contacted staff from the Tohono O’odham Nation to discuss potential impacts to tribally sensitive species. At the request of the tribe, tribally sensitive species for the Tohono O’odham Nation were considered in the EIS when they were also protected under a Federal, State, or County law. For those species that are not specifically addressed in the EIS, Western and BLM would coordinate with the Tohono O’odham Nation to determine appropriate mitigation.

COUNTY

Pima County Sonoran Desert Conservation Plan

The SDCP, prepared by Pima County (2009), was developed as an ESA Section 10 consultation with FWS. The plan includes 23 species in Pima County, of which 4 are plant species. These four species have potential to be present in the analysis area, and they are listed in table D-1.

Pima County Native Plant Protection Ordinance

Pima County regulates the loss of native plant material associated with ground-disturbing activities through their Native Plant Protection Ordinance (NPPO) (Pima County 1998). The NPPO requires inventory of the site, along with protection and mitigation of certain plant species slated for destruction. There are various tables that determine the mitigation ratio for different native plant species (e.g., saguaros (*Carnegiea gigantea*), ironwood trees (*Olneya tesota*), Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*)), with the result that mitigation may occur at a 1:1 or 2:1 replacement ratio. Mitigation requirements are met through the development of preservation plans.

Noxious Weeds and Exotic Invasive Plant Species

Noxious weeds are plant species that have been introduced deliberately or accidentally and have spread rapidly, primarily on disturbed soils. Noxious weeds can have adverse impacts on native ecosystems by outcompeting native plant species and producing fuels for wildfire**.** Noxious weeds are invasive plant species that have regulatory laws relating to their introduction, transport, or management. The 1974 Federal Noxious Weed Act (PL 93-629 (7 U.S.C. 2801 et seq.; 88 Stat. 2148), enacted January 3, 1975) defined noxious weeds as “any living stage, such as seeds and reproductive parts, of any parasitic or other plant of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation, or the fish or wildlife resources of the United States or the public health.” The Federal Noxious Weed Act included a list of particular foreign noxious weeds.
The Federal Plant Protection Act (2000) replaced the Federal Noxious Weed Act, and primarily regulates the importation of invasive plant species into the United States, particularly those species listed by the Federal Noxious Weed Act. The Federal Invasive Species Act (EO 13112, 1999) uses the term “invasive species” instead of “noxious weeds” and defines invasive species as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” The Federal Invasive Species Act does not list particular species, but rather provides measures to reduce the introduction of invasive species within the United States.

The States of Arizona and New Mexico have their own noxious weed regulations (ADA 2013d; New Mexico Department of Agriculture (NMDA) 2013). The NMDA and the ADA developed lists of species that are considered noxious weeds (ADA 2013d; NMDA 2009). The State of New Mexico defines noxious weeds as “any foreign plant (not native to the US) that has the potential to be harmful to crops, livestock, other useful plants and animals, agricultural interests, or public health” to be targeted as noxious weeds for control or eradication pursuant to the Noxious Weed Control Act of 1998 (NMDA 2013). The State of Arizona defines noxious weeds as “any species of plant that is, or is liable to be, detrimental or destructive and difficult to control or eradicate and shall include any species that the director, after investigation and hearing, shall determine to be a noxious weed.” Weed species listed as noxious by the States of Arizona and New Mexico are presented in table D-2 in appendix D.

Some species of highly invasive exotic weeds are not listed as noxious weeds in Arizona or New Mexico, including Russian thistle (*Salsola tragus* (formerly species *kali*)), burningbush (*Bassia scoparia* (formerly genus *Kochia* and also referred to as "kochia" in the Southwest)) (NRCS 2013d), and Lehmann lovegrass (*Eragrostis lehmanniana*). These and other invasive exotic weed species are now so common and widespread that regulation and control of transport are considered to be impractical. However, species such as Russian thistle and burningbush are common throughout the analysis area and are likely to invade disturbed soils, potentially compete with native plants, and provide fine fuels for wildfire, and they should be considered to have potentially negative environmental impacts.

Federal Invasive Species Act, Executive Order 13112

EO 13112 of 1999 compels Federal agencies whose actions may affect the status of invasive species to employ measures to prevent the spread of invasive species, to the extent practicable and permitted by law. These measures include preventing introduction of invasive species, monitoring invasive species populations, and conducting research on techniques and technologies to prevent introduction and control existing populations of invasive species. Additionally, this order prohibits Federal agencies from authorizing, funding, or carrying out an action that may cause or promote introduction or spread of invasive species unless the agency has determined that the benefits of the action outweigh the potential harm of invasive species and that all feasible and prudent measures to minimize harm would be taken.

NEW MEXICO NOXIOUS WEEDS

The NMDA separates noxious weeds into three categories. Class A species are either not currently present in New Mexico or they have limited distribution. Preventing new infestations and eradicating existing infestations is the highest priority for this class of species. Class B species are limited to portions of the State. In areas with severe infestations, management is encouraged to contain the infestation and prevent further spread. Class C species are widespread in New Mexico, and control measures are encouraged to be undertaken at the local level, based on feasibility and level of infestation. Watch list species are of concern because of their potential to become problematic (NMDA 2013). All of these species are listed in table D-2. The NRCS (2003b) also provides a list of New Mexico noxious weeds, but this list is based on an earlier version of the NMDA list and is not current. Primary noxious weeds of concern in the vicinity of the proposed Project in New Mexico are African rue (*Peganum harmala*) and starthistles (*Centaurea* spp.).

Exotic invasive species known to occur in the analysis area in New Mexico are Russian thistle, kochia, Lehmann lovegrass, filaree (*Erodium cicutarium*), and mustards (*Brassicaceae* spp.), but these species are not defined as noxious weeds in New Mexico.

ARIZONA NOXIOUS WEEDS

The State of Arizona prohibits noxious weeds from entering the State, and regulated noxious weeds may be controlled or quarantined to prevent further infestation or contamination. Restricted species are quarantined to prevent further infestation or contamination (ADA 2013d). These species are listed in table D-2 in appendix D. The NRCS (2006) also provides a list of Arizona noxious weeds, but that list is based on an earlier version of the ADA list and is not current. The primary noxious weed of concern in the vicinity of the analysis area in Arizona is buffelgrass (*Cenchrus ciliaris*).

Exotic invasive species known to occur in the analysis area in Arizona are Russian thistle, filaree, and mustards, but these species are not defined as noxious weeds in Arizona.

Issues to Be Analyzed

Potential effects on vegetation as a result of the proposed Project include the following:

- Direct impacts on special status species from construction activities.
- Indirect impacts on special status species from increased access to analysis areas by ATVs or OHVs over newly constructed transmission line access roads.
- Loss of vegetation in each native plant community due to construction activities.
- Conversion of native plant communities to exotic grassland from invasion of nonnative species, such as buffelgrass, red brome (*Bromus rubens*), and/or Lehmann lovegrass, causing:
    - Direct mortality of native plants due to competition for resources.
    - Increased incidence of wildfire, to which exotic grasses such as buffelgrass and Lehmann lovegrass are adapted but many native plants are not, resulting in mortality of native plants and replacement by exotic plants.
    - Increased soil erosion in any area where construction activities and proposed Project-related road traffic would occur.
- Loss and/or degradation of wetland, xeroriparian, riparian, or other areas with special vegetation designations where proposed ROW would cross water bodies.
- Chemical contamination of soils and/or wetlands during construction activities.
- Postconstruction impacts on native vegetation relative to the Transmission Vegetation Management Program (NERC, FAC-003-1) for long-term management of vegetation along transmission line ROWs.

The extent to which the proposed Project would result in such effects are addressed in chapter 4, section 4.8.1.

Analysis Area Conditions

Descriptions of the vegetation communities that occur within the analysis area are provided in the following sections. The terms biotic communities and plant associations are additionally used below. All three terms—vegetation communities, biotic communities, and plant associations—are based on the presence of dominant plant species that characterize the species composition and physical structure of the landscapes.

Current existing large and small spatial-scale vegetation communities/associations present across the analysis area are described below.

LARGE-SCALE BIOTIC COMMUNITIES: BROWN AND LOWE BIOTIC COMMUNITIES

The map of biotic communities of the Southwest produced by Brown and Lowe (1980) and based on biotic communities described in Brown (1982) shows six communities within the analysis area (figures 3.8-1a and 3.8-1b). Acreage calculations by biotic community presented below were derived for the total analysis area for both the New Build and Upgrade Sections. In descending order of coverage, these communities are Semidesert Grassland (594,916.7 acres), Chihuahuan Desertscrub (293,231.6 acres), Playa (11,650.0 acres), Arizona Upland Subdivision of Sonoran Desertscrub (3,789.2 acres), Lower Colorado River Subdivision of Sonoran Desertscrub (1,399.1 acres), and Madrean Evergreen Woodland (194.8 acres). A description of each of these communities is provided in the following paragraphs.

The coarse scale of the Brown and Lowe biotic communities does not provide the more detailed analysis possible with the finer-scale Southwest Regional Gap Analysis Project (SWReGAP) (2013) plant associations. The vegetation communities crossed by the proposed Project and its alternatives are described below as background information and to place the finer-scale SWReGAP plant associations in a broader biogeographic context, but are not addressed in the further analysis of biotic communities. Note that plant species names used below are based on those presented by Brown and Lowe (1980), and some of the plant names and taxonomic classifications have changed since then. Updated and current plant classifications and names are available at the NRCS PLANTS Database (NRCS 2013d).

Semidesert Grassland

The Semidesert Grassland biotic community comprises 65.7 percent of the analysis area and covers large areas of southeast Arizona, southwest New Mexico, West Texas, and northern parts of Sonora and Chihuahua, Mexico. This perennial, grass-shrub-dominated community is situated topographically above desert scrub communities and below evergreen woodland, chaparral, or plains grassland (Brown 1982). The upper and lower elevation limits of this community vary substantially over its distribution. The lower contact with desert scrub is generally between about 3,600 and 4,600 feet, while the upper contact with evergreen woodland or chaparral is generally between 4,920 and 5,580 feet. Average annual rainfall in this community ranges from 9.8 to 17.7 inches. This community is dominated by a variety of grasses and seasonally abundant forbs. Common shrub species include mesquites (*Prosopis* spp.), Mormon tea (*Ephedra* spp.), mimosas (*Mimosa* spp.), catclaw acacia (*Acacia greggii*), and ocotillo (*Fouquieria splendens*). Common leaf succulents include agaves (*Agave* spp.), yuccas (*Yucca* spp.), and sotols (*Dasylirion* spp.). This community is interspersed with Chihuahuan Desertscrub and covers nearly 66 percent of the analysis area, beginning just west of Las Cruces, New Mexico, and extending west until it contacts the Sonoran Desertscrub community southeast of Tucson, Arizona.

Chihuahuan Desertscrub

The Chihuahuan Desertscrub biotic community comprises 32.4 percent of the analysis area and covers large areas of southern New Mexico and West Texas, smaller areas of southeast Arizona, and a large part of the State of Chihuahua, Mexico. This community is centered in the highland plains and basins of northern Mexico, below the Semidesert Grassland community (Brown 1982). This biotic community is dominated by basin and range topography, and most of this community is underlain by limestone.
The lower elevation limit of Chihuahuan Desertscrub is around 1,300 feet, while its upper limit is generally between 4,600 and 5,250 feet. Average annual rainfall in this community ranges from 7.9 to 11.8 inches. Large areas of this desert are dominated by three shrubs: creosotebush (*Larrea tridentata*), tarbush (*Flourensia cernua*), and viscid acacia (*Vachellia neovernicosa*). Honey mesquite (*Prosopis glandulosa*) and saltbush (*Atriplex* spp.) are common in some areas. Common leaf succulents include agaves, yuccas, and sotols. This community is interspersed with Semidesert Grassland and covers approximately 32 percent of the analysis area, mainly between Las Cruces, New Mexico, and Benson, Arizona.

Playa

Playas, or dry lake beds, comprise 1.3 percent of the analysis area and are present in several valleys of southeast Arizona and southwest New Mexico, as well as in other parts of the Southwest. This community is not described as a separate unit by Brown (1982), although it has similarities to some features described as Sonoran Interior Strands. These features are found in closed basins, where they may accumulate water during rainy periods and then dry out by evaporation and infiltration. With fluctuating water levels, these areas remain nearly unvegetated. Playas are present in the Animas Valley (Lordsburg Playa) of New Mexico and in the Sulphur Springs Valley (Willcox Playa) of Arizona.

Sonoran Desertscrub – Arizona Upland Subdivision

The Arizona Upland Subdivision comprises only 0.4 percent of the analysis area but covers large areas of the northern and eastern parts of the Sonoran Desertscrub biotic community in Arizona and Sonora, Mexico. This subdivision is a cactus-dominated community situated topographically above the Lower Colorado River Subdivision and below Semidesert Grassland (Brown 1982). As with other communities, the upper and lower elevation limits of this community vary substantially over its distribution. The lower edge of this subdivision is generally between about 1,000 and 2,100 feet, whereas the upper contact with Semidesert Grassland is generally between 2,950 and 3,300 feet. Average annual rainfall in this community ranges from 7.9 to 16.7 inches. This community is dominated by a high diversity of cactus, and most of the woody shrubs have thorns. Common cactus species include saguaro, chollas (*Cylindropuntia* spp.) and pricklypears (*Opuntia* spp.), barrel cactus (*Ferocactus* spp.), hedgehog cactus (*Echinocereus* spp.), and pincushion cactus (*Mammillaria* spp.). Some common small trees and shrubs include paloverde (*Parkinsonia* spp.), ironwood, velvet mesquite (*Prosopis velutina*), acacias (*Acacia* spp.), and creosotebush. In the analysis area, this community is limited to the immediate vicinity of Tucson, Arizona.

Sonoran Desertscrub – Lower Colorado River Subdivision

The Lower Colorado River Subdivision comprises only 0.2 percent of the analysis area but covers large areas of the southern and western parts of the Sonoran Desertscrub biotic community in Arizona, California, Baja California, and Sonora, Mexico. This subdivision is a shrub-dominated community situated topographically below the Arizona Upland Subdivision (Brown 1982). This community is the hottest and driest part of the Sonoran Desert, with average annual rainfall between 1.2 and 11.3 inches. Dominant shrub species include creosotebush, white bursage (*Ambrosia dumosa*), and saltbush. Other shrubs and small trees are present in xeroriparian zones along small drainages. In the analysis area, this community is limited to a relatively small area northwest of Tucson, Arizona.

Madrean Evergreen Woodland

The Madrean Evergreen Woodland biotic community comprises less than 0.1 percent of the analysis area but is widespread in southeast Arizona, eastern Sonora, and western Chihuahua. This community is dominated by small evergreen tree species and is situated topographically above the Semidesert Grassland (Brown 1982). The lower elevation limit of this community is about 4,800 feet in the proposed Project vicinity. Average annual rainfall in this community ranges from about 13.0 to 40.2 inches. This community is dominated by a variety of oak (*Quercus* spp.), pines (*Pinus* spp.), and junipers (*Juniperus* spp.). In the analysis area, this community is found only at the north end of the Dragoon Mountains, southwest of Willcox, Arizona.

LARGE-SCALE BIOTIC COMMUNITIES BY ROUTE GROUP

New Build Section

Brown and Lowe communities crossed by the New Build Section (route groups 1 and 2) in Arizona and New Mexico are primarily categorized as Semidesert Grasslands and Chihuahuan Desertscrub (see figure 3.8-1a). Two areas in route group 2 are mapped as playa by Brown and Lowe (1980). The Lordsburg Playa is located west of Lordsburg and the Willcox Playa is located at the western end of route group 2 in the New Build Section.

Upgrade Section

The Upgrade Section (route groups 3 and 4) is located within Arizona and crosses Chihuahuan Desertscrub and Semidesert Grasslands along the eastern portion (see figure 3.8-1b). As the proposed line moves west into lower elevations, it is characterized by two subdivisions of Sonoran Desertscrub: the Arizona Upland subdivision and the Lower Colorado River subdivision. A small portion crosses Madrean Evergreen Woodland on the Coronado National Forest.

SMALL-SCALE VEGETATION COMMUNITIES

SWReGAP (2013) plant association mapping provides much more detailed vegetation communities than those provided by Brown and Lowe (1980). SWReGAP plant associations across the analysis area are presented in figures 3.8-2a through 3.8-2g for the New Build Section and in figures 3.8-3a through 3.8-3c for the Upgrade Section; wetlands are presented in figures 3.7-2a through 3.7-2d. A total of 33 land cover types, as defined by SWReGAP, are found within the analysis area. Of these, seven land cover types cover approximately 96 percent of the surface area within the analysis area. The remaining 26 types combined constitute just over 4 percent of the land cover. The 7 most common types within the analysis area, in order of dominance, are described in detail below, and all 33 land cover types within the analysis area are provided in table 3.8-1. Acreages in table 3.8-1 have been updated in the EIS to include a modified analysis area to include route variations near Willcox Playa and south of the Tucson International Airport.

Table 3.8-1. Relative Percentage of Cover within the Analysis Area of each SWReGAP Plant Association

Plant Association	Total Acres	Area (percent)
Agriculture	19,616.5	2.17
Apacherian-Chihuahuan Mesquite Upland Scrub	144,769.4	15.99
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	383,117.8	42.32
Barren Lands, Non-specific	42.0	0.00
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	171,738.7	18.97
Chihuahuan Gypsophilous Grassland and Steppe	429.1	0.05
Chihuahuan Mixed Salt Desert Scrub	33,513.8	3.70
Chihuahuan Sandy Plains Semi-Desert Grassland	3,936.1	0.43
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	105,060.0	11.61
Chihuahuan Succulent Desert Scrub	3,008.4	0.33
Developed, Medium - High Intensity	6,434.1	0.71
Developed, Open Space - Low Intensity	812.7	0.09
Inter-Mountain Basins Semi-Desert Shrub Steppe	402.5	0.04
Madrean Encinal	2,497.1	0.28
Madrean Juniper Savanna	2,058.6	0.23
Madrean Pine-Oak Forest and Woodland	26.7	0.00
Madrean Pinyon-Juniper Woodland	1,534.1	0.17
Mogollon Chaparral	1,043.2	0.12
North American Arid West Emergent Marsh	683.5	0.08
North American Warm Desert Active and Stabilized Dune	11,034.1	1.22
North American Warm Desert Bedrock Cliff and Outcrop	1,451.6	0.16
North American Warm Desert Lower Montane Riparian Woodland and Shrubland	56.0	0.01

Table 3.8-1. Relative Percentage of Cover within the Analysis Area of each SWReGAP Plant Association (Continued)

Plant Association	Total Acres	Area (percent)
North American Warm Desert Pavement	475.0	0.05
North American Warm Desert Playa	360.2	0.04
North American Warm Desert Riparian Mesquite Bosque	1,371.9	0.15
North American Warm Desert Riparian Woodland and Shrubland	130.1	0.01
North American Warm Desert Volcanic Rockland	3,647.0	0.40
North American Warm Desert Wash	2,027.7	0.22
Open Water	314.1	0.03
Rocky Mountain Lower Montane-Foothill Shrubland	1.1	0.00
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	888.0	0.10
Sonoran Mid-Elevation Desert Scrub	79.9	0.01
Sonoran Paloverde-Mixed Cacti Desert Scrub	2,620.5	0.29
Total	**905,181.5**	**100**

Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe

The Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe land cover type comprises 42.3 percent of the analysis area and includes desert grasslands and savannas with mixed shrubs and succulents or xeromorphic trees. In the Sky Islands, this community is found on bajadas that are gently sloping and have frequent fire occurrence, whereas in the Chihuahuan Desert, this cover type is typically found on steep foothill slopes. This land cover type is characterized by a diverse assortment of perennial grasses, including black grama (*Bouteloua eriopoda*), hairy grama (*B. hirsuta*), Rothrock's grama (*B. rothrockii*), sideoats grama (*B. curtipendula*), blue grama (*B. gracilis*), plains lovegrass (*Eragrostis intermedia*), bush muhly (*Muhlenbergia porteri*), curlyleaf muhly (*M. setifolia*), James' galleta (*Pleuraphis jamesii*), tobosagrass (*P. mutica*), and alkali sacaton (*Sporobolus airoides*). Common succulents include agaves, sotols, and yuccas. Shrubs and trees in this land cover type include mesquites and various oaks, such as gray oak (*Quercus grisea*), Emory oak (*Q. emoryi*), and Arizona white oak (*Q. arizonica*). This land cover type extends from the Sky Islands near the borders of Arizona, New Mexico, and northern Mexico throughout the Chihuahuan Desert, west to the Sonoran Desert, and north to the Mogollon Rim.

Chihuahuan Creosotebush Mixed Desert and Thorn Scrub

The Chihuahuan Creosotebush Mixed Desert and Thorn Scrub land cover type comprises 19.0 percent of the analysis area and includes dry basins and plains, as well as foothill transition zones supporting mixed desert scrub. Creosotebush is dominant throughout and may be present alone or mixed with other desert scrub and thorn scrub species. Other desert and thorn scrub species present include lechuguilla (*Agave lechuguilla*), green sotol (*Dasylirion leiophyllum*), Wright's beebrush (*Aloysia wrightii*), ocotillo, American tarwort (*Flourensia cernua*), plumed crinklemat (*Tiquilia greggii*), sandpaper bush (*Mortonia scabrella*), Big Bend barometerbush (*Leucophyllum minus*), Engelmann's pricklypear (*Opuntia engelmannii*), mariola (*Parthenium incanum*), catclaw mimosa (*Mimosa aculeaticarpa* var. *biuncifera*), and honey mesquite. Grasses such as black grama, sideoats grama, Chino grama (*Bouteloua ramosa*), bush muhly, tobosagrass, and low woollygrass (*Dasyochloa pulchella*) may be present, but cover less area than shrubs. This land cover type is widespread throughout southeastern Arizona, southern New Mexico, and northern Mexico.

Apacherian-Chihuahuan Mesquite Upland Scrub

The Apacherian-Chihuahuan Mesquite Upland Scrub land cover type comprises 16.0 percent of the analysis area and is composed of areas dominated by mesquites and succulents but generally lacks grass. In addition to honey and velvet mesquites, other dominant or codominant species include whitethorn acacia (*Acacia constricta*), viscid acacia, one-seed juniper (*Juniperus monosperma*), and redberry juniper (*J. coahuilensis*). Upland scrub is found at higher elevations than desert scrub and often in gravelly soils that allow infiltration and storage of moisture in deeper soil layers. This land cover type is widespread at mid-elevations throughout southern Arizona and New Mexico.

Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub

The Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub land cover type comprises 11.6 percent of the analysis area and contains the sparsely vegetated shrublands of coppice dunes and sandsheets in the Chihuahuan Desert. Honey mesquite typically dominates this land cover type, which also includes soaptree yucca (*Yucca elata*), fourwing saltbush (*Atriplex canescens*), Torrey's jointfir (*Ephedra torreyana*), longleaf jointfir (*E. trifurca*), and littleleaf sumac (*Rhus microphylla*). Additionally, broom snakeweed (*Gutierrezia sarothrae*), frosted mint (*Poliomintha incana*), and mesa dropseed (*Sporobolus flexuosus*) provide low shrub cover, though total vegetation cover is often less than 30 percent. This shrubland is most commonly found in southwestern New Mexico but also occurs sparsely in southeastern Arizona and southeastern New Mexico.

Chihuahuan Mixed Salt Desert Scrub

The Chihuahuan Mixed Salt Desert Scrub land cover type comprises only 3.7 percent of the analysis area and occurs on alluvial flats and around playas with finely textured, saline soils in the Chihuahuan Desert. This open landscape is characterized by halophytic shrubs such as fourwing saltbush, mound saltbush (*Atriplex obovata*), cattle saltbush (*A. polycarpa*), iodinebush (*Allenrolfea occidentalis*), tarworts (*Flourensia* spp.), glassworts (*Salicornia* spp.), and seepweeds (*Suaeda* spp.). Grass cover may be dense or sparse and includes species such as alkali sacaton, tobosagrass, and saltgrass (*Distichlis spicata*). This community is sparsely distributed across southern New Mexico, southeastern Arizona, and northern Mexico.

Agriculture

The Agriculture land cover type comprises 2.2 percent of the analysis area and includes landscapes altered for crop production. Agricultural lands include those being actively tilled, those planted for livestock grazing or hay production, those producing annual crops, and those with perennial woody crops such as orchards and vineyards. These lands occur throughout the West but are less common in southern Arizona and New Mexico.

North American Warm Desert Active and Stabilized Dune

The North American Warm Desert Active and Stabilized Dune land cover type comprises 1.2 percent of the analysis area and includes unvegetated to sparsely vegetated active dunes and sandsheets. Sandy substrates in this system are typically derived from quartz or gypsum. Low shrubs characterize the vegetation in this land cover type and generally cover less than 10 percent of the ground surface. Common species include mesquites, littleleaf sumac, creosotebush, white bursage, desert sand verbena (*Abronia villosa*), rosemary-mints (*Poliomintha* spp.), indigo bushes (*Psorothamnus* spp.), sand sagebrush (*Artemisia filifolia*), Colorado Desert buckwheat (*Eriogonum deserticola*), and big galleta

(*Pleuraphis rigida*). This community occurs in south-central New Mexico and extreme southwestern Arizona.

Other Plant Associations

Other SWReGAP land cover types comprise just over 4 percent of the analysis area but may be locally dominant. For example, Sonoran Paloverde-Mixed Cacti Desert Scrub is only 0.3 percent of the total area, but it is a dominant land cover type in locations near Tucson, Arizona.

SWReGAP Data Limitations

SWReGAP mapped vegetation communities or plant associations over the entire Southwest using interpretation of satellite images and spectral reflectance patterns at 30 x 30–meter (m) pixel resolution. Lowry et al. (2005) acknowledged that errors in mapping may occur from incorrect interpretation of spectral data. Brief field ground-truthing of SWReGAP analysis of plant associations within the analysis area appeared to be generally accurate and provides a useful tool with which to evaluate the vegetation in segments. However, some associations appeared to be overrepresented on the SWReGAP map.
For example, several areas in New Mexico that were mapped as Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub, actually had very little, if any, creosotebush. Other associations appeared to be underrepresented on the SWReGAP maps. Both the Chihuahuan Gypsophilous Grassland and Steppe and the Chihuahuan Sandy Plains Semidesert Grassland were observed in areas in which they were not shown on the maps.

Two large playas, the Willcox Playa and a playa in the Animas Valley west of Lordsburg, should have been designated as North American Warm Desert Playa, but they were actually mapped as Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe. Areas mapped as open water are either cooling water ponds associated with power plants, sewage disposal ponds, gravel pits, or artificially created ponds. The North American Arid West Emergent Marsh association also may be overrepresented by counting areas that appear to be xeroriparian vegetation in the vicinity of Bowie, Arizona.

SMALL-SCALE VEGETATION ASSOCIATIONS BY ROUTE GROUP

Route Group 1 – Afton Substation to Hidalgo Substation

Vegetation Communities

The principal SWReGAP vegetation communities that route group 1 (New Build Section) passes through are shown in figures 3.8-2a through 3.8-2g and 3.8-3a, and are listed in table 3.8-2, along with acreages for each.

Table 3.8-2. Route Group 1 Afton Substation to Hidalgo Substation SWReGAP Acreages

Vegetation Type	Acres
Agriculture	4,552.5
Apacherian-Chihuahuan Mesquite Upland Scrub	36,439.9
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	203,507.6
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	101,491.3
Chihuahuan Gypsophilous Grassland and Steppe	429.1
Chihuahuan Mixed Salt Desert Scrub	6,746.9
Chihuahuan Sandy Plains Semi-Desert Grassland	3,354.7

Table 3.8-2. Route Group 1 Afton Substation to Hidalgo Substation SWReGAP Acreages (Continued)

Vegetation Type	Acres
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	94,258.8
Chihuahuan Succulent Desert Scrub	2,824.0
Developed, Medium - High Intensity	1,137.5
Developed, Open Space - Low Intensity	315.0
Inter-Mountain Basins Semi-Desert Shrub Steppe	402.5
Madrean Encinal	358.3
Madrean Juniper Savanna	1,543.6
Madrean Pinyon-Juniper Woodland	135.9
Mogollon Chaparral	44.4
North American Arid West Emergent Marsh	10.7
North American Warm Desert Active and Stabilized Dune	11,034.1
North American Warm Desert Bedrock Cliff and Outcrop	197.5
North American Warm Desert Lower Montane Riparian Woodland and Shrubland	55.3
North American Warm Desert Pavement	407.8
North American Warm Desert Playa	360.2
North American Warm Desert Riparian Mesquite Bosque	34.2
North American Warm Desert Riparian Woodland and Shrubland	74.3
North American Warm Desert Volcanic Rockland	3,057.0
North American Warm Desert Wash	687.0
Open Water	22.5
Rocky Mountain Lower Montane-Foothill Shrubland	1.1
Total	**473,484.5**

Special Status Plant Species

None of the plant species listed under the ESA is considered to have the potential to occur along route group 1 within the analysis area. Among the other sensitive listed plant species, dune pricklypear (*Opuntia arenaria*), and Gregg night-blooming cereus (*Peniocereus greggii*) have potential to occur throughout route group 1. Additionally, among non-ESA listed plant species, Parish's alkali grass (*Puccinellia parishii*), and the Chihuahua scurfpea (*Pediomelum pentaphyllum*) have the potential to occur within this route group.

Noxious Weeds and Other Exotic Invasive Plant Species

Primary noxious weeds of concern across route group 1 are African rue and starthistles. Other exotic invasive weeds that are not classified as noxious, such as Russian thistle, kochia, filaree, and mustards, are likely to occur throughout the analysis area.

Route Group 2 – Hidalgo Substation to Apache Substation

Vegetation Communities

The principal SWReGAP vegetation communities that route group 2 (New Build Section) passes through are shown in figures 3.8-2a through 3.8-2g and 3.8-3a, and are listed in table 3.8-3 along with acreages for each.

Table 3.8-3. Route Group 2 Hidalgo Substation to Apache Substation SWReGAP Acreages

Vegetation Type	Acres
Agriculture	14,640.8
Apacherian-Chihuahuan Mesquite Upland Scrub	106,272.5
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	178,562.2
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	69,674.5
Chihuahuan Mixed Salt Desert Scrub	26,526.0
Chihuahuan Sandy Plains Semi-Desert Grassland	581.4
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	10,799.8
Chihuahuan Succulent Desert Scrub	184.4
Developed, Medium - High Intensity	3,894.6
Developed, Open Space - Low Intensity	256.9
Madrean Encinal	2,128.7
Madrean Juniper Savanna	514.0
Madrean Pine-Oak Forest and Woodland	26.7
Madrean Pinyon-Juniper Woodland	1,398.3
Mogollon Chaparral	984.4
North American Arid West Emergent Marsh	663.4
North American Warm Desert Bedrock Cliff and Outcrop	1,242.0
North American Warm Desert Lower Montane Riparian Woodland and Shrubland	0.7
North American Warm Desert Pavement	67.2
North American Warm Desert Riparian Mesquite Bosque	1,238.6
North American Warm Desert Volcanic Rockland	590.0
North American Warm Desert Wash	1,338.7
Open Water	276.7
Sonoran Mid-Elevation Desert Scrub	7.8
Sonoran Paloverde-Mixed Cacti Desert Scrub	248.3
Total	**422,118.5**

Special Status Plant Species

None of the plant species listed under the ESA have potential to occur along the route group 2 analysis area. Of the other sensitive plant species considered in this analysis, the following species have some potential to occur within this route group:

- Gregg night-blooming cereus;

- Parish's alkali grass;
- devilthorn hedgehog cactus (*Echinocereus pseudopectinatus*);
- San Carlos wild-buckwheat (*Eriogonum capillare*);
- slender needle corycactus (*Coryphantha scheeri* var. *valida*);
- Wilcox pincushion cactus (*Mammillaria wrightii* var. *wilcoxii*);
- varied fishhook cactus (*Mammillaria viridiflora*);
- button cactus (*Epithelantha micromeris*);
- playa spider plant (*Cleome multicaulis*);
- dune pricklypear (*Opuntia arenaria*); and
- needle-spined pineapple cactus (*Echinomastus erectocentrus* var. *erectocentrus*);
- Chihuahua scurfpea.

In 2014 BLM surveys identified a previously unknown population of Chihuahua scurfpea approximately 0.7 mile south of segment LD3a, northwest of Lordsburg, New Mexico. The species may be present in other portions of route group 2 along segments LD4 and P4b.

Noxious Weeds and Other Exotic Invasive Plant Species

Primary noxious weeds of concern in the region of the proposed Project in New Mexico are African rue and starthistles. Tamarisk (*Tamarix* sp.) is known to occur in this route group and in the San Simon Creek vicinity (National Institute of Invasive Species Science (NIISS) 2013). The primary noxious weed of concern in the vicinity of the proposed Project in Arizona is buffelgrass. This species is not known to occur within the analysis area. Hoary cress (*Cardaria draba*) has been documented in the Lordsburg vicinity (NIISS 2013), and it could be present within the analysis area. Other exotic, invasive species, including Russian thistle, filaree, and mustards, occur throughout the region, but these species are not classified as noxious weeds.

Route Group 3 – Apache Substation to Pantano Substation

Vegetation Communities

The principal SWReGAP vegetation communities that route group 3 (Upgrade Section) passes through are shown in figures 3.8-3a through 3.8-3c, and are listed in table 3.8-4 along with acreages for each.

Table 3.8-4. Route Group 3 Apache Substation to Pantano Substation SWReGAP Acreages

Vegetation Type	Acres
Agriculture	133.3
Apacherian-Chihuahuan Mesquite Upland Scrub	2,040.5
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	1,048.0
Barren Lands, Non-specific	< 0.1
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub	573.0
Chihuahuan Mixed Salt Desert Scrub	240.9
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub	1.4
Developed, Medium - High Intensity	266.1

Table 3.8-4. Route Group 3 Apache Substation to Pantano Substation SWReGAP Acreages (Continued)

Vegetation Type	Acres
Developed, Open Space - Low Intensity	84.6
Madrean Encinal	0.9
Mogollon Chaparral	14.4
North American Arid West Emergent Marsh	9.4
North American Warm Desert Bedrock Cliff and Outcrop	12.0
North American Warm Desert Riparian Mesquite Bosque	21.2
North American Warm Desert Riparian Woodland and Shrubland	0.6
Open Water	4.6
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	436.8
Sonoran Mid-Elevation Desert Scrub	51.5
Sonoran Paloverde-Mixed Cacti Desert Scrub	824.0
Total	**5,773.5**

Special Status Plant Species

Two of the plant species listed under the ESA are considered to have the potential to occur in route group 3. The Huachuca water umbel (*Lilaeopsis schaffneriana* spp. *recurva*), listed as endangered under the ESA, is known to be present along portions of the San Pedro River. This species has some potential to be present in route group 3 if suitable habitat is available on this portion of the San Pedro River. The proposed crossing of the San Pedro River is currently spanned by the existing Western transmission line. Pima pineapple cactus has the potential to occur on the San Xavier Indian Reservation at the western end of route group 3.

Of the other sensitive plant species considered in this analysis, the broadleaf ground cherry (*Physalis latiphysa*), button cactus, devilthorn hedgehog cactus, giant sedge (*Carex gigantea*), littleleaf false tamarind (*Lysiloma watsonii*), magenta-flowered hedgehog cactus (*Echinocereus fasciculatus*), needle-spined pineapple cactus, San Carlos wild-buckwheat, San Pedro River wild buckwheat (*Eriogonum terrenatum*), slender needle corycactus, varied fishhook cactus, and Wilcox pincushion cactus have some potential to occur in route group 3.

Noxious Weeds and Other Exotic Invasive Plant Species

The primary noxious weed of concern in the vicinity of the proposed Project is buffelgrass. Russian thistle, an exotic, invasive species occurs throughout the route group.

Route Group 4 – Pantano Substation to Saguaro Substation

Vegetation Communities

The principal SWReGAP vegetation communities that route group 4 (Upgrade Section) passes through are shown in figures 3.8-3b and 3.8-3c, and are listed in table 3.8-5 along with acreages for each.

Table 3.8-5. Route Group 4 Pantano Substation to Saguaro Substation SWReGAP Acreages

Vegetation Type	Acres
Agriculture	290.0
Apacherian-Chihuahuan Mesquite Upland Scrub	16.5
Barren Lands, Non-specific	42.0
Developed, Medium - High Intensity	1,136.0
Developed, Open Space - Low Intensity	155.4
North American Warm Desert Riparian Mesquite Bosque	77.9
North American Warm Desert Riparian Woodland and Shrubland	55.1
North American Warm Desert Wash	2.0
Open Water	10.2
Sonora-Mojave Creosotebush-White Bursage Desert Scrub	451.1
Sonoran Mid-Elevation Desert Scrub	20.6
Sonoran Paloverde-Mixed Cacti Desert Scrub	1,548.2
Total	**3,805.0**

Special Status Plant Species

The Pima pineapple cactus is listed as endangered under the ESA. Based on Baker (2006) polygons within 500 meters (m) of known individual Pima pineapple cacti and of predicted habitat overlay with the proposed Project, this species has potential to be present on the southern parts of route group 4 analysis area. Roller (1996) mapped the known distribution of Pima pineapple cactus, locating the species in the vicinity of Vail north and south of I-10 and east and west of SR 83 and west of I-19 south of Tucson. Baker (2006) surveyed lands along a portion of the proposed Project and modeled predicted habitat based on sightings of Pima pineapple cacti. The species is known to be present in the vicinity of the San Xavier Indian Reservation and is also likely present on the reservation. The portions of the analysis area that could support the Pima pineapple cactus are, generally, from the area of the Pantano Substation, between Cienega Creek and Davidson Canyon and the area of Del Bac Substation, near I-19 and Valencia Road. Pima pineapple cactus has been found in the vicinity of the Nogales Substation within the area of the proposed Project (personal communication, Johnida Dockens, BLM, 2013).

Additionally, the Huachuca water umbel, listed as endangered under the ESA, has some potential to be present in the analysis area if suitable habitat is present where route group 4 crosses Cienega Creek (see figure 3.7-2d). This species is known to be present on other parts of Cienega Creek. The proposed crossing of Cienega Creek is currently spanned by the existing Western line.

Of the other sensitive plant species considered in this analysis, the desert barrel cactus (*Ferocactus cylindraceus*), Engelmann pricklypear (*Opuntia engelmannii* var. *flavispina*), giant sedge, littleleaf false tamarind, magenta-flowered hedgehog cactus, needle-spined pineapple cactus, night-blooming cereus (*Peniocereus greggii* var. *transmontanus*), Pima Indian mallow (*Abutilon parishii*), San Carlos wild-buckwheat, San Pedro River wild buckwheat, staghorn cholla (*Opuntia versicolor*), Thornber fishhook cactus (*Mammillaria thornberi*), Tumamoc globeberry (*Tumamoca macdougalii)*, varied fishhook cactus, and hybrid Kelvin cholla (*Opuntia* x *kelvinensis*) have some potential to occur in the analysis area. Tumamoc globeberry occurs at Tumamoc Hill along route group 4 where long-term monitoring plots for the species are present. Pima County, Forest Service, Reclamation, FWS, NPS, and the Desert Laboratory on Tumamoc Hill all support the species monitoring efforts, which are conducted by volunteers.

Noxious Weeds and Other Exotic Invasive Plant Species

The primary noxious weed of concern in the vicinity of route group 4 analysis area is buffelgrass, which has been documented in the Tucson vicinity (NIISS 2013). Two other noxious weed species, field bindweed (*Convolvulus arvensis*) and hydrilla (*Hydrilla verticillata*), have also been documented near the Santa Cruz River on the western edge of Tucson (NIISS 2013) and could be present in the analysis area. Other invasive species in route group 4 include Russian thistle, filaree, and mustards, but these are not classified as noxious weeds.

3.8.2 Wildlife

This section includes documentation and analysis regarding the occurrence and distribution of wildlife species within the analysis area (as defined in section 3.8.1), including general, endangered, threatened, candidate, proposed, sensitive, and other special status wildlife species that are afforded protection within the analysis area (collectively referred to as special status species). Threatened and endangered species are those species that are protected under the ESA. Proposed, conservation agreement, and candidate species are also addressed under the ESA.

Sensitive species include the BLM Sensitive Species for the Las Cruces District Office of the Las Cruces District in New Mexico, BLM Sensitive Species for the Tucson and Safford Field Offices of the Gila District in Arizona, Sensitive species for the Douglas District of the Coronado National Forest, and migratory bird species protected under the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA). In addition to these Federal listings, State and local special status species were also analyzed, including Species of Greatest Conservation Need (SGCN) in New Mexico and Arizona, species listed under the New Mexico Wildlife Conservation Act of 1978 administered by the NMDGF, State of Arizona Wildlife Species of Concern, and species listed under the Pima County Multi-species Conservation Plan (MSCP).

In addition to special status wildlife species, this section also documents special designation areas, including ESA-related proposed and designated critical habitat, wildlife management areas, Pima County preserves, and Biological Corridor Linkages. Wildlife habitat and distribution data were obtained from existing resource data through thorough ecological literature searches. Relevant scientific literature and agency-related wildlife management documents, such as RMPs, were used as the sources for describing species ecology, habitat needs, distribution, and management guidelines.

Some of the information provided in the following subsections is partially taken from a report titled “Southline Transmission Project Resource Report 18: Wildlife” (CH2M Hill 2013h). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

Analysis Area

The analysis area for wildlife resources of the New Build Section of the proposed Project includes 1 mile on either side of the centerline of alternatives carried forward and any substation or access roads outside that corridor. The analysis area for wildlife resources of the Upgrade Section includes a 500-foot corridor (200 feet off of existing centerline of 100-foot corridor) for each alternative. This is to identify resources that could be directly impacted by ground disturbance and where construction materials, equipment, and workers may be present.

The affected environment, with regard to wildlife resources, is the combination of naturally occurring vegetation communities, physical factors (soil, water availability, topography and elevation, weather, and climate), historical land use patterns, and prior surface disturbances that affect how wildlife use the analysis area. Wildlife species within a region will have different optimal environmental conditions (roosting, nesting, foraging, reproduction, and physical environment needs), allowing them to survive in different circumstances. Species with highly specific environmental conditions tend to have localized distributions.

Several factors influence the potential for wildlife species to occur within the analysis area.
The vegetation resources present within the analysis area are a crucial component of habitat availability for wildlife species (including special status species). The proposed Project would cross (east to west) two ecoregions in New Mexico (the Chihuahuan Desert and the Apache-Highlands South) and two ecoregions in Arizona (the Apache-Highlands South and the Sonoran Desert) (AGFD 2006; NMDGF 2006) (figures 3.8-4 and 3.8-5). These ecoregions contain some of the highest vertebrate species richness (number of taxa) of the Southwestern United States (NMDGF 2006). It has been documented that at least 468 bird species have been identified in southeastern Arizona (in the Apache-Highlands South ecoregion) in the past 50 years. The Sonoran Desert's riparian habitats are among the richest in North America in terms of breeding bird diversity and productivity (AGFD 2006).

The Chihuahuan Desert ecoregion is dominated by semidesert grasslands and desertscrub, and it lies within the Basin and Range Province. The Basin and Range Province is a physiographic region characterized by mostly parallel, north-south-trending mountain ranges separated by valleys filled with alluvial soils. There is a wide variation in elevation in the region. The annual precipitation, as in the other ecoregions that the analysis area crosses, is a bimodal pattern, with approximately half the precipitation coming during summer monsoons and half during winter months as gentle, steady rain events.

The Apache-Highlands South ecoregion is known for its more than 20 mountain ranges that rise abruptly from surrounding basins of grasslands and desertscrub, known as "sky islands." Topography is varied; elevations range from 2,200 feet to over 10,700 feet. Precipitation averages between 10 and 30 inches per year, based on elevational differences of the landscape (AGFD 2006). This ecoregion also contains the Willcox Playa and Lordsburg Playa. Playas are lake beds or depressed basins that contain significant wetland habitat for many species of wildlife, including waterfowl, shorebirds, and other migratory birds (NMDGF 2006). Because of the variations in elevation and precipitation, many varied vegetation associations occur in this ecoregion.

The Sonoran Desert ecoregion occurs in southwestern Arizona and northern Sonora, Mexico. In Arizona, elevations range from around 100 to 5,900 feet and also feature Basin and Range physiography of broad valleys and rugged mountain ranges. Annual precipitation ranges from 3 to 17 inches and generally increases from west to east. Biodiversity in this ecoregion is among the highest of any desert in North America. The cactus-dominated vegetation communities of upland Sonoran desertscrub resulting from increased precipitation levels display a more diverse plant assemblage and greater vertical structural component than the desertscrub of the lower elevations (AGFD 2006).

The analysis area for wildlife resources is divided into four specific route groups (route group 1 – Afton Substation to Hidalgo Substation, route group 2 – Hidalgo Substation to Apache Substation, route group 3 – Apache Substation to Pantano Substation, and route group 4 – Pantano Substation to Saguaro Substation (from east to west)) for purposes of identifying baseline environmental conditions and for analyses of environmental consequences in section 4.8.2 in chapter 4. Within these route groups, the area is further subdivided into sections according to the type of construction: New Build Section and Upgrade Section. Route groups 1 and 2 are within the New Build Section; route groups 3 and 4 are within the Upgrade Section. The analysis for this proposed Project will be conducted separately by route groups and thus by construction type, i.e., New Build or Upgrade Section. The analysis area for each is presented below.

NEW BUILD SECTION

Table 3.8-6 identifies wildlife movement corridors in the analysis area and tables 3.8-7 through 3.8-10 identify special status species that could occur by route group for the proposed Project. Within the New Build Section the proposed line would be located alongside existing and planned infrastructure such as roads, railroads, pipelines, transmission lines, and the yet-to-be constructed SunZia Transmission Line. Approximately 502.8 miles of the New Build Section alternatives would be located next to existing and planned infrastructure. This would be approximately 63.5 percent of the total length (792.0 miles) of the New Build Section alternatives.

Route Group 1 – Afton Substation to Hidalgo Substation

The route group 1 lies primarily within the Chihuahuan Desert ecoregion, with a small portion located in the Apache-Highlands in the western portion of the route group. The elevational range of this route group is 3,957 to 5,508 feet, and it contains 27 SWReGAP vegetation associations (see figures 3.8-2a through 3.8-2e). This route group also crosses the Burro Mountains to Cedar Mountains Potential Cougar Corridor (figure 3.8-6), lies in the Pacific flyway bird migration corridor (figure 3.8-7), lies in a marginal high-wind area (figure 3.8-8), and includes sandhill crane (*Grus canadensis*) migratory/stopover habitat and avian protection areas/bird habitat conservation areas (see figure 3.8-7). No designated critical habitat is found within the analysis area in route group 1 (figure 3.8-9).

Route Group 2 – Hidalgo Substation to Apache Substation

The route group 2 lies entirely within the Apache-Highlands South ecoregion. The elevational range of this route group is 3,350 to 5,512 feet. This route group contains 25 SWReGAP vegetation associations (see figures 3.8-2e through 3.8-2g and 3.8-3a); contains the Lordsburg and Willcox playas; and crosses the San Simon River. This route group contains marginal high wind areas at either end of the group (see figure 3.8-8) and crosses three potential wildlife linkage zones (PLZs) throughout its length, the Pinaleño-Dos Cabezas-San Simon Valley PLZ, Willcox Playa-Winchester-Pinaleño-Dos Cabezas PLZ, and the Pinaleño-Sam Simon Valley PLZ (see figure 3.8-6). Route group 2 would intersect with sandhill crane migratory/stopover habitat, as well as Willcox Playa, one of Arizona's primary wintering sites for cranes and waterfowl, and several avian protection areas/bird habitat conservation areas (see figure 3.8-7). Pronghorn (*Antilocapra americana*) are also present in the San Simon Valley. No designated critical habitat is found within the analysis area in route group 2 (see figure 3.8-9).

UPGRADE SECTION

Within the Upgrade Section the proposed line would be located in the ROW for the existing Western transmission line and alongside other existing infrastructure such as roads, railroads, pipelines, and transmission lines. Approximately 157.1 miles of the Upgrade Section alternatives would be located with existing infrastructure. This would be approximately 98.1 percent of the total length (160.1 miles) of the Upgrade Section alternatives.

Route Group 3 – Apache Substation to Pantano Substation

Route group 3 lies entirely within the Apache-Highlands South ecoregion. The elevational range of this route group is 3,307 to 5,866 feet above mean seal level (amsl). This route group contains 19 SWReGAP vegetation associations (see figures 3.8-3a and 3.8-3b), and would cross Cienega Creek and Davidson Canyon, both listed as Outstanding Arizona Waters (see figure 3.7-1c). It is within the Pacific flyway bird migration corridor (figure 3.8-10) and would cross proposed critical habitat for the northern Mexican gartersnake (*Thamnophis eques megalops*) along the existing crossing of the Western transmission line at

Cienega Creek and the San Pedro River, both of which do not contain perennial water at the proposed crossing locations (figure 3.8-11). Cienega Creek and the San Pedro River also contain migratory and foraging habitat for the endangered southwestern willow flycatcher and the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), a threatened species, both of which utilize riparian areas. This area includes the Bar V Ranch. Critical habitat for the southwestern willow flycatcher and proposed critical habitat for yellow-billed cuckoo on the San Pedro River is located approximately 10 miles north of the proposed crossings.

Riparian woodland areas form a very limited vegetation type that is of very high value as habitat for wildlife and special status species. It has been estimated that riparian woodland communities covered approximately 1 percent of land in the West historically and that of that 1 percent, approximately 95 percent has been altered or destroyed in the past century (Krueper 1993, 1996).

This route group crosses two PLZs, the Galiuro-Winchester-Dragoon PLZ and the Rincons-Whetstone-Santa Rita PLZ (figure 3.8-12). It also crosses Pima County Priority Conservation Areas (PCAs) (figure 3.8-13) and Important Bird Areas (IBAs) (see figure 3.8-10).

Route Group 4 – Pantano Substation to Saguaro Substation

The route group 4 lies within a portion of the Apache-Highlands South and a portion of the Sonoran Desert ecoregions. The elevational range of this route group is 1,841 to 4,167 feet. This route group contains 12 SWReGAP vegetation associations (see figures 3.8-3a through 3.8-3c). This route group is within the Pacific flyway bird migration corridor (see figure 3.8-10) and would also cross three PLZs, the Rincon-Whetstone-Santa Rita PLZ, Tucson Mountains-San Xavier PLZ, and Ironwood-Tortolita PLZ (see figure 3.8-12). The Santa Cruz River also contains migratory and foraging habitat for the endangered southwestern willow flycatcher and the threatened western yellow-billed cuckoo.

It is also within PCAs for species covered under the SDCP (see figure 3.8-13) and includes Tucson Mountain Park and Tumamoc Hill (figure 3.8-14).

Laws, Ordinances, Regulations, and Standards

FEDERAL

- ESA of 1973, as amended: Section 7 of the ESA requires Federal agencies to consult with the FWS to ensure that undertaking, funding, permitting, or authorizing an action is not likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat, as defined under the act, exists only after FWS officially designates it. Critical habitats are (1) areas within the geographic area that have features essential to the conservation of the species and that may require special management consideration or protection; and (2) those specific areas outside the geographic area occupied by a species at the time it is listed that are essential to the conservation of the species.
- Migratory Bird Treaty Act of 1918, as amended: The MBTA gives Federal protection to all migratory birds, including nests and eggs. This law states that it is unlawful to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird" (16 U.S.C. 703). More than 800 species of migratory birds are protected under this law. The MBTA includes protection for all raptor species. This regulation

does not discriminate between live or dead birds, and it also grants full protection to any bird parts, including feathers, eggs, and nests. In order to relocate or destroy any nest and maintain compliance with the MBTA, it is necessary to obtain a permit from the FWS, the responsible agency for regulating this law. Only those entities permitted by the FWS can assist in the relocation of birds or nests. Section 1 of the FWS Region 2 "Interim Empty Nest Policy" states that if the nest is completely inactive at the time of destruction or movement, a permit is not required in order to comply with the MBTA. If an active nest is observed during any activities related to the Project, measures should be taken to protect the nest from destruction and to avoid a violation of the MBTA.

- Fish and Wildlife Coordination Act of 1934, as amended: This act requires coordination with Federal and State wildlife agencies (FWS, AGFD, and NMDGF) for the purpose of mitigating losses of wildlife resources caused by a Project that impounds, diverts, or otherwise modifies a stream or other natural body of water.
- Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668–668c), as amended: The BGEPA, as amended, prohibits "taking" bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*), including their parts, nests, or eggs, without a permit from the FWS. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle . . . [or any golden eagle], alive or dead, or any part, nest, or egg thereof."

  The BGEPA defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." The FWS defines "disturb" under the BGEPA as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."
- BLM Manual 6840: BLM policy (Manual 6840) dictates that the BLM must carry out management for the conservation of State-listed plants and animals in addition to species protected under the ESA (BLM 2008e). BLM Manual 6840 is a Federal guidance document that outlines the criteria for listing species as Sensitive on BLM-administered lands and provides direction on management of these species. BLM Sensitive Species are species that the FWS currently lists under status review; species whose populations are declining rapidly and may warrant Federal protection in the future; species that have small, widely distributed populations; and species that are located in special or unique habitats.
- Mimbres RMP: The Mimbres RMP, developed in December 1993, covers the BLM lands within the Las Cruces District, called the Mimbres Resource Area. It includes all New Mexico portions of the proposed Project's New Build Section, including the Proponent Preferred route, the Proponent Alternative, and the local alternatives. The Mimbres RMP establishes areas for limited, restricted, or exclusive uses, levels of production, allowable resource uses, resource condition objectives, program uses, program constraints, and general management direction. This RMP provides an appendix with the list of wildlife species that the BLM considers sensitive when occurring on lands administered by the Las Cruces District Office of the BLM in New Mexico.
- Safford District RMP: The Safford District RMP, finalized in December 1991, establishes management direction for lands administered by the Safford District Office, extending from the New Mexico border to west of Benson. This includes both the New Build Section and Upgrade Sections of the proposed Project and alternatives. The Safford RMP identifies objectives and policies for lands managed by the BLM and identifies avoidance and exclusion areas that include wilderness areas.

- Phoenix District RMP: The Phoenix District RMP, finalized in 1988, covers the BLM lands within the Phoenix District called the Phoenix Resource Area. It includes portions of the proposed Project's Upgrade Section and alternatives in Pima County from east of Benson to the project terminus. The Phoenix District RMP identifies objectives and policies for lands managed by the BLM and avoidance and exclusion areas including wilderness study areas. This area is now managed by the Tucson Field Office.
- Coronado National Forest Plan, as amended: The "Coronado National Forest Land and Resource Management Plan," as amended (Forest Service 1986a), guides the long-term management of National Forest System lands on the Coronado National Forest. The Coronado National Forest Plan provides for integrated multiple use and sustained yield of goods and services from the Coronado National Forest in a way that maximizes long-term net public benefits in an environmentally sound manner (Forest Service 1986a:1). This management direction allows for a variety of uses of available National Forest System lands for appropriate public and private interests consistent with Forest Service policies. Management goals are identified for 12 different program elements, including environmentally sound energy and mineral development (Forest Service 1986a:9).
    - The role of Management Indicator Species (MIS) in Forest Service planning is described in the 1982 implementation regulations for the National Forest Management Act of 1976 (36 CFR 219.19(a)(1)) (Forest Service 1982). Forest Service Manual (FSM) 2620.5 defines MIS as "plant and animal species, communities or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (Forest Service 1991:6). These regulations require that certain vertebrate and/or invertebrate species present in the area be identified as MIS within the planning area (i.e., Coronado National Forest lands) and that these species be monitored, as "their population changes are believed to indicate the effects of management activities" (36 CFR 219.19(a)(1)).
    - Standard and Guideline No. 1 for Wildlife and Fish within the Coronado National Forest Plan (Forest Service 1986a:31-1) directs the Coronado National Forest to "maintain or improve occupied habitat of . . . listed threatened and endangered species, and MIS through mitigation of Forest activities." Standard and Guideline No. 11 for Wildlife and Fish within the Coronado National Forest Plan (Forest Service 1986a:32) further states that MIS will be monitored through "evaluation through consultation with Arizona Game and Fish Department, New Mexico Department of Game and Fish and Natural Resources, along with other wildlife and plant-oriented groups where appropriate, population viability of Management Indicator Species through determination of: (1) amount of suitable habitat; (2) distribution of suitable habitat; (3) number of individuals that support regional population goals; and (4) likelihood of continued existence." Population and habitat trends of MIS are documented as part of forest plan monitoring.
- USDA Departmental Regulation 9500 and FSM 2670: As described in FSM 2670.12 (Forest Service 2005:3), Departmental Regulation 9500-4 dictates that the Forest Service will always (1) manage "habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least minimum viable populations of such species;" (2) conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species;" and (3) avoid actions "which may cause a species to become threatened or endangered." FSM 2670.22 (Forest Service 2005:4) further explains that the objectives of the Forest Service regarding all sensitive species are to (1) develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions; (2) maintain at least viable populations of all native and desired nonnative

wildlife, fish, and plant species in habitats distributed throughout their geographic range on Forest Service–administered lands; and (3) develop and implement management objectives for populations and/or habitat of sensitive species. Policy for the management sensitive species, as explained in FSM 2670.32 (Forest Service 2005:5), dictates that the Forest Service (1) assist States in achieving their goals for conservation of endemic species; (2) review programs and activities as part of the NEPA process through a biological evaluation, to determine their potential effect on sensitive species; (3) avoid or minimize impacts to species whose viability has been identified as a concern; (4) analyze, if impacts cannot be avoided, the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole in an attempt to avoid creating significant trends toward Federal listing; and (5) establish management objectives in cooperation with the States when projects on Forest Service–administered lands may have a significant effect on sensitive species population numbers or distributions.

STATE

- New Mexico Wildlife Conservation Act of 1978 (NMSA 1978 17-2-37 et seq.): The New Mexico Wildlife Conservation Act is administered by the NMDGF. The New Mexico Wildlife Conservation Act is the legal framework for establishing lists of species considered threatened or endangered within the State of New Mexico. ESA-listed species may be included in the list of State-identified species, as appropriate. The act requires the State to conduct a biennial review of the status of each designated threatened and endangered species, and requires the development of a recovery plan for each State-listed species. The act provides for the purchase of land and support of research to meet recovery plan goals. The director of the NMDGF is the ultimate authority for the law; and enforcement is provided by conservation officers, county sheriffs, and the New Mexico State Police. The Conservation Services Division of the NMDGF issues authorizations and permits for taking of protected wildlife, including endangered species listed under the New Mexico Wildlife Conservation Act.
- Arizona State Wildlife Action Plan: The State of Arizona lists various wildlife species as SGCN, which is an AGFD status listing defined as wildlife of conservation priority—described nationally as Wildlife of Greatest Conservation Need. As discussed in the 2012 AGFD's Comprehensive Wildlife Conservation Strategy (AGFD 2012a), SGCN are species of vertebrates, crustaceans, and mollusks that rank high in the vulnerability category and have been identified for immediate action.
- New Mexico State Wildlife Action Plan: The State of New Mexico lists various wildlife species as SGCN, which is an NMDGF status listing defined as wildlife of conservation priority—described nationally as Wildlife of Greatest Conservation Need. As discussed in NMDGF's Comprehensive Wildlife Conservation Strategy (NMDGF 2006), SGCN are species of vertebrates, mollusks, and crustaceans that rank high in the vulnerability category and have been identified for immediate action.

LOCAL

- SDCP/Pima County MSCP: In 1997, the Pima County Board of Supervisors initiated the development of the SDCP (Pima County 2011) to develop a region-wide plan to address the long-term conservation needs of cultural and natural resources in Pima County. Through the development of the SDCP, a goal of developing a conservation plan and obtaining an ESA Section 10 permit was established. Thus, to avoid, minimize, and mitigate the effects of future growth of the human-built environment, Pima County developed the MSCP, which is part of the SDCP, to apply for a 30-year Section 10 permit under the ESA (Pima County 2010). The MSCP identifies 49 covered Priority Vulnerable Species for the forthcoming Section 10 permit, including 4 plants, 8 mammals, 8 birds, 6 fish, 2 amphibians, 7 reptiles, and 14 invertebrates.

Issues to Be Analyzed

Potential effects on general wildlife species as a result of the proposed Project would include the following:

- Loss or degradation of habitat:
  - Loss or degradation of terrestrial habitat from clearing of vegetation during construction.
  - Degradation of terrestrial habitat due to increased soil erosion or introduction of invasive non-native plants.
  - Degradation of aquatic and wetland habitat from increased soil erosion and/or chemical contamination.
- Increased risk of collision with transmission lines, or predation due to operation of linear transmission line.
- Increased risk of vehicular mortality (direct and indirect) due to construction activities.
- Displacement or decrease in fitness due to noise and human activity associated with all aspects of construction and operation/maintenance.
- Decreased forage availability and foraging habitat quality due to the spread of noxious weed species and the removal of habitat.
- Indirect impacts related to loss of habitat or direct loss of wildlife individuals due to increased risk of wildfire from the introduction of noxious weed species.
- Habitat fragmentation, including a decrease in function to wildlife corridors, due to the construction of linear features (power lines and roads) and large areas of habitat (power facilities and associated infrastructure).

Analysis Area Conditions

Because the proposed Project would cross a variety of habitat types within three ecoregions, many species of birds, reptiles, amphibians, fishes, invertebrates, mammals, and game species have the potential to be present within the analysis area. Below, we briefly describe each of these major groups of animals.

BIRDS

Desertscrub, grasslands, riparian (including xeroriparian) habitats, and agricultural areas throughout and adjacent to the analysis area provide habitat for a variety of bird species. Bird species have the potential to use habitats within the analysis area for nesting, foraging, and migratory stopover. The dominant habitat types within the analysis area are semidesert grassland and desertscrub communities. Birds common to these habitats include a variety of grassland sparrows (*Ammodramus humeralis*), raptors, doves (family Columbidae), hummingbirds (family Trochilidae), and quail (family Odontophoridae).

The analysis area also includes several seasonal wetlands (see figures 3.7-2a through 3.7-2d in the “Water Resources” section), mainly playas, which can support a diverse avian community, particularly during migratory periods. For example, the Willcox Playa is seasonally flooded to a shallow depth and has outlying pothole lakes, including Cochise Lakes. Crane Lake in the AGFD Willcox Playa Wildlife Area is artificially filled by AGFD each spring. An existing SWTC 230-kV transmission line is located northwest of Crane Lake between the lake and the playa. Willcox Playa supports over 200 different species of birds, including cranes, other waterfowl, and shorebirds (Wings over Willcox 2013) and provides one of the primary wintering habitats for sandhill cranes in Arizona. In addition, the agricultural fields south and east of Willcox Playa are important foraging areas for sandhill cranes (see figure 3.8-3a). Avian species that normally are found at higher elevations in southern New Mexico and Arizona could also be present in the analysis area during migration or as vagrants following storm events.

The analysis area also includes the San Pedro River, which is an important migratory route for neo-tropical bird species and hosts 345 different bird species (Tucson Audubon Society 2013).

REPTILES

Reptiles are well adapted to the dry conditions, extreme temperatures, and desertscrub and grassland habitats that are common throughout the analysis area. Most lizards in the Sonoran Desert are diurnal (active during the day), whereas snakes are primarily nocturnal (active at night). The semidesert and desertscrub habitats have the potential to support a variety of lizards, snakes, and the Sonoran desert tortoise (*Gopherus morafkai*). Seasonal water features such as playas and stock tanks may support a locally diverse assemblage of reptile species. The analysis area includes the San Pedro River, which is habitat for more than 40 reptile species (Tucson Audubon Society 2013).

AMPHIBIANS

Amphibians are not as common in the analysis area as other groups of animals because of the limited availability of water in southwestern desertscrub and grassland habitats. Permanent and seasonal sources of water within the analysis area could support several species of native toads and frogs. In addition, the introduced bullfrog (*Lithobates catesbeiana*) and tiger salamanders (*Ambystoma tigrinum*) have the potential to occur in more perennial water features.

FISH

Because of the lack of perennial reaches of streams and rivers crossed by the analysis area, very few fish species have the potential to be present within the analysis area. In spatially intermittent streams, such as Cienega Creek, native fish may occupy perennial reaches year-round and use ephemeral reaches of the stream within the analysis area during precipitation events.

MAMMALS

A variety of common mammal species inhabit semidesert grassland and desertscrub vegetation communities within the analysis area. These species range from small rodents (e.g., mice, rats, gophers, squirrels) and bats to rabbits, skunks, raccoons, ungulates, and large predators such as mountain lions, bobcats, foxes, and coyotes. Mammals that normally inhabit higher elevations may also use lower elevation habitats to move between mountain ranges. The analysis area also includes the San Pedro River, which is habitat for more than 80 species of mammals, including 20 bat species (Tucson Audubon Society 2013).

INVERTEBRATES

Invertebrates are likely the most diverse group of animals that inhabit the analysis area. Isolated habitats, such as the mountain ranges in southern Arizona and New Mexico as well as ephemeral and perennial water sources, may support a number of endemic invertebrate species. However, because relatively few studies focus on the ranges and populations of invertebrate species, current understanding is limited. The analysis area includes the San Pedro River, which is habitat for more than 100 butterfly species (Tucson Audubon Society 2013).

GAME SPECIES

The AGFD and NMDGF manage a wide variety of species for hunting and recreational purposes that have the potential to occur within the analysis area, including alternative segments. The proposed Project has the potential to impact select game species, particularly big-game and migratory avian game species that use large geographic areas. The analysis area also includes several seasonal wetlands, mainly playas that may be used by game species. Game species are also known to use transmission line corridors as movement corridors.

Priority big-game species with the potential to occur in the analysis area include black bear (*Ursus americanus*), mountain lion (*Felis concolor*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), bighorn sheep (*Ovis canadensis nelsoni*), javelina (*Tayassu tajacu*) and pronghorn. Avian game species that could occur include waterfowl, sandhill cranes, and small avian species such as doves and quail. The proposed Project is not anticipated to affect aquatic game species such as fish. Game management areas are designated within Arizona and New Mexico and managed for recreation uses. See Section 3.14, “Recreation,” for more information on these recreation areas.

WILDLIFE LINKAGES

Through resource management planning in recent years, the cooperating agencies for the proposed Project (AGFD, BLM, and Pima County), along with other agencies and organizations, have identified important wildlife movement corridors throughout Arizona. During the development of the 2006 “Arizona’s Wildlife Linkages Assessment” (Arizona Department of Transportation (ADOT) 2006) and the 2012 “Pima County Wildlife Connectivity Assessment: Report on Stakeholder Input” (AGFD 2012b), numerous wildlife movement corridors have been identified as important to the conservation of species and their populations. In addition, natural topographical features, such as canyons, xeroriparian washes, mesoriparian washes, and riparian areas, have been identified that are also used as animal movement corridors. Some of these animal movement corridors have been further analyzed and modeled (CorridorDesign 2013) to refine the best biological corridor. In many areas existing infrastructure including roads, railroads, transmission lines, and pipelines exist that intersect with wildlife linkages in the analysis areas. This existing infrastructure would be a barrier to wildlife movement.

The analysis area includes eight wildlife linkage corridors in the vicinity of the analysis area (ADOT 2006; AGFD 2012a; Menke 2008). These wildlife linkage corridors are shown below in table 3.8-6. Table 3.8-6 contains the details of animal movement corridors within the analysis area, and figures 3.8-6 and 3.8-12 depict their geographical placement in the analysis area and surrounding region.

Table 3.8-6. Animal Movement Corridors in the Analysis Area

Animal Movement Corridor Name	Source	Connection Details	Size and Land Ownership*	Focal Species	Threats and Barriers
Route Group 1 Afton Substation to Hidalgo Substation					
Big Burro Mountains to Cedar Mountains Potential Cougar Corridor	Menke (2008)	Provides a roughly north-south linkage between the Big Burro Mountains and Cedar Mountains.	270,742 acres total; 21,719.3 acres (8%) in analysis area total.	Mountain lion	Existing roads, such as I-10.

Table 3.8-6. Animal Movement Corridors in the Analysis Area (Continued)

Animal Movement Corridor Name	Source	Connection Details	Size and Land Ownership*	Focal Species	Threats and Barriers
Route Group 2 Hidalgo Substation to Apache Substation					
Linkage #90, Pinaleño-Dos Cabezas-San Simon Valley Linkage	Arizona's Wildlife Linkage Assessment (ADOT 2006)	Provides north-south and east-west linkages among the habitat blocks in the Pinaleño Mountains, San Simon Valley, and Dos Cabezas Mountains.	292,315 acres total; 102,022.0 acres (35%) in analysis area; total area includes 57% of private land and 43% State Trust land.	-California leaf-nosed bat -Fringed myotis -Jaguar -Long-legged myotis -Mexican spotted owl -Mule deer -Ornate box turtle -Pale Townsend's big-eared bat -Texas horned lizard -White-nosed coati -Yellow-nosed cotton rat	Existing roads, such as I-10 and U.S. 191; the Southern Pacific Railroad; and expanding urban development.
Linkage #89, Willcox Playa-Winchester-Pinaleño-Dos Cabezas Linkage	Arizona's Wildlife Linkage Assessment (ADOT 2006)	Provides north-south and east-west linkages among the habitat blocks in Willcox Playa, the Winchester Mountains, the Pinaleño Mountains, and Dos Cabezas Mountains.	188,700 acres total; 70,842.3 acres (37.5%) in analysis area; total area includes 57% of private land and 43% State Trust land. Note that this linkage has not been refined (i.e., modeled) yet, thus the details are not available.	-Bobcat -Chiricahua leopard frog -Javelina -Kit fox -Mexican spotted owl -Mountain lion -Mule deer -Ornate box turtle -Plains leopard frog -Texas horned lizard -Western burrowing owl	Existing roads, such as I-10 and SR 186; the Southern Pacific Railroad; expanding urban development; and border security/illegal immigration issues.
Route Group 3 Apache Substation to Pantano Substation					
Linkage #89, Willcox Playa-Winchester-Pinaleño-Dos Cabezas Linkage	Arizona's Wildlife Linkage Assessment (ADOT 2006)	Provides north-south and east-west linkages among the habitat blocks in Willcox Playa, the Winchester Mountains, the Pinaleño Mountains, and Dos Cabezas Mountains.	188,700 acres total; 70,842.3 acres (37.5 %) in analysis area; total area includes 57% of private land and 43% State Trust land. Note that this linkage has not been refined (i.e., modeled) yet, thus the details are not available.	-Bobcat -Chiricahua leopard frog -Javelina -Kit fox -Mexican spotted owl -Mountain lion -Mule deer -Ornate box turtle -Plains leopard frog -Texas horned lizard -Western burrowing owl	Existing roads, such as I-10 and SR 186; the Southern Pacific Railroad; expanding urban development; and border security/illegal immigration issues.

Table 3.8-6. Animal Movement Corridors in the Analysis Area (Continued)

Animal Movement Corridor Name	Source	Connection Details	Size and Land Ownership*	Focal Species	Threats and Barriers
Route Group 3 Apache Substation to Pantano Substation, cont'd.					
Linkage #88, Galiuro-Winchester-Dragoon Linkage	Arizona's Wildlife Linkage Assessment (ADOT 2006)	Provides a roughly north-south linkage among the habitat blocks in the Galiuro Mountains, Winchester Mountains, and Dragoon Mountains of Coronado National Forest.	157,103 acres total; 276.6 acres (0.1%) in analysis area; total area includes 59% of private land, 37% NFS land, and the remaining 4% is either State Trust of local or State Parks; 97% is natural vegetation, 0.9% is aquatic, and 0.3% is agricultural land.	-Black bear -Chiricahua leopard frog -Javelina -Mexican long-tongued bat -Mountain lion -Mule deer -Ornate box turtle -Plains leopard frog -Texas horned lizard -White-nosed coati -White-tailed deer -Grassland birds	Existing roads, such as I-10; the Southern Pacific Railroad; and expanding urban development.
Linkage #94, Rincon-Santa Rita-Whetstone Linkage	ADOT (2006); Beier et al. (2006); AGFD (2012a)	Provides a roughly north-south linkage among the habitat blocks in the Rincon Mountains, Santa Rita Mountains, and the Whetstone Mountains; includes six stands/corridors.	85,304 acres total; 752.6 acres (0.9%) in analysis area; total area includes 57% State Trust land, 24% private land, 13% BLM land, and 6% NFS land; 99.5% is natural vegetation, and 0.5% is developed land. Note that this linkage has been refined (i.e., modeled), thus the details are more specific than the others.	-Black bear -Chiricahua leopard frog -Giant spotted whiptail -Gila chub -Gila topminnow -Javelina -Lesser long-nosed bat -Longfin dace -Lowland leopard frog -Mexican long-tongued bat -Mexican spotted owl -Mountain lion -Northern gray hawk -Ornate box turtle -Sonoran desert tortoise -Western red bat -Western yellow-billed cuckoo -White-tailed deer	Existing roads, such as I-10 and SR 83; the Southern Pacific Railroad; and border security/illegal immigration issues.

Table 3.8-6. Animal Movement Corridors in the Analysis Area (Continued)

Animal Movement Corridor Name	Source	Connection Details	Size and Land Ownership*	Focal Species	Threats and Barriers
Route Group 4 Pantano Substation to Saguaro Substation					
Linkage #94, Rincon-Santa Rita-Whetstone Linkage	ADOT (2006); Beier et al. (2006); AGFD (2012a)	Provides a roughly north-south linkage among the habitat blocks in the Rincon Mountains, Santa Rita Mountains, and the Whetstone Mountains; includes six stands/corridors.	85,304 acres total; 752.6 acres (0.9%) in analysis area; total area includes 57% State Trust land, 24% private land, 13% BLM land, and 6% NFS land; 99.5% is natural vegetation and 0.5% is developed land. Note that this linkage has been refined (i.e., modeled), thus the details are more specific than the others.	-Black bear -Chiricahua leopard frog -Giant spotted whiptail -Gila chub -Gila topminnow -Javelina -Lesser long-nosed bat -Longfin dace -Lowland leopard frog -Mexican long-tongued bat -Mexican spotted owl -Mountain lion -Northern gray hawk -Ornate box turtle -Sonoran desert tortoise -Western red bat -Western yellow-billed cuckoo -White-tailed deer	Existing roads, such as I-10 and SR 83; the Southern Pacific Railroad; and border security/illegal immigration issues.
Linkage #79, Ironwood-Tortolita Linkage	Arizona's Wildlife Linkage Assessment (ADOT 2006)	Provides a roughly northeast-southwest linkage between the habitat blocks in the Ironwood Forest National Monument and the Tortolita Mountains.	32,416 acres total; 232.6 acres (0.7%) in analysis area; total area includes 51% State Trust land, 43% private land, 4.5% BLM land, and 1.5% Reclamation land.	-Bighorn sheep -Bobcat -Cactus ferruginous pygmy-owl -Cave myotis -Javelina -Kit fox -Mountain lion -Mule deer -Sonoran desert tortoise -Western burrowing owl	Existing roads, such as I-10; CAP canal; the Southern Pacific Railroad; agriculture; urbanization; and border security/illegal immigration issues.
Coyote-Ironwood-Tucson Linkage	Arizona's Wildlife Linkage Assessment (ADOT 2006; AGFD 2012a)	Provides a linkage between IFNM and the Coyote habitat block and IFNM and the Tucson Mountains.	176,721 acres total; 506.7 acres (0.3%) in analysis area; total area includes 23% private land, 20% State Trust land, 36% tribal land, 6% NPS land, and 13% BLM land.	-Badger -Bats -Black-tailed jackrabbit -Gila monster -Sonoran desert tortoise	Existing roads, such as SR 86; Sandario Road; Twin Peaks Road; urban development; CAP canal; and fences.

Table 3.8-6. Animal Movement Corridors in the Analysis Area (Continued)

Animal Movement Corridor Name	Source	Connection Details	Size and Land Ownership*	Focal Species	Threats and Barriers
Route Group 4 Pantano Substation to Saguaro Substation, cont'd.					
Linkage #87, Tucson Mountains-San Xavier Linkage	ADOT 2006	Provides a roughly north-south linkage between the habitat blocks in Saguaro National Park–West, the Tucson Mountains, and the San Xavier Indian Reservation.	18,216 acres total; 323.2 acres (1.8%) in analysis area; total area includes 88% private land, 5% State Trust land, 4% BLM land, and 3% tribal land. Note that this linkage has not been refined (i.e., modeled) yet, thus the details are not as specific as the others.	-Bobcat -California leaf-nosed bat -Cave myotis -Giant spotted whiptail -Greater western mastiff bat -Mountain lion -Pocketed free-tailed bat -Sonoran desert tortoise -Western burrowing owl	Existing roads, such as SR 86; urbanization, and border security/illegal immigration issues.
Riparian Movement Area #2: Brawley Wash	AGFD (2012a)	Tohono O'odham Nation (Garcia Strip) & CAP Wildlife Mitigation Corridor – Silver Bell/Waterman Mountains/Samaniego Hills Wildland Block	14,713 acres total; 273.4 acres (1.9 %) in analysis area; National Forest System land, BLM land, private land, and State Trust land.	-American pronghorn; -Black bear -Chiricahua leopard frog -Migratory birds -Mule deer -Raptors -White-nosed coati -White-tailed deer	Agriculture (grazing); border activities; exotic species (Lehmann lovegrass); high-density residential development; high-traffic gravel road (Gardner Canyon Road); low-density residential development; mining; OHV use; paved road (SR 286); solar energy development; wind energy development

* Acreage calculations were based on the animal movement corridor shapefiles available online and provided by the researchers, i.e., AGFD. Then, the animal movement corridors were overlaid with the proposed Project routes and vicinity, and calculations were conducted.

Special Status Wildlife

FEDERAL ENDANGERED SPECIES ACT SPECIES

The analysis area for ESA species covers portions of four counties in New Mexico and five counties in Arizona. The current FWS wildlife species lists for Doña Ana, Grant, Hidalgo, and Luna counties in New Mexico and Greenlee, Graham, Cochise, Pima, and Pinal counties in Arizona were addressed for this proposed Project. These lists include wildlife species that are currently listed under the ESA as endangered (23), threatened (10), experimental/non-essential population (3), or conservation agreement (2) species, and also those that are listed as petitioned for listing/under review (3) or candidates (8). All combined, this is a total of 49 wildlife species, with 11 bird species, 16 fish species, 9 mammal species, 6 invertebrate species, 3 amphibian species, and 4 reptile species (appendix E). Table 3.8-7 lists ESA species that could potentially occur within each route group.

Some species are considered unlikely but possibly present; this is because, although suitable habitat parameters may be present, the route group is not within the species' typical range.

Table 3.8-7. Federal Endangered Species Act Species by Route Group

Common Name	Scientific Name	Route Group 1	Route Group 2	Route Group 3	Route Group 4
Mammals					
Jaguar	*Panthera onca*	-	-	U	U
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	-	P	P	P
Mexican long-nosed bat	*Leptonycteris nivalis*	-	P	P	U
Ocelot	*Leopardus pardalis*	-	U	U	U
Birds					
California least tern	*Sterna antillarum browni*	-	-	U	U
Least tern (Interior Population)	*Sterna antillarum*	U	U	-	-
Mexican spotted owl	*Strix occidentalis lucida*	-	U	U	U
Northern aplomado falcon	*Falco femoralis septentrionalis*	P	P	P	-
Southwestern willow flycatcher	*Empidonax traillii extimus*	-	U	P	P
Sprague's pipit	*Anthus spragueii*	P	P	P	P
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	-	-	P	P
Reptiles					
Northern Mexican gartersnake	*Thamnophis eques megalops*	-	-	P	-
Sonoran desert tortoise*	*Gopherus morafkai*	-	U	P	P
Amphibians					
Chiricahua leopard frog	*Lithobates chiricahuensis*	-	P	U	U
Fish					
Gila chub	*Gila intermedia*	-	-	U	U
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	-	-	U	U

Notes: P = occurrence is probable, U = occurrence is unlikely but possible as suitable habitat parameters are present but the analysis area is outside the species' range.

*On October 6, 2015, FWS determined the Sonoran desert tortoise does not warrant protection under the ESA as a candidate species.

BUREAU OF LAND MANAGEMENT SENSITIVE SPECIES

The analysis area covers portions of two BLM districts and three field offices within New Mexico and Arizona: the Las Cruces Field Office of the Las Cruces District in New Mexico; and the Safford and Tucson Field Offices of the Gila District in Arizona. The Mimbres District of the Las Cruces Field Office lists 45 species as BLM Sensitive, including 1 amphibian species, 9 bird species, 6 fish species, 20 mammal species, 5 invertebrate species, and 4 reptile species. The Gila District, which includes both the Safford and Tucson Field Offices, lists 47 species as BLM Sensitive, including 4 amphibian species, 17 bird species, 6 fish species, 5 invertebrate species, 11 mammal species, and 4 reptile species. A list of BLM Sensitive Species is included in table 18.6 of the "Southline Transmission Project Resource Report

18: Wildlife" (CH2M Hill 2013h). Differences between the table and the text here were based upon further review of available habitat parameters for BLM Sensitive Species within the route groups. Table 3.8-8 lists BLM Sensitive Species that could potentially occur within each route group.

Table 3.8-8. Bureau of Land Management Sensitive Species by Route Group

		Las Cruces Field Office Sensitive Species		**Safford and Tucson Field Office Sensitive Species**	
Common Name	**Scientific Name**	**Route Group 1**	**Route Group 2**	**Route Group 3**	**Route Group 4**
Mammals					
Allen's big-eared bat	*Idionycteris phyllotis*	P	P	P	P
Arizona myotis	*Myotis occultus*	-	-	P	P
Banner-tailed kangaroo rat	*Dipodomys spectabilis*	-	P	P	P
Big free-tailed bat	*Nyctinomops macrotis*	P	P	P	-
Black-tailed prairie dog	*Cynomys ludovicianus*	-	U	U	-
California leaf-nosed bat	*Macrotus californicus*	-	-	P	P
Cave myotis	*Myotis velifer*	P	P	-	P
Desert pocket gopher	*Geomys arenarius arenarius*	U	U	-	-
Fringed myotis	*Myotis thysanodes thysanodes*	P	P	-	-
Greater western mastiff bat	*Eumops perotis californicus*	-	P	P	P
Little brown myotis	*Myotis lucifugus occultus*	P	P	-	-
Long-legged myotis	*Myotis volans* (interior)	P	P	-	-
Mexican long-tongued bat	*Choeronycteris mexicana*	P	P	P	P
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	P	P	P	P
Spotted bat	*Euderma maculatum*	P	P	P	P
Western small-footed myotis	*Myotis ciliolabrum melanorhinus*	P	P	-	-
Yellow cotton-nosed rat	*Sigmodon ochrognathus*	-	U	-	-
Yuma myotis	*Myotis yumanensis yumanensis*	P	P	-	-
Birds					
American peregrine falcon	*Falco peregrinus*	-	U	P	P
Arizona Botteri's sparrow	*Aimophila botterii arizonae*	-	U	U	-
Arizona grasshopper sparrow	*Ammodramus savannarum ammolegus*	-	P	P	P

Table 3.8-8. Bureau of Land Management Sensitive Species by Route Group (Continued)

		Las Cruces Field Office Sensitive Species		Safford and Tucson Field Office Sensitive Species	
Common Name	**Scientific Name**	**Route Group 1**	**Route Group 2**	**Route Group 3**	**Route Group 4**
Birds, cont'd.					
Baird's sparrow	*Ammodramus bairdii*	U	U	-	-
Bald eagle	*Haliaeetus leucocephalus*	-	P	P	P
Burrowing owl	*Athene cunicularia hypugaea*	P	P	P	P
Cactus ferruginous pygmy-owl	*Glaucidium brasilianum cactorum*	-	-	P	P
Desert purple martin	*Progne subis hesperia*	-	-	P	P
Ferruginous hawk	*Buteo regalis*	-	U	U	-
Gilded flicker	*Colaptes chrysoides*	-	-	P	P
Golden eagle	*Aquila chrysaetos*	-	P	P	P
Loggerhead shrike	*Lanius ludovicianus*	P	P	-	-
White-faced ibis	*Plegadis chihi*	P	P	-	-
Reptiles					
Arizona striped whiptail	*Aspidoscelis arizonae*	-	P	P	P
Desert ornate box turtle	*Terrapene ornata*	-	P	P	P
Giant spotted whiptail	*Aspidoscelis burti stictogrammus*	-	U	-	-
Slevin's bunchgrass lizard	*Sceloporus slevini*	U	U	U	U
Sonoran mud turtle	*Kinosternon sonoriense sonoriense*	-	P	P	P
Tucson shovel-nosed snake	*Chionactis occipitalis klauberi*	-	-	-	U
Texas horned lizard	*Phrynosoma cornutum*	P	P	-	-
Amphibians					
Colorado River toad	*Anaxyrus alvarius*	P	P	-	-
Lowland leopard frog	*Lithobates yavapaiensis*	-	P	P	P
Plain's leopard frog	*Lithobates blairi*	-	P	P	-
Sonoran green toad	*Bufo retiformis*	-	-	P	P
Western narrow-mouthed toad	*Gastrophryne olivacea*	-	-	P	P
Fish					
Desert sucker	*Catostomus clarki*	-	U	U	U
Gila chub	*Gila intermedia*	-	-	U	U
Longfin dace	*Agosia chrysogaster*	-	P	U	U

Table 3.8-8. Bureau of Land Management Sensitive Species by Route Group (Continued)

Common Name	Scientific Name	Las Cruces Field Office Sensitive Species		Safford and Tucson Field Office Sensitive Species	
		Route Group 1	Route Group 2	Route Group 3	Route Group 4
Invertebrates					
Animas minute moss beetle	*Limnebius aridus*	-	U	-	-

Notes: P = occurrence is probable, U = occurrence is unlikely but possible as suitable habitat parameters are present but the analysis area is outside the species' range.

Some species are considered unlikely but possibly present; this is because, although suitable habitat parameters may be present, the route group is not within the species' typical range.

FOREST SERVICE SENSITIVE AND MANAGEMENT INDICATOR SPECIES

The analysis area covers an approximately 0.5-mile section of the Douglas District within the Coronado National Forest in Cochise County, Arizona. On lands administered by the Coronado National Forest, two special status listings apply: the 2007 Coronado National Forest Sensitive species list, which includes 57 wildlife species; and 33 MIS in eight groups—Cavity Nesters, Riparian Species, Species Needing Diversity, Species Needing Herbaceous Cover, Species Needing Dense Canopy, Game Species, Special Interest Species, and Threatened and Endangered Species (Forest Service 1986a). The Coronado National Forest Sensitive species list is composed of 3 amphibian species, 24 bird species, 4 fish species, 1 invertebrate species, 15 mammal species, and 10 reptile species. The Coronado National Forest MIS list is composed of 4 amphibian species, 15 bird species, 6 fish species, 5 mammal species, and 3 reptile species.

Seven species listed as Forest Service Sensitive and three species listed as MIS were identified as having the potential to occur because the analysis area is within their range and suitable habitat parameters are present. The species potentially occurring are shown below in table 3.8-9.

Table 3.8-9. Coronado National Forest Sensitive Species and Management Indicator Species

Common Name	Scientific Name	Potential for Presence	
		Forest Service Sensitive Species	Forest Service MIS Species
Mammals			
Black bear	*Ursus americanus*	-	U
Chihuahuan pronghorn	*Antilocapra americana mexicana*	-	U
Cockrum's desert shrew	*Notiosorex cockrumi*	P	-
Fulvous harvest mouse	*Reithrodontomys fulvescens*	U	-
Greater western mastiff bat	*Eumops perotis californicus*	P	-
Hooded skunk	*Mephitis macroura milleri*	P	-
Mexican long-tongued bat	*Choeronycteris mexicana*	P	-
Northern pygmy mouse	*Baiomys taylori ater*	P	-
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	P	-

Table 3.8-9. Coronado National Forest Sensitive Species and Management Indicator Species (Continued)

Common Name	Scientific Name	Potential for Presence: Forest Service Sensitive Species	Potential for Presence: Forest Service MIS Species
Mammals, cont'd.			
Plains harvest mouse	*Reithrodontomys montanus*	P	-
Western yellow bat/southern yellow bat	*Lasiurus xanthinus/Lasiurus ega*	P	-
Coues white-tailed deer	*Odocoileus virginianus couesi*	-	P
Yellow cotton-nosed rat	*Sigmodon ochrognathus*	P	-
Birds			
Abert's towhee	*Melozone aberti*	P	-
American peregrine falcon	*Falco peregrinus*	P	P
Arizona grasshopper sparrow	*Ammodramus savannarum ammolegus*	P	-
Baird's sparrow	*Ammodramus bairdii*	U	U
Bell's vireo	*Vireo bellii*	-	P
Buff-collared nightjar	*Caprimulgus ridgwayi*	U	-
Lucifer hummingbird	*Calothorax lucifer*	U	-
Montezuma's quail	*Cyrtonyx montezumae*	-	U
Western burrowing owl	*Athene cunicularia hypugaea*	P	U
Reptiles			
Canyon (giant) spotted whiptail	*Aspidoscelis burti*	U	-
Reticulate Gila monster	*Heloderma suspectum suspectum*	U	-
Slevin's bunchgrass lizard	*Sceloporus slevini*	U	-
Sonoran desert tortoise	*Gopherus morafkai*	U	-

Note: P = occurrence is probable, U = occurrence is unlikely but possible as suitable habitat parameters are present but the analysis area is outside the species' range.

NEW MEXICO WILDLIFE CONSERVATION ACT

The NMDGF administers the New Mexico Wildlife Conservation Act and lists species as Endangered and Threatened (see table 3.8-10). This list includes a total of 119 wildlife species, of which 56 are listed as Endangered and 46 are listed as Threatened. These Wildlife Conservation Act species comprise 32 birds, 24 fish, 15 mammals, 27 invertebrates, 6 amphibians, and 15 reptiles. The species that have the potential to occur in the analysis area are shown below in table 3.8-10.

Some species are considered unlikely but possibly present; this is because, although suitable habitat parameters may be present, the route group is not within the species' typical range.

Table 3.8-10. New Mexico Wildlife Conservation Act Species by Route Group

Common Name	Scientific Name	State of New Mexico Listed Species	
		Route Group 1	Route Group 2
Mammals			
Desert bighorn sheep	*Ovis canadensis mexicana*	P	P
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	-	P
Spotted bat	*Euderma maculatum*	P	-
Western yellow bat	*Lasiurus xanthinus*	P	P
Birds			
Abert's towhee	*Melozone aberti*	P	P
American peregrine falcon	*Falco peregrinus*	P	P
Arizona grasshopper sparrow	*Ammodramus savannarum ammolegus*	-	P
Bald eagle	*Haliaeetus leucocephalus*	U	U
Baird's sparrow	*Ammodramus bairdii*	U	U
Bell's vireo	*Vireo bellii*	P	P
Costa's hummingbird	*Calypte costae*	U	U
Gila woodpecker	*Melanerpes uropygialis*	P	P
Gray vireo	*Vireo vicinor*	-	P
Least tern (Interior Population)	*Sterna antillarum*	U	U
Lucifer hummingbird	*Calothorax lucifer*	P	P
Northern aplomado falcon	*Falco femoralis*	P	P
Southwestern willow flycatcher	*Empidonax traillii extimus*	-	P
Varied bunting	*Passerina versicolor*	P	P
Reptiles			
Canyon spotted whiptail	*Aspidoscelis burti*	-	U
Gila monster	*Heloderma suspectum*	P	P
Slevin's bunchgrass lizard	*Sceloporus slevini*	U	U
Amphibians			
Great Plains narrow-mouthed toad	*Gastrophryne olivacea*	P	P
Lowland leopard frog	*Lithobates yavapaiensis*	-	P

Source: Biota Information System of New Mexico (2014).

Note: P = occurrence is probable, U = occurrence is unlikely but possible as suitable habitat parameters are present but the analysis area is outside the species' range.

STATE OF NEW MEXICO SPECIES OF GREATEST CONSERVATION NEED

The NMDGF developed a "Comprehensive Wildlife Conservation Strategy" for New Mexico (NMDGF 2006). This document was developed as directed by a national initiative for accomplishing wildlife conservation through Congressional interest in the State Wildlife Grants program, which aims at conserving biodiversity and thereby precluding the necessity of listing more species under the ESA. Within the document, the State of New Mexico was mapped by ecoregions as well as watershed drainages. Subsequently, species associated with these ecoregions and watershed drainages were listed as SGCN for those areas. The analysis area for the proposed Project is within the Chihuahuan Desert and

Apache Highlands ecoregions (see figure 3.8-4) and the Rio Grande, Mimbres, and Gila watershed drainages (NMDGF 2006). It should be noted that many of these species are also listed under various other special status designations, such as the ESA.

New Build Section

Route group 1 is within the Chihuahuan Desert and Apache Highlands ecoregions, and the Rio Grande and Mimbres watershed drainages. Thus, the species that have the potential to occur in this route group within the ecoregions include a total of 62 wildlife species, composed of 22 bird species, 16 mammal species, 11 invertebrate species, 3 amphibian species, and 10 reptile species. And the species that are possible to occur in this route group within the Rio Grande and Mimbres watershed drainages include a total of 64 wildlife species, composed of 6 bird species, 8 fish species, 8 mammal species, 18 invertebrate species, 14 amphibian species, and 10 reptile species. Bendire's thrasher (*Toxostoma bendirei*) is likely to be added to the State of New Mexico's SGCN list when the list is next updated. As such, it is included in the analysis of SGCN (FWS 2014c).

Route group 2 is within the Apache Highlands ecoregion, and also within the Gila watershed drainage. Thus, the species that are possible to occur in this route group within the ecoregion include a total of 49 wildlife species, composed of 22 bird species (and Bendire's thrasher), 15 mammal species, 3 invertebrate species, 1 amphibian species, and 8 reptile species. And the species that have the potential to occur in this route group within the Gila watershed include a total of 49 wildlife species, composed of 17 bird species, 11 fish species, 8 mammal species, 4 invertebrate species, 6 amphibian species, and 3 reptile species.

STATE OF ARIZONA WILDLIFE SPECIES OF CONCERN

The State of Arizona lists wildlife species of concern for species whose occurrence in Arizona is or may be in jeopardy, or has known or perceived threats or population declines.

New Build Section

A review of the list of wildlife species of concern identified eight species possibly occurring in route group 2. This includes six bird species and two mammal species in route group.

Upgrade Section

A review of the list of wildlife species of concern identified 20 species possibly occurring in Upgrade Section. This includes 6 bird species, 8 mammal species, 5 reptile species, and 1 amphibian species in route group 3 and 5 bird species, 7 mammal species, 11 reptile species, and 2 amphibian species in route group 4.

STATE OF ARIZONA SPECIES OF GREATEST CONSERVATION NEED

The State of Arizona also lists various species as SGCN, which is an AGFD status listing defined as wildlife of conservation priority—described nationally as Wildlife of Greatest Conservation Need.
As discussed in the AGFD's Comprehensive Wildlife Conservation Strategy (AGFD 2006), SGCN are species of vertebrates, crustaceans, and mollusks that rank high in the vulnerability category and have been identified for immediate action. It should be noted that many of these species are also listed under various other special status designations, such as ESA listings.

New Build Section

The HabiMap SGCN query results indicated that 69 SGCN species could possibly occur within the Arizona portion of route group 2. This list includes 30 bird species, 23 mammal species, 3 amphibian species, and 13 reptile species. Many of these species are also listed under other special status categories, including ESA listings, BLM Sensitive, or Forest Service Sensitive.

Upgrade Section

The HabiMap SGCN query results indicated that 76 SGCN species could possibly occur within route group 3, including 15 Tier 1a and 61 Tier 1b species. This list includes 35 bird species, 2 fish species, 25 mammal species, 3 amphibian species, and 11 reptile species in route group 3. Many of these species are also listed under other special status categories, including ESA listings, BLM Sensitive, or Forest Service Sensitive.

The HabiMap SGCN query results indicated that 88 SGCN species could possibly occur within route group 4, including 22 Tier 1a and 66 Tier 1b species. This list includes 35 bird species, 4 fish species, 25 mammal species, 5 amphibian species, 1 invertebrate species, and 18 reptile species in route group 4. Many of these species are also listed under other special status categories including ESA listings, BLM Sensitive, or Forest Service Sensitive.

LOCAL SONORAN DESERT CONSERVATION PLAN/PIMA COUNTY MULTI-SPECIES CONSERVATION PLAN

The analysis area for this proposed Project includes covered portions of the Pima County MSCP, which is part of the SDCP (Pima County 2010). The MSCP identifies 45 wildlife species as covered Priority Vulnerable Species for their forthcoming Section 10 permit, including 8 mammals, 8 birds, 6 fish, 2 amphibians, 7 reptiles, and 14 invertebrates. It should be noted that the majority of the 45 wildlife species listed as Priority Vulnerable Species under the MSCP are also covered under other special status listings.

The only portion of the analysis area where the MSCP applies is the portions of route groups 3 and 4 within Pima County. Within these route groups, 17 species were identified as having the potential to occur because the analysis area is within their range and suitable habitat parameters are present. These species include the western yellow bat/southern yellow bat (*Lasiurus xanthinus/Lasiurus ega*), western red bat (*Lasiurus blossevillii*), Mexican long-tongued bat (*Choeronycteris mexicana*), western burrowing owl (*Athene cunicularia hypugaea*), lowland leopard frog (*Lithobates yavapaiensis*), Abert’s towhee (*Melozone aberti*), rufous-winged sparrow (*Aimophila carpalis*), pale Townsend’s big-eared bat (*Corynorhinus townsendii pallescens*), California leaf-nosed bat (*Macrotus californicus*), northern Mexican gartersnake, desert box turtle (*Terrapene ornate*), Bell’s vireo (*Vireo bellii*), ground snake (*Sonora semiannulata*), Merriam’s mesquite mouse (*Peromyscus merriami*), giant spotted whiptail (*Aspidoscelis burti stictogrammus*), Swainson’s hawk (*Buteo swainsoni*), and Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*).

In addition, four other species—the Allen’s lappet-browed bat (*Idionycteris phyllotis*), red-backed whiptail lizard (*Cnemidophorus burti xanthonotus* (*Aspidoscelis xanthonota*)), longfin dace (*Agosia chrysogaster*), and desert sucker (*Catostomus clarki*)—could also occur but are considered unlikely to occur because, although suitable habitat parameters are present, the analysis area within this route group is not within the species’ typical range.

Migratory Birds

Most migratory bird species in the United States are protected by the MBTA, which implements treaties for the protection of shared migratory bird resources signed by the United States with Canada, Japan, Mexico, and Russia. Specific provisions in the statute include the establishment of a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird" (16 U.S.C. 703).

The actual list of migratory birds protected by the MBTA is published in 50 CFR 10.13. Excluded from that list are nonnative species such as the European starling (*Sturnus vulgaris*) and the Eurasian collared-dove (*Streptopelia decaocto*).

Issues related to potential impacts of the proposed Project to migratory birds are listed below:

- Direct (due to collision or burial for burrowing or ground-nesting species) and indirect (injury caused by collision) mortality of migratory bird species in foraging, shelter, breeding, dispersal, and/or migratory habitat from construction and operation/maintenance.
- Loss or degradation of special designation areas from construction and operation/maintenance.
- Increased risk of electrocution or predation due to construction of linear transmission lines.
- Increased risk of vehicular mortality (direct and indirect) due to construction of access roads and associated vehicular traffic.
- Displacement or decrease in fitness due to noise and human activity associated with all aspects of construction and operation/maintenance.

One of the main potential impacts of the proposed Project is related to the risk of avian collision with transmission lines. That risk varies by species based on several factors, including body size, maneuverability, flight pattern, behavior, and habitat use (APLIC 2012). For example, birds with a high wing loading (ratio of body weight to wing area) such as ducks and grebes are more susceptible to collisions than birds with a low wing loading. Birds with a low aspect ratio (ratio of the square of the wing span to the wing area), such as vultures, herons, and cranes, are similarly more prone to collisions. Birds with both a high wing loading and a low aspect ratio are classified as "poor fliers" and must be considered particularly vulnerable to the risk of collision (APLIC 2012). Poor fliers include turkeys (*Meleagris gallopavo*), pheasants (subfamily Phasianinae), and grouse (subfamily Tetraoninae), but also doves and woodpeckers (family Picidae).

Flocking is an additional risk factor for avian collisions with transmission lines and structures, as are flying at night and spending a large amount of time in the air, as opposed to being perched or foraging on the ground (APLIC 2012). Flocking birds such as waterfowls and wading birds are more vulnerable to the risk of collision than non-flocking species. The density of birds in large flocks leaves little room to maneuver around obstacles, especially among the trailing birds, which have obstructed views of upcoming obstacles. This is true in particular of flocks of sandhill cranes, already at risk due to low maneuverability in flight. A high collision incidence has been observed in this species, including in several instances collisions between birds trying to maneuver around power lines. Sandhill cranes also illustrate another risk factor during migration. They are daily migrants rather than long-distance migrants. They take shorter flights and numerous stops to rest and feed, each time risking collisions in areas with power lines. Other daily migrants include ducks and geese (family Anatidae) and some raptors.

Another group of birds with higher susceptibility to collisions is that of aerial predators, birds that tend to exhibit high flight maneuverability and acute vision. Because they chase prey at high speed, however, they may not perceive power lines in time to avoid a collision. Birds that nest close to power lines also incur a higher risk of collision, an important consideration for birds that nest in colonies such as herons and egrets (family Ardeidae). Ducks have eyes adapted to underwater vision but are slightly near-sighted in air, a trait that probably affects their ability to detect wires in time to maneuver around them. Finally, immature birds are more likely to collide with power lines than the more experienced adults (APLIC 2012).

The proposed Project intersects the administrative boundary between the Pacific flyway and the Central flyway (see figure 3.8-7 inset). Based on band recoveries, most migratory birds in the Project vicinity are likely to be using the Pacific flyway, but because of the mobility of long-distance migrants and the potential effects of weather conditions and storm events, Central flyway birds could also easily be present wintering in or passing through the analysis area. The Willcox and Lordsburg playa systems, which are discussed in this section, are key locations for wintering and migratory birds along these flyways.

The dominant habitat types within the analysis area are semidesert grassland and desertscrub communities (see table 3.8-1). Birds common to these habitats include a variety of grassland sparrows, raptors, doves, hummingbirds, and quail. The proposed Project would also include several seasonal wetlands, mainly playas, which can support a diverse avian community, particularly during migratory periods. For example, the Willcox Playa supports more than 200 different species of birds, including cranes, other waterfowl, and shorebirds (Wings over Willcox 2013). Avian species that normally are found at higher elevations in southern New Mexico and Arizona could also be present in the analysis area during migration or as vagrants following storm events.

Below is a description of sites known to be important for migratory birds and located along some of the proposed routes. They include high ridges and low passes, often used as migration routes; and prairie dog (*Cynomys* sp.) towns, which tend to attract predators such as raptors. Areas of high wind are also mentioned, as they may compound the risk of collision with power lines where these occur. All of these landscape features are examined for each route group from east to west.

NEW BUILD SECTION

Route Group 1 – Afton Substation to Hidalgo Substation

The analysis area for route group 1 encompasses sections of four counties in New Mexico: from east to west, Doña Ana, Luna, Grant, and Hidalgo counties. It intersects the administrative boundary between the Central and Pacific flyways. In Doña Ana County, the Afton Generation Station lies on the edge of the Rio Grande Valley, an important migration corridor in particular for neotropical migrants, which use the river channel, cottonwood groves, willow stands, and/or nearby agricultural fields as stopover habitat (Yong and Finch 2002).

Stopover habitats along sandhill crane migration routes tend to consist of large open lakes and riparian wetlands near agricultural areas (Krapu et al. 1984). From the Rio Grande Valley in the Las Cruces area, sandhill crane fall migration routes extend south to the Deming-Columbus Valley, where the species overwinters, and southwest to southeastern Arizona (Mitchusson 2003). These two flyways intersect with the Afton to Hidalgo route group (see figure 3.8-7).

The Deming-Columbus agricultural area in Luna County is a broad to gentle sloping semidesert plain between 4,000 and 5,000 feet in elevation used by wintering sandhill cranes (Mitchusson 2003). The size of the local wintering crane population varies in part as a function of seasonal precipitation. Agricultural lands near Columbus are used for foraging while playas on both sides of the U.S.–Mexico border serve as roosting locations (Mitchusson 2003).

Two small playas in Mexico, one about 8 miles south of Columbus and the other about 15 miles southwest of Columbus, both represent potential roosting locations for sandhill cranes wintering near Columbus. Both of these playas appear to be less than 1,500 acres in size. Other migratory waterfowl and shorebirds could also use these playas and nearby agricultural areas, depending on seasonal conditions and water availability. Because of their relatively small size, compared with the Willcox and the Lordsburg playa systems, these playas would be expected to support much smaller numbers of wintering cranes and other waterfowl.

Much of the analysis area contains western burrowing owl habitat. Where they occur, prairie dog towns and colonies of other sciurid rodents likely attract raptors such as golden eagles, bald eagles, ferruginous hawks (*Buteo regalis*), and red-tailed hawks (*Buteo jamaicensis*) (Cartron 2010). The spotted ground squirrel (*Spermophilus spilosoma*), which is a raptor prey species, occurs in Doña Ana, Luna, and Grant counties (NMDGF 2010).

High ridges include the Aden Hills, the highest ridge in the East Potrillo Mountains, and the highest ridge of Camel Mountain. They also include the highest ridge in the Carrizalillo Hills and the highest ridges in the Cedar Mountains and Flat Hill in Luna County. Low passes occur in the Carrizalillo Hills or between the Cedar Mountains and the Carrizalillo Hills. Some areas classified as wind power class 3 or higher by the NREL occur in route group 1 analysis area. Those include the Carrizalillo Hills in Luna County. Areas with wind, a high wind power class, and/or low passes would be areas where bird species could be more susceptible to collisions with transmission lines.

Agricultural lands are present throughout the analysis area, including near Columbus, Mimbres, Separ, and Lordsburg (see figures 3.8-2a through 3.8-2g). SWReGAP mapping shows 591.5 acres of agricultural lands southeast of Lordsburg in particular. According to SWReGAP mapping, playas, emergent wetlands, and riparian shrublands, woodlands, and mesquite bosque all occur within the analysis area between Afton and Hidalgo. The Lordsburg Playa is an ephemeral, shallow alkaline lake located approximately 10 miles west of Lordsburg, New Mexico, in Hidalgo County, north of I-10. The total area of the playa is approximately 8,000 acres, which is dry much of the year, but can be inundated due to runoff following seasonal rainfall events.

A portion of the Lordsburg Playa is within a Special Management Area (SMA) and an RNA managed by the Las Cruces District Office of the BLM (BLM 2000a). Much of the area is designated for multiple uses, including recreation and grazing, though the RNA is closed to OHV use. The edges of the playa may support riparian or wetland vegetation, although no obligate riparian species are present and the majority of the area is characterized by Chihuahuan Desert and alkali sacaton flats. Migrating shorebird and waterfowl may be observed in the area during wet years (BLM 2000a). Suitable habitat for the western burrowing owl is located in the area around the Lordsburg Playa system.

Route Group 2 – Hidalgo Substation to Apache Substation

Willcox Playa and Twin Lakes

The Willcox Playa is located on the north end of Sulphur Springs Valley. It is an interior lake that drains portions of the Dragoon Mountains to the south and west and the Dos Cabezas and Chiricahua mountains to the south and east (see figure 3.8-3a). The playa itself constitutes the remnant of a prehistoric lake formed at a time when the region received more precipitation. Today, Willcox Playa is an ephemeral wetland (though it is identified as a lake by the NWI) supported by seasonal rain and snowfall, which means that it remains dry for large portions of the year. Nevertheless, the playa and the surrounding vegetation, as well as the agricultural fields in the immediate vicinity, support large numbers of avian migrants, particularly migratory waterfowl (table 3.8-11).

The Willcox Playa and surrounding areas form a matrix of lands owned by the DOD, BLM, AGFD, ASLD State Trust, and private landowners. Because of its biological value, the Willcox Playa is designated by several governmental agencies and non-governmental organizations (NGOs) as a unique biological feature important to a variety of species. The northern section of the playa is administered by the BLM to conserve the vegetation and wildlife associated with the lake bed and is designated by the NPS as an NNL and an Area of Critical Environmental Concern (ACEC) by the BLM. As noted previously, an existing SWTC 230-kV transmission line crosses the southeast side of Willcox Playa (northwest of Crane Lake).

The AGFD owns and administers the Willcox Playa Wildlife Area on the southeastern edge of the playa for hunting and wildlife recreation. The Willcox Playa Wildlife Area is considered to be high value habitat for Arizona wildlife species. The original management emphasis for the Willcox Playa Wildlife Area was waterfowl and waterfowl habitat (AGFD 2015); however, because sandhill cranes have increased in number at the wildlife area, the management emphasis now is sandhill crane winter habitat, wildlife education, and viewing. The Wildlife Area is considered to be Resource Category 1 under the AGFD’s habitat compensation policy (AGFD 2010). Resource Category 1 areas have a compensation goal of no loss of existing in-kind habitat value.

The National Audubon Society considers the Willcox Playa as an IBA of global priority because of the large concentration (> 1 percent of the North America population simultaneously or > 5 percent of the entire population over a single season) of sandhill cranes that use the playa as overwintering habitat (National Audubon Society 2013). Ducks Unlimited (2013) considers the playa as an important part of the Pacific flyway for waterfowl and performs some habitat projects in the area, though it does not consider the flyway where the playa is situated to be one of high conservation concern. Local birding organizations, including Wings over Willcox (2013), consider the playa and immediately adjacent habitats to be important for bird populations. The Willcox Playa is also designated as an Arizona Heritage Water due to its hydrologic, cultural and biological significance (Northern Arizona University 2011a).

The alkaline lakebed itself supports large numbers (5,000 to 9,000) (see National Audubon Society 2013) of roosting sandhill cranes in the winter months, which garners much of the attention of birding enthusiasts. However, when the lakebed fills with water from seasonal precipitation it also supports thousands of waterfowl, gulls, and other shorebirds of more than 100 species, particularly during migratory periods. While the lakebed is sparsely covered by a variety of grasses, the shrub cover on its margins can be quite extensive, consisting of saltbush, mesquite, and tamarisk (*Tamarix ramosissima*). A few Goodding’s willows (*Salix gooddingii*) and Fremont cottonwoods (*Populus fremontii*) also persist in the drainages ditches that have been constructed around the playa (Northern Arizona University 2011b). These habitats support a variety of avian species ranging from migrating warblers to several raptor species.

Waterfowl and other non-passerine birds recorded at Willcox Playa from 2007 through 2011 are listed in table 3.8-11 below. Nearly all of them are associated with a higher risk of collision with power lines.

Also in the immediate vicinity of the Willcox Playa are two networks of manmade lakes named Twin Lakes or Cochise Lakes. They are located just south of Willcox, Arizona, near a municipal golf course and are fed by effluent discharges from the nearby wastewater treatment plant and the golf course. The second network was created by the Arizona Electric Power Cooperative near the Apache generating station on the west side of the playa. Both of these wetlands support foraging habitat for migrating waterfowl and shorebirds.

Table 3.8-11. Non-passerine Birds Recorded at Willcox Playa from 2007–2011

Common Name	2007	2008	2009	2010	2011
Greater white-fronted goose	x				
Snow goose	x	x	x	x	x
Ross's goose	x	x	x	x	x
Canada goose	x	x	x	x	x
Cackling goose				x	
Tundra swan			x		
Wood duck			x		x
Gadwall	x	x		x	x
American wigeon	x	x	x	x	x
Mallard	x	x	x	x	x
Cinnamon teal	x	x	x	x	x
Northern shoveler	x	x	x	x	x
Northern pintail	x	x	x	x	x
Green-winged teal	x	x	x	x	x
Canvasback	x	x	x	x	x
Redhead	x	x		x	x
Ring-necked duck	x	x	x	x	x
Greater scaup				x	x
Lesser scaup	x	x	x	x	x
White-winged scoter					
Bufflehead	x	x	x	x	x
Common goldeneye		x			
Hooded merganser		x			
Common merganser	x	x	x	x	x
Ruddy duck	x	x	x	x	x
Wild turkey			x	x	
Scaled quail	x	x	x	x	x
Gambel's quail	x	x	x	x	x
Montezuma quail	x				
Pied-billed grebe	x	x	x	x	
Eared grebe	x	x	x	x	
Western grebe				x	x
Clark's grebe					x
Great blue heron	x	x	x	x	x
Great egret				x	
Snowy egret				x	
Cattle egret					
Green heron			x	x	
Black-crowned night-heron		x	x		x

Table 3.8-11. Non-passerine Birds Recorded at Willcox Playa from 2007–2011 (Continued)

Common Name	2007	2008	2009	2010	2011
White-tailed kite		x			
Bald eagle	x	x	x	x	x
Northern harrier	x	x	x	x	x
Sharp-shinned hawk	x	x	x	x	x
Cooper's hawk	x	x	x	x	x
Northern goshawk			x		
Harris's hawk	x	x	x	x	x
Red-tailed hawk	x	x	x	x	x
Ferruginous hawk	x	x	x	x	x
Rough-legged hawk		x			x
Golden eagle	x		x	x	x
Crested caracara			x	x	
American kestrel	x	x	x	x	x
Merlin	x	x	x	x	x
Peregrine falcon		x	x	x	x
Prairie falcon	x	x	x	x	x
Virginia rail		x	x	x	x
Sora		x	x	x	x
Common moorhen	x			x	
American coot	x	x	x	x	x
Sandhill crane	x	x	x	x	x
Killdeer	x	x	x	x	x
Mountain plover		x		x	x
Greater yellowlegs			x		x
Spotted sandpiper	x	x	x	x	
Long-billed curlew	x	x		x	x
Western sandpiper				x	
Least sandpiper	x	x	x	x	x
Long-billed dowitcher	x	x	x		x
Wilson’s snipe	x	x	x	x	
Bonaparte's gull	x				
Ring-billed gull	x			x	
Rock pigeon	x	x	x	x	x
Band-tailed pigeon		x			
Eurasian collared-dove	x	x	x	x	x
White-winged dove	x	x	x	x	x
Mourning dove	x	x	x	x	x
Inca dove		x			x
Ruddy ground-dove				x	

Table 3.8-11. Non-passerine Birds Recorded at Willcox Playa from 2007–2011 (Continued)

Common Name	2007	2008	2009	2010	2011
Greater roadrunner	x	x	x	x	x
Barn owl	x	x	x	x	x
Western screech-owl				x	
Great horned owl	x	x	x	x	x
Burrowing owl		x	x	x	
Long-eared owl		x			
Short-eared owl			x		
White-throated swift		x		x	x
Acorn woodpecker	x	x	x	x	x
Gila woodpecker	x	x	x	x	
Williamson's sapsucker	x				x
Red-naped sapsucker	x	x	x	x	x
Ladder-backed woodpecker	x	x	x	x	x
Hairy woodpecker				x	
Arizona woodpecker	x	x	x	x	x

Source: Wings over Willcox (2013).

The surrounding agricultural fields, particularly corn fields, provide considerable foraging habitat for sandhill cranes as well as other migrating waterfowl (National Audubon Society 2013). In addition, the abundance of shorebirds and other wildlife likely presents ample hunting opportunities for both bald eagle and golden eagle. These agricultural fields are the main focus of conservation concern for birds wintering in the Willcox Playa/Twin Lakes area (National Audubon Society 2013). Their loss could reduce foraging habitat for cranes in particular and hamper their ability to overwinter in large numbers at Willcox Playa.

Other Notable Areas

Suitable burrowing owl habitat occurs throughout much of the route group 1 analysis area. Black-tailed prairie dogs (*Cynomys ludovicianus*) occurred historically in Cochise County, Arizona, but are thought to be now extirpated from the county (AGFD 2004).

In Hidalgo County, the analysis area intersects a portion of the highest ridge in the Pyramid Mountains and the Roostercomb Ridge in the Peloncillo Mountains, and a portion of the highest ridge in the Circle I Hills all areas classified as wind power class 3 or higher by the NREL (see figure 3.8-8). A portion of Powers Canyon constitutes a low pass in the Peloncillo Mountains. In Cochise County, Arizona, the analysis area would intersect a portion of the highest ridge in the Dos Cabezas Range as well as a low pass within the range. Areas classified as wind power class 3 or above by NREL (see figure 3.8-8) are located in the Dos Cabezas Mountains. Areas with wind a high wind power class and/or low passes would be areas where bird species could be more susceptible to collisions with transmission lines.

Near San Simon in Cochise County are 1,899.9 acres of agricultural lands, as identified by SWReGAP mapping. Near Bowie also in Cochise County, Arizona, are 1,493.3 acres of agricultural lands and northwest of Willcox lie an additional 1,900.4 acres mapped by the SWReGAP. Riparian mesquite bosque is present, as are wetlands and ponds or playas.

UPGRADE SECTION

Route Group 3 – Apache Substation to Pantano Substation

The analysis area for route group 3 intersects the Pacific flyway. It encompasses stretches of the San Pedro River, an important migration corridor at the scale of southwestern North America for warblers in particular. Species of raptors that nest on the lower San Pedro River include gray hawk (*Buteo nitidus*), Mississippi kite (*Ictinia mississippiensis*), common black-hawk (*Buteogallus anthracinus*), and zone-tailed hawk (*Buteo albonotatus*). The western yellow-billed cuckoo nests in numbers on the lower reaches of San Pedro River.

Suitable western burrowing owl habitat exists throughout much of the analysis area from Apache to Pantano. Black-tailed prairie dogs occurred historically in southeastern Arizona, but are thought to be extirpated from that area (AGFD 2004).

Agricultural lands are found in the Sulphur Springs Valley and near Benson in Cochise County. Marshes, riparian woodlands and shrublands, and riparian mesquite bosques are present in the route group 3 analysis area. Riverine wetlands are located along the San Pedro River and some freshwater ponds occur, including in association with a sewage treatment plant immediately west of the river (see figure 3.7-2c in the “Water Resources” section).

The analysis area encompasses a low pass located between the Dragoon Mountains and the Gunnison Hills (figure 3.8-15). Portions of ridgelines and low passes also intersect the analysis area where it bisects the Little Dragoon and Big Dragoon mountains, specifically portions of Adams Peak, Texas Canyon, the northern tip of the Gunnison and Red Bird hills, and the valley separating the Steel Hills from the Red Bird Hills. Areas classified as wind power class 3 or higher by the NREL are found in association with the high ridges of the Dragoon Mountains and Gunnison Hills. Areas with a high wind power class and/or low passes would be areas where bird species could be more susceptible to collisions with transmission lines.

Route Group 4 – Pantano Substation to Saguaro Substation

The analysis area for route group 4 is all within Arizona. SWReGAP mapping of the analysis area shows the existence of agricultural lands near Marana in Pima County, as well as within Avra Valley. During winter months, numerous raptors and other species use agricultural lands in the Marana area. Riparian areas, wetlands, and ponds are found along this route group, including along an ephemeral reach of the Santa Cruz River that passes through Tucson (see figure 3.7-2d in the “Water Resources” section).

Black-tailed prairie dogs occurred historically in southeastern Arizona, in which this segment is located, but are thought to be extirpated from the area currently (AGFD 2004).

According to USGS topographic maps, the analysis area intersects an unnamed ridge near Ajo Way and Rattlesnake Pass in the Tucson Mountains (see figure 3.8-15). Areas with wind, a high wind-power class, and/or low passes would be areas where bird species could be more susceptible to collisions with transmission lines.

3.9 CULTURAL RESOURCES

Some of the information provided in the following subsections is taken from a report titled “Southline Transmission Project Resource Report 2: Cultural Resources” (CH2M Hill 2013i). The contents of that report are used herein without specific reference. Additional explicit "in text" references to scientific and other sources relied upon for conclusions in the analysis are included.

3.9.1 Analysis Area

Cultural resources are the physical manifestations of the activities of past or present cultures, including archaeological sites, historic buildings and structures, trails, and other places of traditional cultural or religious importance. Cultural resources can be human-made or natural features and are, for the most part, unique, finite, and nonrenewable.

The proposed Project has the potential to impact cultural resources both directly and indirectly. Resources of particular concern in the analysis area include the Tumamoc Hill Archaeological District and the Desert Laboratory NHL, the Anza NHT corridor, and the Butterfield Trail (see also Appendix F, "National Scenic and Historic Trails Assessment").

The analysis area for direct disturbance is 1 mile on either side of the centerline (2-mile corridor) for all alternatives in the New Build Section. This is to identify resources that could be directly impacted by ground disturbance from the power line installation, including access routes and staging areas. The analysis area for direct disturbance for the Upgrade Section is a 500-foot corridor encompassing the existing 100-foot ROW. A Class I records search was performed for this analysis area that included all data from previous Class III pedestrian surveys within the analysis area (see below).

The analysis area for visual and indirect effects is 5 miles on either side of the centerline (10-mile corridor). This is to identify resources whose character-defining properties could be adversely impacted by Project viewshed effects, and other less direct effects. A 10-mile corridor is necessary in order to allow for relatively subtle but potentially important visual effects on properties eligible for the NRHP under Criteria A, B, or C.

For the cultural resources analysis only, route group boundaries were adhered to, regardless of segment. This means that portions of a segment may be analyzed separately where they span route group boundaries to ensure that the locational data of resources correspond to the correct route group.

3.9.2 Laws, Ordinances, Regulations, and Standards

Several Federal, State, and tribal laws, regulation, and policies that protect cultural resources are applicable to the proposed Project.

Federal

In addition to NEPA, other laws, ordinances, EOs, policies, and agreements applicable to this Project include:

- American Antiquities Act of 1906 (16 U.S.C. 431–433), which protects archaeological sites and historic structures on Federal lands by allowing the President to declare them national monuments and establishing a permitting requirement for excavation and collection of objects of antiquity from sites on Federal lands;
- National Historic Preservation Act of 1966 (54 U.S.C. 470x–6), as amended, Regulations Implementing Section 106 of the National Historic Preservation Act (36 CFR 800), and Regulations Implementing the Curation of Federally Owned and Administered Archaeological Collections (36 CFR 79), which created policies for the preservation of historic properties

throughout the nation, put in place the Section 106 review process (see below), and established the NRHP, ACHP, and the State Historic Preservation Officers/Tribal Historic Preservation Officers;

- National Trails System Act of 1969 (16 U.S.C. 1241–1251), which establishes the National Trails System and National Scenic Trails "to provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas;"
- EO 11593 (May 13, 1971), "Protection and Enhancement of the Cultural Environment," directs Federal agencies to responsibly manage cultural properties on Federal land for future generations by inventorying properties under their management and establishing procedures for the maintenance and recordation of those properties;
- American Indian Religious Freedom Act (AIRFA) of 1978 (42 U.S.C. 1996), which, among other things, protects Native American access to sacred sites;
- Archaeological Resources Protection Act (ARPA) of 1979 (16 U.S.C. 470aa–470mm), Archaeological Resources Protection Act Uniform Regulations (43 CFR 7), and Regulations Implementing the Curation of Federally Owned and Administered Archaeological Collections (36 CFR 79), which was designed to protect archaeological resources on Federal and Indian lands and establishes procedures for permitting archeological work on Federal or tribal lands in order to curtail unauthorized collection;
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (25 U.S.C. 3001–3013) and Regulations Implementing the Native American Graves Protection and Repatriation Act (43 CFR 10), which "gives ownership and control" of Native American human remains and associated objects excavated on Federal and Indian lands to Native Americans;
- Religious Freedom Restoration Act of 1993 (42 U.S.C. 21B) was designed to prevent the Federal Government from placing substantial burden on a person's religious exercise;
- EO 13007 (May 24, 1996), "Indian Sacred Sites," which was designed to protect, when practical, access to Native American sacred sites on Federal land.
- EO 13175 (November 6, 2000), "Consultation and Coordination with Indian Tribal Governments," which encourages the strengthening of government-to-government relations between the United States Government and Indian tribes;
- The "Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in which the BLM Will Meet its Responsibilities under the National Historic Preservation Act, February 2012," lays out the roles of the BLM, the SHPOs, and the ACHP concerning undertakings that have a potential to affect historic properties on land administered by the BLM;
- The BLM has issued several manuals that are relevant to the proposed Project, including "MS-8100: The Foundation for Managing Cultural Resources" (BLM 2004b), "MS-8110: Identifying and Evaluating Cultural Resources" (BLM 2004c), "MS-8120: Tribal Consultation under Cultural Resources" (BLM 2004d), "MS-8140: Protecting Cultural Resources" (BLM 2004e), "MS-6250: National Scenic and Historic Trails Administration (Public)" (BLM 2012c), and "MS-6280: Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation (Public)" (BLM 2012d);
- Several BLM land use plans detail framework for managing public lands within the proposed analysis area: Mimbres RMP (BLM 1993), Safford RMP (BLM 1991), Las Cienegas RMP (BLM 2003), and Phoenix RMP (BLM 1988a); and

- The Coronado National Forest Plan (Forest Service 1986a), as amended, which is currently under revision, provides guidance for managing cultural resources when evaluating projects on Coronado National Forest land.

Most pertinent to the proposed Project is Section 106 of the NHPA, which requires Federal agencies to take into account the effects of their undertakings on historic properties, defined in 36 CFR 800.16(l) as any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP. The Section 106 process requires that if a project has the potential to affect historic properties, the Federal agency must, in consultation with the SHPO or THPO and other interested parties, establish the area of potential effects (APE), identify historic properties within the undertaking's APE, assess what, if any, effects the undertaking may have on historic properties in the APE, and attempt to resolve adverse effects through avoidance, minimization, or mitigation of the adverse effects.

The NPS has issued a series of bulletins to provide guidance on matters of importance to historic properties and the NRHP. Relevant bulletins include "Bulletin 15: How to Apply National Register of Historic Properties Criteria" (NPS 1997), "Bulletin 36: Guidelines for Evaluating and Registering Archaeological Properties" (Little et al. 2000), and "Bulletin 41: Guidelines for Evaluating and Registering Cemeteries and Burial Places" (Potter and Boland 1992). Additionally, "Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties" (Parker and King 1998) provides valuable guidance and information on recognizing and evaluating traditional cultural properties (TCPs).

State

Both Arizona and New Mexico have State laws protecting cultural resources and human remains on State and private land.

NEW MEXICO

New Mexico Cultural Properties Act of 1978 (NMSA 18-6-1 through 18-6-23) declares that the historical and cultural heritage of the State is one of the State's most valued and important assets; that the public has an interest in the preservation of cultural properties for their scientific and historical information and value; and that the neglect, desecration, and destruction of historical and cultural sites results in an irreplaceable loss to the public. Its purpose is to provide for the preservation, protection, and enhancement of structures, sites, and objects of historical significance within the State, in a manner conforming to the provisions of the NHPA. It establishes the Cultural Properties Review Committee, requires review of State undertakings, establishes penalties for destruction of cultural properties, and requires permits for archaeological work on State lands or for mechanical excavation of archaeological sites on private lands.

New Mexico Prehistoric and Historic Sites Preservation Act of 1978 (NMSA 18-8-1 through 8) has as its purpose to acquire, stabilize, restore, or protect historic and prehistoric sites. The law prohibits State funding for projects on State land with State- or NRHP-listed historic properties unless there are no other alternatives.

New Mexico Cultural Properties Protection Act of 1995 (NMSA 18-6A-1 through 6), like the 1978 version discussed above, directs State government divisions to develop procedures to identify and protect cultural resources from inadvertent damage under their jurisdiction in conjunction with the Historic Preservation Division. The 1995 statute also establishes a fund for grants for interpretation, restoration, preservation, stabilization, and protection of resources on State property.

ARIZONA

Arizona Antiquities Act of 1960 (ARS 41-841 through 844) protects archaeological and paleontological resources on State lands by requiring authorization prior to excavation or collection on State lands (ARS 41-841) and prohibits defacing of sites or objects on State land (ARS 41-843). The act stipulates that any institution undertaking archaeological work on State or local lands acquire a permit from the Arizona State Museum (ASM) (ARS 41-842) and requires that all discoveries, including human remains and funerary objects, on State land be reported to the ASM (ARS 41-844).

State Historic Preservation Act of 1982 (ARS 41-861 through 41-865) created the Arizona Register of Historic Places and requires that the effects on cultural properties be considered at all levels of planning and development by agencies that manage State land. ARS 41-865 also requires that private landowners report human remains or funerary objects found on their lands to the ASM.

Tribal

TOHONO O'ODHAM

Title 8, Chapter 1, "Archaeological Resources Protection" (Ordinance No. 06-84), prohibits archaeological work, including the removal of artifacts, on the reservation by non-tribal members unless a permit is granted by the Chairman, unless they are employees or agents of the Federal Government or tribal members.

3.9.3 Definition of Terms Used

NEPA and the NHPA use different terminology to discuss the effects of a Federal action on cultural resources and/or historic properties. Table 3.9-1 provides definitions for similar terms under NEPA and NHPA.

Table 3.9-1. Comparison of NEPA and NHPA Terminology for Project Effects

NEPA	NHPA
Cultural resources – includes archaeological sites, historic built environment resources such as buildings or structures, TCPs, natural features, and traditional use areas	Historic properties – means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP This definition of historic properties applies to all occurrences of the term within this document.
Significance – refers to the context in which an action is to be evaluated and the intensity (or severity) of impacts	Historical significance – districts, sites, buildings, structures and objects that (a) are associated with events that have made significant contribution to the broad patterns of history; (b) and associated with lives of persons significant in our history; (c) that embody the distinctive characteristics of a type, period, or method of construction; and/or (d) that have yielded or may yield important information about the past.
Eligible – resources that are listed in or eligible for the NRHP according to the NHPA; resources with unknown eligibility are treated as eligible during the NEPA and NHPA processes	Eligible – properties that meet the criteria for inclusion in the NRHP, both those determined eligible in accordance with regulations and those recommended eligible.
Impacts – results of actions on the environment (natural resources, cultural resources, social, health, economic, etc.); can be direct, indirect, or cumulative	Effects – any alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the NRHP

Table 3.9-1. Comparison of NEPA and NHPA Terminology for Project Effects (Continued)

NEPA	NHPA
Adverse Impacts – actions that have a negative effect on a resource	Adverse Effects – effects that may result in the loss of NRHP eligibility by diminishing the property's integrity of location, design, feeling, association, setting, materials, and/or workmanship. Adverse effects are determined by the lead Federal agency through consultation with the SHPO, tribes, and other interested parties.
Mitigation – actions that avoid an impact, minimize the impact, reduce impact over time, or rectify or compensate for the impact	Resolution of Adverse Effects – adverse effects may be resolved through measures to avoid, minimize, or mitigate the effects

A property of traditional religious and cultural importance (PTRCI) is a resource important to an Indian tribe that may be eligible for the NRHP. A TCP, as discussed in National Parks Bulletin 38, is "eligible for the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1998:1). Some agencies prefer the term Traditional Cultural Places in order to deemphasize the concept of these locations as being "owned." A *traditional use area* is one which a community uses for resource gathering or other activity. A *sacred site* is a specific location identified by an American Indian tribe as being sacred because of its religious or ceremonial significance.

3.9.4 Issues to Be Analyzed

- The disturbance to, partial loss of, or loss of historic properties by the Project construction (including access roads and staging areas).
- The disturbance to, partial loss of, or loss of historic properties that are historic built environment resources by the Project construction (including access roads and staging areas).
- The disturbance to, partial loss of, or loss of historic properties that are PTRCIs or TCPs by the Project construction (including access roads and staging areas).
- The disturbance to or loss of American Indian critical resources (e.g., plants and springs) by the Project construction (including access roads and staging areas).
- The visual effects (alterations of setting) of the Project on historic properties.
- The Project's direct, visual, and recreational impact to historic trails and National Historic Trail (NHT) corridors.

3.9.5 Class I Records Search Methods

Inventory Methods

Data for this analysis were collected from several sources: (1) State databases; (2) Federal agencies; (3) tribal nations; (4) local governments and organizations; and (5) published maps. Information was then incorporated into a Project-specific database. Information on archaeological sites, the historic built environment, districts, and previous surveys was obtained from the New Mexico and Arizona State databases: the New Mexico Cultural Resources Information System (NMCRIS) and AZSITE. NMCRIS data also included historic properties registered on the NRHP and the New Mexico Register of Historic Properties. Data were also gathered from the Arizona's SHPO database. Information was obtained from the following Federal sources: the Las Cruces BLM District Office, the Safford BLM Field Office, the

Tucson BLM Field Office, the Coronado National Forest, and the NRHP database maintained by the NPS. Peter Steere, the Tohono O'odham Nation's Tribal Historic Preservation Officer, was contacted by CH2M Hill for information about resources on tribal lands. In addition, the City of Tucson and Pima County provided information on State- and NRHP-listed properties in Tucson and Pima County.

Six NPS-certified local governments were contacted for information on local cultural resources: Benson, Arizona; Pima County, Arizona; Tucson, Arizona; Willcox, Arizona; Columbus, New Mexico; and Deming, New Mexico. Several museums, civic organization, historical societies, and individuals were also contacted for further information such as the San Pedro Valley Arts and Historic Museum, the Amerind Foundation, the Pinal County Historical Museum, the Chiricahua Regional Museum and Research Center, the railroad historian Vernon J. Glover, staff at the Pancho Villa State Park, and the Fort Bowie National Historic Site.

Published maps consulted included General Land Office (GLO) maps, USGS maps, and pre-1960 highway maps. Potential cultural resources were digitized off the maps and added to the GIS database.

It must be noted that data from the different databases are of variable quality and reliability. This is especially true of older data, which were recorded prior to the use of global positioning system (GPS) technology. When possible, original survey reports and hard-copy site cards were consulted to resolve any ambiguities or missing or overlapping data. In some cases, Federal or State databases may not have been completely up to date, either. All efforts were made to acquire as accurate and up-to-date information as possible from hard-copy records.

Archaeological sites and historic built environment sites were classified in the database as "Determined Eligible," "Determined Not Eligible," "Unevaluated," or "Unknown." Only properties evaluated by the SHPO were classified in the "Determined Eligible" and "Determined Not Eligible" categories. Properties that have been recommended eligible or recommended not eligible were classified as "Unevaluated."

Sensitivity Measures

Data gathered from the above sources were used by CH2M Hill to estimate the potential number of resources for areas not previously surveyed. After correction for sample bias, survey area shape, and site size, an "effective" coverage inventory area was ascertained. CH2M Hill then used "this effective coverage area . . . to establish the effective sampling fraction by dividing the effective coverage area by the project segment's area. To forecast the total number of resources in the segment, the actual number of resources in the inventory areas, including the linear resources, is multiplied by 1 divided by the effective sampling fraction ($Forecast\ resources = number\ of\ resources\ \times \frac{1}{effective\ sampling\ fraction}$)" (CH2M Hill 2013i:20).

In 2012 Statistical Research, Inc. (SRI), under contract to the BLM New Mexico State Office, created a quantitative sensitivity model for the southern portion of the State within the jurisdiction of the Las Cruces and Pecos district offices (Heilen et al. 2012). The sensitivity model was designed to predict the probability of occurrence of a variety of site types from multiple prehistoric and historic time periods. Probability values were generated in a 30-m raster dataset covering the entire New Mexico portion of the proposed undertaking.

As an additional measure of cultural resources sensitivity, an archaeological sensitivity analysis was performed on the data collected for the Class I inventory. A relative value (unknown to high) was assigned to each site based on the site type and its characteristics. By adding the number of each value, each alternative segment can be assigned an overall relative sensitivity for comparison.

This archaeological sensitivity analysis follows that presented in BLM (2013a) but modified to accommodate the data gathered for this Project. All archaeological sites within the 2-mile analysis area were assigned a sensitivity value from 0 to 5 or unknown to high. Values were based on NRHP eligibility, site type, site physical characteristics, and special values such as NHL status. Values are as follows:

- Unknown Sensitivity (0) – Includes sites in data set with no known site type and cultural/temporal affiliation.
- Low Sensitivity (1) – Includes sites that have been determined not eligible for the NRHP.
- Low to Moderate Sensitivity (2) – Includes prehistoric artifact scatters with only non-diagnostic artifacts and historic artifact scatters with or without features.
- Moderate Sensitivity (3) – Includes prehistoric artifact scatters with diagnostic artifacts, prehistoric non-habitation sites with features, prehistoric camp sites, multicomponent sites with or without features, bedrock mortars, prehistoric trails, historic homesteads, historic non-homestead structures and buildings, historic transportation or utility related sites, and potential routes of historic trails.
- Moderate to High Sensitivity (4) – Includes prehistoric habitation sites, multicomponent sites with features, petroglyph sites, rock shelters and caves, Paleoindian sites, historic trails, historic ranches, and historic internment camps.
- High Sensitivity (5) – Includes listed prehistoric and historic sites, prehistoric sites with known human remains, historic townsites, NHTs, NHLs, and historic cemeteries or gravesites.

Percentages for the assigned values were calculated for the analysis area by route group and the representative ROW by alternative (see chapter 4) to compare the relative sensitivities of route groups and alternatives. All three sensitivity measures described above are used in chapter 4 (see section 4.9) to estimate the relative cultural resource sensitivity of each alternative.

In addition, Pima County provided GIS data on cultural resources sensitivity from their SDCP (Pima County 2009). This model ranks areas of Pima County by low, moderate, or high sensitivity. Relevant data provided by the County are considered in portions of route group 3 and in all of route group 4 in Chapter 4.

ARCHAEOLOGY SOUTHWEST’S CULTURAL RESOURCES PRIORITY CONSERVATION AREAS

In addition, Archaeology Southwest has recently published an analysis of archaeological data in which they recommend Cultural Resources Priority Conservation Areas (PCAs) in southern Arizona and New Mexico (Laurenzi et al. 2013) (figures 3.9-1a through 3.9-1d). These PCAs were designed to encompass areas with significant archaeological sites or clusters of sites or areas with the potential to have significant resources. The PCAs were created to assist planners in Arizona and New Mexico to identify areas that may be of higher cultural sensitivity and to target areas where future research is needed.

Visual Impacts Inventory Methods

For the visual impacts analysis, data were gathered from State and Federal databases and registers within 5 miles on either side of the proposed Project centerline. Because of the great amount of data within the analysis area, analysis was restricted to the following types of historic properties:

1. Historic properties listed in State or Federal registers within the 10-mile corridor; and

2. Historic properties determined or recommended eligible under Criterion A, B, or C (i.e., those for which location, setting, association, and/or feeling are important characteristics) within the 2-mile direct effects analysis area.

3.9.6 Analysis Area Conditions

Culture History

SOUTHWESTERN NEW MEXICO

The following culture history for southwestern New Mexico is modified from CH2M Hill (2013i).

Paleoindian Period (ca. 10,000 through 6000 B.C.)

Paleoindian peoples were the first to inhabit North America as the glaciers of the Pleistocene began to retreat during the Late Pleistocene-Early Holocene. They were highly mobile hunters and foragers who exploited Pleistocene megafauna such as bison, mammoth, and mastodon, as well as a variety of plant resources and smaller game (Cordell and McBrinn 2012). The Paleoindian tool kit consisted of scrapers, knives, gravers, drills, and utility flakes, and lanceolate projectile points (Judge 1973). Several Paleoindian cultures are represented in New Mexico, including Clovis (9500–9000 B.C.), Folsom (8800–8300 B.C.), and Plano Complexes (7000–6000 B.C.) (Irwin-Williams and Haynes 1970). The Clovis tradition is best known for its distinctive fluted projectile points, which have been found in association with megafauna; a few Clovis kill sites have been excavated in New Mexico (Bonnichsen and Turmire 1991; Boldurian and Cotter 1999; Irwin-Williams and Haynes 1970). Paleoindian toolkits grew more diversified as time progressed, likely in response to the changes in the environment at the beginning of the Holocene and the extinction of the megafauna. As resources disappeared, new subsistence strategies better suited to the warmer climate emerged. For example, in southwestern New Mexico, Folsom assemblages are notably absent. The Folsom tradition was adapted to exploit *Bison antiquus*, a now-extinct form of bison, as well as other quarry, and the absence has been posited to be the result of local populations adapting to the disappearance of the bison from the region (Waters 1986).

Archaic (ca. 5500 B.C. through A.D. 200)

The Archaic tradition was an adaptive response to the warmer and dryer conditions of the Holocene. As the environment changed, Archaic people diversified their exploitation of resources by focusing more on more plant resources and smaller types of game. The increased use of plant resources such as seeds and nuts is reflected in the presence of ground stone tools and roasting pits for processing plant resources. Projectile technology also changed during the Archaic. Instead of large, lanceolate points, Archaic people manufactured smaller points with notches or a shoulder element for hafting.

The Archaic adaptation of New Mexico has been split into regional cultures such as the Cochise (Sayles and Antevs 1941), the Chiricahua (MacNeish and Beckett 1987) and the Oshara (Irwin-Williams 1973). However, some debate remains regarding the efficacy of these divisions, and many researchers use Huckell's (1984) Early, Middle, and Late Archaic broad temporal divisions instead.

The Early Archaic represented a shift towards a reliance on plant resources that continued into the Middle Archaic, as seen in the increase in grinding stones and roasting pits; however, Early and Middle Archaic populations were still highly mobile. During the Late Archaic, maize cultivation was introduced and pit structures began to appear, suggesting a more permanent or semi-permanent settlement pattern. Because the Late Archaic represents incipient agriculture in the southwest, the term "Early Agricultural period" is now used more often than Late Archaic. The shift from mobile hunter-gatherers to more sedentary village farmers did not occur consistently throughout the Southwest, with people in some areas continuing the hunter-gatherer lifeway until well into the first millennium A.D.

The Archaic occupation (6000 B.C. to A.D. 200) of the analysis area indicates a small hunting-and-gathering population that exploited resources on a fairly extensive seasonal round. Late Archaic remains show changes to a semi-sedentary population living in ephemeral pit houses (as well as rock shelters) (Minnis 1980:86, 87). These later groups incorporated agricultural products such as maize, beans, and squash into a diet of collected plant resources such as mesquite and agave (Minnis 1980:77–85).

Formative Period (A.D. 200 through 1450) – Southern Mogollon Tradition

Drought conditions commenced 1,900 years ago (A.D. 100) and lasted 400 to 600 years (to A.D. 500 to 700). Formative period cultures emerged out of the Late Archaic traditions and demonstrated an increased dependence on domesticated resources. Cultural complexity increased, with greater numbers of people gathering at locations of higher agricultural potential and forming semi-sedentary villages at or near agricultural locations. By about A.D. 200, small pit house villages occupied some of these areas and ceramics appear, signaling the beginning of the Mogollon culture. Within the analysis area, two branches of the Mogollon are relevant: the San Simon Mogollon of southeastern Arizona (discussed below) and the Mimbres Mogollon of southwestern New Mexico (Breternitz 1959; Haury and Sayles 1947; Martin and Rinaldo 1947, 1960; Sayles 1945; Wheat 1954).

Pithouse Period

The Pithouse period (A.D. 200 to ca. 1000) of the Mogollon is widely distributed throughout the New Mexico Bootheel and southeastern Arizona. The Early Pithouse period (A.D. 200 to 500 through 550) is characterized by increased sedentism with some mobile hunting and gathering (Gilman 1983, 1997). The occupation is best known from sites in the Gila River and Mimbres River drainages (LeBlanc 1980; Lekson 1992). Sites generally are located on the knolls, mesas, and high ridges that occur within the river valleys with access to agricultural land (LeBlanc and Whalen 1980:112). Villages consisted of clusters of up to a dozen round or oval pit houses (Anyon et al. 2005; Lekson 2006). The pithouses lack superimposition suggesting a single episode of occupation per village. Large pit rooms (kivas) have been suggested to be communal redistribution or ceremonial centers that were organized perhaps along lineage or clan lines. Early ceramics consist of plain brownwares with red-slipped wares appearing toward the end of the Early Pithouse period (Diehl and LeBlanc 2001; Gilman 1997; Sayles 1945).

Late Pithouse occupation dated from A.D. 550/600 to 1000 and was characterized by an increase in population and distribution especially during the last 200 years of the phase. One of the most marked changes from the Early to Late Pithouse is the change in village location. Late Pithouse villages are located on river terraces and low ridges within river valleys. The architecture during the Late Pithouse period evolved from round to rectangular and semi-subterranean pit houses with ramp entrances. Both villages and communal structures got larger, indicating a population increase; grave goods were frequently placed with burials; and the types of trade goods increased, indicating more regional contact and complex trading networks.

Pueblo Period

Classic Mimbres (A.D. 1000 to 1130–1150) of the Pueblo period is marked by masonry surface dwellings in blocks of rooms, a general lack of kivas, Mimbres Black-on-white pottery, and evidence of irrigation (Hegmon and Nelson 2003; Nelson 1999). Architecture became square-walled, aboveground masonry walls forming contiguous roomblocks. The reasonably large rooms have been postulated to indicate nuclear families organized at the household level. Irrigation was used more frequently to increase production of domesticated crops.

The Classic Mimbres phase reflects a population increase from the Pithouse period. Occupation of major river valleys continued, with the population spreading to secondary drainages and to both higher and lower elevations (LeBlanc and Whalen 1980:113). The larger pueblos of Mimbreños were abandoned about A.D. 1130 to 1150 and people settled in smaller more dispersed villages and hamlets (Hegmon and Nelson 2003; Nelson 1999). What caused this abandonment is the subject of considerable debate (Lekson 1992). The most common explanation is environmental stressors in conflict with an expanded population that was already using all available resources.

The Post-Classic Mimbres Occupation

Larger settlements began to appear again on the landscape after A.D. 1300 (Nelson 1999). Large multiroom pueblos (up to 250 rooms) with compounds but no kivas were constructed of puddled adobe, rather than cobblestones and pueblos were generally U-shaped or entirely enclosed a plaza (Stuart and Guathier 1981). However, southwestern New Mexico was then largely abandoned after A.D. 1400.

The Protohistoric Period and the Historic Native American Period (A.D. 1540 through the present)

By the time of Spanish exploration of the New World (A.D. 1450), the entire Mogollon culture area had been abandoned by pueblo-dwelling populations as part of a larger trend in the Southwest of population movement and reorganization. Several groups lived in southwestern New Mexico and southeastern Arizona at the time of the Spanish entrada; some groups were sedentary agriculturists, while others were mobile hunter-gatherers.

Spanish explorers noted the presence of small groups of hunter-gatherers along the margins of the Rio Grande. Variously termed Apache, Jumano, or Quemanderos, these groups lacked settled agricultural villages suitable for Spanish colonization and, accordingly, were ignored by the Spanish until the 1700s. Archaeological studies of this time period are lacking, and what is known is based on historical research (Beckett and Corbett 1992; Hammond and Rey 1929).

According to Beckett and Corbett (1992:3):

> At the time of Spanish contact, several indigenous cultures existed in the northern half of the area known to botanists as the Chihuahuan Desert. Although Spanish expeditions through the region began in 1581, they left only meager descriptions of the area’s inhabitants. A number of different groups are mentioned as inhabiting the area. These include the Chinarra, Concho, Jano, Jocome, Manso, and Suma. All of these were hunting and gathering people. North of the Chihuahuan Desert lived the sedentary, pueblo-dwelling Piro. To the east were the buffalo-hunting Jumano. In the mountains to the southwest lived the Tarahumara and to the west dwelled the Opata and Sobaipuri.

As missions were established near El Paso, Manso and Suma peoples were actively recruited and converted to Catholicism. Before long, missionaries had gathered many of the Manso, whereas others were reportedly found living in the Mesilla Valley (Forbes 1960:162).

Historic Apache (A.D. 1600 through the present)

The Apache, Athabascans from the north who possibly entered the Southwest by way of the eastern slopes of the Rocky Mountains, had probably migrated to the area by about A.D. 1500 (Opler 1983; Willey 1966:233). By A.D. 1600, they employed a hunting-and-gathering subsistence strategy to exploit large areas with varied resources for scheduled seasonal harvesting (Lekson 1985:149–162). Such strategies resulted in intensive use of various environmental zones.

The Mimbres, Copper Mine, or "Warm Springs" Apache

According to ethnographer Morris Opler, the term "Apache" is the Spanish rendition of a Zuni word meaning Navajo (Opler 1983:418). Related by similar Athabascan languages, the Apache and Navajo had long maintained separate tribal identities. The Apache who lived in the Santa Rita area were known as the Mimbres Apache, a subdivision of the larger Chiricahua Apache group. The Mimbres Apache are further categorized as Eastern Chiricahua, and their band name is alternately rendered as Gila, Coppermine, Mimbreño, Warm Springs, or Ojo Caliente (Thrapp 1974:3).

Historical land use studies by Basehart (1959) revealed that this group used a large portion of southwestern New Mexico and northern Chihuahua on a seasonal basis, with some permanent residents in the mountains west of the Rio Grande. The very names for this band seem to indicate a focus of activity in the general area of Santa Rita, New Mexico. The Mimbres River flows southward east of Santa Rita and the Gila River flows westward to the north of the town and the famous copper deposits at Santa Rita were worked by Native American (Thrapp 1974:18).

During the nineteenth century, relations between the Apache and, first, Mexicans, and, later, Americans were antagonistic and often violent. After the end of Mexican–American war, conflicts between the Apache and American soldiers led up to more than 20 years of warfare, ending with the surrender of Geronimo in 1886. Today the Mimbres Apache now live at Fort Sill, Oklahoma, or on the Mescalero Indian Reservation in south-central New Mexico.

SOUTHEASTERN ARIZONA AND THE TUCSON BASIN

Paleoindian Period (ca. 10,000 to 8000 B.C.)

The Paleoindian period is generally considered to cover the span of time from ca. 10,000 to 8000 B.C. in southeastern Arizona (Agenbroad 1970). Like in New Mexico, the archaeological record suggests that Paleoindian populations were small and dependent on the exploitation of megafauna and wild plants. Several sites have been excavated in southeastern Arizona where mammoths and other extinct megafauna were found in association with Clovis points and other artifacts (Faught and Freeman 1998; Haury et al. 1959; Haynes 1973; Haynes and Huckell 2007). The high degree of technological conformity and continental distribution of sites and isolated points indicate that this cultural complex was specialized, widespread, and highly mobile.

Archaic Period (8000 B.C. to A.D. 300)

As discussed for New Mexico, after about 8000 B.C., the Paleoindian complex gave way to numerous regional expressions assigned to the Archaic period (8000 B.C. to A.D. 300). Dates for the beginning of the Early Archaic period are not well established in southern Arizona, but the available evidence suggests that it began around 8000 B.C. The Early Archaic period is poorly documented in southern Arizona (Huckell 1984:137), probably because of its general underrepresentation and low visibility. In southern Arizona, the Middle Archaic period is better represented than the Early Archaic period.

Like in New Mexico, hunting and gathering strategies in the Archaic focused on smaller game and locally available plant resources. Artifact assemblages reflect this economic orientation, with an increased emphasis on plant-processing tools, such as grinding stones. Middle Archaic period socioeconomic adaptation in southern Arizona exploited a wide range of plants and animals in complementary environmental zones. Middle Archaic assemblages from southern Arizona frequently include large numbers of projectile points and slab metates, as well as introducing basin metates, mortars, and pestles.

As in New Mexico several changes in artifact assemblages, cultural features, and the introduction of maize agriculture, signifying changes in settlement and subsistence patterns, appeared in the beginning of the Late Archaic/Early Agricultural period. Some new evidence of early maize cultivation suggests the Early Agricultural period began as early as 2100 B.C. in the Tucson Basin (Mabry 2008). Early Agricultural sites are characterized by relatively small domestic structures with small, interior, bell-shaped storage pits, abundant flaked stone artifacts, simple shell jewelry, clay objects, utilitarian seed milling equipment, and maize cultivation, suggesting some level of sedentism (Huckell et al. 1995; Huckell and Huckell 1984). Recent excavations in the Tucson Basin encountered canals that date to the Early Agricultural period (Mabry 2008).

Early Formative (A.D. 200 to 800)

The Early Formative period is characterized by the formation of a rather uniform cultural expression in southeast and central Arizona, as well as in southern New Mexico and northwestern Mexico. In the Tucson Basin, the Early Formative period marks the transition between the Early Agricultural period and the subsequent Hohokam Pioneer period. Plain brown ware ceramics and red-slipped plain ware and vessel shapes that include primarily seed jars and occasional outcurved-rim bowls characterize the Early Formative. With the advent of ceramic vessels came a significant change in storage technology.
The increased use of ceramic storage vessels corresponds to a decrease in the use of large storage pits.

Many Early Formative pit structures were square to rectangular, with formal, plastered hearths centered on the entryway (Crown and Judge 1991). The regularity in architecture suggests less mobility and greater sedentism. The non-random organization of space within the community, which began as early as the Early Agricultural period, continued, with discrete courtyard groups, large open areas (plazas), and large communal houses (Mabry 2000).

Late Formative Period (A.D. 800 to 1050/1150)

The Late Formative period is defined by increased cultural differentiation throughout southeastern Arizona. It is also distinguished by the implementation of canal irrigation systems and changes in ceramic production and exchange, as well as in settlement patterns. Within the Tucson Basin and southeastern Arizona are found the Hohokam and the San Simon branch of the Mogollon.

The Hohokam archaeological culture of the Tucson and Gila-Salt basins developed out of the Early Ceramic period. Population rapidly increased during beginning of the Late Formative Colonial period (A.D. 750 to 950). By A.D. 800, a number of settlements had become established along the Santa Cruz River. Doelle and Wallace (1991) suggest a fourfold increase in the number of sites. Ball court villages appear in the western Tucson Basin and other areas (Czaplicki and Ravesloot 1989; Doelle and Wallace 1991; Downum 1993). These ball court villages were composed of larger communities that included farmsteads and field houses, as well as loci for wild plant procurement.

The Sedentary period (A.D. 950 to 1150) witnessed a substantial growth in the size of existing villages, the construction of platform mounds, and an increase in the number of ball court villages in both the Tucson and Gila-Salt basins. Irrigation systems were expanded, and settlements extended away from riverine environments to secondary drainages and bajadas. The growing populations also fostered the expansion of trade networks, and by the middle of the Sedentary period, the Hohokam regional system had reached its maximum extent (Crown and Judge 1991; Wilcox 1991).

In the Tucson Basin during the Sedentary period, widespread abandonment of the existing courtyard groups occurred, and a large number of other changes made their appearance. New architectural types, new modes of interment, and changes in subsistence and economic pursuits were introduced, following changes in settlement structure. Changes in architecture included the addition of various types of adobe-wall constructions, and inhumations were added to the mortuary complex. Changes in subsistence pursuits included the significant increase in use of wild species, specifically agave (Wallace 1995: 806–810).

During the Late Formative, the San Simon branch of the Mogollon demonstrates both continuity with local traditions and peripheral cultural differentiation influenced by Mimbres culture the Hohokam. Initially, domestic structures consist of wood frame houses that are covered by grass and/or reed mats and adobe plaster and have fire pits, hearths, entries, and subfloor pits. Although basin metates and grinding slabs remain dominant, slight changes in the subsistence patterns are indicated by the adoption of shallow trough metates and rectangular two-hand manos. During the later part of the Late Formative, the San Simon Mogollon organized into large permanent communities, developed upland agricultural systems, and constructed ball courts. Changes in material culture included the introduction of clay figurines (with "coffee-bean" eyes), carved stone bowls and palettes, pottery paddles, tabular tools, an influx of Mimbres ceramics, and an increase in the amount and variety of stone and shell jewelry. This period culminates in the abandonment of large portions of the San Simon and Sulphur Springs valleys around A.D. 1050 (Gilman 1997, 2011). Although permanent settlements continued, villages tended to be smaller than those documented earlier and are relatively concentrated within the upper bajada zone.

Classic Period (A.D. 1050/1150–1450)

Regionalism, agricultural intensification, and exchange/alliance networks define the Classic period. These processes are distinguished by specific and rapid changes in ceramic production and exchange, as well as repeated reorganization of settlement patterns, the integration of upland dry-farming systems, and the adaptation of upland irrigation.

For the Hohokam, the Classic period was a time of major change. In the Tucson Basin, design styles of red-on-brown ceramics (specifically Tanque Verde Red-on-brown) became simpler and more rectilinear. Tanque Verde Red-on-brown pottery expanded beyond the Tucson Basin, appearing in low frequencies in the Gila Basin and the western Papaguería (Harry 1997).

During the Classic period, inhumation became the dominant mode of burial. Additional architectural forms appeared, including adobe-walled pit houses and, later, aboveground structures of adobe and stone masonry. These structures were often incorporated in compounds that were surrounded, entirely or in part, by adobe and stone walls. Ball court construction ceased, and earthen platform mounds, indicators of larger community organization, became the focal point of communal activities. At the end of the Classic period, residential units, possibly elite residences, were built on some of the mounds. The Hohokam aggregated into larger primary villages located along the major drainages, possibly as a result of an increase in warfare (or threat thereof) (Doelle and Wallace 1991). Maize, beans, squash, and cotton continued to dominate agricultural production, but a wider variety of cultivars and wild-plant resources were exploited.

The Classic period was a time of population migration, most likely prompted by increased environmental fluctuation, especially drought. Evidence of population relocation from northern and central Arizona has been documented in southeastern Arizona in the San Pedro River valley and possibly the eastern Tucson Basin (e.g., Clark 2001; Di Peso 1958; Slaughter and Roberts 1996; Woodson 1999). The changes in the Classic period material culture, site structure, and settlement patterns may result from sociopolitical and economic reorganization prompted by the influx of new people to the region.

In southeastern Arizona, the San Simon Valley was essentially abandoned during the Classic period; however, in the beginning of the Classic period local traditions begin to emerge within the major drainage throughout southeastern Arizona. These represent populations residing in large, formal communities that appear to form large cooperatives. At the regional scale these appear to have been loosely integrated and indirectly affiliated with a regional system centered in northwestern Chihuahua and northeastern Sonora.

The most important aspect of this period is the formation of relatively large year-round agricultural communities and agricultural use of the uplands, either by dry farming or irrigation (Sauer and Brand 1930). Clusters of small, compact, residential compounds, characterize early Classic habitation sites. These consist of two or three groups of rooms (both rectangular surface rooms and pit rooms) arranged around a large courtyard. By the later Classic, settlements are large, aggregated villages of residential compounds situated in both basin and upland environmental zones and coincide with the expansion of upland farming systems (Sauer and Brand 1930).

The Protohistoric Period and the Historic Native American Period (A.D. 1540 through the present)

The Protohistoric period, from the end of the Hohokam occupation around A.D. 1450 to Spanish contact at the end of the 16th century, is little understood in southern Arizona. Historical documents from the earliest Spanish contact suggest that the Sobaipuri, a Piman group, occupied the area at the end of the Protohistoric period (Doelle 1984). Kino first encountered the Sobaipuri in 1691, although current research indicates their occupation of the area has significantly greater time depth (cf. Seymour 2007). Archaeological evidence is sparse for the period, in part because of recent agricultural practices and urban expansion. Doelle (1984) also suggests that the material culture and architecture of the Sobaipuri were quantitatively less than that of the Hohokam, resulting in ephemeral, hard-to-find sites. Sobaipuri settlement has long been thought to be concentrated in villages located along the major watercourses of the Tucson Basin. In part based on accounts of traditional Tohono O’odham subsistence, a bimodal settlement pattern has been suggested, with villages along the major watercourses and small, seasonal occupations located in the foothills and on the bajadas (Harry 1993). A recent, and ambitious, reevaluation of the evidence argues that some Sobaipuri sites were larger, and more enduring, than their visibility in the archaeological record suggests (Seymour 2011a). Diagnostic artifacts associated with the Sobaipuri include Whetstone Plain and Sobaipuri Plain ceramics and small triangular points with deeply notched bases and serrated edges (Masse 1981:44).

Little is known about southeastern Arizona during the time of the arrival of the Spaniards (A.D. 1535 to 1540). Cabeza de Vaca and Coronado may have traveled through the region, but their route is uncertain. To the south, along what is believed to be the Rio Sonora, early explorers described the area as “thickly settled” with evenly spaced large towns and smaller settlements in-between. The region’s inhabitants employed irrigation to grow maize and beans (e.g., Reff 1981). The large towns were later interpreted as regional religious and socioeconomic centers by archaeologists (e.g., Pailes 1978). These centers were architecturally complex and nucleated, with large-scale public architecture. One village was said to have 200 terraced houses, and another regional center was described as a fortress with enclosing walls, 2 small towers, and 4 room blocks that surrounded a central plaza. The historical residents of the Rio Sonora and neighboring Rio Bavispe and Rio Moctezuma Valleys (Amsden 1928) were referred to as the Opata. In the early 1640s, Spanish attempts to subdue the upper Opata alliance failed, but the area was opened to missionization and became a staunch Spanish ally after 1650.

After 1651, the demands of the Spanish military, economic, and administrative systems, European disease, internal conflict, and incessant raiding by Apaches significantly weakened the Opata and the Sobaipuri (a point contested by some scholars, cf. Seymour 2011b). Possibly as early as the 1670s, the northern Opata villages of the Bavispe region came under increasing attack from the northern raiders. After 1690, outlying upper Opata villages in the Carretas and Bavispe basins were abandoned, and the population was relocated to settlements that could be defended with greater ease (Reff 1981). In a similar fashion, the Sobaipuri villages along the San Pedro Valley witnessed increased devastating Apache raiding; finally, the San Pedro Sobaipuri were resettled in the Tucson area (Dobyns 1976).

Although small bands of Apaches frequented southeastern Arizona by 1675, they did not assume a dominant role until after 1700. In the period following 1697, the conflict between the Spanish affiliates, the Sobaipuri and Opata, and individual Suma groups intensified. The opportunistic Apaches appear to have exploited the internal divisions and conflicts within the Spanish administration, the Native allies, and the various Suma groups at several different levels. The Apache were the ultimate victors in this conflict and appear to have rapidly assimilated members of the dissolved anti-Spanish Suma confederation. By the middle of the 18th century, the Apaches occupied and effectively controlled southeastern Arizona.

SOUTHWESTERN NEW MEXICO AND SOUTHEASTERN ARIZONA HISTORIC EURO-AMERICAN OCCUPATION (A.D. 1540 THROUGH THE PRESENT)

The Spanish launched several expeditions into the Southwest, including the efforts of Friar Marcos de Niza (1539), Francisco Vasquez Coronado (1540 to 1542), Francisco de Ibarra (1565), Fray Agustin Rodriguez and Francisco Sanchez Chamuscado (1581 to 1582), Antonio de Espéjo and Fray Bernardino Beltran (1582 to 1583), and Gaspar Castaño de Sosa (1589). Of these expeditions, certainly Coronado's explorations of the American Southwest are the best documented (Bolton 1964; Ellis 1971:5–16; Hammond and Rey 1940). Most of these early expeditions followed the Rio Grande north, except for Coronado, who entered New Mexico via eastern Arizona.

Colonization of New Mexico began with the Juan de Oñate expedition in 1598, which also followed the Rio Grande. Oñate's greatest contribution to the settlement of northern New Mexico was establishing the Camino Real along the Rio Grande. By 1610, Santa Fe was the northern capital and remained the center of political and economic control for Spanish and Mexican rule until the mid-19th century.

Between 1610 and the Pueblo Revolt of 1680, the northern province of New Mexico was extremely isolated and continually harassed by native nomadic peoples. As early as the late 1620s, the Franciscans began their efforts to convert the natives in the southern Rio Grande Valley to Christianity. The most important of these Franciscans was Father Alonso de Benavides, who established relations with the indigenous Mansos and recommended missionary activity among them (Wilson et al. 1989:7). Relations with other native groups were extremely strained. In particular, the Gila Apache to the west of the Rio Grande presented problems to colonists and missionaries alike. Reports of Apache depredations continued until the Pueblo Revolt of 1680, when attentions turned to the northern pueblos. After the Spaniards were expelled from the northern province, the Spanish established their base of operations at El Paso del Norte. From the reconquest of New Mexico in 1692 into the mid- to late 18th century, Apache hostilities in the south plagued colonial rule. Attempts to control the Gila and Mimbres Apache had limited success under Colonel Hugo O'Conor in the 1770s. These efforts concentrated in the Alamo Hueco, the Florida Mountains, and the Big and Little Hatchet ranges of southwestern New Mexico (Couchman 1990:18).

Spanish colonization of what is now known as southern Arizona began in the 1690s with the travels of the Jesuit missionary Eusebio Francisco Kino. Kino first traveled as far north as the Tucson Basin in 1692 and 1694 (Doelle 1984). The mission at San Xavier del Bac in the southern Tucson Basin was established under Kino's influence in 1700. In 1775, a presidio was established in Tucson to protect the missions at San Xavier and San Agustín from Apache attack (Harry and Ciolek-Torello 1992). Small numbers of Spanish settlers populated the Santa Cruz Valley after the establishment of the presidio, but settlement slowed after Mexican independence and renewed Apache attacks (Clemensen 1987; Harry and Ciolek-Torello 1992).

In 1775 and 1776, Juan Bautista de Anza led settlers to the San Francisco area through what is now Arizona and California. The purpose of the Anza expedition was to establish a trail from Sonora, Mexico, to the San Francisco area so that the Spanish could successfully settle Alta California (Gough 2012). The 1775 to 1776 expedition was actually Anza's second expedition to cross the desert into California. His first expedition left Tubac, Arizona, for Monterey, California, in early 1774, and reached San Gabriel, California, in March (Gough 2012). Not long after his return from California, Anza was commissioned to travel once again to California, this time to establish a mission with settlers in the San Francisco area. Families were recruited from towns in what is now Mexico. Anza and the settlers then traveled to Tubac to meet up with the two friars who would be establishing the mission. Two hundred forty people, including 153 women and children, set out from Tubac in October 1775. The members of the expedition encountered many hardships such as extreme cold weather, lack of water, treacherous terrain, and disease; however, they reached Monterey in March 1776 (Gough 2012). Anza returned to Mexico City not long after that; the settlers continued their journey to San Francisco, arriving in June. The Anza NHT was used by colonists journeying to California for several years and was crucial to the establishment of the Spanish in Alta California.

In an effort to establish a reliable trade route between Sonora and the northern reaches of the Spanish empire at Santa Fe, Captain Don Jose de Zuñiga and 20 men left the Presidio in Tucson in April 1795 to rendezvous with soldiers and Apache scouts from 5 other presidios at Santa Cruz on the San Pedro River south of present-day Saint David (Madsen 2012). Madsen has reconstructed the expedition route from the diaries of the participants and has determined that the first day camp of the soldiers from Tucson was southwest of present-day Benson in Davidson Canyon. The group then traveled northeast to the San Pedro River north of Benson, turning south to rendezvous with the main expeditionary force at the Presidio of Santa Cruz de Terrenate, located on the San Pedro south of present-day Saint David. From this point, the group traveled back to Saint David and turned to the northeast, passing the eastern edge of the Willcox Playa and heading north toward the foot of the Winchester Mountains. From this point, the expedition traveled northeast across the San Simon Valley to the Gila River near present-day Duncan. One of the purposes of the expedition was to mark a trail that could be followed later by others.

In New Mexico, progress in bringing some political and economic stability was enhanced by the renewed exploration and integration of the region between northern Chihuahua, Sonora, and California. New routes between Santa Fe, New Mexico, and Arizpe, Sonora, and between Janos, Chihuahua, and the Santa Rita Copper Mine were opened (Couchman 1990:19–21). These routes crossed in the area approximately 32 km (20 miles) west of Columbus, New Mexico. Between 1804 and the 1830s, the Janos Copper Road provided a transportation route for ore from the Santa Rita del Cobre of present-day central New Mexico to smelters in Janos, Chihuahua, until Apache depredations again increased dramatically and forced the mine to close (Silver City 2004). At the end of the 18th century, Lt. Col. Jose Manuel Carrasco obtained the Santa Rita mine; he then sold a portion of it to Don Francisco Manuel Elguea, who began taking copper ore to Janos by mule train. Soon thereafter, a Spanish garrison was established at Santa Rita, and the military used prisoners to work the mine. After the War of Independence from Spain in 1821, the mines were controlled by the Mexican government, who used the ore to mint coins (Silver City 2004). The mines were abandoned and the mule trains south stopped by the 1830s because of the threat from the Apache and problems within the Mexican government. The copper mine remained uninhabited until the 1850s (Couchman 1990:24).

In 1821, Mexico gained its independence from Spain; however, political anarchy and economic problems followed. Texas's independence in 1836 and President Polk's expansionistic ideas of the 1840s provided an impetus for the Mexican War. The only fight in the region was the Battle of Brazito that took place in Vado, New Mexico Territory (Couchman 1990:43). The signing of the Treaty of Guadalupe Hidalgo ended the Mexican–American War in 1848.

During the Mexican–American War, 500 Mormon soldiers marched approximately 1,850 miles from Iowa to California (Kimball 1979). They had been requested by President James K. Polk to help in the war effort in 1846. They marched beginning in July 1846 in Council Bluffs, Iowa, arriving in San Diego, California, in January 1847 (Easton Black n.d.). The original commander, Lt. Col. James Allen, died en route to Santa Fe. The first soldiers arrived in Santa Fe in October 1846 and, once in Santa Fe, command was handed over to Lt. Col. Philip St. George Cooke. Cooke sent a detachment of ill soldiers to Colorado and marched the remaining soldiers down the Rio Grande del Norte and across New Mexico into Arizona (Talbot 2002 [1992]). The soldiers constructed a wagon road along the way to allow their supply wagons to pass. By mid-November, they had arrived at Cooke's Spring, northeast of what is now Deming, New Mexico, and by the beginning of December, they had crossed into Arizona (Talbot 2002 [1992]). As they traveled along the San Pedro River on the way to Tucson, the company was attacked by bulls on December 11, and two soldiers were injured in the "Battle of the Bulls" (Easton Black n.d.; Talbot 2002 [1992]). This would be the only battle they would see, for the Mexican soldiers who were garrisoned at Tucson fled as the company arrived in December. By January, the company had crossed the Colorado River and arrived in California.

After the Mexican-American War, miners seeking to strike it rich in the Southwest and California began traveling West. Many followed the Gila Trail, which had been a travel route since prehistoric times but became known as the Southern Emigrant Trail due to the large numbers of fortune seekers who traveled the route (Brigandi 2010). The Gila Trail may have also been partially followed by the Mormon Battalion and later the Butterfield Overland Stage Route. In 1857, Congress approved the construction of the El Paso to Ft. Yuma Road as one of four roads designed for travelers seeking to move westward. Construction began in 1858, following the Gila Trail through portions of the route, but it went through the San Pedro River valley rather than the Santa Cruz, bypassing Tucson (Pry and Anderson 2011; Pima-Maricopa Irrigation Project 2005–2006).

By 1854, the Gadsden Purchase had secured the southern boundary of New Mexico and Arizona and provided the United States with a southern route for a future continental railroad. Brevet Major Emory was assigned the task of surveying the newly acquired land, which he completed in October 1855 (Ames 1977:432). Many of the stone boundary monuments that Emory established were destroyed by the Apache or the elements and were not redressed or reconstructed until Barlow's expedition in 1892.

From 1857 to 1861, mail service and transportation across the southern Southwest was provided primarily by the San Antonio-San Diego Mail Company and the Butterfield Overland Mail Company. These services entered New Mexico by way of El Paso, followed the Rio Grande north to Mesilla, and turned west to Cooke's Spring. From there, the lines crossed the Mimbres River and ventured into Arizona by way of Apache Pass.

The Butterfield Overland Mail and Stage Route was a mail route used between St. Louis, Missouri, Memphis, Tennessee, and San Francisco from 1858 to 1861 John Butterfield won a government contract to carry mail from two eastern points (St. Louis and Memphis) to San Francisco for 6 years in September 1857 (Norris 2013; Talbot 2002 [1992]). Because the terms of the contract stipulated that service begin within a year of the contract award, Butterfield and his Overland Mail Company quickly set up routes and stations, many in unfriendly territory (Norris 2013; Talbot 2002 [1992]). Passengers were accepted to ride the coach with the mail for approximately $200 per person. A chain of stations that provided food, ammunition, water, and accommodations was constructed along the trail and operated for 2.5 years until the Civil War (Talbot 2002 [1992]). The route itself follows several older trails, including Cooke's Mormon Battalion Trail (see below) in some places in Arizona.

Disruption of mail and transportation service began with the Confederate invasion of New Mexico in 1861. Although short lived, southern New Mexico and Arizona were part of the secessionist Confederacy until the Confederates' expulsion in 1862 (Wilson 1975).

After the Civil War, homesteaders, miners, and entrepreneurs alike began to settle in New Mexico. However, between 1863 and 1886, Apache unrest plagued southern New Mexico, with hundreds on both sides killed. Such uneasiness resulted in the establishment of several frontier forts in this corner of New Mexico, including Fort Cummings (1863), Fort Seldon (1865), Fort Bayard (1866), and Fort West (1863) (Couchman 1990:168). By 1880 to 1881, rail service had begun in many parts of southern New Mexico, and by 1886, with Geronimo's surrender, peace was finally at hand.

In Arizona, the discovery of gold in California, the 1862 Homestead Act, and development of gold and silver mines near Tombstone heralded the arrival of a large number of Euro-American settlers by the middle 1870s. The population expanded but remained centered on the town of Tucson until the 1870s because of Apache raids. The earliest occupants of the eastern Tucson Basin and the analysis area arrived after the Apache truce of 1872, when an increased military presence at Fort Lowell helped control Apache raiding (Clemensen 1987; Harry 1993).

In the Sulphur Springs Valley, the first silver-lead-copper deposits were discovered in 1877 and began an influx of miners to southeastern Arizona. The socioeconomic system of the Apache was severely disrupted when they were barred from their traditional hunting, gathering, and agricultural areas and prevented from raiding. A system of military bases was organized in order to provide settlement and transportation networks and protection from continued raids. The Chiricahua homeland was recognized in 1872, and 2 years after the death of Cochise in 1874, the Chiricahua Apache were moved to reservations in the San Carlos area by the U.S. military.

The relocation of the Apaches allowed construction of the Southern Pacific Railroad from 1878 to 1880, which in turn accelerated the transformation of southern New Mexico and Arizona economy by providing access to the mines, farms, and ranches of the West by the factories and markets of the East. The main line of the Southern Pacific Railroad was built through the Willcox Basin in 1880. Soon, mining camps were established at Gleeson, Pearce, Bisbee, and Courtland, and by the early 1900s, a smelter had been built at Douglas to process the ore supplied by the nearby mines. Mining districts in New Mexico—such as Cooke's Peak, Lake Valley, Apache Hills, Santa Rita, Tyrone, Stein's Pass, Shakespeare, and Hachita—provided some economic success and stability.

The El Paso and Southwestern Railroad originated as the Arizona and South Eastern Railroad, a small local line built in 1888–1889 to serve the copper mines at Bisbee. The line had extended north to the town of Fairbank, along the San Pedro River, to meet up with the New Mexico and Arizona railroad, which then shipped the ore to Nogales (Myrick 1975). In 1894, due to a dispute with the New Mexico and Arizona Railroad, it was decided that a connection between Fairbank and the Southern Pacific mainline at Benson was needed (Myrick 1975). Following several setbacks, including washouts, floods, and labor unrest, the line was completed in October of that year (Myrick 1975). Around the turn of the 20th century, the Arizona and South Eastern was renamed the El Paso and Southwestern Railroad Company and expansion east began to run to the new smelter in Douglas (Myrick 1990). The line was then extended east from Douglas through Hermanas, New Mexico, and north to Deming, New Mexico. Construction was also continued east to El Paso along the New Mexico border by 1902 (Myrick 1990; Wilson 1975).

In 1911, plans were initiated to extend the El Paso and Southwestern from Benson to Tucson, and this line was completed on October 31 the following year (Myrick 1975). For a time, Tucson served as the hub of three separate bustling railroad lines; however, in 1924, the El Paso and Southwestern was leased by Southern Pacific and became Southern Pacific's "SouthLine" (Myrick 1975). Southern Pacific's "NorthLine" consisted of the tracks running through Lordsburg and Deming and on to Tucson. Following the merger, the two sets of line between Tucson and Mescal were used as a double track, and portions remain in use today (Myrick 1975); however, the portions of the Southline in New Mexico and in southern Arizona were abandoned and the rails removed in the 1960s.

By the end of the 19th century and the first few years of the 20th, New Mexico and Arizona grew because of their mining, ranching, and herding industries. Both New Mexico and Arizona were admitted as states to the United States in 1912 and continued to expand their economic impact into other industries such as the military.

Many large ranches in southern and southwestern New Mexico began during this same period. Rich grama-grass rangeland and mild winters encouraged the establishment of such ranches as the WS Ranch (1881), Slocum or Mason Ranch (1870), Las Uvas Ranch (1888), and Corralitos (1912), to name a few (Wilson 1975:98–106).

Probably the most significant event of the 20th century along the U.S.–Mexico border was Francisco “Pancho” Villa’s raid on the small border town of Columbus, New Mexico. Between 1910 and 1920, the Mexican Revolution provided a stage for border activities from Brownsville, Texas, to Douglas, Arizona. The United States maintained thousands of National Guardsmen along the entire border, in case of trouble. Trouble hit on March 9, 1916, when Villa hit Columbus to restock his army and to retaliate against the United States’ recognition of the Carranza government. Villa’s raid was generally a failure, as he lost hundreds of men in the process. Following the raid, “Black Jack” Pershing and a “punitive expedition” pursued Villa until February 1917 (Hall and Coerver 1990:77). Pershing’s return ended much of the United States’ intervention in Mexico because the war in Europe took attention away from the revolution. Camp Furlong in Columbus was the staging base for Pershing’s expedition and was staffed until 1923.

In 1917, the U.S. Government established Camp Cody near Deming, New Mexico, approximately 56 km (35 miles) north of the border. This camp trained soldiers to fight in the European campaigns of World War I. Again in World War II, the border area provided training exercises for young airmen. Desolate areas north and east of Deming, New Mexico, were used as target locations (Couchman 1990:237). In addition, Japanese, German, and Italian prisoners of war were housed at internment camps in Deming and the Mesilla Valley. Japanese-Americans were held at a camp in Lordsburg.

Today, in many places along the border, there are no roads, fences, or signs of human life. Most of the country to the north of the border is still used for grazing, with limited mining. Some families in the Playas and Animas valleys turned to farming using pump water for irrigation and to stockfeeding operations during the 1930s and 1950s; however, these are largely gone (Wilson 1975:96). Current land use is primarily either grazing or mining. This is in contrast to the dense population of Tucson where the growth of the suburbs and the presence of services and industry has allowed continued population increase. By 1950, the population of Tucson had grown to nearly 120,000 and today has reached over 500,000.

Historic Trails and National Historic Trail Corridor

One important historic trail corridor, the Juan Bautista de Anza NHT corridor, and four historic trails are crossed by the current analysis area in several places: the Butterfield Trail, Mormon Battalion Trail, Janos Copper Road, and Zuñiga Trail. Following is a discussion of these trails. Appendix F, “National Scenic and Historic Trails Assessment,” also discusses the Anza NHT and the Butterfield Trail, which is under study to become an NHT, as well as other national scenic trails in the analysis area.

JUAN BAUTISTA DE ANZA NATIONAL HISTORIC TRAIL

The Anza NHT historic corridor commemorates Anza's 1775 to 1776 expedition to lead settlers to the San Francisco area through what is now Arizona and California. Congress designated the trail as an NHT in 1990, as part of the National Trails System. The trail begins at Nogales, Arizona, ends in San Francisco, and is approximately 1,200 miles long.

The Anza NHT consists of three parts: the trail corridor, which represents an approximation of the route taken by the expedition; a recreation trail managed by the NPS in cooperation with local land managers and agencies; and an auto tour route, which follows the corridor via roadways. There are no historic properties related to the Anza NHT in the Project area, nor are there any Federal Protection Components, including high potential sites and segments.

The NPS is the Trail Administrator, and BLM manages the portions of the trail that lie within its jurisdiction. The "Juan Bautista de Anza National Historic Trail Comprehensive Management and Use Plan" is the current guiding and managing document for the trail. The plan states the following vision:

> A traveler will be able to hike, ride horseback, bicycle, and drive on a marked route from Nogales to San Francisco and the loop in the eastern portion of San Francisco Bay. Along the way, the visitor can experience landscapes similar to those the expedition saw; learn the stories of the expedition, its members, and descendants; better understand the American Indian role in the expedition and the diversity of their cultures; and appreciate the extent of the accomplishments of Juan Bautista de Anza and his colonizers. (NPS 2006:7)

JANOS COPPER ROAD OR TRAIL

The Janos Copper Road or Trail was the primary route for the transportation of copper ore from the Santa Rita del Cobre mine in New Mexico to smelters in Janos, Chihuahua, in the early 19th century (Silver City 2004); however, the road has not been physically documented in the analysis area.

ZUÑIGA TRAIL

The Zuñiga Trail route ran from Tucson along the San Pedro River to Saint David. It then turns northeast along the eastern edge of Willcox Playa north toward the foot of the Winchester Mountains. The route then travels northeast across the San Simon Valley to the Gila River near present-day Duncan. One of the purposes of the expedition was to mark a trail that could be followed later by others. Although it is doubtful that physical remnants of this trail are still visible today, it may be possible to locate trail markers in the form of rock cairns along the reconstructed route, which crosses the analysis area.

MORMON BATTALION TRAIL

In New Mexico and Arizona, the Mormon Battalion Trail runs from Santa Fe down the Rio Grande del Norte River through what is now Deming and west into Arizona. In Arizona, they traveled west until they reached the San Cruz River and then followed the river north to Tucson. From Tucson, they continued west into California. Traces of the Mormon Battalion Trail can be found in Arizona and New Mexico. Later routes such as the Butterfield Overland Stage and Mail Route followed the trail marked by the Mormon Battalion through this area.

GILA TRAIL

The Gila Trail crosses into Arizona from New Mexico near Douglas. The trail then travels southeast to the north of Willcox Playa and on to north of Benson. From Benson, it travels west until the Santa Cruz

River valley and then turns north to Tucson. From Tucson, it follows the Santa Cruz River northwest and continues on until Phoenix.

BUTTERFIELD OVERLAND MAIL AND STAGE ROUTE

The Butterfield Overland Mail and Stage Route, also known as the Butterfield Trail, the Oxbow Route, the Butterfield Overland Mail, and the Butterfield Stage, was a stagecoach route used between St. Louis, Missouri, Memphis, Tennessee, and San Francisco from 1858 to 1861 (Norris 2013). The NPS is currently conducting a feasibility study for the designation of the Butterfield Overland Stage and Mail Route as an NHT.

In New Mexico, the Butterfield Overland Stage and Mail Route runs west from Las Cruces, passing north of Deming to Lordsburg. It then continues west to Arizona, where it crosses near Stein's Peak (Talbot 2002 [1992]). The trail then runs south of the Willcox Playa and continues roughly west until it reaches the Rincon Mountains, where it turns northwest toward Tucson. Physical traces of the Butterfield Overland Stage and Mail Route exist in New Mexico and Arizona today; these portions of the trail are considered linear historic resources. In New Mexico, the trail is listed in the State Register (SR-173), and different segments have been assigned site numbers LA 173985, LA 173986, LA 173988, and LA 173989. In Arizona, portions of the trail have been assigned site numbers AZ T:14:61(ASM) and AZ T:15:32(ASM).

Several crossings near or in the study area were visited as part of the Class II sample survey for the SunZia Transmission Project (Swanson and Rayle 2012). Segments in route group 1 and 2 (DN1 and LD4) would share the ROW with the approved but not yet constructed SunZia project. In route group 1, 5 cairns and several historical artifacts were recorded along the alignment of the Butterfield Overland Stage and Mail Route and designated LA 173987 (Swanson and Rayle 2012); however, the trail itself was not found within the SunZia study area. In route group 2, cairns and artifacts at site LA 173989 and wagon ruts/trail at AZ T:14:61(ASM) were found during the survey (Swanson and Rayle 2012).

In 2013, staff members from the New Mexico BLM Las Cruces Field Office did reconnaissance, looking for traces of the Butterfield Trail at four potential Southline transmission line crossings in New Mexico in route groups 1 and 2 (Childress 2013a). The objective of the site visits was to look for physical signs of the trail and to assess the segment's usefulness for interpretation or retracement provided the Butterfield Trail is designated a NHT. The crossings visited in route group 1 both lacked physical evidence of the trail itself; one crossing did have rocks with rust marks (Childress 2013a). The setting for both crossings in route group 1 is industrial; two gas pipelines and a power line are nearby. The crossing in route group 2 west of Lordsburg did have evidence of the trail itself; however, it was faint and hard to follow in places. The trail at the crossing near Doubtful Canyon likely consists of the Doubtful Canyon Road itself. The setting for both segments in route group 2 is scenic, with some modern improvements.

3.9.7 Cultural Resource Types

Archaeological Site Categories

AMERICAN INDIAN SITE CATEGORIES

Habitation sites are those with evidence of permanent or semi-permanent human occupation. Habitation sites vary greatly in size, density, and length of occupation, and in the number of types of features that may be present. Types of habitations that may be encountered in the analysis area include field houses (single-room masonry structures), room blocks (consisting of two or more adjacent rooms), and pit houses (semi-subsurface structures). Habitations may also have hearths, pits, roasting pits, middens, burials, and occupational surfaces. Site types that indicate habitations include artifact scatters, artifact scatters with features, features, habitations, burials and cremations.

Rock shelter and *cave sites* are habitation or camp sites located in rock shelters or caves. They often have features such as middens, burials, or hearths.

Agricultural sites are those features related to the cultivation of domestic crops such as check dams or rock piles. Agricultural sites provide insight into water use and water control technology. Site types that indicate agricultural activity include artifact scatters, artifact scatters with features, features, rock piles, canals, and other agricultural features.

Resource procurement and/or processing sites are short-term occupation or activity sites with evidence of the gathering and processing of plant or animal resources. Plant gathering sites often have manos or metates used for grinding seeds and other plant material. Hunting sites may have flaked stone tools used for cutting and processing meat and may include hunting-blind features. Site types that indicate resource procurement include artifact scatters and artifact scatters with features.

Lithic manufacture sites consist primarily of flaked stone scatters of debitage from the making or repairing of flaked stone tools. Often these sites are seen as one or more knapping stations where the debitage is from one or two raw materials. Site types that indicate resource procurement include artifact scatters, artifact scatters with features, and quarries.

Trails are linear sites along which people traveled in prehistoric times. Trails can show evidence of clearing and often have campsites or other small sites along their routes. Many prehistoric trails were used into historic times as well.

Petroglyph sites are those with etched, scratched, pecked, or painted images on rocks. They can be located on single boulders or on rock walls of cliffs and mountains. Often, petroglyph sites are also rock shelter or caves sites, resource processing sites, or habitation sites.

EURO-AMERICAN SITE CATEGORIES

Homesteads (habitation) are the remains of early settlement in the Southwest. They may be complex sites with features like foundations, wells, outbuildings, fences, and landscape modifications, or they may be simply a tent platform and some trash. Some homesteads can be associated with a Federal land patent.

Mining sites result from mining activities including exploration, testing and full-scale surface or underground extraction. Mining sites can consist of features such as shafts, adits, claim cairns, large sophisticated operations with mills and other buildings, or campsites and company towns. Mining sites are usually associated with mining claims filed with the Federal Government, or patents of such land issued by the Federal Government.

Ranching sites are those associated with animal husbandry such as corrals, barns, pastures, ranch houses, and outbuildings. *Agriculture sites* consist of farmhouses, outbuildings in association with irrigation structures and fields.

Water control sites are those associated with directing and containing the flow of water. These sites include dams, canals, and water tanks.

The term *transportation site* encompasses linear sites used for the movement of people such as roads, railroads, and trails. Features associated with transportation sites include railroad tracks and stations, culverts, bridges, trestles, walls, etc. Many transportation sites may still be in use today and are also considered part of the historic built environment.

Infrastructure sites are utilities such as telephone lines and electric lines. Like transportation sites, these may still be in use.

Military sites are the result of military activities such as forts, bases, training facilities, and airfields. Military sites in the Southwest range from evidence of early campaigns against American Indians to World War II auxiliary airfields.

Town sites are large settlement sites that consist of several different property types: transportation, infrastructure, and historic built environment property types. Town sites may still be occupied or abandoned. Often, historic town sites are discussed as districts rather than as individual property types because of their complexity.

Cemeteries are locations where people interred their dead. They can be found freestanding or in direct association with a town or church.

Trash dumps/scatters (limited activity) are locations where trash was dumped in one or more episodes. Often, these sites cannot be definitely associated with any particular historic sites, but the content usually indicates the context from which the trash originated, such as a household or an industrial site.

Historic Built Environment Property Types

Historic built environment property types consist of a large variety of historic era places such as homesteads, mining sites, ranching sites, transportation sites, infrastructure sites, town sites, military sites, stores, churches, schools and cemeteries. However, unlike archaeological sites, they must have standing buildings or structures.

Buildings are designed to shelter human activity, whereas *structures* are not designed to shelter human activity. For example, a house or a railroad station would be considered a building, and an irrigation system or a mining headframe would be considered a structure.

Historic Trails

Historic trails are special types of transportation sites that are particularly significant to our history and are either subject to specific management guidelines by the BLM and/or NPS (for those designated as NHT or under study) or the NHPA. For the purpose of this EIS, the term historic trail is used to describe known important historic trails with physical traces, such as the Butterfield Trail, as well as designated NHT corridors, with no physical traces, such as the Anza NHT.

Property of Traditional Religious or Cultural Importance

PTRCIs are places of importance to American Indian tribes or Native Hawaiian organizations. According to NHPA Section 101(d)(6)(B), a Federal agency must consult with any American Indian tribe that attaches religious or cultural significance to a PTRCI.

Traditional Cultural Property

According to NPS Bulletin 38, TCPs are extremely varied, but they must possess traditional cultural significance to a community (Parker and King 1998). That means they must embody or be associated with beliefs, customs, and practices of a community that are essential to that community's identity. TCPs include natural features or landscapes, buildings or entire communities, places where ceremonial activity takes place, or many other types of places.

American Indian Critical Resource Types

The term *American Indian critical resource* encompasses places and things not thought of as TCPs but that are still important to traditional beliefs and lifeways. Springs are often considered critical resources in the desert Southwest and are also considered sacred sites by many tribes. Places where medicinal and edible plants are gathered or where certain animals are hunted can also be considered critical locations for resources, as well as places where clay, stone tool raw materials, and plants used for building material, basketry, ceremonial use, or clothing are found.

3.9.8 Known Cultural Resources

A total of 910 archaeological sites and/or historic built environment resources has been previously recorded within the 2-mile analysis area. Of those, 8 have been listed in State registers or the NRHP, 102 have been determined eligible for listing, 47 have been determined not eligible, and 753 are unevaluated or unknown.

Only 7 percent of the analysis area has been previously surveyed; survey coverage varies greatly across the analysis area (table 3.9-2). In New Mexico, less than 4 percent of route group 1 analysis area and less than 10 percent of the route group 2 analysis area has been previously surveyed. In Arizona, the survey coverage is better: 50 percent of the route group 3 analysis area and 65 percent of the route group 4 analysis area has been previously surveyed.

Table 3.9-2. Previous Survey Acreage in the Analysis Area by Route Group

Route Group No.	Route Group	Acres Surveyed	Total Acres in Route Group	Percentage Surveyed
1	Afton to Hidalgo	17,244	490,759	3.5
2	Hidalgo to Apache	47,554	422,119	11.3
3	Apache to Pantano	1,644	3,270	50.3
4	Pantano to Saguaro	4,219	5,925	71.2
Total		**75,811**	**871,053**	**8.7**

In the Upgrade Section, the 100-foot ROW was surveyed from the Tucson to Saguaro substations in 1985; 11 sites were recorded within the 100-foot ROW (Effland and Greene 1985). Two recent surveys have been performed along the existing transmission line in the Upgrade Section (Goldstein 2008; Hart 2012). Goldstein (2008) conducted a Class III pedestrian survey along the existing Tucson–Apache 115-kV transmission line. The survey covered approximately 80 miles within a 200-foot-wide survey corridor from the Tucson Substation to the Apache Substation. Fifty-three sites were recorded: 18 sites were recommended eligible for the NRHP; 30 sites were recommended not eligible; and 5 sites were undetermined. Hart (2012) conducted a Class III survey of a 100-foot access road ROW between several pole structures along the line between the Tucson and Apache substations for a total of 4.45 miles.
An additional check for sites along the ROW from the Tucson Substation to the Saguaro Substation was conducted in 2012 by a Western archaeologist, but no survey corridor width was specified and no report was generated (personal communication, Maria Martin, Galileo Project LLC, 2013).

3.9.9 New Build Section

Route Group 1 – Afton Substation to Hidalgo Substation

Route group 1 consists of segments of the proposed Project (Proponent Preferred and Proponent Alternative), as well as all of local alternatives A, B, C, D, and DN1. As noted in chapter 2, more than 75 percent of the subroute 1.1 (Proponent Preferred - segments P1, P2, P3, and P4a) is routed along or adjacent to existing facilities and infrastructure such a pipelines, railroads, and transmission lines and would be routed along portions of the approved, but not yet constructed SunZia project. Forty-four percent of the subroute 1.2 (Proponent Alternative – segments S1 through S8) is routed along existing roads and transmission lines. Local alternatives A, B, C, and D are routed along existing roads or pipelines, while the entire local alternative DN1 would parallel the approved, but not yet constructed SunZia project.

Within the analysis area (2-mile corridor), 277 archaeological surveys have been previously conducted; 17,244 acres of the 490,759 analysis area (less than 4 percent) have been surveyed. These surveys and other documentation have resulted in the recordation of 415 archaeological sites and/or historic built environment resources. Three resources, the Village of Columbus and Camp Furlong NHL, the Shakespeare Ghost Town, and Shakespeare Cemetery, are listed on State or Federal registers. Sixty-five of these resources have been determined eligible for the NRHP, 39 have been determined not eligible, and 308 of the resources are unevaluated or unknown. Of the previously recorded sites, 177 are prehistoric, 139 are historic, 35 have both a prehistoric and historic component, and 64 are of unknown temporal affiliation. For the unknown sites, no additional data were available. Sites that have been determined eligible and sites of unknown temporal affiliation are not discussed further in this section.

Twenty-nine of the 177 prehistoric sites have been determined eligible for the NRHP, 7 have been determined not eligible, and 141 are unevaluated or unknown. Only the 170 sites that are eligible or have unevaluated/unknown NRHP eligibility are discussed in the table 3.9-3, below. Two sites have both a Paleoindian and Mogollon component. Eighteen of the 177 sites are Archaic; 10 are Archaic and Mogollon. Ninety-nine of the 177 prehistoric sites are classified as Mogollon: 20 are Jornada Mogollon, 2 are Mimbres, 1 is Casas Grandes, and 76 are unspecified. The remaining 48 prehistoric sites are classified as Native American or unknown.

The eligible and unevaluated/unknown prehistoric sites fall into six site types: artifact scatter, artifact scatter with features, features (ash feature, hearths, fire-cracked rock), camp, quarry, and habitation (see table 3.9-3).

Table 3.9-3. Prehistoric Site Types of Eligible or Unevaluated/Unknown NRHP Status within the Route Group 1 Analysis Area

Site Type	No. of NRHP-Eligible Sites	No. of NRHP Unevaluated/Unknown Sites	Total
Artifact scatter	9	93	**102**
Artifact scatter with features	16	28	**44**
Features	1	2	**3**
Camp	0	6	**6**
Habitation	2	1	**3**
Quarry	1	0	**1**
Unknown	0	11	**14**
Total	**29**	**145**	**170**

Of the 139 historic sites and/or built environment resources, 3 are listed on State or Federal registers, 30 have been determined eligible for the NRHP, 29 have been determined not eligible, and 77 are unevaluated or unknown. Only the 110 sites that are listed, eligible, or have unevaluated/unknown NRHP eligibility are discussed in table 3.9-4, below. Two of the historic sites are or may be Apache. Ninety-four of the historic sites are nonnative or Euro-American, 9 are Hispanic or Mexican-American, 2 are multi-cultural, and 32 are unknown.

Historic site categories for determined eligible or unevaluated/unknown resources include habitation, industrial, limited-activity, ranching, town, transportation, utility, and unknown (see table 3.9-4).

Table 3.9-4. Historic Archaeological Sites and Built Environment Resources of Listed, Eligible, or Unevaluated/Unknown NRHP Status in the Route Group 1 Analysis Area

Resource Category	No. of NRHP-Eligible Sites (includes listed historic properties)	No. of NRHP Unevaluated/Unknown Sites	Total
Habitation	5	5	**10**
Industrial	6	2	**8**
Limited activity	6	28	**34**
Mining	2	4	**6**
Ranching	0	5	**5**
Town	7	2	**9**
Transportation	4	4	**8**
Utility	0	1	**1**
Unknown	3	26	**29**
Total	**33**	**77**	**110**

Of the 35 sites with both a historic and a prehistoric component, 4 have been determined eligible, 2 have been determined not eligible, and 29 are of unevaluated or unknown NRHP-status. Nineteen sites are artifact scatters, 11 are artifact scatters with features, 1 is an artifact scatter with a feature and a telephone line, 1 is trail or road, and 3 are unknown.

In addition to the above resources, 778 features were digitized from historic maps (table 3.9-5). These features represent potential historic-age resources; however, their existence has not been verified by field visits.

Table 3.9-5. Potential Historic Features in the Route Group 1 Analysis Area, Digitized off Historical GLO and USGS Maps

Resource	Count
Airfield	1
Canal	3
Cemetery	1
Corral	2
Ditch	1
Fence	67
Gas line	2

Table 3.9-5. Potential Historic Features in the Route Group 1 Analysis Area, Digitized off Historical GLO and USGS Maps (Continued)

Resource	Count
Mining feature/claim	14
Pipeline	3
Pumping station	2
Railroad feature	28
Ranch	8
Reservoir	1
Road	432
Structure	155
Tank	12
Target	2
Telegraph line	3
Town	16
Trail	14
Utility	2
Well	3
Windmill	6
Total	**778**

HISTORIC TRAILS

Three historic trails cross the route group 1 analysis area: the Butterfield Overland Stage and Mail Route, the Mormon Battalion Trail, and the Janos Copper Road route. Physical evidence of the Butterfield Overland Stage and Mail Route is present within the analysis area for P2, which shares ROW with the SunZia alignment. During the Class II sample survey for the SunZia project, five cairns and several historical artifacts were recorded along the alignment of the Butterfield Overland Stage and Mail Route (LA 173987) (Swanson and Rayle 2012); however, the trail itself was not found within the SunZia study area. Members of the BLM Las Cruces Field Office staff visited two potential crossings in the route group 1 study area; however, the trail could not be located at either potential crossing (Childress 2013a).

ARCHAEOLOGY SOUTHWEST'S CULTURAL RESOURCES PRIORITY CONSERVATION AREAS

Two Archaeology Southwest PCAs are found within the route group 1 analysis area: Black Mountain and Burro Creek Cienega (see figure 3.9-1a).

Route Group 2 – Hidalgo Substation to Apache Substation

Route group 2 consists of segments of the Proponent Preferred and the Proponent Alternative, route variations P7a through P7d, as well as local alternatives LD1, LD2, LD3, LD4, and WC1. Approximately 85 percent of the route group 2 Proponent Preferred alternative (segments P4b, P4c, P5a, P5b, P6a, P6b, P6c, P7, and P8) is routed along or adjacent to existing pipelines, roads, or transmission lines and P4 is routed along the proposed SunZia transmission line route. More than 55 percent of the Proponent

Alternative (segments E, F, Ga, Gb, Gc, I, and J) is routed along existing infrastructure and facilities; segment Ga would be routed along the proposed SunZia transmission line route. Approximately 80 percent of route variation P7a is routed along existing facilities and infrastructure; portions of all the route variations run along existing roads. Some portion of all of the local alternatives except LD2 and LD3b run along or is adjacent to existing pipelines, roads, or transmission lines.

Within the 2-mile-wide analysis area, 269 archaeological surveys have been conducted; 47,554 acres of the 422,119 acres has been surveyed (11 percent). These surveys and other documentation have resulted in the recordation of 352 archaeological sites and historic built environment resources. One resource is listed in State or Federal registers: the Cochise Hotel. Sixteen resources have been determined eligible for listing on the NRHP, 4 have been determined not eligible, and 331 are unevaluated or unknown.

One hundred twenty-seven sites are prehistoric; 76 are historic; 16 have both a prehistoric and a historic component; and 133 are unknown. No further information was available for sites which are temporally classified as unknown. Sites which have been determined not eligible or are of unknown temporal classification are not discussed further in this section.

Of the 127 prehistoric sites, 5 have been determined eligible, 1 has been determined not eligible, and 121 are unevaluated or unknown. Only the 126 sites with an NRHP-status of eligible or unknown are presented in the table below. Seventeen of the prehistoric sites are attributed to the Archaic culture. Thirty sites are Mogollon; 2 are Hohokam. Seventy-eight sites are classified as Native American or unknown.

The 126 eligible or unevaluated/unknown sites fall into 9 site types: artifact scatter, artifact scatter with features, camp, cave or rock shelter, habitation, petroglyph site, quarry, rock piles, or unknown (table 3.9-6).

Table 3.9-6. Prehistoric Site Types for Sites of Eligible or Unevaluated/Unknown NRHP Status within the Route Group 2 Analysis Area

Site Type	No. of NRHP-Eligible Sites	No. of NRHP Unevaluated/Unknown Sites	Total
Artifact scatter	2	75	**77**
Artifact scatter with features	2	17	**19**
Camp	0	7	**7**
Cave or rock shelter	0	2	**2**
Habitation	0	12	**12**
Petroglyph site	0	2	**2**
Quarry	1	0	**1**
Rock piles	0	1	**1**
Unknown	0	5	**5**
Total	**5**	**121**	**126**

Of the 76 historic sites and/or built environment resources, one is listed in State or Federal registers, 9 have been determined eligible, 2 have been determined not eligible, and 64 are unevaluated or unknown. Only the 74 sites of listed, eligible, or unevaluated/unknown NRHP status are discussed in table 3.9-7, below. Seventy resources are Euro-American; 1 has both Euro-American and American Indian components. One is Asian-American, and two are Hispanic. The cultural affiliation of the remaining two sites is unknown.

The listed, eligible, and unevaluated/unknown sites fall into nine categories: habitation, limited activity, mining, ranching, structure, transportation, water control, utility, and unknown (table 3.9-7).

Sixteen sites have both a prehistoric and a historic component. Two of those sites have been determined eligible; the remaining 14 are unevaluated or unknown. Eleven of those sites are artifact scatters or artifact scatters with features representing limited activity. Three are historic sites such as a road or water control features with prehistoric artifacts; two are habitation sites.

Table 3.9-7. Historic Archaeological Sites and Built Environment Resources of Listed, Eligible, or Unevaluated/Unknown NRHP Status in the Route Group 2 Analysis Area

Resource Category	No. of NRHP-Listed Sites	No. of NRHP-Eligible Sites	No. of NRHP Unevaluated/ Unknown Sites	Total
Habitation	1	1	2	**4**
Limited Activity	0	1	20	**21**
Mining	0	0	2	**2**
Ranching	0	0	7	**7**
Structure	0	0	3	**3**
Transportation	0	7*	19	**26**
Utility	0	0	6	**6**
Water control	0	0	3	**3**
Unknown	0	0	2	**2**
Total	**1**	**9**	**64**	**74**

* Includes a segment of the Butterfield Overland Stage and Mail Route.

Digitized features from historic maps total 1,646 potential resources (table 3.9-8).

Table 3.9-8. Potential Historic Features in the Route Group 3 Analysis Area, Digitized off Historical GLO and USGS Maps

Resource	Count
Airfield/Airport	3
Cemetery	4
Compound	9
Corral	1
Dike	3
Ditch	2
Fence/Fence line	129
Land claim	4
Levee	3
Mill	1
Mine/mining feature	35
Oil well	1
Park	1

Table 3.9-8. Potential Historic Features in the Route Group 3 Analysis Area, Digitized off Historical GLO and USGS Maps (Continued)

Resource	Count
Pipeline	5
Railroad/railroad feature	27
Ranch	8
Reservoir	1
Road	771
Stage route	1
Structure	393
Tank	124
Telegraph line	4
Town	8
Trail	12
Transmission line	1
Utility line	21
Well	35
Windmill	39
Total	**1.646**

HISTORIC TRAILS

Two historic trails cross the Hidalgo to Apache route group analysis area: the Butterfield Overland Stage and Mail Route and the Zuñiga Trail. Physical evidence of the Butterfield Trail in the form of cairns and artifacts (LA 173989) and wagon ruts/trail (AZ T:14:61(ASM)) was found in the analysis area near the local alternatives for route group 2 during the SunZia Class II survey (Swanson and Rayle 2012). During the BLM field reconnaissance, evidence of the trail, although difficult to follow, was identified at potential crossings near LA 17389 and Doubtful Canyon. In the Doubtful Canyon area, the Butterfield Trail is likely to be what is now Doubtful Canyon Road (Childress 2013a).

ARCHAEOLOGY SOUTHWEST CULTURAL RESOURCES PRIORITY CONSERVATION AREAS

Four PCAs are found within the route group 2 analysis area: Krider, San Simon Village, Fischer Hills, and Peloncillo North (see figure 3.9-1b).

3.9.10 Upgrade Section

Route Group 3 – Apache Substation to Pantano Substation

Route group 3 consists of segments of the Proponent Preferred and local alternative H. The Proponent Preferred alternative consists entirely of an existing Western transmission line; local alternative H is routed along or adjacent to existing roads or transmission lines. Within the analysis area (500-foot corridor encompassing the existing 100-foot ROW), 47 Class III archaeological surveys have been previously conducted, including the recent survey of 200-foot and 100-foot corridors along the existing

transmission line (Goldstein 2008; Hart 2012); 1,844 acres of the 3,628 analysis area (51 percent) have been surveyed. These surveys account for the larger percentage of coverage for this route group.
The previous surveys and other documentation have resulted in the recordation of 44 archaeological sites and/or historic built environment resources. One of these resources, the Empirita Ranch Historic District, has been listed on a State or National Register; 4 of these resources have been determined eligible for the NRHP; and 39 of the resources are unevaluated or unknown.

Ten of the sites are prehistoric. All 10 are unevaluated and classified as Native American, but are likely to be Hohokam. Six of the sites are artifact scatters, two are artifact scatters with features, and two are bedrock mortars.

Twenty of the sites or resources are historic: 5 are listed or eligible and 15 are unevaluated (table 3.9-9).

Table 3.9-9. Historic Archaeological Sites and Built Environment Resources of Listed, Eligible, or Unevaluated/Unknown NRHP Status in the Route Group 3 Analysis Area

Resource Category	No. of NRHP-Eligible Sites (includes NRHP-listed)	No. of NRHP Unevaluated/Unknown Sites	Total
Historic District	1	0	**1**
Limited activity (artifact scatter)	0	2	**2**
Mining	0	1	**1**
Transportation	4*	4	**8**
Utility	0	2	**2**
Water control	0	6	**6**
Total	**5**	**15**	**20**

* Includes the Butterfield Overland Stage Route.

Two sites have both a prehistoric and historic component and are unevaluated. Twelve sites are of unknown temporal affiliation and are unevaluated for the NRHP.

Features digitized off historic maps total 78 features. These features represent potential historic-age resources; however, their existence has not been verified by field visits. The majority of the resources are roads (table 3.9-10).

Table 3.9-10. Potential Historic Features in the Route Group 3 Analysis Area, Digitized off Historical GLO and USGS Maps

Resource	Count
Acequia	2
Mine or mine features	2
Pipeline	4
Railroad feature	5
Ranch	1
Road	58
Town	2
Trail	4

HISTORIC TRAILS

Three historic trails are present within the analysis area for route group 3: the Butterfield Overland Mail and Stage Route, the Crook's Wagon/Mormon Battalion Trail, and the Zuñiga Trail.

ARCHAEOLOGY SOUTHWEST CULTURAL RESOURCES PRIORITY CONSERVATION AREAS

The Lower Cienega Creek PCA is within the route group 3 analysis area (see figure 3.9-1c).

Route Group 4 – Pantano Substation to Saguaro Substation

Route group 4 consists of segments of the Proponent Preferred, route variation U3aPC, and local alternatives TH1 and subroutes, TH3 and subroutes, and MA1. Subroute 4.1 (the Proponent Preferred - segments U3b, U3c, U3d, U3e, U3f, U3g, U3h, U3i, U3j, U3k, U3l, U3m, and U4) is the existing Western transmission line. Approximately 80 percent of route variation U3aPC is routed along existing transmission lines or roads. All of the local alternatives TH1 and TH3 and their subroutes except for TH1c and TH3-OptionB follow existing roads or pipelines.

Within the analysis area (500-foot corridor), 212 archaeological surveys have been previously conducted, including the recent survey of 200-foot and a 100-foot corridors along the existing transmission line from the Apache to Tucson substations (Goldstein 2008; Hart 2012), a portion of the existing ROW from the Tucson to Saguaro substations (personal communication, Maria Martin, Galileo Project LLC, 2013), and the entire 100-foot ROW from Tucson to Saguaro substations (Effland and Green 1985); 3,834 acres of the 5,944 analysis area (64 percent) have been surveyed. The recent surveys and their location in the Tucson area account for the larger percentage of coverage for this route group. These surveys and other documentation have resulted in the recordation of 117 archaeological sites and/or historic built environment resources. Four of these resources or sites are listed in State or Federal registers: AZ AA:11:25(ASM) (Los Robles Archaeological Area), AZ BB:13:15(ASM) (Valencia Site), AZ BB:13:315(ASM), and the Tumamoc Hill Archaeological District and Desert Laboratory NHL (figure 3.9-2).

Of the remaining resources or sites, 23 have been determined eligible for the NRHP, 4 are determined ineligible, and 86 are unevaluated or unknown. Sixty-one sites are prehistoric; 32 are historic; 12 have both a prehistoric and a historic component; and 12 are of unknown temporal affiliation. Sites which have been determined ineligible or are of unknown temporal affiliation are not discussed further in this section.

Sixty of the prehistoric sites are listed, eligible, or unevaluated/unknown; one site has been determined ineligible for the NRHP and is not included in the table below. One site is Cochise, 33 are Hohokam, and 26 are classified as Native American or unknown. The prehistoric sites fall into nine site types: agriculture, artifact scatter, artifact scatter with feature, bedrock mortar, canal, cremation (burial), habitation, and rock piles/features (table 3.9-11).

Table 3.9-11. Prehistoric Site Types of Listed, Eligible, or Unevaluated/Unknown NRHP Status within the Route Group 4 Analysis Area

Site Type	No. of NRHP-Listed Sites	No. of NRHP-Eligible Sites	No. of NRHP Unevaluated/Unknown Sites	Total
Agriculture	1	0	1	2
Artifact scatter	0	9	20	**29**
Artifact scatter with feature	0	1	11	**12**

Table 3.9-11. Prehistoric Site Types of Listed, Eligible, or Unevaluated/Unknown NRHP Status within the Route Group 4 Analysis Area (Continued)

Site Type	No. of NRHP-Listed Sites	No. of NRHP-Eligible Sites	No. of NRHP Unevaluated/Unknown Sites	Total
Bedrock mortar	0	0	1	**1**
Canal	0	0	1	**1**
Cremation	0	0	1	**1**
Habitation	3	1	7	**11**
Lithic procurement	0	0	1	**1**
Rock piles/features	0	0	2	**2**
Total	**4**	**11**	**45**	**60**

Of the 32 historic sites or built environment resources, 30 are listed, eligible, or unevaluated/unknown; 2 are ineligible. Only the 30 listed, eligible, or unevaluated/unknown sites are presented in the following table. All but four are attributed to Euro-American culture: one is Asian-American, one is Mexican-American, and two are Tohono O'odham.

Historic site and built environment types are variable, but they fall into nine general categories within the analysis area: habitation, industrial, limited activity, ranching, structures, transportation, and utility (table 3.9-12).

Table 3.9-12. Historic Site and Built Environment Categories of Listed, Eligible, or Unevaluated/Unknown NRHP Status within the Route Group 4 Analysis Area

Site Category	No. of NRHP-Listed Sites	No. of NRHP-Eligible Sites	No. of NRHP Unevaluated/Unknown Sites	Total
Habitation	0	2	0	**2**
Industrial	0	0	2	**2**
Limited Activity	0	1	2	**3**
Ranching	0	0	2	**2**
Structure	0	0	1	**1**
Transportation	1	2	7	**10**
Utility	0	2	4	**6**
Water Control Features	0	0	4	**4**
Total	**1**	**7**	**22**	**30**

Twelve sites have both a Hohokam or other Native American occupation and a later Euro-American occupation. Two of those sites are eligible; 10 are unevaluated. Most of these sites are earlier artifact scatters or artifact scatters with features/habitations and historic camps or ranches/homesteads.

Features digitized off historic maps total 465 features. These features represent potential historic-age resources; however, their existence has not been verified by field visits. The majority of the resources are roads and structures, but canals, fences, railroads, and other features are also found (table 3.9-13).

Table 3.9-13. Potential Historic Features in the Route Group 4 Analysis Area, Digitized off Historical GLO and USGS Maps

Resource	Count
Camp Huachuca	1
Canal	3
Compound	4
Fence	9
Mine features	2
Pipeline	1
Railroad feature	8
Road	317
Structure	107
Trail	2
Tucson Military Reservation	1
Utility Line	6
Well	4

HISTORIC TRAILS

Five historic trails or trail corridors are present within the analysis area for route group 4: the Anza NHT corridor, the Gila Trail, the Butterfield Overland Mail and Stage Route, the Cooke’s Wagon/Mormon Battalion Trail, and the Zuñiga Trail.

ARCHAEOLOGY SOUTHWEST CULTURAL RESOURCES PRIORITY CONSERVATION AREAS

Eight PCAs are found within the route group 4 analysis area: Los Robles, Los Morteros, River Confluence, Lower Cienega Creek, Middle Santa Cruz, West Branch, Valencia, and Zanardelli (see figure 3.9-1d).

3.9.11 Archaeological Sensitivity Analysis

Table 3.9-14 presents the archaeological sensitivity of the analysis area by route group. Numbers given represent all sites within each route group study corridor, including sites determined not eligible. Thirty-two to 47 percent of sites in each route group were classified as level 3: Moderate sensitivity. Route group 4 has the largest percentage of level 5: High sensitivity, at 6 percent. Please note that for route group 2, 36 percent of sites were classified as level 0 or unknown, meaning no data were available for analysis.

Table 3.9-14. Number and Percentage of Archaeological Sites by Sensitivity Level

Sensitivity Level	Route Group 1 (%)	Route Group 2 (%)	Route Group 3 (%)	Route Group 4 (%)
Unknown (0)	74 (16.6%)	133 (35.8%)	11 (23.4%)	10 (8.4%)
Low (1)	38 (8.5%)	4 (1.1%)	0 (0%)	2 (1.7%)
Low to Moderate (2)	87 (19.6%)	68 (18.3%)	8 (17.0%)	12 (10.1%)

Table 3.9-14. Number and Percentage of Archaeological Sites by Sensitivity Level (Continued)

Sensitivity Level	Route Group 1 (%)	Route Group 2 (%)	Route Group 3 (%)	Route Group 4 (%)
Moderate (3)	199 (44.7%)	119 (32.0%)	24 (51.1%)	50 (42.0%)
Moderate to High (4)	38 (8.5%)	46 (12.4%)	4 (8.5%)	37 (31.1%)
High (5)	9 (2.0%)	2 (0.5%)	1 (2.1%)	7 (5.9%)

3.9.12 Visual Effects

The analysis area for visual effects for the New Build Section (route groups 1 and 2) and the Upgrade Section (route groups 3 and 4) is 5 miles on either side of the centerline (10-mile corridor). Because of the large size of the visual analysis area, data for the visual analysis were limited to historic properties listed in State or Federal registers within the 10-mile corridor and properties determined eligible under Criterion A, B, or C within the 2-mile direct effects corridor. Visual impacts to historic properties are those that alter the characteristics of a property that make it eligible for the NRHP by diminishing the integrity of the property's location, setting, association, or feeling.

Route Group 1 – Afton Substation to Hidalgo Substation

LISTED HISTORIC PROPERTIES

Twenty-eight listed historic properties were found within the 10-mile corridor analysis area for route group 1. Seven of those properties were listed in the NRHP; 21 were listed in the New Mexico State Register of Cultural Properties (table 3.9-15).

Table 3.9-15. Listed Properties within the Visual Analysis Area for Route Group 1

Property
NRHP-Listed Historic Properties
Deming Armory
Seaman Field House
Luna County Courthouse and Park
Mahoney Building
Deming Main U.S. Post Office
Village of Columbus and Camp Furlong NHL*
Deming Armory
State Register–Listed Historic Properties
Hoover Hotel
105–107 North Silver Avenue, Deming, New Mexico
Baker Hotel
Columbus Village Jail
Diamond Furniture Warehouse (112–114 South Silver Avenue Deming, New Mexico)
Deming Art Council (100 South Gold Avenue, Deming, New Mexico)
Waymaker Christian Store (110 South Gold Avenue, Deming, New Mexico)
Mimbres Valley Brewing Company (200 South Gold Avenue, Deming, New Mexico)

Table 3.9-15. Listed Properties within the Visual Analysis Area for Route Group 1 (Continued)

Property
State Register–Listed Historic Properties, cont'd.
Liberty Finance (202 South Gold Avenue, Deming, New Mexico)
Old Deming National Bank
Palmas Restaurant
The New T-Shirt Print Shop (118 East Pine Street, Deming, New Mexico)
Railroad Station Complex, Columbus, New Mexico
Star Barber Shop (Possible location (?) 116 North Silver Avenue, Columbus, New Mexico)
Tinaja Alta Trading Co. (116 North Silver Avenue, Deming, New Mexico)
Antique Shop (Silver Avenue, Deming, New Mexico)
112–120 East Spruce Street, Deming, New Mexico
Delaney & Hernandez (113 East Spruce Street, Deming, New Mexico)
United States Army Headquarters, Columbus, New Mexico
United States Custom House, Columbus, New Mexico (Museum and Visitor Center of Pancho Villa State Park)
Camp Furlong Recreation Hall

* Within direct effects analysis area.

DETERMINED ELIGIBLE HISTORIC PROPERTIES

Two historic properties which have been determined eligible under Criterion A, B, or C are located within the direct effects analysis area for route group 1: LA 12839 and LA 164811. LA 12839 is the El Paso and Southwestern Railroad and the Southern Pacific Railroad's Columbus Station (personal communication, Jane Childress, BLM, 2013b). LA 164811 is the Cambray Civilian Conservation Corps Camp (G-174-N).

Route Group 2 – Hidalgo Substation to Apache Substation

LISTED HISTORIC PROPERTIES

Twenty-one State or federally listed historic properties are found within the visual analysis area for route group 2. Eighteen are listed in the NRHP; 3 are listed in the New Mexico State Register of Historic Places (table 3.9-16).

Table 3.9-16. Listed Properties within the Visual Analysis Area for Route Group 2

Property
NRHP-Listed Historic Properties
Hidalgo County Courthouse
Hidalgo County Library, Lordsburg
Benjamin E. Briscoe House
Cochise Hotel*
Crowley House

Table 3.9-16. Listed Properties within the Visual Analysis Area for Route Group 2 (Continued)

Property
NRHP-Listed Historic Properties, cont'd.
John Gung'l House
Hecker House
Hooker Town House
Tillotson House
Joe Mee House
Morgan House
John H. Norton and Company Store
Harry Saxon House
Schwertner House
Pablo Soto House
Willcox Women's Club
J. C. Wilson House*
Shakespeare Ghost Town
State Register–Listed Historic Properties
Shakespeare Cemetery*
Lordsburg Coaling Tower (no longer existing)
Stein's Peak Station, Lordsburg, New Mexico (Possible location)

* Within direct effects analysis area.

DETERMINED ELIGIBLE HISTORIC PROPERTIES

Within the route group 2 direct effects analysis area, six historic properties have been determined eligible for the NRHP under Criterion A: LA 50129, LA 111003, LA 129569, AZ Z:2:40(ASM), AZ CC:3:91(ASM), and AZ FF:1:34(ASM).

LA 50129 is a Hispanic homestead. LA 111003 is the Arizona & New Mexico Railroad and the Lordsburg & Hachita Railroad. LA 129569 is an unattributed railroad bed.

AZ Z:2:40(ASM) is the Southern Route of the Southern Pacific Railroad Mainline. AZ CC:3:91(ASM) is the historic route of U.S. 191 and U.S. 71. AZ FF:1:34(ASM) is an Arizona & Colorado Railroad Company railroad.

Route Group 3 – Apache Substation to Pantano Substation

LISTED HISTORIC PROPERTIES

Nine State-listed or federally listed historic properties were found within the 10-mile corridor for visual effects for route group 3: the Benson Railroad Historic District, the Cochise Hotel, the Hi Wo Company Grocery, the W.D. Martinez General Merchandise Store, the Oasis Court, the Redfield-Romine House, the Smith-Beck House, the Max Treu Territorial Meat Company, and the Empirita Ranch Historic District. (The Empirita Ranch Historic District is also within the analysis area for direct effects.)

DETERMINED ELIGIBLE HISTORIC PROPERTIES

Three historic properties which have been determined eligible under Criterion A, B, or C by the Arizona SHPO are present within the 2-mile direct impacts corridor: AZ EE:3:74(ASM), AZ FF:9:17(ASM), and AZ Z:2:40(ASM). All four sites are linear sites. AZ EE:3:74(ASM) and AZ Z:2:40(ASM) are both railroads: the El Paso and Southwestern Railroad and the Southern Pacific Railroad Mainline–Southern Route, respectively. AZ FF:9:17(ASM) is SR 80.

Route Group 4 – Pantano Substation to Saguaro Substation

One hundred nine State- or NRHP-listed or pending listing properties were identified within the visual analysis area for route group 4 (table 3.9-17).

Table 3.9-17. State- or NRHP-Listed Properties within the Visual Analysis Area for Route Group 4

NRHP-Listed Historic Properties
4th Avenue District
Arizona Daily Star Building
James P. and Sarah Adams House
Arizona Hotel
Arizona Inn
Armory Park Historic Residential District
Barrio Anita Historic District
Barrio El Hoyo Historic District
Barrio Libre Historic District
Barrio El Membrillo Historic District
Barrio Santa Rosa Historic District
Bear Down Gym
Binghampton Rural Historic Landscape
Blenman-Elm Historic District
Blixt-Avitia House
Boudreaux-Robison House
Bray-Valenzuela House
Dr. William Austin Cannon House
Erksine P. Caldwell House
Catalina American Baptist Church
Catalina Vista Historic District
Cienega Bridge
Colonia Solana Residential Historic District
Copper Bell Bed and Breakfast
Cordova House
Coronado Hotel
John P. and Helen S. Corcoran House

Table 3.9-17. State- or NRHP-Listed Properties within the Visual Analysis Area for Route Group 4 (Continued)

NRHP-Listed Historic Properties
Dodson-Esquivel House
Don Martin Apartments
Downtown Tucson Historic District
Eckbo Landscape
El Encanto Estates Residential Historic District
El Encanto Apartments
El Conquistador Water Tower
El Montevideo Residential Historic District
El Paso and Southwestern Railroad Depot
El Paso and Southwestern Historic District
El Presidio Historic District
El Tiradito
Empirita Ranch Historic District*
First Hittinger Block
First Joesler House
P.W. Fletcher House
Fourth Avenue Underpass
Fox Commercial Building
Fox Theatre
Gabel House
Ghost Ranch Lodge
Arthur C. Hall and Helen Neel House
Haynes House
Hotel Congress
Hotel Heidel (MacArthur Hotel, Iron Horse Hotel)
Sam Hughes Neighborhood Historic District
Iron Horse Expansion Historic District
J. C. Penney-Chicago Store
Jefferson Park Historic District
Julian-Drew Building
Los Robles Archaeological Area*
Levi H. Manning House
Marist College Historic District
Antonio Matus House and Property
Menlo Park Historic District
Men's Gymnasium, University of Arizona
Miracle Mile Historic District
Old Adobe Patio

Table 3.9-17. State- or NRHP-Listed Properties within the Visual Analysis Area for Route Group 4 (Continued)

NRHP-Listed Historic Properties
Old Library Building
Old Main, University of Arizona
Owen Homesite
Pascua Cultural Plaza
Pie Allen Historic District
Pima County Courthouse
Ramada House
Rebeil Block
Rialto Building
Rialto Theatre
Rillito Racetrack-Chute
Rincon Heights Historic District
Ronstadt House
Ronstadt-Sims Adobe Warehouse
Sabedra-Huerta House
San Agustin del Tucson
San Xavier del Bac
Santa Cruz Catholic Church
Schwalen-Gomez House
Sixth Avenue Underpass
Professor George E. P. Smith House
Sosa-Carrillo-Fremont House
Southern Pacific Railroad Locomotive No. 1673
Speedway-Drachman Historic District
John Spring Neighborhood Historic District
St. Philip's in the Hills Episcopal Church
Stone Avenue Underpass
Type A Joesler
Type B Joesler
Tucson Warehouse Historic District
Tumamoc Hill Archaeological District and Desert Laboratory NHL*
U.S. Post Office and Courthouse
University Heights Elementary School
University of Arizona Campus Historic District
University Library, Arizona State Museum, North
USDA Tucson Plant Materials Center
Valencia Site*
Valley of the Moon Historic District

Table 3.9-17. State- or NRHP-Listed Properties within the Visual Analysis Area for Route Group 4 (Continued)

NRHP-Listed Historic Properties
Valley National Bank Building
Velasco House Warehouse District
Villa Catalina
Solomon Warner House and Mill
West University Historic District
Winterhaven Historic District

* Within direct effects analysis area.

DETERMINED ELIGIBLE HISTORIC PROPERTIES

Three historic properties within the direct effects analysis area have been determined eligible under Criterion A, B, or C: AZ Z:2:40(ASM), AZ AA:2:118(ASM), and AZ AA:8:366(ASM). AZ Z:2:40(ASM) is the Southern Route of the Southern Pacific Railroad Mainline. AZ AA:2:118(ASM) is the historic alignment of SR 84; and AZ AA:8:366(AMS) is the Saguaro-Oracle 150-kV transmission line.

3.9.13 Tribal Concerns

Tribal consultation is ongoing and being conducted through the BLM New Mexico State Office and the Las Cruces District Office.[1] Twenty-one American Indian tribes have been invited to participate in the NEPA and Section 106 consultation processes:

- Ak-Chin Indian Community
- Comanche Nation
- Fort Sill Apache Tribe of Oklahoma
- Gila River Indian Community
- The Hopi Tribe
- Kiowa Tribe of Oklahoma
- Mescalero Apache Tribe
- Navajo Nation
- Pascua Yaqui Tribe
- Pueblo of Acoma
- Pueblo of Isleta
- Pueblo of Laguna
- Pueblo of Tesuque
- Pueblo of Zuni
- Salt River Pima-Maricopa Indian Community
- San Carlos Apache Tribe
- Tohono O’odham Nation
- Tonto Apache Tribe
- White Mountain Apache Tribe
- Yavapai-Apache Nation
- Ysleta del Sur Pueblo

Correspondence

On March 23, 2012, the BLM sent the above tribes a letter introducing the proposed Project and initiating consultation under NEPA and Section 106. Letter responses from the Hopi Tribe, White Mountain Apache Tribe, and Ysleta del Sur Pueblo were received on April 2, April 4, and April 7, 2012,

[1] Please note that tribal consultation, including government-to-government consultation meetings, will continue throughout the NEPA and Section 106 processes.

respectively. Email responses from the BLM were sent to the Pascua Yaqui Tribe and the Tohono O'odham on April 22, 2012 and July 3, 2012, regarding consultation.

Meetings

The following meetings have been held with the BLM:

- October 4, 2011, with representatives from the San Carlos Apache Tribe and the White Mountain Apache Tribe. The purpose of the meeting was to give an overview of the Project.
- July 18, 2012, with representatives from the Tohono O'odham Nation. The purpose of the meeting was to give an overview of the Project.
- July 20, 2012, with the Four Southern Tribes Cultural Resources Working Group to give an update of the Project.
- August 28, 2012, with the Pueblo of Zuni to give an introductory presentation on the Project.
- October 15, 2012, with the Ysleta del Sur Pueblo representatives. The purpose of the meeting was to give an introduction to the Project.
- October 18, 2012, with representatives from the San Carlos Apache Tribe. The purpose of the meeting was to give an introduction to the Project.
- November 9, 2012, with representatives of the Ysleta del Sur Pueblo.
- April 23, 2013, with all stakeholders interested in the Project impacts to Tumamoc Hill. Peter Steere, the Tribal Historic Preservation Officer for the Tohono O'odham Nation, was in attendance.
- August 8, 2013, Section 106 kick-off meeting in Albuquerque with representatives from the ACHP, Acoma Pueblo, Archaeology Southwest, National Trust for Historic Preservation, New Mexico Historic Preservation Division, New Mexico SHPO, NMSLO, NPS, San Carlos Apache Tribe, and USACE.
- August 15, 2013, Section 106 kick-off meeting in Tucson with representatives from the ACHP, Ak-Chin Indian Community, Arizona SHPO, ASM, ASLD, City of Tucson, Gila River Indian Community, Mescalero Apache Tribe, NPS, Pima County, Tohono O'odham Nation, Town of Marana, Tumamoc Hill (University of Arizona), and the Forest Service (Coronado National Forest).

Resources of Concern to Tribes

Several resources that are known concerns to tribal groups exist in or near the analysis area: Tumamoc Hill is of concern to O'odham groups and Mount Graham to Apache groups.

The Tumamoc Hill Archaeological District (AZ AA:16:6(ASM)) is a listed property within the Pantano to Saguaro route group (see figure 3.9-2). Prehistoric sites found throughout the district include trincheras or hilltop sites with masonry walls and features, bedrock grinding areas, petroglyphs, habitation structures, agricultural terraces, walls, and trails. Terrace and wall constructions at the site date to as early as the Cienega phase (800 B.C. to 50 A.D.) of the Early Agricultural period (Fish et al. 2007; Wallace et al. 2007). The Tortolita phase occupation of the hill (A.D. 500 to 700) consisted of a large village on the hilltop, numbering 150 or so houses. During the Protohistoric and Historic period, the hill was also used by the Tohono O'odham, as evidenced by talus pits containing Tohono O'odham ceramics (University of Arizona 2008).

The Tohono O'odham have also expressed concerns about the proposed transmission line's proximity to San Xavier del Bac and Martinez Hill.

Mount Graham has been determined eligible for the NRHP under Criterion A, as a TCP for its importance to the Western Apache (NPS 2002). The boundary of the TCP is the administrative boundary of the Pinaleño Mountains unit of the Coronado National Forest, which is located just north of (but outside) the visual analysis area for the Hidalgo to Apache route group. Although it is outside the visual analysis area, it is included in this analysis because of its importance to the Western Apache.

In addition, during tribal consultation meetings, representatives of the San Carlos Apache Nation expressed concerns regarding water sources such as springs and streams and places associated with water such as wet meadows because water is sacred to the Apache. Mountain tops and foothills are also sacred locations. Further concerns may be brought forth during the ongoing tribal consultation.

3.10 VISUAL RESOURCES

This section includes a VRI and visual characterization of the existing aesthetic conditions of the landscape. Some of the information provided within this visual resources analysis was excerpted from "Southline Transmission Project Resource Report 16: Visual Resources" (CH2M Hill 2013j). The contents of the resource report are used herein without specific reference. Additional explicit "in text" references to scientific and other sources relied upon for conclusions in the analysis are included.

Consistent with methods based on BLM's VRM guidance (BLM H-8410-1 (1986a)), the visual resources analysis focused on a visual inventory and site analysis to characterize the affected environment for all landscapes, regardless of jurisdiction. The VRI provided a baseline of existing resources evaluated in terms of scenic quality, sensitivity, and distance zones. The site analysis is a focused study of the proposed Project landscape and includes a description of existing scenic qualities of the affected visual environment and the identification of visually sensitive gathering points, populations, and visually sensitive landscape features. Results of public scoping and consultation with key stakeholders were also included in the site analysis and resulted in the identification of several critical visual areas, which included designated scenic trails (i.e., the CDNST, Butterfield Trail, Anza NHT, and Arizona NST); designated SMAs and WSAs; the Coronado National Forest; Saguaro National Park (west); and Tumamoc Hill and Tucson Mountain Park.

3.10.1 Analysis Area

The visual resources evaluation is based upon both spatial (landscape) and temporal (time) limits. The analysis area for visual resources is generally 5 miles on either side of the ROW centerline (10 miles total) for the New Build Section and 2 to 5 miles on either side of the ROW centerline (4 to 10 miles total) for the Upgrade Section and all local alternatives and route variations. The rationale for a reduced analysis area for the Upgrade Section is that the basic physical elements are already part of the visual landscape, unlike the New Build Section, where nothing like it existed previously. In the Upgrade Section, the analysis area goes out to a distance where the Project structures might be viewed in detail and where the visual change would be most noticeable to the public (e.g., in the foreground and in certain locations, the middleground distance zones). The visual resources analysis also included viewing locations and key observation points (KOPs) located outside the 2- to 5-mile buffer. These views were identified based on the potential visibility of the proposed Project and to inform the assessment of effects on the viewing public as a result of the proposed Project. The analysis area for visual resources was determined through the application of visibility mapping, field reconnaissance, and distance zones.

Given the long, linear nature of the proposed Project, the analysis area for visual resources was segmented into sections based on similar scenic quality or landscape character. Visibility mapping indicated that the proposed transmission line would not be visible, or would be negligibly visible, beyond the 10- to 18-mile threshold. Recent research on visibility indicates that lattice structures are typically not visible beyond 7 miles and monopoles are typically not visible beyond 5 miles in landscapes similar to that of the proposed Project (Sullivan et al. 2014).

The visual resources analysis is largely documented from the KOPs or critical viewpoints identified as being important to the landscape and affected public (see appendix I). The most critical KOP views that represent areas of public sensitivity or heightened scenic quality were selected for simulation to illustrate the introduction of the proposed Project features into the existing environment and to guide the impacts analysis (see appendix K).

3.10.2 Laws, Ordinances, Regulations, and Standards

The laws, ordinances, regulations, and standards—the regulatory framework that governs visual resources throughout the analysis area and within the geographic region of southwestern New Mexico and southeastern Arizona—includes Federal, State, regional, and local plans and policies. The following section includes all applicable laws, ordinances, regulations, and standards for visual resources.

Federal Regulations

Federal regulations pertaining to the proposed Project include the FLPMA and NEPA. The BLM and Western serve as co-lead Federal agencies for this EIS and must carry out administrative requirements in accordance with FLPMA and NEPA. FLPMA provides that “the public lands be managed in a manner that will protect the quality of the . . . scenic values” and identified “scenic values” as one of the resources for which public land should be managed.

FLPMA requires that the BLM prepare and maintain on a continuing basis an inventory of all public lands and their resources and other values (including scenic values). This inventory is referred to as VRM and is described in BLM Manual 8400 – “Visual Resource Management,” and BLM IM 2009-167, “Application of Visual Resource management Program to Renewable Energy.” The BLM VRM system requires the inventory of scenic resources (VRI) and the establishment of land management objectives (VRM classes) reported in the RMPs conducted and updated for all BLM Field Offices. A VRI is required to be completed to process all permit applications; for field offices that have an out-of-date or incomplete VRI, an inventory would be completed.

NEPA, as amended, requires that the Federal Government use all practicable means to ensure citizens “safe, healthful, productive, and aesthetically pleasing surroundings.” NEPA requires Federal agencies to analyze the potential environmental effects of proposed actions and their alternatives, to avoid or minimize adverse effects of proposed actions, and to restore and enhance environmental quality as much as possible.

All Federal lands crossed by the analysis area in New Mexico are managed by the BLM and are managed by the Las Cruces District Office. The Las Cruces District Office manages lands within Doña Ana, Luna, Grant, and Hidalgo counties under the 1993 Mimbres RMP, which currently establishes visual policies and objectives for the analysis area in New Mexico (BLM 1993). The Mimbres RMP identifies VRM goals and planned actions for specially designated areas located within the proposed Project analysis area: Aden Lava Flow RNA and WSA; West Potrillo Mountains WSA, Butterfield Trail SMA, CDNST, Northern Peloncillo Mountains ACEC, and Lordsburg Playa RNA. The Las Cruces District Office is currently updating the Mimbres RMP via the draft Tri-County RMP/EIS and has issued an updated VRI that covers the New Mexico portion of the analysis area (BLM 2013b).

The 2009 “Comprehensive Plan for the Continental Divide Trail” provides direction or coordination between the various agencies that manage different portions of the trail, including the Forest Service, BLM, and NPS (Forest Service 2009). However, the portions of the trail that would be crossed by the proposed Project are all on BLM, State, or private lands. As described in the plan, the purpose of the trail is to provide scenic hiking and horseback riding opportunities and to conserve natural, historic, and cultural resources along the trail corridor.

In Arizona, the majority of Federal lands crossed are administered by the BLM (Tucson and Safford Field Offices), and a small stretch of Coronado National Forest land is crossed in southeastern Arizona for approximately 0.5 mile in the Upgrade Section of the proposed Project. The 1991 Safford RMP is the plan that identifies VRM policies and goals for this portion of the analysis area. Visually sensitive areas identified by the Safford RMP within the project analysis area include the Peloncillo Mountains Wilderness, and the Willcox Playa NNL/ACEC (BLM 1991). A wilderness management plan exists for the Peloncillo Mountains Wilderness. In 2011, a VRI was issued by the Safford Field Office that covers the analysis area in the Safford Field Office area (BLM 1994).

Although no elements of the proposed Project intersect BLM land managed by the Tucson Field Office, the analysis area east of the Safford Field Office area in western Cochise County, Pima County, and southern Pinal County is managed by the Tucson Field Office. Visual resources along the analysis area in the Tucson Field Office area are managed under the 1988 Phoenix RMP (BLM 1988a). The Phoenix RMP was developed by the BLM Phoenix District Office to manage the former Phoenix Resource Area, a portion of which is now managed by the Tucson Field Office. BLM has not conducted a VRI for the Tucson Field Office. Initial inventory data were supplied by the BLM for use in this analysis but are currently incomplete; therefore, an interim VRI was conducted at the project level for the approximately 70 miles of alternatives within route group 4. As noted above, the analysis area crosses 0.5 mile of the Coronado National Forest. The 1986 “Coronado National Forest Land and Resource Management Plan,” amended through 2009, provides management direction for national forest lands in southeastern Arizona and southwestern New Mexico (Forest Service 1986a). It is currently undergoing revision in a draft plan. Visual resources are a key issue in both the existing and draft plans, with utility corridors specifically addressed. In the current plan, existing utility corridors are identified as the preferred location for new utility lines.

3.10.3 State and Regional Plans

No State or regional plans were identified for New Mexico. In Arizona, ADOT published a “Corridor Management Plan for the Patagonia-Sonoita Scenic Road” (ADOT 2003) that sets goals and objectives for managing this scenic route from the intersection of SR 83 and I-10.

3.10.4 County and Regional Plans

In New Mexico, Comprehensive Plans exist for Doña Ana, Luna, Grant, and Hidalgo counties (Doña Ana County 2011; Grant County 2012; Hidalgo County 2011; Luna County 1999). In Doña Ana County, the primary goal is to protect and maintain county resources by designated scenic highway to preserve the historic nature of rural communities. Doña Ana County has established several goals pertaining to preserving and respecting scenic views, sites, and corridors, including the support of a “visually cohesive region respecting the character of communities that make them unique” and “promoting development that reflects the region’s vision which generally relates to a territorial agricultural, historic, and rural character" (Doña Ana County 2011:122–123). In Luna County, emphasis on publicizing local and regional parks (e.g., Rockhound Park, Spring Canyon Park, and Poncho Villa Park) should be made available to the public (Luna County 1999). Grant and Hidalgo counties have references to aesthetics or visual resources in the planning documents (Grant County 2012; Hidalgo County 2011).

In Arizona, county planning documents exist for Pinal County (2010a), Pima County (2009), Cochise County (2006), and Graham County (1996). The Pinal County Comprehensive Plan indicates goals to protect scenic viewsheds and dark skies through the implementation of context sensitive design, as well as limiting development intensity, site coverage, vegetation removal, and protection of open space and ecological, geological, archaeological, historic, or cultural features with importance to natural resources.

In Pima County, the Comprehensive Plan recommends reducing the visual impact of development on scenic vistas and entry points by providing design guidance and requiring more intensive restoration of graded areas.

The Cochise County Comprehensive Plan recommends reduction of light pollution, maintaining rural character, and maintaining a trail network while protecting wildlife, pathways, green open spaces, and dark skies.

One of the goals of the Graham County Comprehensive Plan is to conserve natural resource, preserve scenic beauty, and to promote recreational opportunities. The plan also includes an outdoor lighting code to protect and maintain access to dark night skies.

3.10.5 Local Plans

The analysis area passes through Deming, Lordsburg, and Columbus, New Mexico, and Benson, Willcox, Tucson, and Marana, Arizona. Each of these municipalities has a general plan and municipal code.

3.10.6 Issues to Be Analyzed

The issues to be analyzed include the following:

- Identification of the visual extent of the proposed Project
- Identification of visually sensitive publics/stakeholders whose scenic values are likely to be affected by the proposal
- Identification of visually sensitive landscape features and areas of highly intact landscapes (such as natural, rural or heritage scenic landscapes; prominent views, landmarks, or landscape icons, special area designations, etc.)
- Identification of public concerns about effects that the proposed Project will have on scenic values
- Conformance with the respective BLM RMP VRM Class objectives
- Assess impacts on scenic values held by visually sensitive publics as a result of this proposal
- Assess impacts to the scenic value of public lands caused by the act of introducing long-term utility disturbance in an otherwise undisturbed and intact landscape
- Assess impacts to scenic values as a result of amending VRM Classes to allow this proposal

3.10.7 Inventory Methods

The visual resources evaluation methodology is based upon guidance as stated in BLM 8400 series manuals (H-8410-1 (BLM 1986a); H-8431 (BLM 1986b)) and begins with establishing the area of exposure, identifying the sensitive receptors within the area of exposure, identifying issues of concern as expressed during scoping, KOP selection based on public sensitivity and landscape character, public outreach, field reconnaissance, and any specific communications with vested stakeholders, an assessment of scenic values (as expressed by the public), and the assessment and description of the degree of effect on public scenic value as required by NEPA.

3.10.8 Establishing the Area of Exposure

Evaluation of the area of exposure for the project specific analysis involved the creation of viewshed mapping rendered using a typical 170-foot structure height and a typical span of 1,000-foot pole points along the length of the proposed Project (i.e., Proponent Preferred, Proponent Alternative, local alternatives and route variations). The viewshed map included a buffered area within 10 miles of the centerline and a 30-m digital elevation model was used to provide a macro-level viewshed screening of both BLM and non-BLM lands to establish the area of exposure (see figures 3.10-1 through 3.10-10).

Though the proposed Project in the New Build Section would include only 345-kV facilities, for comparison, 500-kV lattice tower facilities have been shown to be visible at or beyond 10 miles, noticeable to casual observers at distances of up to 10 miles, and to strongly attract attention at distances of up to 3 miles. 500-kV monopole structures have been judged to be noticeable to casual observers at 5 miles.

In terms of the Upgrade Section, 230-kV H-frame structures were judged to be noticeable to casual observers at distances up to 3.5 miles (Sullivan et al. 2014). The viewshed mapping for this proposed Project includes an area up to 10 miles from centerline to capture any potential impacts to culturally or historically significant places (see figures 3.10-1 through 3.10-10). The analysis area for visual resources is 5 miles on either side of the centerline of the New Build Section, which includes 345-kV lattice and monopole structures, and 2 to 5 miles on either side of the centerline for the Upgrade Section, which includes 230-kV monopole structures. This is consistent with recommendations on analysis areas in the "Electric Transmission Visibility and Visual Contrast Threshold Distances in Western Landscapes" (Sullivan et al. 2014).

3.10.9 Identifying the Sensitive Receptors within the Area of Exposure

The area of exposure is used to identify areas of critical public concern (as represented by the KOPs). Concern levels and public awareness (which includes visitation, frequency of viewers, relative visibility, and noticeability) also was determined to identify the sensitive receptors.

3.10.10 Identifying Concern Levels

Concern levels and public awareness (which includes visitation, frequency of viewers, relative visibility, and noticeability) relate to maintaining the existing scenic quality and viewsheds from specific viewing locations. Identifying concern levels began with a desktop analysis to determine and document orientation of views and was finalized through coordination with stakeholders such as the Tumamoc Hill working group, community representatives, scoping comments, other Federal agencies, and local planning documents. In tandem, the VRI sensitivity level rating analysis also provides additional necessary detail to inform the VRI as well as to provide a basis for KOP selection reflective of concern levels.

3.10.11 Methods for KOP Selection

Selection of KOPs occurred within the proposed area of public exposure and relates to locations of visually sensitive publics or visually sensitive locations. The initial step to identify locations from where to conduct a focused study of the affected visual environment was done using a desktop analysis. The desktop analysis involved the use of:

- Viewshed mapping rendered from a 30-m digital elevation model for the entire analysis area to delineate the areas from which the proposed Project would be visible (as described above).
- Scenic quality rating unit (SQRU) mapping rendered using a combination of viewshed mapping, topographic mapping, and professional knowledge of the landscape to delineate landscape character for the entire analysis area.
- Sensitivity mapping rendered to indicate point features where sensitive populations and gathering places are located throughout the entire analysis area.

The KOPs described here were reviewed by BLM and additional agency cooperators and participants, and were finalized for use in this analysis (see appendix I). Locations of the highest visual sensitivity and the highest visually sensitive landscape features were selected for photographic simulation(s) (see figures 3.10-11 and 3.10-12). The derivation of the KOPs analyzed in this section is the result of comprehensive and extensive field reconnaissance, desktop analysis, and GIS mapping. As such, additional views were considered, documented, and eliminated from the final set of KOPs selected for further detailed study, but are considered supplemental critical viewpoints and are included in the proposed Project record.

3.10.12 Assessment of Scenic Values

VRM guidance set forth by the BLM includes an assessment of scenic values, which is referred to as the VRI. Management objectives for visual resources are derived subsequent to the VRI and establishment of scenic values. A combination of scenic quality, sensitivity levels, KOPs, public concern levels, and exposure analysis[2] was used to compose the scenic values evaluation and is described later in this resource section.

Regardless of jurisdiction, an inventory and site analysis to characterize the affected environment for all alternatives was conducted. The evaluation of BLM and non-BLM lands for this Project used a combination of scenery (established through documentation of regional landforms, vegetation, and water) and viewing locations (established through evaluation of sensitive views and scenic values documented through identification of KOPs).

3.10.13 Assessment and Description of the Degree of Effect on Public Scenic Value

The VRI and all components that form the proposed Project-specific VRI are used to evaluate the effects of change on scenic value, compared with the existing environment. Further detail regarding the degree of

[2] The exposure analysis refers to how much of the proposed Project would be perceived by members of the public in the course of their normal interactions in proximity to the proposed Project, such as length of time in view, frequency of view, angle of observation.

effect on public scenic value is explored in chapter 4. Project contrasts would result from modifications to landform, removal of vegetation, or introduction of new structures to the existing landscape. Determination of a substantial effect on visual resources could be mitigated for the purposes of reducing contrast.

3.10.14 Bureau of Land Management Direction

In addition to assessing the degree of effect on scenic value, BLM sets objectives for management of landscape preservation and change through its land use planning process as described in section 3.10.2. All BLM lands are placed into one of four classes, Classes I through IV. These classes identify the degree of acceptable landscape change, or alteration, giving consideration to the scenic value of the landscape and other resource values and uses of the land:

- Class I objectives are established in areas in which no landscape change is desired.
- Classes II objectives are established in areas in which the level of change to the existing landscape should be low.
- Class III objectives are established in areas where the level of change to the existing character of the landscape should be moderate.
- Class IV objectives are set for landscapes that BLM manages for uses that will result in substantial landscape changes.

Scenic quality is assessed in terms of degree of distinctiveness, which takes into consideration such factors as landform, vegetation, color, water, adjacent scenery, scarcity, and cultural modification.

- Class A landscapes are represented by unique lands of outstanding or distinctive diversity or interest, including high-relief mountains, escarpments, highly dissected canyons, monumental landforms and scenic riverways.
- Class B landscapes are lands of above-average diversity of interest and consist of rolling vegetated hills and valleys, mesas, buttes, and unique landforms that define the environment.
- Class C landscapes are primarily common and of minimal diversity, such as high desert plateaus and desert plains areas with few distinguishing features (BLM Manual H-8410-1, “Visual Resource Inventory” (BLM 1986a)).

3.10.15 Analysis Area Conditions

This section will present the VRI (or existing conditions) based on the following factors:

- Scenic quality rating
- Sensitive viewers
- Distance zones
- Visual contrast ratings

A viewshed map is included showing the potential for visibility within a 10-mile, 5-mile, and 2-mile buffer to indicate potential for views within the foreground, middleground, background, and seldom seen zone (see figures 3.10-1 through 3.10-10).

New Build Section

As described in chapter 2, the proposed New Build Section includes two proposed subroutes (1.1 and 1.2, and 2.1 and 2.2), generally between the Afton Substation in southeastern New Mexico, and the Apache Substation in southeastern Arizona.

ROUTE GROUP 1 – AFTON SUBSTATION TO HIDALGO SUBSTATION

Route group 1 would start at the Afton Substation and end at the Hidalgo Substation in New Mexico. The analysis area for route group 1 is located entirely within the Chihuahuan Desert and cross three north-south-trending valleys: Afton, Deming, and Lordsburg. These three valleys are defined by mountain ranges and occasional volcanic cones rising from the valley floors. There is a notable lack of surface water, and typical vegetation along the route group is characterized by low-lying grass and shrub communities.

Several population centers occur along interstate or state highways within the analysis area. The cities of Deming (population 14,963) and Lordsburg (population 2,278) are along I-10. The smaller communities of Columbus (population 1,678) and Hachita (population 49) are along NM 9 along the U.S.–Mexico border (see section 3.15 for more demographic information). Outside these population centers, only isolated, rural residences are known to occur. Several recreational attractions are known throughout this region. There are dispersed recreation opportunities located in the East Potrillo Mountains. In addition, there are recreation opportunities at Pancho Villa State Park in Columbus, the Pyramid Mountains south of Lordsburg, and the CDNST (see section 3.14 for more on recreation opportunities). There are hiking opportunities at the Aden Lava Flow Wilderness Study Area, Kilbourne Hole volcanic crater, and Hunt's Hole volcanic crater. There are also motorized trails within the Aden Hills Open Area between Deming and Las Cruces.

Subroute 1.1 (the Proponent Preferred alternative) passes through 65.5 miles of BLM-managed land. Of that BLM-managed land, 45 percent is managed as VRM Class IV, and the remaining 55 percent is managed as VRM Class III. Subroute 1.2 (Proponent Alternative) along the international border would pass through 82.5 miles of BLM-managed land, of which 32 percent is managed as VRM Class IV. The remaining lands are managed as VRM Class III (44 percent), and VRM Class II (24 percent).

Subroute 1.1 – Proponent Preferred

Subroute 1.1 (the Proponent Preferred alternative) within route group 1 is 147.1 miles long and crosses Doña Ana and Luna counties in New Mexico. The Proponent Preferred alternative originates at the Afton Substation and continues on toward the Hidalgo Substation and the city of Lordsburg.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

The Proponent Preferred alternative crosses the Afton, Deming Valley, and Lordsburg SQRUs, all rated as BLM Class C scenic quality (figure 3.10-13). The SQRUs are typical of the Chihuahuan Desert landscape, broken by occasional volcanic cones and buttes rising from the desert valley floor. All three SQRUs are characterized by low, rolling landscape, minimal vegetation, muted colors, and open desert. It is not an area known for scenic quality. The Aden Lava Flow WSA is located 7 miles to the west, the Florida Mountains are located more than 10 miles to the west, and the West Potrillo Mountains are more than 10 miles to the east. There are no existing substations, although more than 75 percent of subroute 1.1 is adjacent to, and routed along, existing linear features such as existing transmission and gas lines or other transmission lines. KOPs were established in the Lordsburg Mesa and West Potrillo Mountains SQRUs to capture additional views of the area. The SQRUs are summarized in table 3.10-1.

Table 3.10-1. Subroute 1.1 Scenic Quality Rating Units

SQRU	Rating	Description	KOPs
Afton	C	Flat to gently rolling desert landscape with little color contrast between the soils and low-growing vegetation.	P1-01, P2-01, P2-03, P2-04, P3-01, P3-02
Deming Valley	C	Deming Valley is characterized by flat to gently rolling desert landscape with little color contrast between the sandy soils and low-growing desert vegetation.	P2-05, P2-06, P2-07
Lordsburg Valley	C	Lordsburg Valley is characterized by flat valley floors with little variation in topography or color contrast between the sandy soils and low-growing desert vegetation. Buckman Hill, Homestead Hill, and Black Mountain provide isolated topographic variation.	None
Lordsburg Mesa	B	Lordsburg Mesa is adjacent to Lordsburg Valley and is differentiated from the valley by more eroded and rolling topography rising up to the higher mountainous SQRUs and the National Forest.	P2-08
West Potrillo Mountains	B	The West Potrillo Mountains are characterized by low volcanic peaks. The volcanic cones of the West Potrillo Mountain WSA are located 2 miles to the north of subroute 1.1.	P2-02

Sensitivity

Subroute 1.1 (Proponent Preferred alternative) crosses the Afton, I-10 Deming to Lordsburg, and Deming Valley sensitivity level rating units (SLRUs) (figure 3.10-14). The Afton SLRU is used primarily as range land interspersed with isolated rural residences. The area has low levels of public use, primarily ranching and some OHV activity. The area has low viewer sensitivity. The I-10 to Deming SLRU is a major travel corridor with high viewer sensitivity. Once past Deming, the Proponent Preferred alternative follows an existing 345-kV transmission line. The Deming Valley SLRU is an area with rural residential, agricultural, and some industrial uses with medium viewer sensitivity. There are no known residences or other occupied areas in the southern half. Travel routes along this segment are limited to I-10 in the north, NM 9 in the south, and a sparse unpaved county road network throughout. There are recreational opportunities, including the Aden Hills OHV Open Area, and dispersed recreation opportunities in the Florida Mountains. The Butterfield Trail also crosses the Langford Mountains.

KOPs were established in the East Potrillo Mountains and Lordsburg Mesa SLRUs to capture additional views of the area. The SLRUs are summarized in table 3.10-2.

Table 3.10-2. Subroute 1.1 Sensitivity Level Rating Units

SLRU	Rating	Description	KOPs
Afton	Low	The unit is primarily used for ranching and has some OHV activity. The area is isolated, has no large population centers, few rural residences, and limited recreational opportunities.	P1-01, P3-02
I-10 Deming to Lordsburg	High	The unit is a heavily traveled corridor for local residents and tourists.	P2-01, P2-03, P2-04, P2-05, P2-06 P3-01, P3-02

Table 3.10-2. Subroute 1.1 Sensitivity Level Rating Units (Continued)

SLRU	Rating	Description	KOPs
East Potrillo Mountains	High	The East Potrillo Mountains are considered a scenic destination near to the population centers of El Paso and Las Cruces, and are considered a high viewer sensitivity area. Nearby recreation opportunities include day hikes at Mount Riley and Cox Mountain in the East Potrillo Mountains. Hunt's Hole and Kilbourne Hole are regional tourist draws for the scenic and geologic interest.	P2-02
Deming Valley	High	The unit contains rural residential, agricultural, and industrial land uses.	P2-07
Lordsburg Mesa	Low	Unit has very low use.	P2-08

Key Observation Points

Dispersed rural residences are located along portions of the subroute 1.1. There are concentrations of residences in the community of Deming. High concern sensitive viewing areas for the proposed route include the I-10 travel corridor, Aden Hills OHV area, Aden Lava Flow, West Potrillo Mountains, Florida Mountains WSA, and access to the CDNST. The KOPs for subroute 1.1 are summarized in table 3.10-3.

Table 3.10-3. Subroute 1.1 KOP Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
P1-01	No	Afton	Afton	Foreground/ Middleground of the proposed route	View represents the Afton Substation from background. Approximately 6 miles from the San Jose Catholic Church Historical Site and VRI/VRM Class II, High Sensitivity, Class B Scenic Quality. Approximately 8 miles from Aden Lava Flow (VRI/VRM Class III).
P2-01	Yes	Afton	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	2.2 miles from Aden Hills OHV, simulation represents VRI/VRM Class III OHV area.
P2-02	No	West Potrillo Mountains	East Potrillo Mountains	Foreground/ Middleground of the proposed route	View from West Potrillo Mountains directly adjacent to VRI/VRM Class II, High Sensitivity, Class B Scenic Quality lands.
P2-03	No	Afton	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	Located near several private properties outside of BLM lands on the boundary between Luna and Doña Ana counties. This view is from NM 549, approximately 0.36 mile from an existing monopole line, and 0.6 mile from existing railroad tracks.
P2-04	Yes	Afton	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	This view is from within the I-10 transportation corridor approximately 0.85 mile from the proposed line and is located within/adjacent to VRI/VRM Class III landscape.
P2-05	Yes	Deming Valley	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	This is the closest view in the Deming area (approximately 3.7 miles due north). Several potentially sensitive receptors (including local parks, churches, cemetery, and residences) exist in Deming. This is also the closest point to the Florida Mountains (identified as a well-used recreation area and VRI/VRM Class II).

Table 3.10-3. Subroute 1.1 KOP Descriptions (Continued)

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
P2-06	No	Deming Valley	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	View is from Padre Hill Drive NW and Overhill Drive located directly north of a residential driveway and approximately 0.5 mile from the proposed line.
P2-07	No	Deming Valley	Deming Valley	Foreground/ Middleground of the proposed route	KOP within VRI/VRM Class IV landscape and adjacent to (within 500 feet of) VRI/VRM Class III landscape. This view is located along an unpaved county road at the foot of Grandmother Mountain. This roadway heads west and north and provides access to a single ranch and largely open/vacant lands. This view is 2 miles east of the CDNST.
P2-08	No	Lordsburg Mesa	Lordsburg Mesa	Foreground/ Middleground of the proposed route	Located on a small parcel of BLM land (VRI/VRM Class IV). No immediate sensitive receptors; landscape is very rural and largely vacant.
P3-01	Yes	Non-BLM land	Non-BLM land	Foreground/ Middleground of the proposed route	Located on non-BLM land with views to the west from Geronimo Road and Ojo Road. Rural residential area with racetrack to the northwest (approximately 0.5 mile).
P3-02	No	Non-BLM land	Non-BLM land	Foreground/ Middleground of the proposed route	Florida Mountains lie 6 miles to the west and could afford direct long-distance views of the line. From the east (looking west) at the West Potrillo Mountains between 7 and 12 miles away, direct views of the line would likely occur due to “superior” viewing locations and visual impacts from the substation expansion.

Bureau of Land Management Visual Resource Management

Subroute 1.1 crosses 5.5 miles of VRM Class III and 59.4 miles of VRM Class IV BLM-managed lands. Lands not managed by the BLM are generally State-owned or privately owned (figures 3.10-15 and 3.10-16).

Subroute 1.2 – Proponent Alternative

Subroute 1.2, the Proponent Alternative, would also start at the Afton Substation, but would go south, intersecting NM 9 and following the highway west along the U.S.–Mexico border.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

Subroute 1.2 crosses nine SQRUs: the Afton, East Potrillo Mountains, West Potrillo Mountains, Deming Valley, Hermanas Mountains, Cedar Mountains, Hachita Valley, Lordsburg Valley, and Pyramid Mountains SQRUs (see figure 3.10-13). The scenic rating and brief description of each SQRU that the alternative crosses is provided in table 3.10-4.

Table 3.10-4. Subroutes 1.1 and 1.2 Scenic Quality Rating Units

SQRU	Rating	Description	KOPs
Afton	C	Flat to gently rolling desert landscape with little color contrast between the soils and low-growing vegetation.	P1-01, S1-01, S1-02, S2-01, S3-01, P3-02
East Potrillo Mountains	B	Low, rounded hills with two prominent, conical peaks; Cox Mountain and Mount Riley.	None
West Potrillo Mountains	B	The West Potrillo Mountains are characterized by low volcanic peaks. The volcanic cones of the West Potrillo Mountain WSA are located 2 miles to the north of the alternative.	S4-01
Deming Valley	C	Deming Valley is characterized by flat to gently rolling desert landscape with little color contrast between the sandy soils and low-growing desert vegetation.	S5-01, S5-02, S5-03
Hermanas Mountains	B	The Hermanas Mountains are characterized by low rounded hills with three distinct conical peaks. Ranches and agricultural fields surround most of the town of Columbus.	None
Cedar Mountains	C	The Cedar Mountains are characterized by a small pyramidal series of mountains running diagonally from the Mexican border between the Deming and Hachita valleys.	None
Hachita Valley	C	Hachita Valley is characterized by low, flat valleys, with little variation in topography, color, or vegetation. There are no existing transmission lines or substations.	S6-01, S7-01, S7-02, S7-03, S7-04
Lordsburg Valley	C	Lordsburg Valley is characterized by flat valley floors with little variation in topography or color contrast between the sandy soils and low-growing desert vegetation. Buckman Hill, Homestead Hill, and Black Mountain provide isolated topographic variation.	S7-05, S8-01, S8-02
Pyramid Mountains	B	The Pyramid Mountains are known for complex landforms and adjacent scenic mountain range and valley.	None

Sensitive Viewers

Subroute 1.2 crosses the Afton, East Potrillo Mountains, Deming Valley, Hermanas Mountains, Cedar Mountains, Hachita Valley, Lordsburg Valley, and I-10 Lordsburg to Deming SLRUs (see figure 3.10-14). The sensitivity level rating and a brief description of each SLRU is provided in table 3.10-5.

Table 3.10-5. Subroute 1.2 Sensitivity Level Rating Units

SLRU	Rating	Description	KOPs
Afton	Low	The area is primarily used for ranching and has some OHV activity. The area is isolated, has no large population centers, few rural residences, and limited recreational opportunities.	P1-01, S1-01, S1-02, S2-01, S3-01, P3-02
East Potrillo Mountains	High	The East Potrillo Mountains are considered a scenic destination near to the population centers of El Paso and Las Cruces and are considered a high viewer sensitivity area. Nearby recreation opportunities include day hikes at Mount Riley and Cox Mountain in the East Potrillo Mountains. Hunt’s Hole and Kilbourne Hole are regional tourist draws for the scenic and geological interest.	S4-01
Deming Valley	Medium	Contains rural residential, agricultural, and industrial land uses.	S5-01, S5-02, S5-03
Hermanas Mountains	Low	There are low numbers of users in the area.	None
Cedar Mountains	Low	There are low numbers of users in the area.	None

Table 3.10-5. Subroute 1.2 Sensitivity Level Rating Units (Continued)

SLRU	Rating	Description	KOPs
Hachita Valley	Medium	Includes the presence of rural residences in other parts of the valley. Contains rural residential land uses sensitive to change.	S6-01, S7-01, S7-02, S7-03, S7-04
Lordsburg Valley	Low	The Lordsburg Valley SLRU is rated as low viewer sensitivity because of the development that occurs in the area. Lordsburg Valley includes the town of Lordsburg and surrounding rural-residential communities, cultivated farmlands, and ranching.	S7-05, S8-02
I-10 Lordsburg to Deming	High	The unit is a major travel corridor with high viewer sensitivity. The CDNST crosses northeast of Lordsburg where the trail enters the Langford Mountains.	S8-01

Key Observation Points

Dispersed rural residences are located along portions of the subroute 1.2. There are concentrations of residences in the communities of Lordsburg, Columbus, and Hachita. High concern sensitive viewing areas for the alternative southern route include the I-10 travel corridor, Pancho Villa State Park, and the CDNST. KOPs for subroute 1.2 are summarized in table 3.10-6.

Table 3.10-6. Subroute 1.2 KOP Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
S1-01	Yes	Afton	Afton	Foreground/ Middleground of the alternative southern route	No highly sensitive receptors. Class IV BLM lands.
S1-02	No	Afton	Afton	Foreground/ Middleground of the alternative southern route	View from foot of Kilbourne Hole.
S2-01	Yes	Afton	Afton	Foreground/ Middleground of the alternative southern route	No highly sensitive receptors.
S3-01	Yes	Afton	Afton	Foreground/ Middleground of the alternative southern route	View is located along NM 9 and is oriented westward along roadway along the Proponent Alternative. View is located outside of any sensitive locations, or unique landscape.
S4-01	No	West Potrillo Mountains	East Potrillo Mountains	Foreground/ Middleground of the alternative southern route	View is located approximately 2.2 miles from the Proponent Alternative line and 2.5 miles from the U.S.–Mexico border. Landscape is largely flat and common; few sensitive viewers are located in this area as it is highly monitored by the U.S. Border Patrol.
S5-01	No	Deming Valley	Deming Valley	Foreground/ Middleground of the alternative southern route	View is located along NM 9 oriented southward away from the community of Columbus. This view does not represent a sensitive location.

Table 3.10-6. Subroute 1.2 KOP Descriptions (Continued)

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
S5-02	Yes	Deming Valley	Deming Valley	Foreground/ Middleground of the alternative southern route	View is 1.26 miles from the Proponent Alternative line and simulation shows a “superior” view from atop a mountain within the Pancho Villa State Park (just southwest of Columbus). Recommend further determination of park users and sensitivity from this location.
S5-03	No	Deming Valley	Deming Valley	Foreground/ Middleground of the alternative southern route	Though located 43 miles to the west, this view is very similar to S5-01 and does not represent a sensitive viewpoint or distinctive lands.
S6-01	No	Hachita Valley	Hachita Valley	Foreground/ Middleground of the alternative southern route	Also located on NM 9, view is representative of a slightly different landscape character than S5-03 but does not represent sensitive viewing conditions.
S7-01	No	Hachita Valley	Hachita Valley	Foreground/ Middleground of the alternative southern route	Very similar view to S5-03.
S7-02	Yes	Hachita Valley	Hachita Valley	Foreground/ Middleground of the alternative southern route	Simulation shows view from Hachita oriented northward within a rural residential community.
S7-03	No	Hachita Valley	Hachita Valley	Foreground/ Middleground of the alternative southern route	View is over 0.5 mile north of Hachita oriented toward the town. 180 degrees north of the viewpoint is a large proposed staging area.
S7-04	No	Hachita Valley	Hachita Valley	Foreground/ Middleground of the alternative southern route	View is located immediately adjacent to the CDNST and is 0.5 mile from the Proponent Alternative.
S7-05	No	Lordsburg Valley	Lordsburg Valley	Foreground/ Middleground of the alternative southern route	View is located 1.5 miles from Proponent Alternative and is indicative of a slightly more vegetated landscape; however, no sensitive viewers are located nearby.
S8-01	Yes	Lordsburg Valley	I-10 Lordsburg to Deming	Foreground/ Middleground of the alternative southern route	Located along I-10; simulation depicts Proponent Alternative crossing the I-10 at a perpendicular angle.
S8-02	No	Lordsburg Valley	Lordsburg Valley	Foreground/ Middleground of the alternative southern route	Located at Muir Road, view is oriented to the south looking toward agricultural fields.

Bureau of Land Management Visual Resources Management

Subroute 1.2 crosses 19.3 miles of VRM Class II, 36.1 miles of VRM Class III, and 25.5 miles of VRM Class IV BLM land. Local route alternative segments (A, B, C, and D) within route group 2 cross 5.5 miles of VRM Class II, 17.0 miles of VRM Class III, and 11.9 miles of VRM Class IV lands. Lands not managed by BLM are generally State owned or privately owned (figures 3.10-15 and 3.10-16).

DN1

Local alternative DN1 is 42.5 miles long and provides a co-location option with the approved but not yet constructed SunZia project. This local alternative is farther north of I-10 than subroute 1.1.

Scenic Quality

Local alternative DN1 crosses the Deming Valley, Lordsburg Valley, Lordsburg Mesa, and Grandmother Victoria SQRUs, all rated as BLM Class B and Class C scenic quality (see figure 3.10-13). The SQRUs are typical of the Chihuahuan Desert landscape broken by occasional volcanic cones and buttes rising from the desert valley floor. All SQRUs are characterized by low, rolling landscape, minimal vegetation, muted colors, and open desert. The Lordsburg Mesa, which is rated as Class B scenic quality, is characterized by higher mountains and more diverse topography. It is not an area known for scenic quality. There are no existing substations or other transmission lines. The SQRUs are summarized in table 3.10-7.

Table 3.10-7. Local Alternative DN1 Scenic Quality Rating Units

SQRU	Rating	Description	KOPs
Deming Valley	C	Deming Valley is characterized by flat to gently rolling desert landscape with little color contrast between the sandy soils and low-growing desert vegetation.	None
Lordsburg Valley	C	Lordsburg Valley is characterized by flat valley floors with little variation in topography or color contrast between the sandy soils and low-growing desert vegetation. Buckman Hill, Homestead Hill, and Black Mountain provide isolated topographic variation.	None
Lordsburg Mesa	B	Differentiated from Lordsburg Valley and Deming Valley by more eroded and rolling topography rising up to higher mountains units and National Forest.	None
Grandmother	C	Unit consists of Grandmother Mountains and Victoria Mountains split by I-10. Mountains are surrounded by lower valley units.	None

Sensitivity

Local alternative DN1 crosses the I-10 Deming to Lordsburg, Deming Valley, Grandmother Victoria, and Lordsburg Mesa SLRUs (see figure 3.10-14). The I-10 to Deming SLRU is a major travel corridor with high viewer sensitivity. The Deming Valley SLRU is an area with rural residential, agricultural, and some industrial uses with medium viewer sensitivity. Both the Grandmother Victoria and Lordsburg Mesa SLRUs are areas of very low use and low viewer sensitivity. The SLRUs are summarized in table 3.10-8.

Table 3.10-8. Local Alternative DN1 Sensitivity Level Rating Units

SLRU	Rating	Description	KOPs
I-10 Deming to Lordsburg	High	The unit is a heavily traveled corridor for local residents and tourists.	None
Deming Valley	Medium	The unit contains rural residential, agricultural, and industrial land uses.	None
Grandmother Victoria	Low	Not a well-used area, or an area well known for visual sensitivity.	None
Lordsburg Mesa	Low	Unit has very low use.	None

Key Observation Points

No critical KOPs were identified for DN1. The area has no known populations, and KOPs P2-05, P2-06, and P2-07 established for subroute 1.1 may be used for this alternative.

Bureau of Land Management Visual Resource Management

DN1 crosses 4.0 miles of VRM Class III and 2.9 miles of VRM Class IV BLM-managed lands (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

A

Local alternative A is 17.5 miles long and would largely follow existing unpaved county roads.

Scenic Quality

Local alternative A crosses lands identified as BLM Class C scenic quality (see figure 3.10-13).
The SQRUs are typical of the Chihuahuan Desert landscape, broken by occasional volcanic cones and buttes rising from the desert valley floor. All SQRUs are characterized by low, rolling landscape, minimal vegetation, muted colors, and open desert. It is not an area known for scenic quality. There are no existing substations or other transmission lines.

Sensitivity

Local alternative A passes few residences and no known recreational resources. Local alternative A would follow County Road A015 and NM 9 for its entire length.

Key Observation Points

Local alternative A passes no residences; one KOP (A-01) was identified. The area has no known populations.

Bureau of Land Management Visual Resource Management

Local alternative A crosses 14.7 miles of VRM Class III BLM-managed lands (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

B

Local alternative B is 12.2 miles long and parallels NM 9 for the entire 12 miles.

Scenic Quality

Local alternative B crosses Class B and Class C scenery, similar to segment S4. Portions of segment B follow the West Potrillo Mountains WSA boundary. The SQRUs are typical of the Chihuahuan Desert landscape, broken by occasional volcanic cones and buttes rising from the desert valley floor. All SQRUs are characterized by low, rolling landscape, minimal vegetation, muted colors, and open desert. The area is not known for scenic quality. There are no existing substations or other transmission lines.

Sensitivity

Local alternative B follows NM 9 and portions of the West Potrillo Mountains WSA boundary, and there would be higher viewer sensitivity from the WSA.

Key Observation Points

One KOP (B-01) was identified for local alternative B. The area has no known populations.

Bureau of Land Management Visual Resource Management

Local alternative B crosses 10.0 miles of VRM Class IV BLM-managed lands (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

C

Local alternative C is 9 miles long and would parallel NM 9 for the entire 9 miles.

Scenic Quality

Local alternative C crosses lands rated as BLM Class C scenic quality (see figure 3.10-13).

Sensitivity

Local alternative C follows NM 9 for its entire length. There are no residences or known recreation resources that occur along local alternative C, and there are areas of very low use and low viewer sensitivity.

Key Observation Points

One KOP (C-01) was identified for local alternative C. The area has no known populations.

Bureau of Land Management Visual Resource Management

Local alternative C crosses 3.7 miles of VRM Class II BLM-managed lands (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

D

Local alternative D is 22.8 miles long beginning just east of the Hidalgo and Grant county line in New Mexico.

Scenic Quality

Local alternative D crosses lands rated as BLM Class C scenic quality and is not an area known for scenic quality. There are no existing substations or other transmission lines.

Sensitivity

Local alternative D crosses perpendicular to the CDNST, where sensitivity would be moderate. There are few rural residences in the area, and few other dispersed recreation resources.

Key Observation Points

Two KOPs (D-01 and D-02) were identified for this local alternative.

Bureau of Land Management Visual Resource Management

Local alternative D crosses 1.8 miles of VRM Class II, 2.3 miles of VRM Class III, and 1.9 miles of VRM Class IV BLM-managed lands (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

ROUTE GROUP 2 – HIDALGO SUBSTATION TO APACHE SUBSTATION

Subroute 2.1 – Proponent Preferred

Subroute 2.1 is approximately 95.5 miles long, originating near the western boundary of Grant County, New Mexico, and crossing west and south to the Willcox Playa in Arizona. There is approximately 28.3 miles of the route that crosses BLM land.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

Subroute 2.1 crosses a diversity of landscapes. The Dos Cabezas Mountains are rated as Class A scenic value and are characterized by the highly varied landscape of the Dos Cabezas Mountains (see figure 3.10-13). The Peloncillo Mountains and San Simon Valley are rated as Class B scenic value and are characterized by steep undulating ridgelines, low rounded hills, and eroded rocky peaks. The Lordsburg Valley and Sulphur Springs Valley are rated as Class C areas and are generally characterized by flat desert valleys and playas surrounded by mountains, including the Willcox Playa. As noted in chapter 2, more than 83 percent of subroute 2.1 is adjacent to, and routed along, existing linear features, most of which are existing transmission and gas lines. The SQRUs are described in table 3.10-9.

Table 3.10-9. Subroute 2.1 and Variations Scenic Quality Rating Units

SQRU	Rating	Description	KOPs
Lordsburg Valley	C	Lordsburg Valley is characterized by flat valley floors with little variation in topography or color contrast between the sandy soils and low-growing desert vegetation. Buckman Hill, Homestead Hill, and Black Mountain provide isolated topographic variation.	P4-01, P4-02, P5-01
Peloncillo Mountains	B	A long, complex mountain range running from the Mexican border northwest to the Arizona border. Two lower valleys to the east and west.	None
San Simon Valley	B	Large river valley between mountain ranges on west and east. San Simon River is not evident through most areas in the valley.	P5-02, P6-01, P6-02
Dos Cabezas Mountains	A	Prominent and distinctive mountain range dividing the Sulphur Springs Valley and San Simon Valley. Proposed route briefly intersects.	None
Sulphur Springs Valley	C	Limited scenic qualities, although Willcox Playa ACEC is an NNL. Most of the playa is a designated bombing range. Fragmented BLM parcels in wide valley with mountain ranges on the east and west sides. Large semidesert grassland.	P6-03,P7-01, P7-02, P7-03
Willcox Playa	C	Limited scenic value; most adjacent land is agricultural.	None

Sensitivity

Subroute 2.1 crosses 11 SLRUs with low, moderate, and high sensitivity (see figure 3.10-14). High sensitivity areas include major travel corridors along I-10 with views of the subroute in the foreground and middle ground. Tourist attractions and recreation sites along the proposed route with high viewer sensitivity include the Fort Bowie Historic Site, Dos Cabezas Wilderness Area, hiking opportunities in the Langford Mountains, the CDNST, and Willcox Playa Wildlife Area. There are several rural communities, including Lordsburg, San Simon, and Bowie. Widely dispersed rural residences and agricultural development occur along the remainder of the route. The SLRUs crossed by subroute 2.1 are described in table 3.10-10.

Table 3.10-10. Subroute 2.1 and Variations Sensitivity Level Rating Units

SLRU	Rating	Description	KOPs
Lordsburg Valley	Low	Valley has development.	None
I-10 Deming to Lordsburg	High	Travel corridor for local residents and tourism.	P4-01, P4-02, P5-01
Animas Valley	High	Scenic area enjoyed by local residents and tourists to the area.	P5-02
I-10 Willcox to New Mexico	High	Major transportation route with scenic areas visible from the highway,	
Apache Pass	High	Historic pass through Dos Cabezas and Chiricahua Mountains.	None
Dos Cabezas	High	Access to Dos Cabezas Mountain Wilderness.	P6-02
U.S. Route 191 Safford to I-10	High	Major transportation route with scenic areas visible from the highway.	None
Haekel and Fan Roads	Moderate	San Simon Creek area and moderately used access route to Hot Well Dunes Recreation Area. Popular dispersed recreation area with good access to highways.	P6-01
I-10 Willcox to Texas Canyon	High	Major transportation route with scenic areas visible from the highway.	P6-03
Sulphur Spring	Low	Low-use and population area with small parcels of BLM among State and private lands. Sulphur Springs contains mostly private and State lands. The small amount of BLM within the unit is located near the community of Pearce and around mining claims in the Swisshelm Mountains.	None
Willcox Playa Wildlife Area	High	A popular birding location for sandhill cranes, and hunting area.	P7-01, P7-02, P7-03

Key Observation Points

As noted above, there are concentrations of residences in the communities of Lordsburg, San Simon, and Bowie. Dispersed rural residences are located in the analysis area along the remainder of the proposed route. High sensitivity viewing areas within the analysis area for the proposed route include the I-10 travel corridor, the CDNST, the Peloncillo Mountains, Dos Cabezas Wilderness, Fort Bowie, and the Willcox Playa. The KOPs for subroute 2.1 are summarized in table 3.10-11.

Table 3.10-11. Subroute 2.1 and Variations KOP Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
P4-01	No	Lordsburg Valley	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	View is not from BLM land and is located along a portion of the CDNST that parallels NM 90 approximately 0.25 mile northeast of the intersection with NM 70. Very few residents or destinations are located along NM 90. There is no marked trailhead located here, and landscape is characterized by large expanses of open space. Recreators seeking a solitary experience on the CDNST may use this portion of the trail.
P4-02	No	Lordsburg Valley	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	Located at the intersection of Hook and Anchor Road and NM 70 (Duncan Highway). This view is oriented north approximately 0.4 mile from the proposed line. There is one rural residence 0.3 mile south of this view. A potential staging area is 0.45 mile northwest of this KOP on NM 70. Few sensitive receptors and common landscape character represent this view.
P5-01	Yes	Lordsburg Valley	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	Located on LD1 (bypass of Lordsburg Playa) within VRI/VRM III, Scenic Quality C, and High Sensitivity.
P5-02	Yes	San Simon Valley	Animas Valley	Foreground/ Middleground of the proposed route	Adjacent to VRI/VRM Class II, Scenic Quality B, High sensitivity lands, located in VRI/VRM Class III. View is located in a wash southwest of Peloncillo Mountains. Simulation is rendered 2.3 miles from proposed line, views of Chiricahua Mountains in the background distance zone (beyond 20 miles south).
P6-01	No	San Simon Valley	Fort Bowie National Historic Site	Foreground/ Middleground of the proposed route	Located 6 miles from VRI/VRM Class II landscape, and 8 miles from Dos Cabezas. View is from residential community within town of Bowie.
P6-02	No	San Simon Valley	Dos Cabezas	Foreground/ Middleground of the proposed route	View is from roadway that accesses Fort Bowie.
P6-03	Yes	Sulphur Springs Valley	I-10 Willcox to Texas Canyon	Foreground/ Middleground of the proposed route	View is oriented 0.5 mile from VRM Class II lands looking north away from Dos Cabezas toward Pinaleño Mountains.
P7-01	No	Sulphur Springs Valley	Willcox Playa Wildlife Area	Foreground/ Middleground of the proposed route	This view is due west of Willcox Playa; Dos Cabezas Mountains are 180 degrees east from this point. View is 0.5 mile from line, proposed staging area would be in the immediate foreground.
P7-02	Yes	Sulphur Springs Valley	Willcox Playa Wildlife Area	Foreground/ Middleground of the proposed route	Not on BLM lands. Approximately 2 miles from edge of Willcox Playa and 4 miles north of Butterfield Trail. Surrounded by agricultural fields. Facing north-northwest.
P7-03	No	Sulphur Springs Valley	Willcox Playa Wildlife Area	Background	1.4 miles from BLM Class II VRI/VRM on west side of Willcox Playa. KOP oriented 8 miles from line to the southeast and 1 mile from agency route alternative.

Bureau of Land Management Visual Resource Management

Subroute 2.1 crosses 21.0 miles of VRM Class III, and 14.9 miles of VRM Class IV BLM-managed lands (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

Subroute 2.2 – Proponent Alternative

Subroute 2.2 is approximately 96 miles long, originating near the western boundary of Grant County, New Mexico, and crossing west and south to the Willcox Playa in Arizona. Approximately 21.9 miles of the route crosses BLM land.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

Subroute 2.2 crosses a diversity of landscapes. There are 49.0 miles of subroute 2.2 that cross Class C scenery (51 percent of the subroute), and 47.6 miles that cross Class B scenery (49 percent of the subroute) (see figure 3.10-13). The Peloncillo Mountains and San Simon Valley are rated as Class B scenic value and are characterized by steep undulating ridgelines, low rounded hills, and eroded rocky peaks. The Lordsburg Valley and Sulphur Springs Valley are rated as Class C areas and are generally characterized by flat desert valleys and playas surrounded by mountains, including the Willcox Playa. As noted in chapter 2, more than 55 percent of subroute 2.2 is adjacent to, and routed along, linear features such as existing transmission lines. The SQRUs are described in table 3.10-12.

Table 3.10-12. Subroute 2.2 Scenic Quality Rating Units

SQRU	Rating	Description	KOPs
Lordsburg Valley	C	Lordsburg Valley is characterized by flat valley floors with little variation in topography or color contrast between the sandy soils and low-growing desert vegetation. Buckman Hill, Homestead Hill, and Black Mountain provide isolated topographic variation.	None
Peloncillo Mountains	B	A long, complex mountain range running from the Mexican border northwest to the Arizona border. Two lower valleys to the east and west.	None
San Simon Valley	B	Large river valley between mountain ranges on west and east. San Simon River is not evident through most areas in the valley.	E-01, E-02, F-01, F-02
Sulphur Springs Valley	C	Limited scenic qualities, although Willcox Playa ACEC is an NNL. Most of the playa is a designated bombing range. Fragmented BLM parcels in wide valley with mountain ranges on the east and west sides. Large semidesert grassland.	G-01, G-02, G-03
Willcox Playa	C	Limited scenic value; most adjacent land is agricultural.	None

Sensitivity

Subroute 2.2 crosses 7 SLRUs with low, moderate, and high sensitivity (see figure 3.10-14). High sensitivity areas include major travel corridors along I-10 with views of the subroute in the foreground and middle ground. Tourist attractions and recreation sites along the route with high viewer sensitivity include the Willcox Playa Wildlife Area. There are several rural communities, including San Simon, Bowie, and Cochise. Widely dispersed rural residences and agricultural development occur along the remainder of the subroute. The SLRUs crossed by the route are described in table 3.10-13.

Table 3.10-13. Subroute 2.2 Sensitivity Level Rating Units

SLRU	Rating	Description	KOPs
I-10 Deming to Lordsburg	High	Travel corridor for local residents and tourism.	E-01, E-02
Animas Valley	High	Scenic area enjoyed by local residents and tourists to the area.	None
I-10 Willcox to New Mexico	High	Major transportation route with scenic areas visible from the highway,	None
Haekel and Fan Roads	Moderate	San Simon Creek area and moderately used access route to Hot Well Dunes Recreation Area. Popular dispersed recreation area with good access to highways.	F-01, F-02
I-10 Willcox to Texas Canyon	High	Major transportation route with scenic areas visible from the highway.	G-01
Sulphur Spring	Low	Low-use and population area with small parcels of BLM among State and private lands. Sulphur Springs contains mostly private and State lands. The small amount of BLM within the unit is located near the community of Pearce and around mining claims in the Swisshelm Mountains.	None
Willcox Playa Wildlife Area	High	A popular birding location for sandhill cranes, and hunting area.	G-02, G-03

Key Observation Points

There are concentrations of residences in the communities of San Simon, Bowie, and Cochise. Dispersed rural residences are located in the analysis area along the remainder of the route. High sensitivity viewing areas within the analysis area for subroute 2.2 include the I-10 travel corridor, Fort Bowie, and the Willcox Playa. The KOPs for subroute 2.2 are summarized in table 3.10-14.

Table 3.10-14. Subroute 2.2 Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
E-01	Yes	Lordsburg Valley	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	Alkali Flat; view from I-10 across Alkali Flat, toward the Peloncillo Mountains. Same as local alternative LD1.
E-02	No	San Simon Valley	I-10 Deming to Lordsburg	Foreground/ Middleground of the proposed route	View is from town of San Simon, sensitive residential receptors. Major transportation route with scenic areas and provides connection from Las Cruces to Tucson. Same as local alternative LD1.
F-01	Yes	San Simon Valley	Haekel and Fan Roads	Foreground/ Middleground of the proposed route	This view is located 0.25 mile from alternative route, at the intersection of North Central and East Arizona Street in the town of Bowie. No public comments came from Bowie during scoping. North of the alternative line are agricultural fields and limited homes. Concentrated residential area more than 0.25 mile north of I-10 at Apache Pass Road exit. Surrounded by agricultural lands.
F-02	No	San Simon Valley	Haekel and Fan Roads	Foreground/ Middleground of the proposed route	View is 0.5 mile from the alternative and 2.7 miles from preferred alternative. KOP faces due south. Limited visual sensitivity in this area due to lack of receptors.
G-01	No	Sulphur Springs Valley	I-10 Willcox to Texas Canyon	Foreground/ Middleground of the proposed route	Not on BLM lands. Cascabel Road with views of the Dos Cabezas in the background to the east and of Segment Ga to the west.

Table 3.10-14. Subroute 2.2 Descriptions (Continued)

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
G-02	No	Sulphur Springs Valley	Willcox Playa Wildlife Area	Foreground/ Middleground of the proposed route	North of the Willcox Playa with views of Ga, Gb, and Gc to the west and south.
G-03	Yes	Sulphur Springs Valley	Willcox Playa Wildlife Area	Foreground/ Middleground of the proposed route	View from the Cochise area.

Bureau of Land Management Visual Resource Management

Subroute 2.2 crosses 17.8 miles of VRM Class III, and 4.1 miles of VRM Class IV BLM-managed lands (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

Route Group 2 Route Variations

Several route variations (P7a through P7d) were developed in an area generally located southeast of the Willcox Playa on both ASLD and privately owned lands. These route variations were developed to reduce potential avian impacts on the southeast side of the Willcox Playa from subroute 2.1.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

The route variations cross lands rated as Class C that are generally characterized by flat desert valleys and agricultural lands including several vineyards. There are a number of areas along the route variations where other developments do exist and in general these route variations parallel existing roadways.
The SQRU crossed by the route variations are described in table 3.10-9. Views from the Willcox Bench feature the scenic Dos Cabezas and Chiricahua mountains.

Sensitivity

The route variations cross lands with a high viewer sensitivity (see figure 3.10-14). High-sensitivity areas primarily include the domestic farm wineries, tasting rooms, and private properties located on the Willcox Bench. Dispersed rural residences and agricultural development, including a handful of vineyards and three existing winery tasting rooms, also occur along the route variations. At least 12 of the vineyards in the Willcox area are located on the Willcox Bench, in relative proximity to the P7a, P7b, P7c, and P7d route variations. In addition, there are three existing winery tasting rooms in close relative proximity to the P7a and P7b route variations. Vineyard owners have expressed concerns about potential impacts of these route alternatives on tourist visits to their vineyards and tasting rooms (see Section 4.15, “Socioeconomics and Environmental Justice,” and chapter 8). The SLRUs crossed by the route variations are described in table 3.10-10.

Key Observation Points

Although the route variations are located farther south and east of the higher sensitivity viewers at the Willcox Playa, they are located near high sensitivity viewers associated with wineries, winery tasting rooms, and private properties on the Willcox Bench. Three KOPs were identified as representative of the potential views of the route variations. The KOPs for the route Group 2 route variations are summarized in table 3.10-15.

Table 3.10-15. Route Group 2 Route Variations Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
WB-01	Yes	Sulphur Springs Valley	Willcox Playa Wildlife Area	Foreground of the proposed route	View is from the existing Zarpara Winery Tasting Room and faces east to capture sensitive views of people visiting the vineyard and tasting room. This is an existing tasting room located approximately 2 miles from P7a.
WB-02	Yes	Sulphur Springs Valley	Willcox Playa Wildlife Area	Foreground of the proposed route	View is from the existing Pillsbury Winery Tasting Room and faces east to capture sensitive views of people visiting the vineyard and tasting room. This is an existing tasting room located approximately 1 mile from P7a.
WB-03	Yes	Sulphur Springs Valley	Sulphur Springs	Foreground of the proposed route	View is located less than 0.25 mile from route variation P7a from the privately owned Narita property.

Bureau of Land Management Visual Resource Management

None of the route variations cross BLM-managed land.

LD1

LD1 is approximately 35 miles long, 98 percent of which is adjacent to, and routed along, existing linear features. LD1 would follow the I-10 for its entire length and avoids the Lordsburg Playa entirely.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

LD1 crosses the Lordsburg Valley SQRU, which is rated as Class C and is characterized by low flat valley and playas surrounded by mountains (see figure 3.10-13). There are three large playas making up the Lordsburg Playa RNA. LD1 also crosses the Peloncillo Mountains, and San Simon Valley SQRUs, which are rated as Class B, and are characterized by steep, undulating, mountain ridgeline and a large river valley, in which the river is not visible in most views. Development along LD1 is limited and consists mainly of transportation corridors. There are no major transmission lines near LD1. The SQRUs are summarized in table 3.10-16.

Table 3.10-16. Local Alternative LD1 Scenic Quality Rating Units

SQRU	Rating	Description	KOPs
Lordsburg Valley	C	Valley has development.	P5-01/E-01
Peloncillo Mountains	B	A long, complex mountain range running from the Mexican border northwest to the Arizona border. Two lower valleys to the east and west.	None
San Simon Valley	B	Large river valley between mountain ranges on west and east. San Simon River is not evident through most areas in the valley.	E-02

Sensitivity

LD1 crosses the I-10 Deming to Lordsburg, and I-10 Willcox to New Mexico SLRUs, which are both rated as high viewer sensitivity (see figure 3.10-14). The SLRUs are both high sensitivity because they are major travel corridors for local residents and tourism with scenic areas visible from the Interstate.

Key Observation Points

LD1 would pass several small areas of concentrated rural residences, including San Simon, Steins Ghost Town, and Road Forks. The remainder of LD1 is sparsely populated. High concern sensitive viewing areas for the proposed route include the I-10 travel corridor. The KOPs for LD1 are summarized in table 3.10-17.

Table 3.10-17. Local Alternative LD1 KOP Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
E-01	Yes	Lordsburg Valley	I-10 Deming to Lordsburg	Foreground/ Middleground	Alkali Flat; view from I-10 across Alkali Flat, toward the Peloncillo Mountains.
E-02	No	San Simon Valley	I-10 Willcox to New Mexico	Foreground/ Middleground	Represents view from within community of San Simon.

Bureau of Land Management Visual Resource Management

LD1 crosses 14 miles of VRM Class III BLM-managed lands (see figures 3.10-15 and 3.10-16).

LD2

The LD2 alternative is 8.9 miles long and occurs entirely within Hidalgo County, New Mexico, north of I-10. LD2 is west of the town of the Lordsburg. LD2 passes between two playas and avoids conflicts with the Lordsburg Playa.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

The LD2 alternative crosses the Lordsburg Valley SQRU, rated as BLM Class C scenic quality (see figure 3.10-13). The SQRU is characterized by a broad, flat valley and the Lordsburg Playa RNA. There are no major transmission lines near LD2.

Sensitivity

The LD2 alternative crosses the I-10 Deming to Lordsburg, and Lordsburg Valley SLRUs (see figure 3.10-14). The I-10 Deming to Lordsburg SLRU is a major travel corridor with high viewer sensitivity The Lordsburg Valley SLRU has existing development and has low viewer sensitivity. There are no known residences or other occupied areas along LD2. Travel routes along this segment are limited to I-10 in the north, NM 9 in the south, and a sparse unpaved county road network throughout. The Butterfield Trail is near the LD2 for most of its length.

Key Observation Points

No critical KOPs were identified for LD2. The area has no known populations, and representative views of other proposed routes from the I-10 are already available.

Bureau of Land Management Visual Resource Management

LD2 crosses 3.0 miles of VRM Class II and 0.5 mile of VRM Class IV BLM-managed lands (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are primarily privately owned.

LD3 (LD3a and LD3b)

Local alternative LD3 (LD3a and LD3b) alternative is 28.8 miles and occurs entirely within Hidalgo County, New Mexico. LD3 would begin less than 1 mile east of NM 90, and 6 miles northeast of Lordsburg and extend roughly east-west along the north side of the Lordsburg Playa and wrap around the west side of the playa.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

LD3a crosses 11.7 miles of BLM land (8 miles of VRM Class III, and 3.7 miles of VRM Class IV). LD3b crosses 1.3 miles of VRM Class IV (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

Sensitivity

LD3 crosses the Lordsburg SLRU (see figure 3.10-14). The Lordsburg Valley SLRU has existing development and has low viewer sensitivity. A small portion of LD3 (1.9 miles) crosses the I-10 Deming to Lordsburg SLRU. The I-10 Deming to Lordsburg SLRU is a major travel corridor with high viewer sensitivity. The Peloncillo Mountains WSA is visible as a backdrop from I-10.

Key Observation Points

No critical KOPs were identified for LD3a or LD3b. The area has no known populations, and representative views of other routes from I-10 are considered in this analysis.

Bureau of Land Management Visual Resource Management

LD3a crosses 8.0 miles of VRM Class III, and 3.7 miles of VRM Class IV BLM-managed lands. LD3b crosses 1.3 mile of VRM Class IV (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

LD4

Like DN1, LD4 is a local alternative developed by the BLM and Western that provides a co-location option with the approved, but not yet constructed SunZia project. LD4 would be approximately 54 miles long and extend through the San Simon Valley. LD4 would need to use a combination of connection options (see LD4-Option 4 or LD4-Option 5 discussed below) in order to connect to the Apache Substation.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

LD4 crosses a diversity of landscapes with scenic quality ratings of Class B and Class C (see figure 3.10-13). The Class C areas are generally characterized by flat desert valleys and playas surrounded by mountains, including the Willcox Playa. The Class B areas are characterized by steep undulating ridgelines, low rounded hills, and eroded rocky peaks. LD4 would include the shared use of approximately 50 miles of ROW with the approved, but not yet constructed SunZia project; there are also a number of areas along LD4 where existing transmission lines, substations, and other developments do exist. The SQRUs are summarized in table 3.10-18.

Table 3.10-18. Local Alternative LD4 Scenic Quality Rating Units

SQRU	Rating	Description	KOPs
Lordsburg Valley	C	Lordsburg Valley is characterized by flat valley floors with little variation in topography or color contrast between the sandy soils and low-growing desert vegetation. Buckman Hill, Homestead Hill, and Black Mountain provide isolated topographic variation.	None
Peloncillo Mountains	B	A long, complex mountain range running from the Mexican border northwest to the Arizona border. Two lower valleys to the east and west.	None
San Simon Valley	B	Large river valley between mountain ranges on west and east. San Simon River is not evident through most areas in the valley.	None
Playa De Los Pinos	B	The area is formed by higher mountains surrounding a valley of low, rolling, rounded hills.	None
Sulphur Springs Valley	C	Limited scenic qualities, although Willcox Playa ACEC is an NNL. Most of the playa is a designated bombing range. Fragmented BLM parcels in wide valley with mountain ranges on the east and west sides. Large semi-desert grassland.	None

Sensitivity

LD4 crosses 10 SLRUs with low, moderate, and high sensitivity (see figure 3.10-14). Tourist attractions and recreation sites along the proposed route with high viewer sensitivity include hiking opportunities in the Langford Mountains, the Hot Well Dunes OHV area, and Willcox Playa Wildlife Area. Widely dispersed rural residences, agricultural development, and the Bowie Mining District occur along LD4. The SLRUs crossed by LD4 are summarized in table 3.10-19.

Table 3.10-19. Local Alternative LD4 Sensitivity Level Rating Units

SLRU Name	Rating	Description	KOPs
Lordsburg Valley	Low	Valley has development in it.	None
Lordsburg Mesa	Low	Low-usage recreational area with no major population centers. San Simon lies to the east of the Chiricahua Mountains and is at the foothills of the Dos Cabezas Mountains. To the northeast are the Peloncillo Mountains. The ephemeral San Simon River flows northwest though the valley.	None
I-10 Deming to Lordsburg	High	Travel corridor for local residents and tourism.	None
Animas Valley	High	Scenic area enjoyed by local residents and tourists to the area.	None
Dos Cabezas	High	Access to Dos Cabezas Mountain Wilderness.	None
Haekel and Fan Roads	Moderate	San Simon Creek area and moderately used access route to Hot Well Dunes Recreation Area. Popular dispersed recreation area with good access to highways.	None
Hot Well Dunes OHV area	High	2,000-acre Hot Well Dunes OHV area. Popular high-use recreation area near Safford, Clifton, and Duncan.	None
I-10 Willcox to Texas Canyon	High	Major transportation route with scenic areas visible from the highway.	None
Sulphur Spring	Low	Low-use and population area with small parcels of BLM among State and private lands. Sulphur Springs contains mostly private and State lands. The small amount of BLM within the unit is located near the community of Pearce and around mining claims in the Swisshelm Mountains.	None
Willcox Playa Wildlife Area	High	A popular birding location for Sandhill Cranes, and hunting area.	None

Key Observation Points

No critical KOPs were identified for LD4. The area has no known populations, and representative views of other routes from the sensitive areas I-10 are already available.

Bureau of Land Management Visual Resource Management

LD4 alternative crosses 39.7 miles of Class IV BLM-managed lands (see figures 3.10-15 and 3.10-16). Lands not managed by the BLM are generally State owned or privately owned.

LD4-Option 4

LD4-Option 4 is 6.4 miles long and is an alternative to portions of LD4.

Scenic Quality

LD4-Option 4 crosses lands rated as BLM Class C scenic quality.

Sensitivity

Segment LD4-Option 4 crosses with lands with low to high viewer sensitivity. High viewer sensitivity occurs along the I-10 corridor where LD4-Option 4 crosses.

Key Observation Points

No critical KOPs were identified for segment LD4-Option 4. There are representative views from the I-10 corridor described under subroute 2.2.

Bureau of Land Management Visual Resource Management

LD4-Option 4 crosses no BLM managed lands.

LD 4-Option 5

LD 4-Option 5 is 12.3 miles long.

Scenic Quality

LD4-Option 5 crosses lands rated as BLM Class B and C scenic quality. Class B lands along LD4-Option 5 are characterized by ridgelines, hills, and eroded rocky peaks.

Sensitivity

Segment LD4-Option 5 crosses lands with moderate to high viewer sensitivity. High viewer sensitivity occurs along the I-10 corridor where LD4-Option 5 crosses.

Key Observation Points

No critical KOPs were identified for segment LD4-Option 5.

Bureau of Land Management Visual Resource Management

LD4-Option 5 crosses no BLM-managed lands.

WC1

WC1 is a local alternative measuring 14.8 miles long and occurs entirely in Cochise County, Arizona. WC1 follows I-10 through Willcox, Arizona, ending just north of the Willcox Dry Lake Playa.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

WC1 crosses the Sulphur Springs Valley SQRU, rated as BLM Class C scenic quality (see figure 3.10-13). The SQRU is characterized by limited scenic qualities, although the Willcox Playa ACEC is an NNL. Most of the playa is a designated bombing range. WC1 follows the I-10 corridor for most of its length.

Sensitivity

WC1 crosses the I-10 Willcox to New Mexico, I-10 Willcox to Texas Canyon, and Willcox Playa Wildlife Area SLRUs, all of which have high viewer sensitivity (see figure 3.10-14). The I-10 SLRUs are major travel corridors with high viewer sensitivity. The Willcox Playa Wildlife Area SLRU is a popular recreation destination for birding and for waterfowl hunting, however, WC1 is located almost 10 miles north of the Willcox Playa Wildlife Area where more sensitive viewers would congregate. WC1 alternative follows the I-10 though the town of Willcox. SLRUs crossed by WC1 are summarized in table 3.10-20.

Table 3.10-20. Local Alternative WC1 Sensitivity Level Rating Units

SLRU Name	Rating	Description	KOPs
I-10 Willcox to New Mexico	High	Major transportation route with scenic areas visible from the highway	None
I-10 Willcox to Texas Canyon	High	Major transportation route with scenic areas visible from the highway	None
Willcox Playa Wildlife Area	High	A popular birding location for Sandhill Cranes, and hunting area	None

Key Observation Points

No critical KOPs were identified specifically for WC1. KOPs P7-01, P7-02, and P7-03 for subroute 2.1 could be used for WC1.

Bureau of Land Management Visual Resource Management

WC1 crosses no BLM-managed lands.

Upgrade Section

As described in chapter 2, the proposed Upgrade Section would replace approximately 120 miles of Western’s existing 115-kV single-circuit transmission line, and upgrade the lines to a double-circuit 230-kV transmission line. The upgrade includes a 2-mile segment of new 230-kV double-circuit segment to connect the existing Western upgrade to the Vail Substation. The Upgrade Section would traverse through portions of Cochise, Pima, and Pinal counties.

ROUTE GROUP 3 – APACHE SUBSTATION TO PANTANO SUBSTATION

Route group 3 within the Upgrade Section would start at the Apache Substation in Arizona and traverse westerly to the Pantano Substation located in Pima County. The existing Western 115-kV line would be upgraded; this route roughly parallels I-10 in an east-west direction.

The relatively small communities of Dragoon (population 413) and Benson, Arizona (population 5,163) are the population centers located along this portion of the Upgrade Section (see section 3.15 for more on demographics). Outside of these population centers are scattered rural residences, including ranches, homesteads, and farms.

Recreational areas within this route group include the Little Dragoon and Dragoon Mountains, Texas Canyon, San Pedro River valley, and recreation within Benson. Recreation in this area is sporadic and typically sparse within the undeveloped desert to the north. However, the lands adjacent to Benson support guest ranches, museums, other tourist attractions, and the Kartchner Caverns, which receive more than 145,000 visitors per year (see section 3.14 for more on recreation opportunities). The landscape in the area of the Apache Substation in Cochise County is largely located within the valley between the Little Dragoon and Dragoon mountains (running south of Texas Canyon) and San Pedro Valley.
The segment traverses cropland and rural residences and is characterized by low-density development with a mix of natural landscape, agricultural fields, and rural communities.

Subroute 3.1 – Proponent Preferred

Subroute 3.1, which is the existing Western 115-kv line, is located between Apache and Pantano substations. The developed landscape in this area is generally rural, low-density residential and agricultural lands, surrounded by large swaths of undeveloped open desert. It affords views of several mountain ranges in the background and seldom seen distance zones, including the Dragoon and Little Dragoon mountains, which run south of Texas Canyon and into the San Pedro Valley. As the subroute 3.1 heads west, it crosses the northern corner of the Coronado National Forest for approximately 0.5 mile, then heads just south of the community of Dragoon.

Subroute 3.1 then heads east to cross I-10 as it enters the San Pedro River valley and crosses the San Pedro River, then passes north of Benson, Arizona. Additionally, in this area, the existing line closely parallels the Butterfield Trail for approximately 4 miles, diverging at North Pomerene Road just east of the San Pedro River crossing. The town of Benson is the most populated area within route group 3, and is largely characterized by a small community population concentrated to the south of I-10, with rural residences and croplands located outside of the town center. Beyond the town center, subroute 3.1 passes through rural residential and light industrial development. A portion of the San Pedro Golf Course spans beneath the existing Western 115-kV transmission line; golfers at the San Pedro Golf Course have full middle distance, open views of the line both to the east and west as it crosses perpendicular to the greens.

West of Benson, subroute 3.1 crosses into Cochise County, Arizona, for approximately 7 miles before connecting with Pantano Substation. The developed landscape is largely rural residential with some agricultural lands just west of Benson, then opens up to undeveloped desert landscape. West of Benson, the route is located south of and parallel to I-10 and ranges from 0.5 to 1.5 miles south of I-10.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

Just east of Apache Substation in the Sulphur Springs Valley, the BLM lands are characterized as scenic quality rating Class C (figure 3.10-17). As subroute 3.1 heads west beyond the Sulphur Springs Valley, it briefly crosses the Little Dragoon Mountains, which have a Class B scenic quality rating. Scenic quality within the San Pedro Basin, located west of Dragoon, Benson, and Mescal, Arizona, is designated as SQRU Class C (table 3.10-21).

Table 3.10-21. Subroute 3.1 Scenic Quality Rating Units

SQRU	Rating	Description	KOPs
Willcox Playa	C	(See Hidalgo to Apache route group)	(See Hidalgo to Apache route group)
Dragoon/Little Dragoon Mountains	B	Located on the edge of the Coronado National Forest	U1-01
San Pedro Basin	B	Located on the western edge of residential area between NM 90 and I-10, reveals views within the San Pedro River Basin.	U2-01, U2-04

Sensitivity

The majority of lands along subroute 3.1 are identified as moderate, with some smaller portions of high sensitivity along the Willcox Playa and within the Texas Canyon portion of the Little Dragoon Mountains SLRU (figure 3.10-18). Typically, the lands along subroute 3.1 are infrequently visited, as there are few developed trails and access points. However, the Texas Canyon area is a popular rest stop for travelers on I-10, because it is an appealing landscape replete with long-distance views of large granite boulder-strewn lands. The Willcox Playa just east of the Apache Substation (which is mostly located within route group 2) also is designated as a high sensitivity area, because it is widely visited by birders and naturalists seeking views of migrating birds to this area (table 3.10-22).

Table 3.10-22. Subroute 3.1 Sensitivity Level Rating Units

SLRU	Rating	Description	KOPs
Willcox Playa	High	(See Hidalgo to Apache route group)	(See route group 2)
Dragoon Mountains	Moderate	Located relatively further from the Proponent Preferred alternative, within landscape with less frequency of viewers.	U1-01
Little Dragoon Mountains	High	Views of large granite boulder-strewn area, unique to the region and sought after views by locals and travelers along I-10.	NA
San Pedro Basin	Moderate	Viewer concern regarding reroute of line because of existing and planned community development.	U2-01, U2-02, U2-03, U2-04

Key Observation Points

KOPs selected along subroute 3.1 are representative of a variety of views along the span between the Apache and Pantano substations, including several SQRUs. The KOPs are largely characterized by low levels of development and natural desert landscape, including desert scrub vegetation, bare rock to low vegetation cover, and a range of topography from low hills to visually dominant rock outcroppings and distant isolated mountain ranges (table 3.10-23).

Table 3.10-23. Subroute 3.1 KOP Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
U1-01	Yes	Dragoon Mountains	Dragoon	Foreground/ Middleground	View from western extent of Coronado National Forest.
U2-01	No	San Pedro Basin	San Pedro Basin	Foreground/ Middleground	View from multiuse recreational park/fields in Benson.
U2-02	No	San Pedro Basin	San Pedro Basin	Foreground/ Middleground	View from newly constructed road with unobstructed view from area identified for future development.
U2-03	Yes	San Pedro Basin	San Pedro Basin	Foreground/ Middleground	Represents views from Mescal along rural residential area on North Mescal Road.
U2-04	No	San Pedro Basin	San Pedro Basin	Foreground/ Middleground	Located on Navajo Trail Road and represents low-density residential homesteads with existing views of “H” frames.

Bureau of Land Management Visual Resource Management

Subroute 3.1 passes through 0.6 mile of BLM-managed land, all of which is VRM Class IV (see figures 3.10-19 and 3.10-20).

H

Local alternative H would bypass the town of Benson, and the communities of Pomerene and Mescal, Arizona, to the north, crossing the San Pedro River valley approximately 2 to 3 miles north of the subroute 3.1. This subroute would also follow an existing “H” frame transmission line for the entirety of its length. The alternative would head northwest along the alignment of the existing transmission line, cross the north end of the valley west of Benson, and extend south until it met a railroad line, then would follow the railroad line west along with the existing transmission line until it turned southward and connected with subroute 3.1 in an area just east of Mescal. This alternative would require the construction of a new transmission line and would not replace the existing “H” frame line.

Local Alternative H route parallels the Butterfield Trail for approximately 1.2 miles before the trail diverges northwesterly. This area is largely unpopulated, with limited recreational opportunities.
The primary natural feature is the San Pedro River crossing, which is located approximately 3 miles north of where the existing Western line, also subroute 3.1, crosses the San Pedro River.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

Local Alternative H would pass through the same SQRUs (San Pedro River and San Pedro Basin) as subroute 3.1, remaining within the scenic quality rating of Class B (table 3.10-24).

Table 3.10-24. Local Alternative H Scenic Quality Rating Unit

SQRU Name	Rating	Description	KOPs
San Pedro Valley	B	Scenic quality is represented by a mix of riparian lands within and adjacent to the river surrounded by desert scrub vegetation, bare rock, and isolated mountains and hills. Vegetation and color variation is most significant adjacent to the San Pedro River which is the primary water feature in the area.	H-01, H-02, H-03

Sensitivity

Local Alternative H would pass through the SLRUs (San Pedro River and San Pedro Basin) as subroute 3.1 remaining within the sensitivity level rating of moderate (table 3.10-25).

Table 3.10-25. Local Alternative H Sensitivity Level Rating Unit

SQRU Name	Rating	Description	KOPs
San Pedro Valley	Moderate	Low use and low population area, with small concentrations of residential development. The majority of landscape is unpopulated but with well preserved, expansive open desert views.	H-01, H-02, H-03

Key Observation Points

The KOPs selected along the local alternative H route represent dispersed rural residential areas. Given the existence of multiple, similar transmission line structures, the sensitivity level from these residential areas is limited to moderate. However, the large, open expanses of desert views heighten sensitivity from residents, recreators, and travelers (table 3.10-26).

Table 3.10-26. Local Alternative H KOP Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
H-01	Yes	San Pedro River	San Pedro Basin	Foreground/ Middleground	View from Pomerene along North Cascabel Road in a residential area.
H-02	No	San Pedro River	San Pedro Basin	Foreground	View from north Mescal within rural residential area north of Mescal community. This view is in the vicinity of the area where Butterfield Trail parallels the alternative.
H-03	No	San Pedro River	San Pedro Basin	Middleground	View from rural residence/pasture located in Mescal.

Bureau of Land Management Visual Resource Management

There are no BLM lands along local alternative H, and BLM VRM classes do not apply.

ROUTE GROUP 4 – PANTANO SUBSTATION TO SAGUARO SUBSTATION

Route group 4 is located predominantly outside BLM and federally administered lands. This route group passes the towns of Vail and Marana and metropolitan Tucson and runs west and northwest to its terminus at the Saguaro Substation.

Subroute 4.1 – Proponent Preferred

Subroute 4.1 traverses a mix of developed and vacant desert as it heads west and north through Vail, Tucson, and Marana, and ends at the Saguaro Substation just north of Marana, Arizona. Aside from several swaths of undeveloped open space, the majority of the landscape varies from rural residential development, bedroom communities, and high- to moderate-density urban development in the Tucson area. Tucson is the second largest city in the State of Arizona (population 524,295 (Census Bureau 2013b)). Tucson has a major university (University of Arizona), an urban core, and light and heavy industry, and supports a very active tourist and recreationist population as well as seasonal winter residents known as “snowbirds.” The portion of subroute 4.1 that traverses through the city limits would replace the existing Western 115-kV transmission line and is, in large part, paralleled by other transmission and utility structures in this well-developed area.

To the north and south of the City, subroute 4.1 continues to parallel the existing Western 115-kV transmission line through small communities, rural residential areas, agricultural land, and open space. None of the lands crossed by subroute 4.1 are administered by the BLM.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

Scenic quality for the lands crossed by subroute 4.1 ranges from vacant desert open space to moderate and highly developed urban areas. Scenic quality in urban areas is typically designated as Class D (developed land) (see figure 3.10-17).

Sensitivity

Though much of subroute 4.1 is located within developed lands, the sensitivity along the route ranges from low to high as the Proponent Preferred alternative traverses areas in which residents and recreationists are located and sensitive to changes in the landscape (see figure 3.10-18). However, due to the existence of other, similar types of utility development (i.e., transmission lines, substations, and ancillary facilities) the viewing sensitivity tends to lessen as the area is characterized by urban congestion, rather than wide open natural views and opportunities for unadulterated desert views.

Key Observation Points

The KOPs identified for subroute 4.1 follow the entirety of the line from Pantano Substation to the terminus at Saguaro Substation. These KOPs (table 3.10-27) represent a variety of views and viewer types ranging from open, undeveloped desert views to highly urbanized views from or of specific viewing areas of community or natural concern (e.g., Tumamoc Hill, Tucson Mountain Park, and Saguaro National Park West).

Table 3.10-27. Subroute 4.1 KOP Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
U3-03	No	Vail	Vail – SR 83	Foreground	View located along SR 83 in proximity to the community of Vail, Arizona. Scoping comments received regarding visual impacts to the community (and planned community).
U3-04	Yes	Vail	Vail – SR 83	Foreground	View located along SR 83 in proximity to the community of Vail, Arizona. Scoping comments received regarding visual impacts to the community (and planned community).
U3-05	No	Vail	Vail – SR 83	Foreground	View is approximately 0.8 mile from Fairgrounds on East Dawn Road, from parking lot and raceway. Lowest sensitivity viewers are represented from this viewpoint.
U3-06	Yes	South Tucson	South Tucson – (I-19 Nogales Highway to Summit)	Foreground	View from small community of Summit, Arizona (adjacent to mobile home park to the south) and vacant disturbed lands to the north.
U3-07	No	San Xavier Mission	San Xavier Mission	Background	View from Mission San Xavier del Bac, and San Xavier historic district. View of Proponent Preferred alternative is over 1.5 miles from KOP.

Table 3.10-27. Subroute 4.1 KOP Descriptions (Continued)

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
U3-07a	Yes	San Xavier Mission	San Xavier Mission	Background	View from Mission San Xavier del Bac, and San Xavier historic district. View of Proponent Preferred alternative is over 1.5 miles from KOP.
U3-08	No	Santa Cruz River	Anza NHT	Foreground	View is representative of bikeway along the Santa Cruz Bikeway. Commercial development is located on the east bank and the west affords views of the dry/seasonal riverbed. Views to the north and south are largely open and long distance. Anza NHT is identified as an important community and historic feature through Tucson.
U3-09	No	Santa Cruz River	Anza NHT	Foreground	View is located along the Proponent Preferred alternative as it heads west across the Santa Cruz River and into residential development near South Midvale Park Road. Homes are medium-density tract housing with existing views of the “H” frame line.
U3-10	Yes	Tucson West	Tucson West	Foreground	View is from Kennedy Park along 12-kV feeder line and upgrade line.
U3-11	Yes	Tucson West	Tucson West	Foreground	View is 0.11 mile from the upgrade within open space/community space.
U3-12	No	Tumamoc Hill	Sentinel Peak	Foreground/ Middleground	View is from Sentinel Peak oriented toward upgrade line, within the historic and well-used Tumamoc Hill/Sentinel Peak area. This area is considered highly sensitive for a variety of users.
U3-13	Yes	Tumamoc Hill	Tumamoc Hill	Foreground/ Middleground	View shows historic fence approximately 700 feet from upgrade line near sensitive community area.
U3-15	No	Tucson Central	North Silverbell Road to Silvercroft	Foreground/ Middleground	View shows multiple transmission line congestion, though public sensitivity is low given distance from upgrade line and lack of sensitive receptors. View is from the northern portion of Juhan Park.
TH1-S1	Yes	Tumamoc Hill	Starr Pass and existing line	Foreground	View would be of proposed line rebuilt where the existing H-frame structures are located from the vantage of West Starr Pass Road. From this viewpoint, the proposed structures would be visible against the sky and would also be visible within the vicinity of Tumamoc Hill.
TH1-S9	No	Tumamoc Hill	Speedway Boulevard and El Rio	Foreground	View is located near El Rio Golf Course along North El Rio Drive toward TH1c. Existing utility structures are located in this area and views are largely obstructed by development and large vegetation around the golf course.
TH1-S10	No	Tumamoc Hill	I-10 to West Grant Road	Foreground	View is from well-traveled intersection of I-10 and West Grant Road, just east of the Santa Cruz River bikeway “the loop.” Upgrade line would cross Grant Road and I-10 to connect with Tucson Substation.
AN-04	Yes	Anza North	Anza NHT	Foreground/ Middleground	View is from bridge crossing where the upgrade line and Anza NHT intersect. Area is largely tract housing surrounded by vacant washes and open space.
U3-16	No	Anza North	Rillito and Silverbell Golf Course	Foreground/ Middleground	View from club house of Silverbell Golf Course.

Table 3.10-27. Subroute 4.1 KOP Descriptions (Continued)

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
SA-01	Yes	Anza North	Saguaro West	Middleground	View is located within the Saguaro National Park (west) from an existing trail oriented toward the proposed upgrade.
AN-12	Yes	Marana	Anza NHT (north)	Middleground	View is located along the Anza NHT to the west of Pinal Airpark and approximately 1 mile from the upgrade line.
U3-17	Yes	Anza North	Silverbell	Foreground	View from west side of upgrade line across from Columbus Park.
U3-18	Yes	Anza North	Silverbell	Foreground	Few/no residences along this road. Located 0.14 mile from Anza NHT outside of sensitive viewing.
U3-19	No	Picture Rocks	Saguaro West to Twin Peaks Road	Background	View is approximately 2 miles from upgrade line and represents views from road accessing Saguaro National Park–West.
U3-20	No	Anza North	Silverbell Road	Foreground	View from residential area along upgrade.
U3-21	No	Anza North	Silverbell Road	Foreground	View from south of West Twin Peaks Road within residential/commercial area.
U3-22	Yes	Picture Rocks	Picture Rocks Road to Saguaro National Park–West	Foreground	View from West Twin Peaks Road slightly northeast of the upgrade line. Road is well traveled by recreators and commuters to the north Tucson/Marana and Saguaro National Park–West area.
U3-23	Yes	Marana	Marana/Avra Valley	Foreground	View located adjacent to upgrade line on West Silverbell Road.
U3-24	No	Red Rocks North	I-10 Red Rock to North Tucson	Background	View is located within new residential community at Red Rock, oriented south to the upgrade line and substation.

Bureau of Land Management Visual Resource Management

No BLM VRM exists for this area as the lands are not administered by BLM.

Route Group 4 Route Variation

One route variation (U3aPC) was developed in an area generally located 3 miles northwest of the existing Nogales Substation and would occur entirely on privately owned land. U3aPC is a roughly 6-mile-long route located south of the Tucson International Airport, 80 percent of which follows existing roadways or transmission lines.

Bureau of Land Management Visual Resources Inventory

Scenic quality for the lands crossed by U3aPC ranges from vacant desert open space to dispersed development. Scenic quality along the route variation is considered B.

Sensitivity

The San Xavier historic district is considered highly sensitive because of its cultural significance in the region. Mission San Xavier del Bac serves the surrounding community and is a well-known destination. The area includes agricultural fields, and dispersed residential development. The Mission is located more than 3 miles west of the route variation. In addition the view from the Mission toward the variation is screened by the I-19 corridor.

Key Observation Points

No additional KOPs were selected for the route variation. Views from Mission San Xavier del Bac and the San Xavier historic district are over 3 miles from the KOP (see table 3.10-27).

Bureau of Land Management Visual Resource Management

Route variation U3aPC does not cross BLM-managed land.

Local Alternatives

MA1

Local alternative MA1 is approximately 1.1 miles long and is adjacent to the Marana Regional Airport. This alternative was developed to avoid future planned expansion of the Marana Regional Airport in an "L" shape that runs west and north to reconnect with subroute 4.1.

Bureau of Land Management Visual Resources Inventory

This very short alternative alignment is located adjacent to developed land and is of low scenic quality because of the broad, flat, developed nature of the landscape in this area (table 3.10-28; see figure 3.10-17).

Table 3.10-28. Local Alternative MA1 Scenic Quality Rating Unit

SQRU	Rating	Description	KOPs
Avra Valley	C	Views are characterized largely by the adjacent aviation facility and surrounding agricultural lands, bisected by paved roadways.	MA-02, MA-03

Local alternative MA1 is located within a low visual sensitivity area due to the adjacent development (i.e., airport and ancillary associated facilities) and adjacent agricultural development within the Avra Valley (table 3.10-29; see figure 3.10-18).

Table 3.10-29. Local Alternative MA1 Sensitivity Level Rating Unit

SQRU	Rating	Description	KOPs
Avra Valley	Low	Viewers include patrons of the Marana Regional Airport, residents of the Avra Valley, or travelers en route to the Saguaro National Park (west), I-10, or other destinations in the Marana outskirts.	MA-02, MA-03

KOPs selected for MA1 represent views from within the Avra Valley, oriented easterly toward the alignment, and, conversely, from the SkyLine Restaurant, located within the airport complex, oriented westerly toward the alignment (table 3.10-30).

Table 3.10-30. Local Alternative MA1 KOP Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
MA-02	Yes	Marana	Marana/Avra Valley	Foreground	View is from the Marana Regional Airport complex, surrounded by agricultural land to the southwest and vacant land to the northeast.
MA-03	Yes	Marana	Marana/Avra Valley	Middleground	View is located along the Anza NHT adjacent to and surrounded by agricultural land and is approximately 0.85 miles from the upgrade line.

Bureau of Land Management Visual Resource Management

No BLM lands are crossed for local alternative MA1; lands are primarily privately owned.

Local Alternatives – Tumamoc Hill

Nine alternatives were developed in the area of Tumamoc Hill (TH1a, TH1b, TH1c, TH1-Option, TH3a, TH3b, TH3-Option A, TH3-Option B, and TH3-Option C). These agency alternatives were derived from agency and public outreach pertaining to the critically sensitive Tumamoc Hill area. Tumamoc Hill is considered an ecological and cultural hub located just west of Tucson's downtown core. It is a protected open space and is considered a "hallowed refuge for people and nature" (University of Arizona 2013). On Tumamoc Hill is a 2,300-year-old village site that was once home to the Hohokam people. There are hundreds of petroglyphs and prehistoric vestiges including burial sites for the Apache and Hohokam people. Development within the Tumamoc Hill area includes the existing Western "H" frame 115-kV transmission line, many transmitter towers, a historic lookout structure, recreational trails, and the Steward Observatory. This area is considered a landmark for Tucson and is a popular recreational area with pedestrian and non-motorized trails as well as interpretive signage and public education exhibits. Tumamoc Hill is recognized as an NHL and archaeological district and is in the NRHP.

Some of these local alternatives are wholly located outside of BLM-administered lands. Scenic quality and sensitivity levels were developed in keeping with BLM methods for visual resource analysis but are not subject to BLM or other Federal agency plan conformance.

Bureau of Land Management Visual Resources Inventory

Scenic Quality

Tumamoc Hill is located within a largely moderate-density residential area; however, the lands within the Tumamoc Hill SQRU (table 3.10-31) are primarily undeveloped with some utility development (e.g., radio towers and transmission lines), recreational facilities, research facilities, and protected Hohokam village sites (see figure 3.10-17). Given the rare combination of open space, archaeological ruins, and recreational opportunity, scenic quality in the Tumamoc Hill area is considered Class A and is considered an important visual and cultural resource.

Table 3.10-31. Local Alternatives Tumamoc Hill Scenic Quality Rating Unit

SQRU	Rating	Description	KOPs
Tumamoc Hill	A	Flanked by residential and utility development, characterized by rolling hills and significant topography. Color contrast is low; vegetation coverage ranges from bare, rocky desert to large-growth desert shrubs. Deer Mountain, Tumamoc Hill, and Tucson Mountain provide isolated topographic variation.	U3-08, U3-09, NPS-02, TH3-R2, TH3-R4, AN-02, TH1-S2, TH3-R3, TH1-S3, TH1-S4, TH1-S5, TH1-03

Sensitivity

The Tumamoc Hill area is considered highly sensitive because of its visual and cultural significance in the region (see figure 3.10-18). Surrounded by residences and with recreational and educational opportunities throughout the area, Tumamoc Hill is a well-known, popular destination for local residents and visitors to the area (table 3.10-32).

Table 3.10-32. Local Alternatives Tumamoc Hill Sensitivity Level Rating Unit

SQRU Name	Rating	Description	KOPs
Tumamoc Hill	High	High- to moderate-density residential development to the immediate boundary, very high usage area which supports a multitude of recreational, educational, research, and astronomy activities.	U3-08, U3-09, NPS-02, TH3-R4, AN-02, TH1-S2, TH3-R3, TH1-S3, TH1-S4, TH1-S5

Key Observation Points

The KOPs (table 3.10-33) identified for the Tumamoc Hill area include a variety of views and represent a variety of sensitive viewers, including residents, recreators, researchers, and travelers viewing from the roadway.

Table 3.10-33. Local Alternatives Tumamoc Hill KOP Descriptions

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
NPS-02	Yes	Santa Cruz River	Anza NHT	Foreground/ Middleground	View is located along the Loop on the Santa Cruz River Bikeway/Anza NHT.
TH3-R4	No	Santa Cruz River	Anza NHT	Foreground/ Middleground	View is located along the Loop on the Santa Cruz River Bikeway/Anza NHT.
TH1-02	Yes	Tumamoc Hill	Sentinel Peak	Foreground/ Middleground	View from atop Sentinel PeakTumamoc Hill oriented towards local alternatives TH1b and TH1c.
TH1-03	Yes	Tumamoc Hill	Sentinel Hill	Foreground/ Middleground	View is from Sentinel Peak oriented toward local alternatives TH1b and TH1c of the upgrade line, within the historic and well-used Tumamoc Hill/Sentinel Peak area. This area is considered highly sensitive for a variety of users.
TH1-S2	No	Tumamoc Hill	Starr Pass to Kinder Morgan Pipeline	Foreground/ Middleground	View would be of agency alternative at West Starr Pass Road looking north to the Tumamoc Hill. From this viewpoint, the proposed structures would be visible against the sky and would also be visible within the vicinity of Tumamoc Hill.
TH3-S1	Yes	Tumamoc Hill	Sentinel Peak	Foreground	View from Sentinel Peak toward the east.
TH3-R3	No	Santa Cruz River	Anza NHT	Foreground/ Middleground	View is located along the Loop on the Santa Cruz River Bikeway/Anza NHT.
TH1-S3	Yes	Tumamoc Hill	Starr Pass to Deer Mountain	Foreground/ Middleground	View would be from Starr Pass Road in the vicinity of Deer Mountain looking toward agency alternative that runs parallel north on Greasewood Road. This area is a mix of recreation and residential.
TH1-S4	No	Tumamoc Hill	Greasewood to Deer Mountain	Foreground/ Middleground	View is located south of Deer Mountain at the Tolson Elementary School on Greasewood Road and represents views from both the school and recreators at Deer Mountain.
TH1-S5	No	Tumamoc Hill	Greasewood to Calle Tonala	Foreground/ Middleground	View represents residences within the neighborhoods to the west of Greasewood Road An existing 69-kV line runs north and south on Greasewood Road.

Table 3.10-33. Local Alternatives Tumamoc Hill KOP Descriptions (Continued)

KOP	Simulated	SQRU	SLRU	Distance Zone	Description and Rationale
TH1-S6	Yes	Tumamoc Hill	Greasewood to Broadway Blvd.	Foreground/ Middleground	View represents residences within the neighborhoods to the west of Greasewood Road An existing 69-kV line runs north and south on Greasewood Road.
TH3-R2	No	Santa Cruz River	Anza NHT	Foreground/ Middleground	View is located along the Loop on the Santa Cruz River Bikeway/Anza NHT.
TH1-S7	No	Tumamoc Hill	Greasewood and Speedway	Foreground/ Middleground	View is from intersection of Greasewood Road and Speedway Boulevard, both roads are very well traveled at a posted speed of 45 miles per hour (mph).
TH1-S8	No	Tumamoc Hill	Speedway	Foreground/ Middleground	View is from Speedway Boulevard, road is very well traveled at a posted speed of 45 mph.
TH3-R1	No	Santa Cruz River	Anza NHT	Foreground/ Middleground	View is located along the Loop on the Santa Cruz River Bikeway/Anza NHT.
AN-03	No	Santa Cruz River	Anza NHT	Foreground/ Middleground	View is located along the Loop on the Santa Cruz River Bikeway/Anza NHT.

Bureau of Land Management Visual Resource Management

No BLM lands are crossed. Lands are private, State owned, or county owned.

3.11 LAND USE, INCLUDING FARM AND RANGE RESOURCES AND MILITARY OPERATIONS

This section describes the land uses that currently take place within the analysis area, including farm and range resources and military operations.

3.11.1 Land Use

Land use baseline conditions (the land use “affected environment”) includes the discussion of existing land uses in terms of land ownership, management of lands, land use authorizations and ROWs (including lands and realty actions), and future or planned land uses. Land ownership in the New Build Section and Upgrade Section is presented in figures 3.11-1 through 3.11-4. Management of lands indicates the processes and functions a particular land-managing agency (e.g., BLM, State land departments, etc.) implements to accomplish the stated goals and objectives of the land. Management of lands is normally specified in an agency’s land use plan. Land use authorizations and ROWs are exceptions granted by the agency for a particular use. Future or planned land uses are trends, anticipated growth/reductions, or set-asides intended to accommodate reasonably foreseeable uses of a particular land area, such as but not limited to future recreation use, future grazing, or future municipal or rural development. Some of the information in this section is sourced from a report titled “Southline Transmission Project Resource Report 7: Land Use” (CH2M Hill 2013k). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

Analysis Area

The geographic scope for the land use analysis area for the New Build Section is a 2-mile corridor around the action alternatives (1-mile buffer on either side of the centerline). In addition, substations and access roads that are proposed outside the 2-mile corridor are included in the land use analysis area. Some substation expansions and access roads would occur outside the 2-mile corridor and are thus included to capture any potential changes to existing land uses that may result if the proposed project were constructed. The 2-mile corridor is used to identify land uses and land use resources that could be impacted by surface disturbance and where construction materials, equipment, and workers that may be present intermittently along the ROW (i.e., surface disturbance would not occur ROW-wide; much of the ROW will experience minor or no surface disturbance at all). The 2-mile corridor is also used to capture potential changes to the land use resources' visual character (i.e., 2 miles represents a reasonable distance for the human naked eye to "see" potential foreground changes to land uses), and where available, BLM VRM settings. Visual resources are described in section 3.10 of this EIS.

The land use analysis area for the Upgrade Section is a 500-foot corridor (250-foot buffer on either side of the centerline). The Upgrade Section would not change the physical location of the existing Saguaro–Tucson and Tucson–Apache 115-kV transmission lines. Since the Upgrade Section would utilize existing facilities and would not introduce a new visual contrast, the analysis area for the land use resources' visual character is the same 500-foot corridor. Further, there are very limited BLM lands in the Upgrade Section that are subject to existing BLM VRM settings. The temporal scope for the land use analysis area is for the life of the proposed project (50 years).

Laws, Ordinances, Regulations, and Standards

The Federal, State, and local agency jurisdictions that would be traversed by the Project have adopted land use plans and regulations that guide the type, time, and intensity of land use. An inventory of applicable plans was conducted to determine which land use plans may intersect with the Project.
The following discussion summarizes the relevant land use laws, regulations, plans, and policies that would apply to the proposed Project (laws, regulations, plans, and policies discussed in chapter 1, 2 or other resource sections are not repeated here).

The BLM lands and realty program provides for land use, purchase, exchange, donation, and sale; determines the boundaries of Federal land; and maintains historic records for these ownership transactions. Land ownership transfer (tenure) through purchase, exchange, disposal, donation, and sale is a component of the BLM's land management strategy.

FEDERAL

Federal Land Policy and Management Act of 1976, as Amended

The FLPMA and the regulations contained in 43 CFR 1600 govern the BLM planning process.
The primary legal basis for authorizing a ROW grant on BLM land is Section 501 of the FLPMA. Under the FLPMA, the Secretary of the Interior is authorized to grant, issue, or renew ROWs over, on, or through such land for utilities, roads, trails, highways, railroads, canals, etc. The FLPMA provides the BLM with authority to issue ROW grants for the use, occupancy, and development of public lands.

BLM identifies ROW avoidance or exclusion areas during the RMP planning process. Section 503 of FLPMA directs BLM to "minimize adverse environmental impacts and proliferation of separate ROWs by using common ROWs to the extent practicable." A designated ROW corridor is a preferred location for the placement of ROWs; however, applicants may propose outside designated corridors, but must follow the prescribed avoidance or exclusion areas as identified by the BLM.

Section 302 of the FLPMA provides the BLM's authority to issue leases and permits for the use, occupancy, and development of the public lands. Leases and permits are issued for purposes such as transmission lines. The regulations establishing procedures for the processing of these leases, grants, and permits are found in 43 CFR 2800 and 2920.

Energy Policy Act of 2005

Section 368 of the EPAct, PL 109-58 (H.R. 6), directs the Secretaries of Agriculture, Commerce, Defense, Energy, and Interior to designate under their respective authorities corridors on Federal land in 11 western states for oil, gas, and hydrogen pipelines, and electricity transmission and distribution facilities (utility corridors). These utility corridors are designated by Federal, State, or county agencies and can be determined through coordination between multiple agencies to help ensure continuity of the corridors between different jurisdictional land ownership. These Section 368 lands can be recognized across multiple agencies as existing utility corridors and identified as the preferred location for new utility lines. Within the land use analysis area, there are existing Section 368 lands. Both the proposed Project and its alternatives follow portions of the existing Section 368 lands within the New Build Section.

U.S. Bureau of Reclamation

Reclamation manages, develops, and protects water and related resources in the western United States. It is the largest wholesaler of water in the country and functions as a contemporary water management agency (Reclamation 2013). In the Upgrade Section of the proposed Project, the analysis area crosses a small area (less than 1 mile) of Reclamation-managed land (segment U3i). Reclamation issues ROWs under 43 U.S.C. 1761–1771 and 43 CFR 429. The portion of the proposed Project crossing Reclamation lands includes existing transmission facilities and substation areas that already have an existing use authorization.

Bureau of Indian Affairs

The DOI provides services directly or through contracts, grants, or compacts to 566 federally recognized tribes with a service population of about 1.9 million American Indian and Alaska Natives (BIA 2012). Natural resources management is among the programs administered through the BIA. The analysis area crosses land managed by the BIA (and the Fort Sills Apache, who are becoming reestablished in their traditional homeland) within the New Build Section; however, none of the Project alternatives would be located on the Fort Sills Apache lands. The analysis area also crosses land managed by the BIA and the San Xavier District of the Tohono O'odham Nation along the Upgrade Section. Approximately 3 miles of segment U3a would cross the northeast portion of the San Xavier District of the Tohono O'odham Nation. The Tohono O'odham, San Xavier District reservation includes Mission San Xavier del Bac, a Spanish colonial mission open to the public. The San Carlos Indian Reservation is approximately 35 miles from the analysis area in the Upgrade Section of the proposed Project. The BIA operates under the DOI, and any ROW requests are done in coordination with the local tribe's governing authority (e.g., Tohono O'odham Department of Planning and Economic Development).

U.S. International Boundary and Water Commission

Projects located on or near the international boundary which may affect international boundary monuments or drainage flows into either country must be reviewed by the USIBWC. Under the authority of proclamation 758, the USIBWC has a duty to access, maintain, and use the international boundary monuments along the United States–Mexico land boundary. The USIBWC is charged with these duties through treaties (Roosevelt 1907) and international agreements between the United States and Mexico. Several segments of the proposed Project alternatives (subroute 1.2 and 2.2, Proponent Alternative), and approximately 3,357 acres of the analysis area, occur within 60 feet of the international boundary between the United States and Mexico.

Land Use Plans

Land uses on Federal lands in the analysis area are governed by various land use plans. These plans typically establish goals, objectives, and standards that apply to the land and resources managed under the plan. To ensure the best balance of uses and resource protections for public lands, Federal agencies undertake extensive land use planning through a collaborative approach with local, State, and tribal governments; the general public; and stakeholder groups. The documents provide land use planning and management direction on a broad scale and guide future actions on Federal land. Land use plans and the decisions they promulgate are the basis for every on-the-ground action the agency undertakes. As required by FLPMA, NEPA, and Federal land management policy, public lands that are not designated for special management must be managed under the principles of multiple use and sustained yield. Each of the plans listed herein must be compatible with action alternatives, if implemented. This compatibility analysis is presented in Chapter 4, "Environmental Consequences."

The BLM manages a majority of the Federal lands within the analysis area for the proposed Project. The 1993 Mimbres RMP (BLM 1993) is the primary plan that covers analysis area in New Mexico. The BLM's Safford and Tucson field office planning areas in Arizona include lands within the analysis area, including the Peloncillo Mountains Wilderness. The Phoenix RMP (BLM 1988a), Safford RMP (BLM 1991) and the Peloncillo Mountains Wilderness Management Plan (BLM 1995) cover portions of the analysis area in Arizona. Plans governing BLM lands are described below.

FEDERAL

Mimbres Resource Management Plan

The Mimbres RMP manages certain lands within the Las Cruces District. The Mimbres RMP, signed in December 1993, was written at a time when the BLM Las Cruces District Office consisted of two Resource Areas, one of which was the Mimbres Resource Area. At this point the administrative unit is referenced as the Las Cruces District Office, with no smaller sub-units, and includes lands in both Sierra and Otero counties. The RMP provides long-term direction for the BLM's management decisions and applies to BLM lands in Grant, Hidalgo, Luna, and Doña Ana counties. It includes all New Mexico portions of the New Build Section, including the proposed route, alternatives, and the agency alternatives. The Mimbres RMP establishes areas for limited, restricted, or exclusive uses, levels of production, allowable resource uses, resource condition objectives, program uses, program constraints, and general management direction. Additionally, the RMP sets forth the land use decisions, terms, and conditions for guiding and controlling future management actions on public land in the Mimbres RMP planning area. All uses and activities in the resource area must conform with the decisions, terms, and conditions described in the RMP. ROWs are issued on a case-by-case basis. The Mimbres RMP specifies that new ROWs are issued within existing ROWs whenever possible to promote joint use. Further, the RMP designates both exclusion and avoidance areas for ROWs. While exclusion areas only allow ROW grants when mandated by law, ROWs may be granted within avoidance areas where no feasible alternative route or designated corridor is available. Special terms and conditions are usually required. The Mimbres RMP designated ACECs and SMAs, and identifies specific management guidance therein. Doña Ana County is currently part of the Mimbres RMP but will eventually be included in a new planning unit (see discussion in the future land use subsection of chapter 4). The 1993 Mimbres Plan includes management prescriptions for the CDNST (BLM 1993) (refer to Appendix F, "National Scenic and Historic Trails Assessment"). All of route group 1 and portions of route group 2 would occur within the Mimbres RMP planning area.

The Mimbres RMP was amended in support of the Solar Energy Development PEIS. The amendments designated approximately 100,000 acres as solar SEZs within the Las Cruces District Mimbres RMP–managed lands. The BLM would prioritize solar energy development in SEZs (as well as development of associated transmission infrastructure) (BLM and DOE 2012).

BLM identifies ROW avoidance or exclusion areas during the RMP planning process. There are avoidance areas within the analysis area that are recognized in the Mimbres RMP; this is discussed below under the "BLM Lands and Realty" subsection below.

The BLM Las Cruces District is undergoing a new land-use planning process that will replace part of the Mimbres RMP: the Tri-County RMP. The Tri-County Draft RMP/EIS was issued on April 12, 2013 and will replace the Doña Ana County portion of the Mimbres RMP (BLM 2013e). A proposed RMP/FEIS may be issued in summer 2015. The Tri-County Draft RMP/EIS will analyze and update the BLM's management of public lands in Sierra, Otero, Luna, and Doña Ana counties in south-central New Mexico. Management of BLM lands in Grant and Hidalgo counties would continue under the Mimbres RMP. Currently, a supplement to the Tri-County Draft RMP/EIS is being prepared by the BLM Las Cruces District Office.

Safford Resource Management Plan

The Safford RMP, finalized in December 1991, establishes management direction for lands administered by the BLM Safford District Office, extending from the New Mexico border to west of Benson, Arizona. At this time, no revisions or plan amendments are proposed, and the 1991 Safford RMP is the guiding plan. This includes both the New Build Section and Upgrade Section of the proposed Project and alternatives. ROWs are issued on a case-by-case basis. The Safford RMP, like the Mimbres RMP, identifies objectives and policies for lands managed by the BLM, and also identifies avoidance and exclusion areas for land actions such as ROWs (BLM 1991). Route group 2 in Arizona, and one segment in route group 3 (U1a) would occur within the Safford RMP planning area. The Safford RMP was not amended in support of the Solar Energy Development PEIS. There is one avoidance area recognized by the Safford RMP within the analysis area in the northwest corner of Willcox Playa.

Peloncillo Mountains Wilderness Management Plan

The Peloncillo Mountains Wilderness is located northeast of San Simon and is identified as an exclusion area in the Safford RMP. The Wilderness Management Plan (BLM 1995) establishes the objectives, policies, and actions by which the Peloncillo Mountains Wilderness is managed. The analysis area includes a small portion of the Wilderness; however, the proposed project and alternatives would not cross the wilderness (BLM 1995). The Peloncillo Mountains Wilderness Management Plan planning area is located within route group 3; however, the actual project footprint would be outside the Peloncillo Mountains Wilderness Management Plan planning area. The Peloncillo Mountains Wilderness Plan was exempted from amendment in support of the Solar Energy Development PEIS. The Peloncillo Mountains Wilderness Plan recognizes the entire wilderness area as an exclusion area. No project facilities would be constructed in the wilderness area since it expressly prohibited by the enabling legislation of the Wilderness Act, in addition to the Safford RMP and Peloncillo Mountains Wilderness Plan.

Phoenix Resource Management Plan

The BLM Tucson Field Office is managed under the 1988 Phoenix RMP. At this time, no revisions or plan amendments are proposed, and the 1988 Phoenix RMP is the guiding plan. Land use authorizations (ROWs, leases, permits, easements) are issued on a case-by-case basis. The RMP specifies that ROWs would be issued to promote the maximum use of existing ROWs, including joint use whenever possible.

Corridors, as identified in the RMP, identify the BLM's preferred utility systems routing. No avoidance or exclusion areas prescribed by the Phoenix RMP would occur within the analysis area. However, with the exception of those areas identified in the RMP as closed to ROW development, the BLM land is generally open to ROW development on a case-by-case basis (BLM 1988a). Route group 4 would occur within the Phoenix RMP planning area. The Phoenix RMP was not amended in support of the Solar Energy Development PEIS. There are no avoidance areas recognized by the Phoenix RMP within the analysis area.

Continental Divide National Scenic Trail Comprehensive Plan

The 2009 Comprehensive Plan for the CDNST provides management direction to the CDNST Interagency Leadership Council, which includes the Forest Service, BLM, and NPS (Continental Divide National Scenic Trail Interagency Leadership Council 2009). Segments of the trail intersect the analysis area and proposed Project in various locations near Lordsburg in New Mexico. As described in the plan, the nature and purpose of the CDNST is to provide for high-quality, scenic, hiking, and horseback riding opportunities and to conserve natural, historic, and cultural resources along the CDNST corridor. Extending 3,100 miles between Mexico and Canada, the trail traverses landscapes primarily on public lands within 50 miles of the geographic feature known as the Continental Divide. The CDNST was established in 1978 through the authority of the National Trails System Act (PL 90-543) and can be identified with line-of-sight signs except where it follows ranch roads. Equestrian facilities are intermittent and in various stages of development. The CDNST plan specifies that on public lands administered by the BLM, a VRI must be conducted on the basis that the CDNST is a high sensitivity–level travel route, with the inventory performed as if the trail exists even in sections where it is proposed for construction or reconstruction (Forest Service 2009). The 1993 Mimbres Plan includes management prescriptions for the CDNST (BLM 1993). An ongoing VRI is described in section 3.10. The CDNST is discussed in further in Section 3.12, "Special Designations;" Section 3.14, "Recreation;" and Appendix F, "National Scenic and Historic Trails Assessment." The CDNST Plan was exempted from amendment in support of the Solar Energy Development PEIS.

Coronado National Forest Plan

The existing Western line (segment U1a) crosses a 0.5-mile stretch of the Dragoon Ecosystem Management Area of the Coronado National Forest, managed by the Douglas Ranger District. The portion of the existing line crossing Coronado National Forest lands includes existing transmission facilities that already have an existing use authorization. The 1986 "Coronado National Forest Land and Resource Management Plan," amended through 2009, provides management direction for the National Forest System lands in southeastern Arizona and southwestern New Mexico, providing for integrated multiple uses. ROWs are issued on a case-by-case basis (Forest Service 1986a). A draft updated Coronado National Forest Plan was prepared in October 2013 and when finalized, will replace the 1986 plan. Project alternatives for the 2013 draft Coronado National Forest Plan acknowledge the existing Western line that would be included as part of the proposed Project upgrade portion of the analysis area.

Las Cienegas Resource Management Plan

The 2003 Las Cienegas RMP is a plan for managing 49,000 acres of BLM land, resources, and uses within the Las Cienegas National Conservation Area (NCA) and BLM land in the Sonoita Valley Acquisition Planning District (SVAPD). The NCA was designated by Congress in order to conserve, protect, and enhance the unique and nationally important aquatic, wildlife, vegetative, archaeological, paleontological, scientific, cave, cultural, historical, recreational, educational, scenic, rangeland and riparian resources and values of the public lands within the NCA, while allowing livestock grazing and recreation to continue in appropriate areas (PL 106-538). ROWs are issued on a case-by-case basis.

The existing Western line within route group 3 (segment U3a) crosses the SVAPD on non-BLM lands (BLM 2003); the proposed Project does not cross the Las Cienegas NCA. The SVAPD is primarily composed of private land. BLM (or other land conservation organizations) pursue land tenure and acquisition options within the SVAPD in order to further protect the NCA, as opportunities are available (see Section 3.12, “Special Designations”).

Saguaro National Park Abbreviated Final General Management Plan

The 2008 Final General Management Plan (NPS 2008) defines resource conditions and visitor experiences; and provides a framework for management decisions about how to protect resources, provide for visitor experiences, and manage visitor use; and ensures foundations for decisions are developed in consultation with stakeholders. The analysis area for the existing Western line in subroute 4.1 (segment U3i) is adjacent to NPS lands (Saguaro National Park West Unit). No project activities would occur within the Park and as the existing Western line in this area is located approximately 0.5 mile to the northeast of the Park.

Juan Bautista de Anza National Historic Trail (Anza NHT) Comprehensive Management and Use Plan

The 1996 Anza Trail Comprehensive Management and Use Plan is administered by the NPS. The Anza NHT stretches from Nogales, Arizona, to San Francisco, California. Because only a small portion of the 1,200-mile Anza NHT crosses Federal land available for trail uses, the role of the NPS in the development and management of trail features would primarily be that of trail-wide coordination. The 1996 Anza Trail Plan does not include management prescriptions for transmission line construction, spanning, or co-location. Portions of subroute 4.1 would occur within the Anza NHT planning area (NPS 1996). Further information about the Anza NHT is presented in Section 3.12, “Special Designations,” and Appendix F, “National Scenic and Historic Trails Assessment.”

Ironwood Forest National Monument Resource Management Plan

The RMP for the Ironwood Forest National Monument (IFNM) was completed in February 2013. IFNM, which encompasses approximately 189,600 acres of land, was established in 2000 under the authority of the Antiquities Act. ROWs are issued on a case-by-case basis. The IFNM intersects the analysis area for route group 4; however, the proposed Project and alternatives would be outside the IFNM (BLM 2013c). The IFNM RMP was exempted from amendment in support of the Solar Energy Development PEIS.

STATE

New Mexico State Land Office

The NMSLO is responsible for administering surface and subsurface estates for the beneficiaries of the state land trust, which includes schools, universities, hospitals, and other important public institutions.

The NMSLO seeks to optimize revenues while protecting the health of the land for future generations. By leasing state trust land for a wide array of uses, the NMSLO generates hundreds of millions of dollars each year to support these beneficiaries. New Mexico state land in the analysis area is nearly all managed for recreation, grazing, rangeland management, and commercial and open space purposes.

Willcox Playa Wildlife Area

The Willcox Playa Wildlife Area is a mixed-ownership area of approximately 595 acres, including 120 acres of deeded land, 320 acres of land patented from the BLM, a 115-acre perpetual ROW from the

ASLD, and a 40-acre easement from a private landowner. The Wildlife Area is managed by the AGFD and is adjacent to the DOD land that comprises the majority of the actual playa, which is more than 27,000 acres. Management emphasis for the Willcox Playa Wildlife Area is to support the best wildlife habitat possible on the wildlife area for present and future generations. This emphasis includes keeping opportunities available for public hunting and other wildlife-oriented recreation (AGFD 2012c). The management emphasis for the Willcox Playa Wildlife Area does not include management prescriptions for transmission line construction. Subroutes 2.1 and 2.2 within route group 2 are adjacent to the Willcox Playa; local alternative WC1 and route variations P7a, P7b, P7c, and P7d are options considered to avoid the Wildlife Area.

Arizona State Land Department

ASLD-owned lands are not public lands, but are instead the subject of a public Trust created to support the education of Arizona children. The Trust accomplishes this mission in a number of ways, including through its sale and lease of Trust lands for grazing, agriculture, municipal, school site, residential, commercial, and open space purposes.

Similar to New Mexico State lands, Arizona State lands included in the analysis area are nearly all managed for recreation, grazing, rangeland management, and commercial and open space purposes.

Arizona State Land Department Conceptual Land Use Plans

ARS 37-331.03 directs the ASLD to create conceptual land use plans for urban state trust lands as appropriate. These plans are to identify appropriate land uses, transportation corridors, and infrastructure requirements, and natural and artificial constraints and opportunities associated with the land. One plan was identified by ASLD as intersecting the proposed transmission line. Portions of the analysis area would pass through the Marana Phase I and Phase II conceptual plan (ASLD 2006). Two other ASLD conceptual land use plans would be adjacent to the proposed Project: Rincon Posta Que Mada (ASLD 2007), and Houghton Road Corridor Conceptual Plans (ASLD 2004).

COUNTY

County of Doña Ana Comprehensive Plan

The 1994 Doña Ana County (New Mexico) Comprehensive Plan is designed to guide future growth and development in the County in a manner consistent with the community’s goals for its physical, social, and economic environment. The plan provides a combination of goals, policies, and actions that are used to make responsible development decisions. The plan discourages transmission lines in residential areas. Portions of subroutes 1.1, 1.2, and local alternatives A and B would occur within the Doña Ana County Comprehensive Plan planning area. Chapter 250 of the Doña Ana County Land Use and Zoning Code (a chapter within the 1994 Comprehensive Plan) defines the purpose of the Performance Zone District as allowing flexibility for land use activities (including transmission line development) in the rural areas of the county, while protecting residents and property values. In the Performance Zone District, any use may be approved, provided that all standards for that particular use are met and the use is consistent with the character of the surrounding areas (Doña Ana County 1994). Standards to meet in Performance Zone Districts include using existing ROWs to the maximum extent possible. Portions of subroute 1.1 would pass through Performance Zone Districts.

Luna County Planning Ordinance

Luna County, New Mexico, includes land use planning ordinances review processes. The purpose of the 1994 Luna County Natural Resource Planning and Review Ordinance is to provide a problem-solving process to eliminate or significantly reduce conflicts or negative impacts on the human environment within Luna County as a result of State or Federal actions. The ordinance does not currently contain any regulations on transmission of electricity (Luna County 1994). No proposed project activities would conflict with other goals and objectives of the plan. Portions of subroutes 1.1 and 1.2, and local alternatives B, C, and DN1, as well as the proposed Midpoint Substation, would occur within the Luna County planning area.

Grant County Planning Ordinance

The Grant County, New Mexico, 1978-12-04-01 ordinance establishes the procedure for determining rules and regulations regarding the construction and maintenance of utilities and other facilities within the Grant County road ROW system. The ordinance specifically addresses the height of aboveground transmission lines and establishes the procedure for environmental review (Gutierrez 2011). The proposed Project would be subject to a discretionary review process by the Grant County Board of Commissioners. Portions of subroutes 1.1 and 1.2, and local alternative DN1, would occur within the Grant County planning area.

Hidalgo County Comprehensive Plan

Hidalgo County, New Mexico, does not have designated zoning or any other land use data available that speak to transmission development. Both the Hidalgo County Manager’s Office and Assessor’s Office confirmed that the county does not have any zoning in place, nor does it contain any future land use data available that would preclude transmission development (Salazar 2011). No proposed Project activities would conflict with other goals and objectives of the plan. Portions of subroutes 1.1 and 2.1, and local alternatives LD1, LD2, LD3a, and LD3b would occur within the Hidalgo County planning area.

Greenlee County Comprehensive Plan

The 2003 Greenlee County (Arizona) Comprehensive Plan includes the following elements: commercial/infrastructure; economic; land use; recreation/health; residential/natural hazards; and statistics and demographics. Goals and policies are addressed in each element. However, no specific regulations pertaining to electrical transmission are included in the document (Greenlee County 2003). No proposed Project activities would conflict with other goals and objectives of the plan. Local alternative LD4 within route group 2 would occur within the Greenlee County planning area.

Graham County Comprehensive Plan

The 2002 Graham County (Arizona) Comprehensive Plan’s purpose is to guide Federal, State and county decision makers in protecting, evaluating, and enhancing the county’s custom and culture, social stability, economy, tax base, and the overall health of land and resources (Graham County 2002). It specifies land use zones in five broad categories: urban residential, rural residential, agricultural, commercial, and manufacturing. The plan encourages coordination and consultation between Federal and State agencies and Graham County when State or Federal projects have an impact on the county and/or its local resources. The plan does not state specific transmission line objectives. No proposed Project activities would conflict with other goals and objectives of the plan. Local alternative LD4 within route group 2 would occur within the Graham County planning area.

Cochise County Comprehensive Plan

The Cochise County (Arizona) Comprehensive Plan, amended through 2006, sets forth goals, objectives, and policies to control development within the county. The plan includes growth area categories and other plan designations, as well as a land use element plan map. However, the plan contains no specific regulations governing transmission projects (Cochise County 2006). No proposed Project activities would conflict with other goals and objectives of the plan. Portions of subroutes 2.1, 2.2, and 3.1, and local alternatives LD1, LD4-Option 4, LD4-Option 5 within route group 2, and local alternative H within route group 3 would occur within the Cochise County planning area. Cochise County has also developed a Babocomari Area Plan, which covers lands within Cochise County approximately 15 miles south of Benson, Arizona, to assist in managing development at or near the junction of SR 82 and SR 90 and to coordinate development with Fort Huachuca. The Babocomari Area Plan does not occur within the analysis area.

Pima County Comprehensive Plan

The Pima County (Arizona) Comprehensive Plan, updated in 2009, assigns special designations (including parks, open space, and scenic road designations) and lays out policies for uses within those areas. The Pima County Zoning Ordinance designates zoning districts and establishes a land use intensity map. The ordinance, however, does not specifically address transmission of electricity, although electrical transmission requires a Conditional Use Permit under some zoning districts (Pima County 1992, 2011). The 2009 plan is the current guiding plan; Pima County is currently updating its Comprehensive Plan. Route groups 3 and 4 include segments, local alternatives, and a route variation that would occur within the Pima County Comprehensive Plan planning area.

Pima County Sonoran Desert Conservation Plan

Pima County maintains important biological, ecological, and natural resources under their 2012 SDCP. The 2012 SDCP is guiding regional efforts to conserve the best lands and most precious resources for future generations of Pima County residents to enjoy. As part of the SDCP, the associated MSCP combine short-term actions with long-range land-use decisions in Pima County, to avoid, minimize, and mitigate impacts to species protected under the ESA and their habitats. Pima County submitted the MSCP to the FWS for 44 species that may be impacted as a result of the otherwise lawful activities of Pima County and its development community (Pima County 2012a).

The SDCP designates a CLS, which identifies lands within Pima County necessary to achieve the SDCP goals, while delineating areas suitable for development. The five tenants of the CLS:

- perpetuate the comprehensive conservation of vulnerable species;
- retains those areas that contain large populations of focal vulnerable species;
- provides for the adjacency and proximity of habitat blocks;
- preserves the contiguity of habitat at the landscape level; and
- retains the connectivity of reserves with functional corridors.

The CLS land-use policies apply only to discretionary actions of and lands owned and/or managed by the Pima County and the Pima County Regional Flood Control District Boards. CLS policies do not apply to privately owned lands unless the landowner takes it upon themselves to adopt CLS land-use policies. CLS lands include important riparian areas, biological core management areas, special species management areas, multiple use management areas, scientific research areas, agricultural inholdings, and critical landscape connection corridors. Route group 3 and 4 include segments, local alternatives, and a route variation that would occur within CLS lands. CLS lands are further discussed in Section 3.12, “Special Designations.”

Pinal County Comprehensive Plan

The 2001 Pinal County Comprehensive Plan, as amended through 2007, guides and manages the County's future growth, quality of life, and sustainability. The 2007 amended plan is the current guiding Plan. Policy 7.6.1.6 and Goal 7.7 of the plan directly address transmission of electricity: "Support the transmission of renewable energy from sources within and outside of Pinal County," and "support the provision of adequate energy for the future while protecting the natural environment and resources." The Pinal County Zoning Ordinance provides rules, regulations, and plans by which the future growth and development in the county may be directed in accordance with the Pinal County Comprehensive Plan and ordinance, as provided in the County Planning and Zoning Act of 1949. Section 2.150.010 states that transmission lines for the distribution of electricity and power substations shall be permitted in any zoning district and not be subject to the minimum lot area requirement (Pinal County 2010a, 2011). The Pinal County Open Space and Trails Master Plan (Pinal County 2007) was developed to identify areas within the County that had high resource values, such as water, geology, biological significance, cultural resources, and other important values. Additionally, parks, open space, and trails from municipalities, Federal land managers, and other entities within Pinal County were collected and inventoried. These areas were included in the 2007 Comprehensive Plan as an addition to the "Open Space and Acquisition and Preservation" element. No portions of the analysis area occur within Pinal County's open space or trails. Segments of subroute 4.1 (U3k, U3l, and U3m) would occur within the Pinal County Comprehensive Plan planning area.

Cienega Creek Natural Preserve Management Plan

The 1994 plan was drafted by the Pima County Regional Flood Control District to manage the 3,979-acre Cienega Creek Natural Preserve, located along Cienega Creek in eastern Pima County. The principal management objectives are to preserve and protect perennial stream flow in Cienega Creek, preserve and protect the existing natural riparian community along the stream corridor, and to provide opportunities for the public use of the preserve (McGann and Associates 1994). The analysis area for land use includes a small portion of the preserve; however, the proposed Project and alternatives would occur outside the preserve planning area since the preserve would not be intersected by the proposed Project.

LOCAL

City of Deming Comprehensive Plan

The City of Deming (New Mexico) Comprehensive Plan 2010 Update is a long-range document that works with previous city planning efforts to guide future growth and development in Deming. It is comprehensive in covering the entire geographic planning area within the city of Deming's municipal limits and addressing the major functions of a community (referred to as planning elements), including land use, economic development, transportation, housing, water/wastewater infrastructure, community facilities and recreation, hazard mitigation, and implementation strategies. However, no goals or policies are included in the plan that specifically address transmission of electricity. The City of Deming Zoning Ordinance designates zones and specific uses allowed in each zone. The ordinance contains specific regulations for transmission projects, including setbacks and height limits. Transmission development is allowed in all zones (City of Deming 2006, 2010). A segment of subroute 1.1 (segment P2) would occur within the City of Deming planning area.

City of Lordsburg Comprehensive Plan

The 2011 Comprehensive Plan Update is a policy document that establishes what the residents, property owners, and other stakeholders would like to see in the future for the city. No goals or policies are included in the plan that specifically address transmission of electricity (City of Lordsburg 2011).

No proposed Project activities would conflict with other goals and objectives of the Plan. Within the New Build Section, portions of the analysis area for would pass along the northern and southern edges of the city's planning area.

City of Willcox General Plan

The General Plan for the City of Willcox, as updated through 2009, includes the following elements: citizen participation, land use, transportation/circulation, housing, growth, cost of development, environmental planning, open space, and water resources. The overriding goal of the general plan is to protect and preserve the city's heritage and to ensure compatible and managed growth for its citizens (City of Willcox 2009). The plan does not include management prescriptions for transmission line construction. No proposed project activities would conflict with other goals and objectives of the Plan. Within the New Build Section, portions of the analysis area would pass along the western and northern edges of the city's planning area.

City of Benson General Development Plan

The 2002 City of Benson General Development Plan sets goals, policies, and objectives for future development within the city. The plan contains the following elements: land use, circulation, economic development, housing, water resources, cost of development, growth areas, open space, and environmental planning. The plan acknowledges the city's presence along a transmission corridor (City of Benson 2002a, 2002b). The transmission of electricity is allowed in all zoned areas of Benson. Segment U2 within subroute 3.1 would pass through the city limits of Benson.

City of Tucson General Plan

The General Plan, developed in December 2001, presents a series of policies and recommendations for Tucson and, in some cases, all of eastern Pima County. It is in effect only within the corporate limits of the city of Tucson. The policies establish a basic direction and approach to guide the future growth and development of Tucson. The plan does not include management prescriptions for transmission line construction. No proposed Project activities would conflict with other goals and objectives of the plan. The policies also provide guidance for the preparation of more detailed environmental, land use, and transportation proposals; the refinement of community facility and service plans; and the development or amendment of subregional, area, neighborhood, and other specific plans. Within the Upgrade Section, segments U3a in subroute 3.1 and segments within subroute 4.1 (U3b, U3c, U3d, U3e, U3f, U3g, U3h, U3i, TH1 option) and local alternative TH3 would cross within the city limits of Tucson. The City of Tucson Land Use Code was published on July 1, 1995 to protect and promote the general health, safety, and welfare of all present and future residents of Tucson. More specifically, the Land Use Code implements the City's General Plan, guides new growth and redevelopment in the community in accordance with the policies of the City of Tucson Land Use Code, encourages the most efficient use of land through site-sensitive design, reduces potential hazards to individuals and neighborhoods (public) resulting from incompatible land uses or from the development of environmentally hazardous or sensitive lands, protects and enhances the city's natural, cultural, historical, and scenic resources, and promotes the economic stability of the community (City of Tucson 1995, 2001). The City of Tucson is currently updating its General Plan.

Town of Marana General Plan

The 2010 General Plan for the Town of Marana includes the following themes and elements: land management, built environment, people and community, resource management, and natural systems. The General Plan designates a land use map and transportation map as part of the plan. However, the plan does not specifically address transmission of electricity (Town of Marana 2010). No proposed Project activities would conflict with other goals and objectives of the plan. Within the Upgrade Section of the proposed Project, segment U3j within subroute 4.1 and local alternative MA1 would pass through the town of Marana.

Renewable Energy Management Areas

Several renewable energy management areas (REMAs) or initiatives exist in southern Arizona and New Mexico, as described below.

WESTERN RENEWABLE ENERGY ZONE

The Western Governors' Association commissioned interviews with 25 utilities, 11 PUCs, and two provincial energy ministries to learn their views on potential collaboration to develop WREZ hubs. These WREZ hubs are identified as those areas in the West with vast renewable resources and the potential to expedite the development and delivery of renewable energy where it is needed through the establishment of an efficient network of interstate transmission lines to deliver the energy to load centers. The Western Governors' Association Web site[3] identifies the highest-quality solar and wind resources that meet State quality thresholds and provides more information on these zones (Western Governors' Association 2010).

SOLAR ENERGY ZONES

In response to increasing interest in the development of renewable energy resources, DOE and DOI conducted analysis in support of a programmatic solar EIS, and 2009 identified SEZs (solar energy zones). An SEZ is defined by the BLM and DOE (2012) as an area with few impediments to utility-scale production of solar energy, where BLM would prioritize solar energy and associated transmission infrastructure development. More information on these areas can be found online[4] (BLM 2013d; BLM and DOE 2012).

Afton Solar Energy Zone

The proposed Afton SEZ is located in New Mexico on BLM-administered land within the Las Cruces District in Doña Ana County. The area available for development within the SEZ is approximately 29,964 acres and has the resource potential for 3,329 MW of energy production. The Programmatic EIS ROD was signed for the Afton SEZ on October 12, 2012. The Afton SEZ contains existing unimproved roads, transmission structures, and pipeline segments. Part of the SEZ is administered by the BLM for grazing. The analysis area for route group 1 includes lands that have been identified as within the Afton SEZ. More information on the Afton SEZ can be found online[5] (BLM 2012e) and (BLM and DOE 2010).

RESTORATION DESIGN ENERGY PROJECT NOMINATED SITES

The Arizona State Office of the BLM has prepared an EIS to identify low conflict and previously disturbed lands across Arizona that may be suitable for the development of renewable energy. The EIS and ROD for the RDEP established a baseline set of environmental protection measures for such projects (BLM 2012a). The DEIS was released on February 17, 2012. The ROD was signed on January 18, 2013.

[3] Available at: http://www.westgov.org/index.php?option=com_ content&view=article&id=219&Itemid=81.
[4] Available at: http://solareis.anl.gov/.
[5] Available at: http://solareis.anl.gov/sez/afton/index.cfm.

The RDEP supports the Secretary of Interior's goals to build America's new energy future and to protect and restore treasured landscapes. Emphasis is on lands that are previously disturbed or developed, or where the effects on sensitive resources would be minimized. The BLM used the results of the EIS to amend its land use plans across Arizona to identify areas that are considered to be most suitable for renewable energy projects. Although these amendments only applied to BLM-managed lands, the EIS examined all lands in Arizona and serves as a resource to the public, policy makers, and energy planners.

SECTION 368 OF THE ENERGY POLICY ACT OF 2005

Section 368 of the EPAct (PL 109-58), enacted August 8, 2005, directs the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior to designate under their respective authorities corridors on Federal land in 11 western states for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (utility corridors). These utility corridors are designated by Federal, State, or County agencies, and can be determined through coordination between multiple agencies to help ensure continuity of the corridors between different jurisdictional land ownership. These Section 368 lands can be recognized across multiple agencies as existing utility corridors and identified as the preferred location for new utility lines.

A utility corridor is a linear strip of land identified for the present or future location of utility lines such as electricity, water, and sewer within its boundaries. Utility corridors can provide an opportunity to place new facilities in parallel corridors, which, in turn, helps to minimize impacts. The DOE West-wide Energy Corridors were created by Section 368 of the EPAct of 2005 (West-wide Energy Corridor Programmatic EIS Information Center 2012). A PEIS was published to conduct the requisite environmental analysis for designation of these energy corridors and included the proposed designation of more than 6,000 miles of Section 368 energy corridors among the various agency Land Use Plans. However, there have been recent negotiations challenging the designation of some of the corridors.
In June 2012, a landmark settlement was reached between Federal agencies and a coalition of conservation organizations that had challenged West-wide Energy Corridors initially designated under Section 368 of the EPAct. Through the settlement, the designations will be reevaluated and revised to better avoid environmentally sensitive areas, diminish proliferation of dispersed ROWs, and facilitate development of renewable energy projects. Specifically, the settlement states that:

> The BLM, US Forest Service (FS), and Department of Energy (DOE) will enter into a Memorandum of Understanding (MOU) that will guide the agencies' review of corridors and mitigation measures (both for corridors already designated and any new corridors) through an interagency work group that will review corridors and mitigation measures, and their recommendations on needed revisions, deletions and additions (Settlement Agreement Section II.A.1) (Wilderness Society 2012).

Whereas Section 368 corridors can be designated on Federal lands, no such corridors are designated on State or private lands. This results in unconnected corridor segments where land ownership is mixed. Both the proposed Project and its alternatives follow portions of the existing Section 368 lands.
The Section 368 corridor within the analysis area is "81-213." Approximately 10 miles of subroute 1.1 (segment P2) occurs within Section 368 corridor 81-213, west of the Luna and Grant County line. In addition, local alternative D and segment P5a and P5b in subroute 2.1 are located within Section 368 corridor 81-213 in the vicinity of Lordsburg, New Mexico.

Issues to Be Analyzed

Based on results of the public scoping process and in consultation with BLM and Western, the following areas of concern were identified with regard to land use:

- Potential conflicts with applicable Land Use Plans, policies, goals, or regulations (incompatible land uses).
- Potential conflicts with existing multiuse or utility ROWs.
- Potential conflicts with existing land uses, specifically where the Project would create a direct long-term impact:
    - Physical conflict with existing residential, commercial, industrial, military, or agricultural uses (i.e., displacement of homes, businesses, center-pivot irrigation agriculture fields)
    - Indirect conflict with residential, commercial, or military uses (refer to the "Military Operations" section below)
- Potential conflicts with planned land uses, specifically residential subdivisions or other sensitive land uses at the final plat approval stage.
- Potential conflicts with State or federally established, designated, or reasonably foreseeable planned land use areas (e.g., lands and realty actions, resource inventory determinations (avoidance areas), recreation, wildlife management area, game management areas, waterfowl production areas, scientific and natural areas, wilderness areas, ACECs, etc.).
- The potential for the Project to result in nuisance impacts.

Analysis Area Conditions

The existing conditions for land use are described in an east-to-west sequence, beginning at the Afton Substation in New Mexico and ending at the Saguaro Substation in Arizona. This section describes the environmental setting in terms of the land use resources, such as undeveloped vacant land and urban lands that are encountered within the analysis area. These areas may be affected by implementation of the proposed Project or its alternatives and associated Project components (i.e., substations, representative staging areas, and access roads).

The proposed Project and alternatives cross large tracts of undeveloped land as well as urban and suburban areas. Much of the land in the analysis area is managed by Federal agencies, which generally provide for multiple use management or preservation of natural resources. Special designations of Federal land are discussed in section 3.12. Major portions of the proposed Project parallel existing linear facilities in disturbed corridors, including transmission and distribution lines, roads, and abandoned railroad ROWs. Some of the lands are actively grazed by livestock (see section 3.11.2 below). Additionally, there are residential and commercial lands interspersed in the nearby developed communities. The eastern portion (New Build Section) of the Project would be located in open range-type land uses, crossing mountain ranges (including the Continental Divide) and valley/basins. Farther west (Upgrade Section), the distance between the valley/basins and mountain ranges becomes less, and urban populations surround the Tucson metropolitan area. Specific details regarding land use conditions are described below under "New Build Section" and "Upgrade Section," respectively.

JURISDICTION

The proposed Project would traverse Federal, State, and local agency jurisdictions with existing Land Use Plans and policies (see figures 3.11-1 through 3.11-4). Private land would also be traversed by the Project. Various land management agencies in this region have jurisdiction over land development activities. Land use jurisdiction refers to the limits of administrative authority maintained by Federal, State, regional, or local government agencies responsible for land use planning and policies. Jurisdiction does not necessarily imply land ownership; however, in most cases the authority that has jurisdiction also owns the land. Jurisdictions of the New Build and Upgrade sections are provided below, followed by a land ownership discussion. Additional detail on land ownership can be found in chapter 2 (see table 2-7).

New Build Section

The New Build Section of the proposed Project is primarily characterized by mostly undeveloped desert landscape with areas of rural residential and commercial development surrounding local municipalities. The analysis area for subroute 1.1 would include approximately 188,300 acres of land. The analysis area for subroute 1.2 includes approximately 180,600 acres. The analysis area for the local alternatives includes approximately 133,100 acres. The proposed substation expansions and new construction would require approximately 491 acres of land. Fourteen staging areas are proposed in route group 1, totaling 280 acres.

The analysis area for subroute 2.1 would include approximately 122,200 acres of land. The analysis area for subroute 2.2 includes approximately 122,900 acres. The analysis area for the local alternatives would include approximately 262,300 acres of land. The proposed substation expansions and new construction would require approximately 369 acres of land. Fifteen staging areas are proposed in the route group 2, totaling 300 acres. Table 3.11-1 describes the percentages of jurisdiction within the analysis area for the New Build Section.

Table 3.11-2 lists the local municipalities through which the analysis area for the New Build Section would cross.

Table 3.11-1. New Build Jurisdiction Percentage

	Private Lands		State Lands		BLM Lands		BIA Lands		DOD Lands	
	Analysis Area	**Project Footprint**	**Analysis Area**	**Project Footprint**	**Analysis Area**	**Project Footprint**	**Analysis Area**	**Project Footprint**	**Analysis Area**	**Project Footprint**
Transmission Lines										
Proponent Preferred (subroutes 1.1 and 1.2)	37%	30%	35%	31%	27%	38%	< 1%	–	2%	<1%
Proponent Alternative (subroutes 2.1 and 2.2)	24%	29%	19%	27%	57%	44%	–	–	<1%	–
Local Alternatives and Route Variations	30%	27%	11%	39%	61%	40%	–	–	<1%	–
Substations										
Afton Substation, Proposed Midpoint Substation, Alternative Midpoint Substation	–	24%	–	13%	–	63%	–	–	–	–
Staging Areas	–	52%	–	21%	–	28%	–	–	–	–

Note: Percentages are not additive.

Table 3.11-2. Municipal Jurisdictions within the Analysis Area: New Build Section

State	County	Municipality	Proposed Project and Alternative Segments* within Municipality
New Mexico	Doña Ana County	Unincorporated community of Doña Ana	Route group 1: Proponent Preferred; Proponent Alternative; interconnection substation (Afton); and staging areas
New Mexico	Luna County	City of Deming	Route group 1: Proponent Preferred; local alternatives; alternative substations (proposed Midpoint and Midpoint South); and staging areas
New Mexico	Luna County	City of Columbus	Route group 1: Proponent Alternative; local alternatives; and staging areas
New Mexico	Grant County	Unincorporated community of Hachita	Route group 1: Proponent Alternative; local alternatives; and staging areas
New Mexico	Hidalgo County	City of Lordsburg	Route group 2: Proponent Alternative; local alternatives; Proponent Alternative; Hidalgo Substation; and staging areas
Arizona	Cochise County	Unincorporated community of San Simon	Route group 2: Proponent Preferred; Proponent Alternative; local alternatives; and staging areas
Arizona	Cochise County	Unincorporated community of Bowie	Route group 2: Proponent Preferred; Proponent Alternative; local alternatives; and staging areas
Arizona	Cochise County	City of Willcox	Route group 2: Proponent Preferred; Proponent Alternative; local alternatives; Apache Substation; and staging areas

* Route variations included in the New Build Section (P7a, P7b, P7c, and P7d) would not occur within any municipalities; they would be located in unincorporated Cochise County.

Upgrade Section

The Upgrade Section largely crosses urban and suburban areas, including the Tucson metropolitan area. The Upgrade Section also traverses some areas of desert landscape, rural-residential, and commercial development.

The major difference between the Upgrade Section and the New Build Section is that the Upgrade Section includes the Tucson metropolitan area. The Upgrade Section includes route groups 3 and 4. The route groups of the Upgrade Section are grouped together in this portion of the analysis due to the smaller footprint and the fewer routing options considered for analysis.

The analysis area for subroutes 3.1 and 4.1 would include approximately 7,200 acres of land. The analysis area for local alternatives in route groups 3 and 4 includes approximately 2,500 acres. The proposed substation expansions and new construction would require approximately 178 acres of land. Six staging areas are proposed in the Upgrade Section, totaling 120 acres. Table 3.11-3 describes the percentages of jurisdiction within the Upgrade Section.

Table 3.11-3. Upgrade Section Jurisdiction Percentage

	Private Lands		Arizona State Lands		BLM Lands		BIA Lands		County, FS, Reclamation Lands	
	Analysis Area	Project Footprint	Analysis Area	Project Footprint	Analysis Area	Project Footprint	Analysis Area	Project Footprint	Analysis Area	Project Footprint
Transmission Lines										
Proponent Preferred (subroutes 3.1 and 4.1)	51%	47%	44%	48%	1%	1%	2%	3%	< 1%	1%
Local Alternatives and Route Variations	45%	52%	52%	47%	3%	–	–	–	< 1%	< 1%

Table 3.11-3. Upgrade Section Jurisdiction Percentage (Continued)

	Private Lands		Arizona State Lands		BLM Lands		BIA Lands		County, FS, Reclamation Lands	
	Analysis Area	Project Footprint	Analysis Area	Project Footprint	Analysis Area	Project Footprint	Analysis Area	Project Footprint	Analysis Area	Project Footprint
Substations										
Pantano, Nogales, and Vail Substations	40%-	14	40%	70%	20%	16%-	–	–	–	–
Del Bac, Tucson, DeMoss Petrie, Rattlesnake, Saguaro, and Tortolita Substations	–	44%	–	45%	–	-%	–	–	–	10%
Staging Areas	–	67%	–	33%	–	–	–	–	–	–

Note: Percentages are not additive.

Table 3.11-4 lists the local municipalities through which the analysis area for the Upgrade Section would cross.

Table 3.11-4. Municipal Jurisdictions within the Analysis Area: Upgrade Section

State	County	Municipality	Proposed Project, Alternative, and Route Variation Segments occurring within Municipality
Arizona	Cochise County	Unincorporated community of Cochise	Route group 3: Proponent Preferred; Proponent Alternative; local alternatives; Apache Substation; and staging areas
Arizona	Cochise County	Unincorporated community of Pomerene	Route group 3: Proponent Preferred; Proponent Alternative; Adams Tap Substation; and staging areas
Arizona	Cochise County	City of Benson	Route group 3: Proponent Preferred; Proponent Alternative; Adams Tap Substation; and staging areas
Arizona	Pima County	City of Tucson	Route group 4: Proponent Preferred; Proponent Alternative; local alternatives; route variation; Pantano, Vail, Nogales, Del Bac, and DeMoss Petrie substations; and staging areas
Arizona	Pima County	Town of Marana	Route group 4: Proponent Preferred; Proponent Alternative; local alternatives; Rattlesnake, Marana, and Southline Saguaro substations; and staging areas
Arizona	Pinal County	Census Designated Place of Avra Valley	Route group 4: Proponent Preferred; Saguaro and Tortolita substations; and staging areas

LAND OWNERSHIP

New Build Section

Eight agencies or organizations maintain land jurisdiction or ownership in the analysis area (private landowners are consolidated as a single ‘organization’). The transmission line acreage that forms the New Build Section for land ownership is provided below in table 3.11-5. See figures 3.11-1 and 3.11-2 for an illustration of land ownership for the New Build Section.

Table 3.11-5. Surface Management and Land Ownership: New Build Section Analysis Area

Entity	Acres
BLM	342,940
BIA	31
DOD	3,822
Private	256,308
State	289,996
New Mexico	179,599
Arizona	110,397
FS	256

Note: Acreages overlap and are not additive.

BLM lands in the New Build Section are managed by the Las Cruces and Gila district offices, out of New Mexico and Arizona, respectively. Within the New Build Section analysis area, the Fort Sills Apache (based out of Oklahoma) are becoming reestablished in their traditional homeland of southeastern New Mexico (route group 1); however, though these lands have not been formally designated, 62 acres are proposed for Tribal lands, subject to the BIA. DOD lands within the New Build Section include the Willcox Playa. Numerous non-contiguous parcels of privately owned lands would be crossed by the proposed Project, in both New Mexico and Arizona. Similarly, numerous non-contiguous parcels of State lands would be crossed by the New Build Section, in both New Mexico and Arizona. During the Project routing conducted for the proposed Southline Project, preference was given to State land parcels that already included existing ROWs in order to reduce the potential for the creation of isolated, remnant parcels (Southline 2012a).

Upgrade Section

Seven agencies or organizations maintain land jurisdiction or ownership in the analysis area (private landowners are consolidated as a single ‘organization’) (table 3.11-6; see figures 3.11-3 and 3.11-4).

Table 3.11-6. Surface Management and Land Ownership: Upgrade Section Analysis Area

Entity	Acres
BLM	60
BIA	176
Private	4,980
State (Arizona)	4,270
County	38
Coronado National Forest	30
Reclamation	24

Note: Acreages overlap and are not additive.

BLM lands in the Upgrade Section are managed by the Gila District Office, under the Safford and Tucson Field Offices. BIA lands include the San Xavier District of the Tohono O’odham Nation. Numerous, non-contiguous parcels of privately owned lands would be crossed by the Upgrade Section, in both New

Mexico and Arizona. Similarly, numerous non-contiguous parcels of State lands would be crossed by the Upgrade Section in Arizona. County lands in the analysis area for the Upgrade Section include the Cienega Creek Nature Preserve, Tucson Mountain Park, Empirita Ranch, Bar V Ranch, Kennedy Park, Los Morteros, and Tumamoc Hill. Forest Service lands include a very small portion of the Coronado National Forest. Reclamation lands near the town of Marana would be crossed by the Upgrade Section (segment U3i). All land that is crossed by the existing Western lines includes existing ROWs, leases, easements, or landowner permission for its operation and maintenance.

LAND USE

The following uses were considered in determining land uses in the analysis area: agriculture, aviation, communications, development, military, parks and other protected areas, community facilities, recreation, transportation, and utilities.

The following land use discussion is described in general characterization of land use areas, using best available data as described by the National Land Cover Database categories (2006). These categories are provided below (including examples) and are consistent across New Mexico and Arizona:

- Agriculture Area – center-pivot irrigation areas, ranching, viticulture/vineyards (domestic farm wineries), farming, and dairy operations, with agricultural land uses being primarily ranching and grazing.
- Air Facilities – airports, airparks, landing strips, and airport hazard district for Tucson International Airport.
- Communications Facilities – communication towers and antennae.
- Developed – areas characterized by residential and commercial uses. Residential areas are composed of single-family housing (low, medium, and high density), multi-family housing (such as apartments), and mobile home parks. Commercial development consists of business such as grocery stores, gas stations, restaurants, banks, motels and hotels, etc. Concentrations of commercial development mainly occur in populated areas and along major transportation corridors. Developed areas are characterized by a high percentage (30 percent or greater) of constructed materials (e.g., asphalt, concrete, buildings, etc.). This information is summarized from existing General Plans that the proposed Project would intersect and from the National Land Cover Database 2006 information.
    - Developed, Low-Intensity – areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20 to 49 percent of total cover. These areas most commonly include single-family housing units.
    - Developed, Medium-Intensity – areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50 to 79 percent of the total cover. These areas most commonly include single-family housing units.
    - Developed, High-Intensity – highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.
- Industrial – includes mining exploration sites, active mines, and related mining facilities (including Mining Districts)
- Military – managed by the DOD and includes bases, missile launch facilities, and firing ranges.
- Parks and Preservation Areas – Federal, State, and local parks, open areas, and areas protected from development, including parks, ACECs, WSAs, wilderness areas, and wildlife refuges.
- Public and Community Facilities – churches, schools, cemeteries, and hospitals.

- Recreation – Federal, State, and local recreational trails and designated OHV areas.
- Transportation – minor roads (county highways, city streets, local roads), major roads (interstates, State highways), railroads, trails, etc.
- Utilities – power plants, substations, transmission lines, pipelines, canals, designated utility corridors, and wind and solar farms.

Detailed descriptions of the designated prime farmland, farmland of statewide importance, and rangeland and grazing allotments are described further below. Detailed descriptions of military operations are also described further below in this section. Detailed descriptions of minerals and mining are discussed in section 3.4. Detailed descriptions of the special land use designations (Federal, State, county, city, and tribal), including ACECs, wilderness areas, WSAs, national monuments, State scenic roads, county parks, and city parks are discussed in section 3.12. Detailed descriptions of the recreational opportunities are discussed in section 3.14.

New Build Section

This section summarizes total land use resources for the transmission line segments, substation expansion areas, and representative staging areas for each portion of the New Build Section. Current land uses in the New Build Section of the analysis area are outlined in table 3.11-7. The analysis area is primarily undeveloped land with pockets of heavy to moderate land uses surrounding the municipal areas and industrial use. The New Build Section can be characterized as open desert with some agriculture and widely dispersed, low-density residential uses on private parcels. In Cochise County, Arizona, some of the agricultural land is used for viticulture. As part of the routing process, the proposed Project and alternatives were sited to both follow existing linear facilities to the extent practicable and to minimize potential impacts to sensitive land uses. Although the New Build Section would be new construction, the majority of the New Build Section would parallel existing ROWs and disturbance (see chapter 2).

Table 3.11-7. Analysis Area Land Uses: New Build Section

Land Use	Acreage
Agriculture	32,757
Air facilities	22
Developed, low-intensity	2,852
Developed, medium-intensity	254
Developed, high-intensity	42
Military	2,823
Other*	1,316
Parks and preservation areas	11,241
Recreation	1,917
Land Use	**Number of Facilities**
Public and community facilities	20
Communications facilities	170
Land Use	**Mileage**
Recreation (trails)	45
Transportation	2,184
Utilities	642

Note: Acreages/mileages may overlap and are not additive.

* Industrial park.

Upgrade Section

The Upgrade Section largely crosses urban and suburban areas, including the Tucson metropolitan area. The Upgrade Section also traverses some areas of desert landscape, rural-residential, and commercial development.

Current land uses in the Upgrade Section of the analysis area are outlined in table 3.11-8. The analysis area includes primarily undeveloped land with pockets of heavy to moderate land uses surrounding the municipal areas and industrial use. The undeveloped, more rural area of this analysis area can be characterized as open desert with some agriculture and widely dispersed, low-density residential uses on private parcels. The Upgrade Section does not include a separate new ROW for the proposed Project, but would rather expand the existing Western 115-kV transmission.

Table 3.11-8. Analysis Area Land Uses: Upgrade Section

Land Use	Acreage
Agriculture	380
Air facilities	80
Developed, low-intensity	607
Developed, medium-intensity	127
Developed, high-intensity	18
Military	1,942
Other	0
Parks and preservation areas	777
Recreation	69
Land Use	**Number of Facilities**
Public and community facilities	0
Communications facilities	31
Land Use	**Mileage**
Recreation (trails)	5
Transportation	91
Utilities	43

Note: Acreages/mileages may overlap and are not additive.

The more developed urban and suburban areas in the Upgrade Section includes the communities of Willcox, Benson, Vail, and Tucson. Residents in these areas currently experience the land uses associated with the existing Western lines.

BLM LANDS AND REALTY, LAND USE AUTHORIZATIONS AND RIGHTS-OF-WAY, INCLUDING FUTURE OR PLANNED LAND USES

Linear land-use authorizations and ROWs (utility corridors) are established in BLM Land Use Plans and via the programmatic West-Wide Energy Corridor ROD (West-wide Energy Corridor Programmatic EIS Information Center 2012). When completed, the updated Coronado National Forest Land Use Plan will establish and authorize linear land-use authorizations and ROWs. There is an existing system of primarily east-west high-voltage (230-kV and above) utility and transportation corridors, including Section 368 energy corridors within the analysis area.

New Build Section

Table 3.11-9 below provides a summary of the land use authorizations for the New Build Section. A total of 256 land use authorizations would be intersected by the Upgrade Section. A comprehensive list of BLM land use authorizations (Las Cruces District in New Mexico and the Safford and Tucson Field Offices in Arizona) that occur within the analysis area for the New Build Section are provided in Appendix J, “BLM Land Use Authorizations.”

Table 3.11-9. Land Use Authorizations Summary: New Build Section

Land Use Authorization Type	Amount of Occurrences in Analysis Area
Linear ROW – Transmission Line	57
Linear ROW – Transportation Corridor	71
Linear ROW – Natural Gas Pipeline	32
Linear ROW – Communications	39
Linear ROW – Water Pipeline/Canal	1
Communication Site	12
Oil and Gas Facility	3
Pipeline Facilities	15
Highway Materials Site	11
Other	15

Source: BLM (2013f).

The existing ROW exclusion areas include all wilderness areas, WSAs, ACECs, RNAs, and NNLs. Segment LD2 crosses the Lordsburg Playa RNA.

The existing ROW avoidance areas include the CDNST, Butterfield Trail, bighorn sheep areas, and VRM Class II areas. Specifically, the following special stipulations apply to new facilities that are proposed within avoidance areas:

- Facilities will not be located parallel to the CDNST or Butterfield Trail.
- Facilities will not be located within 0.25 mile of any stage station on the Butterfield Trail.
- Facilities will not be located within riparian areas.
- Access routes will be limited and considered on a case-by-case basis.

The analysis area for the New Build Section includes avoidance areas in the Mimbres RMP, including the CDNST, Butterfield Trail, Lordsburg Playa RNA, and VRM Class II areas (see figures 3.11-1 and 3.11-2).

Suitable/occupied desert bighorn sheep habitat is managed as an avoidance area by the Las Cruces District. Approximately 74 acres of subroute 1.1, roughly 20 acres of the subroute 1.2, 71 acres of local alternative E, 4 acres of local alternative LD3b, and 41 acres of local alternative LD1would occur within suitable/occupied desert bighorn sheep habitat.

Areas identified for disposal are prescribed as avoidance areas under the Mimbres RMP. Approximately 14,704 acres of lands identified as suitable for disposal under the Mimbres RMP would be crossed in the New Build Section.

Upgrade Section

Table 3.11-10 below provides a summary of the land use authorizations for the Upgrade Section. A total of 55 land use authorizations would be intersected by the Upgrade Section. A comprehensive list of BLM land use authorizations (Las Cruces District in New Mexico and the Safford and Tucson Field Offices in Arizona) that occur within the analysis area are provided in Appendix J, "BLM Land Use Authorizations."

Table 3.11-10. Land Use Authorizations Summary: Upgrade Section

Land Use Authorization Type	Amount of Occurrences in Analysis Area
Linear ROW – Transmission Line	6
Linear ROW – Transportation Corridor	34
Linear ROW – Natural Gas Pipeline	5
Linear ROW – Communications	5
Linear ROW – Water Pipeline/Canal	3
Communication Site	1
Other	1

Sources: BLM (2013f, 2013g, 2013h).

No formal utility corridors have been established within the analysis area under the Safford RMP.

No avoidance areas are identified by the Safford RMP (refer to figure 3.11-3).

The Phoenix RMP designated the 1-mile-wide Silver Bell utility corridor within the analysis area for route group 4 near Marana; however, the IFNM ROD abolished this corridor (BLM 2013c). The proposed Project footprint would not occur within this corridor.

No lands identified for disposal are included in the Upgrade Section analysis area.

3.11.2 Farmlands and Rangelands

Some of the information provided in the following subsections is taken from a report titled "Southline Transmission Project Resource Report 3: Farmlands and Rangeland" (CH2M Hill 2013l). The content of that report are used herein without specific reference. Additional explicit "in text" references to scientific and other sources relied upon for conclusions in the analysis are included.

Analysis Area

The analysis includes the area for farmlands and rangeland that would be impacted by disturbance associated with construction of the proposed Project. The analysis area for the New Build Section is 1 mile on each side of the centerline. The analysis area for the Upgrade Section is 500 feet, represented by 200 feet on either side of the existing 100-foot corridor.

Information was gathered on farmlands, rangeland, and grazing within the analysis area of the proposed Project and alternatives for the BLM, NMSLO, and ASLD. Each agency was contacted to acquire grazing data and determine whether any existing plans, regulations, or policies would apply to the proposed Project and alternatives. GIS grazing allotment data were provided by BLM in 2012 (BLM 2012f, 2012g). Online databases were accessed in 2012 for ASLD and NMSLO grazing data. The NRCS was contacted regarding farmlands, and information and GIS data were obtained from the NRCS online database (NRCS 2012a).

Relevant management plans were reviewed to identify potential conflicts between the existing resource management objectives and the proposed Project and alternatives. The NMSLO indicated that additional information might be available by researching hard-copy office files or conducting field trips to confirm the status of range improvement projects. The ASLD provided range improvement information for their grazing allotments that would be intersected by the proposed Project (ASLD 2014). This information is detailed in the Upgrade discussion below. Data on animal unit months (AUMs) were obtained from the BLM for their grazing leases, but stocking rates for some Arizona leases were not available.

GIS data were used to develop a comprehensive set of maps showing the farmlands, rangeland, and grazing areas in the analysis area and calculate acreages for BLM and State lands.

Laws, Ordinances, Regulations, and Standards

FEDERAL LAWS AND MANAGEMENT PLANS

The Farmland Protection Policy Act is a set of Federal programs and policies to protect farmland from urban sprawl and the waste of energy and resources associated with such development. Farmlands are classified into prime, unique, or those having statewide or local importance.

The Taylor Grazing Act of 1934 (PL 73-482) is a Federal law developed to control livestock grazing on public land by creating grazing allotments and providing parameters on the number and type of livestock, and the season of use. The law was intended to prevent overgrazing and soil erosion/loss (BLM 2012h).

To establish grazing fees and a rangeland monitoring program, the Public Rangeland Improvement Act (PL 95-514) was passed in 1978. Under this act, the Forest Service and BLM must consult, coordinate, and cooperate with grazing permittees and State agencies to develop Range Management Plans (Forest Service 2012).

Most of the public land within the analysis area is managed by the BLM from the Las Cruces Field Office (New Mexico) and the Safford Field Office (Arizona). The agency is guided by 43 CFR 4100 to administer livestock grazing on their lands to promote coordination with other Federal and State grazing authorities and ensure that the goals of the previous two acts are met (BLM 2009c). Under the authority of Sections 3 and 15 of the Taylor Grazing Act of 1934 (BLM 2012h), BLM issues grazing permits, generally covering a 10-year period, which include terms and conditions such as the stocking rates in AUMs (the amount of forage needed to sustain one cow for a month), and season of use. The BLM uses rangeland health assessments to monitor proper grazing management on their leases as dictated by the "Arizona Standards for Rangeland Health and Guidelines for Grazing Administration" (BLM 1997).

BLM grazing lands in New Mexico are covered by the 1993 Mimbres RMP (BLM 1993). The Safford RMP (BLM 1991) and the Peloncillo Mountains Wilderness Management Plan (BLM 2012i) cover the Arizona portions of the analysis area; however, the former relies on the Upper Gila-San Simon EIS (BLM 1978) and the Eastern Arizona Grazing EIS (BLM 1986c) for guidance on grazing management. The Proposed Statewide RMP Amendment/FEIS, "New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management" (BLM 2000b), also provides direction for management of grazing leases and RMPs covering public land in New Mexico. The Proposed Statewide RMP Amendment/FEIS, "Arizona Standards for Rangeland Health and Guidelines for Grazing Administration" (BLM 1997), also provides direction for management of grazing leases and RMPs covering public land in Arizona.

STATE GUIDELINES AND MANAGEMENT PLANS

To ensure healthy rangelands, the NMSLO administers grazing leases on State Trust lands following guidelines established in the NMAC 2012, Title 19, "Natural Resources and Wildlife," Chapter 2, Part 8.

The ASLD issues grazing leases to ranchers following protocol issued in the "Arizona Standards for Rangeland Health and Guidelines for Grazing Administration" (University of Arizona 2012). The intent is to provide standards to ensure healthy rangelands, with management coordinated between the State and Federal agencies.

Issues to Be Analyzed

The EIS evaluates whether the construction related to the proposed Project and alternatives would result in significant impacts to farm and range lands. Specifically, the analysis estimates the amount of acreage that would be lost as a result of land clearing and disturbance related to the proposed Project, and identifies whether changes to stocking rates, grazing allotments, or other range improvement projects (i.e., fencing, water) would be required. For farmlands, the analysis assesses loss of crop production on prime or unique farmland or farmland of statewide importance and considers whether the proposed Project would cause interference with existing automated irrigation and fertilization programs.
In accordance with section 1508.27 of CEQ regulations, the analysis considers temporal scale (time), spatial extent (area), and intensity to compare the Project and alternatives.

Analysis Area Conditions

NEW BUILD SECTION

In the New Build Section, the proposed Project would cross land that is primarily characterized by undeveloped desert landscape with interspersed areas of rural residential and commercial development. As noted in chapter 2, a large percentage of the proposed Project footprint for all action alternatives also parallels disturbed areas, including existing linear infrastructure such as transmission lines, roads, and abandoned railroad ROWs. More details can be found above in "Land Use."

Farmlands

Management and planning support for Federal and private farmlands is administered by the NRCS through the Farm and Ranchlands Protection Program. The Farmland Protection Policy Act (NRCS 2012b) defines lands as follows:

Prime—land that has physical and chemical properties that best support the production of food, feed, forage, fiber, and oilseed crops with minimal input of fuel, fertilizer and pesticides. Cropland, pastureland, rangeland, or forestland qualifies, but not land that is committed to urban development or water storage.

Unique—land other than prime farmland used for producing specific high-value food or fiber crops. These lands have the special combination of soil quality, location, growing season, and moisture supply needed to produce economically sustainable high quality and high yields when acceptable farming methods are implemented. Citrus and tree nuts are good examples of crops that qualify.

Farmland of Statewide Importance—land that is of statewide importance for the production of food or other crops. These lands must be designated by the State government and require concurrence by the NRCS State Conservationist.

Farmland of Local Importance—local land considered important for production of food and other crops. The lands are designated by a local agency and require concurrence from the NRCS State Conservationist. There are no farmlands that have been designated as locally important within proximity to the Project footprint or representative ROWs.

Despite the arid climate, farmlands do exist, aided by irrigation where more permanent water sources are present either from river flows or groundwater pumping. Southeast of the Willcox Playa, traditional agricultural land use has shifted to include small vineyards (domestic farm wineries) since the mid-1980s. Since around 2005 there has been an increase in this shift in land use.

Soil units may be classified as prime farmland under current conditions or as prime farmland if certain qualifying conditions exist on the site (e.g., “prime farmland if irrigated,” “prime farmland when protected from flooding,” “prime farmland when irrigated and protected from flooding,” etc.). Table 3.11-11 shows the acreages of farmland classifications within the two route groups in the New Build Section.

Table 3.11-11. Summary of Farmlands in the New Build Section Analysis Area

Route Group	Farmland of Statewide Importance (acres)	Farmland of Unique Importance (acres)	Prime Farmland if Irrigated (acres)	Prime Farmland if Meeting Other Conditions (acres)
Route group 1 – Afton Substation to Hidalgo Substation	73,694	0	3,001	0
Route group 2 – Hidalgo Substation to Apache Substation	29,674	9,530	54,920	29,913

It is important to note that the NRCS classifies farmlands based on the physical, chemical, climatological, and sociological characteristics of the soil and land. It does not imply that areas classified as prime or unique farmlands or farmlands of statewide or local importance are currently being actively farmed or have ever been actively farmed. Therefore, it can be assumed that the calculations of acres of NRCS farmland classifications are larger than the acreages of actual existing farmland.

Rangelands

Rangeland areas that are actively grazed comprise the majority land use in the project footprint in the New Build Section. The BLM, the ASLD, and the NMSLO have the responsibility for management and oversight of public land grazing allotments and leases in proximity to the proposed Project and alternatives. Leases and allotments may contain a mosaic of private, State, and Federal lands, each managed according to a different set of requirements and administrators. The Farmland Protection Policy Act (NRCS 2012b) also recognizes prime rangeland where soil, climate, topography, vegetation, and location have enhanced the quality or value of natural vegetation for the kinds of herbivores common to the area.

Almost all of the land in the analysis area is designated as grazing land, with the exception of active farmland and other urban and developed areas. This is also true of those areas to be developed for substations and staging areas. Within route group 1, the majority of the grazing allotments in the areas analysis area are managed by the BLM, with some overlap in jurisdiction with the State of New Mexico (table 3.11-12). The management responsibility for grazing management in the route group 2 analysis area is distributed among both the BLM and State agencies, with the majority of the grazing allotments being administered by the New Mexico BLM and the State of Arizona (see table 3.11-12).

Table 3.11-12. Summary of Grazing Lands in the New Build Section Analysis Area

Route Group	Arizona BLM Grazing Lands (acres)	New Mexico BLM Grazing Lands (acres)	Arizona State Grazing Lands (acres)	New Mexico State Grazing Lands (acres)	Total Acres
Route group 1 – Afton Substation to Hidalgo Substation	0	205,430	0	125,146	**330,576**
Route group 2 –Hidalgo Substation to Apache Substation	115,522	46,243	209,176	35,786	**406,727**

UPGRADE SECTION

Farmlands

The analysis area for the Upgrade Section generally consists of urban and suburban areas, including the city of Tucson, with minimal farmland. Most of the farmlands are playas that would require seasonal flooding to be agriculturally productive (table 3.11-13).

Table 3.11-13. Summary of Farmlands in the Upgrade Section Analysis Area

Proposed and Alternative Routing Options Segment	Farmland of Statewide Importance (acres)	Farmland of Unique Importance (acres)	Prime Farmland if Irrigated (acres)	Prime Farmland if Meeting Other Conditions (acres)
Route group 3 – Apache Substation to Pantano Substation	0	0	200	459
Route group 4 – Pantano Substation to Saguaro Substation	0	146	959	1,146

Rangelands

The majority of the rangeland within the analysis area for the Upgrade Section consists of grazing lands managed by the State of Arizona (table 3.11-14). The ASLD provided range improvement information for their grazing allotments that would be intersected by the proposed Project (ASLD 2014). This information includes the locations for rangeland improvements such as pasture fencing, stock tanks, water pipelines, corrals, troughs, and cattleguards. A summary of range improvements that occur on ASLD grazing allotments that would be intersected by the proposed Upgrade Section is provided in table 13.11-15; the data files are included in included in the Project Record.

Table 3.11-14. Summary of Grazing Lands in the Upgrade Section Analysis Area

Proposed and Alternative Routing Options Segment	Arizona BLM Grazing Lands (acres)	New Mexico BLM Grazing Lands (acres)	Arizona State Grazing Lands (acres)	New Mexico State Grazing Lands (acres)	Total Acres
Route group 3 – Apache Substation to Pantano Substation	671	0	3,662	0	**4,333**
Route group 4 – Pantano Substation to Saguaro Substation	646	0	689	0	**1,335**

Table 3.11-15. Summary of ASLD Range Improvements on Allotments in the Upgrade Section Analysis Area

ASLD Grazing lease	Total Improvements on Lease*	Fence	Corral	Stock Tank/Tank/ Pond	Trough	Pipeline	Well	Other
Hidalgo to Apache								
Allred	0							
Atwood	1	1						
Avanti	0							
Belva Klump	3	1	1					1
Chambers	11	11						
Davenport	4	2				1		1
Dozier	7	6						1
Dubois	3	3						
Ed Barnes	6	4	1					1
Ellis	0							
Fisher Hills	35	10	2	5	1	10	2	5
Flanders	0							
Flying W	3	2					1	
Hedges	2	1						1
John L. Klump	0							
Klump	126	22	3	28	5	23	11	34
Kortsen	97	31		12			4	50
Lawson	17	9	2	1	1		1	3
M. Barnes	2	1						1
Monk	41	2		17	1		10	11
Montierth	16	5	1	1		3	1	5
Moore	4	4						
Moreman	1				1			
Moser	0							
Noland	0							
Parker	13	2	1	2				8
Pierson	0							

Table 3.11-15. Summary of ASLD Range Improvements on Allotments in the Upgrade Section Analysis Area (Continued)

ASLD Grazing lease	Total Improvements on Lease*	Fence	Corral	Stock Tank/Tank/ Pond	Trough	Pipeline	Well	Other
Hidalgo to Apache, cont'd.								
Rancho Sacatal	84	34	3	15	5	4	4	19
Red Wing	23	10		4		3	1	5
Redtail	97	32		22		1		42
Riggs	1	1						
Robbs	1	1						
Roll Ranch	11	4		2	1		2	2
Rough Mountain	6	5		1				
Todd	99	25	6	18	7	11	4	28
Wear	16	6		1	1	5	1	2
Apache to Pantano								
Adams	45	18	4	8	1	7	0	7
Andrada (Notz)	116	27	4	50	8	11	1	15
Armer	64	14	2	12	8	8	8	12
Ash Creek	43	15	1	11	2	1	6	7
Bar X	41	15	1	2	3	10	2	8
Bar Y (Pima County)	82	13	6	13	1	16	8	25
Black Jack (De La Ossa)	34	24		1	1	4		4
De La Ossa	35	9	8	5	1	6		6
Empirita (BLM)	1	1						
Fouur	11	3		4	1	2		1
Getzweiler	29	7		6	1	1		14
Hopp	6	2		1	1	1		1
Krumpotick	19	8		3	2	1	1	4
Lamb	4			2			1	1
Pringle	44	13	5	12	2	3	4	5
Zr Hereford	178	53	1	21	18	40	10	35
Pantano to Saguaro								
BKW	48	27	5	5	1	5	1	4
Black Jack (De La Ossa)	34	24		1	1	4		4
De La Ossa	35	9	8	5	1	6		6

* Includes range improvements both inside and outside the Representative ROW.

Source: ASLD (2014).

ELECTROMAGNETIC FIELDS

One issue raised during the EIS scoping process was the potential for electromagnetic fields (EMF) created by the flow of electricity associated with the proposed Project to interfere with radio signals used in automated irrigation or fertilization systems. This effect is classified as broadband interference since it occurs over a wide range of electromagnetic spectrum and may be difficult to void. Electric fields from electric power transmission lines can interfere with radio signals, although the effect may only be experienced for systems located beneath or in close proximity to the power line, with the interference dissipating rapidly as distance from the line increases.

Little information is available to assess this impact. To date, the only guidelines established for EMF exposure by the Federal Communications Commission (FCC), the IEEE, and the American Conference of Governmental Industrial Hygienists (ACGIH) are related to human health. No EMF regulations have been established by the Federal Government or by the New Mexico and Arizona State governments related to exposure and human health. Nor have any guidelines been established or evaluations completed of the impact of EMF on interference with radio signals of the type that might be employed by local farmers. One technique used to prevent interference is to enclose the electric operating unit in a conductor envelope also called a Faraday cage, which shields the instrumentation from the electric field.

3.11.3 Military Operations

Military baseline conditions (the military “affected environment”) include the discussion of existing military land uses in terms of military operations, military training routes (MTRs), and military installations. Some of the information provided in this section is taken from a report titled “Southline Transmission Project Resource Report 19: Military Operations” (CH2M Hill 2013m). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

Analysis Area

The analysis area military operations for both the New Build Section and Upgrade Section includes any military operation, MTRs, and military installation that may intersect with the footprint for the action alternatives. This includes a 1-mile buffer around the BSETR. The analysis area includes the proposed Project footprint total acreage (approximately 0 to 2,000 acres, depending upon alternative) as well as the intersection of the proposed Project with the 1.6 million-acre BSETR. This analysis area is at the request of military staff from BSETR, who requested a 1-km buffer, which is captured in the 1-mile buffer. This analysis area is used to identify military operations, MTRs, and military installations that could be directly, indirectly, or cumulatively impacted by surface disturbance, above-surface facilities (i.e., towers, spans) and where construction materials, equipment, and workers may be present (figures 3.11-5a and 3.11-5b).

Laws, Ordinances, Regulations, and Standards

Proposed BLM actions must consider military regulations during the application review process and resource analysis. The following discussion summarizes the relevant military laws, regulations, plans, and policies that would apply to the Project (laws, regulations, plans, and policies discussed in chapter 2 or other resource sections of this EIS are not repeated here).

FEDERAL

National Telecommunications and Information Administration Regulations and Procedures

There are two managed areas in the vicinity of Fort Huachuca within which radio frequencies could affect the U.S. Army Electronic Proving Ground (EPG). The “Coordination Zone” and “Noise Minimize Zone” are established in the “Manual of Regulations and Procedures for Federal Radio Frequency Management” published by the National Telecommunications and Information Administration of the DOC (2013). Each Federal agency having radio operations within the Coordination Zone must notify the Area Frequency Coordinator, Fort Huachuca, or the Army Interdepartment Radio Advisory Committee representative, of the frequency, power, location, and type emission of the radio operations. The Coordination Zone is the area bounded by connecting lines along Arizona SR 80 from Tucson to Bisbee, due south from Bisbee to the international border, west along the border to a point due south of Dateland, due north to Dateland, along SR 80 from Dateland to Gila Bend, and along SR 84 from Gila Bend to Tucson. The Noise Minimize Zone is the area extending 15 miles from Fort Huachuca within which transmissions of mobile stations need to be minimized to the extent feasible. Signal levels within the Noise Minimize Zone should not exceed the following limits:

- 10–540 kilohertz (kHz) 20 millivolts (mV) per meter
- 540–1,600 kHz 50 mV per meter
- 1.6–20 megahertz (MHz) 20 mV per meter
- 20–54 MHz 50 mV per meter
- 54–148 MHz 20 mV per meter
- above 148 MHz 50 mV per meter

U.S. Department of Defense and Federal Aviation Administration

The DOD implemented the Air Installation Compatible Use Zone (AICUZ) Program in 1973 to promote compatible land use development around military airfields. The AICUZ Program creates standard land-use guidelines for areas that may be affected by noise exposure and accident potential, and provides information that can be used by local government jurisdictions to regulate land use and development. The AICUZ Program identifies noise zones and accident potential zones (APZs), while providing guidance regarding the compatibility of various land uses.

NOISEMAP and the Integrated Noise Model are the two EPA-approved computer models used to determine potential noise impacts from aircraft operations. The FAA uses the Integrated Noise Model for civilian airport modeling, whereas the U.S. Air Force uses the NOISEMAP model to describe noise impacts created by aircraft operations.

The AICUZ Program identifies APZs for military airfields to limit noise exposure and safety hazards. An area of high accident potential is known as a Clear Zone (CZ), followed by Accident Potential Zone I (APZ-I), and Accident Potential Zone II (APZ-II). Due to high incidence rate of accident potential within CZ areas, acceptable land uses within these areas are highly limited. Nationwide, the U.S. Air Force has funded the acquisition of real property interests within CZs at military bases. Land uses also are limited within APZs due to the potential for accidents to occur. The AICUZ Program guidelines apply to Libby Army Airfield associated with Fort Huachuca, as does State law (primarily ARS 28-8481 and 28-8482) concerning military airports. No APZs are included in the analysis area.

Issues to Be Analyzed

Public scoping of the proposed Project generated eight comments regarding military concerns. These comments generally recommended analysis of the potential impacts to military installations and airspace from the Project:

- directly or indirectly impacting DOD-owned land, leased land, or withdrawn Federal land; military bases, bombing ranges, gunnery ranges (including EPGs), airports, and airspace; parachute drop zones; and MTRs;
- directly or indirectly impacting access to military owned, leased, or withdrawn (including EPGs) lands as a result of fencing or other physical or legal barriers necessary for completion and operation/maintenance of the proposed Project and its alternatives; or
- conflicting with, or putting limitations on, existing and/or future military activities and/or missions.

Analysis Area Conditions

The existing conditions for military operations are described in an east-to-west sequence, beginning at the Afton Substation in New Mexico and ending at the Saguaro Substation in Arizona. Military operations are illustrated in figures 3.11-5a and 3.11-5b, New Build and Upgrade sections, respectively.

New Build Section

DEPARTMENT OF DEFENSE LAND

Lands managed by DOD form less than 1 percent of the analysis area (refer to Section 3.11.1, "Land Use"). The DOD lands crossed by the New Build Section are located in Willcox Playa, in route group 2 (segment P7 of subroute 2.1). The Willcox Playa was formerly used as a bombing range around World War II, but is no longer used as an active bombing range. Remnant unexploded ordinance may exist on the Willcox Playa. The Willcox Playa is under a perpetual lease to the Fort Huachuca's EPG operations by DOD and is currently used for aerial training by the EPG. The playa falls outside the BSETR, but is still a key location for Fort Huachuca's overall electronic testing mission in Arizona.

MILITARY TRAINING ROUTES

The MTR program is a joint venture by the FAA and the DOD to develop routes for the purpose of conducting low-altitude, high-speed training. MTRs may refer to types of special use airspace, other than restricted airspace or prohibited airspace, where military operations justify limitations on aircraft not participating in those operations. The DOD (e.g., U.S. Army, U.S. Air Force) trains in a wide range of airborne tactics, one of which is low-level combat. MTRs are aerial corridors in which military aircraft generally operate below 10,000 feet at speeds in excess of 250 knots.

The FAA and DOD define Special Use Airspace areas used for military flight activities as follows:

- Prohibited Areas—airspace that may contain a high volume of pilot training activity or an unusual type of aerial activity, neither of which is hazardous to aircraft. They are depicted on aeronautical charts for information to non-participating pilots.
- Restricted Area—airspace designated for hazardous military activities including live firing of weapons. Restrictions are placed on all non-participating air traffic.

- Warning Areas—international airspace designated for military activities. Although activities may be hazardous, international agreements do not provide for prohibition of flight in international airspace.
- Military Operations Areas (MOAs)—airspace designated for non-hazardous military activity such as acrobatics, air combat tactics, and formation training. The designation informs and segregates non-participating instrument flight rules aircraft from the activity. Visual flight rules aircraft are not restricted from operating in MOAs. Examples of activities conducted in MOAs include, but are not limited to, air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics.
- Alert Areas—alert areas are depicted on aeronautical charts to inform nonparticipating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity. Pilots should be particularly alert when flying in these areas.
- Controlled Firing Areas—airspace where live ammunition is used to simulate combat scenarios. Controlled firing areas contain activities which, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft. The distinguishing feature of the Controlled Firing Area, compared with other Special Use Airspace, is that its activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be approaching the area.

The FAA and DOD define Other Airspace Areas used for military flight activities as follows:

- MTRs—for military flight training at airspeeds in excess of 250 knots. There are two types of MTRs:
  - Instrument Flight Rules: for low-altitude navigation and tactical training below 10,000 feet and at airspeeds in excess of 250 knots at night and in foul weather.
  - Visual Flight Rules: for low-altitude navigation and tactical training below 10,000 feet at airspeeds in excess of 250 knots under visual flight rules (FAA 2013).

Each training route is identified by two letters, followed by either four digits for routes below 1,500 feet above ground level (AGL), or three digits for routes extending for at least one leg above 1,500 feet AGL. Each segment of an MTR is allocated a floor and ceiling altitude and lateral boundaries. The floor may be at the earth’s surface or at any altitude above the surface. Lateral boundaries are described by nautical miles left and right of the route. Nautical miles have been converted to statute miles for the purposes of this analysis. All mileage calculations of MTRs that cross the analysis area have been provided by the Arizona Air National Guard (2105). FAA Sectional charts only display the MTR centerline, not the actual MTR leg widths. See figures 3.11-5a and 3.11-5b for actual route points and leg widths. MTRs are subdivided into Instrument MTRs, Visual MTRs, and Slow-Speed, Low-Altitude MTRs. Instrument MTRs are flown under Air Traffic Control, while Visual MTRs are not.

U.S. Air Force military aircraft operating on the MTRs with night-vision goggles under “HI illumination” conditions are restricted to a 1,000 feet AGL minimum. Those operating with night-vision goggles under “LO illumination” or without night-vision goggles are restricted to a Minimum Safe Altitude computed for each leg of the route. This leg Minimum Safe Altitude is typically always higher than 1,000 feet AGL minimum, due to terrain and human-made obstructions. Army, Navy, and Marine aircraft might have lower-altitude restrictions depending on the type of equipment (e.g., Army helicopters).

There are multiple MTRs throughout southern New Mexico and Arizona within the New Build Section military analysis area. MTRs and airspace restriction areas were reviewed specific to the proposed and alternative project routes. Specific military training flight paths that intersect or occur adjacent to the New Build Section are shown in table 3.11-16 and on figure 3.11-5a. Transmission line structures built along training routes would need to be limited in height to less than 200 feet, and consultation with military authorities is advised. Building to the floor of the airspace would require separate operational clearance requirements for safety because the MTR AGL minimum applies to not just the terrain, but also human-made obstructions.

Table 3.11-16. Military Training Routes that Cross the Analysis Area – New Build Section

Route Segment/Expansion Area/Staging Area	Visual MTR	Height AGL at Point of Route Crossing (feet)	Length of Analysis Area Crossed by MTR (miles)
Route Group 1 Afton Substation to Hidalgo Substation			
P2- subroute 1.1	VR-176	100	0
	VR-263	100	19.3
P4a - subroute 1.1	VR-263	100	8.9
Local Alternative DN1	VR-263	100	6.8
Local Alternative D	VR-263	100	7.3
S7 - subroute 1.2	VR-263	100	34.1
S8 - subroute 1.2	VR-263	100	14.6
Route Group 2 Hidalgo Substation to Apache Substation			
P4b - subroute 2.1	VR-263	100	11.4
	VR-1233	300	8.4
P6b - subroute 2.1	VR-260	300	5.9
P7 - subroute 2.1	VR-259	700	7.6
	VR-260	300	15.4
P8 - subroute 2.1	VR-259	700	0.5
F – subroute 2.2	VR-260	300	5.9
Ga - subroute 2.2	VR-259	700	1.3
Gb - subroute 2.2	VR-259	700	1.0
Gc - subroute 2.2	VR-259	700	7.4
P7a - route variation	VR 259	700	13.3
	VR 260	300	12.1
P7b - route variation	VR 259	700	2.1
	VR 260	300	0.6
P7d - route variation	VR 259	700	1.2
Local Alternative LD3a	VR-263	100	19.9
	VR-1233	300	22.3
Local Alternative LD4	VR-260	300	5.5
	VR-263	100	44.6
	VR-1233	300	35.5
Local Alternative LD4-Option 5	VR-260	300	5.1
	VR-263	100	3.0
	VR-1233	300	4.9
Local Alternative WC1	VR-259	700	1.3

Table 3.11-16. Military Training Routes that Cross the Analysis Area – New Build Section (Continued)

Route Segment/Expansion Area/Staging Area	Visual MTR	Height AGL at Point of Route Crossing (feet)	Length of Analysis Area Crossed by MTR (miles)
Substations			
Hidalgo Substation Expansion	VR-263	100	0. 27
Southline Apache Substation Expansion	VR-259	700	0.27
SWTC Apache Substation Expansion	VR-259	700	0.27
Staging Areas			
Staging Area P1	VR-263	100	0
Staging Area P2	VR-176	100	0
Staging Area P4a	VR 263	100	0
Staging Area S7	VR-263	100	0
Staging Area S8	VR-263	100	0
Staging Area D	VR 263	100	0
Staging Area P6b	VR 260	300	0
Staging Area P7a	VR 259	700	0
Staging Area F	VR 260	300	0
Staging Area Ga	VR 259	700	0
Staging Area Gb	VR-259	700	0
Staging Area LD1	VR 259	700	0
Staging Area LD3a	VR 263	100	0
Staging Area WC1	VR 260	300	0

Tucson International Airport is home to the U.S. Air Force 162nd Fighter Wing (FW), which trains pilots in the F-16 Falcon fighter aircraft. The 162nd FW uses MTRs in New Mexico and Arizona. Low-altitude tactical maneuvering is an important part not only for their training syllabi, but also for other units who use their MTRs for their own training requirements. The 162nd FW uses the MTRs to fly extremely high-task-loaded missions called Low Altitude Step Down Training. These missions are flown dual (with an instructor pilot in the rear cockpit) at 500 feet AGL and 500 to 575 miles per hour (mph) (450 to 500 knots). The student pilot maneuvers the aircraft three-dimensionally (e.g., vertical pull to specific attitude/altitude, then inverted pull down back to 500 feet AGL). Although the 162nd FW's F-16 aircraft are currently limited to a 500 feet AGL minimum training altitude, many other military units using the MTRs do currently train to lower minimum altitudes. Recent examples include local and deployed units flying Air Force A-10 Thunderbolts and C-130 Hercules, Marine MV-22 Ospreys and AV-8 Harriers, Navy F-18 Hornets, and Royal Air Force GR-4 Tornados. These aircraft often fly these prime low-level training down to their operational minimum altitudes (100 to 300 feet AGL) or the MTR minimum, whichever is higher.

Specific military airspace operations categories that intersect the analysis area include Low Altitude Step Down Training, Low-Altitude Navigation, Low-Altitude Tactical Formation, and Low-Altitude Awareness Training.

MILITARY OPERATIONS AREA (IAW FAA ORDER JO 7400.2.J, CHAPTER 25, MILITARY OPERATIONS AREA)

An MOA is “airspace established outside Class A airspace to separate or segregate certain nonhazardous military activities from instrument flight rules (IFR) Traffic and to identify for visual flight rules (VFR) Traffic where these activities are conducted” (14 CFR Part 1-2). Class A airspace is defined by the FAA as “generally, that airspace from 18,000 feet mean sea-level (MSL) up to and including flight-level (FL) 600, including the airspace overlying the waters within 12 nautical miles (NM) of the coast of the 48 contiguous States and Alaska. Unless otherwise authorized, all persons must operate their aircraft under instrument flight rules (IFR).”

MOAs are designated to contain nonhazardous, military flight activities, including, but not limited to, air combat maneuvers, air intercepts, low-altitude tactics, etc. (FAA JO 7400.2J, 25-1-2) (FAA 2012).

The 162nd FW conducts daily operations in the Tombstone MOA, Outlaw MOA, Jackal Low/Jackal MOAs, Reserve/Morenci MOA, Ruby/Fuzzy MOA, and Sells MOA. The MOAs are not active 24 hours a day; they are activated and deactivated by the Albuquerque Air Route Traffic Control Center, as required. The analysis area for the proposed New Build Section would only intersect one MOA: the Morenci MOA; the Jackal Low and Tombstone MOAs are located in general proximity to the proposed New Build Section, as shown in table 3.11-17.

Table 3.11-17. Military Operations Areas in the Vicinity of the New Build Section

Facility	Distance to Nearest Route (Segment Name)	Analysis Area Crossed (miles)
Jackal Low MOA	3.9 miles (LD4)	0
Morenci MOA	0 miles (LD4)	19.2
Tombstone A and B MOAs	3.2 miles (S7)	0

JACKAL LOW MILITARY OPERATIONS AREA

The Jackal Low MOA overlies Graham County in southwestern Arizona. The lowest altitude of operation is 100 feet AGL, and the highest is 10,999 feet amsl. The Jackal Low MOA is always active Monday through Friday from 7 a.m. to 6 p.m. It is active by Notice to Airmen (NOTAM) from 6 p.m. to 10 p.m., Monday to Friday, and intermittently on weekends.

MORENCI MILITARY OPERATIONS AREA

The Morenci MOA occurs at an altitude between 1,500 feet AGL and 17,999 feet amsl. Greenlee County Airport is located within the boundaries of the Morenci MOA. The MOA is active Monday through Friday from 6 a.m. to 9 p.m., and other times by NOTAM.

TOMBSTONE MILITARY OPERATIONS AREAS

The Tombstone MOAs (A, B, and C) are managed by the 355th FW at Davis-Monthan AFB and occasionally utilized by the 162nd FW. A cooperative scheduling agreement is in place among the 56th FW at Luke AFB, 355th FW at Davis-Monthan AFB, and 162nd FW at Tucson to ensure all three units have sufficient access to the airspace to accomplish their training goals. Tombstone MOAs A and B occur at an altitude between 500 feet AGL and 14,500 feet amsl; Tombstone MOA C occurs at an altitude between 14,500 feet amsl and 17,999 feet amsl. The Tombstone MOAs all are active Monday through Friday from 6 a.m. to 9 p.m., and other times by NOTAM.

MILITARY INSTALLATIONS

There are no military installations within the analysis area for the New Build Section.

Upgrade Section

DEPARTMENT OF DEFENSE LAND

Lands managed by DOD form less than 1 percent of the analysis area (refer to Section 3.11.1, “Land Use”). No DOD lands would be crossed by the Upgrade Section.

MILITARY TRAINING ROUTES

There are multiple MTRs throughout southern Arizona. However, only one MTR crosses a segment in the Upgrade Section. MTR VR-259 would be crossed by 1.5 miles of segment U1a. MTR VR-259 has a minimum height AGL of 700 feet where it crosses segment U1a. This MTR shares the same descriptions and users as those described under the New Build Section above.

MILITARY OPERATIONS AREA

Tombstone A and C MOAs are located within the Upgrade Section analysis area. However, neither MOA is located within 10 miles of the analysis area. Tombstone C MOA’s minimum altitude is 14,500 feet amsl, whereas Tombstone A MOA starts at 500 feet AGL.

MILITARY INSTALLATIONS

Several military installations are located in the vicinity of the Upgrade Section; however, the military analysis area only intersects Fort Huachuca’s BSETR and Willcox Dry Lake Bombing Range, where military test operation activities are possible. The vast majority of the intersection would occur in the Upgrade Section; however, there are areas of the BSETR that would occur in the New Build Section. Other military installations that are located nearby that may use the MTRs or MOAs described above are included. The military installations in the vicinity of the proposed analysis area (within 5 miles) are presented in table 3.11-18.

Table 3.11-18. Military Installations in the Upgrade Section

Facility	Distance to Nearest Route (Segment Name)	Analysis Area Crossed (acres)
Fort Huachuca BSETR Willcox Dry Lake Bombing Range	0 miles (U1a, U1b, U2, H) 0 miles (P7)	825 5
Davis-Monthan Air Force Base	3.7 miles (U3a, U3aPC)	0
Tucson International Airport – Arizona Air National Guard – 162nd FW	2.1 miles (U3a, U3aPC)	0
Arizona Army National Guard - Silver Bell Army Heliport - Western Army Aviation Training Site (WAATS) - 1/285th ARB - Peace Vanguard – Pinal Airpark	1 mile (U3k)	0
DOD Parachute Training and Testing Facility - Drop Zone (West Drop Zone-VFR-Supplement U.S. Page 208) – Pinal Airpark	Less than 1 mile (U3k)	0

Fort Huachuca

The primary Fort Huachuca facility near the city of Sierra Vista is located on approximately 70,000 acres in the foothills of the Huachuca Mountains near the U.S.–Mexico border, approximately 60 miles southeast of Tucson. The primary mission of Fort Huachuca is to support the U.S. Army's military intelligence training for the 111th and 112th Military Intelligence Brigades. Fort Huachuca also supports numerous tenants including the Army's Signal Command, EPG, and the 11th Signal Brigade. Arizona Senate Bill 1387 was signed into law in 2007 by Governor Jan Brewer, which requires that Fort Huachuca be notified and consulted with for projects with potential impacts to the Fort or BSETR. Senate Bill 1387 was enacted to protect the unique electromagnetic conditions of the BSETR. BLM and Western have coordinated closely with the military through the DOD clearinghouse, and directly with the EPG to address impacts to the BSETR.

The EPG is a facility headquartered at Fort Huachuca where tests of electronic combat and electronic warfare equipment are conducted. One area of the EPG where such tests are conducted extends northward from Fort Huachuca and crosses the existing Western power line corridor (included in the analysis area) west of the Apache power plant (segment U2 of subroute 3.1 and alternative H of route group 3 local alternatives). Existing facilities, such as power lines, cell phone structures, radio stations, and other radio frequency emitters, have been measured and taken into account to form a “zero point” for electronics and communications testing purposes within the EPG.

The EPG conducted a power line study in July 2012 (Valentine et al. 2012) and measured emissions from 500-kV lines at different locations in Arizona. Broadband noise was detectable above the ambient noise floor out to distances of approximately 0.6 mile. The study used existing lines that used a radio communications carrier on the conductors. This could present more EMI than a line using fiber optics for communications, or microwave communications, as the radio signal is carried on the transmission line itself. Additional studies, to be coordinated between the EPG and Southline, would be conducted to further categorize possible interference by transmission lines to military C4 systems under various operational configurations and environments.

The electromagnetic environment that surrounds Fort Huachuca is an unparalleled asset for the testing and training operations carried out under a wide variety of missions. The receiving and transmitting points involved in operations in the “Electronic Range” extend well beyond the boundaries of the Fort; while most points are located within 30 miles of the Fort, some operations extend to the Tucson area and beyond.

Fort Huachuca's Electronic Range Complex is unique in several aspects:

- Much of the land surrounding the Fort is either undeveloped or occupied by low-density uses that generate relatively little electromagnetic activity and therefore relatively little EMI.
- Its location in the San Pedro River valley, surrounded by mountains, further reduces EMI. This area is referred to locally as “the bowl:”
- It is the only U.S. location where aggressive, offensive electronic warfare/jamming can be conducted.
- It is the only test range with a frequency coordination zone protected by Federal mandate.
- It is expandable to adjacent Federal, State and local lands to emulate division-size tests.
- The Restricted Airspace controlled by Libby Army Air Field is coterminous with much of the Electronic Range providing controlled airspace for unmanned aerial vehicle testing.

The topography of the San Pedro River valley forms a natural high-altitude "bowl" that largely defines the BSETR for purposes of this EIS. The National Telecommunications and Information Administration "Noise Minimize Zone" is located within the boundaries of the BSETR. Although the actual Electronic Range extends outside the BSETR boundary analyzed in this EIS and extends as far as Tucson, the primary operations most critical to the electronic testing and training missions are carried out within the BSETR area delineated. As these missions change and new information about EMI becomes available, the boundary of the BSETR may require revision. For example, the Fort is conducting research to delineate mountain peaks above a certain elevation to determine whether peaks that contain facilities that may transmit electromagnetic energy (i.e., telecommunications signal facilities) could create EMI interference issues. It is likely that in the future some of these mountain peak areas may be included in the BSETR.

The National Telecommunications and Information Administration has adopted regulations to limit electronic interference in the vicinity of Fort Huachuca. The nature and status of the existing land use compatibility guidance (including Federal, State and local guidelines and regulations) are addressed below.

Cochise County Comprehensive Plan

The County's Comprehensive Plan, adopted in 1984 and amended through 2006, has as a major focus the designation of growth areas around existing communities (unless otherwise approved through a master development plan process). Thus, growth areas are defined around the cities of Sierra Vista, Huachuca City, Benson, Willcox, the Whetstone area, and Tombstone.

An Area Plan has also been adopted for the Babocomari Area, located southeast of the Whetstone Area and north of the Fort's East Range. The Comprehensive Plan and Babocomari Area Plan may be found online.[6]

Babocomari Area Plan

Among the issues addressed in the Babocomari Area Plan, adopted in September 2005, were to determine the appropriate types and density of land uses in the high priority encroachment area associated with the Hubbard Assault Strip in Fort Huachuca's East Range. To address this issue, the plan includes the following policies:

Policy 1.1 New land uses should be compatible with adjacent existing uses, particularly with historic ranching, mining, rural-residential, and military activities and should incorporate setbacks, vegetative and visual screening, and noise attenuation measures into project design to mitigate potential impacts associated with proximity to these historic land uses.

Policy 1.3 The use of conservation tools, such as fee-simple acquisition, conservation easements, and conservation subdivision options, are encouraged and supported by this plan to protect washes, open space, wildlife corridors, and the hydrologic functions of the Babocomari River.

Policy 1.4 Developers of property should provide disclosure to future buyers of military activities in the air space over the Plan Area, as required by ARS 33-422, and all new subdivision plats should include a note about military as well as private airfield activities in the area.

[6] Available at: www.cochisecounty.com/P&Z/Comprehensive.htm.

The plan also identifies specific policies for the Hubbard Assault Strip Encroachment Area, including:

- Gross residential densities in the southern half of the Hubbard Assault Strip Encroachment Area should not exceed 1 residence per 3 acres.
- Sellers will provide disclosure of the Hubbard Field Encroachment Area and military activities to potential buyers of lots, as well as provide a disclosure notice on subdivision plats.
- No special uses will be approved that have the ability to impact the military missions of the East Range.
- Additional light pollution control measures may be considered in the future.

City of Sierra Vista General Plan

The City of Sierra Vista General Plan, "Vista 2020," was adopted in 2003 and contains goals and strategies for the city's development. Among the goals are Goal 2-6, "Minimize conflicts between land uses using appropriate performance standards and design guidelines" and Goal 5-1, "Target growth to identified growth areas." Strategies for achieving both of these goals include coordinating with the Fort on development plans and growth areas. The economic development element of the plan also recognizes that the city's economy is largely dependent on the Fort. The growth areas identified in the General Plan are located generally to the south and west of the existing developed portions of the city, away from the major operational areas of the Fort.

Because the success of Fort Huachuca in achieving its mission is highly dependent on the proper operation of sophisticated communication systems, EMI is an important consideration. An environment free of EMI is essential to carry out its training and testing mission using a wide range of electronic equipment and systems.

Electromagnetic interference (or radio frequency interference) occurs when an electromagnetic field interferes with the normal operation of an electronic device. Any device that transmits, distributes or processes any form of electrical energy can be a source of EMI. Such interference typically is generated on a small scale due to the operation of everyday items such as cell phones or fluorescent lights, but because the reach of the field from such devices is small, it does not result in problems. However, larger sources of interference, such as telecommunication signal facilities, or other transmitters can create significant problems for other devices using the radio frequencies. With the growth of the telecommunications industry, the increase in dependence on electronic control and guidance systems for aircraft, and the generally increased use of the radio frequency spectrum by an expanded number of users, the potential for adverse effects will likely increase in the future.

Transmitters are designed to emit electromagnetic energy to convey radio frequency signals to receiving devices; interference occurs when the emitted energy is picked up by a receiver that is not the intended recipient of the emissions. Typically, the operating frequency of the transmitter and receiver of the unwanted emissions are in the same frequency bandwidth; the potential for interference decreases as the frequency separation between a transmitter and receiver increases. Interference can also occur when unintended leakage occurs from a device that is not intended to emit energy. For example, properly maintained television cable carrier systems do not radiate much electromagnetic energy. However, malfunctioning of the system may result in significant leakage and consequent interference.

EMI from surrounding land uses can adversely affect military operations in numerous ways. Among these are interference with aircraft guidance systems (including those on the ground as well as in the aircraft itself); interference with the proper functioning of computer hardware; disruption of communications between units during training exercises; and interference with testing of electronic systems and devices. Military operations that transmit electromagnetic energy can also potentially interfere with civilian activities around the installation, such as television and radio reception and operation of computers and medical devices.

An important consideration for avoiding electromagnetic interference is that electronic fields operate according to the inverse square law of physics, which states that a quantity of something such as electromagnetic energy is inversely proportional to the square of the distance from a source point. For example, at twice the distance, 1/4 of the emissions would be received, while at 10 times the distance, only 1/100 would be received. For this reason, distance is one of the best methods to avoid EMI, as the effects decrease more rapidly than the distance increases.

Compatibility problems due to obstruction or interference can be avoided by following principles concerning obstructions and sources of interference, and by submitting proposals for these kinds of uses to the installation for review.

1. The height of structures and other objects (such as trees) in critical airspace should be restricted in accordance with relevant FAA and DOD guidance to avoid obstructions. (See above for a discussion of guidance concerning airspace obstructions.)
2. Uses that transmit electromagnetic energy should be located at sufficient distance from any receivers on the installation to avoid interference with the operation of the receivers. Such uses may include:
    - Telecommunications signal facilities,
    - Television and radio transmitting towers, and
    - High-voltage electric transmission lines.

All sources of light around the installation should be shielded to avoid adverse effects of light pollution (such as light trespass, glare or sky-glow) on installation operations.

The analysis area is approximately 20–21 miles north of Fort Huachuca, but passes through the BSETR at about the midway point. The most northern tip of the BSETR is 48 miles north of Fort Huachuca.

The BSETR is located near Sierra Vista in southeastern Arizona. It is the principal Army Test Center for testing of command, control, communications, computer, and intelligence equipment and systems in real, virtual, and constructive environments. The BSETR is within the analysis area near Benson in Arizona. The BSETR also manages the 26,000-acre Willcox Dry Lake, where test operations are possible. A segment of the Proponent Preferred route (segment P7) would pass through the eastern edge of Willcox Dry Lake Bombing Range.

The BSETR is the Army’s C4I (Command, Control, Communications, Computers, Intelligence) Developmental Tester, and is a test center of the U.S. Army Developmental Test Command, which in turn is part of the U.S. Army Test and Evaluation Command. The mission of BSETR is to plan, conduct, and analyze the results of Technical Tests for C4I systems, Signal Intelligence, and Electronic Combat/Electronic Warfare equipment. In addition to conducting developmental tests, BSETR supports the Army operational test community in the conduct of operational tests, user tests, and experiments, and also supports customers in the joint and training communities. BSETR provides quality services to developers through the acquisition development cycle. Early in the acquisition development cycle, BSETR, through the use of modeling and simulation can address questions concerning frequency assignment, potential electromagnetic compatibility, and the effects of electronic warfare while the equipment is in the early design stage. Later in the development cycle, extensive measurement capabilities are available to satisfy the developer’s data collection needs. BSETR conducts bench tests, lab tests, field tests, and tests of large-scale, geographically distributed systems employing a mix of live and simulated instrumentation and assets.

- The Electromagnetic Environmental Test Facility makes extensive use of modeling and simulation for determining electromagnetic effects on test items. It includes the Virtual Battlefield Environment facility, a hardware-in-the-loop simulator that provides scenario-driven communications and radar environments.
- The Instrumented Test Range provides time-space-position information and target signals for open-air testing. An extensive network of precision tracking instrumentation and surveillance radars measure data on airborne and ground-based vehicles. The Instrumented Test Range can collect both airborne and ground telemetry from systems as far west as the Yuma Proving Grounds.
- The Antenna Test Facility provides large scale testing of antennas mounted on platforms, and can determine radiation patterns in the high-frequency to microwave frequencies.
- The Environmental Test Facility can perform a full range of static and dynamic environmental testing on components and systems, particularly electromagnetic compatibility and interference testing, the need for which is becoming more prevalent with the increased number of electronic systems on the battlefield.
- The Electromagnetic Interference/Electromagnetic Compatibility/TEMPEST Test Facility offers testing both at its Fort Huachuca chambers and in the field with portable test equipment.

BSETR’s area of operation includes more than 9,000 square miles of public and private lands in and around the Fort Huachuca military reservation. Operations are routinely possible on 70,000 acres at Fort Huachuca, 23,000 acres on Willcox Playa Dry Lake Bombing Range, more than 100,000 acres at Gila Bend, and with prior coordination, on approximately 62 million acres of Federal and State-owned land.

Davis-Monthan Air Force Base and Pinal Airpark

Davis-Monthan Air Force Base (AFB) and Pinal Airpark are located in the Tucson metropolitan area. Davis-Monthan AFB is home to the 355th FW, which trains pilots to fly the A-10 Thunderbolt II aircraft. Pinal Air Park is home to the Silver Bell Army Heliport, a U.S. Army helicopter training facility. Airspace north of the city (including MOAs within the analysis area) is used by the Army National Guard to conduct flight training operations.

Tucson International Airport – Arizona Air National Guard – 162nd Fighter Wing

The 162nd Wing of the Arizona Air National Guard is located at the Tucson International Airport in Tucson. The 162nd Wing is the largest Air National Guard wing in the United States with three fighter squadrons, a reconnaissance group, and the Air National Guard/Air Force Reserve Test Center.
The mission of the 162nd Wing of the Arizona Air National Guard is to provide fighter training programs and tactical reconnaissance. The 162nd Wing provides F-16 training for pilots through academic, simulator, and flight training. The 162nd Wing has scheduling responsibility and operational control of the Special Use Airspace for seven MOAs (including the Outlaw, Jackal, and Jackal Low MOAs, located north of Tucson; the Morenci and Reserve MOAs, located northeast of Tucson; and the Ruby and Fuzzy MOAs, located south of Tucson), three low-level MTRs and one Air-to-Air Refueling Anchor. The 162nd Wing also regularly uses the Goldwater Range Complex and the Sells MOA.

Arizona Army National Guard – Silver Bell Army Heliport – Pinal Airpark

The Arizona Army National Guard, Silver Bell Army Heliport, is located about 30 miles northwest of Tucson in Marana, Arizona, in the Pinal Airpark Area. The Silver Bell Army Heliport is the home of Western Army Aviation Training Site, Army Aviation Support Facility #2, 1-285th Attack Recon Battalion, Singapore Air Force Peace Vanguard and other Army Aviation Supporting Units. Western Army Aviation Training Site is a premier training site for-Army Aviation Rotor-Wing advance airframe qualifications courses for aviators, advance aviation enlisted training courses and foreign military training for the Army National Guard which is directed by the National Guard Bureau–Training and Doctrine Command, and Joint Force Headquarters – Arizona. Army Aviation Support Facility #2 provides airfield operations support for Silver Bell Army Heliport, aircraft maintenance support and training support for 1-285th Attack Recon Battalion and other aviation supporting units, and Peace Vanguard, which is directed by Arizona Army National Guard, Joint Force Headquarters – Arizona. The Army National Guard trains helicopter pilots near the Saguaro and Tortolita substations. Military training flights occur between 1,000 and 10,999 feet amsl. Segments U3i, U3k, U3l, U3m, and MA1 might conflict with their training.

Pinal Airpark – DOD Parachute Training and Testing Facility

Pinal Airpark is located about 30 miles northwest of Tucson in Marana, Arizona. Pinal Airpark is the home to DOD Parachute Training and Testing Facility at the West Drop Zone of Pinal Airpark. West Drop Zone of Pinal Airpark is near the Segments U3i, U3k, U3l, U3m, and MA1 might conflict with their training and testing. Pinal Airpark (MZJ) is currently updating the Master Airport Plan.

U.S. Border Patrol

During the preliminary studies conducted by Southline, contact was made with CBP, and no areas of concern or flight paths in the analysis area were identified by the CBP representative. However, if U.S. Border Patrol flight paths do cross the analysis area, then potential exists for U.S. Border Patrol activities to be affected by the proposed Project and alternatives.

3.12 SPECIAL DESIGNATIONS

The following section includes the discussion of existing special designations (“affected environment”) in terms of designated wilderness areas, wilderness study areas, national trails, ACECs, national monuments, county and city special designations, and REMAs. Lands that are managed to or that may possess wilderness characteristics are addressed in Section 3.13, “Wilderness Characteristics.” Some of the information provided in the following section is sourced from a report titled “Southline Transmission Project Resource Report 13: Special Designations” (CH2M Hill 2013n). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

The BLM, through previous inventory and ongoing land planning efforts, has identified areas of public land for special designation throughout New Mexico and Arizona (as well as nationwide) as part of the National Conservation Lands, also known as the National Landscape Conservation System (NLCS). BLM does not designate wilderness areas or national trails. Those designations are established by Congress or Presidential proclamation (i.e., wilderness areas, National Historic and Scenic Trails, national monuments) and are included in the NLCS. The BLM established the NLCS in 2000 to increase public awareness of the scientific, cultural, educational, ecological, and other values present within certain special designations (BLM 2013i). The NLCS was signed into law by Congress in 2009.

In addition to lands designated by Congress or the President, the BLM may also create special designations through administrative resource inventories or during the planning process, such as cooperative management areas and protection areas, outstanding natural areas, forest reserves, wilderness study areas, ACECs, RNAs, Special Recreation Management Areas (SRMAs), SMAs, backcountry byways, and energy zones. Energy zones are areas with few impediments to utility-scale production of energy (namely solar) where BLM would prioritize renewable energy production and associated transmission infrastructure development.

3.12.1 Analysis Area

The analysis area for special designations for the New Build Section is a 2-mile corridor around the proposed Project (1-mile buffer on either side of the centerline). In addition, proposed and alternative substations and access roads that are proposed outside the 2-mile corridor are included in the analysis area. The analysis area for special designations for the Upgrade Section is a 500-foot corridor (250-foot buffer on either side of the centerline of the existing Saguaro–Tucson and Tucson–Apache 115-kV transmission lines). References to the “Project” indicate the actual transmission line facilities (i.e., a 200-foot-wide transmission line corridor for the New Build Section and a 150-foot-wide corridor for the Upgrade Section, substation, or access road) that would remain during operation and maintenance of the proposed Project.

3.12.2 Issues to Be Analyzed

Effects on special designations would occur if construction and operation/maintenance of the proposed Project conflicts with the objectives of the special designation. The proposed Project could have potential effects on natural qualities, outstanding opportunities for solitude and primitive recreation, and values such as visual resources and visibility from special designations.

Indicator:

- Whether the proposed Project would conflict with the goals, objectives, and resources a particular special designation is intended to protect.

3.12.3 Analysis Area Conditions

The existing conditions for special designations are described in an east to west sequence, beginning at the Afton Substation in New Mexico and ending at the Saguaro Substation in Arizona. This section begins by describing the special designations that occur within the analysis area, followed by a more detailed description of specific special designations as they would occur in the proposed New Build and Upgrade sections, respectively. These areas may be affected by implementation of the proposed Project or its alternatives and associated proposed Project components (i.e., substations, representative staging areas, and access roads).

The analysis area and proposed Project cross linear and spatial special designations. There are multiple agencies that manage special designations within the analysis area; these are illustrated below in figures 3.12-1 and 3.12-2.

3.12.4 Designated Wilderness, Including Wilderness Study Areas

The Wilderness Act of 1964 (PL 88-577)

The Wilderness Act of 1964 was passed to "establish a National Wilderness Preservation System." The act defines wilderness as

> an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Designated by Congress for inclusion in the National Wilderness Preservation System, wilderness areas are managed either independently or cooperatively by the BLM, NPS, FWS, and Forest Service. Wilderness areas protect the habitat, serve as a sanctuary from modern-day conflicts for diverse species of plants and animals, and provide a source of clean water for numerous plant and wildlife species. They are also used for science and education by providing sites for field trips and study areas for student research. Wilderness areas may also provide recreational opportunities such as hiking and camping in a primitive setting. There is one wilderness area within the analysis area.

PELONCILLO MOUNTAINS WILDERNESS

The Peloncillo Mountains Wilderness is located northeast of San Simon and is identified as an exclusion area in the Safford RMP. Portions of the analysis area for segment Pb5 intersect the Wilderness; however none of the proposed Project would occur within the Wilderness. The Peloncillo Mountains Wilderness Management Plan establishes the objectives, policies, and actions by which the Peloncillo Mountains Wilderness is managed. The Peloncillo Mountains Wilderness Area totals nearly 20,000 acres within the Peloncillo Range, which extends from the Gila River into Mexico, near the border between Arizona and New Mexico. This remote and primitive area shows little signs of human activity and affords opportunities for primitive recreation, including hiking, backpacking, rock scrambling, hunting, and sightseeing. The higher country offers long-distance views, and excellent scenery enhances wilderness values in the rugged mountains and canyons (BLM 1995). Access to the southern section of the wilderness area is north of San Simon.

Wilderness Study Areas

BLM WSAs are identified through FLPMA, which directed the BLM to inventory and study its roadless areas for wilderness characteristics. Until Congress makes a final determination on a WSA, the area is managed so as not to impair its suitability for preservation as wilderness. WSAs often have special qualities, such as ecological, geological, educational, historical, scientific, and scenic values, and must possess the following characteristics:

- Size – Roadless areas of at least 5,000 contiguous acres of public land or of manageable size.

- Naturalness – Generally appear to have been affected primarily by the forces of nature (unaffected by manmade influences).
- Solitude – Provide outstanding opportunities for solitude or primitive and unconfined types of recreation.

Though BLM continued to designate WSAs through the RMP process, after the original FLPMA inventory and subsequent report to Congress, no WSAs have been designated since 1998, due to a court settlement. Therefore, the BLM no longer designates WSAs in the land use planning process. There are four WSAs within the analysis area in New Mexico.

The Mount Riley and West Potrillo Mountains WSAs, managed by the BLM Las Cruces District, consist of two adjacent WSAs comprising mountains that are a series of 48 volcanic cinder cones interspersed with small sand dunes, playas, and lava fields. These WSAs total approximately 151,082 acres.
The vegetation consists of desert grasses and shrubs. Indian Basin, a natural depression at the southwest end of the West Potrillo Mountains, fills with water during the rainy season, providing a temporary pond for ducks. Wintering raptors are found in high numbers due to a high small-mammal prey base. These WSAs are accessed via dirt road in various conditions, which limits usage levels for recreation purposes.

The Aden Lava Flow WSA, also managed by the BLM Las Cruces District, is characterized by basalt flows, volcanic craters, and coppice sand dunes. The Aden Lava Flow WSA is approximately 22,213 acres. The lava flow includes pressure ridges, lava tubes, and steep-walled depressions of up to 100 feet in width. Grass and shrubs grow on the flow with many cacti and yucca. Vegetation consists of grasslands and desert shrubs, such as mesquite and creosote. Vent tubes and the many crevices found in the lava provide cover and den sites for wildlife. Bats are numerous and the rock pocket mouse (*Chaetodipus intermedius*) and black-tailed rattlesnake (*Crotalus colossus*) are found on the black lava flows. The WSA is accessed via dirt road in various conditions, which limits usage levels for recreation purposes.

The Peloncillo Mountains WSA is approximately 3,109 acres. This WSA is adjacent to the designated Peloncillo Mountain Wilderness Area in Arizona, as well as the Northern Peloncillo Mountains ACEC in New Mexico. The WSA is accessed via dirt roads in various conditions, which limits usage levels for recreation purposes.

There are no WSAs within the analysis area in Arizona.

In addition to these federally designated wilderness and WSAs, members of the NGO New Mexico Wilderness Alliance provided information during public outreach efforts for the proposed Project on other sensitive areas near the proposed Project. The NGO has suggested to the BLM that these areas be nominated for official designation as wilderness areas or WSAs. Since the BLM does not have authority to designate either, they are not shown on the maps presented in this EIS. Review of those nominated areas is being addressed through the inventory updates that BLM is conducting for lands with wilderness characteristics (refer to section 3.13).

3.12.5 National Trails/Trails Recommended as Suitable for National Trail Designation

National Trails System Act of 1968 (PL 90-543, as amended through PL 111-11)

The National Trails System Act authorizes the designation of a network of scenic, historic, and recreation trails. These trails provide for outdoor recreation needs; promote the enjoyment, appreciation, and preservation of outdoor areas and historic resources; and encourage public access and citizen involvement. The National Trails System includes national historic, scenic, and recreation trails for public use. BLM is one of several Federal agencies that manage trails within the National Trails System. A national scenic and historic trails assessment is provided in appendix F of this EIS.

National trails are designated under the National Trails System Act of 1968. According to the NPS, this system comprises national recreation trails that provide a variety of outdoor recreation uses in or accessible to urban areas. The National Trails System is designated to allow outdoor recreation opportunities, protect nationally significant scenic, historic, natural, or cultural qualities of areas, and represent desert, marsh, grassland, mountain, canyon, river, forest, and other areas, as well as landforms that are characteristic of a region. National Historic Trails must follow as closely as possible and practicable to the original trails or routes of national historic significance. There are three national trails and one trail under study by Congress within the analysis area. The CDNST, Arizona NST, Anza NHT, and the Butterfield Trail (also known as the Butterfield Overland Trail National Historic Trail) would be crossed by the Project.

Continental Divide National Scenic Trail

The 2009 Comprehensive Plan for the CDNST provides management direction to the CDNST Interagency Leadership Council, which consists of the Forest Service, BLM, and NPS (Continental Divide National Scenic Trail Interagency Leadership Council 2009). The Mimbres RMP was amended in 2009 to include prescriptions for management of the CDNST on BLM lands. Segments of the trail intersect the New Build Section of the proposed Project in various locations near Lordsburg in New Mexico. As described in the plan, the nature and purposes of the CDNST is to provide for high-quality, scenic hiking, and horseback riding opportunities and to conserve natural, historic, and cultural resources along the CDNST corridor. Extending 3,100 miles between Mexico and Canada, the trail traverses landscapes primarily on public lands within 50 miles of the continental divide. The authority to establish national scenic trails is the 1978 National Trails System Act (PL 90-543). The CDNST is identified with line-of-sight signs except where it follows ranch roads. Equestrian facilities are intermittent and in various stages of development. The CDNST plan specifies that on public lands administered by the BLM, a visual resource inventory must be conducted on the basis that the CDNST is a high-sensitivity-level travel route, with the inventory performed as if the trail exists even in sections where it is proposed for construction or reconstruction (Forest Service 2009). The CDNST would be crossed by the proposed Project.

Arizona National Scenic Trail

The Arizona NST is an 820-mile non-motorized trail that traverses Arizona from the Mexico border to Utah. The Arizona NST is intended to be a primitive, long-distance trail that highlights Arizona’s topographic, biologic, historic, and cultural diversity. The trail’s primary users are hikers, equestrians, and mountain bicyclists (outside of wilderness or other specially managed areas). Opportunities also exist for cross-country skiers, snowshoers, joggers, and pack stock users. The Arizona NST is a managed and maintained by multiple partners, including State and Federal agencies, non-profits, and private landowners. Segments of the Arizona NST intersect the Upgrade Section of the proposed Project near Vail, Arizona; these segments are managed by the Arizona Trail Association, a non-profit organization that supports development of the Arizona NST. The BLM does not manage any portions of the trail that would be intersected by the proposed Project. The Arizona NST is 100 percent complete; however, a Comprehensive Management Plan has not been completed. The Forest Service is the lead agency in the development of a Comprehensive Management Plan for the Arizona NST.

Juan Bautista de Anza National Historic Trail

The Anza NHT follows the path of the 1775 Juan Bautista de Anza expedition that began in Mexico and ended in San Francisco, California. A comprehensive plan was published by the National Park Service in 1996. The Anza NHT is managed by the NPS and extends 1,200 miles through 20 counties in Arizona and California (NPS 1996). Today's visitors may follow in the tracks of the 1775–1776 expedition members on Auto Route, Historic Route, or Recreation Trail segments. The portion of the trail within the area of analysis is an Auto Route, primarily within suburban Tucson and nearby rural communities. The Anza NHT stretches from Nogales, Arizona, to San Francisco, California.

Butterfield Overland Mail and Stage Route

The Butterfield Trail is currently under study by the Secretary of the Interior for consideration for NHT designation (Section 7209 of PL 111-11). Though the Butterfield Trail is not designated an NHT, the Mimbres RMP manages for preservation of the Butterfield Trail on BLM lands. BLM Manual 6280 identifies requirements for the management of trails undergoing National Trail Feasibility Study (BLM 2012d). Segments of the Butterfield Trail intersect both the New Build and Upgrade sections of the proposed Project in various locations.

3.12.6 National Monuments

Antiquities Act of 1906 (16 U.S.C. 431-33)

National monuments are designated under the Antiquities Act of 1906, and are managed chiefly by the NPS; some, however, are managed by the BLM, FWS, and other Federal, State, and local agencies.

The Antiquities Act authorizes the President to protect landmarks, structures, and objects of natural, historic, or scientific interest by designating them as national monuments. The Act also requires Federal agencies that manage national monuments to preserve for present and future generations the natural, historic, scientific, commemorative, and cultural values of these lands. National monuments can also be designated by Congress in standalone legislation that is unrelated to the Antiquities Act, such as the Omnibus Lands Act of 2009.There is one national monument adjacent to the analysis area, the IFNM in Pima and Pinal counties, Arizona.

IRONWOOD FOREST NATIONAL MONUMENT

The IFNM was designated under the authority of the Antiquities Act in June 2000. IFNM is northwest of Marana in Pima County, Arizona. This 129,000-acre monument showcases ironwood trees, rugged mountain peaks, and desert valleys. The analysis area is adjacent to the northeast corner of the IFNM; therefore, the proposed Project would be located outside the monument. The IFNM RMP was completed in February 2013 (BLM 2013c).

ORGAN MOUNTAINS – DESERT PEAKS NATIONAL MONUMENT

The Organ Mountains–Desert Peaks National Monument was established on May 21, 2014, by Presidential Proclamation under the authority of the Antiquities Act, and is managed by the BLM Las Cruces District Office. The Monument includes 496,330 acres, and was established to protect significant prehistoric, historic, geologic, and biologic resources of scientific interest. The National Monument includes four distinct areas: the Organ Mountains, Desert Peaks, Potrillo Mountains, and Doña Ana Mountains (BLM 2014a). The analysis area includes a portion of the Potrillo Mountains area of the Organ

Mountains–Desert Peaks National Monument, however none of the proposed Project would be located within the monument. The Potrillo Mountains are the most remote section of the Monument located a distance to the southwest from Las Cruces. This is a volcanic landscape of cinder cones, lava flows, and craters. Numerous volcanic cinder cones jut out prominently from otherwise broad desert plains that are prominent from a long distance.

3.12.7 Areas of Critical Environmental Concern and Research Natural Areas

Federal Land Policy and Management Act of 1976 (PL 94-579)

FLPMA requires BLM to consider special designations during the land use planning process. ACECs are designated in RMPs. The language at 43 CFR 1610.7-2 provides the specifications for the designation of ACECs:

> Areas having potential for Areas of Critical Environmental Concern (ACEC) designation and protection management shall be identified and considered throughout the resource management planning process.
>
> (a) The inventory data shall be analyzed to determine whether there are areas containing resources, values, systems or processes or hazards eligible for further consideration for designation as an ACEC. In order to be a potential ACEC, both of the following criteria shall be met:
>
>> (1) *Relevance.* There shall be present a significant historic, cultural, or scenic value; a fish or wildlife resource or other natural system or process; or natural hazard.
>>
>> (2) *Importance.* The above described value, resource, system, process, or hazard shall have substantial significance and values. This generally requires qualities of more than local significance and special worth, consequence, meaning, distinctiveness, or cause for concern. A natural hazard can be important if it is a significant threat to human life or property.

ACECs are special management areas designated by BLM, per 43 CFR 1510.7-2. ACECs are designated during the land use planning process under the guidance provided in BLM Manual 1613 – "Areas of Critical Environmental Concern" (BLM 1988b). ACECs are designated to protect significant historic, cultural, or scenic values; fish and wildlife resources; natural process or systems; and/or natural hazards that:

- have more than locally significant qualities which give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource;
- have qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change;
- has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of FLPMA;
- has qualities which warrant highlighting in order to satisfy public or management concerns about safety and public welfare; and/or
- poses a significant threat to human life and safety or to property.

There is one ACEC within the analysis area, the Willcox Playa, located in Cochise County, Arizona.

WILLCOX PLAYA NATIONAL NATURAL LANDMARK AND AREA OF CRITICAL ENVIRONMENTAL CONCERN

The Willcox Playa NNL and ACEC is recognized primarily for its geological values, that being a remnant Pleistocene lake and a typical example of playa lakes in the Southwest. The NNL and ACEC are managed by the BLM under the Safford RMP (BLM 1991). The NNL and ACEC also contain unique vegetation that has adapted to the playa conditions and is a resource for wildlife, including the endangered whooping crane. The analysis area would cross a portion of the NNL and ACEC, however, none of the proposed Project would occur within the ACEC.

ADEN LAVA FLOW AND LORDSBURG PLAYA RESEARCH NATURAL AREAS

Research natural areas are also designated in RMPs. RNAs are areas that are part of a national network of reserved areas under various ownership which contain important ecological and scientific values and are managed for minimum human disturbance. In RNAs, natural processes are allowed to predominate without human intervention. Activities such as hiking, bird watching, hunting, fishing, wildlife observation, and photography are permissible but not mandated in RNAs. There are two RNAs within the analysis area, Aden Lava Flow RNA and Lordsburg Playa RNA.

The Aden Lava Flow RNA is located in central Doña Ana County, approximately 20 miles southwest of Las Cruces, New Mexico. The existing RNA is approximately 3,930 acres. Rich vegetation, diverse wildlife, and geologically unique lava flows comprise the Aden Lava Flow RNA. The lava flow is a nearly flat landform, with steep-walled depressions that vary in size and shape, containing crevices, pressure ridges, and lava tubes. Aden Crater is located in the northwestern portion of the RNA (BLM 1993).

Lordsburg Playa RNA is located 10 miles west of Lordsburg, New Mexico, in west-central Hidalgo County. The RNA is approximately 3,833 acres. The playa is a flat, dry lake bed that is devoid of vegetation except around the outer edges. The playa is a relatively pristine and undisturbed relict of the large Pleistocene lakes that covered many of the intermountain basins of the southwestern United States during the last glacial period. The playa provides an important stop-off or wintering site for migrating shorebirds and waterfowls when conditions permit (e.g., wet years) (BLM 1993).

3.12.8 Bureau of Land Management Resource Management Plans and other Administrative Designations

In addition to special designations that have been mandated by law, BLM also manages special designations via management prescriptions that are defined in the field office’s RMP or other long-term planning document. Though not mandated by a law or legislation, many administrative designations promulgated in RMP process carry the weight of law and may effectuate a special designation.

BLM lands that include national trails are required to undergo analysis in accordance with BLM Manual 6250 – “National Scenic and Historic Trails Administration (Public)” and BLM Manual 6280 – “Management of National Scenic and Historic Trials and Trails Under Study or Recommended as Suitable for Congressional Designation (Public)” (BLM 2012c, 2012d). An assessment of the national trails occurring on BLM lands is included in appendix F.

In addition to ACECs and RNAs, BLM special designations may also include OHV areas, National Natural Landmarks, and acquisition planning districts. There is one OHV area, two NNLs, and one acquisition planning district in the analysis area: the Aden Hills OHV area, Kilbourne Hole NNL, Willcox Playa NNL, and the Sonoita Valley Acquisition Planning District (SVAPD).

The Aden Hills OHV Area was established as an “open” area for OHV use under the Mimbres RMP. The OHV Area is managed as a special designation due to the special management required to accommodate the heavy use by the public. The area experiences about 10,000 visitor days of use annually. Attributes such as access, challenging terrain, and availability of trails are most important to users of the Aden Hills OHV area.

Kilbourne Hole NNL is a volcanic feature in southwestern Doña Ana County, totaling approximately 5,480 acres. The Kilbourne Hole is a crater that formed when a volcanic bubble burst on the surface of the earth. The NNL is designated by the BLM and NPS because it is the best known example of a “maar” in the Chihuahuan desert region (BLM 1993).

Willcox Playa NNL is a large, approximately 2-million-acre playa located in western Cochise County, Arizona. The playa is a relatively pristine and undisturbed relict of the large Pleistocene lakes that covered many of the intermountain basins of the southwestern United States during the last glacial period. The playa provides an important stop-off or wintering site for migrating shorebirds and waterfowls when conditions permit (e.g., wet years), and is mostly closed to the public since the area is also used by the DOD for military training exercises.

The 2003 Las Cienegas NCA RMP (BLM 2003), though outside the analysis area, is adjacent to the SVAPD, which covers a mosaic of lands owned by private landowners, the State, and the BLM from the NCA north to I-10. BLM lands within the SVAPD are managed in the same fashion as the NCA. Utility corridors are established in the SVAPD, and the existing Western 115-kV transmission line along which the Upgrade Section would follow occurs within the SVAPD. The purpose of the SVAPD is to provide for future acquisitions of important conservation land within the Sonoita Valley (BLM 2003).
The SVAPD is a planning area that is composed primarily of non-BLM lands. BLM management only applies to BLM-administered lands in the SVAPD. Lands owned by other entities within the SVAPD are managed in accordance with the landowner’s jurisdiction. PL 106-538 and the Las Cienegas NCA RMP identify areas in which, if lands are acquired in the SVAPD, those lands would become subject to the Las Cienegas NCA RMP, but not until after the land acquisition process is complete. Where the proposed Project would intersect the SVAPD, none of the intersections would occur on BLM lands; however, the analysis area for route group 3 does include portions of the SVAPD that are BLM-owned lands. Thus, the SVAPD is included in the analysis area.

RMP-level and resource-inventory actions may also include vegetation restoration, wildlife, and/or wildlife habitat designations. These designations may be treated as special designations since resource management may require special stipulations/regulations. Refer to Section 3.11, “Land Use,” for a discussion on vegetation and/or wildlife avoidance areas.

There are no designated Wild and Scenic Rivers, Scenic Byways, or other special designations within the analysis area.

State

State special designations within the analysis area include the Willcox Playa Wildlife Area. The Wildlife Area is adjacent to the southeast portion of the Willcox Playa, and is managed by the AGFD as part of Game Management Unit (GMU) 30A. As part of the management strategy to provide for migratory bird populations, portions of the Wildlife Area are closed to public entry October 15 through March 15 annually.

The Willcox Playa Wildlife Area covers about 595 acres, including 120 acres of deeded land, 320 acres of land patented from the BLM, a 115-acre perpetual ROW from the ASLD, and a 40-acre donation from a private landowner (AGFD 2012c). AGFD management of the Willcox Playa Wildlife Area emphasizes supporting the best wildlife habitat possible in the wildlife area for present and future generations. This emphasis includes sustaining opportunities available for public hunting and other wildlife-oriented recreation. Existing uses include bird watching, photography, and hunting (for additional information, refer to sections 3.8 and 4.8).

The 2003 Corridor Management Plan for the Patagonia – Sonoita Scenic Road, produced by ADOT, sets goals and objectives related to protection, development, safety, and partnerships in managing this scenic route, which includes Arizona SR 83 (ADOT 2003). The northern terminus of the road corridor is the intersection of SR 83 and I-10, west of Benson, which is within the analysis area.

3.12.9 County and City

County and City special designations may not be the same as BLM special designations and in most cases are not managed by the BLM since county and city special designations generally do not occur upon BLM-managed lands. Nonetheless, the proposed Southline Project includes analysis for county and city special designations in order to establish comprehensive baseline recreation resource conditions. There are two County special designations within the analysis area: Cienega Creek Natural Preserve and Pima county CLS designations, both administered by Pima County in Arizona. There are approximately 12 city special designations (City of Benson and City of Tucson) that are located within the analysis area.

Cienega Creek Natural Preserve

The 1994 Cienega Creek Natural Preserve Management Plan identifies objectives, articulates policies, and lists specific actions related to the management of the Cienega Creek Natural Preserve. The 3,979-acre preserve is owned by the Pima County Flood Control District, and is located adjacent to the analysis area in the Upgrade Section just east of Vail, Arizona, in Pima County (McGann and Associates 1994).

Pima County Comprehensive Plan Update

The Pima County Comprehensive Plan, updated in 2009, assigns special designations (including parks, open space, and scenic road designations) and lays out policies for uses within those areas (Pima County 1992, amended in 2009).

Tumamoc Hill is managed by both the University of Arizona College of Science and Pima County. Since 1906, Tumamoc Hill has been an ecological preserve and study area. Its 860-acre ecological reservation is both an NHL and Archaeological District. Tumamoc Hill also is a heavily used hiking trail along the paved road; however, public hiking access is prohibited between 7:30 a.m. and 5:30 p.m.

Tucson Mountain Park was established in 1929. Totaling approximately 20,000 acres, the park is one of the largest natural resource areas owned and managed by a local government in the United States. The park has approximately 62 miles of non-motorized shared-use trails open to hikers, equestrians, and mountain bikers. The Gates Pass overlook includes interpretive displays and historic structures. Picnicking and wildlife viewing opportunities are located throughout the park.

The Bar V Ranch property, which includes 14,400 acres of fee and grazing lease lands acquired by Pima County in 2005, includes a significant portion of Davidson Canyon—a rare confluence of desert and riparian habitat that contains a stretch of perennial water and provides habitat for numerous vulnerable species (Pima County 2004). The majority of the property is located east of Sonoita Highway 83 and south of I-10 (see figure 3.12-2). The northernmost fee parcel connects to the Cienega Creek Natural Preserve, under I-10, and state lease land extends north of I-10 bordering the Cienega Creek Natural Preserve. Portions of the Bar V Ranch are managed by Pima County as part of their CLS, as described below.

In the Upgrade Section, the proposed Project would be located within Pima County–managed lands, and portions of these route segments would pass through areas designated as conservation lands in the Pima County CLS.

The Pima County Conservation Lands (Regional Plan Policy 6 Environmental Element 2005) were developed as a framework for biological and habitat protection in Pima County; are used as a guide for developing compensatory mitigation for residential and commercial development; and are used to offset the biological impacts of County activities. Conservation lands in proximity to the analysis area are described below:

A. Agriculture In-Holdings within the CLS:

   1) This designation denotes those lands utilized for agricultural purposes and lands where agricultural uses have been abandoned. Agricultural land uses, in general, are more conducive to the movement of native fauna and functional pollination processes than other lands supporting higher intensity uses. Intensifying the land use of these areas could compromise landscape integrity, promote the spread of exotic species, and otherwise compromise the biodiversity of adjacent or nearby CLS lands (Regional Plan Policy 6 Environmental Element 2005).

   2) Conservation Guidelines: Intensifying land uses of these areas will emphasize the use of native flora, facilitate the movement of native fauna and pollination of native flora across and through the landscape, and conserve on-site conservation values when they are present. Development within these areas will be configured in a manner that does not compromise the conservation values of adjacent and nearby CLS lands (Regional Plan Policy 6 Environmental Element 2005).

B. Biological Core Management Areas:

   1) This category identifies lands that fulfill the five tenets used to construct the CLS and which provide greater biological diversity than Multiple Use Management Areas. These areas are primarily distinguished from other lands within the CLS by their potential to support high-value habitat for five or more priority vulnerable species as identified by the SDCP (Regional Plan Policy 6 Environmental Element 2005).

   2) Conservation Guidelines – At least 80 percent of the total acreage of lands within this designation shall be conserved as undisturbed natural open space. As such, land use changes will result in 4:1 land conservation (i.e., 4 acres conserved for every 1 acre developed) and may occur through a combination of onsite and/ or offsite conservation inside the Biological Core Management Area or Habitat Protection Priority Areas. For purposes of this policy, Habitat Protection Priority Areas are those areas referenced and mapped as part of the 2004 Conservation Bond Program. The 4:1 mitigation ratio will be calculated according to the extent of impacts to the total surface area of that portion of any parcel designated as Biological Core Management Areas. Development shall be configured in the least sensitive portion(s) of the property. Area(s) of undisturbed natural open space will be configured to include onsite conservation values and preserve the movement of native fauna and pollination of native flora across and through the landscape. Land use and management within these areas shall focus on the preservation, restoration, and enhancement of native biological communities. Land uses appropriate for these areas must retain and improve conditions for onsite conservation values, preserve the movement of native fauna and pollination of native flora across and through the landscape, and preserve landscape integrity. A transfer of

development rights may be used in order to secure mitigation lands (Regional Plan Policy 6 Environmental Element 2005).

C. Important Riparian Areas:

1) These areas are characterized by hydroriparian, mesoriparian, and xeroriparian biological communities. Hydroriparian communities generally exist in areas where vegetation is supported by perennial watercourses or springs. Mesoriparian communities generally exist in areas where vegetation is supported by perennial or intermittent watercourses, or shallow groundwater. Xeroriparian communities generally exist in areas where vegetation is supported by an ephemeral watercourse (Regional Plan Policy 6 Environmental Element 2005).

   Important riparian areas are valued for their higher water availability, vegetation density, and biological productivity. In addition to the inherent high biological value of these water-related communities, important riparian areas including their associated upland areas provide a framework for linkages and landscape connections. Important riparian areas are essential elements in the CLS (Regional Plan Policy 6 Environmental Element 2005).

2) Conservation Guidelines – At least 95 percent of the total acreage of lands within this designation shall be conserved in a natural or undisturbed condition. Every effort should be made to protect, restore, and enhance the structure and functions of Important Riparian Areas, including their hydrological, geomorphological, and biological functions. Areas within an Important Riparian Area that have been previously degraded or otherwise compromised may be restored and/or enhanced. Such restored and/or enhanced areas may contribute to achieving the 95 percent conservation guideline for Important Riparian Areas. (Regional Plan Policy 6 Environmental Element 2005).

D. Multiple Use Management Areas:

1) This category identifies those lands that fulfill the five tenets used to construct the CLS, but which are not as biologically rich as those lands designated as Biological Core Management Areas. These areas are primarily distinguished from other lands within the CLS by their potential to support high-value habitat for three or more priority vulnerable species as identified by the SDCP (Regional Plan Policy 6 Environmental Element 2005).

2) Conservation Guidelines – At least 66 percent of the total acreage of lands within this designation shall be conserved as undisturbed natural open space. As such, land use changes will result in a 2:1 land conservation (i.e., 2 acres conserved for every 1 acre developed) and may occur through a combination of onsite and offsite conservation inside the Multiple Use Management Area or any more protective category of the CLS, including Habitat Protection Priority Areas.
   For purposes of this policy, Habitat Protection Priority Areas are those areas referenced and mapped as part of the 2004 Conservation Bond Program. The 2:1 mitigation ratio will be calculated according to the extent of impacts to the total surface area of that portion of any parcel designated as Multiple Use Management Areas. Development shall be configured in the least sensitive portion(s) of the property. Area(s) of undisturbed natural open space will include onsite conservation values and facilitate the movement of native fauna and pollination of native flora across and through the landscape. Land use and management goals within these areas shall focus on balancing land uses with conservation, restoration, and enhancement of native biological communities. Land uses appropriate for these areas must facilitate the movement of native fauna and pollination of native flora across and through the landscape, maximize retention of onsite conservation values, and promote landscape integrity. Additional conservation exceeding 66 percent will be encouraged through the use of development-related incentives and may utilize undisturbed natural open space on individual lots. Transfer of development rights may be used in

order to secure lands utilized for mitigation, restoration, and/or enhancement purposes (Regional Plan Policy 6 Environmental Element 2005).

The CLS land-use policies apply only to discretionary actions of and lands owned and/or managed by the Pima County and the Pima County Regional Flood Control District Boards. The more powerful idea of maintaining an interconnected landscape for biological conservation has also motivated state and federal partners to set aside conservation lands (Pima County 2009). However, CLS policies do not apply to privately owned (or any non-county owned) lands unless the land owner takes it upon themselves to adopt CLS land-use policies.

Parks designated and managed by individual municipalities encompass a variety of recreational purposes such as hiking, fishing, camping, etc., and include athletic facilities such as golf courses, ballparks, and swimming pools.

City parks within the analysis area include: San Pedro Golf Course, Christopher Columbus Park, Garden of Gethsemane, Greasewood Park, El Rio Trini Alvarez Municipal Golf Course, Joaquin Murrieta Park, John F. Kennedy Park, Santa Cruz River Park, Sentinel Peak Park, Silverbell Municipal Golf Course, Tucson Mountain Park, and Tumamoc Hill (refer to Section 3.14, “Recreation,” for a description of these City parks). City parks are included within the analysis area for the Upgrade Section, discussed below.

3.12.10 New Build Section

This section describes all specially designated areas within the analysis area for the New Build Section (see figure 3.12-1).

The analysis area for the proposed Project would include the following specially designated areas in the New Build Section:

- BLM Special Designations (New Mexico) (approximately 13,374 acres in the analysis area):
    - Peloncillo Mountains Wilderness (approximately 1,162 acres in the analysis area)
    - Mount Riley/West Potrillo Mountains WSAs (approximately 5,008 acres in analysis area)
    - Lordsburg Playa RNA (2,168 acres in analysis area)
    - Aden Lava Flow WSA/RNA (0 acres in analysis area)
    - Kilbourne Hole NNL (0 acres in analysis area)
    - Organ Mountains–Desert Peaks National Monument (559 acres in analysis area)
- BLM Special Designations (Arizona) (approximately 2,574 acres in the analysis area):
    - Willcox Playa NNL and ACEC (approximately 2,574 acres in the analysis area)
- Butterfield Trail (approximately 31 miles in the analysis area)
- CDNST (approximately 9 miles in the analysis area)
- Willcox Playa Wildlife Area (approximately 548 acres in the analysis area)

3.12.11 Upgrade Section

This section describes all specially designated areas within the analysis area for the Upgrade Section (see figure 3.12-2). As specified in Section 3.11, “Land Use,” the Upgrade Section includes far less public lands than the New Build Section; therefore, the Upgrade Section contains commensurately fewer BLM special designations.

The analysis area for the proposed Project would include the following BLM specially designated areas in the Upgrade Section (note: all proposed Project activities for the Upgrade Section would only apply in the state of Arizona):

- Arizona NST (approximately 0.16 mile in the analysis area)
- Butterfield Trail (approximately 11 miles in the analysis area)
- Sonoita Valley Acquisition Planning District (6,048 acres in the analysis area; 797 acres of BLM-administered lands)
- IFNM (0 acres in the analysis area)
- Anza NHT (approximately 2 miles in the analysis area)

The analysis area for the proposed Project transmission lines would also include the following city or county specially designated areas in the Upgrade Section (note: all proposed Project activities for the Upgrade Section would only apply in the state of Arizona):

- Christopher Columbus Park (approximately 70 acres in the analysis area)
- Cienega Creek Natural Preserve (0 acres in the analysis area)
- Garden of Gethsemane (approximately 0.67 acre in the analysis area)
- Greasewood Park (approximately 11 acres in the analysis area)
- Joaquin Murrieta Park (approximately 13 acres in the analysis area)
- Kennedy Park (approximately 25 acres in the analysis area)
- Pima County Conservation Lands – Ag Inholdings (approximately 91 acres in the analysis area)
- Pima County Conservation Lands – Biological Core Management Areas (approximately 4,109 acres in the analysis area)
- Pima County Conservation Lands – Important Riparian Areas (approximately 705 acres in the analysis area)
- Pima County Conservation Lands – Multiple Use Management Areas (approximately 1,227 acres in the analysis area)
- Santa Cruz River Park (approximately 145 acres in the analysis area)
- Sentinel Peak Park (approximately 0.27 acre in the analysis area)
- Tucson Mountain Park (approximately 4 acres in the analysis area)
- Tumamoc Hill (approximately 142 acres in the analysis area)

The analysis area for the proposed Upgrade Section substations (Adams Tap Substation Expansion, Pantano Substation Expansion, Vail Substation Expansion, Nogales Substation Expansion, Del Bac Substation Expansion, Tucson Substation Expansion, DeMoss Petrie Substation Expansion, Rattlesnake Substation Expansion, Marana Substation Expansion, Southline Saguaro Substation Expansion, APS Saguaro Substation Expansion, and Tortolita Substation Expansion) would include the following city or county specially designated areas in the Upgrade Section:

- Pima County Conservation Lands – Biological Core Management Areas: approximately 25 acres near the Pantano Substation Expansion area.
- Pima County Conservation Lands – Important Riparian Areas: approximately 0.47 acre near the Pantano Substation Expansion area.

- Pima County Conservation Lands – Multiple Use Management Areas: approximately 15 acres near the Marana Substation Expansion area.

The analysis area for the Upgrade Section proposed staging areas would include the following BLM and county and city specially designated areas:

- Anza NHT (approximately 0.01 mile near staging area 13)
- Pima County Conservation Lands – Biological Core Management Areas (approximately 20 acres near staging areas 11 and 13)
- Pima County Conservation Lands – Important Riparian Areas (approximately 20 acres near staging area 13)
- Pima County Conservation Lands – Multiple Use Management Areas (approximately 19 acres near staging area 13a)

3.13 WILDERNESS CHARACTERISTICS

Federal lands that possess the tangible qualities of a wilderness (refer to Section 3.12, "Special Designations") but that have not been designated a wilderness by an act of Congress are sometimes managed to maintain certain wilderness characteristics.

Wilderness characteristics baseline conditions (the wilderness characteristics "affected environment") includes the discussion of existing lands managed to maintain wilderness characteristics. The information provided in this subsection is primarily sourced from existing BLM inventories, and new inventories conducted in support of this proposed Project.

The BLM is directed to maintain an inventory of lands that may contain wilderness characteristics under Section 201 of FLPMA and in accordance with BLM Manual 6310 – "Conducting Wilderness Characteristic Inventory on BLM Lands (Public)" (BLM 2012j). BLM is required to maintain wilderness resource inventories on a regular and continuing basis for public lands under its jurisdiction. BLM Manual 6310 and Section 201 of FLPMA direct the BLM to protect wilderness characteristics through land use planning and project-level decisions unless the BLM determines, in accordance with BLM Manual 6310, that projects within lands managed to maintain wilderness characteristics are appropriate and consistent with other applicable requirements of law and other resource management considerations.

Through previous inventory, ongoing land planning efforts, and a wilderness characteristics inventory conducted for this EIS, the BLM has updated some of their inventory of lands that may contain wilderness characteristics for BLM lands that would be intersected by the action alternatives. These inventories and the lands they encompass are referred to as Wilderness Inventory Units. Only BLM lands in the Las Cruces District in New Mexico, and the Safford District in Arizona were inventoried for lands with wilderness characteristics.

The wilderness characteristics inventory process is guided by BLM Manual 6310. A wilderness characteristics inventory is the process of determining the presence or absence of wilderness characteristics. These "characteristics" are derived from Section 2(c) of the Wilderness Act of 1964:

1. Size: the area must be at least 5,000 acres of contiguous, roadless BLM land. If less than 5,000 acres, the area must be adjacent to an area known to possess wilderness characteristics, or it must be demonstrated that the area is of sufficient size as to make practicable its preservation and use in an unimpaired condition.

2. Naturalness: the area must appear to be in natural ecological conditions, where human developments within the area are unnoticeable enough that it appears the area was affected primarily by the forces of nature.
3. Outstanding opportunities for solitude or primitive, unconfined recreation: the area must provide outstanding opportunities for solitude or primitive, unconfined recreation opportunities.
4. Other supplemental values: the area may contain ecological, geological, or other features of scientific, education, scenic, or historic value. Supplemental values are not required to be present in order for an area to be identified as lands with wilderness characteristics.

Size – The size of an area with wilderness characteristics is determined by roads, ROWs, or land ownership, but can also be determined by areas of unnaturalness. Impacts to the size requirement would be any types of development or construction that directly affects the roadless or naturalness characteristics of the area. For this Project, the types of development or construction that affect naturalness include transmission line construction, construction or improvement of access roads, construction of substations, placement of structures on the landscape, or any other ground disturbance (e.g., clearing of vegetation, digging, or grading of soil) from Project actions. If actions from the proposed Project reduce a land unit identified as having wilderness characteristics to less than 5,000 acres, the Project would affect the size characteristics and the entire unit would not have wilderness characteristics. However, if Project actions bisect a unit but remaining portions of the unit are greater than 5,000 acres in size, the remaining portions may still have wilderness characteristics.

Naturalness – Lands with wilderness characteristics must primarily be influenced by the forces of nature with evidence of humankind substantially unnoticeable. Evidence of humankind on the landscape affects the natural character of the area by introducing unnatural actions or objects. This can cause direct impacts to vegetation, wildlife, soils, landforms, water, and riparian areas. The types of unnatural objects and actions that affect naturalness include transmission lines and access roads, substations, ancillary facilities, or any other ground disturbance (e.g., clearing of vegetation, digging, or grading of soil).

Outstanding Opportunities for Solitude or Primitive and Unconfined Type of Recreation – Outstanding opportunities for solitude or a primitive and unconfined type of recreation can be affected by Project actions by determining whether a visitor can hear or see the Project action. To provide an accurate and extensive estimate of the effects on outstanding opportunities for solitude or primitive recreation, this analysis references the noise analysis presented in section 3.3.

Other Supplemental Values – Special features (or supplemental values) are those features identified as unique to the specific land area. Most special features identified for areas with wilderness characteristics are items such as unique plants, wildlife, or geologic features, and are often analyzed in other sections of the EIS. The analysis in this section identifies any special features for areas with wilderness characteristics affected by Project actions. Such impacts are disclosed in the appropriate section of the EIS for that special feature (see Section 3.4, "Geology and Mineral Resources;" Section 3.6, "Paleontological Resources;" Section 3.8.1, "Vegetation;" and Section 3.8.2, "Wildlife").

If characteristics 1–3 are present, then the area is identified as possessing wilderness characteristics. Finding the presence or absence of wilderness characteristics is not a decision-level finding and thus is not subject to appeal. Acreages herein have been derived from the best available GIS data unless otherwise stated. As a result, there may be some variation from acreages in previous documents.
A screening of size was the first step to determine which lands may be considered as a WIU. Once the WIUs were determined, the next steps were to conduct an assessment of naturalness; an assessment of

outstanding opportunities for solitude or primitive, unconfined recreation; and an assessment for other supplemental values of the WIUs.

3.13.1 Analysis Area

The wilderness characteristics analysis area for the New Build Section is a 2-mile corridor around the action alternatives (1-mile buffer on either side of the centerline). In addition, the action alternative substations and access roads that are proposed outside the 2-mile corridor are included in the wilderness characteristics analysis area. The 2-mile corridor is used to identify lands that may possess wilderness characteristics that could be directly impacted by surface disturbance and where construction materials, equipment, and workers that may be present would potentially conflict with one or more of the four criteria that form the area's potential wilderness characteristics.

The wilderness characteristics analysis area for the Upgrade Section is also 2-mile corridor around the action alternatives (1-mile buffer on either side of the centerline of the existing Saguaro–Tucson and Tucson–Apache 115-kV transmission lines).

References to the "Project" indicate the actual transmission line facilities (i.e., a 200-foot-wide transmission line corridor for the New Build Section and a 150-foot-wide corridor for the Upgrade Section, substation, or access road) that would remain during operation and maintenance of the proposed Project.

3.13.2 Issues to Be Analyzed

The indicators used to characterize the potential impacts to wilderness characteristics are the qualities for which the wilderness is designated (see below). Effects on wilderness characteristics would occur if construction and operation/maintenance of the Project conflicts with one or more of these four tangible qualities.

Indicators:

- Whether the construction, operation and maintenance of the proposed Project would reduce acreage within any WIU (i.e., reduce the acreage of a unit that might be designated as lands with wilderness character, not just by reducing it below 5,000 acres);
- Whether the proposed Project would affect the degree of naturalness;
- Whether the proposed Project would affect outstanding opportunities for solitude or outstanding opportunity for primitive and unconfined types of recreation; and
- Whether the proposed Project would affect any supplemental values, within any areas determined to have requisite wilderness characteristics.

3.13.3 Analysis Area Conditions

The EIS describes WIUs based on the four characteristics: size, naturalness, outstanding opportunities for primitive, unconfined recreation, and supplemental values. The initial set of WIUs described in the Draft EIS included units of BLM land that are 5,000 acres or greater, not intersected by roads that are constructed, maintained, regularly used, and not intersected by developed ROWs. The initial set of WIUs described in the Draft EIS was identified using a GIS desktop analysis, as described below. WIUs that do not meet the size criteria do not contain wilderness characteristics. Those WIUs that met the size criteria were further refined after publication of the Draft EIS, following a comprehensive, on-the-ground road inventory of each unit; the field verification is described below. The field verification of the WIUs included an assessment of naturalness, outstanding opportunities for solitude or primitive, unconfined recreation, and other supplemental values for each WIU that would be crossed by the Agency Preferred Alternative and is included in this EIS.

To determine the first criteria, size, all potential roads and developed ROWs were identified using current aerial imagery and BLM linear data. Following a detailed evaluation by local BLM field office staff, field verification of the Agency Preferred Alternative in accordance with BLM Manual 6310 was conducted in June 2014. The field verification included an evaluation of potential wilderness characteristics as defined in section 2(c) of the Wilderness Act. The field verification was conducted by staff from the BLM Las Cruces Field Office. During the field verification, determinations of the second, third, and fourth criteria were made in accordance with BLM Manual 6310. Based on the findings of the field verification, the WIU boundaries were delineated to exclude wilderness inventory roads, linear ROWs, and other substantially noticeable human-caused impacts.

The results of WIU field verification and subsequent boundary delineations are presented in detail in chapter 4 (see section 4.13). The new delineations will be used by the BLM Las Cruces and Safford Field Offices to update prior inventories for wilderness characteristics. The updates will be made by the BLM Las Cruces Field Office as part of the ongoing Tri-County RMP planning process, in accordance with FLPMA. The BLM Safford Field Office updates will be kept on-file for use in future RMP planning processes. During the RMP planning process, FLPMA requires the BLM to consider lands for their potential to possess wilderness characteristics, in accordance with BLM Manual 6310. The Tri-County RMP is currently undergoing a Supplemental EIS and these new delineations will be included in the RMP's Supplemental EIS process.

If an alternative or combination of alternatives other than the Agency Preferred Alternative is chosen in the ROD, additional field verification would be required to evaluate potential wilderness characteristics.

New Build Section

This section describes inventoried WIUs that occur within the New Build Section analysis area (figure 3.13-1).

ROUTE GROUP 1 – AFTON SUBSTATION TO HIDALGO SUBSTATION

Previous inventories for wilderness characteristics have been conducted by the BLM's Las Cruces District Office in 1979 and 1980, in 1993 (in support of the Mimbres RMP [BLM 1993]), and most recently for the SunZia and Southline transmission line projects. The 1979, 1980, 1993, and SunZia project inventories were reviewed for the Southline Project inventory in cooperation with the BLM Las Cruces District Office and New Mexico State Office to ensure previous conclusions remain valid. Citizen proposed wilderness include portions of NM-LC-006; no designations have been made regarding this proposed wildernesses.

As shown on figure 3.13-1, eight WIUs were documented within route group 1, as identified during the wilderness characteristics inventory process for this proposed Project. These eight WIUs total 245,990 acres.

The numbering convention for the WIUs remains the same as was presented in the Draft EIS. Table 3.13-1 provides the WIUs inventoried for route group 1.

Table 3.13-1. WIUs Analyzed for Route Group 1

WIU No.	WIU Name	WIU Size (acres)
NM-LC-001	Black Mountain -Grant	18,948
NM-LC-002	China Draw	9,813
NM-LC-005	South Doña Ana	55,790
NM-LC-006	East Potrillo Mountains	25,158
NM-LC-007	Rutter South 2	6,680
NM-LC-008	Rutter South 3	6,196
NM-LC-009	Rutter South 1	6,017
NM-LC-015	Apache Hills-Hachita Valley	117,388
Total	**8**	**245,990**

Note: NM-LC-003, NM-LC-004, NM-LC-010, and NM-LC-016 were found not to possess wilderness characteristics and are therefore removed as a WIU in this EIS.

ROUTE GROUP 2 – HIDALGO SUBSTATION TO APACHE SUBSTATION

Previous inventories for wilderness characteristics have been conducted by the BLM's Las Cruces District Office and Safford Field Office in 1979 and 1980, in 1991 and 1993 (in support of the Safford and Mimbres RMPs (BLM 1991 and 1993, respectively)), and mostly recently for the SunZia and Southline transmission line projects. The 1979, 1980, 1991, 1993, and SunZia project inventories were reviewed for the Southline Project inventory in cooperation with the BLM Las Cruces District Office and New Mexico State Office and the BLM Safford Field Office, Tucson Field Office, and Arizona State Office to ensure previous conclusions remain valid.

As shown on figure 3.13-1, two WIUs occur within route group 2, as identified in the wilderness characteristics inventory process for this proposed Project. These two WIUs total 28,313 acres. Table 3.13-2 provides the WIUs inventoried for route group 2.

Table 3.13-2. WIUs Located within the Analysis Area for Route Group 2

WIU No.	WIU Name	WIU Size (acres)
NM-LC-013	Aberdeen Peak	17,529
NM-LC-012	Lordsburg Playa South	10,784
Total	**2**	**28,313**

Note: NM-LC-14 in New Mexico and AZ-SF-004-34, AZ-SF-004-36, AZ-SF-004-46, AZ-SF-004-47, AZ-SF-004-49, AZ-SF-004-50, AZ-SF-004-51, AZ-SF-004-52, AZ-SF-004-53, AZ-SF-004-54, AZ-SF-004-55, AZ-SF-004-56, AZ-SF-004-57, AZ-SF-004-58, AZ-SF-004-59, AZ-SF-004-61, AZ-SF-004-62, and AZ-SF-004-63 in Arizona were found not to possess wilderness characteristics and are therefore removed as a WIU in this EIS.

Upgrade Section

No inventoried WIUs were identified within the Upgrade Section analysis area (i.e., within 1 mile of either side of the Project's centerline) (figure 3.13-2).

Previous inventories for wilderness characteristics have been conducted by the BLM's Tucson and Safford Field Offices in 1979 and 1980, and mostly recently for the SunZia and Southline transmission line projects. The 1979, 1980, and SunZia project inventories were reviewed for the Southline Project inventory in cooperation with the BLM Safford and Tucson Field Offices and Arizona State Office to ensure previous conclusions remain valid. All the previous inventories that include route groups 3 and 4 would not intersect the Project.

Due to the majority of land included in route groups 3 and 4 being non-BLM lands, WIUs were not present within the analysis area, and non-BLM lands are not considered for their wilderness characteristics.

3.14 RECREATION

Recreation baseline conditions (the recreation resources "affected environment") includes the discussion of existing recreation in terms of recreation opportunities and activities, recreation settings, desired recreation experiences, and adjacent recreation areas. Some of the information provided here is sourced from a report titled "Southline Transmission Project Resource Report 10: Recreation" (CH2M Hill 2013o). The contents of that report are used herein without specific reference. Additional explicit "in text" references to scientific and other sources relied upon for conclusions in the analysis are included.

Recreation activities occurring throughout southern New Mexico and Arizona involve a broad spectrum of pursuits, ranging from dispersed and casual recreation to organized, BLM-permitted group uses. Typical recreation in the region includes, but may not be limited to: OHV driving, scenic driving, hunting, hiking, wildlife viewing, horseback riding, camping, backpacking, mountain biking, geocaching, rock-hounding, picnicking, night-sky viewing, viewing cultural/historical sites, soaring/paragliding, and photography. The region is known for its large-scale undeveloped areas and remoteness, which provide a wide variety of recreational opportunities for users who wish to experience undeveloped recreation, as well as those seeking more organized or packaged recreation experiences.

The affected environment is based on defining the existing conditions of recreation resources using the management guidelines from the BLM Mimbres RMP, Safford RMP, Phoenix RMP, and other existing conditions described in applicable long-term planning documents (refer to Section 3.11, "Land Use, Including Farm and Range Resources and Military Operations").

3.14.1 Analysis Area

The analysis area for the New Build and Upgrade sections for recreation resources includes the proposed Project footprint and alternatives. The analysis area for recreation resources does not include a continuous, equidistant buffer (as with other resources), since large areas of land are not likely to have similar existing recreation conditions and settings as the Project footprint. Because the proposed Project could affect adjacent areas where recreation conditions and use may intensify and vary widely, some adjacent recreation areas are included in the Project footprint. Therefore, in addition to the proposed Project footprint, adjacent recreation areas that could be directly or indirectly affected by the proposed Project are also included in the analysis area. Figure 3.14-1 shows the recreation resources for the New Build Section; figure 3.14-2 shows the recreation resources for the Upgrade Section.

3.14.2 Laws, Ordinances, Regulations, and Standards

Federal

NATIONAL TRAILS SYSTEM ACT OF 1968 (PL 90-543, AS AMENDED THROUGH PL 111-11)

The National Trails System Act authorizes the designation of a network of scenic, historic, and recreational trails. These trails provide for outdoor recreation needs; promote the enjoyment, appreciation, and preservation of outdoor areas and historic resources; and encourage public access and citizen involvement (NPS 2010a). The National Trails System includes National Historic, Scenic, and Recreation Trails for public use. BLM is one of several Federal agencies that manage trails within the National Trails System.

FEDERAL LAND POLICY AND MANAGEMENT ACT OF 1976 (PL 94-579)

The FLPMA requires BLM to consider recreation during the land-use planning process. Recreation management prescriptions are designated in RMPs. The Project would traverse Federal, State, and local agency jurisdictions with authority to manage recreation resources. Private land would also be traversed by the Project, and many restrictions on recreation activities that would be applicable to other lands may not apply to private land. The Federal, State, and local agency jurisdictions that would be traversed by the Project may or may not have in place regulations that guide the type, time, and intensity of recreation activity.

Recreational opportunities and activities on BLM lands are managed in accordance with the prescribed settings specified in the RMP. Integral to both prior and current recreation planning processes is the use of a tool called the recreation opportunity spectrum (ROS). This is a system used to inventory and classify public lands according to physical and social settings, which combine to offer specific types of recreational opportunities. As the name implies, such settings range across a spectrum of opportunities from primitive, where motorized use does not occur and facilities are non-existent or minor in extent, to urban, where opportunities are vehicle-dependent and facilities may be extensive. The Mimbres RMP, Safford RMP, Phoenix RMP, and Coronado National Forest Plan use the ROS settings to manage recreation resources.

The BLM also uses benefits-based management, which integrates perceptions of visitor demand with ROS to produce market-based strategies that provide recreational opportunities and visitor services; commonly known as recreation management zones (RMZs). The result is that public lands are allocated to SRMAs in which structured recreational opportunities are offered, or to extensive recreation management areas (ERMAs) in which management is of a custodial nature. The major way this approach differs from one using ROS is that SRMAs now are targeted to demonstrated recreation-tourism (destinations); locales dependent on public land for recreation (communities); or to dispersed, frontier-like opportunities dependent upon the natural characteristics of the landscape (undeveloped). Many BLM RMPs (Mimbres, Safford, and Phoenix RMPs included) have yet to update their recreation management prescriptions to RMZ-management. Future RMPs will use the benefits-based management/RMZ approach for recreation resources. For example, the IFNM RMP (released in February 2013) utilizes the benefits-based management/RMZs for recreation resources. The Tri-County Draft RMP (released in April 2013; ROD expected in 2014) will use benefits-based management/RMZ for recreation prescriptions.

BLM Manual 6280 – "Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation," identifies the requirements for the management of National Trails (BLM 2012d). BLM Manual 8320 – "Planning for Recreation and Visitor Services," identifies the requirements for the management of recreation and visitor services (BLM 2011).

State

State land within the analysis area is open to recreational use as long as the user possesses an active individual permit (e.g., a valid New Mexico or Arizona hunting license), unless otherwise specified. Hunting on all lands in the analysis area, regardless of ownership, is managed by the NMDGF and AGFD under NMAC Title 19, Chapter 31 and AAC Title 12, Chapter 4, respectively (NMDGF 2013).

The ASLD administers a Recreational Permitting Program for those users that may not possess a hunting license. There are two recreational permits available from ASLD: (1) non-competitive/non-commercial group permits and (2) and individual and family permits (ASLD 2012). The non-competitive/non-commercial group Recreational Use Permit is available to user groups such as off-roading clubs, hunting clubs, and other non-competitive outdoor organizational events. Similarly, the NMSLO administers recreational access to NMSLO lands through a permit system determined by the specific type of use (NMSLO 2013). Categories of use include hiking, camping, hunting, outfitter/guide, and educational access. Issues to Be Analyzed

Based on results of the public scoping process and in consultation with the BLM, the following areas of concern were identified with regards to recreation resources, and are the subject of the analysis in chapter 4:

- Recreation Opportunities/Activities
    - Assess whether a change in (loss and creation of) recreational activities would result with development of the proposed Project and improvement of access roads.
    - Specifically, assess whether the change would increase or decrease the qualities of the hunting experience
- Recreation Settings
    - Assess changes in the recreation setting (e.g., undeveloped or rural settings) of the analysis area as a result of the proposed transmission line and access roads. Specifically, assess whether changes in the settings that support existing OHV, hiking, camping, target shooting, or hunting opportunities would increase or decrease within the proposed analysis area.
- Desired Recreation Experiences
    - Assess the potential for diminished or loss of recreational values and quality (e.g., remoteness, quiet, or solitude) in analysis area/region.
    - Identify the hunting in area game management units (GMUs).
- Assess potential changes in recreation (opportunities/activities, settings, and experiences) on lands adjacent to the Project, if present.

3.14.3 Analysis Area Conditions

The existing conditions for recreation are described in an east-to-west sequence, beginning at the Afton Substation in New Mexico. This section describes the environmental setting in terms of the recreation resources, such as designated recreation sites or access points to recreation areas that are encountered within the analysis area. Dispersed and non-designated recreation activities are also present within the analysis area.

The proposed Project and alternatives would cross both large tracts of undeveloped land as well as urban and suburban areas. Much of the land in the analysis area is managed by Federal and state agencies, which generally provide for multiple-use management, in which recreation is included. Additionally, there are residential and commercial lands interspersed in the nearby developed communities. The region is known for its large-scale undeveloped areas and remoteness, which provide a wide variety of recreational opportunities.

The eastern portion (New Build Section) of the proposed Project would be located in open range-type settings, crossing mountain ranges (including the Continental Divide) and valley/basins. Farther west (Upgrade Section), the distance between the valley/basins and mountain ranges becomes less, and urban populations surround the Tucson metropolitan area. Many recreation activities vary in intensity, depending upon the distance to urban populations.

New Build Section

In the New Build Section, the proposed Project would involve the construction of approximately 256 miles of new transmission facilities as well as proposed substation expansion areas and staging areas during construction, and require ROWs across public and private lands. The New Build Section is characterized by primarily undeveloped desert landscape with pockets of rural residential and commercial development. The undeveloped and rural areas offer limited formal recreational opportunities, except in the vicinity of populated areas and designated recreation sites. The majority of the undeveloped areas provide dispersed recreation opportunities, such as hiking, biking, horseback riding, hunting, fishing, and bird watching. Formal recreation opportunities, such as parks, ball fields, golf courses, rodeo arenas, and fairgrounds, are located within cities and towns.

As shown on figure 3.14-1, several recreation areas are located along the New Build Section:

- Federal land open to recreation, including ACECs, wilderness areas, WSAs, and national trails; and
- State, County, and city recreation areas, including OHV areas, State land open to hunting, wildlife areas, natural areas, county parks, and city parks.

RECREATION OPPORTUNITIES/ACTIVITIES

The availability for recreation opportunity and activity in the analysis area is largely dependent upon the amount of public lands in a given area. Private land recreation opportunities and activities are limited to the landowner and invited guests only. Therefore, areas that include larger amounts of public land experience higher use by the public.

Aden Lava Flow Wilderness Study Area

The Aden Lava Flow WSA is 25,287 acres in size and is located within the Potrillo volcanic field, 20 miles southwest of Las Cruces, New Mexico. The Aden Crater lies at the western side of the lava flow. The WSA is characterized by basalt flows, volcanic craters, and coppice sand dunes. The lava flow includes pressure ridges, lava tubes, and steep-walled depressions of up to 100 feet wide. Grass and shrubs grow on the flow with many cacti and yucca. Vegetation consists of grasslands and desert shrubs such as mesquite and creosote. Vent tubes, and the many crevices found in the lava, provide cover and den sites for wildlife. Bats are numerous and the rock pocket mouse (*Chaetodipus intermedius*) and blacktail rattlesnake (*Crotalus lepidus*) are found on the black lava flows. The WSA can be accessed from I-10 via a dirt road, which, depending on the condition, may limit usage levels for recreation purposes. Although less than a 1-hour drive from either Las Cruces, New Mexico, or El Paso, Texas, most of the area receives little visitor use. The area does not have any maintained trails, making cross-country travel for horseback riders, hikers, and backpackers a very primitive experience. The WSA offers primitive and dispersed recreation opportunities and activities (BLM 2013j). Approximately 9 acres of the WSA lies within the analysis area.

West Potrillo Mountains and Mount Riley Wilderness Study Area

The West Potrillo Mountains and Mount Riley WSA is 148,697 acres in size and is located approximately 30 miles southwest of Las Cruces, New Mexico, just north of the Mexico border. It consists of mountains comprising a series of 48 volcanic cinder cones, with small sand dunes, playas, and lava fields in between. The vegetation consists of desert grasses and shrubs. Indian Basin, a natural depression at the southwest end of the West Potrillo Mountains, fills with water during the rainy season, providing a temporary pond for ducks. Wintering raptors are found in high numbers due to a large small-mammal prey base. County Road A3-B provides general access from the south, and County Road A17-B4 allows access from the northeast. The condition of the dirt access roads may limit usage levels for recreational purposes. The WSA offers hang-gliding, parasailing, primitive and dispersed recreation opportunities and activities (BLM 2013k). Approximately 10,163 acres of the WSA lie within the analysis area. The adjacent East Potrillo Mountains and Cox Peak areas provide opportunities for paragliding/parasailing.

Organ Mountains – Desert Peaks National Monument

The Organ Mountains–Desert Peaks National Monument was established on May 21, 2014, by Presidential Proclamation under the authority of the Antiquities Act, and is managed by the BLM Las Cruces District Office. The Organ Mountains–Desert Peaks National Monument includes 496,330 acres, and was established to protect significant prehistoric, historic, geologic, and biologic resources of scientific interest. The National Monument includes four distinct areas: the Organ Mountains, Desert Peaks, Potrillo Mountains, and Doña Ana Mountains (BLM 2014b). A portion of the Potrillo Mountains area of the Organ Mountains–Desert Peaks National Monument is located within the analysis area. Recreation activities within the Organ Mountains–Desert Peaks National Monument include soaring/paragliding, hiking, camping, wildlife viewing, and primitive and dispersed recreation opportunities and activities. Numerous volcanic cinder cones jut out prominently from otherwise broad desert plains, which are prominent from a long distance.

Peloncillo Mountains Wilderness Study Area

The Peloncillo Mountains WSA is 4,061 acres located along the Arizona–New Mexico border, adjacent to the eastern border of the Peloncillo Mountains Wilderness. The landform comprises low mountains, cliffs, and numerous canyons, with gentle hills covered in desert grasses and shrubs. Desert bighorn sheep inhabit the Peloncillo Mountains, as well as Gila monsters and pincushion cacti. There are no marked trails within the WSA, and four-wheel drive is required to access the WSA. The WSA offers primitive and dispersed recreation opportunities and activities (BLM 2013l). Approximately 600 acres of the WSA lie within the analysis area.

Aden Hills Off-Highway Vehicle Area

The Aden Hills OHV Area is designated by the Mimbres RMP as an “open” area for OHV use. The area receives about 10,000 visitor-days of use annually. Use of an OHV open area is not generally dependent upon scenic quality; rather, attributes such as access, challenging terrain, and availability of trails are most important. Approximately 1,555 acres of the Aden Hills OHV Area lies within the analysis area (BLM 1993).

Proposed Butterfield Overland Trail National Historic Trail

The proposed Butterfield Trail commemorates the routes pioneered by John Butterfield and his Butterfield Overland Stage Company as its stages traveled over the “oxbow route” between the eastern termini of St. Louis and Memphis and the western terminus of San Francisco. Stages traveled over this route between 1858 and 1861. Where evidence of the trail is known, the trail can be hiked or traced on horseback. There are many areas where the exact location of the trail is unknown (NPS 2013). Near Willcox, Arizona, the trail location is known and includes access to the ruins of Fort Bowie. The Butterfield Trail offers primitive, developed, and dispersed recreation opportunities and activities (NPS 2013). The trail is currently under study by the NPS to determine whether the trail should be designated under the National Trails System Act of 1968 as historic. Approximately 7.27 miles of the Butterfield Trail crosses the analysis area in the New Build Section.

Continental Divide National Scenic Trail

The CDNST part of the National Trail System is a 50-mile-wide corridor on either side of the Continental Divide. The CDNST provides for scenic, primitive hiking and horseback-riding recreational experiences, while conserving natural, historic, and cultural resources along the Continental Divide. Extending 3,100 miles between Mexico and Canada, the CDNST traverses landscapes primarily on public lands. This National Scenic Trail was established in 1978 through the authority of the National Trails System Act (PL 90-543) and is one of the outstanding resources of the BLM’s National Landscape Conservation System. Where the CDNST crosses BLM lands in New Mexico, the route does not ordinarily have a tread. The trail is identified with line-of-sight signs except where it follows ranch roads. Equestrian facilities are intermittent and in various stages of development. Although the CDNST is open year-round, spring is the best season for northbound travelers, while early fall is best for those entering from the north and heading south. The CDNST offers primitive and dispersed recreation opportunities and activities (Forest Service 2009). Approximately 7.09 miles of the CDNST crosses the analysis area in the New Build Section.

Peloncillo Mountains Wilderness Area

The 19,440-acre Peloncillo Mountains Wilderness is located 9 miles northeast of San Simon, Arizona, in Graham, Greenlee, and Cochise Counties, Arizona. The wilderness lies within the rugged Peloncillo Range, which stretches from Mexico to the Gila River. This remote and primitive area along the New Mexico State line shows little signs of human activity. The higher country offers long-distance views, and excellent scenery enhances wilderness values in the rugged mountains and canyons. High-clearance or four-wheel drive vehicles are recommended for access to the wilderness boundary. The Peloncillo Mountain Wilderness offers opportunities and activities for primitive recreation, including hiking, backpacking, rock scrambling, hunting, and sightseeing (BLM 2012i). Approximately 405 acres of the Peloncillo Mountains Wilderness lie within the analysis area.

Hunting

Table 3.14-1 presents the GMUs crossed by the New Build Section of the proposed Project and alternatives and the hunter days and hunting success data associated with those GMUs. Hunter days and hunt success for the Arizona GMUs were derived from deer, pronghorn, turkey, and javelina hunts (AGFD 2012d).

Table 3.14-1.GMU and Hunting Data Associated with the Proposed New Build Section

GMU	GMU Crossed by Analysis Area (acres)	GMU Game Species and Hunting Month(s)	GMU Permits	GMU Hunter Days*, †	GMU Hunting Success*, ‡
21B (New Mexico)	23,510	Turkey: April 15–May 10, September 1–30 (archery only), November 1–30 Deer (all Unit 21): Select dates in November and December Elk: Select dates October–December Pronghorn antelope (all Unit 21): October 5–7, 26–28 Bear: Select dates in August– November Cougar: Annual	Turkey: Between 2–100 (2013–2014) Deer: 1,100 (21 as a whole; 2013–2014) Elk: 110 (2013–2014) Pronghorn antelope: 7 (2013–2014) Bear: 109 (for all units 12, 13, 15–18, 20–24, 26, 27; yr 2013–2014) Cougar: 89 (for all units 15, 16, 21, 25; yr 2013–2014)	NA	Deer: 25% (2010–2011) Elk: 44% (2011)
23 (New Mexico)	76,054	Turkey: April 15–May 10, September 1–30 (archery only), November 1–30 Deer: Select dates in November and December Elk: October 5–9, 19–23 Pronghorn antelope: Select dates in August and October Javelina: Select dates in January–February Bear: Select dates in August–November	Turkey: Between 2–100 (2013–2014) Deer: 1,375 (2013–2014) Elk: 100 (2013–2014) Pronghorn antelope: 33 (2013–2014) Javelina: 1,300 (total for units 19, 23–28; 2013–2014) Bear: 109 (for all units 12, 13, 15–18, 20–24, 26, 27)	NA	Deer: 28% (2010–2011) Elk: 19% (2011)
24 (New Mexico)	7,165	Turkey: April 15–May 10, September 1–30 (archery only), November 1–30 Deer: Select dates in September through December Elk: October 5–9, 19–23 Pronghorn antelope: October 5–7, 26–28 Javelina: Select dates in January–February Bear: Select dates in August–November Cougar: Annual	Turkey: Between 2–100 (2013–2014) Deer: 1,050 (2013–2014) Elk: 20 (2013–2014) Pronghorn antelope: 6 (2013–2014) Javelina: 1,300 (total for Units 19, 23–28; yr 2013–2014) Bear: 109 (for all units 12, 13, 15–18, 20–24, 26, 27; yr 2013–2014) Cougar: 66 (for all units 22–24; yr 2013–2014)	NA	Deer: 33.3% (2010–2011) Elk: 25% (2011)
25 (New Mexico)	89,230	Deer: November 2–6, 9–13 Pronghorn antelope: October 5–7, 26–28 Ibex (Capra aegagrus): Select days October–January, depending on sporting arm Javelina: Select dates in January–February Cougar: Annual	Deer: 200 (2013–2014) Pronghorn antelope: 6 (2013–2014) Ibex: 165 (2013–2014) Javelina: 1,300 (total for units 19, 23–28; yr 2013–2014) Cougar: 89 (for all units 15, 16, 21, 25; yr 2013–2014)	NA	Deer: 24.9% (2010–2011)
26 (New Mexico)	610	Deer: November 2–6, 9–13 Pronghorn antelope: October 5–7, 26–28 Javelina: Select dates in January–February Bear: Select dates in August–November Cougar: Annual	Deer: 200 (2013–2014) Pronghorn antelope: 11 (2013–2014) Javelina: 1,300 (total for units 19, 23–28; yr 2013–2014) Bear: 109 (for all units 12, 13, 15–18, 20–24, 26, 27; yr 2013–2014) Cougar: 19 (for both units 26–27; yr 2013–2014)	NA	Deer: 43.2% (2010–2011)

Table 3.14-1.GMU and Hunting Data Associated with the Proposed New Build Section (Continued)

GMU	GMU Crossed by Analysis Area (acres)	GMU Game Species and Hunting Month(s)	GMU Permits	GMU Hunter Days*, †	GMU Hunting Success*, ‡
27 (New Mexico)	29,455	Deer: Select dates in November and December Desert bighorn sheep: November 1–30 Javelina: Select dates in January–February Bear: Select dates in August–November Cougar: Annual	Deer: 200 (2013–2014) Desert bighorn sheep: 2 (2013–2014) Javelina: 1,300 (total for units 19, 23–28; yr 2013–2014) Bear: 109 (for all units 12, 13, 15–18, 20–24, 26, 27) Cougar: 19 (for units 26–27; yr 2013–2014)	NA	Deer: 38.5% (2010–2011)
28 (Arizona)	23,765	Mule deer: October/November Javelina: January/February Bighorn sheep: Dec Quail: Oct–February Dove: Sept	Average no. of permits in past 5 years: Mule deer: 1,200 Javelina: 450 Bighorn sheep–desert: 2 Bighorn sheep–Rocky Mountain: 3	6,101	31%
29 (Arizona)	9,880	White-tailed deer: October–December Mule deer: October/November Javelina: February–March Quail: October–February	Average no. of permits in past 5 years: White-tailed deer: 900 Mule deer: 500 Javelina: 300	4,550	26%
30A (Arizona)	44,750	White-tailed deer: October–December Mule deer: October/November Javelina: January/February Quail: October–February Antelope: September	Average no. of permits in past 5 years: White-tailed deer: 1,463 Mule deer: 1,300 Javelina: 650 Antelope: 7	7,376	32%
30B (Arizona)	2,785	White-tailed deer: October–December Mule deer: October/November Javelina: January–March Quail: October–February Mountain lion: Year-round	Average no. of permits in past 5 years: White-tailed deer: 200 Mule deer: 1,480 Javelina: 430, 200 handgun, archery and muzzleloader (HAM), 600 archery	9,134	28%
31 (Arizona)	112	White-tailed deer: November/December Mule deer: October/November Javelina: January/February Black bear: March, September Bighorn sheep: December	Average no. of permits in past 5 years: White-tailed deer: 600 Mule deer: 800 Javelina: 650	5,409	20%

Note: NA: Not available.

*****Arizona hunter days and hunt success were derived from deer, pronghorn, turkey, and javelina hunts.

†NMDGF does not calculate or report GMU hunter days.

‡NMDGF only has success data for elk and deer because they are the only species with mandatory harvest reporting.

Recreation Settings

Critical to producing recreation opportunities is the condition of recreation settings on which those opportunities depend. As specified in section 3.14.2, ROS uses settings that correspond to allowable uses. The ROS stratifies and defines classes of outdoor recreation environments. The spectrum may be applied to all lands, regardless of ownership or jurisdiction. The ROS divides recreation settings into six broad categories: urban, rural, roaded natural, semi-primitive motorized, semi-primitive non-motorized, and primitive (Forest Service 1986a).

The physical setting describes variations in components such as remoteness, naturalness, and facilities. The social setting reflects the variations in components such as group size, number and types of contact with other users, encounters between individuals or groups, and the evidence of use by others.
The administrative setting reflects the variations in the kind and extent of components such as visitor services, management controls, user fees, and mechanized use.

The recreation settings within the analysis area for the New Build Section vary widely. The settings for special designations such as Wilderness, WSA, National Monument, and National Trail offer more restrictive recreation settings such as primitive and dispersed recreational settings, where the users are less likely to anticipate encounters with other users. The settings for lands that have not been specially designated offer less restrictive settings such as motorized and developed recreational settings, where the users are more likely to anticipate encountering other users.

Both developed (e.g., city parks) and undeveloped (e.g., primitive camping) recreational uses are located within the analysis area.

ROS data were largely not available within the analysis area. The Mimbres, Safford, and Phoenix RMPs specify that all BLM lands, unless otherwise designated and subject to travel management rules, are open to recreational use (BLM 1993, 1991, and 1988a, respectively).Although BLM lands within the analysis area do not contain ROS designations, the overall recreation setting of the analysis area for the New Build Section can be characterized as mostly roaded natural, with areas of semi-primitive motorized in site-specific areas. The only non-motorized areas in the analysis area for the New Build Section occur in specially designated areas such as designated Wilderness areas and DOD managed lands.

The 2009 Comprehensive Plan for the CDNST (Forest Service 2009) uses the ROS in delineating and integrating recreation opportunities in managing the CDNST. This ROS system consists of the following classifications: (a) primitive; (b) semi-private non-motorized; (c) semi-primitive motorized; (d) roaded natural; (e) rural and urban; and (f) private lands ROWs or easements. The analysis area intersects with the CDNST approximately 7 miles northeast of Lordsburg in route group 1. The 2009 Comprehensive Plan does not classify lands along the trail. However, because of the physical and visual proximity to urbanized and/or developed areas, the location where the trail would intersect the analysis area would be classified as primitive or semi-primitive. Both the roaded natural and rural and urban classifications assume that the natural setting may have strong modifications, including those that are strongly dominant. The rural and urban class specifically anticipates the presence of utility corridors (Forest Service 2009).

DESIRED RECREATION EXPERIENCES

The Mimbres RMP includes objectives for managing recreation resources. Namely, the objective of the recreation program is to ensure the continued availability of quality outdoor recreation opportunities and experiences that are not readily available from other sources. Recreation use is managed in order to protect the health and safety of visitors; to protect natural, cultural, and other resource values; to stimulate public enjoyment of public land, and to resolve user conflicts (BLM 1993).

The Safford and Phoenix RMP do not prescribe specific, future desired recreation experiences goals and objectives; management prescriptions required to manage SRMAs would be developed between the BLM and cooperating agencies. Management prescriptions that would be addressed include OHV travel, signing requirements, recreation facilities, fee collection, and visitor use allocations (BLM 1988a, 1991).

The future Tri County RMP provides goals and objectives for BLM lands in Doña Ana County, New Mexico (BLM 2013e):

- Provide the public with appropriate information to plan, prepare, and choose safe, enjoyable, and appropriate recreational uses of public land;
- Provide and maintain legal access to public land in SRMAs and ERMAs; and
- Increase understanding, tolerance, and respect for other recreation user types. Improve recreation participant's awareness and sense of stewardship for natural and cultural resource values.

In accordance with the Presidential Proclamation that established the Organ Mountains–Desert Peaks National Monument (BLM 2014c), the BLM shall prepare and maintain a management plan for the Organ Mountains–Desert Peaks National Monument. The management planning process for the Organ Mountains–Desert Peaks National Monument has not yet been initiated.

ADJACENT RECREATION AREAS

The Hot Well Dunes Recreation SRMA is adjacent to the analysis area for the New Build Section. Hot Dune Wells is approximately 1,708 acres and is located approximately 0.5 mile north of the proposed Project in route group 2. The primary recreation activities are camping and OHV driving, because the Hot Well Dunes area is designated as "open" to vehicles (BLM 2013m). The BLM Safford Field Office manages the Hot Well Dunes Recreation Area.

Upgrade Section

The Upgrade Section would involve the upgrade and integration of approximately 120 miles of existing transmission facilities, as well as proposed substation expansion areas and staging areas during construction. The analysis area for the Upgrade Section is characterized by primarily undeveloped desert landscape with pockets of rural residential and commercial development. Similar to the New Build Section, the analysis area for the Upgrade Section is undeveloped and the rural areas offer limited formal recreation opportunities, except in the vicinity of populated areas such as Benson and Tucson.

As shown on figure 3.14-2, the analysis area would include several recreation areas along the Upgrade Section, including:

- Federal lands open to recreation, including national trails and national monuments; and
- State, County, and city recreation areas, including State land open to hunting, natural areas, State scenic roads, county parks, county Important Riparian Areas, and city parks.

RECREATION OPPORTUNITIES/ACTIVITIES

Arizona National Scenic Trail

The Arizona NST, part of the National Trail System, is an 820-mile non-motorized trail that traverses the State from Mexico to Utah. The Arizona NST is intended to be a primitive, long-distance trail that highlights Arizona's topographic, biologic, historic, and cultural diversity. The Trail's primary users are hikers, equestrians, and mountain bicyclists (outside of wilderness or other specially managed areas).

Opportunities also exist for cross-country skiers, snowshoers, joggers, and pack-stock users. The Forest Service is the lead agency in the development of a Comprehensive Management Plan for the Arizona NST. The Arizona NST is a complex partnership of State and Federal agencies, non-profits, and private landowners, and is co-managed, constructed, and stewarded by the Arizona Trail Association in cooperation with agencies. This trail has many different segments. The segment in Pima County does not have a formal visitor recording process, but an estimated 500 visitors per year use the portion of the trail that crosses Bar V Ranch (Arizona Trail Association 2010). A 0.16 mile section of the Arizona NST intersects the analysis area for the Upgrade Section.

Willcox Playa Wildlife Area

The Willcox Playa Wildlife Area totals approximately 595 acres, including 120 acres of deeded land, 320 acres of land patented from the BLM, a 115-acre perpetual ROW from the ASLD, and a 40-acre donation from a private landowner. Management emphasis for the Willcox Playa Wildlife Area is to support the best wildlife habitat possible in the area for present and future generations. This emphasis includes keeping opportunities available for public hunting and other wildlife-oriented recreation. Existing uses include bird watching, photography, and hunting. Willcox Playa was placed on the NPS NNL list in 1966 (NPS 2012). The area is a roosting area for 4,000 to 8,000 sandhill cranes and contains the greatest diversity of tiger beetles (*Cicindela sperata*) in the United States (AGFD 2012c). The entire Willcox Playa Wildlife Area lies within the analysis area for the Upgrade Section (refer to figure 3.14-2).

Juan Bautista De Anza National Historic Trail

The Anza NHT extends 1,200 miles through 20 counties across Arizona and California, and is managed by the NPS. Today’s visitors may follow the trail corridor of the 1775–1776 expedition members on a historic route, auto route, or recreation trail segments. The portion of the trail corridor within the analysis area is an auto route, primarily within suburban Tucson and nearby rural communities (NPS 1996). Approximately 0.98 mile of the trail intersects the analysis area for the Upgrade Section.

Coronado National Forest

The Coronado National Forest includes 1,780,000 acres of land of southeastern Arizona and southwestern New Mexico. Within the forest, 12 scattered mountain ranges or “sky islands” rise from the desert floor, supporting biologically diverse plant communities. The sky islands offer year-round recreation opportunities, including hiking, camping, mountain biking, birding, horseback riding, picnicking, sightseeing, and visiting historic areas. Fishing and boating are available but limited. The Coronado National Forest offers primitive and dispersed recreation opportunities and activities within the analysis area (Forest Service 1986a, 1986b). The analysis area within the Upgrade Section crosses approximately 30 acres of semi-primitive motorized lands within the Coronado National Forest’s Dragoon Management Unit.

Proposed Butterfield Overland Trail National Historic Trail

Approximately 2.11 miles of the Butterfield Trail lies crosses the analysis area in the Upgrade Section.

Hunting

Table 3.14-2 presents GMUs crossed by the Upgrade Section of the proposed Project and alternatives, and the hunter days and hunting success data associated with those GMUs. Hunter days and hunt success for the Arizona GMUs were derived from deer, pronghorn, turkey, and javelina hunts. GMU 38M data are for archery deer only; archery javelina hunters also hunt this unit but no data are available.

Patagonia–Sonoita (State Route 83) Scenic Road

Approximately 53 miles of SR 83 south from I-10 is an Arizona State-designated Scenic Road. Traversing the riparian basin of the Santa Cruz River, this scenic road weaves its way between the Santa Rita and Patagonia Mountains and through the grasslands and rolling hills of southern Arizona, an area rich in geographic diversity with more than 300 bird species, luring birdwatchers from around the world (USDOT 1985). Approximately 2 miles of SR 83 crosses the analysis area for the Upgrade Section.

Bar V Ranch

Pima County acquired the Bar V Ranch in February 2005, with 2004 bond funds. The ranch includes 14,400 acres of fee and grazing lease lands located between the Rincon and Santa Rita Mountains, adjacent to Pima County's Cienega Creek Natural Preserve (described below). The Bar V Ranch contributes to the conservation of an important wildlife movement corridors in the Cienega Valley. The ranch includes a significant portion of Davison Canyon, an important tributary and water source to Cienega Creek and the Tucson Basin. Acquisition of the Bar V Ranch preserves a large intact piece of the overall region (known as the Empire-Cienega landscape) and protects important riparian habitat crucial for several vulnerable species.

The ranch is maintained and continues to operate as a working ranch. Limited grazing is conducted on parts of the ranch and waters have been developed and are maintained year-round for livestock and wildlife. The lands are monitored annually, and activity on the ranch is managed to protect and sustain ecological values. Most of the Davidson Canyon stretch of the perennial and intermittent flow owned by Pima County has been fenced to restrict livestock access and reduce unregulated recreational use impacts.

Trails and roads along Davidson Canyon are used by hikers, ATV riders, and equestrian users. The Arizona NST crosses Bar V Ranch along the Davidson Canyon drainage. Because the ranch is a mix of State Trust Lands and County-owned parcels, diverse recreational opportunities exist on the ranch. Recreational users are subject to County Park rules when on the County lands, and ASLD regulations for the State Trust Lands. Regulatory signage is posted for recreational users. It is estimated the ranch receives approximately 1,500 visitors per year (Pima County 2012b). The existing Western 115-kV line crosses Bar V Ranch; approximately 357 acres of the Bar V Ranch are within the analysis area.

Cienega Creek Natural Preserve

The Cienega Creek Natural Preserve is managed by the Pima County Parks and Recreation Department, and is located approximately 25 miles southeast of downtown Tucson. Hiking and bird-watching are the primary recreational activities. The principal management objectives are to preserve and protect perennial stream flow in Cienega Creek, preserve and protect the existing natural riparian community along the stream corridor, and to provide opportunities for the public use of the Preserve (McGann and Associates 1994). The analysis area includes a small portion (less than 1 acre) of the Preserve.

Las Cienegas National Conservation Area

The 2003 Las Cienegas NCA includes 49,000 acres of public land, resources, and uses within Las Cienegas NCA and SVAPD. NCAs were designated by Congress in order to conserve, protect, and enhance the unique and nationally important aquatic, wildlife, vegetative, archaeological, paleontological, scientific, cave, cultural, historical, recreational, educational, scenic, rangeland, and riparian resources and values of the public lands within the NCAs, while allowing livestock grazing and recreation to continue in appropriate areas (BLM 2003). Land acquisitions within the SVAPD would become part of the NCA upon acquisition. The analysis area does not intersect the Las Cienegas NCA; however, approximately 5 miles of the proposed Project crosses the SVAPD.

Additional recreation opportunities/activities within the Tucson metropolitan area are described below in table 3-14.3.

RECREATION SETTINGS

The recreation settings in the Upgrade Section would be similar to the settings described for the New Build Section.

As a portion of the Upgrade Section is located within the Tucson metropolitan area, there is greater potential for access to recreational settings of varying degrees to a larger population. Recreation settings that provide remoteness, such as semi-primitive motorized, can be readily accessed by the Tucson population.

DESIRED RECREATION EXPERIENCES

The desired recreation experiences of the Safford RMP and Phoenix RMP lands within the Upgrade Section would be the same as described above under the New Build Section.

ADJACENT RECREATION AREAS

The recreation areas adjacent to the analysis area for the Upgrade Section include Saguaro National Park, east of the Upgrade Section and west of downtown Tucson. Saguaro National Park is composed of two distinct districts: The Rincon Mountain District and the Tucson Mountain District. The Tucson Mountain District (West Unit) lies on the west side of Tucson, and the Rincon Mountain District (East Unit) lies on the east side of Tucson.

Both districts were formed to protect and exhibit forests of their namesake plant: the saguaro cactus. The Tucson Mountain District of Saguaro National Park ranges from an elevation of 2,180 to 4,687 feet and contains two biotic communities—desert scrub and desert grassland. Average annual precipitation is approximately 10.27 inches. Common wildlife include coyote, Gambel’s quail, and desert tortoise. Access to hiking trails is concentrated in the western and southern reaches of the West Unit (NPS 2008). The analysis area is located approximately 1 mile from the northeastern reaches of the Park’s West Unit.

The IFNM is northwest of Marana in Pima County, Arizona. This 129,000-acre Monument showcases ironwood trees, rugged mountain peaks, and desert valleys. The analysis area includes portions of the northeast corner of the IFNM. The IFNM RMP was completed in February 2013 (BLM 2013c).

Table 3.14-2. GMU and Hunting Data Associated with the Proposed Upgrade Section

GMU	GMU Crossed by Analysis area (acres)	GMU Hunting Season(s)	GMU Permits	GMU Hunter Days*	GMU Hunting Success*
30B (Arizona)	982	White-tailed deer: October–December Mule deer: October/November Javelina: January–March Quail: October–February Mountain lion: Year-round	*Average no. of permits in past 5 years:* White-tailed deer: 200 Mule deer: 1,480 Javelina: 430, 200 HAM, 600 archery	9,134	28%
32 (Arizona)	444	White-tailed deer: October–December Mule deer: October/November Javelina: January/February Antelope: August/September Quail: October–February	*Average no. of permits in past 5 years:* White-tailed deer: 1,500 Mule deer: 1,000 Javelina: 800 Antelope: 20	12,814	24%
33 (Arizona)	628	White-tailed deer: October–December Mule Deer: October/November Javelina: January/February	*Average no. of permits in past 5 years:* White-tailed deer: 1,700 Mule deer: 700 Javelina: 1,500	15,387	16%
34B (Arizona)	871	Antelope: August/September Mule deer: August–January White-tailed deer: August–January Javelina: January–March	*Average no. of permits in past 5 years:* Antelope: 6 Mule deer: 81 White-tailed deer: 530 Javelina: 600	5,273	15%
37A (Arizona)	1,199	Mule deer: November Javelina: February/March Bighorn sheep: December Dove: September, November–January Quail: October–February	*Average no. of permits in past 5 years:* Mule deer: 200 Javelina: 800 Bighorn sheep: 1	10,880	19%
38M (Arizona)	8,902	Javelina: January (archery only) Mule deer: late December/January (archery only) Mountain lion: August–May (archery only) Eurasian collared dove: year-round Mourning dove, white-wing dove: September 1–15 Mourning dove (only): late November–early January Quail: early October–early February Coyote: year-round Other fur-bearers (bobcat, raccoon): August 1–March 3	*Average no. of hunters in past 5 years:*[†] Deer (archery only): 276	2,192	6% (limited data, archery only for deer)

*Arizona hunter days and hunt success were derived from deer, pronghorn, turkey, and javelina hunts.
[†] AGFD does not authorize a specific number of permits for archery deer hunting in Unit 38M. The majority of archery deer hunts are offered as permits sold over-the-counter; hunters can then choose to hunt in any of the open units for that season; Unit 38M is one of the open units. Value presented is the average number of hunters that elected to hunt unit 38M. Javelina hunter data are not available.

Table 3.14-3. City of Tucson Parks and Recreation Areas Associated with the Proposed Upgrade Section

Name	Acres within Analysis Area*	Description
San Pedro Golf Course*	48	The San Pedro Golf Course, owned and operated by the City of Benson, is an 18-hole championship course located 30 miles southeast of Tucson. The facility has five sets of tee boxes that allow for play from over 7,300 yards down to 5,200 yards. The front nine meanders through mesquite groves along the San Pedro River, while the back nine plays through natural canyons with significant elevation changes (San Pedro Golf Course 2012).
Christopher Columbus Park	70	Christopher Columbus Park is a large, regional-size park located on the northwest side of Tucson at Silverbell Road and Camino del Cero. Features of the park include ramadas, picnic sites, comfort stations, a playground, and two baseball fields. The park has a recreational and urban fishing lake where native waterfowl can be seen. The park also contains a model airplane area, a model boat lake, and an off-leash dog park with a ramada, an entry area for dogs to be introduced to each other, and equipment for dog skill activities. Columbus Park is located along the Anza NHT. Adjacent to the trail is a horse trailer pullout to unload horses, along with a ramada, water for the horses, and drinking fountain. A Comcast camping site with a fire pit, ramada with shade cover, and outdoor sitting area for small groups can be used as a meeting place or for outdoor classroom activities (City of Tucson 2012).
Garden of Gethsemane	Less than 1	The Garden of Gethsemane is located next to the Santa Cruz River on West Congress Street. The garden and small park contain the religious sculptures (registered historic art) of artist Felix Lucero. The garden is often used for weddings, quinceañeras, and small parties. Though open to the public, reservations, fees, and access keys are required (City of Tucson 2012).
Greasewood Park	11	Greasewood Park is located on Greasewood Road in an urban setting. This 160-acre natural desert park is dedicated to nature-oriented recreation and preserving the natural desert vegetation in the Tucson area. Its orienteering course consists of 39 permanent checkpoints located at significant landforms. Picnic areas also are available (City of Tucson 2012).
El Rio Trini Alvarez Municipal Golf Course	Less than 0.5	El Rio Trini Alvarez Municipal Golf Course was built in 1934 and is one of the oldest courses in Tucson. The course was developed with the traditional design of narrow fairways and small greens. The course receives approximately 35,000 visitors per year (Golf Nation 2012).
Joaquin Murrieta Park	13	Located in Tucson on Silverbell Road north of Speedway Boulevard, the 38-acre Joaquin Murrieta Park is considered the home of the Western Little League organization. It is an often-used site for the Old Timers, a group of senior baseball players, and is frequently used for family picnics, public festivals, and youth sports tournaments, including Western and Baja Little League. Features of the park include ramadas, picnic areas, soccer fields, Little League fields, softball fields, and a pool (City of Tucson 2012).
John F. Kennedy Park	25	Features of the John F. Kennedy regional park in Tucson include ramadas, restrooms, grills, sports fields, lighted tennis and basketball courts, playgrounds, and a pool. Its urban fishing lake is stocked regularly (City of Tucson 2012).
Santa Cruz River Park	6	The Santa Cruz River Park is a linear park located in Tucson along the Santa Cruz River north of Speedway Boulevard. The park is home to a disc-golf course in a desert setting. The park also offers picnic benches under mesquite trees, two ramadas, a softball field, a sand volleyball court, and a playground (at Bonita and Commerce Park Loop). The park is frequently used by walkers and bicyclists along the Santa Cruz River (City of Tucson 2012).
Sentinel Peak Park	Less than 1	Sentinel Peak or “A Mountain” in Tucson is a popular lookout point and annually hosts the City’s July 4 fireworks show. A gazebo is located on the west side of the mountains, and picnic areas are available. For special events and/or use of the gazebo, a letter of request is required (City of Tucson 2012).
Silverbell Municipal Golf Course	21	The 18-hole Silverbell Municipal Golf Course in Tucson is a public course that opened in 1979. There are nine lakes on the course with water coming into play on only a few holes (Golfnow 2012; Silverbell Municipal Golf Course 2012).

Table 3.14-3. City of Tucson Parks and Recreation Areas Associated with the Proposed Upgrade Section (Continued)

Name	Acres within Analysis Area*	Description
Tucson Mountain Park	27	Tucson Mountain Park is approximately 20,000 acres in size and one of the largest natural resource areas owned and managed by a local government in the United States. The park has approximately 62 miles of non-motorized shared-use trails open to hikers, equestrians, and mountain bikers. Gates Pass overlook includes interpretive displays and historic structures. Picnicking and wildlife viewing opportunities are located throughout the park. Hunting in Tucson Mountain Park is not permitted within 0.25 mile of any developed picnic area, developed campground, shooting range, occupied building, boat ramp, or golf course. An estimated 2.5 million people visit or drive through Tucson Mountain Park annually. Of this total, approximately 1.4 million people enter the park to visit or use park facilities. The approximate number of visitors traveling to various park destinations is as follows (City of Tucson 2012; Pima County 2008): - Arizona-Sonora Desert Museum: 445,000 per year - Old Tucson Studios: 230,000 per year - Other Pima County–operated facilities and trails: 725,000 per year
Tumamoc Hill	49	Tumamoc Hill is managed by both the University of Arizona College of Science and Pima County. Since 1906, Tumamoc Hill has been an ecological preserve and study area. Its 860-acre ecological reservation is both an NHL and Archaeological District. Tumamoc Hill also is a heavily used hiking trail along the paved road; public hiking access, however, is prohibited between 7:30 a.m. and 5:30 p.m. (City of Tucson 2012).

* Includes proposed Project and alternatives.

3.15 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The following analysis includes a summary of current social and economic data relevant to the proposed Project, including population, demographics, employment, income, and taxes in the analysis area. State, county, municipal, and census tract data are also included to provide a comparative discussion for the analysis area.

Some information in this section was obtained from a report titled "Southline Transmission Project Resource Report 11: Socioeconomics and Environmental Justice" (CH2M Hill 2013p). The contents of that report are used herein without specific reference. Additional explicit "in text" references to scientific and other sources relied upon for conclusions in the analysis are included.

3.15.1 Analysis Area

The analysis area for socioeconomics is based on the counties the proposed Project alternatives traverse and where proposed Project impacts are most likely to occur; these counties include Doña Ana County, Grant County, Hidalgo County, and Luna County in New Mexico, and Cochise County, Pima County, Pinal County, Graham County, and Greenlee County in Arizona. The New Build Section of the proposed Project would generally be located within the four counties in New Mexico and in Cochise County, Arizona. Under one New Build alternative, the line would also cross Graham County and Greenlee County in Arizona. The Upgrade Section of the proposed Project would be located in Cochise County, Pima County, and Pinal County in Arizona. The analysis area for environmental justice includes census tracts that fall within a 2-mile buffer of the proposed Project alternatives within the New Build Section of the proposed Project, and a 500-foot buffer within the Upgrade Section of the proposed Project. All of the census tracts within the analysis area for environmental justice were analyzed for low-income and minority populations.

3.15.2 Laws, Ordinances, Regulations, and Standards

The BLM (2005b) Land Use Planning Handbook (H-1601-1) specifies that the social and economic environment must be considered for all BLM land use planning decisions. Additionally, in accordance with this handbook, by statute, regulation, and EO, the BLM must use social science in the preparation of informed, sustainable land use planning decisions. Further, as noted in the BLM (2008b) NEPA Handbook (H-1790-1), socioeconomic issues typically occur within communities located outside BLM-managed lands. Nevertheless, the BLM must analyze the impacts of a given decision or project on the social and economic resources of a community or region.

Section 202(c)(2) of the FLPMA requires BLM to integrate physical, biological, economic, and other sciences in developing land use plans (43 U.S.C. 1712(c)(2)). FLPMA regulations 43 CFR 1610.4-3 and 1610.4-6 also require BLM to analyze social, economic, and institutional information. Section 102(2)(A) of NEPA requires Federal agencies to "insure the integrated use of the natural and social science in planning and decision making" (42 U.S.C. 4332(2)(A)). Federal agencies are also required to "identify and address" disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States, in accordance with EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations."

EO 12898 was signed by President Clinton in 1994. The EO requires agencies to advance environmental justice by pursuing fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means such groups should not bear a disproportionately high share of negative environmental consequences from Federal programs, policies, decisions, or operations. Meaningful involvement means Federal officials actively promote opportunities for public participation, and Federal decisions can be materially affected by participating groups and individuals.

The proposed Project alternatives cross four BLM planning areas, managed by their respective management plans. These plans are: Mimbres Resource Area RMP (December 1993), Safford District RMP (August 1991), Phoenix RMP (December 1988), and the Las Cienegas RMP (July 2003). These plans provide information on and analyze the social and economic conditions of their respective planning areas. BLM management decisions have the potential to affect the social and economic conditions of communities and individuals within these planning areas.

As noted above, the analysis area crosses several county and local jurisdictions. These counties, cities, and towns have goals, objectives, and policies outlined in comprehensive plans that are related to socioeconomics. A discussion of the regional and local guidelines and associated plans can be found in the land use discussion in section 3.11.

3.15.3 Issues to Be Analyzed

The following discussion describes the current social and economic conditions of the analysis area, and when appropriate, compares these with statewide conditions in New Mexico and Arizona. This description of current socioeconomic conditions is provided as the context used for analyses of issues identified during public and internal scoping for the proposed Project. Topics in this section were selected from issues noted by the public during scoping and include population, employment, housing, and economic trends in the analysis area. Current property values, tourism, and potential environmental justice communities are also discussed.

3.15.4 Analysis Area Conditions

Regional Overview

The proposed New Build Section of the proposed Project extends roughly from Las Cruces, New Mexico, to Willcox, Arizona. In New Mexico it traverses Hidalgo County, Grant County, Luna County, and Doña Ana County, and in Arizona it traverses Cochise County, Graham County, and Greenlee County.
The Upgrade Section of the proposed Project would begin at the western end of the New Build Section and then continue farther west to the Saguaro Substation, approximately 30 miles northwest of Tucson.

Proposed routes for both the New Build and the Upgrade sections generally follow a 330-mile stretch of I-10. I-10 stretches 2,460 miles from Jacksonville, Florida, to Santa Monica, California, and is the southernmost transcontinental Interstate highway. The two largest cities along this portion of I-10 are Las Cruces, New Mexico, and Tucson, Arizona. In Las Cruces, the largest employers include New Mexico State University, the Memorial Medical Center, and Wal-Mart Stores Inc. (New Mexico Workforce Connection 2013). The largest private employers in Tucson are Raytheon Missile Systems, Wal-Mart Stores Inc., and University of Arizona Healthcare (Tucson Regional Economic Opportunities 2013).

However, in contrast to these regional population centers, the majority of the Project's analysis area is rural. In particular, the eastern portion of the New Build Section is near the Mesilla Valley, which is part of the Rio Grande's agriculturally productive floodplain. Doña Ana County is the country's largest producer of pecans and the third largest producer of chilies. Other regional agricultural products include milk, corn, and onions (Mesilla Valley Economic Development Alliance 2013).

In both the urban and rural areas of the analysis area, the histories, cultures, and economies are heavily influenced by the proximity to the international border between the United States and Mexico. The New Build Section's Afton interconnection substation would be approximately 30 miles north of the border, and alternative segments of the New Build Section run within 5 miles of the border. This territory was purchased from Mexico in 1854 as part of the Gadsden Purchase during the term of President Franklin Pierce. The Gadsden Purchase was the last major acquisition of land in the contiguous United States and included 29,670 square miles from southern Las Cruces, New Mexico, to Yuma, Arizona (U.S. Department of State: Office of the Historian 2013). Today, a large proportion of the populations in these counties are Hispanic. The Arizona counties impacted by the proposed Project are roughly 30 percent Hispanic, and the New Mexico counties are between 47 to 67 percent Hispanic. In addition to the international cultural ties, this region has a distinct border economy which is heavily dependent on the transfer of goods, services, and people between the two countries. The transportation and logistics industry is a major sector of the border economy, because of the close proximity to over 300 maquilas in Juarez, Mexico (Mesilla Valley Economic Development Alliance 2013).

Population and Demographics

Population estimates and projections for the analysis area were collected from the Census Bureau and are summarized below for both the New Build and Upgrade sections.

NEW BUILD SECTION

The New Build Section is within both the state of New Mexico and the state of Arizona. With a Census 2010 total population of 2,059,179, New Mexico is ranked 36th in terms of population size (Census Bureau 2010a). Arizona, with a Census 2010 total population of 6,392,017, is the 16th largest state in terms of population (Census Bureau 2010b). Population centers in the New Build Section analysis area include Las Cruces, Deming, and Lordsburg, New Mexico, and Willcox, Arizona.

Of the counties forming the analysis area for the New Build Section, Doña Ana County has the largest population and economy, and Hidalgo County has the smallest. With a Census 2010 total population of 209,233, Doña Ana County is the second largest county in New Mexico and is part of the Las Cruces Metropolitan Statistical Area. Las Cruces is the second largest city in New Mexico and the county seat of Doña Ana County. Hidalgo County, with a Census 2010 population of 4,894, is the southernmost county in New Mexico. Grant County, with a 2010 Census population of 29,514, is the 16th most populous county in New Mexico, while Luna County, with a population of 25,095, is the state's 19th most populous.

Doña Ana County and Cochise County are the only counties in the New Build Section analysis area with greater than 10 percent population increases between 2000 and 2010—at 19.8 percent and 11.5 percent, respectively. Comparatively, populations in Grant County and Hidalgo County, New Mexico and Greenlee County, Arizona decreased during the same period. Luna County's population remained relatively constant. Within the New Build Section analysis area, Las Cruces is the largest city and has experienced the most rapid growth in the past decade (28.2 percent). By contrast, Lordsburg, in Hidalgo County, experienced a 10.1 percent decrease in population for the same period (table 3.15-1). Overall, the New Build Section analysis area experienced a 12.3 percent increase in population between 2000 and 2010.

Population projections for 2020 show continued growth in Doña Ana County, Luna County, Cochise County, and Graham County, of between 8 and 16 percent. Hidalgo County's population is expected to continue to decline during this time period. Grant County's population is expected to stabilize rather than continue decreasing (see table 3.15-1). Overall, population in the New Build Section analysis area is expected to increase by 11.8 percent between 2010 and 2020.

Table 3.15-1. Population: Historical, Current, and Projected (New Build Section Analysis Area)

Location	2000*	2010†	Percent Change 2000–2010	2020‡, §	Percent Change 2010–2010
County					
Doña Ana County, New Mexico	174,682	209,233	19.8	243,164	16.2
Grant County, New Mexico	31,002	29,514	−4.8	29,547	0.1
Hidalgo County, New Mexico	5,932	4,894	−17.5	4,818	−1.6
Luna County, New Mexico	25,016	25,095	0.3	28,024	11.7
Cochise County, Arizona	117,755	131,346	11.5	142,400	8.4
Graham County, Arizona	33,489	36,720	9.6	41,200	12.2
Greenlee County, Arizona	8,547	8,472	−0.1	8,500	0.3
Total New Build Section	*396,423*	*445,274*	*12.3*	*497,653*	*11.8*
City/Town					
Las Cruces (Doña Ana County)	74,267	95,233	28.2	NA	NA
Deming (Luna County)	14,116	14,901	5.6	NA	NA
Lordsburg (Hidalgo County)	3,379	3,039	−10.1	NA	NA
Willcox (Cochise County)	3,733	3,776	1.2	NA	NA
State					
State of Arizona	5,130,632	6,392,017	24.6	7,485,000	17.1
State of New Mexico	1,819,046	2,059,017	13.2	2,351,724	14.2

Note: NA = not applicable.
* Census Bureau (2000).
† Census Bureau (2010a).
‡ University of New Mexico (2013).
§ ADOA (2013).

UPGRADE SECTION

The Upgrade Section is entirely within the State of Arizona. Population centers in the Upgrade Section analysis area include Benson, Vail, Tucson, and Marana. Of the counties forming the analysis area for the Upgrade Section, Pima County has both the largest population and economy, and Cochise County has the smallest. Pima County is the second largest county in Arizona, and the majority of its Census 2010 population of 980,263 resides in Tucson.

Counties in the analysis area for the Upgrade Section have all experienced population growth in the past decade (table 3.15-2). Pinal County in particular had substantial population growth between 2000 and 2010, more than doubling its population.

Table 3.15-2. Population: Historical, Current, and Projected (Upgrade Section Analysis Area)

Location	2000*	2010†	Percent Change 2000–2010	2020‡	Percent Change 2010–2020
County					
Cochise County, Arizona	117,755	131,346	11.5	142,400	8.4
Pima County, Arizona	843,746	980,263	16.2	1,100,000	12.2
Pinal County, Arizona	179,727	375,770	109.1	493,200	31.3
Total Upgrade Section	*1,141,228*	*1,487,379*	*15.6*	*1,735,600*	*56.1*

Table 3.15-2. Population: Historical, Current, and Projected (Upgrade Section Analysis Area), Continued

Location	2000*	2010†	Percent Change 2000–2010	2020‡	Percent Change 2010–2020
City/Town					
Benson (Cochise County)	4,711	5,092	8.1	NA	NA
Vail (Pima County)	2,484	9,468	282.1	NA	NA
Tucson (Pima County)	486,699	520,981	7.0	NA	NA
Marana (Pima County)	13,556	32,993	143.4	NA	NA
State					
State of Arizona	5,130,632	6,392,017	24.6	7,485,000	17.1

Note: NA = not applicable.

* Census Bureau (2000).

† Census Bureau (2010a).

‡ ADOA (2013).

Population estimates for 2020 show continued substantial growth in the Upgrade Section analysis area (56.1 percent) over the next decade. Pima County is projected to continue to grow at a rate generally consistent with the state, while Pinal County growth is expected to be more rapid (31.3 percent), though slower than during the past decade (109.1 percent). Cochise County is projected to experience moderate growth (8.4 percent) over the next decade (see table 3.15-2).

3.15.5 Housing

New Build Section

Consistent with the population figures discussed above, Doña Ana County has the highest number of existing housing units within the New Build Section analysis area, and has experienced the largest expansion in housing capacity (25 percent) within the past decade (table 3.15-3). The average household size is slightly higher for the owner-occupied units in Cochise County, Doña Ana County, and Luna County than for either Grant County or Hidalgo County (see table 3.15-3).

In 2010, homeowner vacancy rates ranged from 1.8 to 3.7 percent across Counties in the New Build Section analysis area, which is generally consistent with the overall homeowner vacancy rate for the states of Arizona and New Mexico. Homeowner vacancy rates were highest in Graham County. In the same year, rental vacancy rates ranged from 7 to 11.2 percent across counties in the New Build Section analysis area, which again is consistent with the statewide rental vacancy rates. Rental vacancy rates were highest in Hidalgo County.

Vacant rental housing potentially available for this proposed Project exists in all counties across the New Build Section analysis area. In the New Mexico portions of the New Build Section, Doña Ana County has the highest number of available rental units and Hidalgo County has the fewest (4,829 and 416 units, respectively). In the Arizona portions of the New Build Section, the counties with the highest total number of units also have the highest number of potentially available rental units. Cochise County has 6,746 available units, whereas Greenlee County only has 1,043. These estimates include vacant general rental properties as well as properties identified in the 2010 Census as being for seasonal, recreational, or migratory labor needs.

Table 3.15-3. Housing Statistics, 2010 Census, New Build Section

Housing Segment	Doña Ana County, New Mexico	Grant County, New Mexico	Hidalgo County, New Mexico	Luna County, New Mexico	Cochise County, Arizona	Graham County, Arizona	Greenlee County, Arizona	State of Arizona	State of New Mexico
Total housing units (2000)*	65,210	14,066	2,848	11,291	51,126	11,430	3,744	2,189,189	780,579
Total housing units (2010)†	81,492	14,693	2,393	10,999	59,041	12,980	4,372	2,844,526	901,388
Percent change	25.0	4.5	−16.0	−2.6	15.5	13.6	16.8	29.9	15.5
Total owner-occupied	48,514	9,019	1,306	6,706	34,711	8,089	1,593	1,571,990	542,122
Total renter-occupied	27,018	3,567	630	2,887	16,154	3,031	1,595	809,303	249,273
Homeowner vacancy rate (2010)†	1.8%	2.1%	2.1%	2.9%	3.2%	3.7%	2.2%	3.9%	2.0%
Rental vacancy rate (2010)†	7.0%	8.9%	11.2%	9.1%	10.6%	2.9%	10.7%	12.9%	8.1%
Potentially available rental units‡	2,054	351	80	293	1,917	502	466	120,490	22,150

* Census Bureau (2000).
† Census Bureau (2010a).
‡ Census Bureau (2010b).

Upgrade Section

Although Pima County has the highest number of housing units within the Upgrade Section analysis area, Pinal County experienced the largest percentage increase in housing units during the last decade, with housing units there nearly doubling between 2000 and 2010 (table 3.15-4). However, while the number of housing units grew 96.2 percent, population in Pinal County increased 109.1 percent. In Cochise County, housing growth (15.5 percent) was larger than population growth (11.5 percent). The same is true for Pima County (see table 3.15-4).

In 2010, homeowner vacancy rates ranged from 2.9 to 5.5 percent in the Upgrade Section analysis area. In the same year, rental vacancy rates ranged from 10.6 to 13.9 percent across counties in the Upgrade Section analysis area. For both owned homes and rentals, vacancy rates were the highest in Pinal County in 2010.

Across the Upgrade Section analysis area there is a considerably larger potentially available rental housing stock than in the counties of the New Build Section analysis area (see tables 3.15-3 and 3.15-4). All of these counties also have large total housing units and high rental vacancy rates. There are nearly 18,000 potential available units in Pima County alone and an additional 4,887 in Pinal County (see table 3.15-4).

Table 3.15-4. Housing Statistics, 2010 Census, Upgrade Section

	Cochise County, Arizona	Pima County, Arizona	Pinal County, Arizona	State of Arizona
Total housing units (2000)*	51,126	366,737	81,154	2,189,189
Total housing units (2010)†	59,041	440,909	159,222	2,844,526
Percent change	15.5	20.2	96.2	29.9
Total owner-occupied	34,711	248,970	95,629	1,571,687
Total renter-occupied	16,154	169,690	29,961	809,303

Table 3.15-4. Housing Statistics, 2010 Census, Upgrade Section (Continued)

	Cochise County, Arizona	Pima County, Arizona	Pinal County, Arizona	State of Arizona
Homeowner vacancy rate (2010)[†]	3.2%	2.9%	5.5%	3.9%
Rental vacancy rate (2010)[†]	10.6%	11.2%	13.9%	12.9%
Potentially available rental units[‡]	1,917	17,708	4,887	120,490

* Census Bureau (2000).
[†] Census Bureau (2010a).
[‡] Census Bureau (2010b).

Other Short-term Accommodations: New Build and Upgrade Sections

Apart from rental housing, motels and recreational vehicle (RV) parks in the analysis area provide other potential accommodations for short-term residents. The western and eastern ends of the analysis area are particularly well served, in this regard, by the larger communities of Tucson and Las Cruces. The Tucson area has about 15,000 motel/hotel rooms and 46 mobile home and RV parks. The Las Cruces area includes about 21 hotels and motels with an estimated 1,000 to 2,000 rooms and 12 mobile home and RV parks (CH2M Hill 2013p; Dean Runyan 2012).

There are fewer short-term accommodations in the central portion of the analysis area, more than 90 miles east of Tucson and more than 90 miles west of Las Cruces. The city of Lordsburg, New Mexico, in Hidalgo County, has approximately 11 hotels and motels offering approximately 400 to 500 rooms and one RV park (CH2M Hill 2013p). To the west, there are numerous hotels and motels in Cochise County, Arizona, but virtually all of them are located a considerable distance south of the potential transmission line routes near I-10 in the cities of Sierra Vista, Tombstone, and Bisbee. There are, however, about 25 mobile home and RV parks in the northeastern portions of Cochise County, proximate to the potential transmission line routes. These RV parks are primarily located in or near the communities of Benson, Willcox, and St. David (CH2M Hill 2013p).

3.15.6 Property Values

With the exception of population centers like Las Cruces and Tucson, the proposed Project and alternatives would traverse generally rural landscapes that are largely undeveloped. Neither the New Build Section nor the Upgrade Section analysis areas have been impervious to the national increases in distressed and foreclosed properties, though the housing markets in New Mexico and Arizona do appear to be recovering slowly. As with any new development, transmission lines have the potential, either real or perceived, to impact residential property values.

New Build Section

Between 2000 and 2010, median home values in New Mexico increased 46.5 percent from $108,100 to $158,400 (table 3.15-5). In Arizona, median home values increased 77.2 percent for the same time period, from $121,300 to $215,000. All counties in the New Build Section analysis area saw an increase in home values between 2000 and 2010. In 2010, median home values in the New Build Section analysis area range from $73,200 in Greenlee County to $154,900 in Cochise County (see table 3.15-5). These figures represent nominal price increases; actual growth in housing values after accounting for inflation was smaller.

Table 3.15-5. Housing Statistics, 2010 Census, New Build Section

Housing Segment	Doña Ana County, New Mexico	Grant County, New Mexico	Hidalgo County, New Mexico	Luna County, New Mexico	Cochise County, Arizona	Graham County, Arizona	Greenlee County, Arizona	State of Arizona	State of New Mexico
Median Home Value (2000)*	$90,900	$87,900	$53,900	$66,000	$88,200	$80,900	$62,700	$121,300	$108,100
Median Home Value (2010)†	$137,200	$125,000	$90,800	$91,700	$154,900	$121,100	$73,200	$215,000	$158,400
Percent change	50.9	42.2	68.5	38.9	75.6	49.7	16.7	77.2	46.5

* Census Bureau (2000).
† Census Bureau (2010c).

Upgrade Section

Median home values in the Upgrade Section analysis area range from $154,900 in Cochise County to $198,300 in Pima County (table 3.15-6). Like the New Build Section analysis area, all counties experienced an increase in home values between 2000 and 2010. Median home values in Pima County were slightly lower than the median state value; median home values in Cochise County and Pinal County were farther below the state average (see table 3.15-6).

Table 3.15-6. Housing Statistics, 2010 Census, Upgrade Section

Housing Segment	Cochise County, Arizona	Pima County, Arizona	Pinal County, Arizona	State of Arizona
Median Home Value (2000)*	$88,200	$114,600	$93,900	$121,300
Median Home Value (2010)†	$154,900	$198,300	$164,400	$215,000
Percent Change	75.6	73.0	75.1	77.2

* Census Bureau (2000).
† Census Bureau (2010c).

3.15.7 Employment and Income

New Build Section

EMPLOYMENT

Two estimates of employment are typically used to describe employment in an area: civilian labor force and employment by industry. The Census Bureau defines the civilian labor force on the basis of individuals in the population who are “16 years and over.” Employment-by-industry data, on the other hand, reflects jobs by “place of work” and includes both part-time and full-time jobs. Individuals with more than one job are counted only once in civilian labor force data and counted in each job in the employment-by-industry data. The 2010 employment statistics summarized in table 3.15-7 are from the U.S. Census 2006–2010 American Community Survey (Census Bureau 2011), whereas the 2000 statistics are from the U.S. Census 2000 (Census Bureau 2000).

Table 3.15-7. Employment Statistics for the New Build Section

	Doña Ana County, New Mexico	Grant County, New Mexico	Hidalgo County, New Mexico	Luna County, New Mexico	Cochise County, Arizona	Graham County, Arizona	Greenlee County, Arizona	State of Arizona	State of New Mexico
Labor force (2000)*	74,546	12,408	2,347	8,633	45,702	12,094	3,694	2,366,372	823,440
Labor force (2010)[†]	92,899	13,447	2,430	9,966	53,041	13,643	3,951	2,975,166	957,903
Labor force, average annual growth rate (2000–2010)	2.2	0.8	0.3	1.4	1.5	1.2	0.7	2.3	1.5
Employed (2010)[†]	84,880	12,387	2,182	8,601	48,973	12,306	3,490	2,747,475	888,761
Unemployment rate (2010)[†]	8.6	7.9	10.2	13.7	7.7	9.8	11.7	7.7	7.2

* Census Bureau (2000)
[†] Census Bureau (2010c)

There has been an overall increase in the civilian labor force within all of the counties in the New Build Section analysis area. The average annual growth rate in the civilian labor force between 2000 and 2010 was highest in Doña Ana County (2.2 percent) and lowest in Hidalgo County (0.3 percent). The average annual growth rate in Doña Ana County was higher than for the State of New Mexico as a whole (1.6 percent), while the average annual growth rate in Cochise County, Graham County, and Greenlee County was lower than that for the State of Arizona as a whole (2.4 percent). Unemployment rates ranged from 7.7 percent in Cochise County to 14.2 percent in Greenlee County.

In terms of employment by industry, the Federal Bureau of Economic Analysis (BEA) reports these data by major industrial classification at the state and county level (BEA 2012b). The most recent data available are from 2009 (table 3.15-8). The services and government sectors were the major employers in the New Build Section analysis area and together accounted for roughly two out of three jobs in the analysis area. The "services" sector includes personal (educational, health care and social assistance, arts, entertainment, and recreation, and accommodation and food) and business (finance and insurance, real estate, professional, scientific, and technical services, and management of companies and enterprises) services. Employment in the construction sector accounted for 4 to 8 percent of the total employment by industry in each of the counties (except Hidalgo County) in 2001, and 4 to 7 percent in 2009. In every county the two largest sectors by employment are government and services (see table 3.15-8).

INCOME

Per capita income in 2009 in the New Build Section analysis area ranged from $23,509 in Graham County to $34,243 in Cochise County, which is below the average per capita income for both states (table 3.15-9). According to the American Community Survey (ACS), Greenlee County had the highest median household income ($49,390) among the counties in the New Build Section analysis area. During the same period, New Mexico's median household income was $43,820 while Arizona's median household income was $50,448 (Census Bureau 2010c).

The ACS data also include an estimate of the number of people living below the poverty level as well as the percentage of population living below the poverty level. Based on the poverty statistics, the percentage of people living below the poverty level was highest in Luna County (26.2 percent) (see table 3.15-9).

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Table 3.15-8. Employment by Industry, New Build Section

	Doña Ana County, New Mexico		Grant County, New Mexico		Hidalgo County, New Mexico		Luna County, New Mexico		Cochise County, Arizona		Graham County, Arizona		Greenlee County, Arizona		State of New Mexico		State of Arizona	
Industry	**2001**	**2009**	**2001**	**2009**	**2001**	**2009**	**2001**	**2009**	**2001**	**2009**	**2001**	**2009**	**2001**	**2009**	**2001**	**2009**	**2001**	**2009**
Agricultural, Forestry, Fisheries, etc.	3,210	4,074	443	434	285*	208*	400*	368*	1,997	2,294	364	D	D	D	40,332	41,680	29,518	29,680
Mining	D	221	D	790	L	D	D	D	77	261	13	D	D	D	12,852	16,514	19,612	24,488
Manufacturing	3,352	3,216	D	109	D	D	1,042	1,030	1,156	896	287	277	D	18	210,741	165,372	45,621	36,355
Transportation, Warehousing, and Utilities	2,112	2,598	D	234	D	75*	D	261*	1,346	1,435	D	D	52	D	92,283	103,971	28,226	29,123
Wholesale Trade	1,377	1,523	236	106	L	D	163	D	615	659	126	127	D	18	104,906	113,085	27,801	26,652
Retail Trade	7,656	8,279	1,642	1,608	324	317	1,172	1,421	6,077	6,539	1,578	1,611	274	199	323,264	364,491	110,010	114,066
Information	1,032	1,020	191	166	22	24	37	32	622	798	D	129	D	D	62,224	49,015	19,438	17,309
Finance, Insurance, and Real Estate	3,565	5,141	640	725	D	D	139	185	D	4,114	333	458	D	D	272,679	393,717	60,211	76,175
Services	27,728	35,704	3,744*	4,240	184*	27*	1,444*	1,841*	17,077	22,000	D	D	D	D	1,093,246	1,352,796	360,041	433,760
Construction	4,532	5,565	872	823	D	D	334	413	2,982	2,718	393	446	451	200	213,716	213,716	63,293	67,211
Government	19,599	22,273	3,571	3,791	540	719	1,776	2,345	16,739	17,409	2,403	2,738	548	554	397,209	452,631	205,158	216,118
Total Employment	**75,712**	**89,614**	**14,423**	**13,026**	**2,276**	**2,307**	**8,350**	**9,780**	**51,397**	**59,123**	**9,594**	**11,099**	**4,727**	**4,220**	**2,823,452**	**3,235,139**	**968,929**	**1,070,937**

Source: BEA (2012a).

Notes: D = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

L = Less than 10 jobs, but the estimates for this item are included in the totals.

* Includes non-disclosure estimates.

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Table 3.15-9. Income Statistics for the New Build Section

	Doña Ana County, New Mexico	Grant County, New Mexico	Hidalgo County, New Mexico	Luna County, New Mexico	Cochise County, Arizona	Graham County, Arizona	Greenlee County, Arizona	State of Arizona	State of New Mexico
Per capita income (2009)*	$28,165	$29,713	$28,772	$24,275	$34,243	$23,509	$29,244	$35,754	$35,131
Median household income (2010)†	$36,657	$36,591	$36,733	$27,997	$44,876	$43,083	$49,390	$50,448	$43,820
Percentage of population living below poverty level†	20.1%	11.7%	20.6%	26.2%	11.8%	21.6%	17.2%	15.3%	18.4%

* BEA (2012c).

† Census Bureau (2010c).

The sources of personal income vary by county but tend to follow the same general patterns (table 3.15-10). In every county in the New Build Section analysis area, earnings by place of work accounts for the largest percent of income, while dividends, interest, and rent is the smallest. Greenlee County, Arizona, has the largest percent coming from earnings and the lowest from both net transfer payments and dividends. Graham County has the largest proportion of income from net transfer payments and the lowest from earnings (see table 3.15-10).

Table 3.15-10. Sources of Personal Income for the New Build Section

	Doña Ana County, New Mexico	Grant County, New Mexico	Hidalgo County, New Mexico	Luna County, New Mexico	Cochise County, Arizona	Graham County, Arizona	Greenlee County, Arizona	State of Arizona	State of New Mexico
Earnings by place of work	62%	51%	61%	55%	61%	49%	75%	66%	65%
Net transfer payments	25%	33%	29%	33%	26%	38%	20%	20%	21%
Dividends, interest, and rent	13%	16%	11%	12%	14%	12%	6%	15%	14%

Source: BEA (2013b).

Compensation by industry also varies by county (table 3.15-11). With the exception of Greenlee County, the construction compensation per job in the New Build Section analysis area is dramatically lower than the state average. Utilities is the highest paid industry in every county; however, the lowest paid industry varies by county.

Table 3.15-11. Earnings per Job by Industry for the New Build Section (2011)

	Doña Ana County, New Mexico	Grant County, New Mexico	Hidalgo County, New Mexico	Luna County, New Mexico	Cochise County, Arizona	Graham County, Arizona	Greenlee County, Arizona	State of Arizona	State of New Mexico
Farming, Forestry, Fisheries, etc.	$21,004	$3,116	$16,394	$21,984	$23,062	$28,819	$64,96	$20,594	$11,270
Mining	$12,217	$80,894	D	D	$23,517	D	D	$52,296	$57,707
Manufacturing	$50,077	$29,427	D	$34,557	D	$28,847	D	$80,431	$59,137
Transportation and Warehousing	$27,031	$19,993	$29,283	D	$31,127	D	D	$48,443	$45,762

Table 3.15-11. Earnings per Job by Industry for the New Build Section (2011), Continued

	Doña Ana County, New Mexico	Grant County, New Mexico	Hidalgo County, New Mexico	Luna County, New Mexico	Cochise County, Arizona	Graham County, Arizona	Greenlee County, Arizona	State of Arizona	State of New Mexico
Utilities	$92,695	$85,259	$68,294	$83,346	$107,520	D	$86,575	$128,435	$99,878
Wholesale Trade	$43,296	$43,211	$12,084	$32,932	$36,998	$38,446	D	$70,429	$48,214
Retail Trade	$23,436	$20,864	$18,484	$22,090	$21,259	$24,146	$22,823	$30,846	$26,357
Information	$41,384	$43,929	$28,733	D	$64,605	$16,466	D	$57,341	$47,734
Businesses	$31,982	$14,072	$20,052	$15,637	$46,286	$48,296	D	$38,588	$42,285
Services	$27,529	$20,198	$23,249	$12,785	$24,499	$32,017	$41,315	$33,797	$28,830
Construction	$29,590	$26,046	D	$27,264	$25,491	D	$47,067	$40,931	$38,390
Government	$63,295	$49,698	$79,490	$70,405	$92,014	$58,959	$44,920	$65,251	$64,192

Source: BEA (2012a, 2013a).

Notes: Compensation per job was calculated by dividing total county compensation per industry by total county employment per industry. Total employment includes both full and part-time jobs.

D = Not shown in order to avoid disclosure of confidential information.

Upgrade Section

EMPLOYMENT

Between 2000 and 2010, there was an overall increase in the labor force in the counties in the Upgrade Section analysis area (table 3.15-12). Pinal County experienced the biggest increase in labor force (7.4 percent) while Cochise County's growth was the lowest (1.5 percent). Within the Upgrade Section analysis area, Pima County, at 8 percent, had the highest unemployment rate. Cochise County and Pinal County had the same unemployment rate as that of the state (7.7 percent).

Table 3.15-12. Employment Statistics for the Upgrade Section

	Cochise County, Arizona	Pima County, Arizona	Pinal County, Arizona	State of Arizona
Labor force (2000)*	45,702	391,673	66,695	2,366,372
Labor force (2010)†	53,041	460,138	136,067	2,975,166
Labor force, average annual growth rate (2000–2010)	1.5%	1.6%	7.4%	2.3%
Employed (2010)†	48,973	423,298	125,577	2,747,475
Unemployment rate (2010)†	7.7%	8.0%	7.7%	7.7%

* Census Bureau (2000).
† Census Bureau (2010c).

The retail trade, services, and government sectors are the major employers in all three counties and the state (table 3.15-13). Employment in the construction sector accounted for 5 to 8 percent of the total employment by industry in each of the counties in the Upgrade Section analysis area as well as the state in 2001. By 2009, the contribution of the construction sector to the three counties and the state had declined slightly to between 4 and 7 percent. As seen in the New Build Section, the largest industries in each county by employment are services and government.

Table 3.15-13. Employment by Industry for the Upgrade Section

Industry	Cochise 2001	Cochise 2009	Pima 2001	Pima 2009	Pinal 2001	Pinal 2009	State of Arizona 2001	State of Arizona 2009
Agricultural, Forestry, Fisheries, etc.	1,997	2,294	1,602	1,500	3,030	2,840	40,332	41,680
Mining	77	261	2,484	3,406	1,330	1,512	12,852	16,514
Manufacturing	1,156	896	34,793	27,030	3,038	3,645	210,741	165,372
Transportation, Warehousing, and Utilities	1,346	1,435	10,403	11,385	957	1,585	92,283	103,971
Wholesale Trade	615	659	8,610	10,309	1,202	1,014	104,906	113,085
Retail Trade	6,077	6,539	48,079	51,663	5,572	7,638	323,264	364,491
Information	622	798	9,249	6,635	370	495	62,224	49,015
Businesses	D	4,114	33,450	55,356	2,463	4,832	272,679	393,717
Services	17,077	22,000	181,474	217,617	13,323*	21,371	1,093,246	1,352,796
Construction	2,982	2,718	28,870	24,245	2,393	2,645	213,716	213,716
Government	16,739	17,409	80,781	86,523	16,418	21,019	397,209	452,631
Total Employment	**51,397**	**59,123**	**439,795**	**495,669**	**51,477**	**68,596**	**2,823,452**	**3,235,139**

Source: BEA (2012b).

Note: D = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

* Includes non-disclosure estimates.

INCOME

Among the three counties in the Upgrade Section analysis area, Cochise County had the highest per capita income ($34,243) in 2009 (BEA 2012c) (table 3.15-14). However, Cochise County's per capita income was still lower than the $35,754 average per capita income for the State of Arizona as a whole. Based on the ACS 5-year estimates data set, Pinal County had the highest median household income ($51,310). During the same period, Arizona's median household income was $50,448 (Census Bureau 2010c).

Table 3.15-14. Income Statistics for the Upgrade Section

	Cochise County, Arizona	Pima County, Arizona	Pinal County, Arizona	State of Arizona
Per Capita Income (2009)*	$34,243	$33,833	$24,225	$35,754
Median Household Income†	$44,876	$45,521	$51,310	$50,448
Percentage of Population Living Below Poverty Level†	11.8%	11.2%	10.1%	15.3%

* BEA (2012b).

† Census Bureau (2010c).

The ACS estimates the number of people living below the poverty level as well as the percentage of the population living below the poverty level. As shown in table 3.15-14, based on the poverty statistics, the percentage of people living below the poverty level was highest within the analysis area in Cochise County (11.8 percent); however, this was lower than the statewide average (15.3 percent).

In all three Arizona counties in the Upgrade Section analysis area, the largest income source is earnings by place of work (table 3.15-15). However, in the analysis area this income source accounts for 47 to 61 percent of total personal income, which is a smaller proportion than the statewide average (66 percent). Net transfer payments make up a larger percentage of income compared to the state for both Cochise County and Pima County. Dividends, interest, and rent account for a larger proportion of income when in Pima County and Pinal County than in Arizona as a whole (see table 3.15-15).

Table 3.15-15. Sources of Income for the Upgrade Section

	Cochise County, Arizona	Pima County, Arizona	Pinal County, Arizona	State of Arizona
Earnings by place of work	61%	60%	47%	66%
Net transfer payments	26%	22%	16%	20%
Dividends, interest, and rent	14%	18%	37%	15%

Source: BEA (2013b).

Compensation per wage follows the same trends in the Upgrade Section analysis area as it does in the New Build Section analysis area (table 3.15-16). Construction compensation in these three counties is less than the statewide value ($40,931), and is lowest in Pinal County ($23,697). Compensation per job is the highest in the utilities industry, though this is still lower in the analysis area than it is statewide (see table 3.15-16).

Table 3.15-16. Earnings per Job by Industry for the Upgrade Section (2011)

	Cochise County, Arizona	Pima County, Arizona	Pinal County, Arizona	State of Arizona
Farming, Forestry, Fisheries, etc.	$23,062	$18,684	$27,181	$20,594
Mining	$23,517	$47,010	$73,832	$52,296
Manufacturing	D	$89,996	$52,898	$80,431
Transportation and Warehousing	$31,127	$41,517	$24,618	$48,443
Utilities	$107,520	$111,453	$71,556	$128,435
Wholesale Trade	$36,998	$53,036	$55,497	$70,429
Retail Trade	$21,259	$26,058	$27,146	$30,846
Information	$64,605	$52,241	$24,596	$57,341
Businesses	$46,286	$32,370	$14,438	$38,588
Services	$24,499	$30,312	$27,293	$33,797
Construction	$25,491	$34,182	$23,697	$40,931
Government	$92,014	$67,224	$60,774	$65,251

Source: BEA (2012a, 2013a).

Notes: Compensation per job was calculated by dividing total county compensation per industry by total county employment per industry. Total employment includes both full and part-time jobs.

D = Not shown to avoid disclosure of confidential information.

3.15.8 Fiscal Conditions and Public Services

States and counties generate revenue to operate through federal funding for programs like education, transportation, etc., as well as by collecting taxes, licensing fees, permit fees, penalties, and other revenues. Tax revenues are generated by the collection of sales, income, corporate, lodging, and property taxes, and used to fund public services. Authorization of the proposed Project has the potential to impact local government agencies such as police and fire departments, but also to generate property and sales and use tax revenues for local agencies. The largest sources of tax revenues for local governments, and the revenue sources most likely to be affected by the proposed Project, are property taxes and sales taxes (termed gross receipts taxes in New Mexico and transaction privilege taxes in Arizona).

New Build Section

TAX REVENUES

In 2012, city and county governments in the New Build Section analysis area received nearly $280 million in property taxes, and almost $160 million in sales tax revenues. Doña Ana County, New Mexico, had the largest tax revenues, and Hidalgo County had the smallest tax revenues in the New Build Section analysis area. Table 3.15-17 summarizes combined municipal and county property and sales taxes, by county, in the New Build Section.

Table 3.15-17. New Build Section Analysis Area Local Government Property and Sales Tax Revenues (2012)

	Doña Ana County, New Mexico	Grant County, New Mexico	Hidalgo County, New Mexico	Luna County, New Mexico	Cochise County, Arizona	Graham County, Arizona	Greenlee County, Arizona	Total New Build Section
Property Taxes	$104,183,082	$12,854,645	$2,962,311	$10,609,406	$110,322,051	$21,331,861	$12,741,917	**$275,005,273**
Sales Taxes	$105,272,193	$13,876,758	$1,889,325	$10,317,668	$17,132,163	$4,938,515	$4,689,937	**$158,116,559**

Source: Arizona Department of Revenue (2012), New Mexico Department of Finance & Administration (2013), and New Mexico Taxation & Revenue Department (2013).

Note: Revenues include property and sales tax revenues received at both the county and municipal levels.

Changes in demand for local agencies are induced by changes in population, workforce, and unemployment; these impacts are analyzed in chapter 4. In general, the eastern portion of the New Build Section analysis area receives public services from county and municipal agencies in Doña Ana County and the City of Las Cruces, which are scaled to serve a relatively large population. The western portion of the New Build Segment, however, is serviced by county and municipal agencies in Hidalgo County, which are much smaller in scale. Table 3.15-18 summarizes police, fire, and medical services in Hidalgo County.

Table 3.15-18. Public Services of Hidalgo County, New Mexico

Public Services	Location
Police Services	
Hidalgo County Sheriff	Lordsburg
Lordsburg Police Department	Lordsburg
New Mexico State Police	Lordsburg
Fire Services	**Location**
Animas Volunteer Fire and Rescue Department	Animas
Cotton City Volunteer Fire Department	Animas
Hidalgo County Fire Department: District 1	Lordsburg
Lordsburg Fire Department	Lordsburg
Playas Fire Department	Playas

Table 3.15-18. Public Services of Hidalgo County, New Mexico (Continued)

Public Services	Location
Medical Services	**Location**
None	None

Upgrade Section

TAX REVENUES

In 2012, county and municipal governments in the Upgrade Section analysis area received more than $1.5 billion in property taxes and about $200 million in sales tax. Cochise County local governments had the lowest amount of both forms of tax revenues within the Upgrade Section analysis area (table 3.15-19).

Table 3.15-19. Upgrade Section Analysis Area Local Government Property and Sales Tax Revenues (2012)

	Cochise County, Arizona	Pima County, Arizona	Pinal County, Arizona	Total Upgrade Section
Property Taxes	$110,322,051	$1,100,070,338	$298,995,538	$1,509,387,927
Sales Tax	$17,132,163	$141,717,822	$41,298,194	$200,148,179

Source: Arizona Department of Revenue (2012).

Note: Revenues includes property and sales tax revenues received at both the county and municipal levels.

PUBLIC SERVICES

In general, the western portion of the Upgrade Section receives public services from county and municipal agencies in Pima County and the city of Tucson, which are scaled to serve a large population. The eastern portion of the Upgrade Section, however, is serviced by county and municipal agencies in Cochise County, which are smaller in scale. As shown in table 3.15-20, many of these services are also based in the southern portion of the county (including Sierra Vista, Bisbee, and Tombstone), which is relatively far from the proposed transmission line alignments.

Table 3.15-20. Public Services of Cochise County, Arizona

Public Services	Location
Police Services	
Benson Police Department	Benson
Cochise County Sheriff	Benson
Cochise County Sheriff's Department	Bisbee
Cochise County Government: Division #1	Sierra Vista
Public Safety Department	Sierra Vista
Sierra Vista Police Department	Sierra Vista
Cochise County Sheriff's Office	Willcox

Table 3.15-20. Public Services of Cochise County, Arizona (Continued)

Public Services	Location
Fire Services	
Huachuca City Fire Department	Huachuca City
Tombstone Fire Department	Tombstone
Tombstone Volunteer Fire Department	Tombstone
Willcox Fire Department	Willcox
Willcox Rural Fire Department	Willcox
Medical Services	
Benson Hospital	Benson
Copper Queen Community Hospital	Bisbee
Southeast Arizona Medical Center	Douglas
Holy Cross Hospital	Nogales
Sierra Vista Regional Health Center	Nogales
Southeast Arizona Medical Center	Sierra Vista
Northern Cochise Community Hospital	Willcox

3.15.9 Tourism and Recreation

Common social trends in the western United States include rapidly growing urban populations, increased concern over loss of open space, increasingly transformed landscapes, continued and increasing loss of biodiversity, and increased pressures for uses of all types (in particular, strong trends in recreational uses). Public land resources continue to be perceived as linked to local economic well-being. The scenic and natural resources, climate, and outdoor opportunities in the region attract visitors and therefore local spending.

Recreation and tourism are important contributors to the economic stability of a community; economic benefits are derived from direct spending on food, gas, lodging, etc., but also from sales tax generated from visitor spending. Local and sales tax revenue is extremely important in rural (or non-urban) areas. This is because tourism often forms a larger proportion of the economic activity in these areas and also because special excise taxes on tourists and visitors (i.e., from food, lodging, auto rentals, etc.) are more heavily paid by visitors, rather than residents (Dean Runyan 2012). OHV use and camping (both dispersed and developed), along with hunting and fishing, stimulate the economy through direct local expenditures on motorized vehicles, trailers, equipment and accessories, and insurance and maintenance costs (Arizona State Parks 2003). Local spending on food, gas, lodging, and souvenirs also indirectly benefits the region by supporting wages and income in the local economy, as well as contributing local and state tax dollar revenue.

Population growth in Arizona and New Mexico is partially attributed to the states' appeal as year-round recreational destinations offering diverse opportunities for outdoor recreational activities such as wildlife watching, birding, nature photography, hiking, biking, camping, OHV use, equestrian activities, and hunting. A number of federal, state, county, and local recreation areas are located along the New Build Section and Upgrade Section analysis areas. These include wilderness areas, trails, national forests, OHV areas, a wildlife area, golf courses, and parks (see Section 3.14, "Recreation"). The Upper San Pedro River and the Willcox Playa, and its environs, are particularly important locations for wildlife and bird watching (see Section 3.8.2 "Wildlife" and Section 3.14 "Recreation"). For example, the annual Wings

Over Willcox Birding and Nature Festival (based in the city of Willcox) has been conducted for more than 20 years and draws visitors from outside the area. An economic impact study of the festival, completed in 2013, found that the event now draws approximately 500 visitors from outside the area and has an estimated local economic impact of nearly $200,000 (personal communication, William Werner, Wildlife Biologist, BLM Arizona State Office, Renewable Energy Coordination Office, May 8, 2015). As above, visitors spend money in the communities they visit through lodging, meals, gas, etc.

There is also a small, but growing, wine tourism industry in southern Arizona. The Willcox area is one of the state's three primary regions for wine growing and wine tasting (together with the Sonoita/Elgin area farther to the west and the Verde Valley in northern Arizona). The Willcox area produced approximately 74 percent of all wine grapes grown in Arizona in 2013, with an estimated grape value of about $1.7 million (USDA 2014). The USDA study does not provide an estimate of the value of finished wine production. A study for the Arizona Office of Tourism estimated there were approximately 250,000 visitors to southern Arizona wineries (including both the Willcox area and the Sonoita/Elgin area) in 2011. The majority of these visitors were Arizona residents, with the largest number originating from Pima County (Northern Arizona University 2011c).

There are currently 10 wine tasting rooms with regular hours in the Willcox area and 3 others that are open by appointment. Most of the wine tasting rooms are located in or near downtown Willcox, but three vineyards with tasting rooms are located on the Willcox Bench southeast of the Willcox Playa. Wineries in the Willcox area are considered "domestic farm wineries," a special designation under the Arizona Department of Liquor Licenses and Control. This designation allows local wineries to sell directly to consumers, and makes visitation a particularly important aspect of their business model.

3.15.10 Environmental Justice

The following discussion of baseline conditions within the Upgrade Section and New Build Section analysis areas uses data at the census-tract level to determine if there are any environmental justice communities with a meaningfully higher percentage of minority or low-income individuals than the state. Census tracts typically include 2,500 to 8,000 people and range in size and geography; however, they do not cross county or state lines.

This section identifies and describes the potential for environmental justice impacts as a result of the construction, operation, and maintenance of the proposed Project. Environmental justice includes the fair treatment and meaningful involvement of all people—regardless of race, ethnicity, or income level—in Federal environmental decision-making. Environmental justice programs promote the protection of human health and the environment, empowerment by means of public participation, and the dissemination of relevant information to inform and educate affected communities. Consideration of environmental justice issues is mandated by EO 12898, which was published on February 11, 1994. This EO requires that all Federal agencies incorporate environmental justice into their mission by "identifying and addressing . . . disproportionately high and adverse human health or environmental effects of [their] programs, policies and activities on minority and low-income populations in the United States" (EPA 1994).

The EPA defines a community with potential environmental justice populations as one that has a greater percentage of minority or low-income populations than does an identified reference community. Minority populations are those populations having (1) 50 percent minority population in the affected area, or (2) a significantly greater minority population than the reference area (EPA 1994). The EPA has not specified what percentage of the population can be characterized as "significantly greater" in order to define environmental justice populations. Therefore, for the purposes of this analysis, a conservative approach is used to identify potential environmental justice populations; it is assumed that if the affected area minority and/or poverty status populations are considerably higher than those of the reference area, there is likely an environmental justice population of concern. Low-income populations were defined as those individuals who are considered living below poverty levels. The Census Bureau defines poverty-level thresholds for individuals and a family of four as income levels below $11,170 and $23,050, respectively (Census Bureau 2012).

The methodology for this analysis included assessing the presence and percentage of minority and low-income populations in the analysis areas (in this section) and determining whether those communities would experience disproportionately high and adverse impacts as a result of the proposed Project (in section 4.15). The Census Bureau data for 2010 at the state, county, municipal, and census-tract level were used to determine the presence of minority and low-income populations.

For determining the presence of low-income communities as environmental justice populations, census tracts in each analysis area were evaluated against a reference population. The reference population for low-income communities is the state in which the tract is located. Thus, all census tracts with an equal or greater percentage of the population below the poverty level as the reference population, or greater than 50 percent minority (not white alone), are considered environmental justice populations.

Minority population data for the states, counties, and census tracts within each analysis area were obtained from the Census Bureau (2011). For this analysis, a population is considered a “minority” based on all races and ethnicities that are not “white alone.”

Low-income populations in an affected area are populations below the annual statistical poverty thresholds published by the Census Bureau’s current population reports on income and poverty. Families and persons are classified by the Census Bureau as below poverty level if their total family income or unrelated individual income is less than the poverty threshold specified for the applicable family size, age, and number of related children under 18 years of age. Poverty status is determined for all families (and, by implication, all family members). For persons not in families, poverty status is determined by their income in relation to the appropriate poverty threshold. Thus, two unrelated individuals living together may not have the same poverty status.

New Build Section

Within the New Build Section analysis area, there are 19 census tracts; 10 tracts in New Mexico and 9 tracts in Arizona. Of the 19 census tracts, 9 tracts scattered across the analysis area include a minority population greater than 50 percent, and 1 additional tract has a proportion of minority residents higher than the state average (table 3.15-21). In terms of low-income populations, there are 13 tracts where the percentage of individuals or families living below the poverty level is greater than that of the state where the tract is located (see table 3.15-21). In combination, all but 3 of the tracts in the Upgrade Section analysis area can be classified as an environmental justice community, because the population within the census tract is either low-income or minority or both.

Upgrade Section

Within the Upgrade Section analysis area, there are 38 census tracts, all located within Arizona. Of the 38 census tracts, 19 tracts within the Upgrade Section analysis area include a minority population greater than 50 percent, and 2 other tracts have a proportion of minority residents greater than the state average (table 3.15-22). In terms of low-income populations, there are 22 tracts where the percentage of individuals or families living below the poverty level is greater than the state where the tract is located (see table 3.15-22). There are 27 census tracts (about 70 percent) in the Upgrade Section analysis area that can be classified as environmental justice communities, because the population within each census tract is either low-income or minority or both.

Table 3.15-21. Minority and Low-Income Percentages for the New Build Analysis Area

2010 Census Tract	Total Population	% White Alone (non-Hispanic)	Minority Population					% Total Minority	% Individuals Below Poverty Level	% Families Below Poverty Level
			% Hispanic or Latino	% African American	% Native American	% Asian	% Native Hawaiian or Pacific Islander			
Arizona	6,392,017	57.8%	29.6%	4.1%	4.6%	2.8%	0.2%	41.3%	16.2%	11.7%
Cochise	131,346	58.5%	32.4%	3.8%	0.8%	1.8%	0.3%	39.0%	16.2%	11.6%
100	1,971	71.5%	24.3%	0.5%	1.0%	0.6%	0.1%	26.4%	22.9%	17.3%
2.01	3,747	54.6%	43.2%	0.3%	0.6%	0.2%	0.2%	44.4%	6.0%	3.1%
2.02	3,982	47.6%	49.0%	0.7%	0.5%	0.6%	0.2%	51.0%	27.3%	23.7%
2.03	2,740	84.5%	11.6%	0.5%	0.8%	0.6%	0.4%	13.8%	16.9%	15.2%
3.03	3,457	83.9%	12.4%	0.4%	0.8%	0.6%	0.2%	14.3%	8.1%	6.6%
Graham	37,220	52.3%	30.4%	1.7%	13.6%	0.5%	0.1%	46.4%	21.6%	16.2%
9615	4,449	62.5%	34.7%	0.3%	0.9%	0.2%	0.0%	36.2%	22.0%	15.3%
9616	3,161	41.5%	42.4%	8.0%	5.0%	1.3%	0.7%	57.3%	35.5%	31.0%
Greenlee	8,437	48.1%	47.9%	0.9%	1.7%	0.5%	0.1%	51.1%	17.2%	12.9%
9603	2,588	68.4%	29.4%	0.4%	0.5%	0.3%	0.0%	30.6%	22.2%	17.6%
Pima	980,263	55.3%	34.6%	3.2%	2.4%	2.5%	0.1%	42.8%	17.4%	12.0%
40.61	4,821	79.4%	13.8%	2.0%	0.5%	1.7%	0.0%	17.9%	4.5%	1.9%
41.09	5,304	75.9%	19.3%	1.1%	0.9%	0.7%	0.1%	22.1%	10.4%	6.7%
New Mexico	2,059,179	40.5%	46.3%	1.7%	8.5%	1.3%	0.1%	57.9%	19.0%	14.4%
Doña Ana	209,233	30.1%	65.7%	1.4%	0.7%	1.0%	0.1%	68.8%	25.6%	20.6%
15	6,119	56.6%	38.5%	1.5%	1.4%	0.7%	0.0%	42.2%	11.5%	9.7%
16	2,910	16.1%	82.4%	0.0%	0.1%	0.0%	0.0%	82.6%	25.4%	22.5%
17.01	5,842	22.7%	75.4%	0.8%	0.2%	0.3%	0.1%	76.8%	20.5%	16.8%
17.02	1,692	18.8%	80.5%	0.1%	0.2%	0.1%	0.0%	80.9%	29.6%	21.8%
Grant	29,514	48.6%	48.3%	0.6%	0.7%	0.4%	0.1%	50.1%	16.6%	12.5%
9648	1,764	45.0%	53.5%	0.6%	0.2%	0.1%	0.0%	54.4%	12.1%	7.1%
Hidalgo	4,894	41.4%	56.6%	0.3%	0.3%	0.5%	0.0%	57.8%	23.7%	20.6%
9700	2,195	66.6%	31.2%	0.0%	0.3%	0.4%	0.1%	32.0%	28.1%	21.0%
9702	2,699	20.9%	77.3%	0.6%	0.3%	0.6%	0.0%	78.7%	20.2%	20.2%
Luna	25,095	35.9%	61.5%	0.8%	0.6%	0.4%	0.0%	63.2%	30.8%	23.6%
4	5,936	42.1%	55.2%	0.5%	0.7%	0.2%	0.0%	56.7%	29.7%	21.5%
5	4,338	43.2%	53.7%	0.7%	1.0%	0.2%	0.0%	55.7%	30.1%	20.6%

Source: Census Bureau (2011).

Note: Shaded cells indicate census tracts that meet the criteria for an environmental justice population.

Table 3.15-22. Minority and Low-Income Percentages for the Upgrade Analysis Area

2010 Census Tract	Total Population	% White Alone (non- Hispanic)	% Hispanic or Latino	% African American	% Native American	% Asian	% Native Hawaiian or Pacific Islander	% Total Minority	% Individuals Below Poverty Level	% Families Below Poverty Level
Arizona	6,392,017	57.8%	29.6%	4.1%	4.6%	2.8%	0.2%	41.3%	16.2%	11.7%
Cochise	131,346	58.5%	32.4%	3.8%	0.8%	1.8%	0.3%	39.0%	16.2%	11.6%
2.03	2,740	84.5%	11.6%	0.5%	0.8%	0.6%	0.4%	13.8%	16.9%	15.2%
3.01	4,212	72.3%	24.4%	0.5%	0.6%	0.4%	0.1%	26.0%	22.9%	13.3%
3.02	4,851	86.0%	10.3%	0.7%	0.9%	0.5%	0.1%	12.5%	8.1%	6.3%
3.03	3,457	83.9%	12.4%	0.4%	0.8%	0.6%	0.2%	14.3%	8.1%	6.6%
4	2,206	80.5%	16.4%	0.4%	0.9%	0.5%	0.0%	18.2%	23.4%	18.3%
Pinal	375,770	58.7%	28.5%	4.3%	4.6%	1.6%	0.4%	39.4%	14.3%	10.5%
8.02	4,154	74.8%	20.7%	1.1%	1.2%	0.6%	0.0%	23.6%	8.7%	10.3%
21.03	5,143	59.8%	33.1%	2.6%	1.9%	0.6%	0.1%	38.4%	9.7%	8.0%
Pima	980,263	55.3%	34.6%	3.2%	2.4%	2.5%	0.1%	42.8%	17.4%	12.0%
2	4,409	22.2%	69.3%	2.4%	3.1%	1.8%	0.1%	76.7%	25.4%	19.2%
1	514	65.4%	25.3%	3.5%	0.8%	1.9%	0.0%	31.5%	42.5%	29.8%
11	2,900	8.1%	86.8%	0.7%	3.0%	0.6%	0.1%	91.0%	26.7%	22.5%
12	3,791	12.1%	67.7%	7.4%	10.5%	0.8%	0.0%	86.4%	32.4%	25.9%
25.01	6,213	19.1%	72.4%	3.9%	3.2%	0.6%	0.1%	80.2%	15.7%	12.9%
25.03	4,153	22.4%	72.9%	1.0%	2.2%	0.5%	0.0%	76.6%	31.2%	26.7%
25.04	5,825	20.4%	75.6%	1.2%	1.5%	0.7%	0.0%	79.0%	29.3%	25.4%
25.05	6,534	13.5%	77.8%	2.9%	3.5%	1.1%	0.1%	85.3%	27.8%	30.0%
39.01	2,095	5.3%	89.3%	0.7%	3.7%	0.2%	0.0%	93.9%	37.8%	30.3%
39.02	2,701	8.7%	88.2%	0.7%	1.8%	0.1%	0.0%	90.8%	25.5%	20.1%
39.03	3,232	8.0%	88.1%	0.9%	1.8%	0.2%	0.1%	91.1%	9.1%	9.7%
40.61	4,821	79.4%	13.8%	2.0%	0.5%	1.7%	0.0%	17.9%	4.5%	1.9%
41.09	5,304	75.9%	19.3%	1.1%	0.9%	0.7%	0.1%	22.1%	10.4%	6.7%
41.13	4,116	44.6%	33.0%	17.2%	4.2%	0.5%	0.0%	55.4%	NA	NA
41.14	5,424	17.2%	79.8%	0.6%	0.5%	0.5%	0.0%	81.5%	30.9%	27.4%
43.1	2,084	30.1%	63.8%	1.7%	1.5%	1.2%	0.0%	68.3%	15.8%	13.3%
44.11	7,085	51.6%	37.5%	4.3%	1.6%	3.4%	0.1%	46.8%	32.4%	13.8%

Table 3.15-22. Minority and Low-Income Percentages for the Upgrade Analysis Area (Continued)

2010 Census Tract	Total Population	% White Alone (non- Hispanic)	% Hispanic or Latino	% African American	% Native American	% Asian	% Native Hawaiian or Pacific Islander	% Total Minority	% Individuals Below Poverty Level	% Families Below Poverty Level
44.14	3,194	31.6%	55.2%	3.5%	2.8%	4.9%	0.1%	66.5%	10.7%	6.2%
44.15	1,622	37.3%	56.8%	1.8%	1.4%	1.2%	0.0%	61.3%	33.5%	31.9%
44.18	3,348	74.5%	19.2%	1.2%	0.3%	3.1%	0.1%	23.9%	6.6%	3.9%
44.19	6,287	71.6%	23.2%	1.7%	1.3%	0.3%	0.1%	26.6%	16.2%	14.4%
44.22	5,312	44.0%	48.5%	3.2%	1.5%	1.5%	0.3%	55.0%	9.7%	2.9%
44.23	4,324	81.5%	13.8%	0.7%	0.8%	0.5%	0.0%	15.8%	9.4%	7.7%
44.25	6,166	76.8%	18.6%	0.7%	1.6%	0.4%	0.1%	21.5%	13.1%	10.9%
44.27	8,138	74.0%	18.1%	2.1%	0.6%	3.1%	0.1%	24.0%	3.6%	4.5%
44.29	7,398	65.0%	23.1%	2.3%	0.4%	6.6%	0.2%	32.6%	0.9%	0.0%
44.3	2,454	54.2%	35.9%	3.5%	3.8%	1.0%	0.1%	44.3%	26.2%	24.1%
44.31	3,903	64.4%	27.9%	3.2%	0.4%	1.8%	0.1%	33.4%	16.7%	8.6%
45.04	7,131	40.7%	51.3%	2.3%	1.2%	2.9%	0.1%	57.9%	38.2%	37.2%
4105.02	6,243	36.7%	44.3%	10.1%	1.6%	4.2%	0.5%	60.7%	9.3%	6.5%
9409	1,885	12.3%	24.9%	0.4%	61.5%	0.3%	0.1%	87.2%	41.5%	32.1%

Source: Census Bureau (2011).

Note: Shaded cells indicate census tracts that meet the criteria for an environmental justice population.

3.16 PUBLIC HEALTH AND SAFETY

This section describes the existing environmental conditions that may affect human health and safety, including electrocution risks; severe weather hazards, including wind and earthquakes; fire hazards; and exposure to electromagnetic fields. These conditions may be affected by implementation of the proposed Project or its alternatives and associated proposed Project components (i.e., substations, representative staging areas, and access roads). For identification and analysis of hazardous materials, transportation conflicts, noise hazards, and potential sabotage hazards, see the “Hazardous Materials and Hazardous and Solid Waste,” “Transportation,” “Noise and Vibration,” and “Intentional Acts of Destruction” sections of this chapter, respectively.

Some of the information provided in the following subsections is taken from a report titled “Southline Transmission Project Resource Report 6: Human Health and Safety” (CH2M Hill 2013q). The contents of that report are used herein without specific reference. Additional explicit “in text” references to scientific and other sources relied upon for conclusions in the analysis are included.

3.16.1 Analysis Area

New Build Section

The analysis area for public health and safety within the proposed New Build Section is a 2-mile-wide corridor that is 1 mile on either side of the centerline of the alternatives carried forward. The analysis area is used to identify natural and man-made hazards that could be directly impacted by construction, operations, and maintenance of the proposed Project.

Upgrade Section

The analysis area for the Upgrade Section is a 500-foot corridor (200 feet on either side of the existing 100-foot corridor).

3.16.2 Laws, Ordinances, Regulations, and Standards

Regulations specific to noise, air, recreation, transportation, and hazardous materials are detailed in those respective sections. The following laws and regulations are specific to public health and safety.

Federal

NATIONAL ELECTRIC SAFETY CODE

The NESC is a national standard that dictates the minimum distance between the phase conductors of the transmission line themselves and the minimum distance between the energized conductors and the ground or to a building or structure. The NESC is used to determine the width of the transmission line ROW, to ensure that the energized line will not come into contact with structures built outside of the ROW.
The NESC is also used to specify a minimum distance to the ground, to prevent vehicles that drive beneath the line from coming into contact with the conductors.

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

The NERC develops and maintains the reliability standards available in its “Standard Processes Manual” for planning and operating the North American bulk power system. The NERC requirements are results-based and guided by three principles: measurable performance, risk mitigation strategies, and entity capabilities. High-voltage transmission projects must comply with NERC reliability standards (NERC 2006).

NERC works through regional transmission planning organizations, in this case the WECC, to ensure that the electric system in the western United States will operate reliably and will have adequate transmission capacity to serve the electric load of the western states, even if some transmission lines are out of service. NERC is able to levy fines on utilities for not complying with reliability requirements.

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

OSHA's mission is to ensure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health. OSHA establishes and enforces protective standards, and reaches out to employers and employees through technical assistance and consultation programs. OSHA standards are listed in 29 CFR 1910 (OSHA 2012).

NEW MEXICO

Within the NMED, the Occupational Health and Safety Bureau enforces OSHA regulations in New Mexico. As applicable to the Project, New Mexico has adopted Federal OSHA regulations.

ARIZONA

Arizona adopted Federal OSHA regulations through the Arizona State Plan, approved in 1985. The Arizona State Plan is administered by the Industrial Commission of Arizona, and within that commission, the Arizona Division of Occupational Safety and Health operates an occupational safety and health program that enforces OSHA regulations.

OTHER

Neither the Arizona and New Mexico governments nor the United States government has regulations limiting EMF exposure from power transmission lines. However, several organizations have developed nonbinding guidelines for EMF exposure, including individual States, the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the IEEE, and the ACGIH.

International Commission on Non-Ionizing Radiation Protection

The ICNIRP electric field guideline for occupational exposure is 8.3 kilovolts per meter (kV/m), and for members of the public, 4.2 kV/m. The ICNIRP guideline for magnetic fields is 4,200 milliGauss (mG), and the guideline for exposure to members of the public is 833 mG (ICNIRP 1998).

Institute of Electrical and Electronics Engineers

The IEEE electric field guideline for occupational exposure is 20 kV/m, and for members of the public, 5 kV/m. The IEEE guideline for magnetic fields is 27,100 mG, and the guideline for exposure to members of the public is 9,040 mG (IEEE 2002).

American Conference of Governmental Industrial Hygienists

The ACGIH electric field guideline for occupational exposure is 25 kV/m. The ACGIH guideline for the exposure of workers to magnetic fields is 10,000 mG (ACGIH 2001).

3.16.3 Issues to Be Analyzed

- Electrocution or Other Construction and Operation Injuries: Electrocution poses a potential hazard to those who come in close contact with overhead transmission lines during energization and commissioning, or maintenance activities, especially those doing construction using mobile equipment. Potential exposure of construction workers to Valley Fever (*Coccidioides immitis*). There could also be severe injuries or death to workers during both the construction and operational phases of the proposed Project from falls or other occupational injuries.
- Wind, Earthquake, and Other Severe Weather Hazards: Severe weather events during construction and operational phases could cause the transmission line to fail from wind or other severe weather events; downed lines could electrocute humans. During operation, there is a risk of wildland fire from lightning strikes.
- Fire Hazards: During construction or maintenance activities, activities such as workers smoking, refueling, welding, blasting, and sparks from vehicles and other equipment could cause fires. During operation and maintenance, fires could be started from accidents related to weapons, or airborne debris, branches, or aircraft coming into contact with conductors, poles, and towers.
- Electromagnetic Fields: EMF associated with the operation and maintenance of the transmission line could create electronic interference, induced electrical current and nuisance shock hazards, stray voltage hazards, and other adverse health effects (e.g., cancer, heart disease, reproductive effects).

3.16.4 Analysis Area Conditions

For existing conditions regarding hazardous materials, transportation, noise, and sabotage, see the “Hazardous Materials and Hazardous and Solid Waste,” “Transportation,” “Noise and Vibration,” and “Intentional Acts of Destruction” sections of this chapter, respectively.

Existing Risk of Construction, Operation, and Maintenance Injuries

Work-related fatalities, injuries, and illnesses associated with utility and construction workers can occur in and around utility construction sites. According to OSHA, “Over the past three decades, occupational injuries and illnesses in the U.S. have declined by 42 percent, even though employment has more than doubled” (OSHA 2012).

The U.S. Department of Labor, Bureau of Labor Statistics (BLS) and the BLS Injuries, Illnesses and Fatalities Program monitor and track statistics on these injury rates. According to the BLS, “an injury or illness is considered to be work-related if an event or exposure in the work environment either caused or contributed to the resulting condition or significantly aggravated a pre-existing condition” (BLS 2012a). Table 3.16-1 provides information on the number of fatalities, and rate of injury and illness cases (per 100 full-time workers) from 2008 to 2011 in the United States (BLS Injuries, Illnesses and Fatalities Program 2012b).

Table 3.16-1. Work-related Fatalities, Injuries, and Illnesses in Construction Field

Data Series	2008	2009	2010	2011
Fatalities				
Number of fatalities	1,016	879	802	(P) 759

Table 3.16-1. Work-related Fatalities, Injuries, and Illnesses in Construction Field (Continued)

Data Series	2008	2009	2010	2011
Rate of injury and illness cases per 100 full-time workers				
Total recordable cases	4.7	4.3	4.0	3.9
Cases involving days away from work, job restriction, or transfer	2.5	2.3	2.1	2.1
Cases involving days away from work	1.7	1.6	1.5	1.5
Cases involving days of job transfer or restriction	0.7	0.7	0.6	0.7

Sources: BLS (2012a); BLS Injuries, Illnesses and Fatalities Program (2012b).
Note: (P) Preliminary.

The BLS released a report in October 2012 with estimates from the Survey of Occupational Injuries and Illnesses that found that “nearly 3.0 million nonfatal workplace injuries and illnesses were reported by private industry employers in 2011, resulting in an incidence rate of 3.5 cases per 100 equivalent full-time workers” (BLS 2012a). The BLS also reported that “more than half of the 3.0 million private industry injury and illness cases reported nationally in 2011 were of a more serious nature that involved days away from work, job transfer, or restriction [and] these cases occurred at a rate of 1.8 cases per 100 full-time workers, unchanged from 2010” (BLS 2012a).

With respect to the New Build Section of the proposed Project in New Mexico, the report did find that the New Mexico rate (at 4.2 incidents per 100 full-time workers) was higher overall than the national statistic for construction-related injuries and illnesses. However, as it pertains to both the New Build and Upgrade Sections of the proposed Project in Arizona, the state rate was lower overall than the national statistic (at 3.2 incidents per 100 full-time workers) (BLS 2012a). Statistics for injuries and illnesses incurred during operations and maintenance activities for the existing transmission lines is not available.

Construction workers could be at risk of contracting Valley Fever, an illness with pneumonia and flu-like symptoms that is caused by the inhalation of the *Coccidioides immitis* fungus. The fungus lives in the soils of southern Arizona and southern New Mexico. In general, construction workers are at a higher risk of contracting Valley Fever because the spores of the fungus may be released into the air during ground disturbing construction activities and/or during periods of high wind. Although the disease does not often progress beyond flu-like symptoms, Valley Fever can become a severe illness and result in disability due to pulmonary involvement and the spreading of the disease to other parts of the body (Das et al. 2012).

Existing Risk of Severe Weather Hazards and Fire

When a power outage impacts more than 50,000 customers or the delivery of more than 300 MW of power is interrupted, the NERC requires electric utilities to file a report on the event. As is characteristic of the desert Southwest, the most common severe weather events in the analysis area are extreme heat in the summer, extreme cold in the winter, strong winds, and lightning strikes. Earthquakes, tornadoes, and hurricanes/tropical storms are historically uncommon events within the analysis area.

The most recent severe weather event to occur within the analysis area that met the NERC reporting criteria was a cold weather–related outage in February 2011. This event caused a severe loss of generation across West Texas, New Mexico, and Arizona, for a total of several thousand MW of generation loss and impacts for more than 4 million customers (FERC 2011). Severe heat can also cause power outages in the summer due to increased demand for electricity to power air conditioners and other climate control devices. Although common in the analysis area, a severe heat event has not triggered an outage that meets the NERC reporting criteria.

High winds frequently occur in southern New Mexico and southern Arizona. On occasion, sustained high winds over dry terrain can cause large dust storms. The largest of these dust storms, called a haboob, can cover very large areas with dust and dirt and damage transmission lines. Several large haboobs have occurred and/or originated from southern Arizona in recent summers.

Lightning strikes can cause fires and transmission outages. Lightning often strikes tall objects because it provides the easiest path for the lightning to take. In a rural desert region, transmission towers are often the tallest objects available. According to data presented by the Fire Danger Subcommittee of the Fire Environment Committee, BLM Safford Field Office, Gila District Fire Management Program, natural fires in the region typically occur in July due to lightning strikes that are concurrent with the onset of monsoon season (National Wildfire Coordinating Group 2007).

Existing Electromagnetic Fields

EMFs are phenomena that occur both naturally and as a result of human activity. Naturally occurring EMFs are caused by the weather and Earth's geomagnetic field. In the case of a transmission line, magnetic fields are created when current flows through power lines. The strength of the fields is determined mainly by line current, line height, and distance. The EMF from the line will occur mainly within the ROW and for a short distance beyond. EMFs occur within the analysis area from existing transmission lines for both the New Build and Upgrade sections. In the New Build Section, transmission lines of various voltages are located within the analysis area, and the Proponent Preferred alternative in the Upgrade Section is the upgrade of an existing transmission line. There are currently no specific OSHA standards that address exposure to EMFs; however, the ICNIRP, IEEE, and ACGIH have developed nonbinding guidelines for EMF exposure as identified above. Figure 3.16-1 shows the electric field contours, and figure 3.16-2 shows the magnetic field contours for a 115-kV H-frame transmission line, as exists within the Upgrade Section.

Figure 3.16-1. Electric field contours for a 115-kV H-frame transmission line.

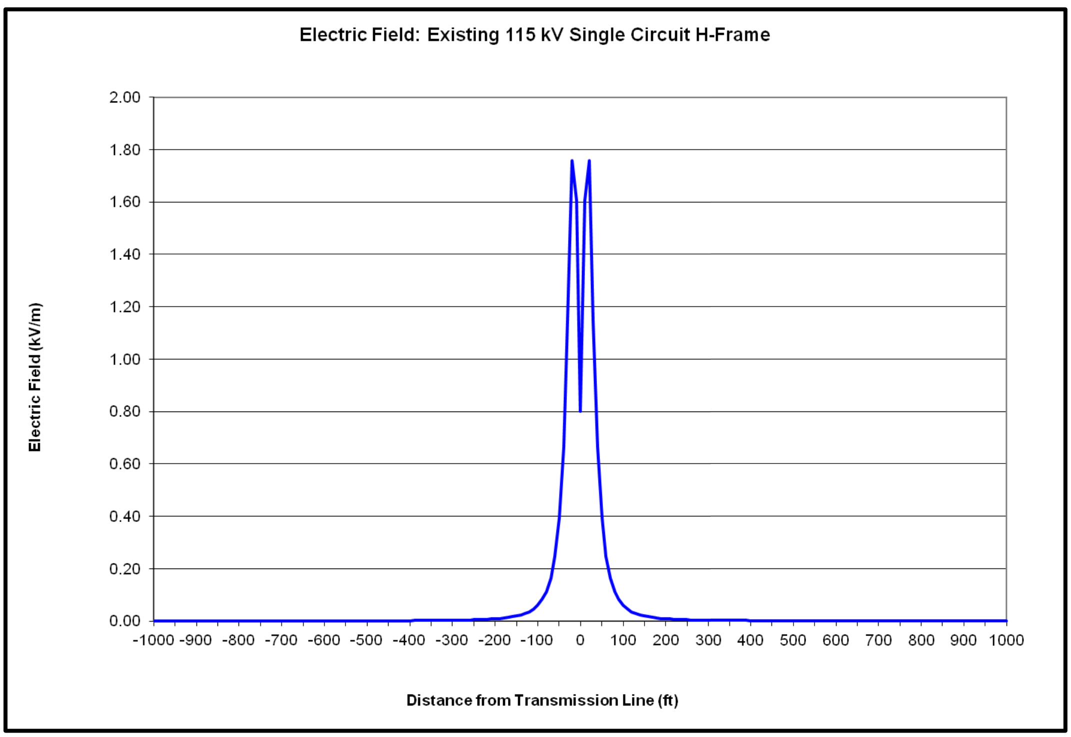
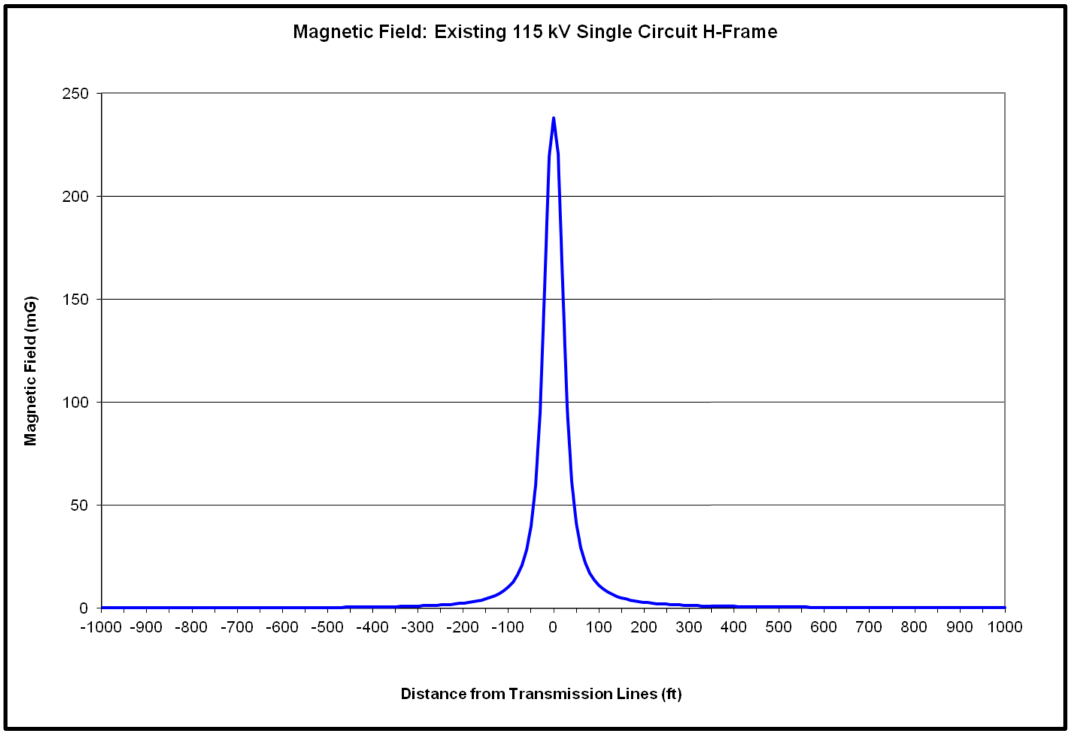


Figure 3.16-2. Magnetic field contours for a 115-kV H-frame transmission line.



3.17 HAZARDOUS MATERIALS AND HAZARDOUS AND SOLID WASTE

Some of the information provided in the following subsections is taken from a report titled "Southline Transmission Project Resource Report 5: Hazardous Materials and Waste" (CH2M Hill 2013r). The contents of that report are used herein without specific reference. Additional explicit "in text" references to scientific and other sources relied upon for conclusions in the analysis are included.

3.17.1 Analysis Area

The analysis area for hazardous materials and solid waste for the New Build Section is a 2-mile corridor, 1 mile on either side of the centerline of alternatives carried forward, and any substations or access roads outside that corridor. This satisfies the search distances specified in American Society for Testing and Materials (ASTM) Standard E 1527-13 (ASTM 2013). The ASTM has determined that these search distances are appropriate distances in which to search for potential sources of contamination that could affect the analysis area (table 3.17-1). The analysis area for the Upgrade Section of the Project is a 500-foot corridor, which is 200 feet on either side of the centerline of the existing 100-foot corridor. The analysis area described here is sufficient to identify hazardous materials sites that could impact, or be directly impacted by, construction or operation and maintenance of the proposed Project.

Table 3.17-1. Hazardous Materials Analysis Area

Environmental Record Source	Approximate Minimum Analysis Area (mile)
Federal NPL	1.0
Federal Delisted NPL	0.5
Federal CERCLIS	0.5
Federal CERCLIS No Further Remedial Action Planned	0.5
Federal RCRA Corrective Action Sites	1.0
Federal RCRA Non-Corrective Action Sites Treatment, Storage, and Disposal	0.5
Federal RCRA Generators	ROW and adjacent properties
Federal Institutional Controls/Engineering Controls	ROW
Federal Emergency Response Notification System	ROW
State and Tribal Hazardous Waste Sites (NPL Equivalent)	1.0
State and Tribal Hazardous Waste Sites (CERCLIS Equivalent)	0.5
State and Tribal Landfill and/or Solid Waste Disposal Sites	0.5
State and Tribal LUST	0.5
State and Tribal Registered UST	ROW and adjacent properties
State and Tribal Institutional Controls/Engineering Controls	ROW
State and Tribal Voluntary Cleanup Sites	0.5
State and Tribal Brownfields Sites	0.5

Source: ASTM (2013).

Note: CERCLIS = Comprehensive Environmental Response, Compensation, and Liability Information System; LUST = leaking underground storage tank; NPL = National Priorities List; RCRA = Resource Conservation and Recovery Act of 1976; UST = underground storage tank

3.17.2 Laws, Ordinances, Regulations, and Standards

Federal

U.S. ENVIRONMENTAL PROTECTION AGENCY

The Federal Toxic Substances Control Act (1976) and the Resource Conservation and Recovery Act of 1976 (RCRA) established a program administered by the EPA for the regulation of the generation, transportation, treatment, storage, and disposal of toxic substances and hazardous waste. RCRA was amended in 1984 by the Hazardous and Solid Waste Act, which affirmed and extended the “cradle-to-grave” system of regulating hazardous wastes.

The CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980 and amended by the Superfund Amendments and Reauthorization Act on October 17, 1986. This law (U.S.C. Title 42, Chapter 103) provides broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA establishes requirements concerning closed and abandoned hazardous waste sites; provides for liability of persons responsible for releases of hazardous waste at these sites; and establishes a trust fund to provide for cleanup when no responsible party could be identified. CERCLA also enables the revision of the National Contingency Plan (NCP). The NCP (40 CFR 300) provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, and/or contaminants. The NCP also established the National Priorities List (NPL).

EPA oversees and enforces the Oil Pollution Prevention regulation (40 CFR 112) as part of the CWA. This is often referred to as the “SPCC rule” because the regulations describe the requirements for facilities to prepare, amend, and implement spill prevention, control, and countermeasure plans. A facility is subject to SPCC regulations if the total aboveground oil storage capacity exceeds 1,320 gallons, or the underground oil storage capacity exceeds 42,000 gallons, and if, due to its location, the facility could reasonably be expected to discharge oil into or upon navigable WUS.

Other Federal regulations overseen by the EPA relevant to hazardous materials and environmental contamination include 40 CFR Chapter I, Subchapter D – Water Programs, and Subchapter I – Solid Wastes. Subchapter D, Parts 116 and 117 of 40 CFR Chapter I designate hazardous substances under the Federal Water Pollution Control Act and set forth a determination of the reportable quantity for each substance that is designated as hazardous in 40 CFR 116. Additionally, 40 CFR 117 applies to quantities of designated substances equal to or greater than the reportable quantities that may be discharged into WUS.

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

OSHA’s mission is to ensure the safety and health of the nation’s workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health. OSHA staff establishes protective standards, enforces those standards, and reaches out to employers and employees through technical assistance and consultation programs. OSHA worker safety standards are listed in 29 CFR 1910 (workplace) and 1926 (construction).

BUREAU OF LAND MANAGEMENT

The BLM’s Hazard Management and Resource Restoration Program objectives include maintaining compliance with all applicable environmental laws, regulations, and directives. Under the BLM 1703 – Hazard Management and Resource Restoration Manual (BLM 2009d), the following policies have been set:

- To protect public health and the environment by minimizing risks from hazards on public lands and from hazards at BLM-owned or -operated facilities. Hazards are defined as any hazard not covered under hazardous substances and includes all physical, geologic, and biologic hazards.
- To maintain public land condition by remediating contaminated sites and restoring natural resources impacted by releases of hazardous substances and petroleum products.
- To reduce costs and liabilities by:
    - pursuing potentially responsible parties for contamination of public lands;
    - conducting efficient and effective assessment, investigation, and remediation actions;
    - identifying environmental concerns associated with acquisition and disposal of real property;
    - ensuring that BLM-owned or -operated facilities are in compliance with environmental laws; and
    - establishing partnerships with States, counties, communities, other Federal agencies, and the private sector.
- To prevent pollution by integrating effective environmental management into all BLM activities, authorized actions, and business processes.

WESTERN AREA POWER ADMINISTRATION

The primary goal of Western's pollution prevention program is to reduce or eliminate the generation of waste and associated adverse environmental impacts from its actions (Western 2012b). Western Order 450.1A, "Environmental Considerations in the Planning, Design, Construction, and Maintenance of Power Facilities and Activities" (Western 2008) establishes policy, assigns responsibilities, and delegates authority to ensure that agency activities comply with environmental requirements. Western's environmental managers are charged with ensuring environmental management system requirements are established, implemented, and maintained in accordance with recognized standards (Western 2004). Western uses the following approaches to meet its pollution prevention goals:

- Waste minimization, product substitution, and life-cycle analysis;
- Recovered material content purchasing;
- Bio-based products purchasing;
- Sustainable design; and
- Green Power Purchases (hydroelectric, solar, and wind).

U.S. DEPARTMENT OF TRANSPORTATION—PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION

The Pipeline and Hazardous Materials Safety Administration (PHMSA) is responsible for regulating and ensuring the safe and secure movement of hazardous materials to industry and consumers by all modes of transportation. To minimize threats to the public, property, or the environment due to hazardous materials related incidents, PHMSA's Office of Hazardous Materials Safety develops regulations and standards for the classifying, handling, and packaging of shipments of hazardous materials within the United States (PHMSA 2012).

Title 49, Subtitle B, Chapter I of the CFR (49 CFR 100-185) outlines regulations and standards under PHMSA. 49 CFR 177, "Carriage by Public Highway," contains the following regulations pertaining to the transport of hazardous substances on any U.S. public highway:

- Sections 49 CFR 177.800–177.823—general information and regulations relating to driver training, recordkeeping and inspections, and shipping papers
- Subpart B, 49 CFR 177.834–177.843—regulations and standards for the loading and unloading of hazardous substances
- Subpart C, D, and E of Title 49 part 177—regulations regarding segregation and separation of hazardous materials, vehicles, and shipments in transit and accidents, and hazardous material on motor vehicles carrying passengers for hire
- Title 49 Part 172—regulations for hazardous materials communications, including the labeling and placarding of all shipments that contain hazardous substances.

State

NEW MEXICO

Within the NMED, the Occupational Health and Safety Bureau is responsible for enforcing occupational health and safety regulations within the State. Relevant to this project, New Mexico has adopted Federal OSHA regulations.

NMED's Hazardous Waste Bureau is charged with providing regulatory oversight and technical guidance to New Mexico hazardous waste generators and treatment, storage, and disposal facilities, as required by the New Mexico Hazardous Waste Act (NMSA 1978, Chapter 74, Article 4) and regulations promulgated under the act. All underground storage tanks (USTs) that contain petroleum or other hazardous substances are required to be registered with the State under the New Mexico Hazardous Waste Act. In addition, the Hazardous Waste Bureau monitors hazardous waste and Superfund sites, the latter of which it coordinates with the EPA (NMED 2013).

New Mexico statute 65-3-13, "Transportation of Hazardous Materials," states, "The director shall adopt regulations not inconsistent with or more stringent than applicable Federal safety standards concerning the safe transportation of hazardous materials, including hazardous substances and waste."

ARIZONA

Under the Federal RCRA and State statutes and codes modeled on the Federal law, ADEQ has the authority to monitor and direct businesses that may generate, transport, or dispose of hazardous waste in Arizona.

ADEQ's Waste Programs Division implements standards for the safe generation, management, treatment, storage, and disposal of hazardous waste. Responsibilities include such things as: conducting compliance and complaint inspections; investigating complaints and violations of soil and groundwater remediation, solid and hazardous waste, aboveground storage tanks, and underground storage tanks (USTs); and permitting of disposal facilities.

The ADOT is responsible, pursuant to ARS 28-5204, for rules governing safety operations of motor carriers, shippers, and vehicles transporting hazardous materials, hazardous substances, or hazardous waste. ADOT also may audit records and inspect these vehicles (as prescribed in Title 49 of the CFR), pursuant to ARS 28-5204. ARS 28-7045 gives ADOT complete and exclusive operational control and jurisdiction over the use of State highways and routes, and for rules regarding the use of these highways and routes (ADOT 2010).

In March 2010, ADOT released a study that states transportation of hazardous materials should be limited to designated routes in order to protect public health and safety. These routes should be chosen with consideration given to the sources and destination of hazardous materials, as well as the different modes of transportation used (ADOT 2010).

3.17.3 Issues to Be Analyzed

- Whether the proposed Project would cause environmental contamination (hazardous materials) or expose workers or the public to contamination;
- What the effects of certain chemicals and materials (characterized as hazardous materials) that would be used during the construction or operation and maintenance of the proposed Project would be;
- What the effects of certain hazardous and nonhazardous solid waste streams would be during transmission line construction and operation/maintenance activities.

3.17.4 Analysis Area Conditions

Publicly available databases were searched to gather information regarding known sites of environmental concern within the analysis area. Sites of potential environmental concern include, but are not limited to, Superfund sites, USTs, and permitted facilities. EPA's Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) contains data on potentially hazardous waste sites that have been reported to EPA, as well as sites listed on the NPL. EPA, NMED, and ADEQ were queried to identify sites of potential environmental concern in relation to the analysis area.

Sites of potential environmental concern exist within the analysis area. Sites of existing potential concern include CERCLIS/Superfund sites, permitted facilities, and UST/leaking underground storage tank (LUST) facilities.

As presented below, there are a total of five CERCLIS/Superfund sites, seven EPA-permitted facilities, and four active LUST cleanups associated with the New Build Section analysis area. In the Upgrade Section, there is one CERCLIS/Superfund site, four EPA-permitted facilities, and two active LUST cleanups within the analysis area.

New Build Section

CERCLIS/SUPERFUND SITES

A search of the publicly available data identified five sites in the New Build Section within New Mexico and no sites in the New Build Section within Arizona, as shown in table 3.17-2. None of the identified sites is on the NPL.

Table 3.17-2. CERCLIS Sites within the New Build Section Analysis Area

Route Group No.	Route Group	City	Segment	Facility Name	EPA ID #	Status
1	Afton-Hidalgo	Deming, NM	P2	Peru Hill Mill	NMD097119986	Fully remediated
1	Afton-Hidalgo	Deming, NM	P2	American Smelting & Refining Deming Mill and Tailings*	NMD980749220	Archived
1	Afton-Hidalgo	Hachita, NM	S7	Hachita Landfill	Unknown‡	–
2	Hidalgo-Apache	Mogollon, NM	P4	Fannie Hill Mine and Mill*,†	NMD981147192	Archived
2	Hidalgo-Apache	Lordsburg, NM	D	Shakespeare Mining District*	NMD986684256	Archived

* Archived Superfund site.

† Latitude and longitude coordinates for this facility appear to be incorrect. Available information suggests this site is not located within the New Build analysis area.

‡ Data obtained from NMED included this site. This site did not appear in the EPA CERCLIS database.

PERMITTED FACILITIES

A search of publicly available data identified seven EPA-permitted facilities within the New Build Section analysis area (table 3.17-3).

Table 3.17-3. EPA Permitted Facilities Located within the New Build Section Analysis Area

Route Group No.	Route Group	City	Segment	Facility Name/Type
1	Afton-Hidalgo	Deming, NM	P2	Luna Energy Facility / Power Gen.
1	Afton-Hidalgo	Deming, NM	P2	Deming Compressor Station / NG Compression
1	Afton-Hidalgo	Deming, NM	P3	Florida Compressor Station / NG Compression
1	Afton-Hidalgo	Berino, NM	P2	Afton Compressor Station / NG Compression
1	Afton-Hidalgo	La Mesa, NM	P2	Afton Generating Station / Power Gen.
2	Hidalgo-Apache	Bowie, AZ	P6	El Paso NG Co. Bowie Compressor Station / NG Compression
2	Hidalgo-Apache	Willcox, AZ	G	Arizona Electric Power Cooperative / Power Gen.

Note: NG = natural gas.

UNDERGROUND STORAGE TANKS

A search of publicly available NMED data identified five USTs within the analysis area in New Mexico; no LUST sites were identified (NMED 2014a). According to ADEQ, over 30 UST sites are within the analysis area of the New Build Section in Arizona (ADEQ 2014a, 2014b). Twelve of those sites have had USTs leak in the past, with a total of 24 tank leaks. All but four of those leak cases have been closed. The remaining four LUSTs are located at only two sites, and are in various stages of cleanup. Table 3.17-4 lists LUST facilities identified within the New Build Section analysis area.

Table 3.17-4. Leaking Underground Storage Tank Sites Located within the New Build Section Analysis Area

Route Group No.	Route Group	City	Segment	Facility Name	Total USTs	USTs that Have Leaked	Open LUST Cases
2	Hidalgo-Apache	San Simon, AZ	E	Vacant Lot	6	1	1
2	Hidalgo-Apache	Bowie, AZ	F	Dixie’s Texaco	4	1	0
2	Hidalgo-Apache	Bowie, AZ	F	PJ’s Family Travel Center	3	2	3
2	Hidalgo-Apache	Bowie, AZ	P6	Concho Petroleum, Inc.	5	5	0
2	Hidalgo-Apache	Bowie, AZ	F	Bowie Depot	7	1	0
2	Hidalgo-Apache	Willcox, AZ	WC1, LD4	Billy’s Freeway Texaco	5	1	0
2	Hidalgo-Apache	Willcox, AZ	WC1	Freeway Texaco	7	5	0
2	Hidalgo-Apache	Willcox, AZ	WC1	Circle K #1431	3	2	0
2	Hidalgo-Apache	Willcox, AZ	WC1	Dunlap Oil Co. Inc.	6	2	0
2	Hidalgo-Apache	Willcox, AZ	WC1	Willcox Unified School District	2	1	0
2	Hidalgo-Apache	Willcox, AZ	WC1	Chevron #9-0044	1	1	0
2	Hidalgo-Apache	Willcox, AZ	LD4	Willcox Truck Plaza	6	2	0

Upgrade Section

CERCLIS/SUPERFUND SITES

A search of publicly available data identified one site in the Upgrade Section within Arizona and no sites in New Mexico (table 3.17-5). The one CERCLIS/Superfund site is in route group 4.The identified site is not on the NPL.

Table 3.17-5. CERCLIS Site within the Upgrade Section Analysis Area

Route Group No.	Route Group	City	Segment	Facility Name	EPA ID #
4	Pantano-Saguaro	Tucson, AZ	U3i	Silverbell Jail Annex Landfill*	AZD980813695

* Archived Superfund site.

PERMITTED FACILITIES

A search of publicly available data identified four EPA-permitted facilities within the Upgrade Section analysis area (table 3.17-6).

Table 3.17-6. EPA Permitted Facilities Located within the Upgrade Section Analysis Area

Route Group No.	Route Group	City	Segment	Facility Name/Type
3	Apache-Pantano	Benson, AZ	U2	City of Benson Water Treatment Plant
3	Apache-Pantano	Tucson, AZ	U3a	United Metro Materials, Valencia 221 / Ready Mix Concrete
3	Apache-Pantano	Tucson, AZ	U3a	Pima Community College D V / Semiconductors
4	Pantano-Saguaro	Tucson, AZ	U3i	Hart & Cooley, Inc. / Fabricated Metalworks

UNDERGROUND STORAGE TANKS

A search of publicly available ADEQ data identified 22 UST sites that are within the Upgrade Section analysis area (ADEQ 2014a, 2014b). Thirteen of those sites have had USTs leak in the past (table 3.17-7) with a total of 24 tank leaks. All but two of those LUST cases have been closed (both LUSTs are at a Texaco service station in Tucson), and those two are on the ADEQ priority list.

Table 3.17-7. Leaking Underground Storage Tank Sites Located within the Upgrade Section Analysis Area

Route Group No.	Route Group	City	Segment	Facility Name	Total USTs	USTs that Have Leaked	Open LUST Cases
3 4	Apache-Pantano, Pantano-Saguaro	Tucson, AZ	U3a, U3aPC	Maust Chevron	4	1	0
4	Pantano-Saguaro	Tucson, AZ	U3g	Circle K #2708772	3	1	0
4	Pantano-Saguaro	Tucson, AZ	U3h	Ryder Truck Rental and Leasing #0489	6	4	0
4	Pantano-Saguaro	Tucson, AZ	U3h	Central Freight	2	1	0

Table 3.17-7. Leaking Underground Storage Tank Sites Located within the Upgrade Section Analysis Area (Continued)

Route Group No.	Route Group	City	Segment	Facility Name	Total USTs	USTs that Have Leaked	Open LUST Cases
4	Pantano-Saguaro	Tucson, AZ	U3i	Circle K #1583	6	1	0
4	Pantano-Saguaro	Tucson, AZ	U3i	ADOT – Tucson Shop	6	1	0
4	Pantano-Saguaro	Tucson, AZ	U3i	Century Link	5	1	0
4	Pantano-Saguaro	Tucson, AZ	U3i	W.W. Williams Southwest, Inc.	3	1	0
4	Pantano-Saguaro	Tucson, AZ	U3i	Mobile Mini Storage Systems	2	0	0
4	Pantano-Saguaro	Tucson, AZ	U3i	City of Tucson – Silverbell Golf Course	2	1	0
4	Pantano-Saguaro	Tucson, AZ	U3i	Exxon #7-3504	8	8	0
4	Pantano-Saguaro	Tucson, AZ	TH3b	Texaco Service	5	2	2
4	Pantano-Saguaro	Benson, AZ	Staging Area 10	Stuckey's Old West	5	2	0

EXISTING WESTERN TRANSMISSION LINE

The existing Western transmission line in route groups 3 and 4 that is proposed to be upgraded connects to several existing electrical substations along its corridor. Existing electrical substations along the proposed Project each contain many transformers. Electrical transformers are filled with insulating mineral oil. Polychlorinated biphenyls (PCBs) are no longer used in transformers.

Sulfur hexafluoride (SF_6) is a nonflammable, odorless, nontoxic, and colorless gas used in the electrical industry for high-voltage circuit breakers, switchgear, and other electrical equipment, often replacing oil-filled circuit breakers that historically contained harmful PCBs. SF_6 under pressure is used as an insulator in gas-insulated switches at electrical substations. Though it is nontoxic and largely inert, it is considered to be an extremely potent GHG. This gas is also present in the existing electrical substations of the Upgrade Section.

3.18 TRANSPORTATION

This section describes the environmental setting in terms of transportation infrastructure resources, including airports, railroads, roads, and BLM roads within the analysis area. These resources may be affected by implementation of the proposed Project or its alternatives and associated proposed Project components (i.e., substations, representative staging areas, and access roads).

Some of the information provided in the following subsections is taken from a report titled "Southline Transmission Project Resource Report 14: Transportation" (CH2M Hill 2013s). The contents of that report are used herein without specific reference. Additional explicit "in text" references to scientific and other sources relied upon for conclusions in the analysis are included.

3.18.1 Analysis Area

New Build Section

The analysis area for transportation infrastructure resources within the proposed New Build Section is a 10-mile-wide corridor that is 5 miles on either side of the centerline of the alternatives carried forward. The analysis area is used to identify existing and proposed transportation infrastructure that could be directly impacted by ground disturbance during construction, delivery of construction equipment, construction worker access, maintenance access, and potential conflicts with flight paths at airports.

Upgrade Section

The analysis area for transportation infrastructure within the proposed Upgrade Section is the same as identified above for the New Build Section.

3.18.2 Laws, Ordinances, Regulations, and Standards

Laws, ordinances, regulations, and standards that apply to the management of transportation resources occur at the Federal, State, and local levels of government, as well as from the private management of railroads and airports.

Federal

FEDERAL HIGHWAY ADMINISTRATION

The Federal Highway Administration (FHWA) regulations state that the FHWA will allow, under controlled circumstances, the placement of longitudinal utility facilities within the access control limits of the Interstate system or other fully access-controlled freeways. These regulations do not apply to utility lines for servicing facilities required for the operation of the freeway.

FEDERAL AVIATION ADMINISTRATION

The mission of the FAA is to provide the safest, most efficient aerospace system in the world. To accomplish this, the FAA developed an obstruction evaluation and airport airspace analysis (OE/AAA) tool to be used for all public and private development that is planned within the vicinity of an airport and has the potential to impact aviation activities. As described in 14 CFR 77.9, Southline would file a notice of construction activities with the FAA to determine potential obstruction impacts to aviation activities according to FAA standards. A proposal must be submitted to the FAA for an OE/AAA for projects that fall within the thresholds. The FAA also issues standards for marking and lighting built components such as transmission line structures.

BUREAU OF LAND MANAGEMENT

On Federal lands managed by the BLM, motorized routes are designated for public use through the managing agency's land use plan or motorized transportation plan. Although the BLM manages its own transportation system, the agency often partners with the FHWA and State and county transportation agencies to provide access to BLM lands. Many BLM roads are unmaintained informal facilities with light use. Applying standard transportation management and regulatory practices can be difficult. Motorized routes may be designated by the BLM for other authorized use. The BLM requires a Right-of-Way Authorization Permit to use public land when certain projects such as transmission lines or roads are planned that are in the public interest. The ROW regulations are authorized by Title V of the FLPMA, as amended (43 U.S.C. 1761–1771).

Bureau of Land Management Right-of-Way Grant

A ROW grant would be required to construct the transmission line, substations, representative staging areas, and roads on BLM land. A ROW grant is an authorization to use a specific piece of public land for transmission lines. The grant authorizes rights and privileges for a specific use of the land for a specific period of time that is appropriate for the life of the project. The grant details the project requirements so the BLM can ensure the proposed transmission line will be constructed, operated, maintained and terminated in a safe and environmentally sound manner. The BLM would monitor the construction, operation, maintenance, and termination of the proposed Project to include protection and rehabilitation of the public lands involved. The ROW grant program is detailed in 43 CFR 2800 and 2880.

Bureau of Land Management Manual 9100 – Facilities Planning, Design, Construction and Maintenance (Public)

BLM Manual 9100, "Facilities Planning, Design, Construction and Maintenance (Public)" (BLM 2008d), is the BLM's manual for facilities, planning design, construction, and maintenance policy; it provides the current standards and codes for BLM-managed lands. New road construction and roads improved on BLM lands for the proposed project use would use this for guidance for minimum standards of width, alignment, grade, surface, and other requirements found in this BLM manual.

Mimbres Resource Management Plan

This RMP is the current plan for Doña Ana, Luna, Hidalgo, and Grant counties in the BLM Las Cruces District Office management area in New Mexico. Note that the Mimbres RMP is currently under partial revision for the Doña Ana County portion of that plan. The TriCounty RMP Amendment is currently in draft and the final RMP Amendment is unlikely to be finalized before the end of 2014.The RMP describes the access program used to enhance access to and across public land. All roads within the Mimbres resource area will be constructed or maintained in accordance with BLM policy.

Safford Resource Management Plan

This RMP is the current plan for all of Graham and Cochise counties and portions of Pima and Pinal counties in southeastern Arizona. This includes both the New Build Section and Upgrade Section of the proposed Project and alternatives. The RMP describes the access program used to enhance access to and across public land. All roads within the Safford resource area will be constructed or maintained in accordance with BLM policy.

Phoenix Resource Management Plan

The BLM Tucson Field Office is managed under the 1988 Phoenix RMP. At this time, no revisions or plan amendments are proposed and the 1988 Phoenix RMP is the guiding plan. The RMP specifies ROWs would be issued to promote the maximum utilization of existing ROWs, including joint use whenever possible. Corridors, as identified in the RMP, identify the BLM's preferred utility systems routing.
The RMP describes the access program used to enhance access to and across public land. All roads within the Phoenix resource area will be constructed or maintained in accordance with BLM policy.

State

NEW MEXICO

The proposed Project and alternatives would likely encroach on highways and highway ROWs that are under the jurisdiction of the New Mexico Department of Transportation (NMDOT). Regulations that describe permit requirements and policies are provided below.

New Mexico Department of Transportation Highway Encroachment/Right-of-Way Permits

Title 17, chapter 4, part 2 of the NMAC describes the conditions under which utilities can be co-located within public ROWs. In general, longitudinal aerial utilities may not run parallel to public roadways within the roadway ROW. Aerial utilities may cross the roadway ROW if a utility permit has been issued. Issuance of this permit is dependent upon receipt of environmental clearance from the NMDOT headquarters office. A ROW permit must be obtained from the NMDOT prior to placing any structures on NMDOT ROW.

New Mexico Department of Transportation Highway Utility Construction Requirements

An NMDOT utility permit is required for all utility crossings of State highways and Interstates. Construction requirements of the utility permit are defined in title 17, chapter 4, part 2 of the NMAC.

New Mexico Department of Transportation Route Restrictions

The NMDOT publishes maps that show bridges with load limitations and non-Interstate roads with vertical clearance restrictions. NM 26 in Luna County has a load-restricted bridge in the vicinity of segment P2 of the Proponent Preferred alternative in the New Build Section. Oversized or overweight loads are not permitted on NM 113 (Hidalgo County) and NM 146 (Grant County). Three locations on I-10 (one west of Las Cruces and two in the vicinity of Lordsburg) have vertical clearance restrictions. For non-interstate roads, three locations in the Deming area and one location on U.S. 70 north of Lordsburg have vertical clearance restrictions.

Airports

The Aviation Division of NMDOT provides planning and technical support in developing and maintaining the State’s airports and other elements of the aviation system throughout New Mexico. The Division plans development of a system of public use airports within the state that includes development and continuous enhancement of the state’s airport system. NMDOT develops a Five-Year Airport Capital Improvement Program (ACIP) to parallel the FAA’s ACIP.

ARIZONA

The proposed Project and alternatives would likely encroach on highways and highway ROWs that are under the jurisdiction of the ADOT. Utilities may not run parallel to interstate roadways within ADOT ROW, but they may cross Interstate ROW. Utilities may run parallel to state highways within ADOT ROW. An encroachment permit must be obtained prior to installing aerial or subsurface utilities running over, under or parallel to ADOT ROW. Regulations that describe permit requirements and policies are provided below.

Arizona Department of Transportation Highway Encroachment/Right-of-Way Permits

AAC Title 17, Article 5 describes the conditions under which utilities can be co-located within public ROWs. An encroachment permit, pursuant to ARS 28-363 and Administrative Rule R17-3-502, is a written approval granted by the ADOT for construction of fixed or temporary improvements within a State highway ROW, or any activity requiring the temporary use of a State highway ROW. For more information, consult the ADOT document "Encroachment Permits, Policies, Guidelines, and Procedures Manual" (ADOT 2008).

Arizona Department of Transportation Highway Policies for Utilities Crossing Highways

The ADOT document "Policy for Accommodating Utilities on Highway Rights of Way" (ADOT 2009) identifies the policies for utilities crossing highways. Permission to perform work in ADOT ROW requires submission of a Highway Encroachment Permit Application. A permit must be issued prior to installation of utilities. Specific information on closing Interstate and State highways, as well as permission for closing, could be obtained from the Tucson ADOT District Office during the pre-permitting phase of the permitting process.

Arizona Department of Transportation Oversize Vehicle Restrictions

Electronic special permit application and issuance for oversize or overweight vehicles is not available for routes that include several structures along I-10 and I-17 in the Tucson metropolitan area; they must be applied for in person. Escorts are required for oversize or overweight vehicles in the metropolitan area. Oversize loads cannot be transported in Tucson on weekdays between 7 a.m. and 9 a.m., or between 4 p.m. and 6 p.m. on I-10, I-19, SR 77, and SR 86. Transport on these routes is also restricted from 3 a.m. to 12 p.m. on Saturdays and on major holidays. Permits for local roads must be obtained from the local authority.

Airports

In conjunction with Arizona's public airports and the FAA, ADOT develops a Five-Year ACIP to parallel the FAA's ACIP. The current document, "2013–2017 Five-Year Transportation Facilities Construction Program," (ADOT 2012) has two main objectives: to maximize use of State dollars for airport development, and to maximize FAA funding for Arizona airports.

Regional, Local, and Other Guidelines

NEW MEXICO

Southwest New Mexico Council of Governments Transportation Plan

This 2007 long-range transportation plan (Southwest New Mexico Council of Governments 2007) provides regional guidance in the development of transportation projects and enhances safety, economic development, freight movement, and growth. The plan contains no specific regulations governing transmission projects.

County Department of Transportation Highway Encroachment/Right-of-Way Permits

The following lists applicable information for one of the New Mexico counties that is part of the study area. An extensive Internet search did not yield relevant information for the other three counties in the analysis area.

Doña Ana County (New Mexico) Code Chapter 274, Section 4:

- Wire utilities shall be placed no farther than 5 feet from the edge of the ROW on the east and/or north side of the centerline of the ROW.

ARIZONA

South East Arizona Governmental Organization Arizona–Sonora Border Master Plan

Overall goals of the 2013 Master Plan (South East Arizona Governmental Organization 2013) are to improve the capacity and operational efficiency for the land point of entries, and to support transportation infrastructure essential to relieving traffic congestion, reducing delays, enhancing safety and security, promoting international trade, and improving the quality of life for residents in the border region. The plan contains no specific regulations governing transmission projects.

Pima Association of Governments 2040 Regional Transportation Plan

The 2040 Regional Transportation Plan (Pima Association of Governments 2012) represents the work of the regional community and focuses on cross-jurisdictional planning issues. The plan contains no specific regulations governing transmission projects; however, the Pima Association of Governments' Greater Tucson Strategic Energy Plan Working Group is working with the DOE to reduce overall energy demand and increase the use of renewable sources of energy, which may include new infrastructure (transmission lines).

County Department of Transportation Highway Encroachment/Right-of-Way Permits

The following lists (verbatim) applicable information for two of the Arizona counties that are in the analysis area. An extensive Internet search did not yield relevant information for the other two Counties in the analysis area.

Cochise County (Arizona) Road Design & Construction Standards & Specifications for Public Improvements Section C Part 4:

- "All new overhead utility lines, utility poles, and other above ground utility structures shall be constructed outside the clear zone of the roadway. Utility poles and any other above ground streetscape shall be located within five feet of the right-of-way line or ten feet from the travel lane, whichever is most restrictive."

Pima County (Arizona) Code, Section 1, Title 10:

- "Conformance with County Regulations. The location or relocation of a user's facilities in the public right-of-way shall conform to county policies, standards, and regulations applicable to the use of the public right-of-way."

Pima County will evaluate requests to install utilities within public ROW if appropriate conditions are met in the ROW application. The conditions of the approval should preserve and protect natural and cultural resources (plant survey and preservation plan cultural resources survey), prevent the reduce air pollution (paved roadway), and ensure safe public transportation facilities (provisions for drainage and appropriate roadways design, width, horizontal and vertical alignment). An approved application will have certain conditions associated with the approval, such as the preservation and protection of natural and cultural resources, prevention and reduction of air pollution, and ensuring of safe public transportation facilities. Coordination with the Pima County Department of Transportation would be required during the construction of transmission lines within or adjacent to the ROW of roads under the department's jurisdiction.

Tucson International Airport Obstacle Free Zone

A portion of the Upgrade Section would be located within the Tucson International Airport Obstacle Free Zone. According to 14 CFR Part 77.9, project sponsors must notify the FAA of the construction of a proposed Project that is within 20,000 feet of a public use or military airport that exceeds a 100:1 surface ratio from any point of the airport's runway(s). Therefore, filing Form 7460-1 with the FAA would be required prior to physical construction of the project within the Tucson International Airport Obstacle Free Zone.

Union Pacific Railroad

If it is necessary to enter the UPRR property for nonintrusive civil engineering survey work, a permit is required as described under the Procedures for Encroachments on the UPRR Website (UPRR 2012). For encroachments of permanent structures in UPRR property, the "Wireline/Pipeline Encroachment Planning Guide & Construction Procedures" (UPRR 2012) provide guidance in preparation of construction drawings to expedite approval by the railroad.

3.18.3 Issues to Be Analyzed

- Increase in traffic that exceeds the volume to capacity ratio for primary roadways.
- Traffic delays on a primary transportation corridor.
- Creation of severe road damage at levels that create hazardous situations for motorists and pedestrians.
- Impacts to BLM roadway system, including improved access into remote or designated roadless or wilderness areas.
- Consistency with Federal, State, and local transportation plans.
- Change in air traffic patterns as a result of new utility towers and lines near airports, including military training facilities away from airports.

3.18.4 Analysis Area Conditions

Transportation infrastructure within the analysis area includes airports, railroads, roads, and highways. This section identifies the existing transportation infrastructure, the existing conditions of the transportation infrastructure, and the existing or future transportation plans within the analysis area.

Existing Traffic on Primary Roadways

Primary roadways for this analysis are defined as interstates, U.S. highways, and state highways. The primary roadways within the analysis area are identified in table 3.18-1 (see figures 2-18a through 2-18j in chapter 2). Traffic conditions on the primary roadways for this analysis are identified by using the volume-to-capacity (v/c) ratio. Segments of roadways that experience high v/c ratios at peak hours suggest that the segment is experiencing a low level of service. For example, a higher v/c ratio on a particular segment of a primary roadway suggests higher levels of traffic demand on the segment and a lower level of service. Levels of service ratings run from a rating of A, for the highest or best level of service, to F, the lowest or worst level of service. A v/c ratio above 0.90 indicates the demand nearly equals the design capacity of the roadway, and a level of service of E or F can be assumed. Roadway segments that experience a v/c ratio between .80 and .90 (level of service equivalent C or D) and above .90 only occur on primary roadways in the vicinity of Tucson. The v/c ratios for all other primary roadways within the analysis area indicate that the existing traffic volumes are within the roadways' design capacities, and the roadways are therefore operating at acceptable levels of service, as typically occurs in rural areas with low populations.

Table 3.18-1. Primary Roadways within the Analysis Area

New Build Section				Upgrade Section			
Interstate	**U.S. Route**	**New Mexico State Route**	**Arizona State Route**	**Interstate**	**U.S. Route**	**New Mexico State Route**	**Arizona State Route**
10	70	9	80	10	191	NA	77
	180	11	90	19			80
	191	26	186				83
		81					86
		113					90
		146					210
		331					
		338					
		418					
		497					
		549					

Note: NA = not applicable.

New Build Section

Traffic volumes vary greatly on primary roads within the analysis areas of each New Build Section. The traffic volumes along I-10 range from 11,000 to 27,000 vehicles per day, with the highest volumes recorded in the vicinity of Deming, New Mexico. The state highways in the vicinity of the alternative routes carry a considerably lower daily traffic volume than those in the Deming area, ranging from 100 to 7,800 vehicles per day. The Interstate and highway segments along the proposed route and alternative routes currently operate with low v/c ratios, which result in uncongested traffic operating conditions and desirable levels of service during peak hours.

Upgrade Section

Traffic volumes are much higher on primary roadways within the analysis area of the Upgrade Section as a result of being located near or within large urban areas. I-10 within Tucson generally carries over 100,000 vehicles per day and congested conditions result during peak hours, with several segments operating at an estimated v/c greater than 1.0. The highways in the Upgrade Section carry between 4,000 and 42,000 vehicles per day. The segment of SR 77 that carries 42,000 vehicles per day (between I-10 and Oracle Road) has an estimated peak-hour v/c ratio of 1.20 and experiences congested peak-hour conditions. The section of SR 86 between I-10 and Mission Road, in the vicinity of the proposed transmission line crossing, also experiences congested peak-hour conditions (36,000 vehicles per day travel this segment and the estimated peak-hour v/c ratio is 1.01). Altogether, segments of three primary roadways within the Upgrade Section currently experience congested operating conditions during peak hours.

Existing Bureau of Land Management Roadway System Roads within the Analysis Area

There are approximately 970 documented BLM routes in the vicinity of the analysis area. They are primarily secondary, or tertiary routes that are unpaved and have a natural gravel surface. Automobiles, trucks, motorcycles, and OHVs have been observed using these roads and routes. Approximately 70 percent of the routes are documented as lightly used or not used. Most of the BLM lands are in the New Build Section of the proposed Project rather than in the Upgrade Section. GIS roadway data indicate that there is an extensive network of existing rural roads and trails (that may or may not be on BLM land) throughout the New Build Section. Every route segment appears to have roads or trails through it; therefore, no large expanses of land are currently inaccessible.

Existing Air Traffic Patterns

A total of 22 public and private airports exists within the analysis area. Only 15 of the 22 airports are currently open and operating. Seven of the operating airports are publicly owned and the remaining eight are privately owned. Figures 3.11-1 through 3.11-4 in the “Land Use” section show the publicly owned airports. Table 3.18-2 provides an inventory of general aviation facilities, excluding military airports in the New Build and Upgrade sections, and summarizes the characteristics of each airport. The inventory includes information relative to owner/operator, capacity, activity, and proximity to transmission line segments and substations. Pinal Airpark is discussed below and in Section 3.11.3 (“Military Operations”) because the Silver Bell Army Heliport is based at this public airport facility. Information regarding other military airports is discussed in Section 3.11, “Land Use, Including Farm and Range Resources and Military Operations.”

Table 3.18-2. Summary of Existing Airports Currently Operating in the Transportation Analysis Area

Airport	Owner	Operator	Capacity (Aircraft)	Average Number of Flights	Adjacent Alternative Segment(s)
New Build Section – Afton Substation to east of Lordsburg					
Columbus Stockyard	Luna County	Private	2	NA	S5
Deming Municipal*	City of Deming	City of Deming	22	78/day	P2
First Aero Squadron Airpark	Estate of M. Ann Cobb-Gambel	Private	7	NA	S5

Table 3.18-2. Summary of Existing Airports Currently Operating in the Transportation Analysis Area (Continued)

Airport	Owner	Operator	Capacity (Aircraft)	Average Number of Flights	Adjacent Alternative Segment(s)
New Build Section – Afton Substation to east of Lordsburg, cont'd.					
Hacienda Sur Luna	Estate of M. Ann Cobb-Gambel	Private	4	NA	S5
Lordsburg Municipal*	City of Lordsburg	City of Lordsburg	4	92/week	D
Solo Ranch	Dennis and Shirley F. Johnson	Private	1	NA	P2 and P3
New Build Section – East of Lordsburg to Apache Substation					
Cochise County*	Cochise County	Cochise County	23	23/day	Ga and WC1
Inde Motorsports Ranch	Motor Sports Ranch	Private	1	NA	Ga
Leroy	Joanny Liliane Leroy	Private	13	NA	P7, P7a – P7d
Upgrade Section – Apache Substation to Saguaro Substation					
Ammon	Peter J. Ammon	Private	1	NA	U1a
Benson	Ben A. Taylor	Private	NA	58/month	U2 and H
Benson Municipal*	City of Benson	Southwestern Aviation	44	98/week	U2 and H
Marana Regional*	Town of Marana	Pima Aviation	221	307/day	U3j
Pinal Airpark*	Pinal County	Pinal County	3	> 30,000/year	U3k
Silver Bell Army Heliport (at Pinal Airpark)	Arizona Air National Guard	Arizona Air National Guard	–	>28,000/year	U3k
Tucson International	Tucson Airport Authority	Tucson Airport Authority	302	421/day	U3a and U3aPC

Note: NA = Not applicable.

* Public airport.

Existing Transportation Plans

NEW MEXICO

Roads

The current Statewide Transportation Improvement Plan (STIP) for New Mexico indicates that three improvements are planned for portions of analysis area roadways through 2015. The planned improvements within the 10-mile analysis area for the New Build Section are:

- Replace railroad bridge on NM 549 near Deming (2013; Segment P2);
- Resurface and relocate utilities along U.S. 180 from Deming to Bayard (2012; Segment P2); and

- Restore and rehabilitate various 1-mile sections of I-10 between Lordsburg and the state line with Arizona (2012, 2014, 2015; Segments P4 and P5).

Airports

Lordsburg Municipal Airport Action Plan

An Airport Action Plan for the Lordsburg Municipal Airport in Lordsburg, New Mexico, was prepared in 2009 (New Mexico Department of Transportation 2014). The airport is regularly used by border patrol, air ambulance, and transient corporate aircraft. The Airport Action Plan addresses non-standard conditions and provides phased development of future landside and airside facilities to accommodate aviation demand.

New Mexico State University Unmanned Aircraft Systems Flight Test Center

Operating out of Las Cruces, New Mexico, the New Mexico State University's (NMSU's) Unmanned Aircraft Systems Flight Test Center (UAS FTC) specializes in unmanned systems flight testing and provides the capability to test several classes of UAS over southern New Mexico. UAS operators can access the airspace from several airports located within the lateral boundaries of the operating area, including Las Cruces (LRU), Lordsburg (SLB), Grant County (SVC), and Socorro (ONM). The UAS FTC operates under an FAA Certificate of Authorization that permits UAS flights in over 15,000 square miles of coordinated airspace in southern New Mexico. The airspace extends from the surface to 18,000 feet amsl. The airspace used by the NMSU UAS FTC is shown in figure 2-2a in chapter 2 (NMSU 2014a).

ARIZONA

Roads

The current STIP for Arizona indicates that several improvements are planned for portions of analysis area roadways through the year 2014. Agency coordination would be recommended for each of these projects to minimize the potential for the construction activities to overlap or increase the impact to the proposed Project. Planned and funded improvements and their date of implementation within the 10-mile analysis area for the New Build Section and Upgrade Section are:

New Build Section

- Construct structures on U.S. 191 over I-10 (2015) and
- Various pavement preservation projects for I-10 have been scoped, but are not currently programmed in the STIP.

Upgrade Section

- Reconstruct and widen I-10 mainline, traffic interchanges, and frontage roads between Ina Road and Marana Road (2011 and 2014);
- Reconstruct and widen I-10 mainline and traffic interchange between Prince Road and Ruthrauff Road (2011);
- Reconstruct I-10 mainline and remove existing rail and bridge at MP 288/Cienega Creek (2011);
- Replace Davidson Canyon westbound bridge superstructure on I-10 (2015);
- Retrofit various I-19 bridges to address scour (2011);

- Widen I-19 between SR 86 and San Xavier Road (2014);
- Reconstruct I-19 interchange with SR 86 (2017);
- Widen SR 86 between Valencia Road and Kinney Road (2013);
- Replace structure on Ina Road over Santa Cruz River (2016); and
- Reconstruct North Silverbell Road to include bicycle lanes in both directions and Americans with Disabilities Act–accessible sidewalks; the southern segment will be four travel lanes with curb and a raised landscape median; the northern segment will be two travel lanes with a two-way center left-turn lane (first phase to begin in 2013).

In addition to the STIP plans noted above, a northerly extension of SR 90 has been discussed for the past several years. This extension would cross both proposed route segment U2 and local alternative route segment H.

Airports

The Benson Municipal Airport (E95) Master Plan Study

The Master Plan Study (City of Benson 1990), evaluates the airport's capabilities and role in forecasting future aviation demand and the airport's ability to plan for the timely development of new or expanded facilities to meet that demand through the year 2010. The master plan provides systematic guidelines for the airport's overall maintenance, development, and operation.

The Marana Regional Airport Master Plan

The Marana Regional Airport Master Plan (Town of Marana 2007) provides a 20-year, long-range strategic forecast of future aviation demands on the community and the airport facilities, and of infrastructure needed to support the aviation requirements. The ultimate goal of the master plan is to provide systematic guidelines for the airport's overall development and operation.

Tucson International Airport Master Plan Update

The Tucson Airport Authority (TAA) is a nonprofit organization that manages the Tucson International Airport and lands owned by the airport and TAA. The TAA (2013) initiated the 2014 Tucson International Airport Master Plan Update to provide a framework for future facility, infrastructure, and land development that will accommodate forecasted airport activity demand through 2034.

Pinal Airpark Master Plan

Pinal County manages the Pinal Airpark in cooperation with the DOD and the Arizona Army National Guard. In February 2013, the county initiated a planning process to update its 1991 master plan (Pinal County 1991).

Cochise County Airport Master Plan

The Cochise County Airport Master Plan (Cochise County 1997) presents a phased development plan intended to result in construction and maintenance of a safe, efficient, economical, and environmentally acceptable public facility. The plan evaluates both existing and future aviation needs to determine the current and long-range requirements for airport development, and to identify and assess site development alternatives.

3.19 INTENTIONAL ACTS OF DESTRUCTION

Intentional destructive acts have the potential to create health and safety hazards through the damage of proposed transmission line support structures. Intentional destructive acts include acts of sabotage, terrorism, vandalism, and theft that sometimes occur at power facilities, including transmission lines and substations. Vandalism and thefts are the most common intentional destructive act, especially theft of metal and other materials that can be sold when the price of construction materials is high on the salvage market.

3.19.1 Analysis Area

New Build Section

Based on the height of the proposed transmission line support structures, the analysis area for intentional acts of destruction on the transmission lines and substations is 200 feet from the edge of the ROW corridor for proposed transmission lines. Critical facilities (e.g., hospitals, emergency response services) that would receive power from the proposed transmission lines are also analyzed.

Upgrade Section

The analysis area for intentional acts of destruction within the proposed Upgrade Section is the same as identified above for the New Build Section.

3.19.2 Laws, Ordinances, Regulations, and Standards

Although specific requirements for the protection of transmission lines and substations are not codified by law, Federal and other utility companies use industry-standard physical deterrents such as fencing, cameras, warning signs, rewards, etc., to help deter theft, vandalism, and unauthorized access to facilities.

3.19.3 Issues to Be Analyzed

During construction or operation and maintenance, the proposed transmission lines, substations, and associated facilities could be targets of intentional destructive acts, such as sabotage, terrorism, vandalism, and theft, with resulting impacts to human health and safety:

- Adjacent areas that could be impacted from an intentional act of destruction
- Potentially impaired critical services (emergency response, hospitals, communications, water supply)

3.19.4 Analysis Area Conditions

Acts of sabotage or terrorism on electrical facilities are rare, although some have occurred. In the past, these acts generally focused on attempts to destroy large steel transmission line towers. For example, in 1999, a large steel transmission line tower in Bend, Oregon, was toppled. In June 2011, almost $1 million in damages was incurred at Alvey Substation near Eugene, Oregon, when unknown individuals were able to breach a security fence and damage equipment in the substation yard during an attempt to disrupt transmission service. Statistics for intentional acts of destruction on existing transmission facilities within the analysis area are not available. The following text identifies adjacent areas that could be impacted from intentional acts of destruction, and existing critical services that could be impacted from power outages resulting from intentional acts of destruction.

New Build Section

The majority of proposed transmission lines in the New Build Section would traverse sparsely populated rural or undeveloped terrain. In general, the line sighting of the proposed transmission lines would avoid populated areas and would not be adjacent to buildings and other infrastructure. The most common adjacent developed areas that could be impacted from intentional acts of destruction in the New Build Section are limited to transportation and utility infrastructure. Tables 3.19-1 through 3.19-3 below identify the critical services in the New Build Section that could be affected by a power outage.

Upgrade Section

The proposed transmission lines in the Upgrade Section traverse a mix of sparsely populated rural areas and highly populated urban areas in metropolitan Tucson. Adjacent areas to the existing transmission lines that could be impacted from intentional acts of destruction range from undeveloped desert land to commercial, residential, and other land uses within metropolitan Tucson. Tables 3.19-1 and 3.19-4 below identify the critical services in the Upgrade Section could be affected by a power outage.

EXISTING THREATS OF SABOTAGE AND TERRORISM

- Impacts of power outages to people and/or critical services (e.g., communications; water supply; critical care facilities; emergency response).

Communication services within the analysis area include telecommunications, radio, cable, Internet, and satellite services and are provided by local and national service providers.

Due to the generally rural setting of the analysis area, water supply for the majority of the analysis area is drawn by wells from local aquifers. The cities of Las Cruces and Tucson each maintain municipal water utilities drawn from local aquifers. Tucson’s water supply comes from the Upper Santa Cruz and Avra Basin Sole Source Aquifer and is supplemented by water from the CAP (City of Tucson 2004).

Critical care facilities and law enforcement departments within the analysis area are identified in the following tables.

Table 3.19-1 identifies the medical facilities within the New Build Section and the major medical facilities in the Tucson area within the Upgrade Section. Table 3.19-2 identifies the law enforcement agencies within the New Build Section. Table 3.19-3 identifies fire protection services within the New Build Section. Table 3.19-4 identifies fire protection services within the Upgrade Section.

Table 3.19-1. Medical Facilities within the New Build Section Analysis Area and Upgrade Section Analysis Area

County	Facility Name	Facility Address
New Build Section		
Doña Ana, New Mexico	Advanced Care Hospital of Southern New Mexico	4441 East Lohman Avenue, Las Cruces, NM
	Ben Archer Health Center	1600 East Thorpe Road, Las Cruces, NM
	Ben Archer Health Center	255 New Mexico 187, Hatch, NM
	Concentra Urgent Care	2170 East Lohman Avenue, Las Cruces, NM
	Covenant Clinics	3961 East Lohman Avenue, Las Cruces, NM
	First Step Center	390 Calle De Alegra, Las Cruces, NM
	Hillrise Medical Center	1005 South Telshor Boulevard, Las Cruces, NM
	La Cruces Surgical Associates	2803 Doral Court, Las Cruces, NM
	Memorial Medical Center	2450 South Telshor Boulevard, Las Cruces, NM
	Mesilla Valley Hospital	3751 Del Rey Boulevard, Las Cruces, NM
	Mountain View Regional Medical Center	4311 East Lohman Avenue, Las Cruces, NM
	VA Las Cruces Clinic	1635 South Don Roser Drive, Las Cruces, NM
Grant, New Mexico	Fort Bayard Medical Center	41 Fort Bayard Road, NM
	Gila Regional Medical Center	1313 East 32nd Street, Silver City, NM
	Urgent Care Clinic	1600 East 32nd Street, Silver City, NM
	VA Silver City Clinic	1302 East 32nd Street, Silver City, NM
Luna, New Mexico	Mimbres Memorial Hospital	900 West Ash Street, Deming, NM
Cochise, Arizona	Benson Hospital	450 South Ocotillo, PO Box 2290, Benson, AZ
	Carondelet Holy Cross Hospital	1171 West Target Range Road, Nogales, AZ
	Copper Queen Community Hospital	101 Cole Avenue, Bisbee, AZ
	Northern Cochise Community Hospital	901 West Rex Allen Drive, Willcox, AZ
	Sierra Vista Regional Health Center	300 South El Camino Real, Sierra Vista, AZ
	Southeast Arizona Medical Center	2174 West Oak Avenue, Douglas, AZ
Upgrade Section		
Pima, Arizona	Kino Community Hospital/University Physicians	2800 East Ajo Way, Tucson, AZ
	Northwest Medical Center	6200 North La Cholla Boulevard, Tucson, AZ
	Sierra Vista Regional Health Center	300 El Camino Real, Sierra Vista, AZ
	St. Joseph's Hospital	350 North Wilmot Road, Tucson, AZ
	St. Mary's Hospital	1601 West St. Mary's Road, Tucson, AZ
	Tucson Medical Center	5301 East Grant Road, Tucson, AZ
	University Medical Center	1501 North Campbell Avenue, Tucson, AZ

Table 3.19-2. Law Enforcement within the New Build Section Analysis Area

County	Law Enforcement Agency	Address
Doña Ana, New Mexico	Anthony Police Department	401 Wildcat Drive, Anthony, NM
	Doña Ana County Sherriff's Department	845 North Motel Boulevard, Las Cruces, NM
	Las Cruces Police Department	217 East Picacho Avenue, Las Cruces, NM
	Hatch Village Police Department	5 Chile Capitol Lane, Hatch, NM 87937
	New Mexico State Police	3000 East University Avenue, Las Cruces, NM
	Sunland Park Police Department	1000 McNutt Road #C, Sunland Park, NM
Grant, New Mexico	Bayard Police Department	800 Central Avenue, Bayard, NM
	Grant County Sheriff Department	214 North Black Street, Silver City, NM
	Hurley Town Police Department	101 Cortez Avenue, Hurley, NM (Hurley Town Hall)
	Silver City Police Department	1011 North Hudson Street, Silver City, NM
Hidalgo, New Mexico	Hidalgo County Sheriff	305 Pyramid Street, Lordsburg, NM
	Lordsburg Police Department	404 West Wabash Street, Lordsburg, NM
	New Mexico State Police	808 High Street, Lordsburg, NM
Luna, New Mexico	Columbus Police Department	214 Broadway, Columbus, NM
	Deming Police Department	700 East Pine Street, Deming, NM
	Luna County Sheriff	3000 East Pine Street, Deming, NM
Cochise, Arizona	Benson Police Department	360 South Gila Street, Benson, AZ
	Cochise County Government: Division #1	100 Colonia De Salud # 102, Sierra Vista, AZ
	Cochise County Sheriff	126 West 5th Street # 2, Benson, AZ
	Cochise County Sheriff's Department	205 North Judd Drive, Bisbee, AZ
	Cochise County Sheriff's Office	450 South Haskell Ave # C, Willcox, AZ
	Huachuca City Fire Department	505 Gonzales Boulevard, Huachuca City, AZ
	Public Safety Department	2599 East Tacoma Street, Sierra Vista, AZ
	Sierra Vista Police Department	911 North Coronado Drive, Sierra Vista, AZ
	Tombstone Police Department	315 East Fremont Street, Tombstone, AZ

Table 3.19-3. Fire Protection Agencies within the New Build Section Analysis Area

County	Fire Departments
Doña Ana, New Mexico	Chamberino Volunteer Fire Department
	East Mesa Volunteer Fire Department
	La Mesa Volunteer Fire Department
	Las Alturas Volunteer Fire Department
	Las Cruces Fire Department
	Mesquite Volunteer Fire Department
	NASA-JSC-White Sands Test Facility
	New Mexico State University Fire and Emergency Services

Table 3.19-3. Fire Protection Agencies within the New Build Section Analysis Area (Continued)

County	Fire Departments
Doña Ana, New Mexico, Cont'd.	Santa Teresa Volunteer Fire Department
	South Valley Volunteer Fire Department
	Town of Mesilla Volunteer Fire Department
Grant, New Mexico	Bayard Volunteer Fire Department
	Cliff-Gila Volunteer Fire Department
	Fort Bayard Volunteer Fire- and Rescue
	Pinos Altos Volunteer Fire Fire and Rescue
	Santa Rita Hanover Fierro Volunteer Fire Department
	Sapillo Creek Volunteer Fire and Rescue
	Town of Hurley Fire Department
	Town of Silver City Fire Department
	Tyrone Volunteer Fire and/ Rescue Department
	Upper Mimbres Volunteer Fire and Rescue
Hidalgo, New Mexico	Animas Volunteer Fire and Rescue Department
	Cotton City Volunteer Fire Department
	Hidalgo County Fire Department District 1
	Lordsburg Fire Department
	Playas Fire District
Luna, New Mexico	Babocomari Fire District
	Columbus Volunteer Fire Department
	Cooks Peak Fire District 403
	Deming Fire Department
	Savoy Volunteer Fire Department
	Sunshine Volunteer Fire Department
Cochise, Arizona	Benson Fire Department
	Bisbee Fire Department
	Douglas Fire Department
	Elfrida Fire Department
	Fry Fire District
	Huachuca City Fire Department
	Mescal Volunteer Fire Department
	Naco Fire District
	Pirtleville Fire District
	Presidential Estates/Babocomari/Woody Hills Fire District
	San Simon Volunteer Fire Department
	Sierra Vista Fire Department
	Sunnyside Fire District
	Sunsites-Pearce Fire Department
	Tombstone Volunteer fire Department
	Willcox Fire Department
	Willcox Rural Fire Department

Table 3.19-4. Fire Protection Agencies within the Upgrade Section Analysis Area

County	Fire Departments
Cochise, Arizona	Babocomari Fire District
	Benson Fire Department
	Bisbee Fire Department
	Douglas Fire Department
	Elfrida Fire Department
	Fry Fire District
	Huachuca City Fire Department
	Mescal Volunteer Fire Department
	Naco Fire District
	Pirtleville Fire District
	Presidential Estates/Babocomari/Woody Hills Fire District
	San Simon Volunteer Fire Department
	Sierra Vista Fire Department
	Sunnyside Fire District
	Sunsites-Pearce Fire Department
	Tombstone Volunteer Fire Department
	Willcox Fire Department
	Willcox Rural Fire Department
Pima, Arizona	162nd Fighter Wing Fire Department
	Arivaca Volunteer Fire Department
	Avra Valley Fire District
	Corona de Tucson Fire Department
	Drexel Heights Fire District
	Golder Ranch Fire District
	Green Valley Fire District
	Helmet Peak Volunteer Fire Department
	Mount Lemmon Fire District
	Northwest Fire District
	Pascua Pueblo Fire Department
	Picture Rocks Fire District
	Raytheon Systems Co Fire Department
	Rincon Valley Fire District
	Rural/Metro Fire Department – Tucson
	Silverbell Army Heliport Fire Department
	Three Points Fire District
	Tohono O’odham Nation Fire Department
	Tucson Airport Authority Fire Department
	Tucson Country Club Estates Fire District
	Tucson Fire Department

Table 3.19-4. Fire Protection Agencies within the Upgrade Section Analysis Area (Continued)

County	Fire Departments
Pinal, Arizona	Ak-Chin Indian Community Fire Department
	Apache Junction Fire District
	Arizona City Fire District
	Casa Grande Fire Department
	Coolidge Fire Department
	Dudleyville Volunteer Fire Department
	Eloy Fire District
	Florence Fire Department
	Mammoth Volunteer Fire District
	Maricopa Fire District
	Oracle Volunteer Fire District
	Queen Valley Fire District
	Regional Fire and Rescue Department, Inc.
	San Manuel Fire Department Association
	Stanfield Volunteer Fire Department
	Superior Fire Department
	Thunderbird Fire District

Figure 3.2-1. Air quality Class I and special designation areas.

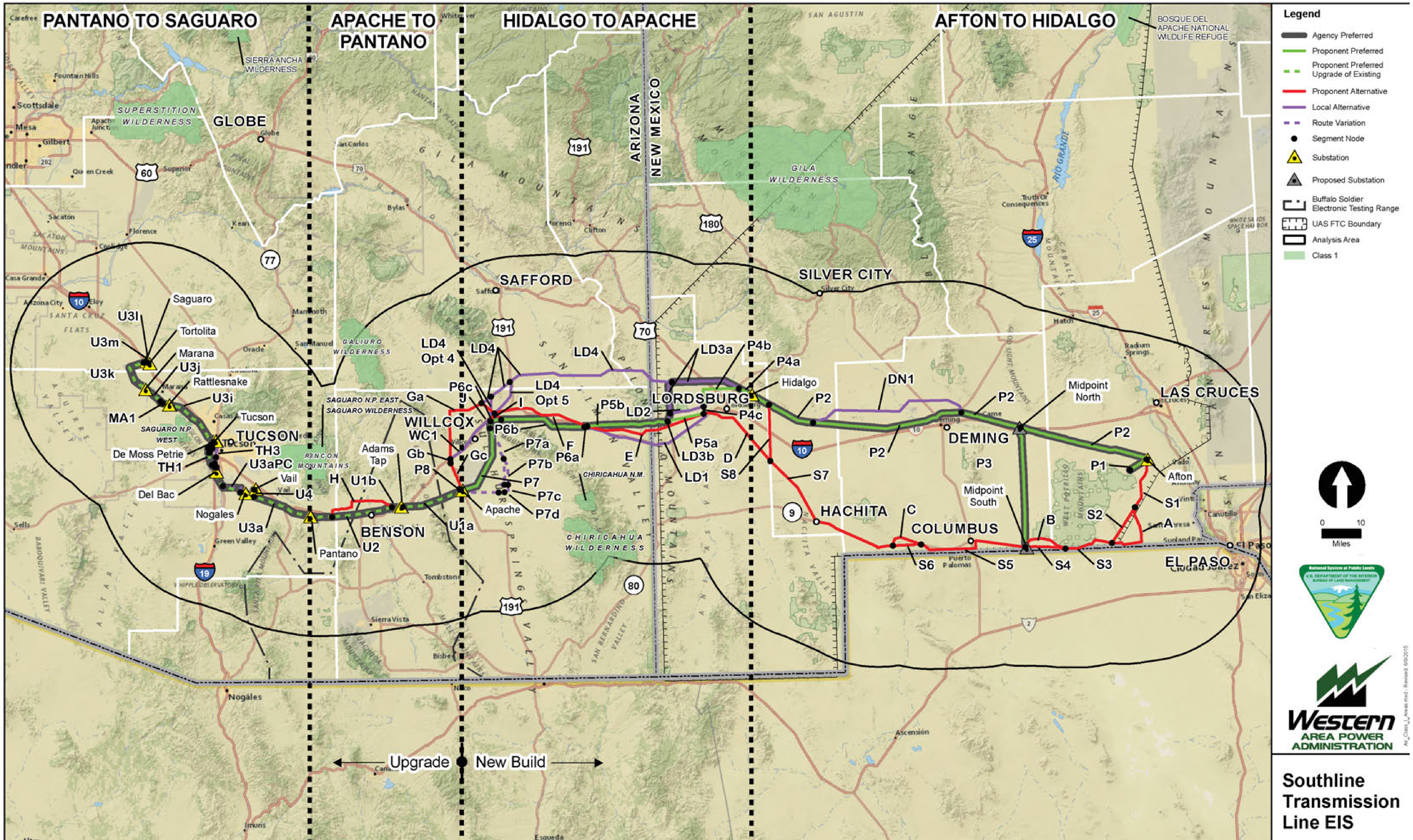


Figure 3.2-2a. Nonattainment and maintenance areas in New Build Section.

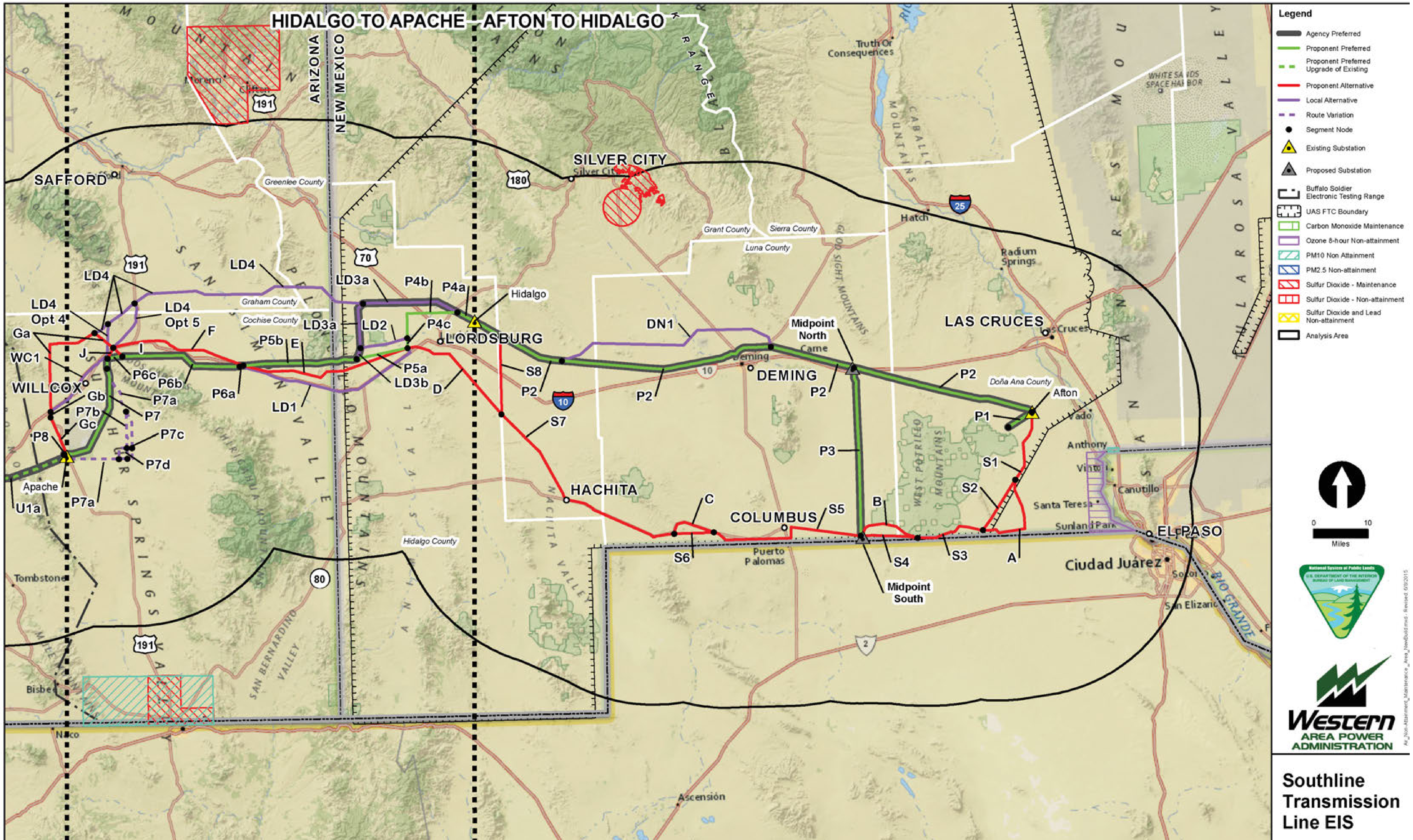


Figure 3.2-2b. Nonattainment and maintenance areas in Upgrade Section.

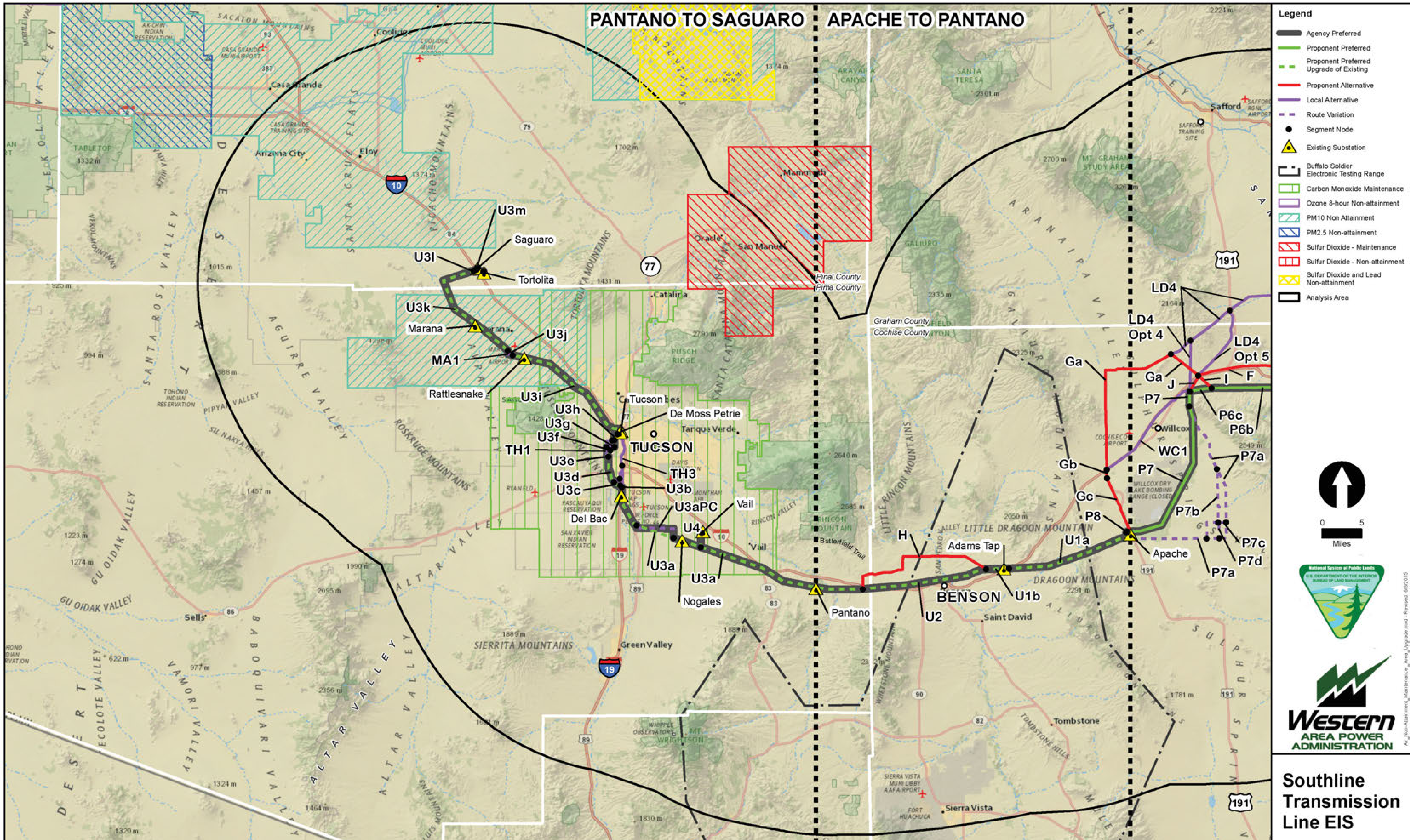


Figure 3.3-1. Noise analysis area for New Build Section.

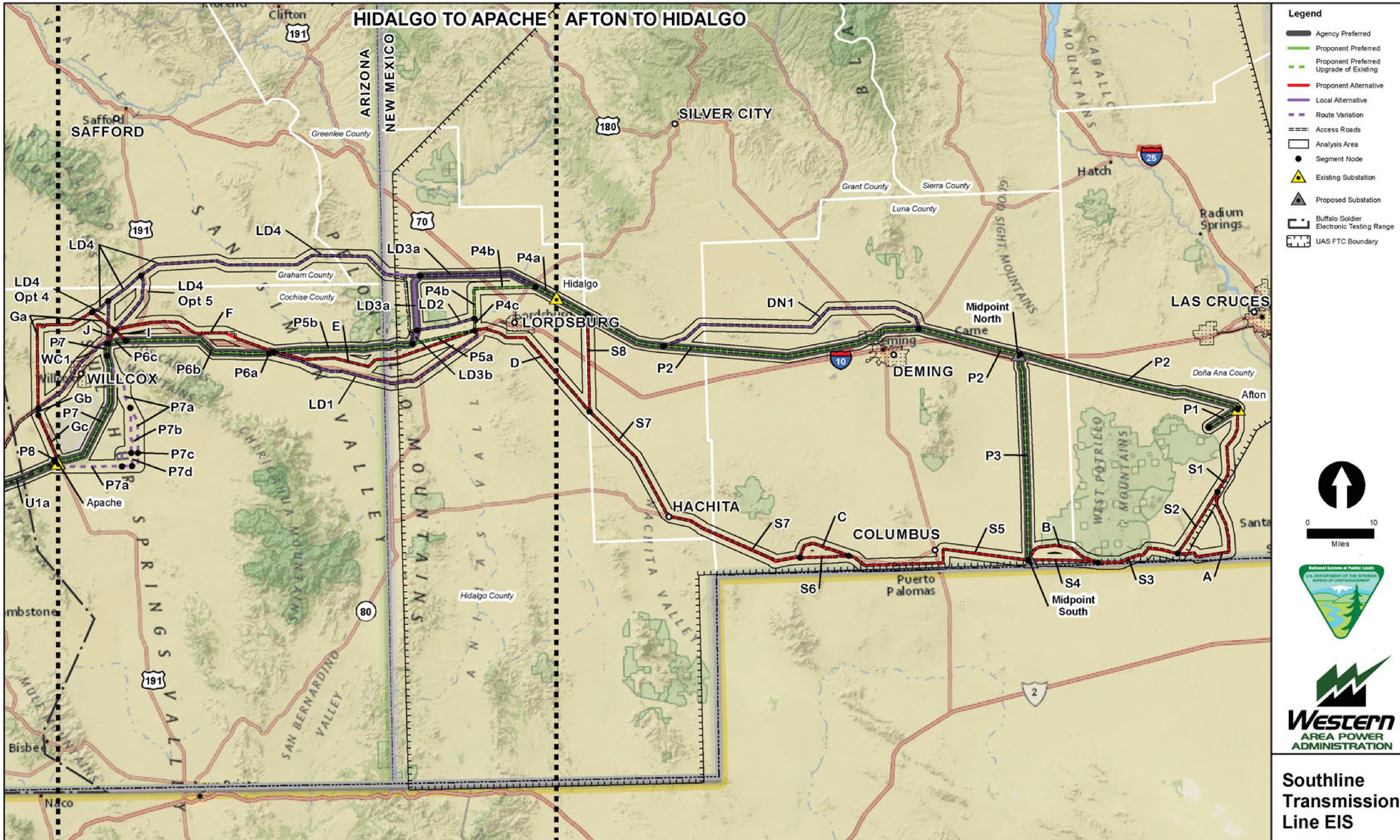


Figure 3.3-2. Noise analysis area for Upgrade Section.

Figure 3.4-2. Geological map sheet, route group 1.

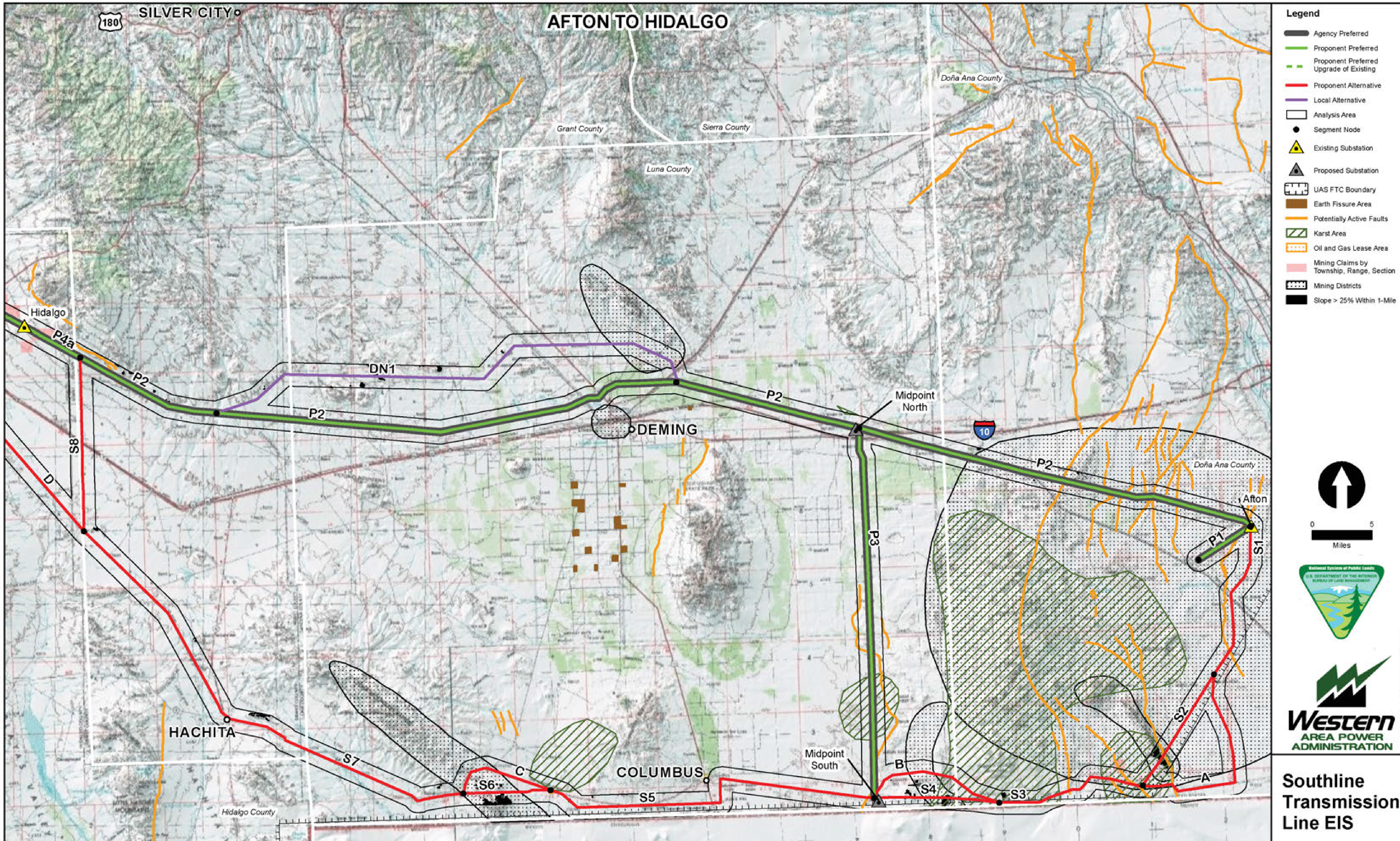


Figure 3.4-3. Geological map sheet, route group 2.

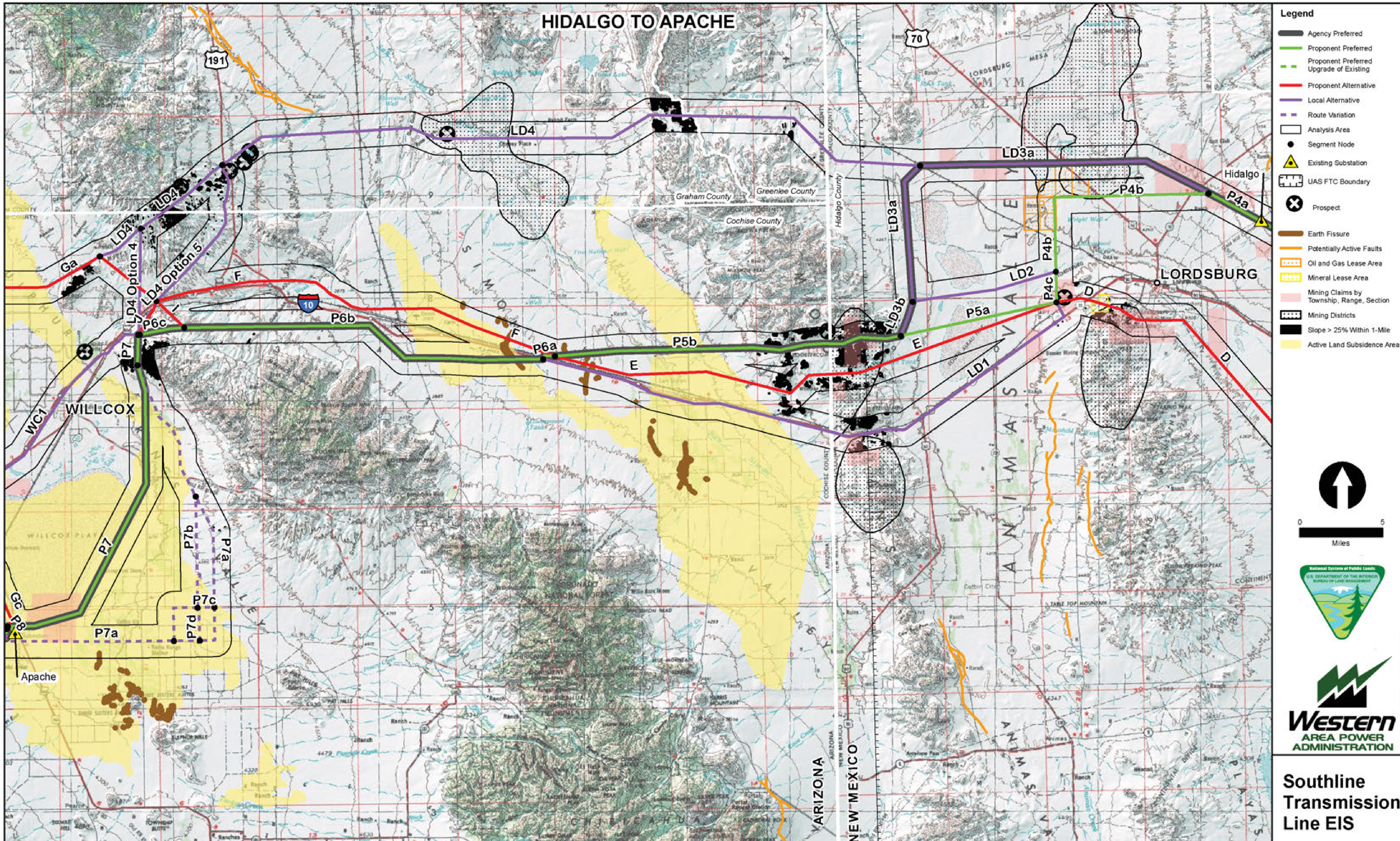


Figure 3.4-4. Geological map sheet, route group 3.

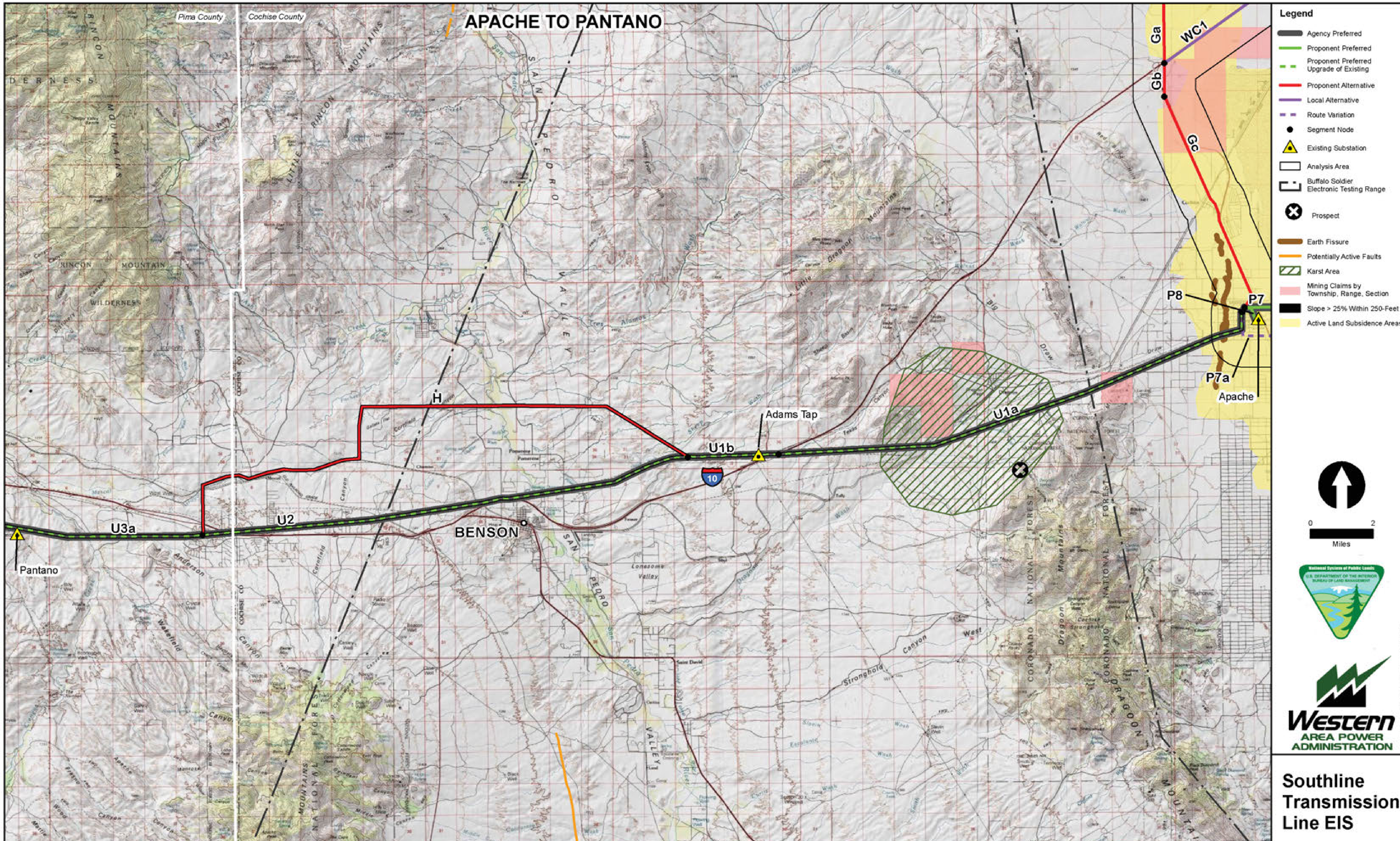


Figure 3.4-5. Geological map sheet, route group 4.

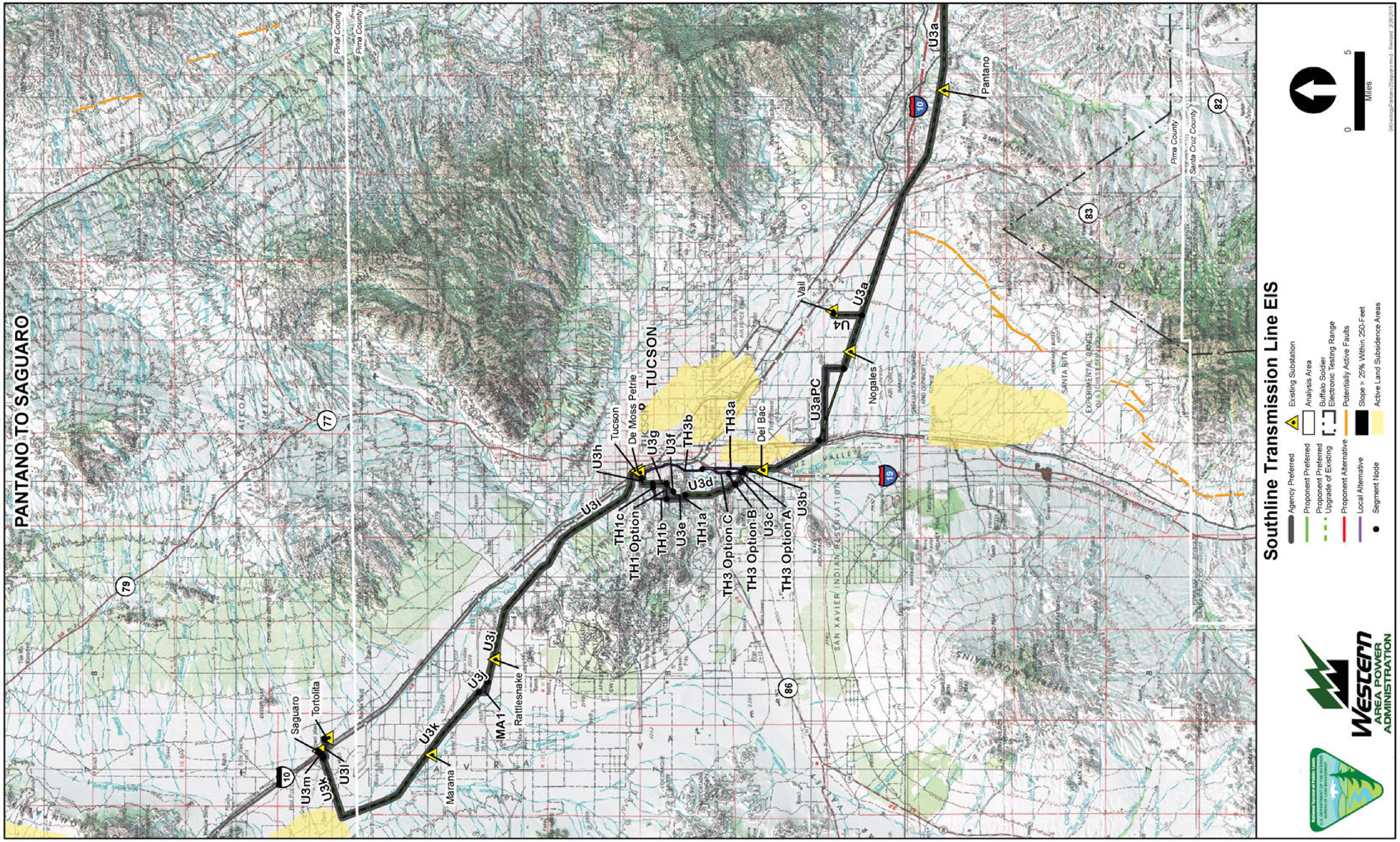


Figure 3.5-1. Soil properties in the vicinity of Lordsburg Playa.

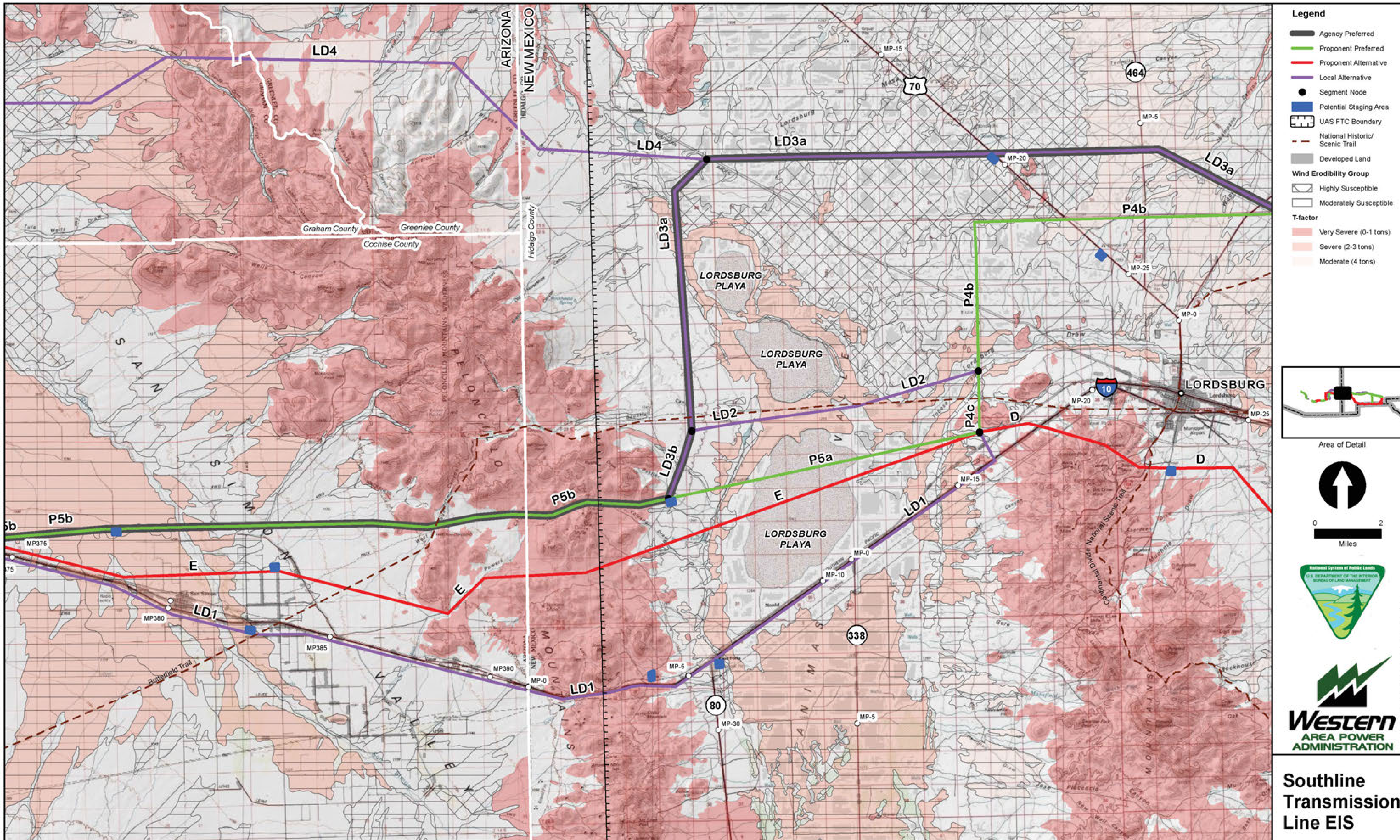


Figure 3.5-2. Soil properties in the vicinity of Willcox Playa.

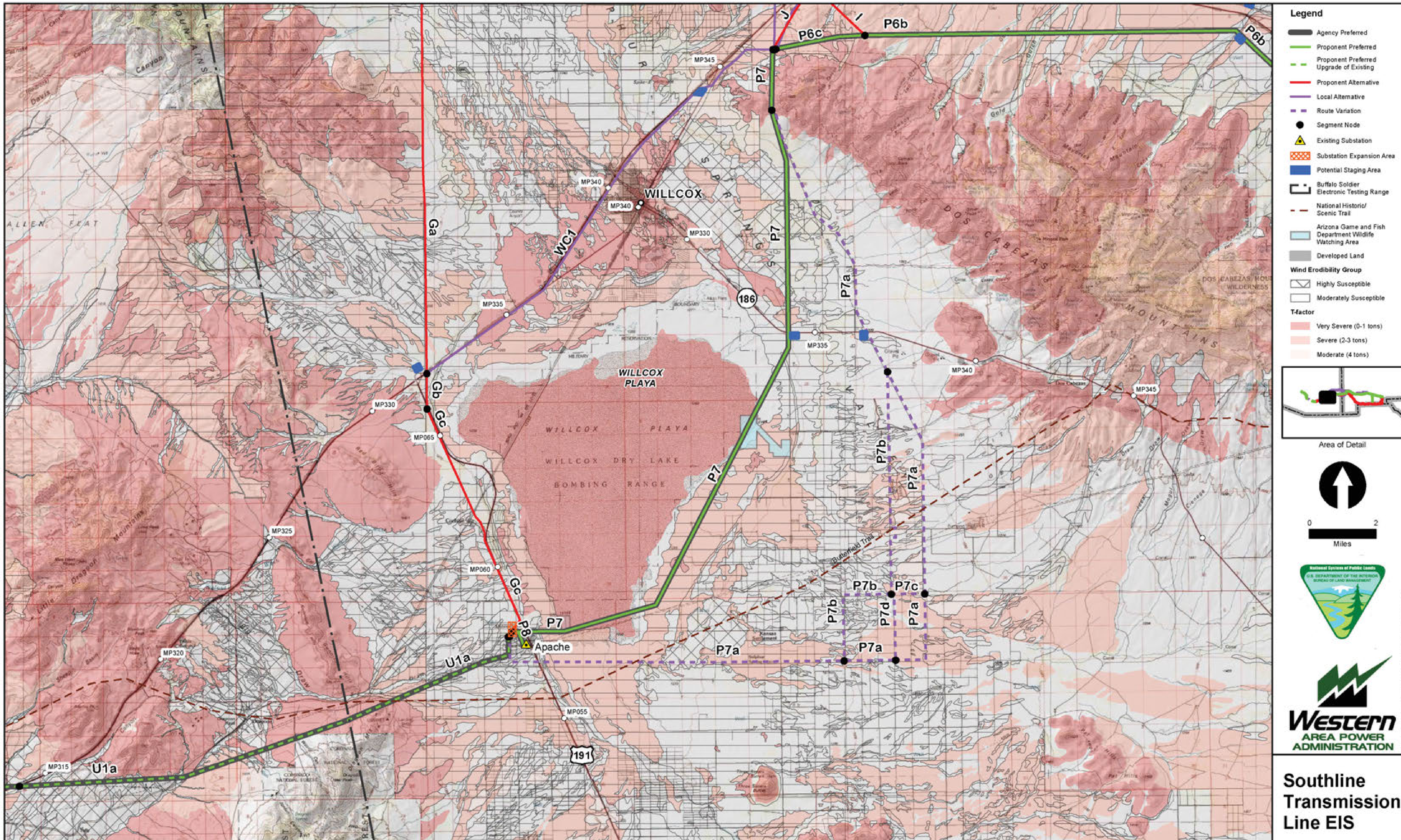


Figure 3.6-1a. PFYC classifications within route group 1.

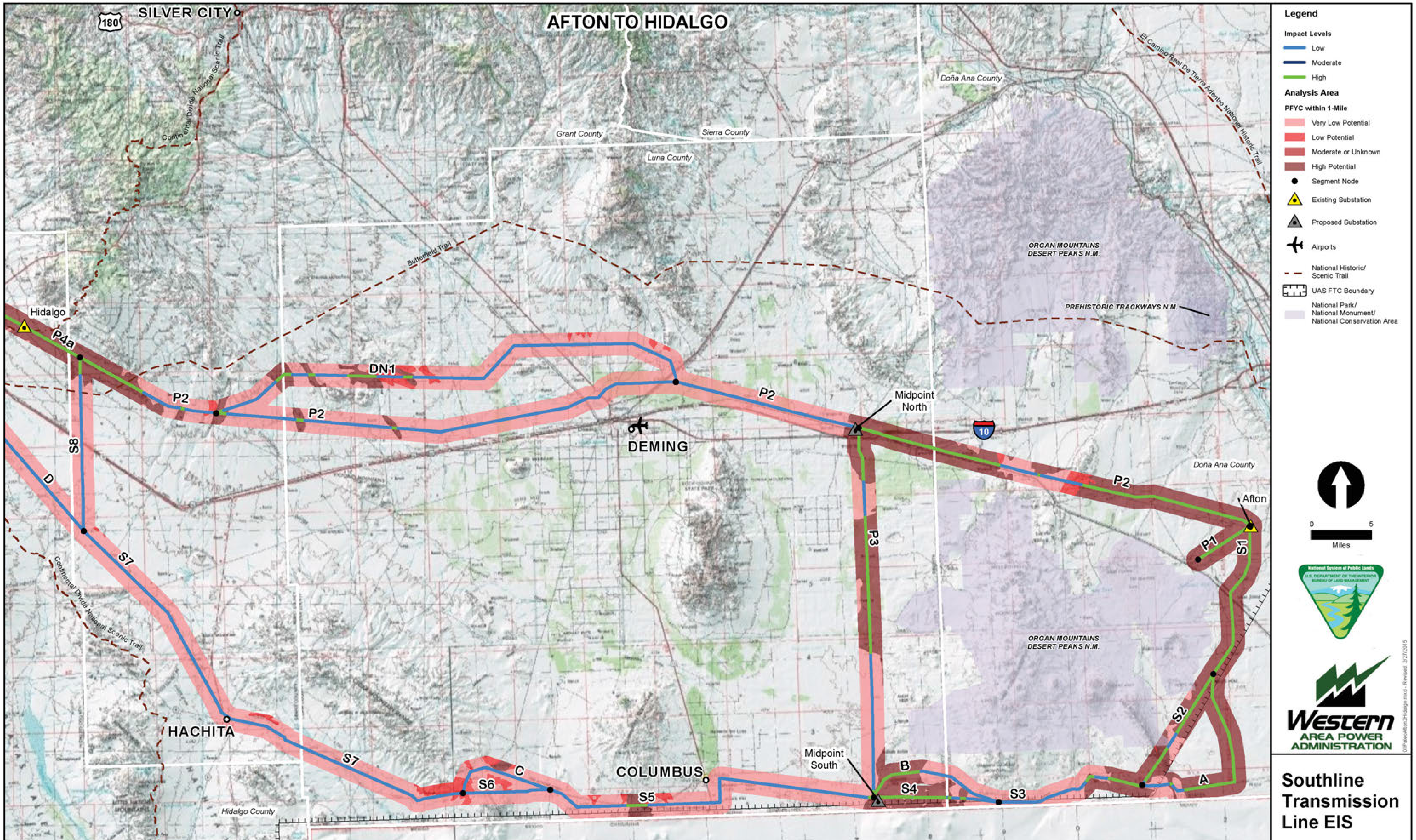


Figure 3.6-1b. PFYC classifications within route group 2.

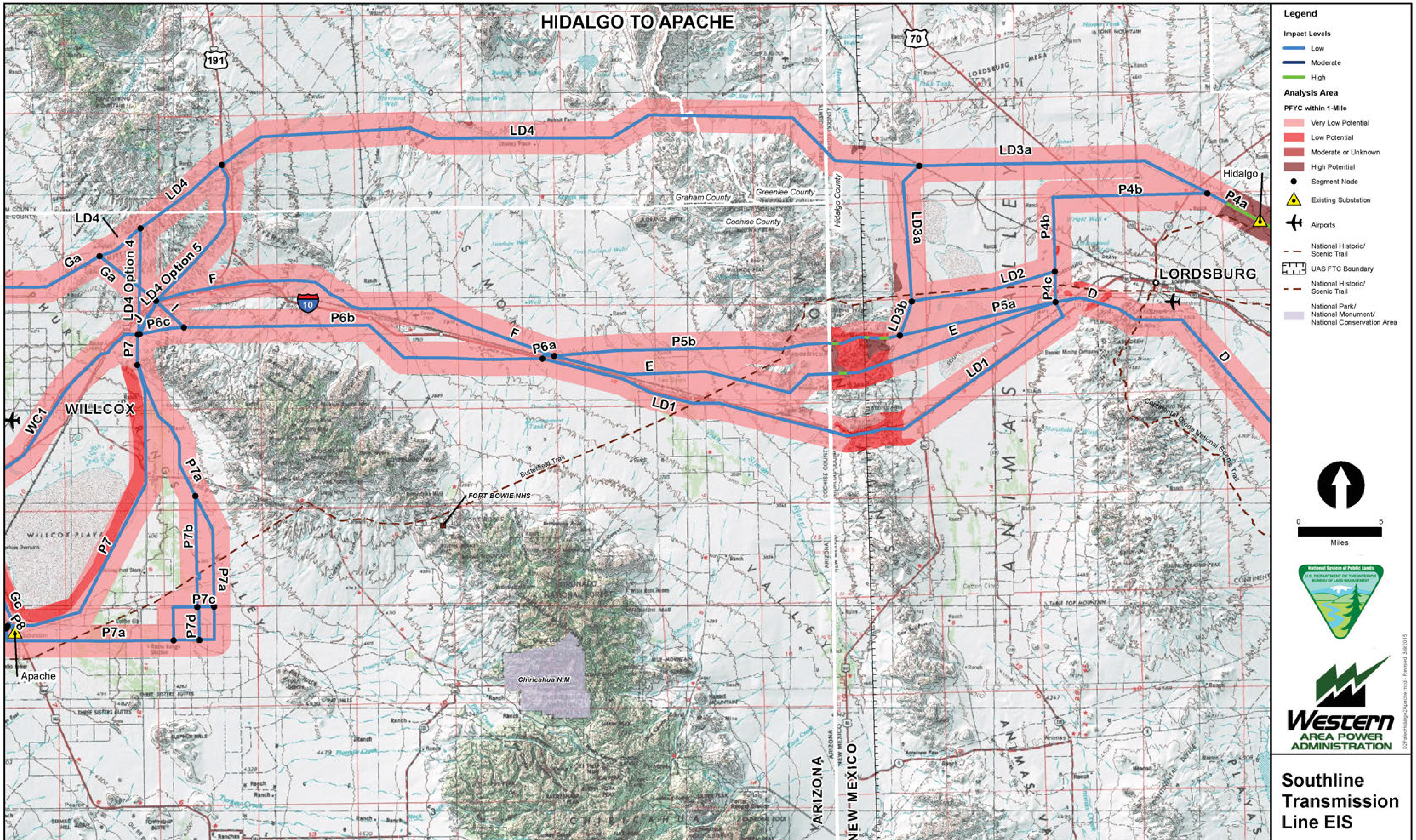


Figure 3.6-1c. PFYC classifications within route group 3.

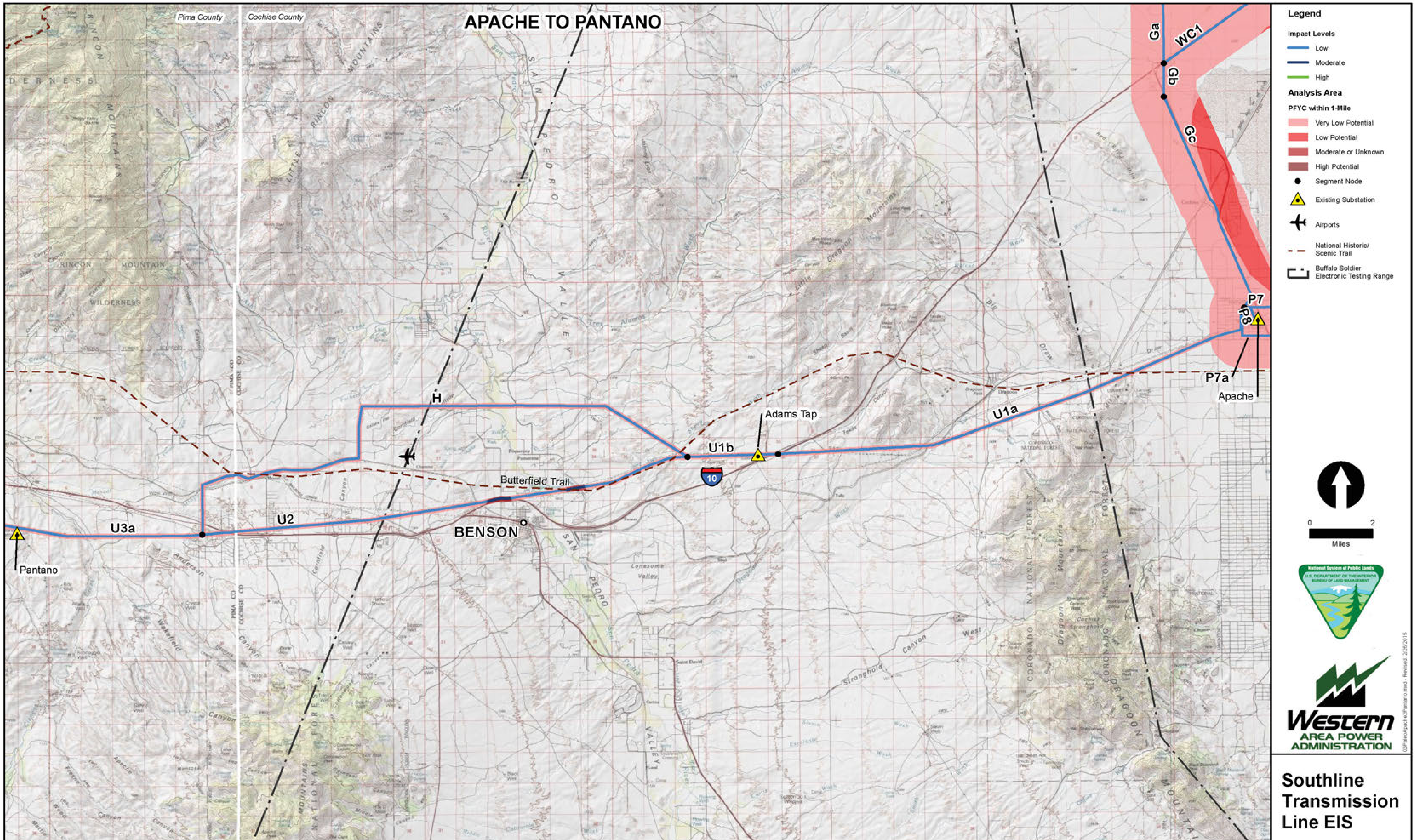


Figure 3.6-1d. PFYC classifications within route group 4.

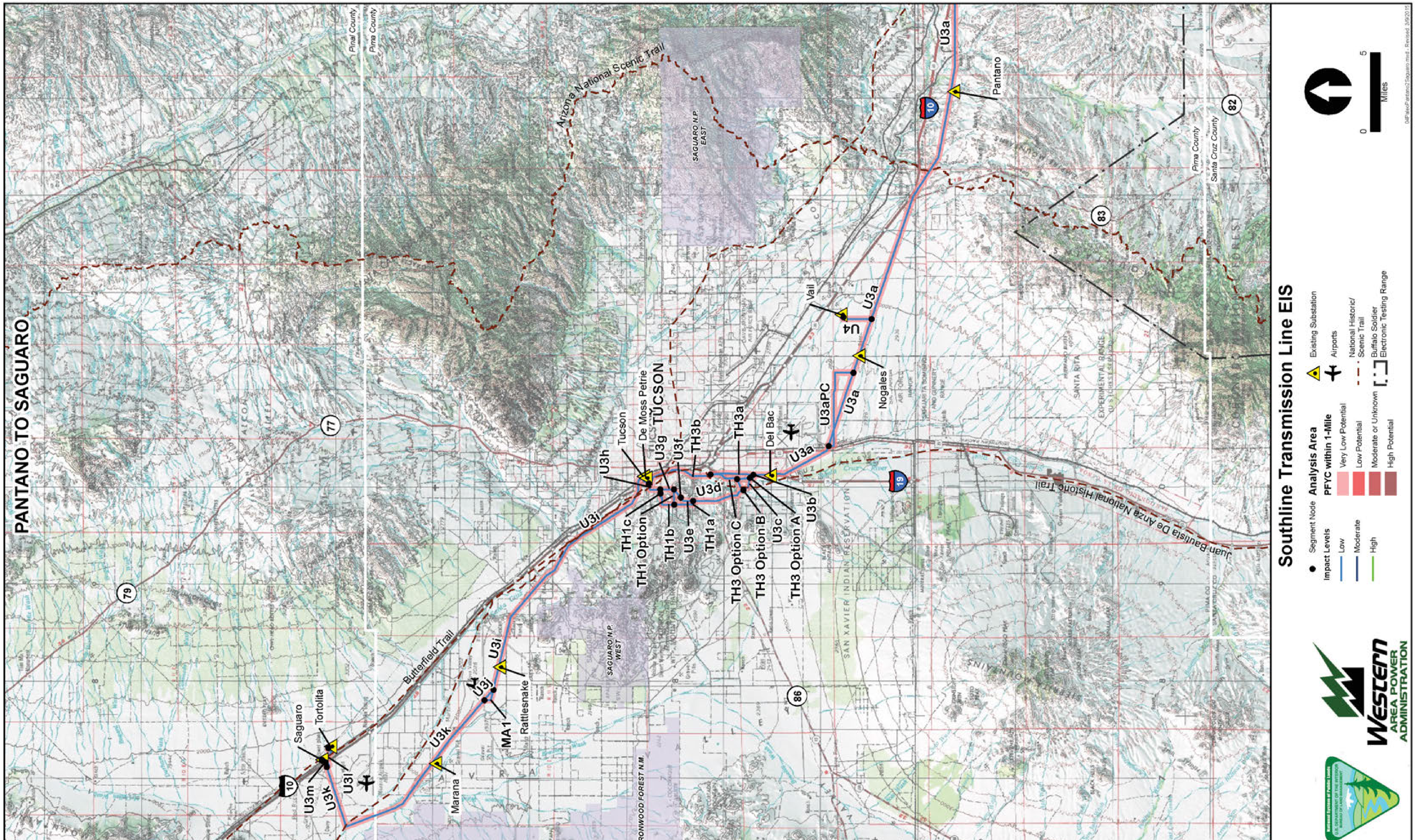


Figure 3.7-1a. Surface water features in route group 1.

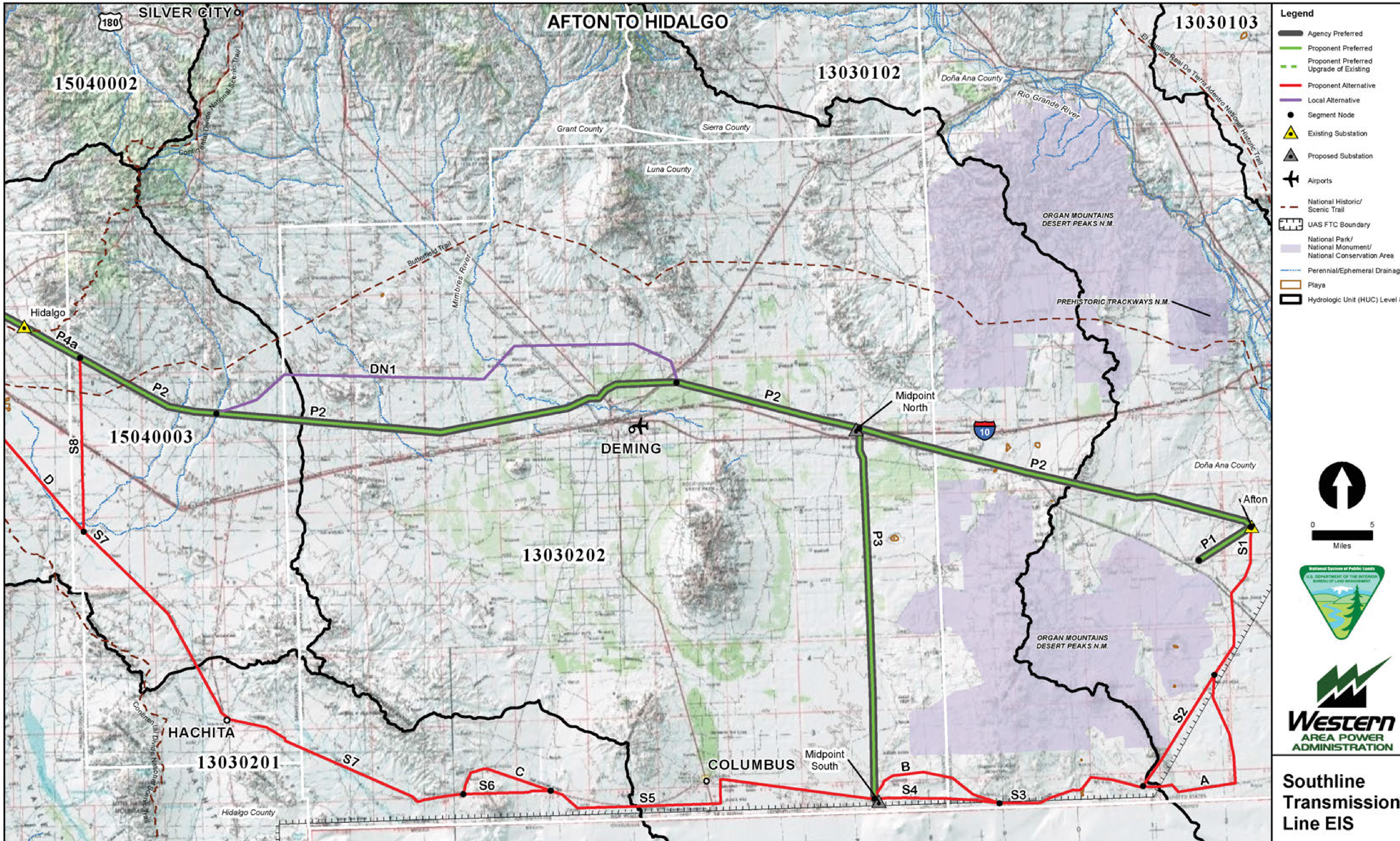


Figure 3.7-1b. Surface water features in route group 2.

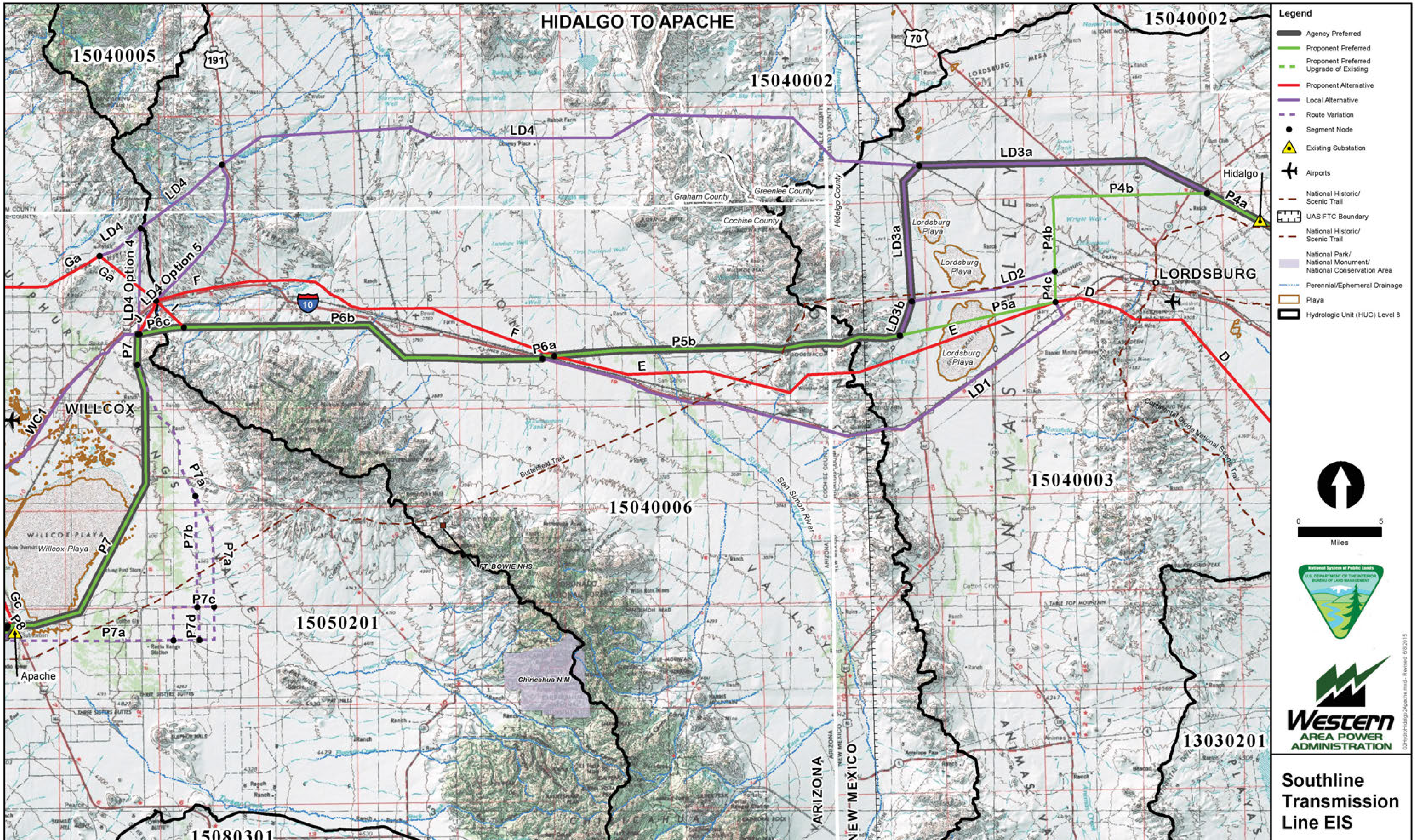


Figure 3.7-1c. Surface water features in route group 3.

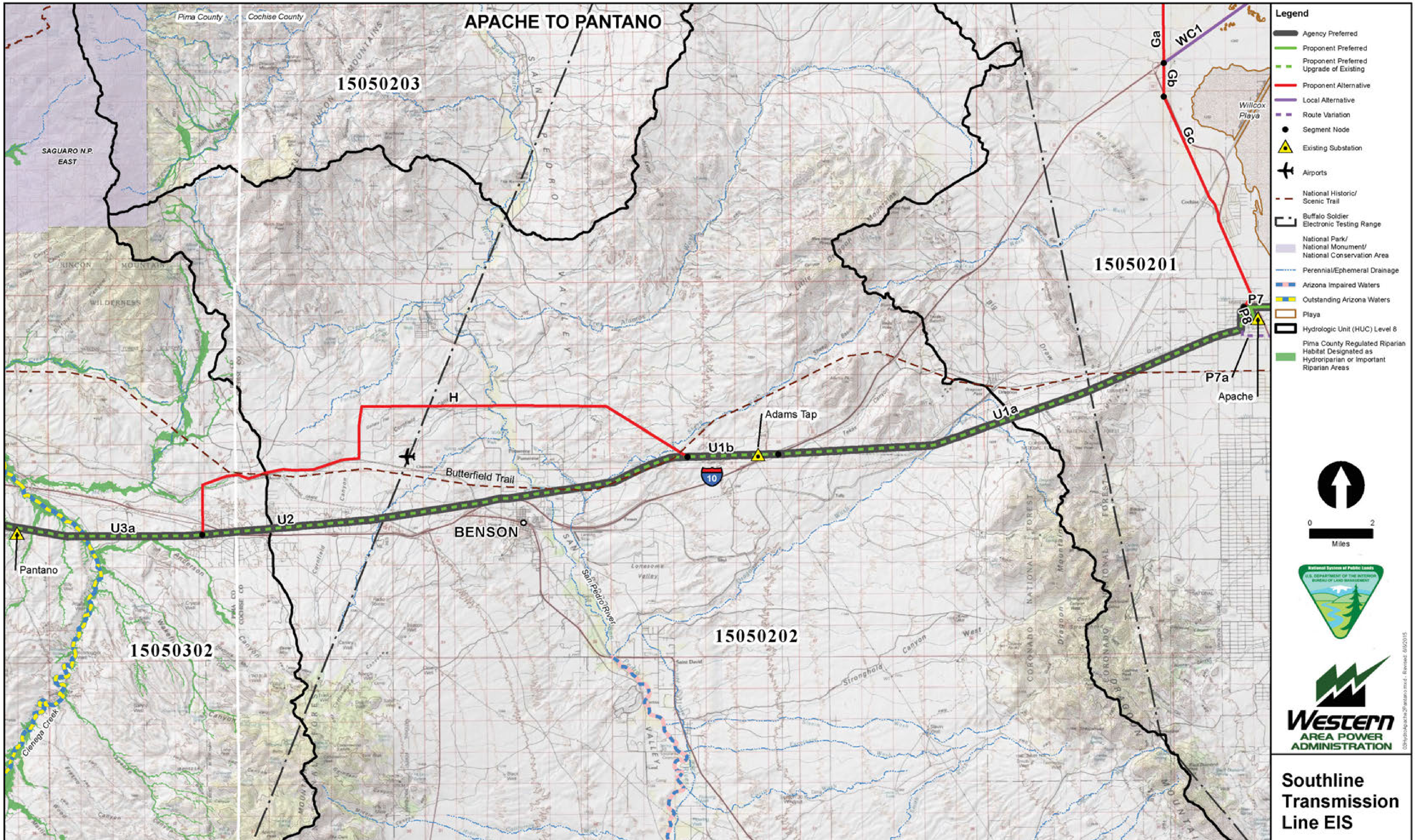


Figure 3.7-1d. Surface water features in route group 4.

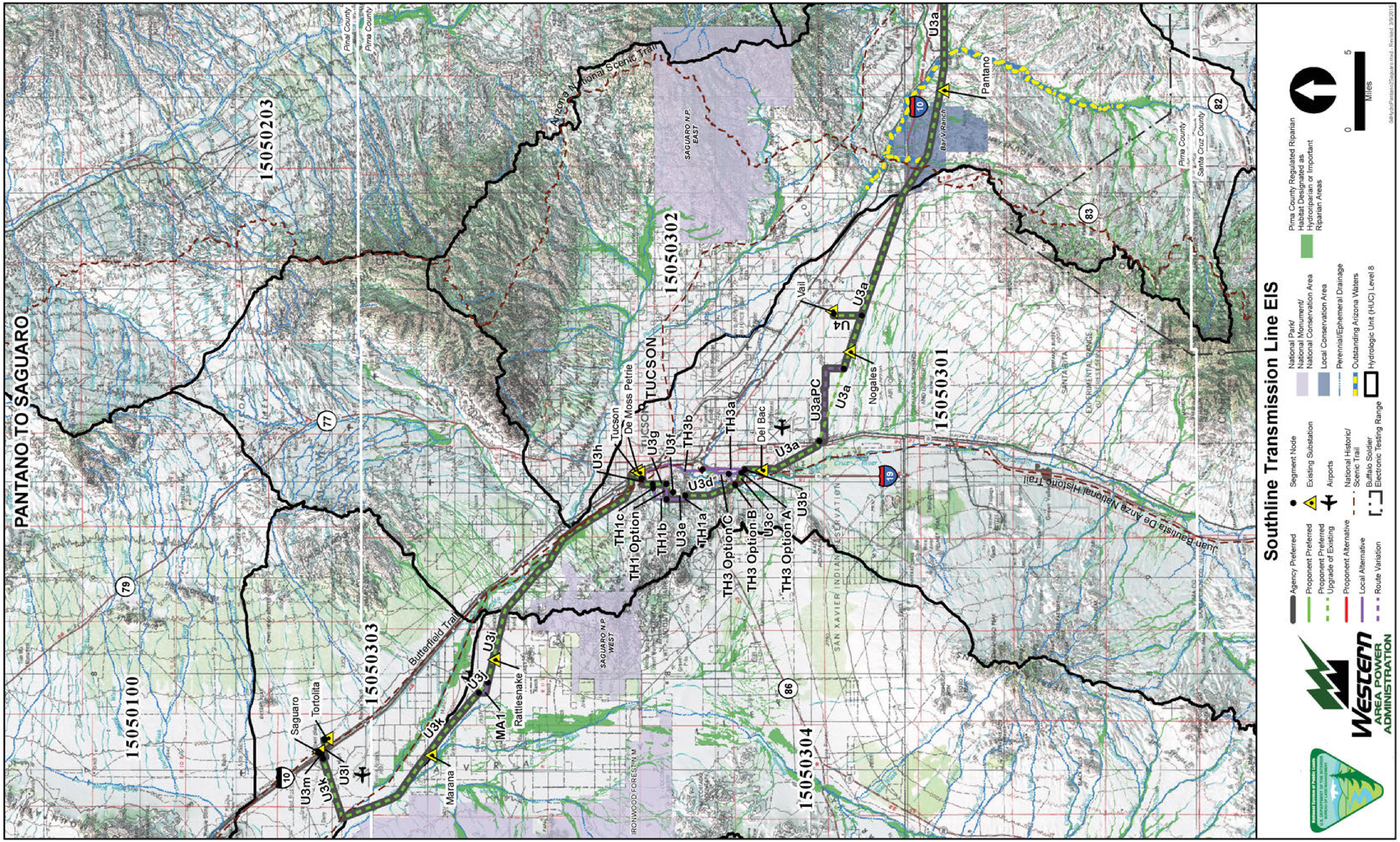


Figure 3.7-2a. Wetlands in route group 1.

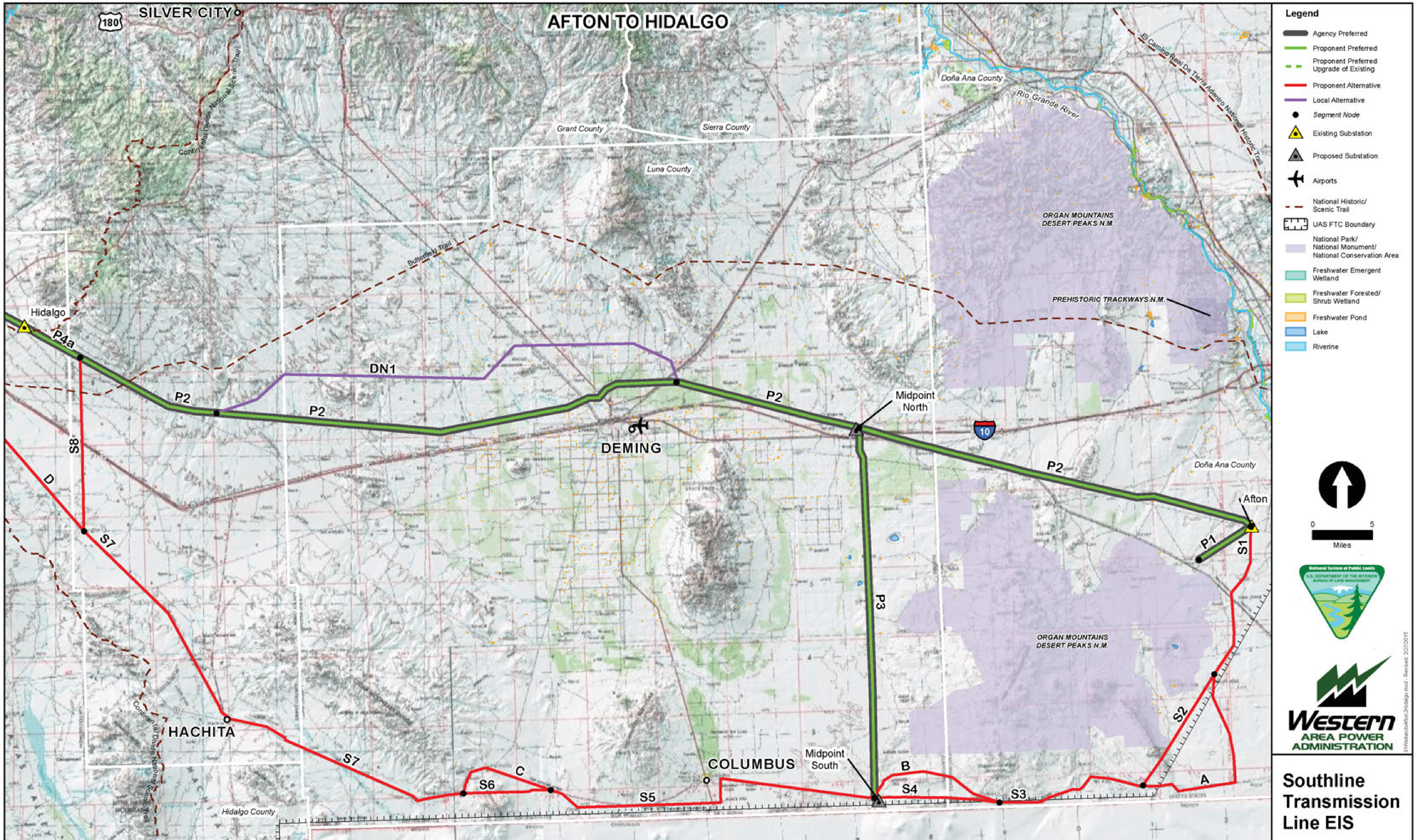


Figure 3.7-2b. Wetlands in route group 2.

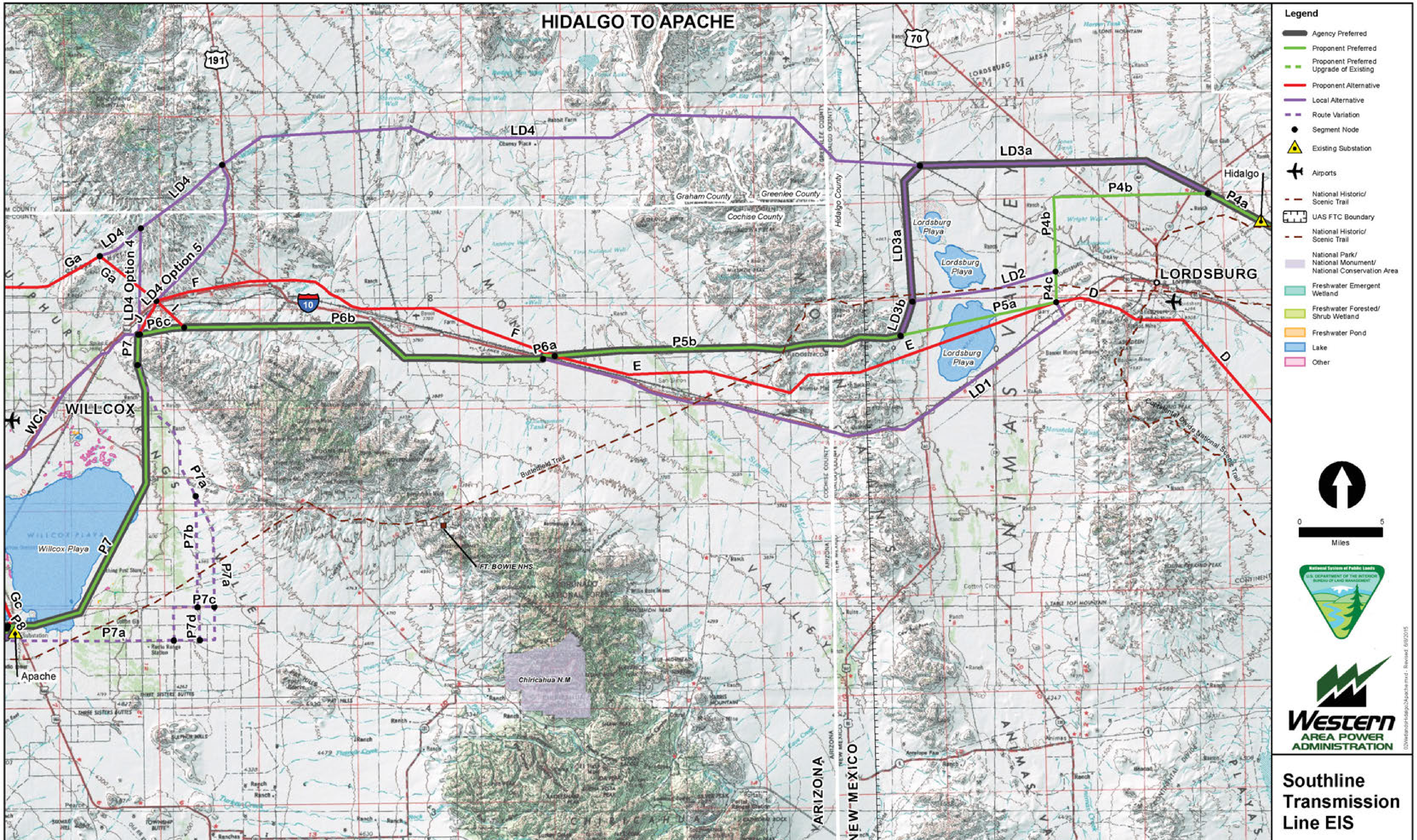


Figure 3.7-2c. Wetlands in route group 3.

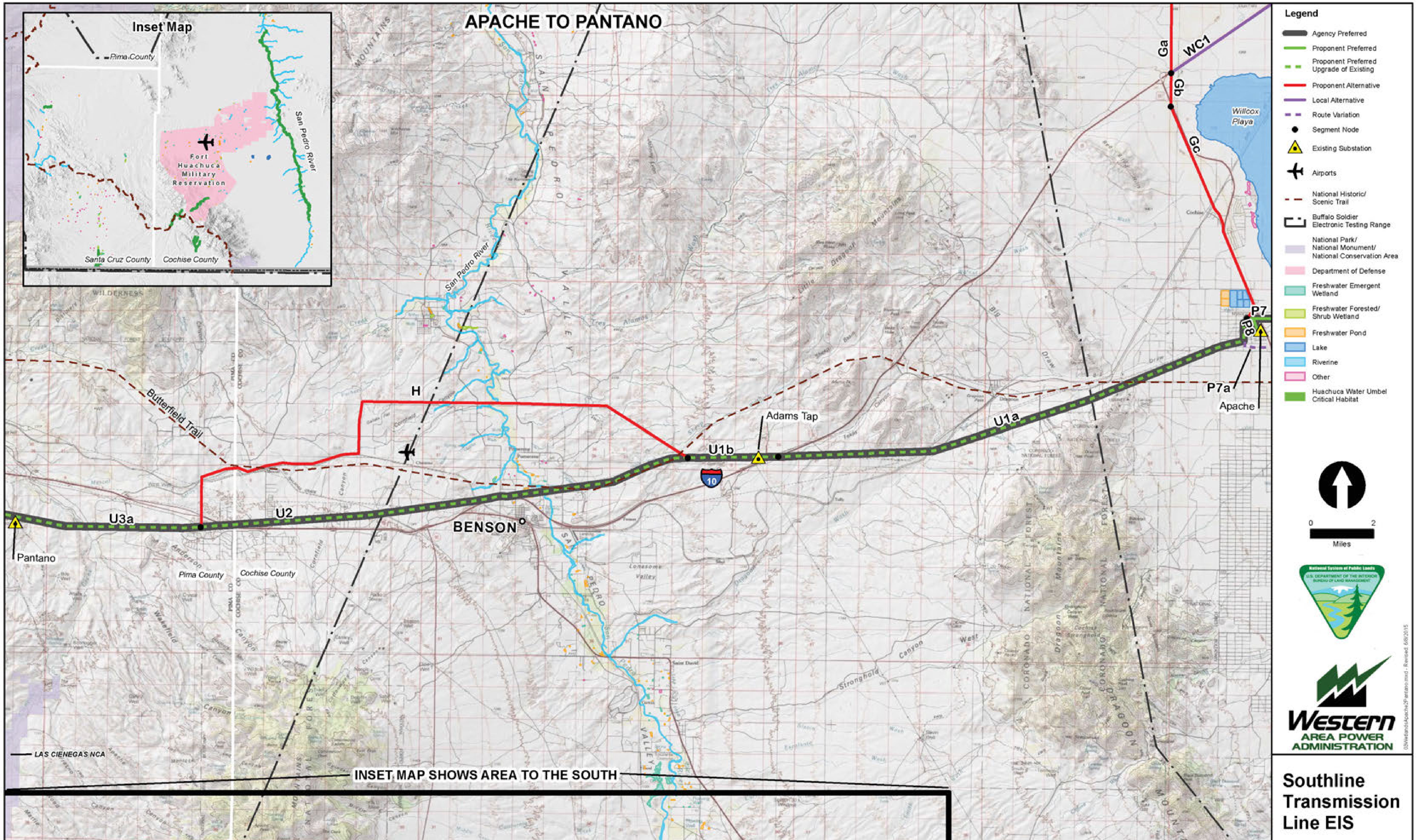


Figure 3.7-2d. Wetlands in route group 4.

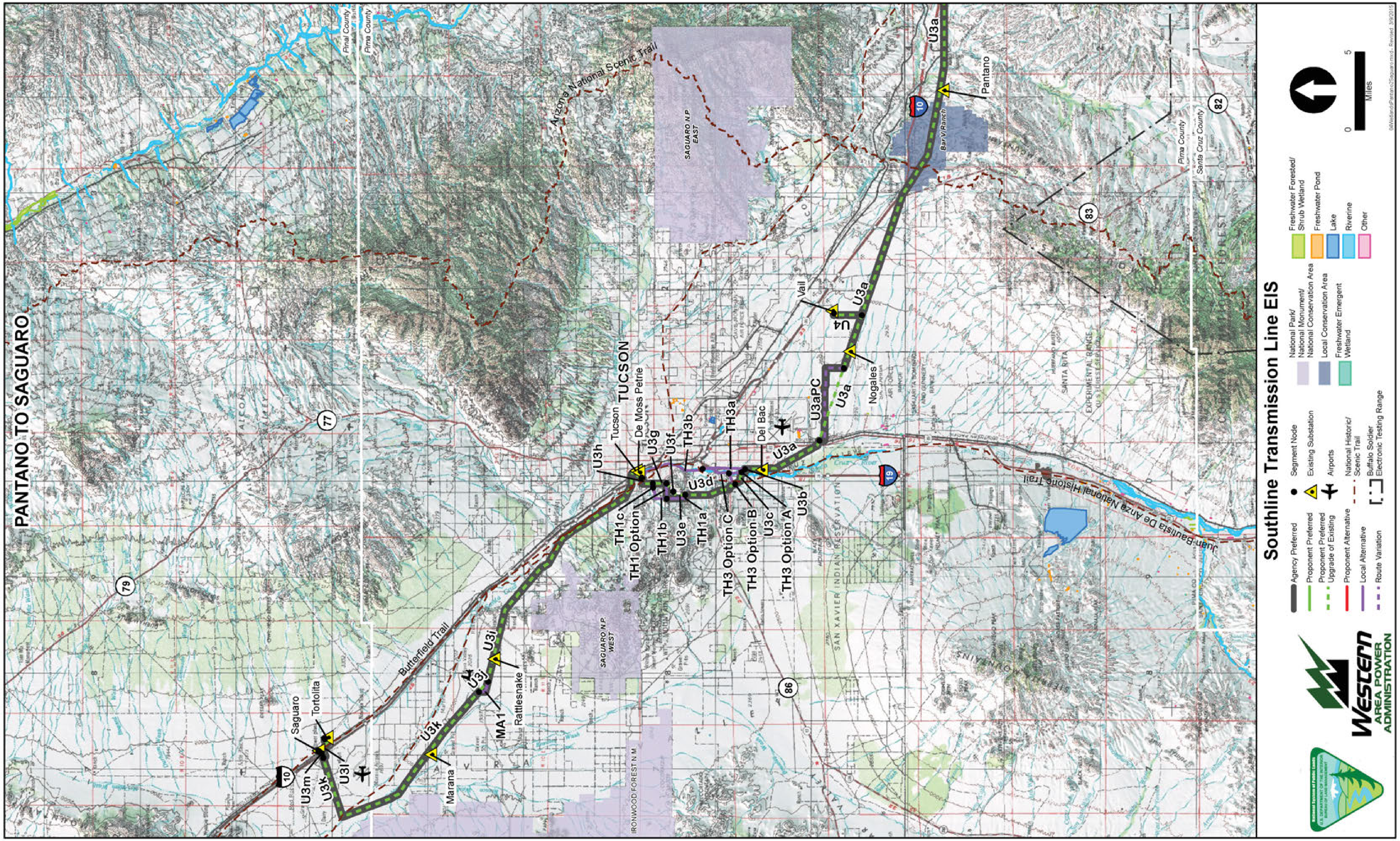


Figure 3.7-3a. Groundwater features in the New Build Section.

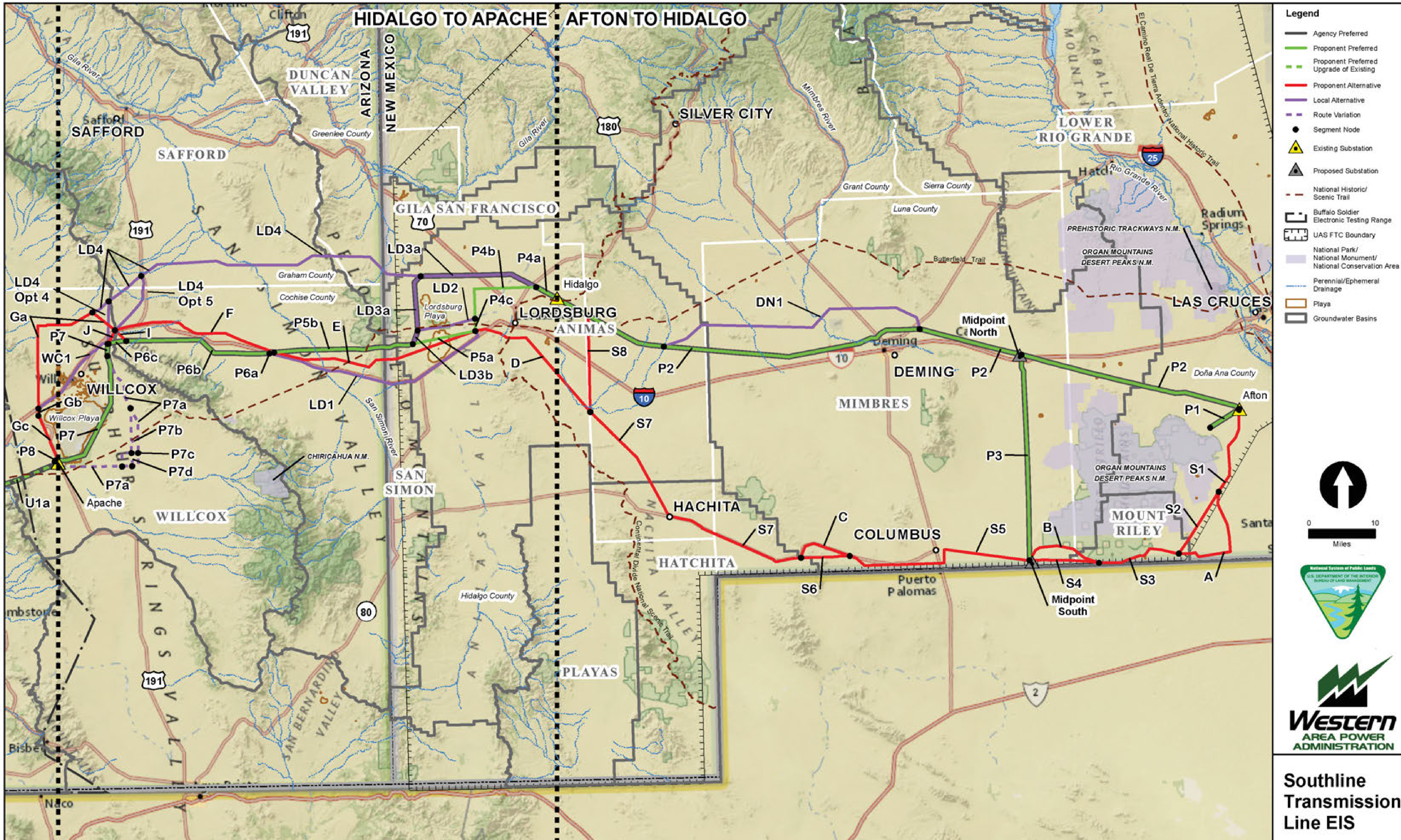


Figure 3.7-3b. Groundwater features in the Upgrade Section.

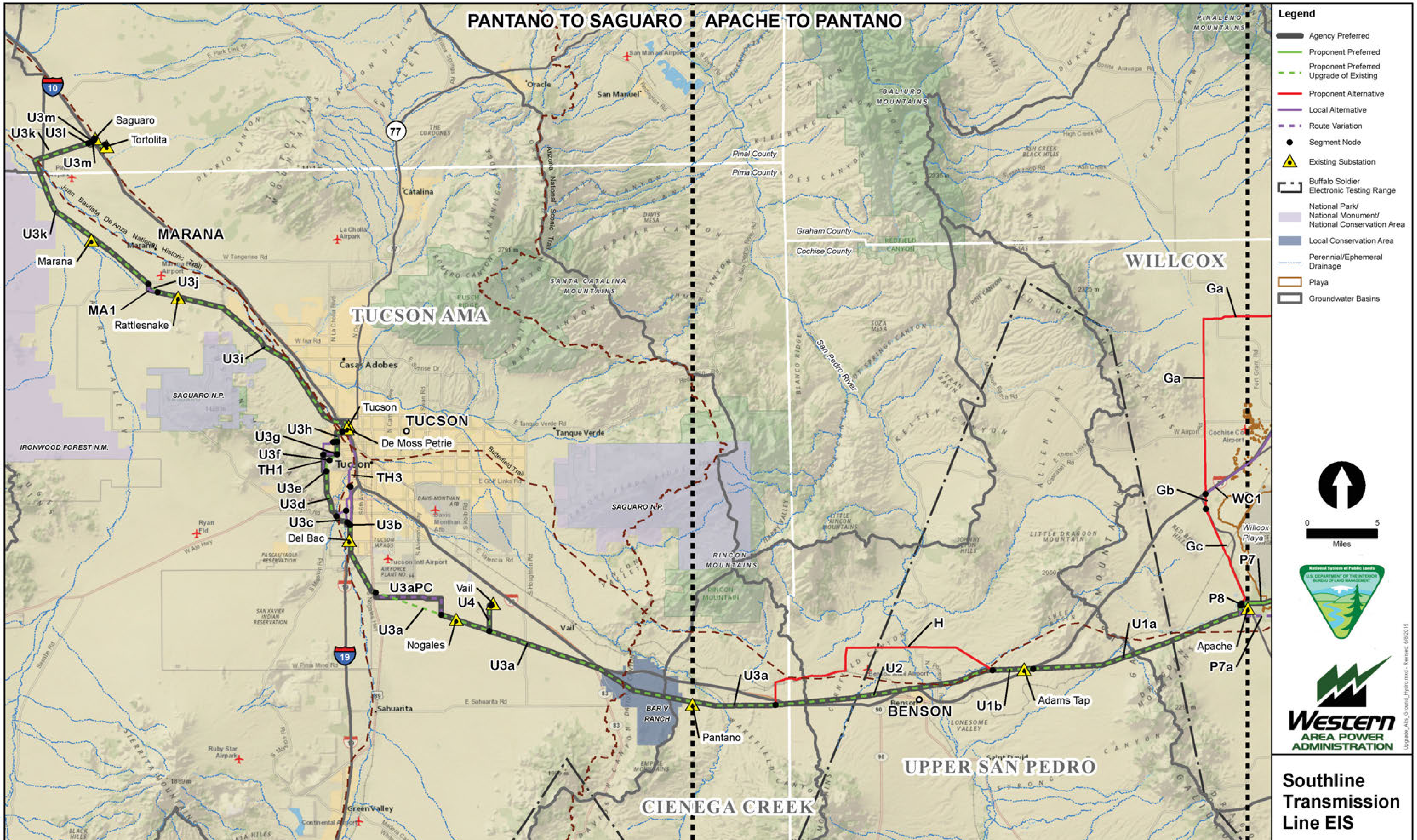


Figure 3.8-1a. Biotic communities in the New Build Section.

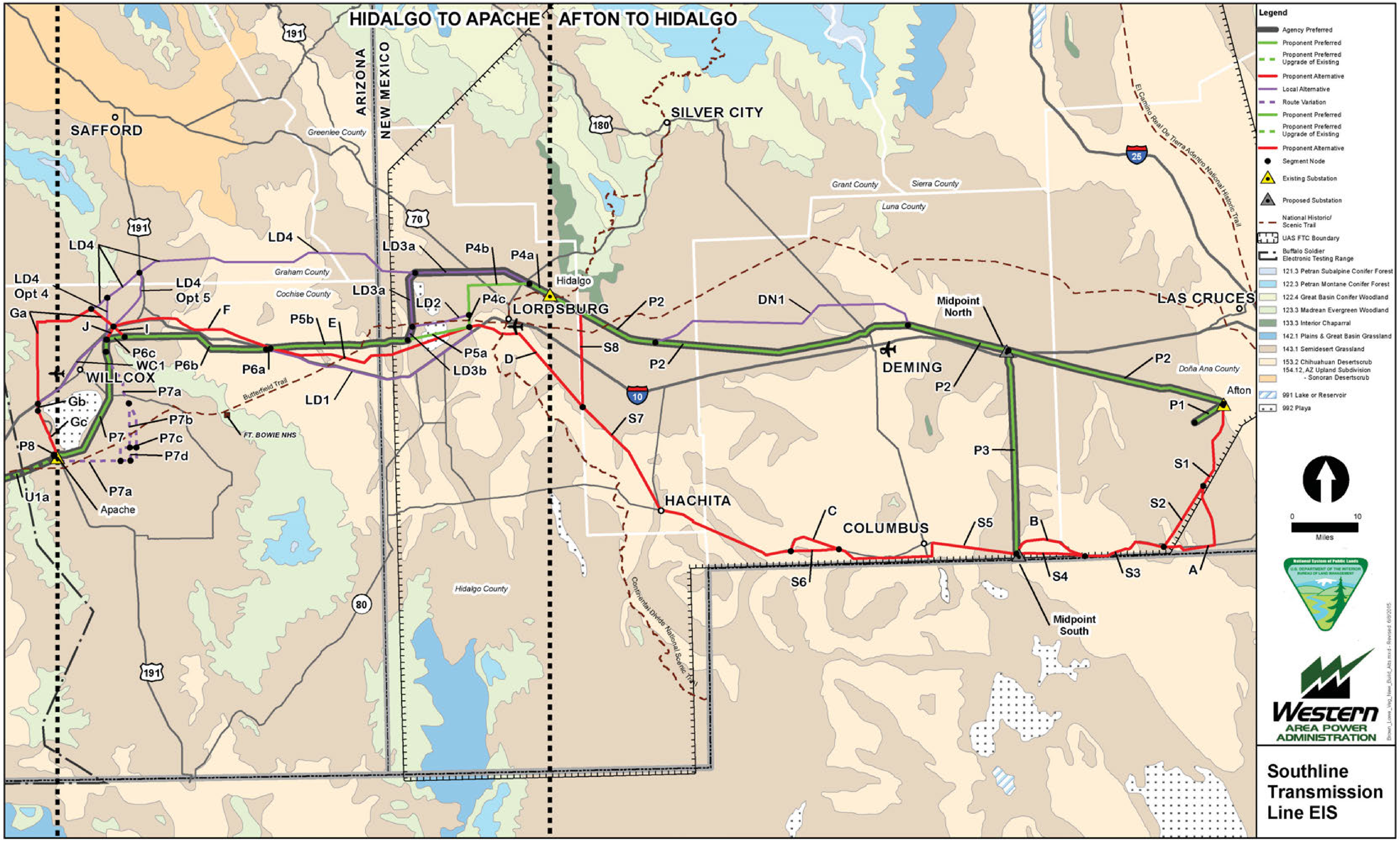


Figure 3.8-1b. Biotic communities in the Upgrade Section.

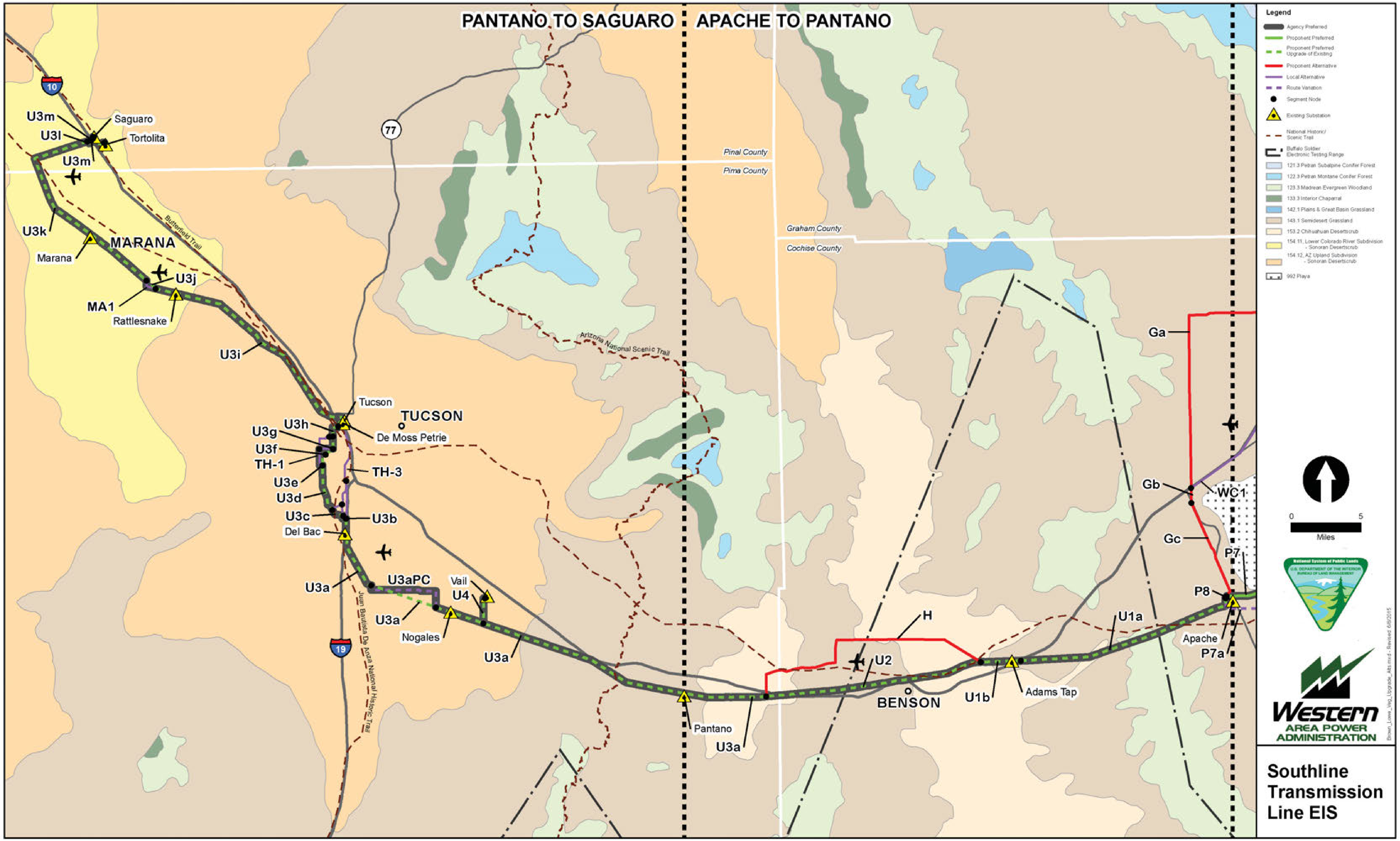


Figure 3.8-2a. SWReGAP plant associations in the New Build Section.

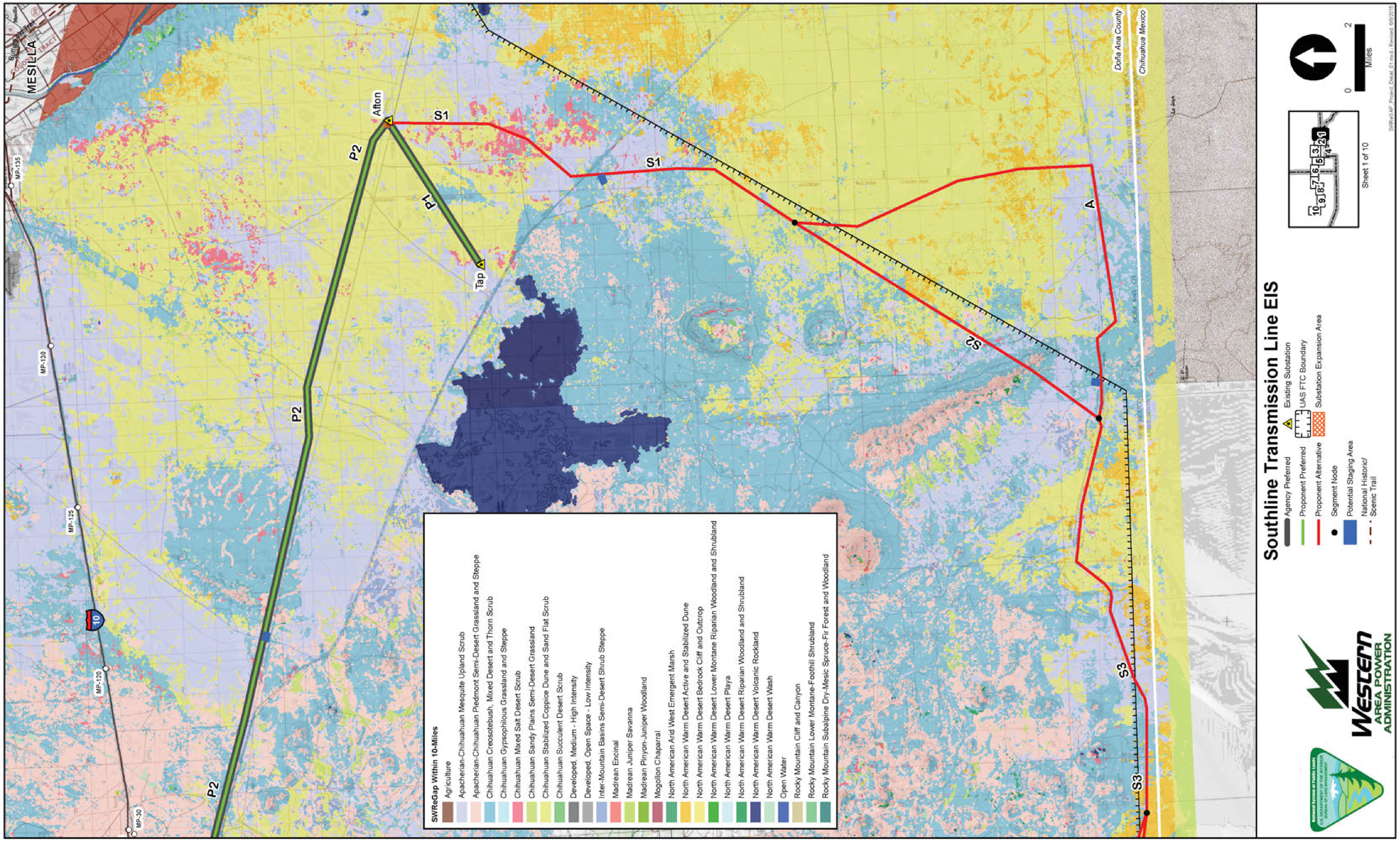


Figure 3.8-2b. SWReGAP plant associations in the New Build Section.

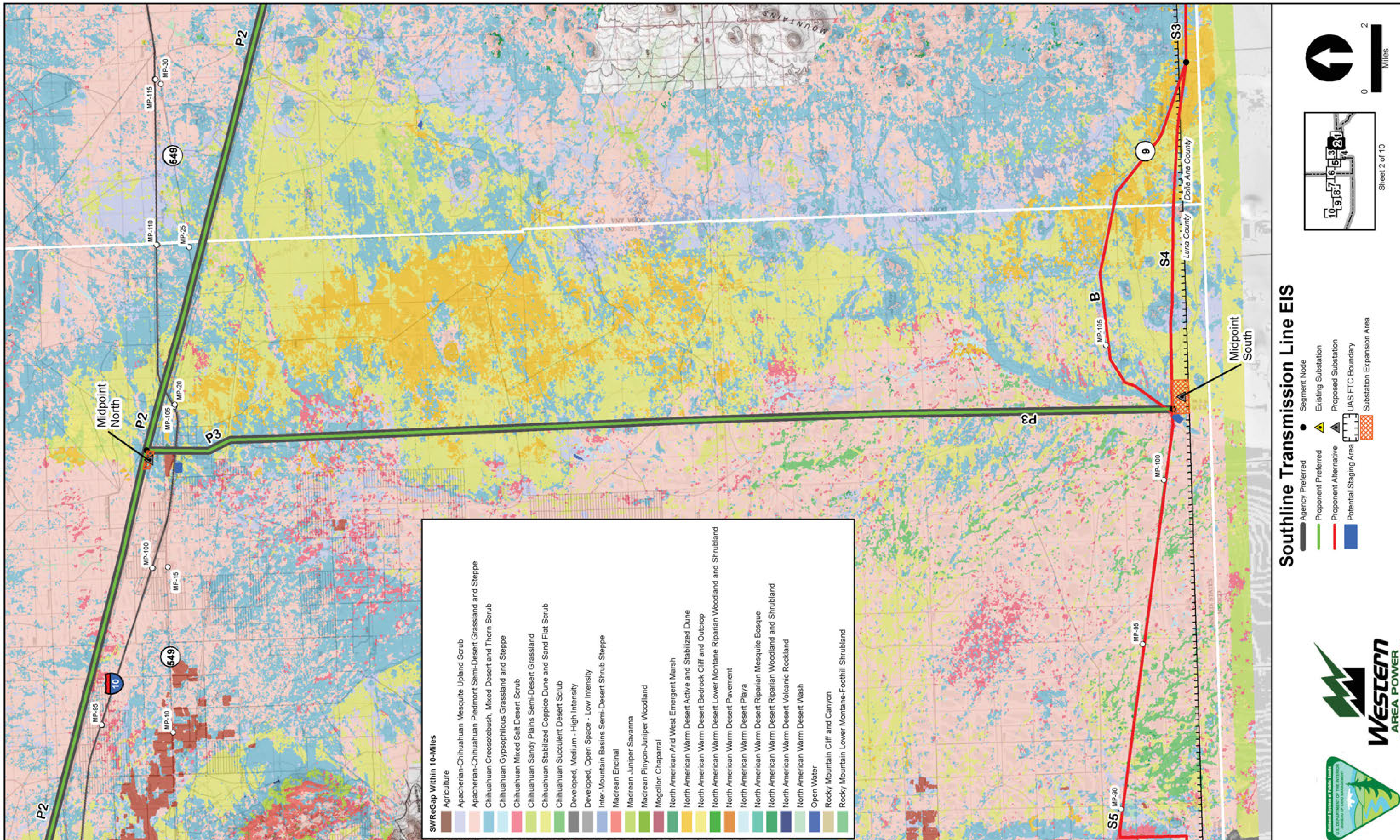


Figure 3.8-2c. SWReGAP plant associations in the New Build Section.

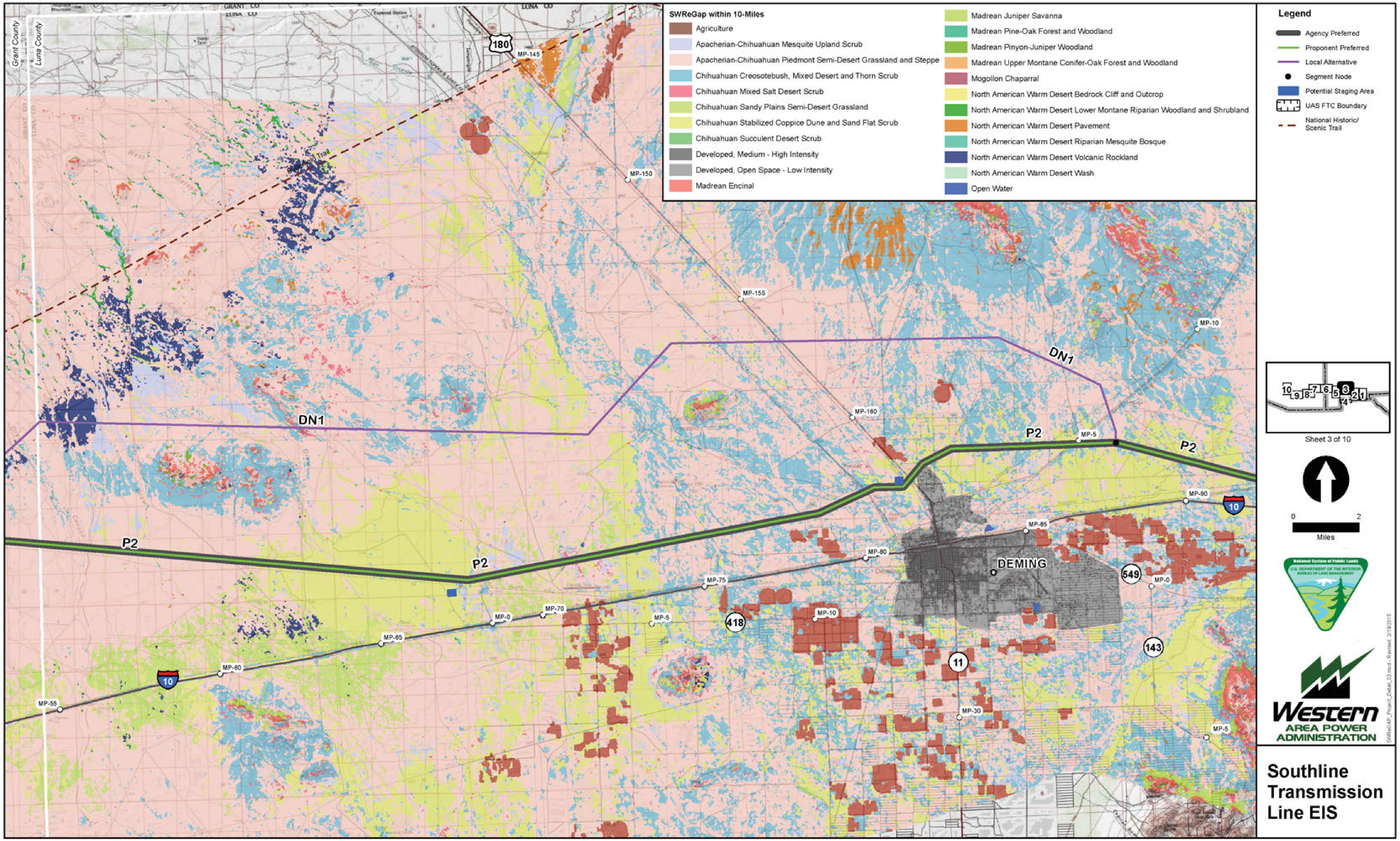


Figure 3.8-2d. SWReGAP plant associations in the New Build Section.

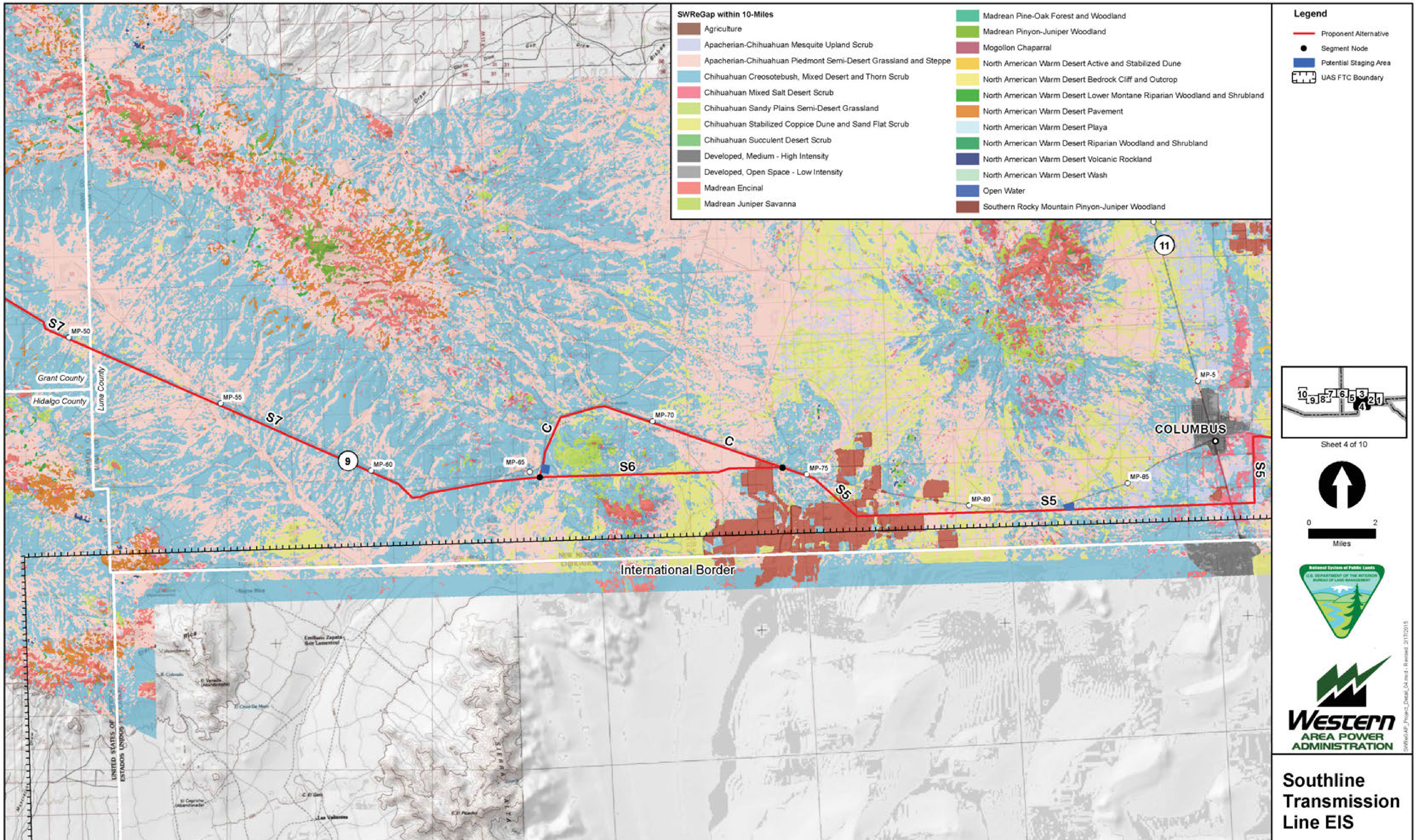


Figure 3.8-2e. SWReGAP plant associations in the New Build Section.

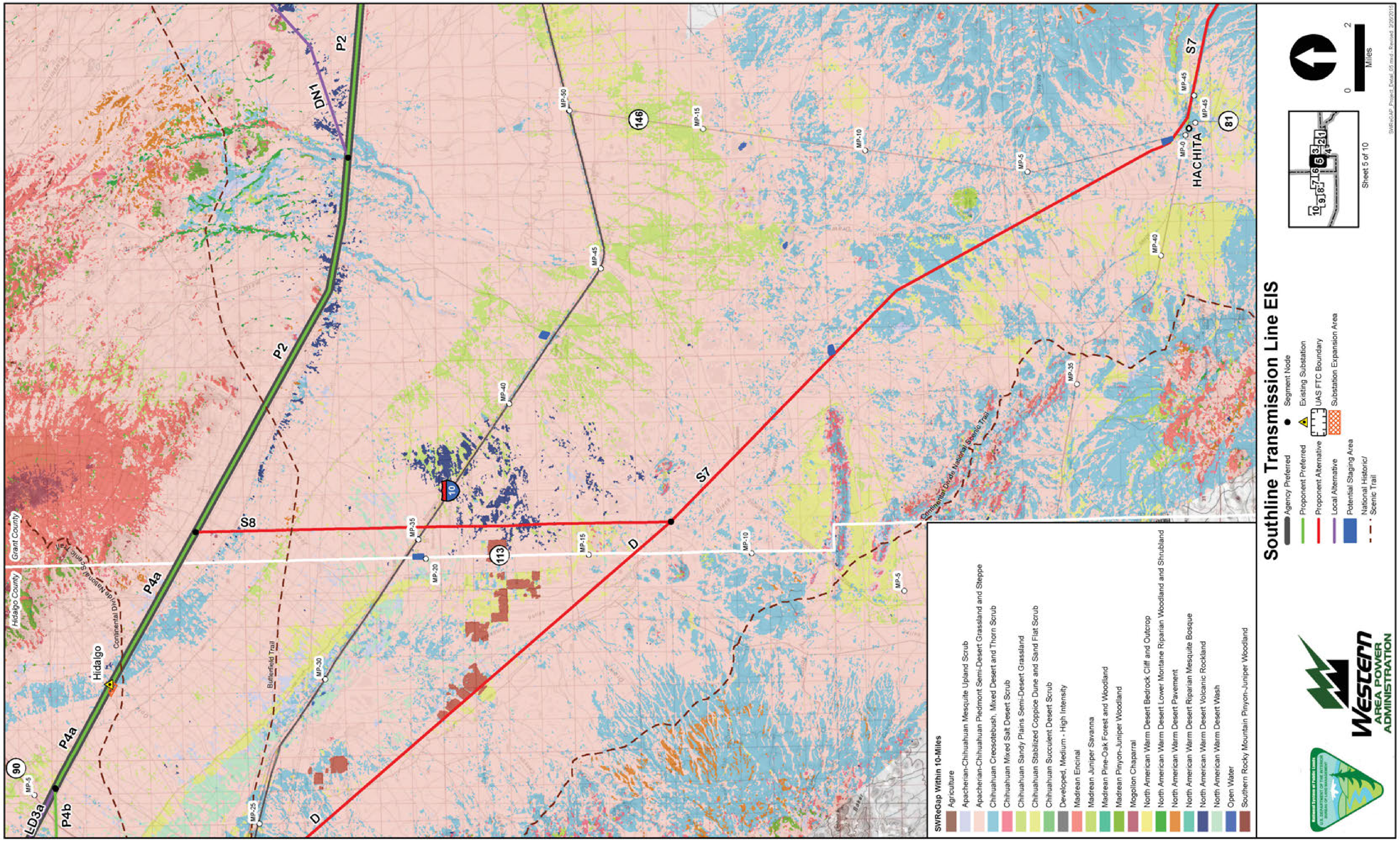


Figure 3.8-2f. SWReGAP plant associations in the New Build Section.

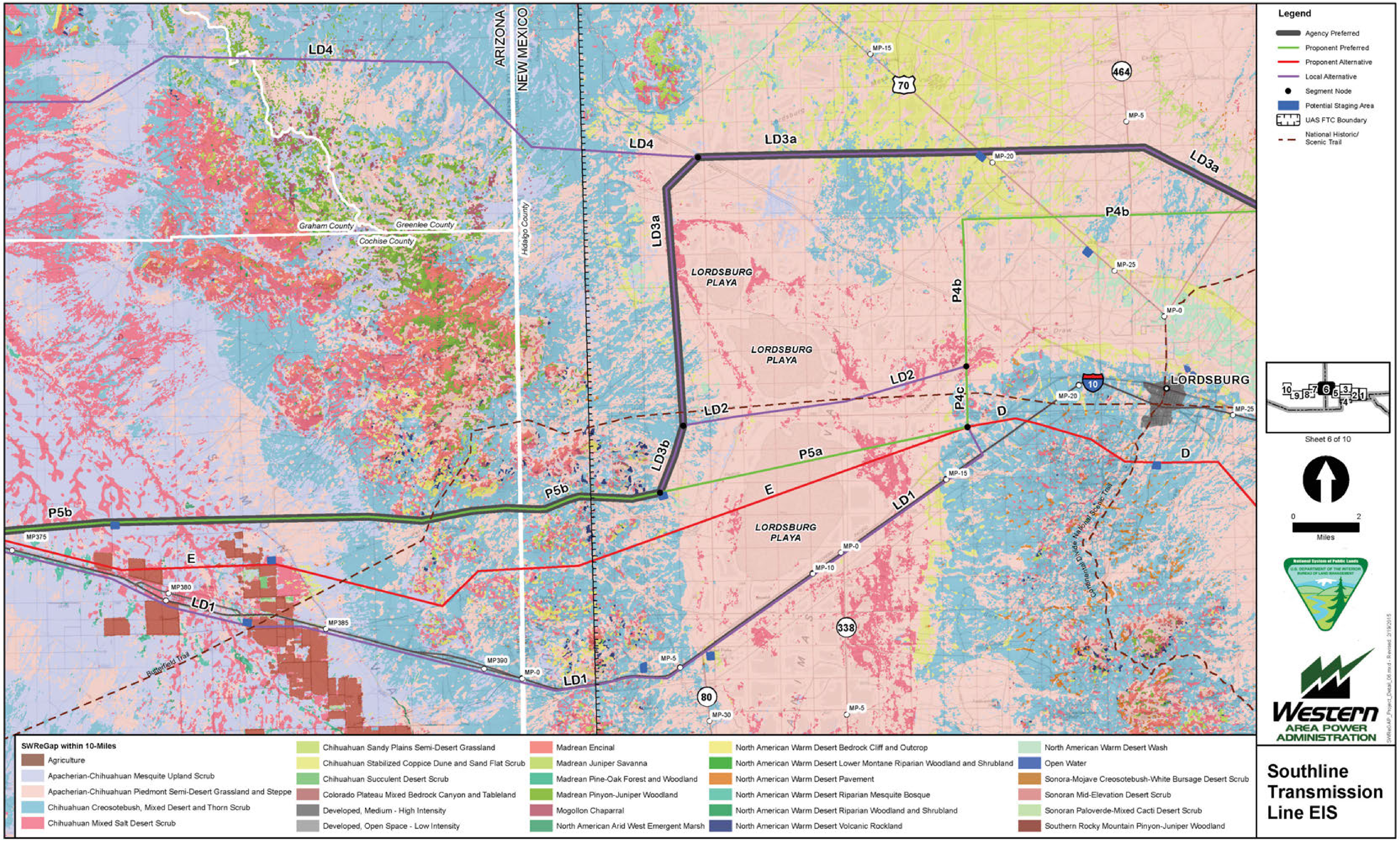


Figure 3.8-2g. SWReGAP plant associations in the New Build Section.

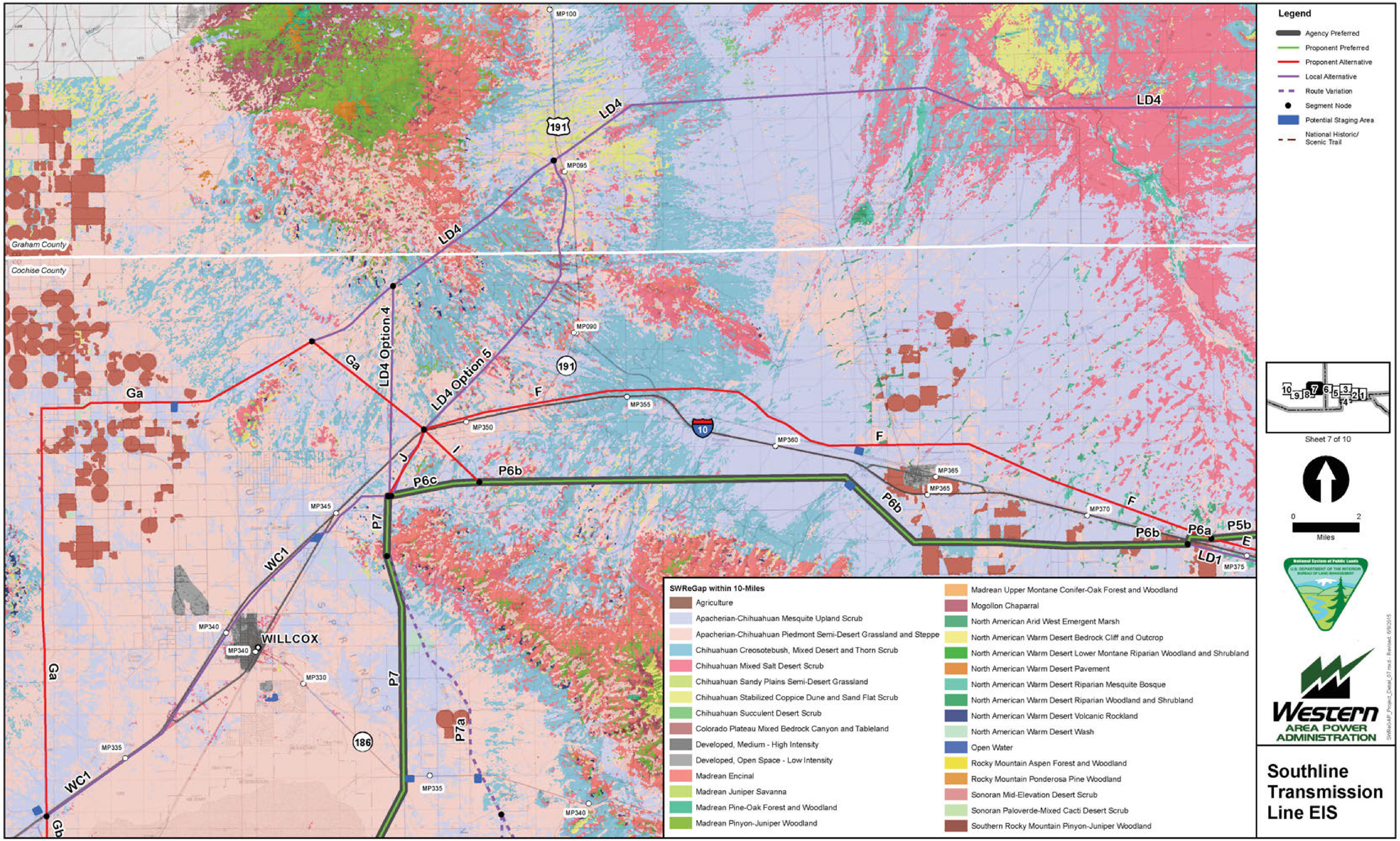


Figure 3.8-3a. SWReGAP plant associations in the Upgrade Section.

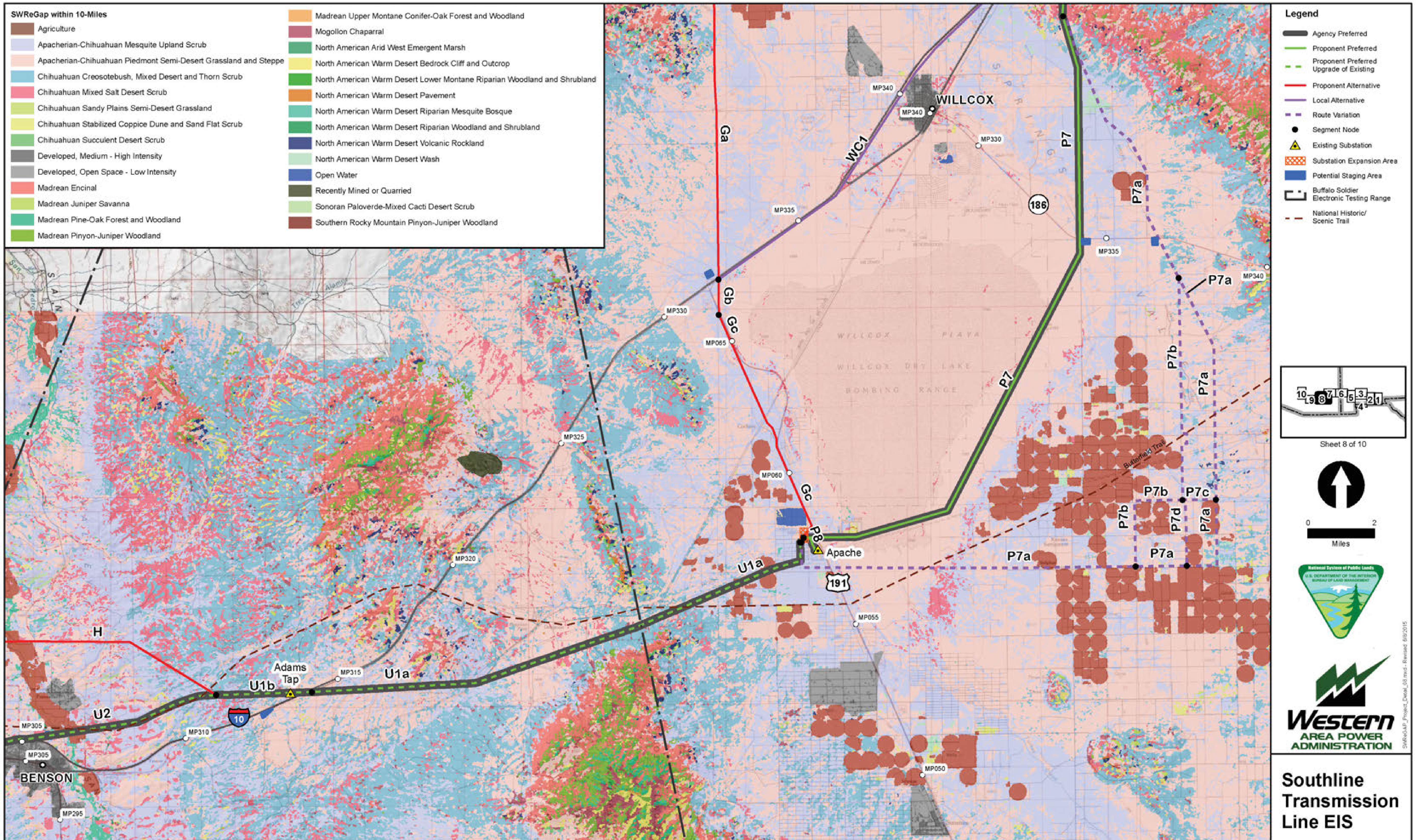


Figure 3.8-3b. SWReGAP plant associations in the Upgrade Section.

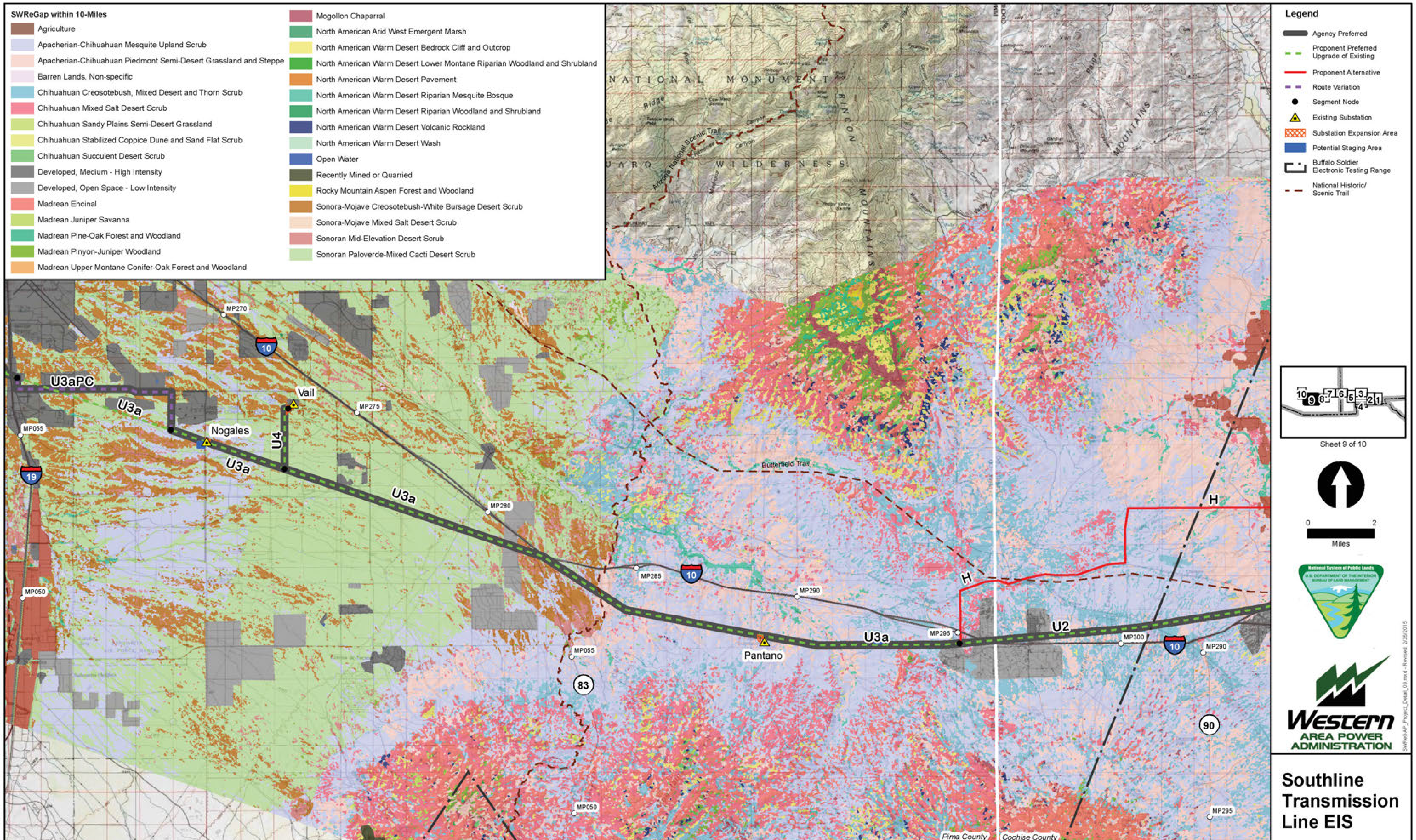


Figure 3.8-3c. SWReGAP plant associations in the Upgrade Section.

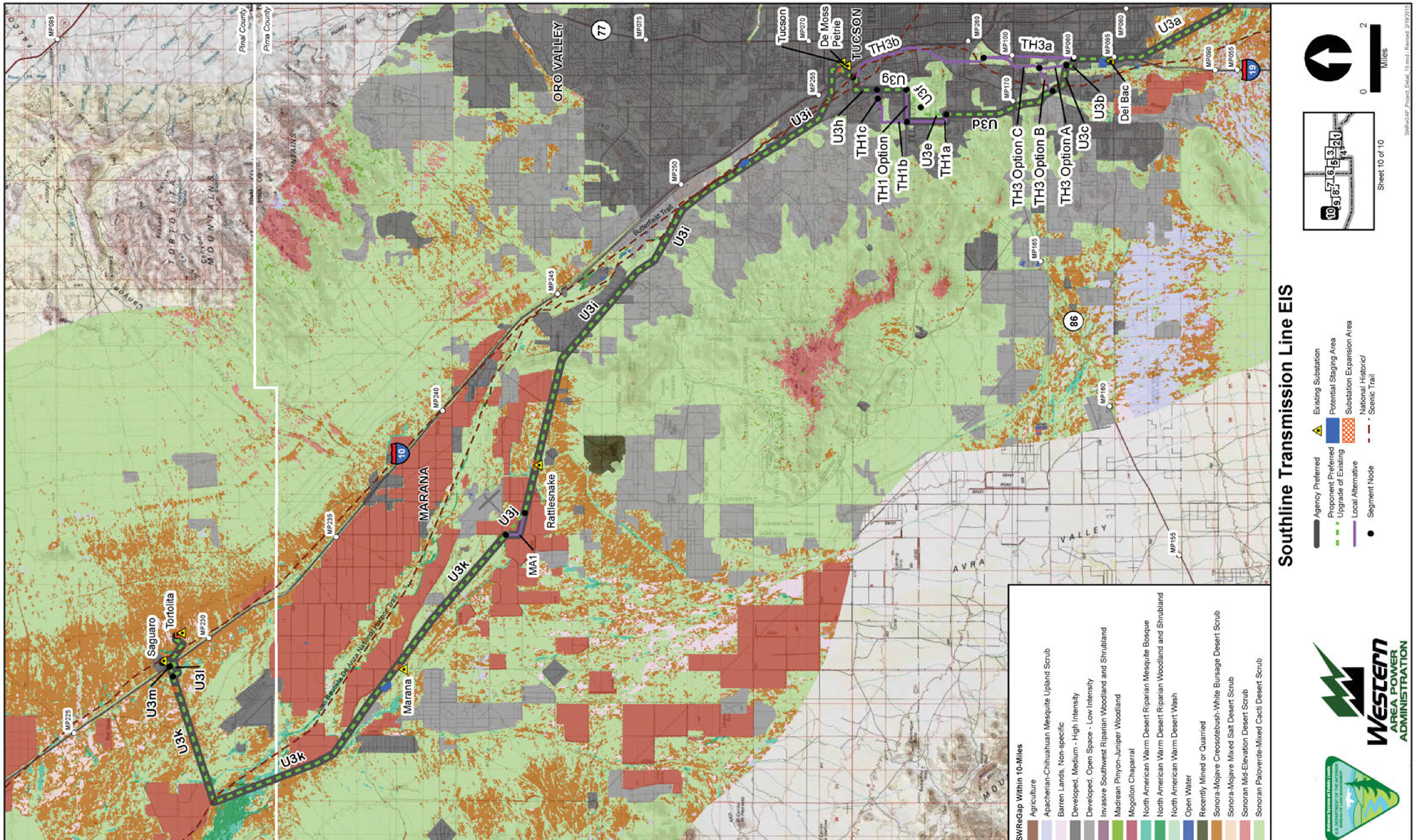


Figure 3.8-4. Ecoregions in New Build Section.

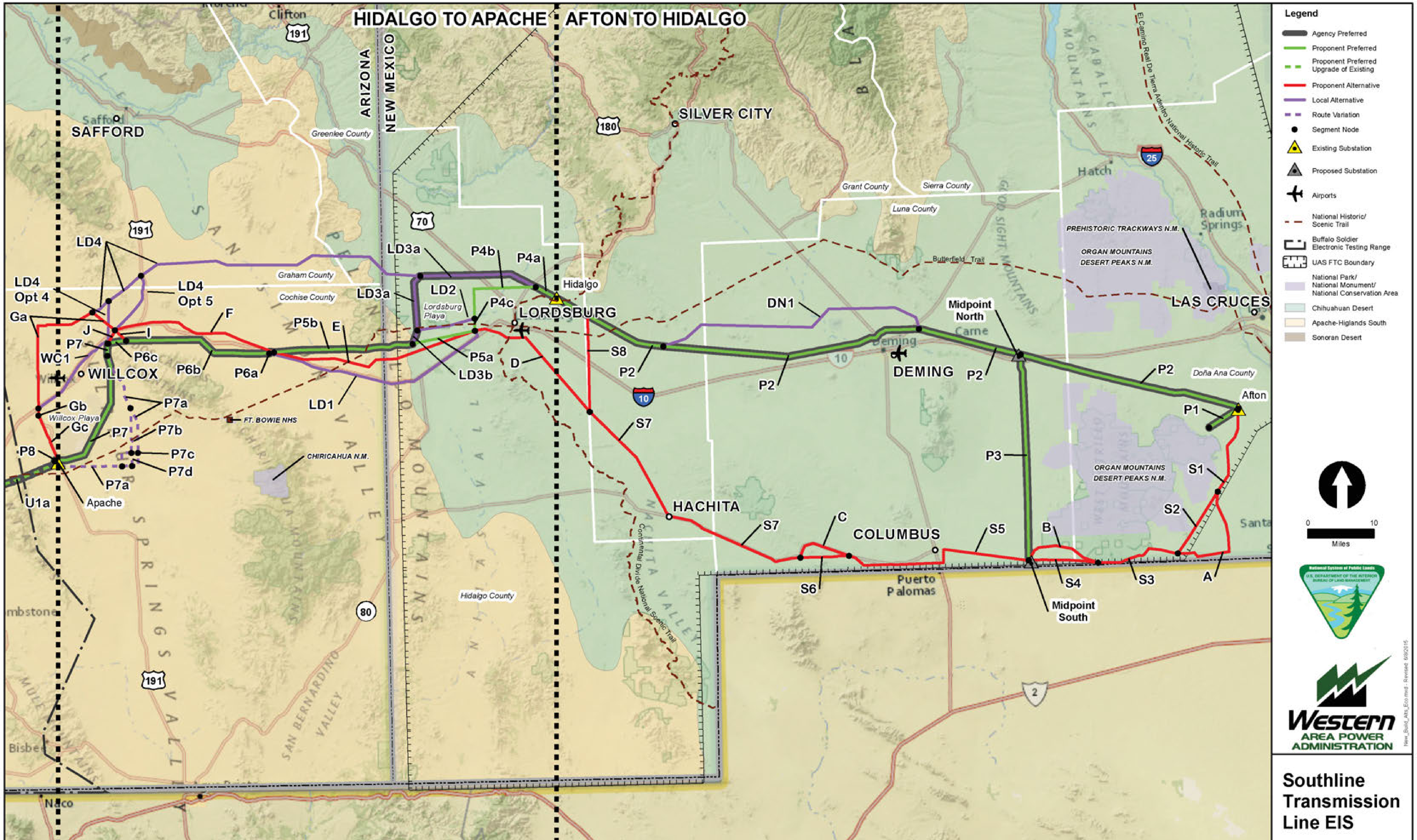


Figure 3.8-5. Ecoregions in Upgrade Section.

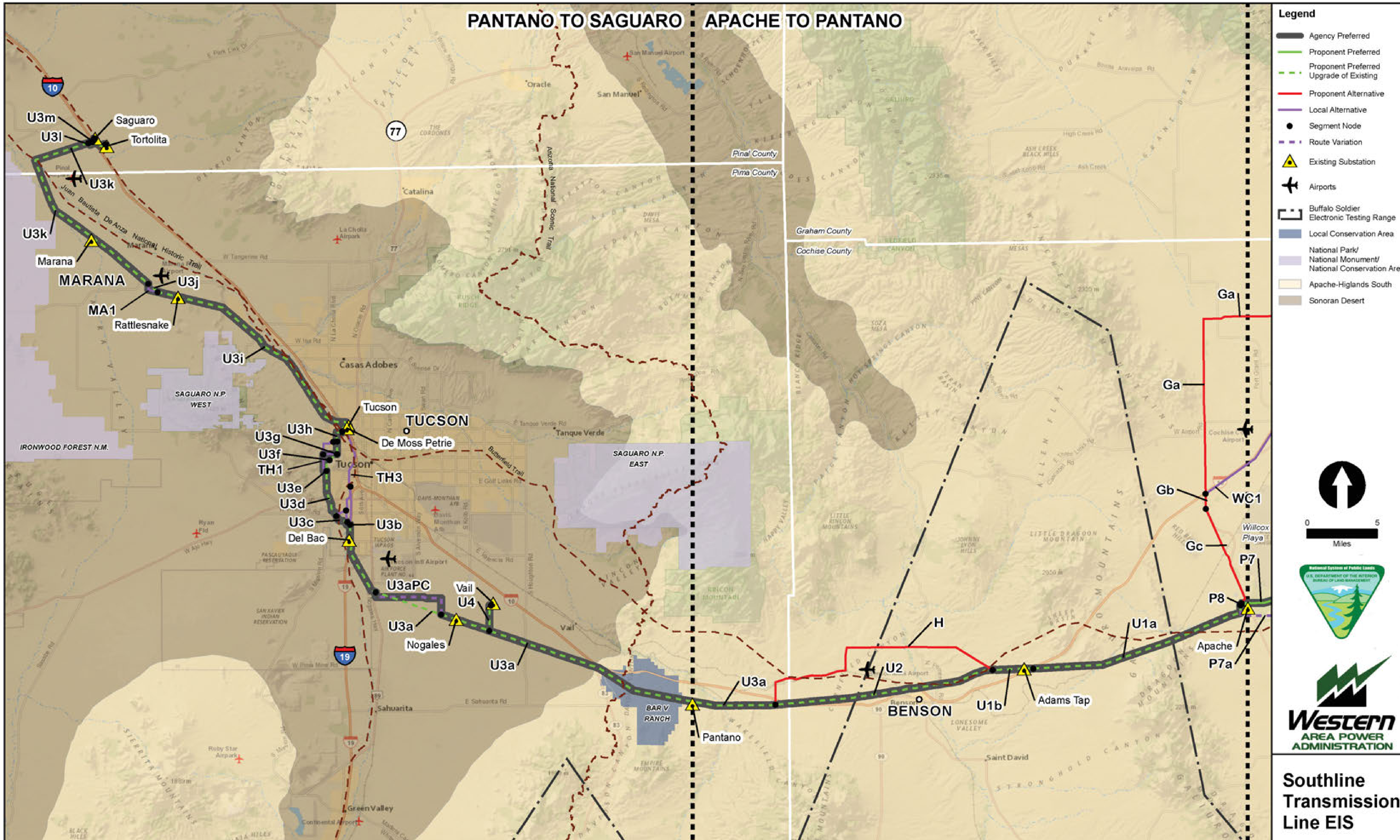


Figure 3.8-6. Wildlife linkages in New Build Section.

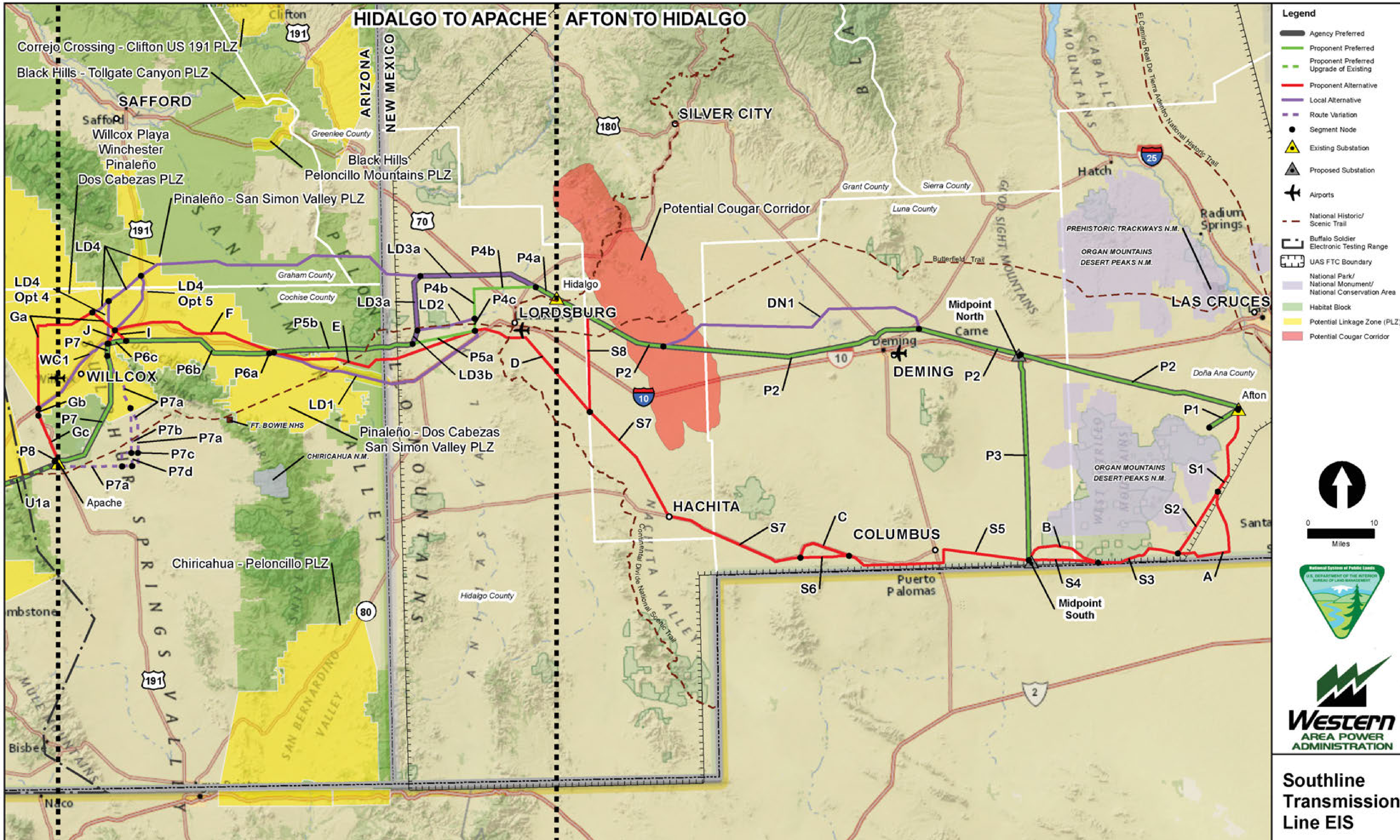


Figure 3.8-7. Avian protection areas in New Build Section.

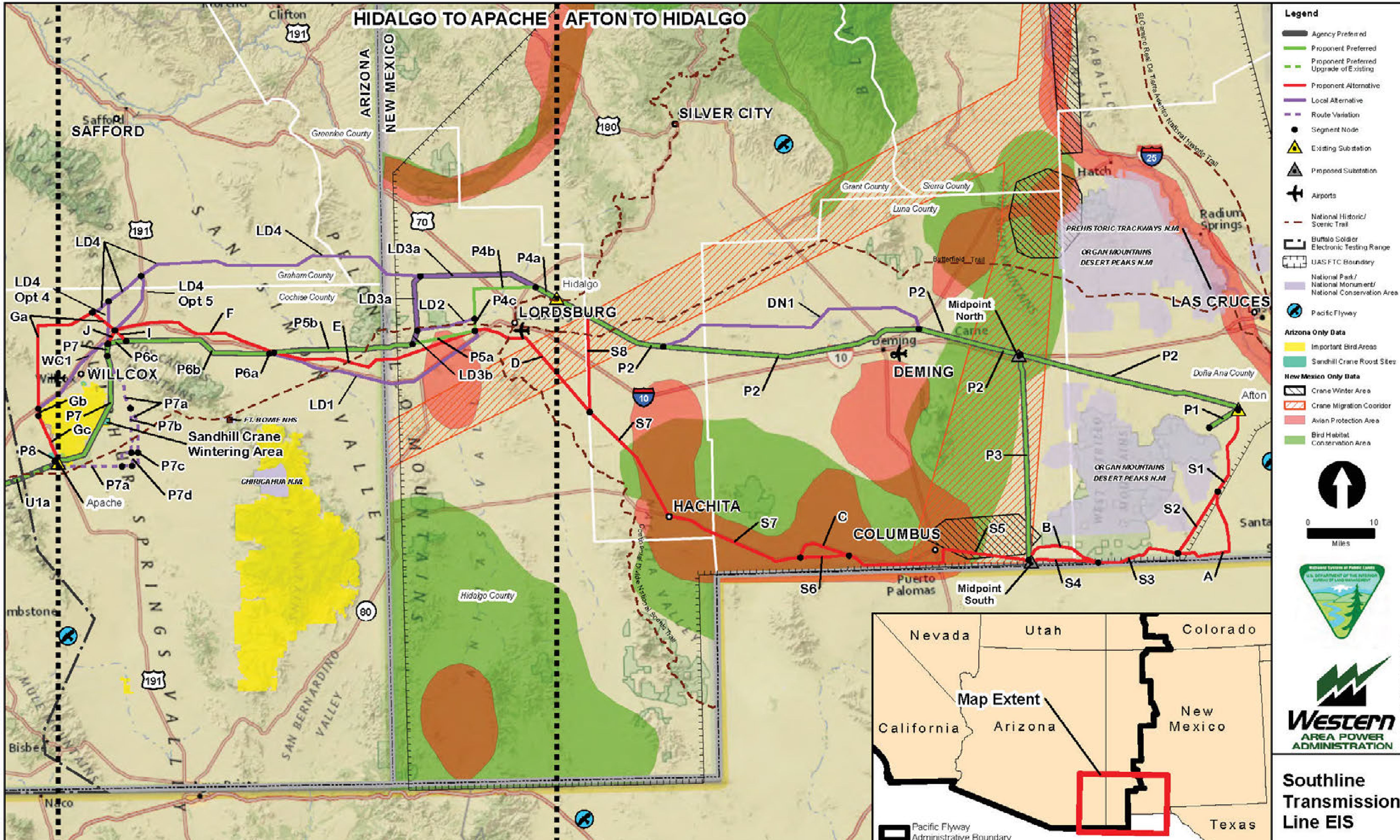


Figure 3.8-8. Wind ratings in New Build Section.

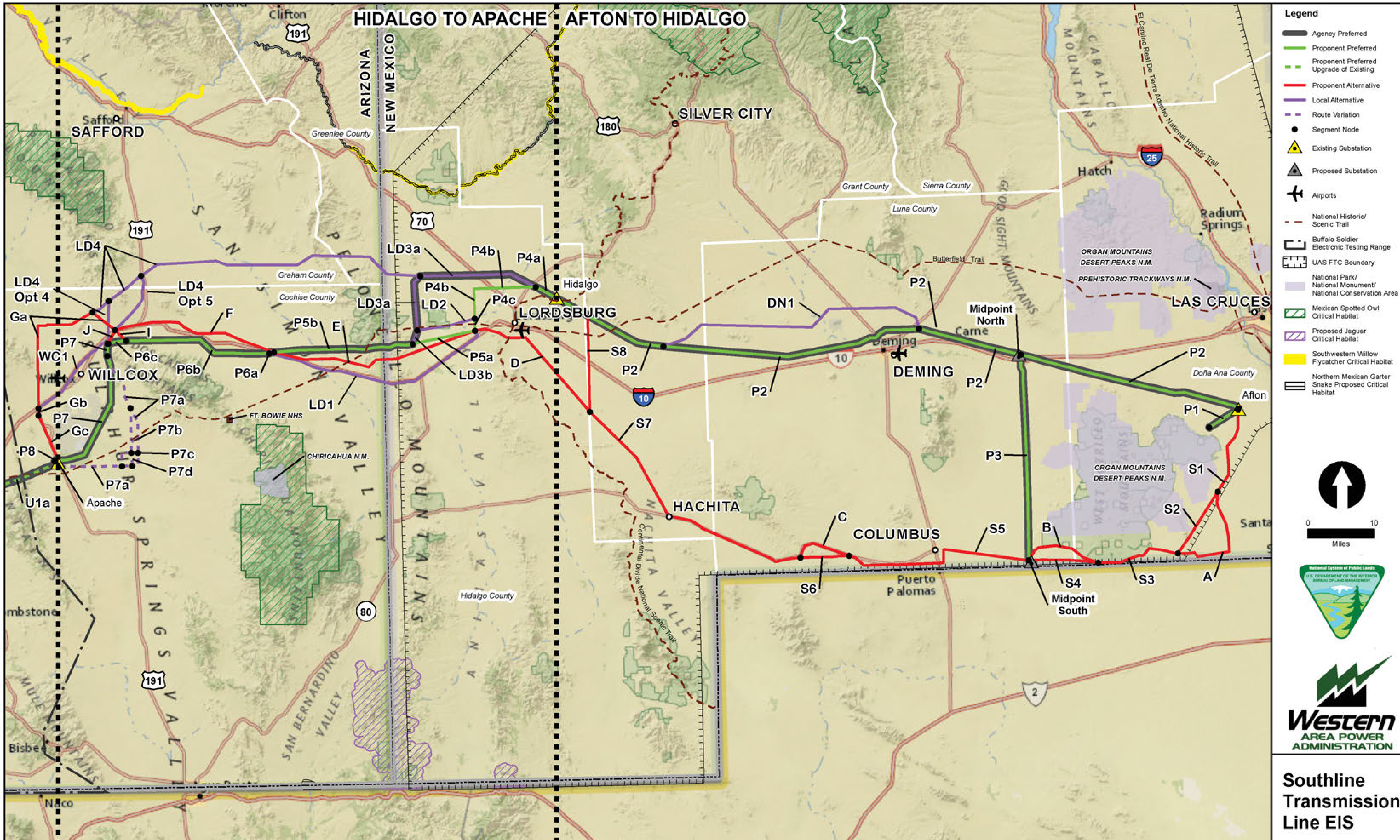


Figure 3.8-9. Critical habitat in New Build Section.

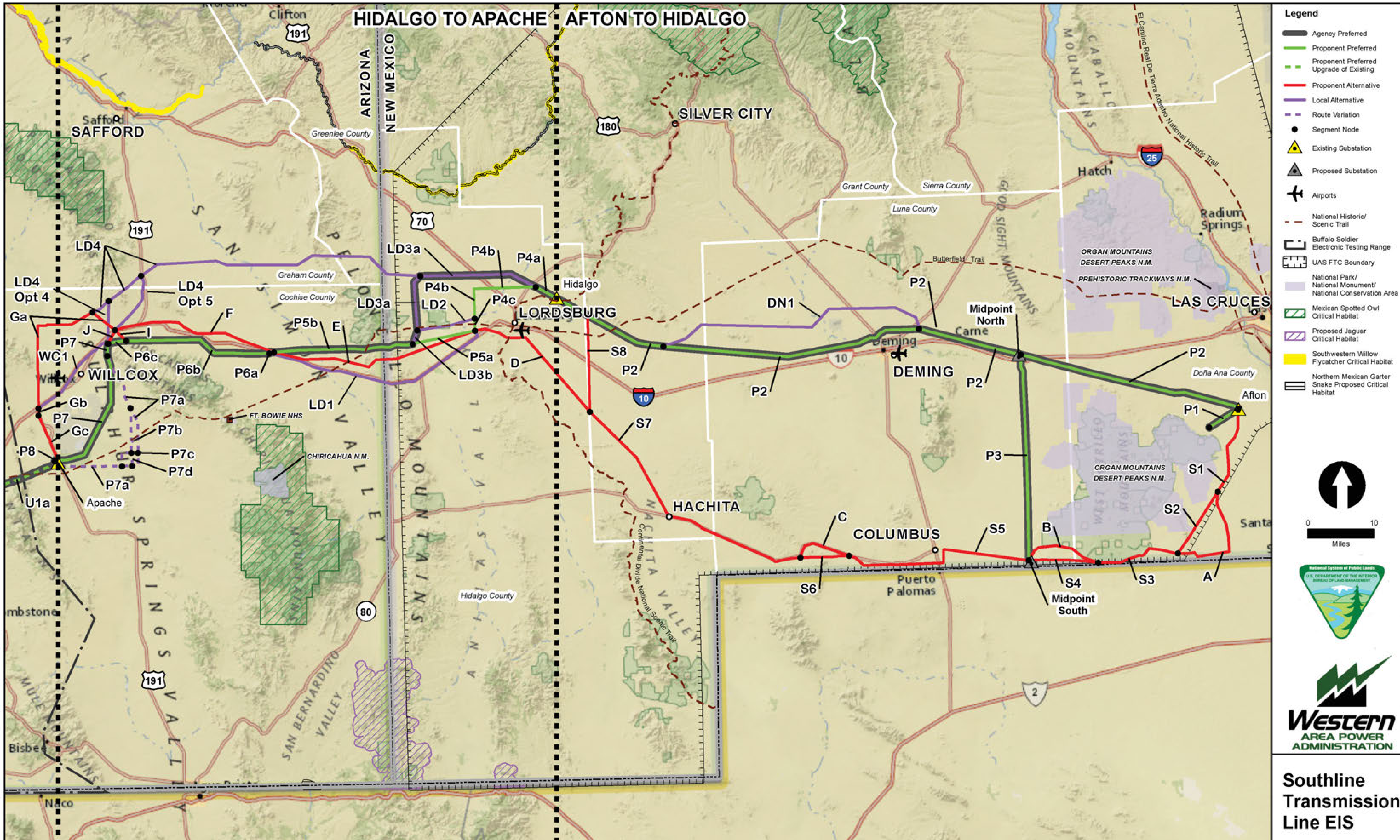


Figure 3.8-10. Avian protection areas in Upgrade Section.

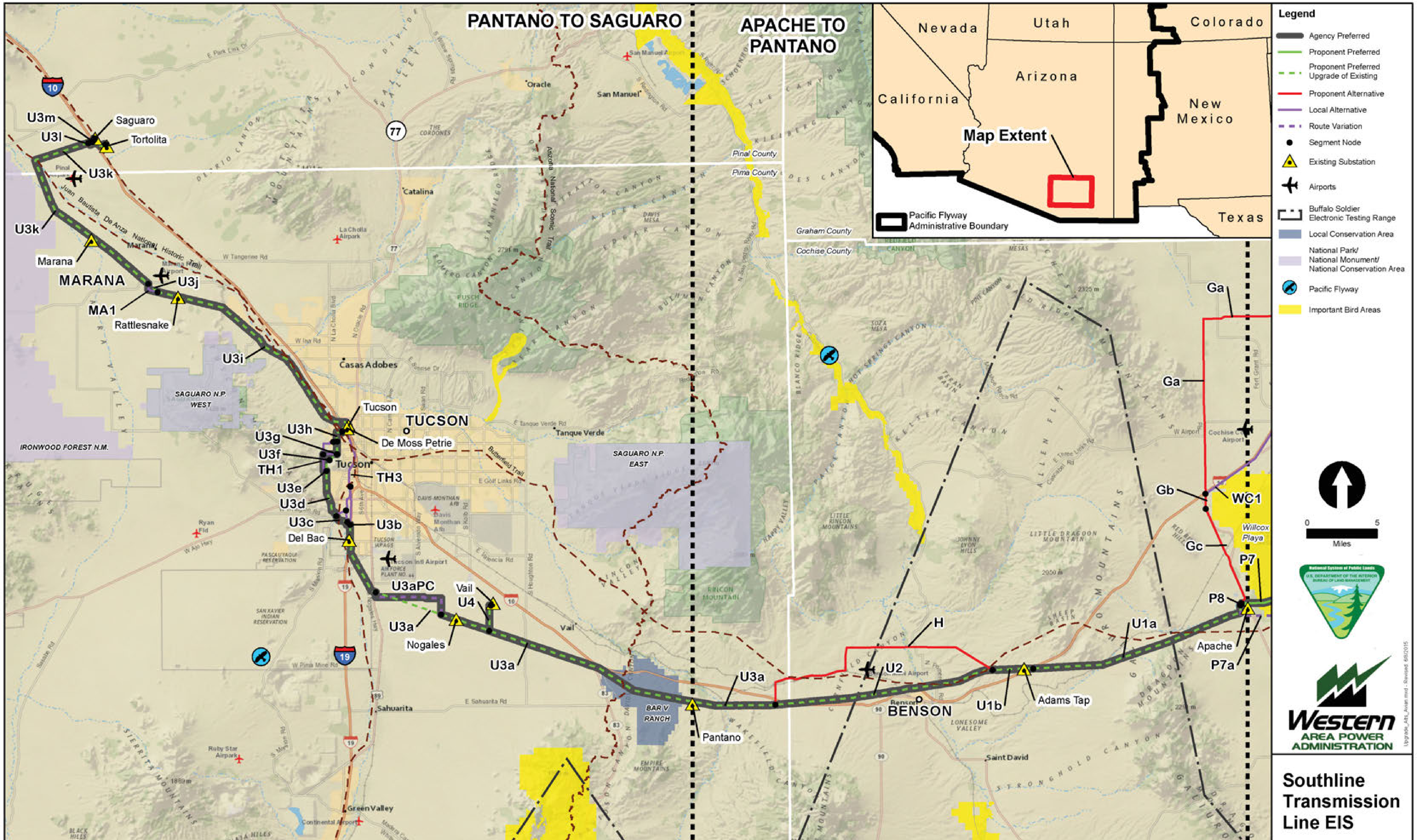


Figure 3.8-11. Critical habitat in Upgrade Section.

Figure 3.8-12. Wildlife linkages in Upgrade Section.

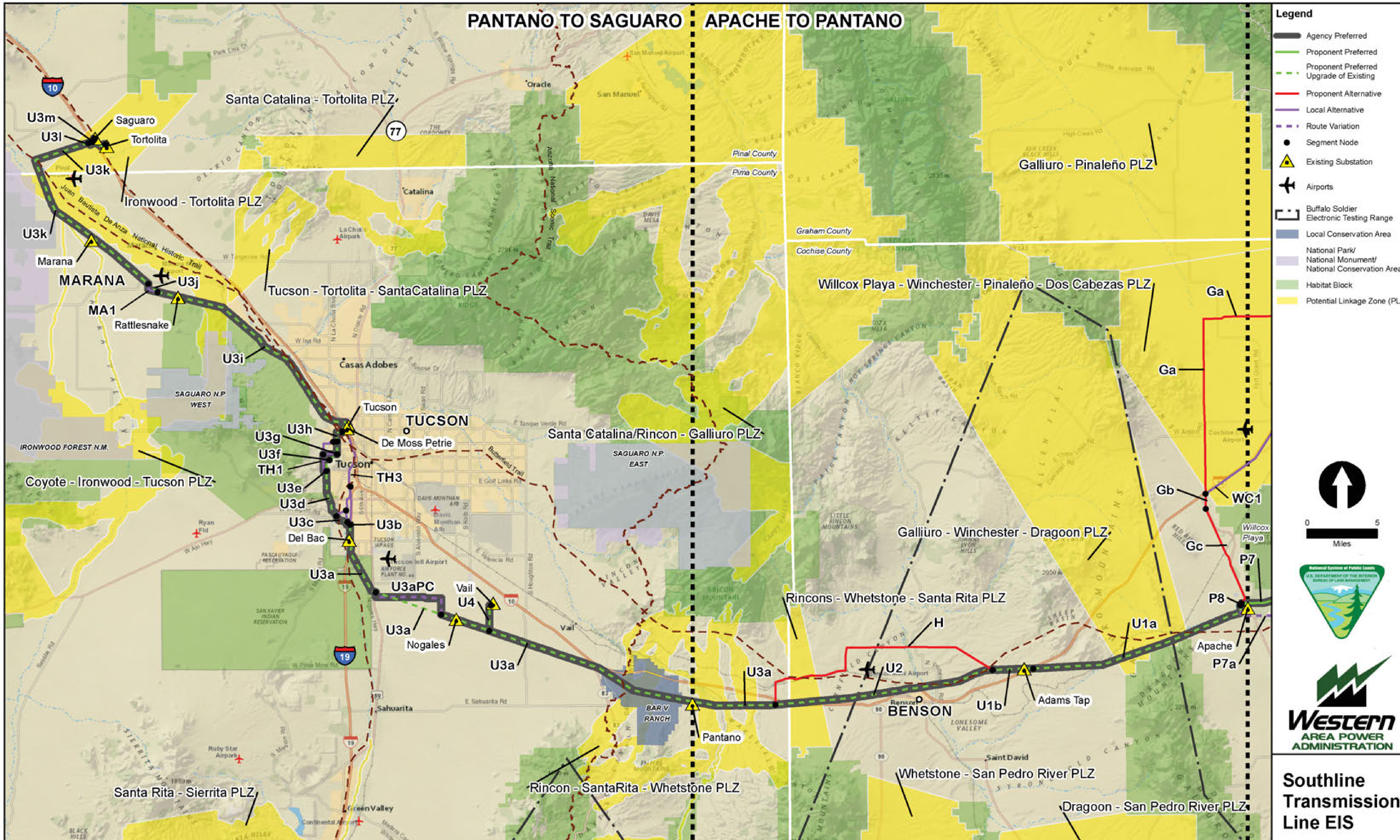
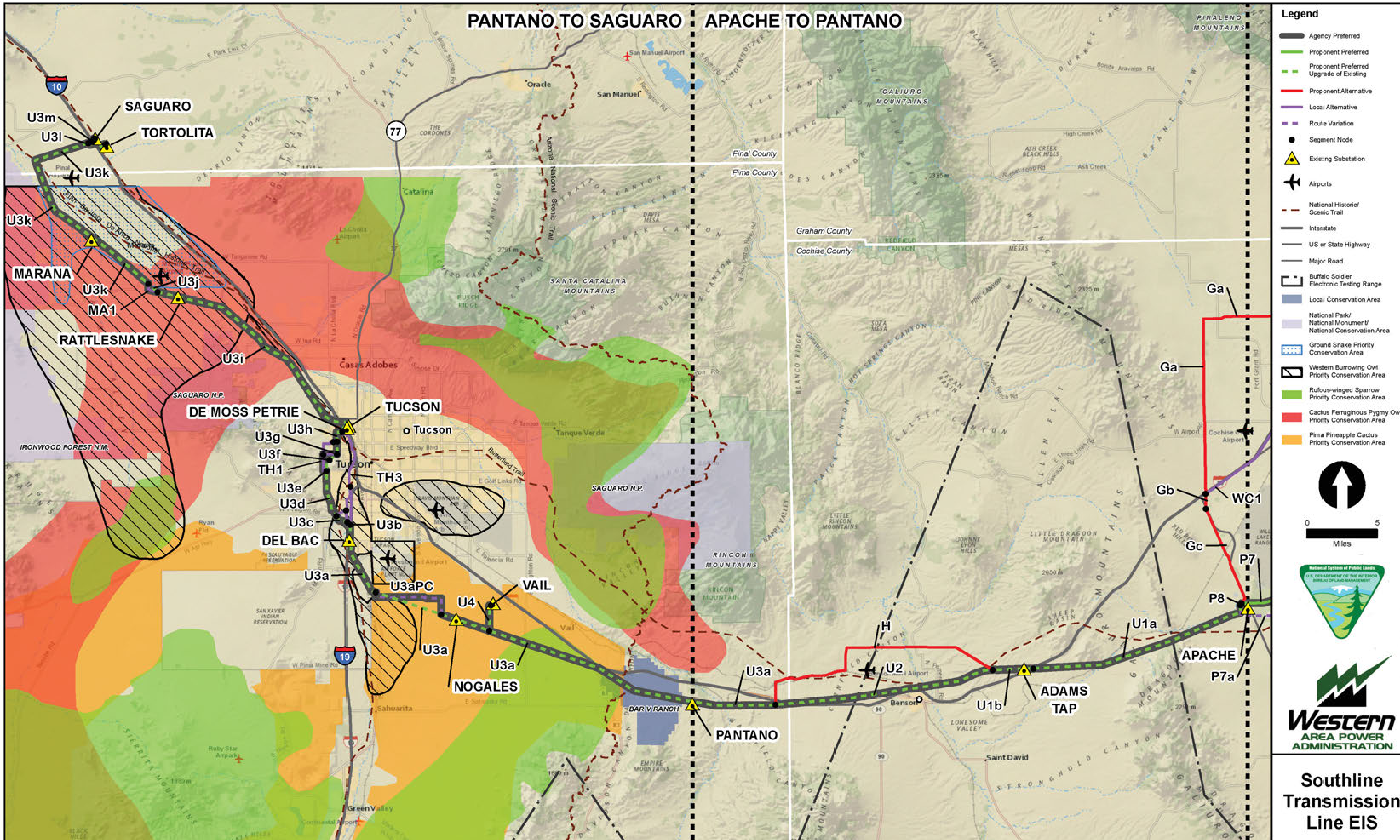


Figure 3.8-13. Pima County Priority Conservation Areas in Upgrade Section.



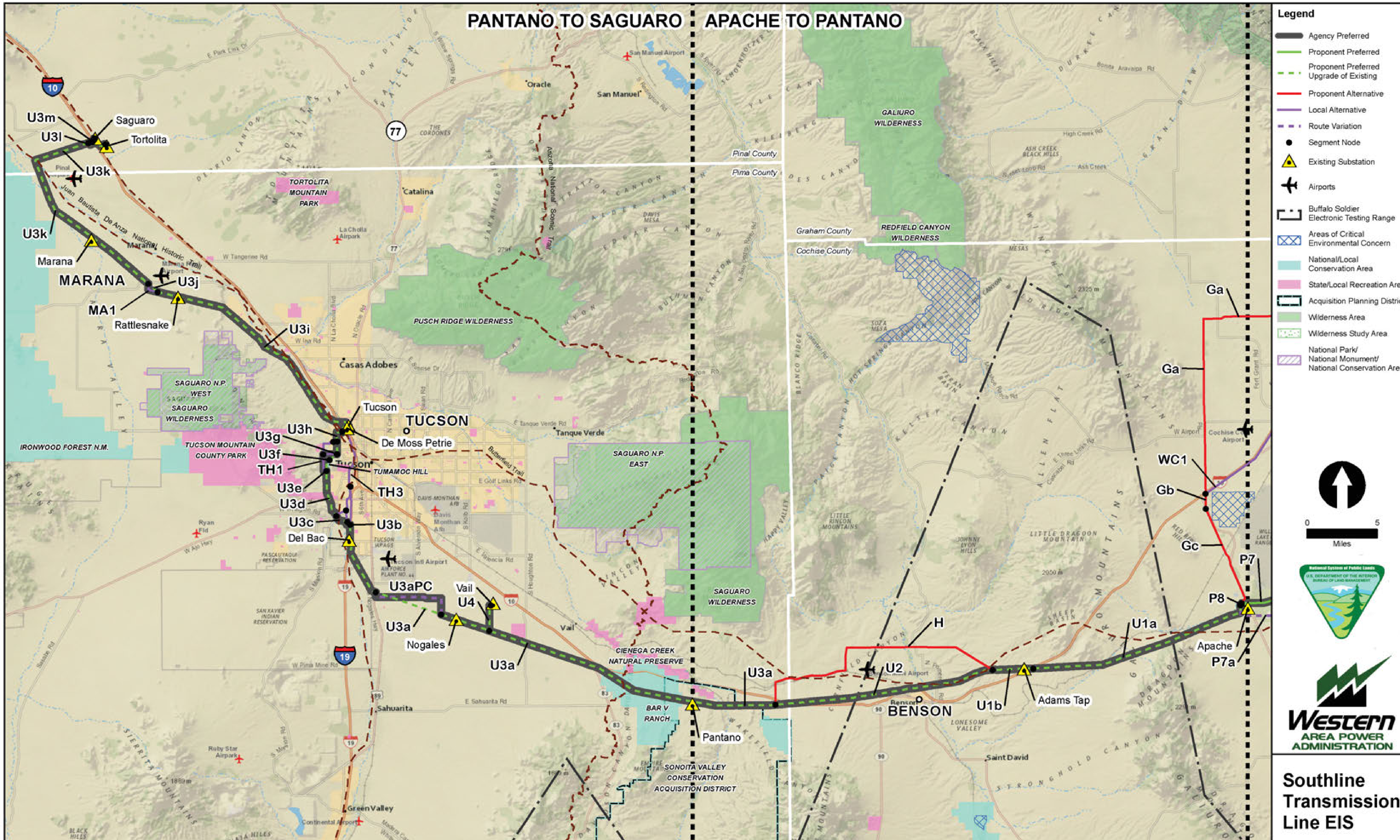


Figure 3.8-14. Preserves and parks in Upgrade Section.

Figure 3.8-15. Wind ratings in Upgrade Section.

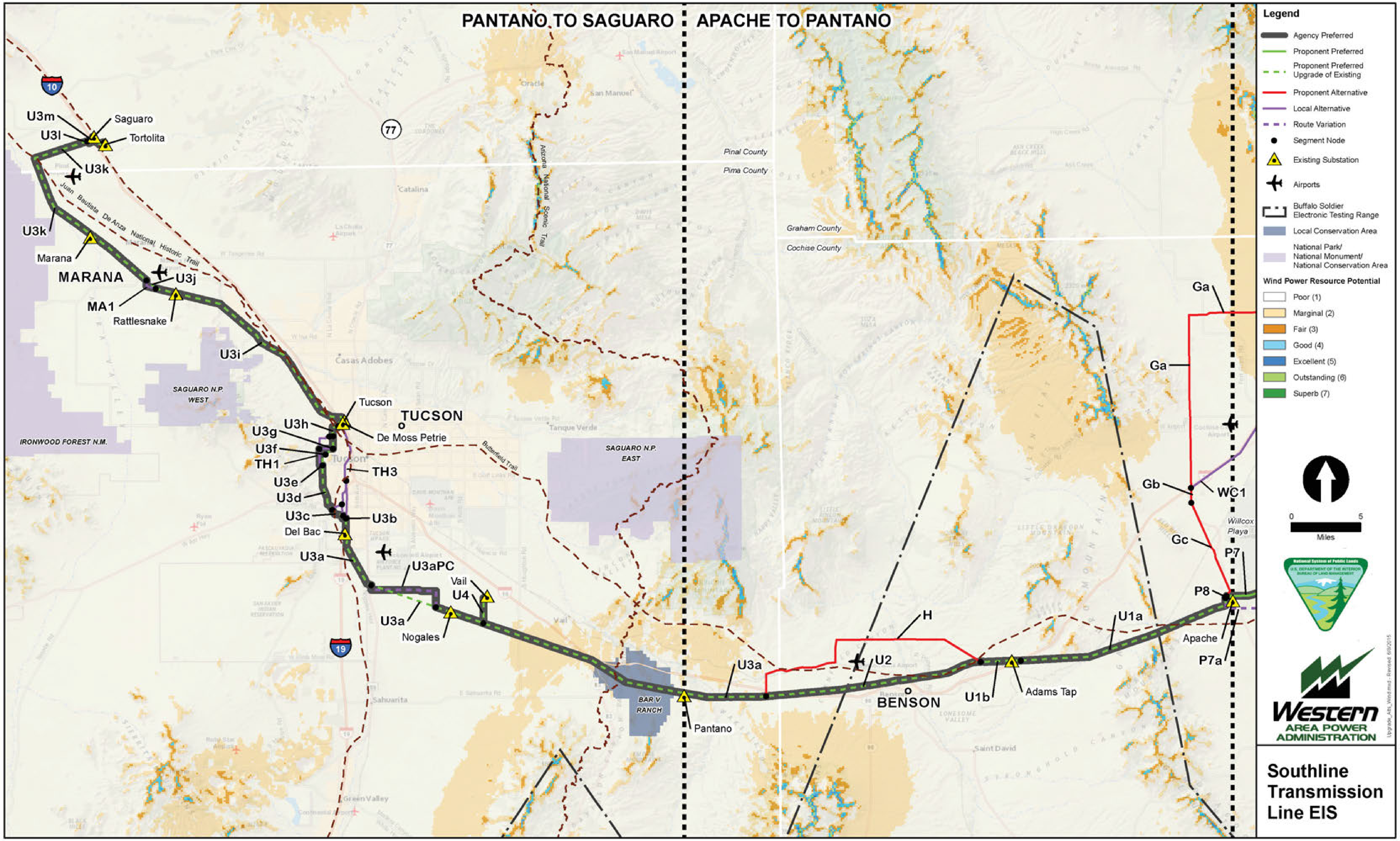


Figure 3.9-1a. Archaeology Southwest's Cultural Resources Priority Areas in route group 1.

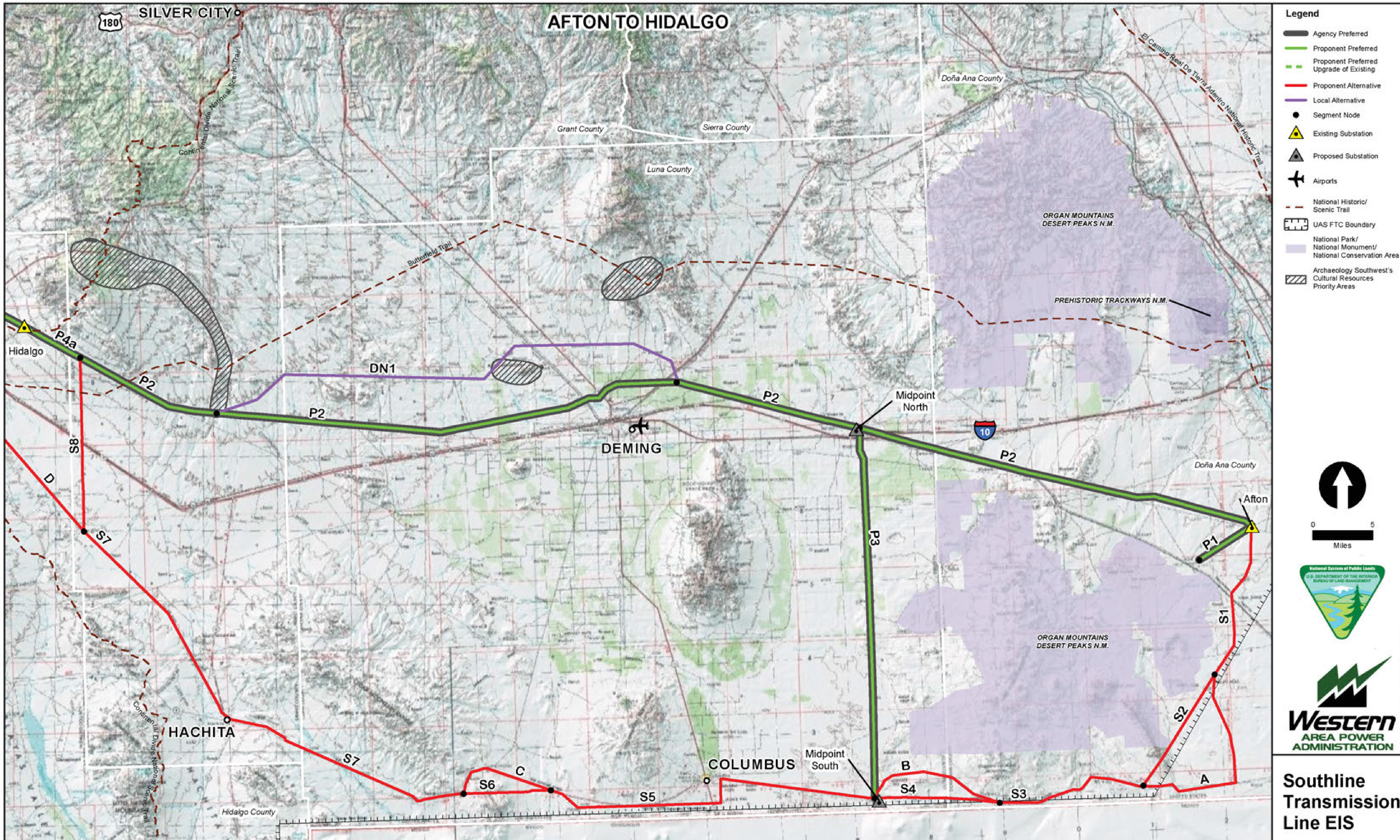


Figure 3.9-1b. Archaeology Southwest's Cultural Resources Priority Areas in route group 2.

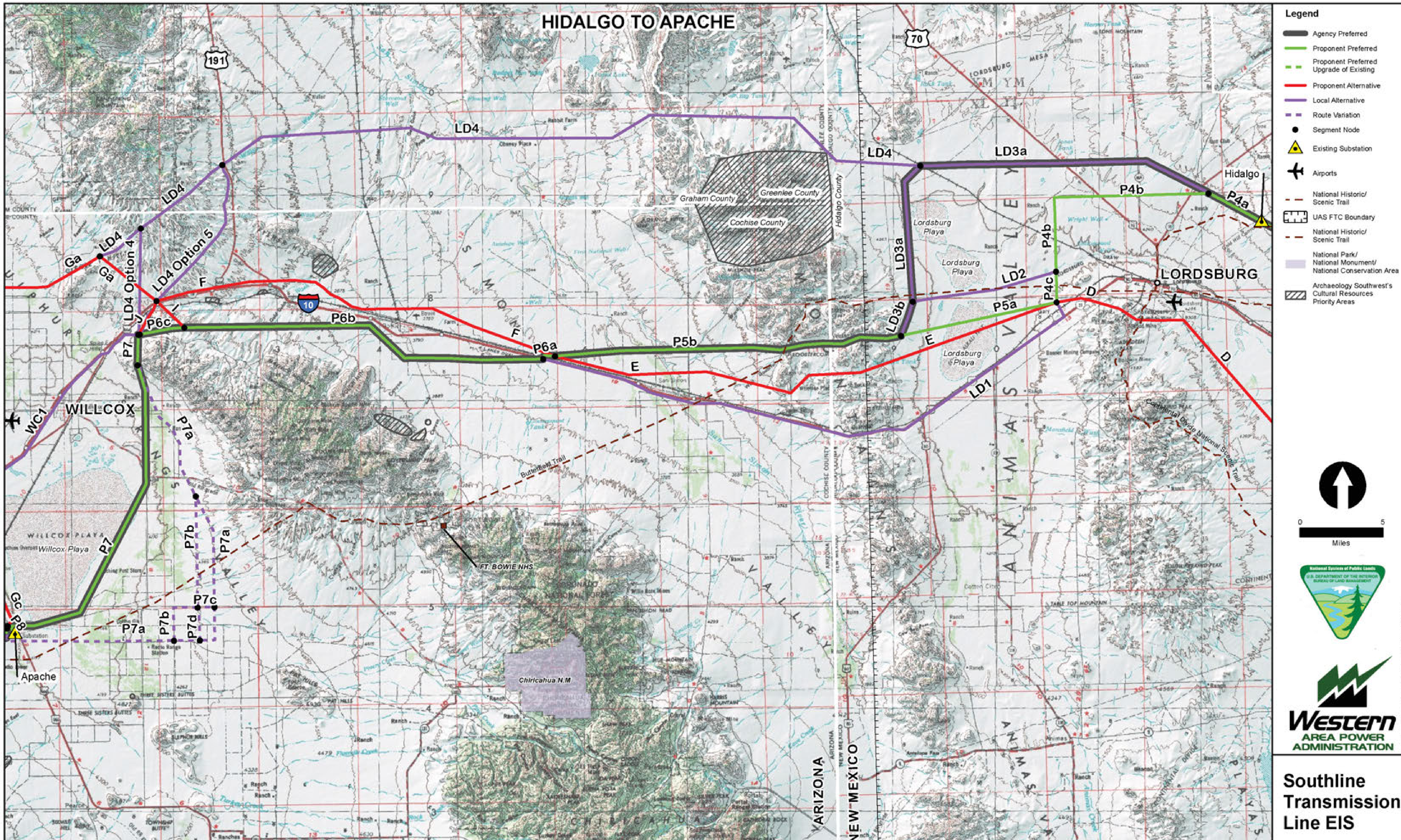


Figure 3.9-1c. Archaeology Southwest's Cultural Resources Priority Areas in route group 3.

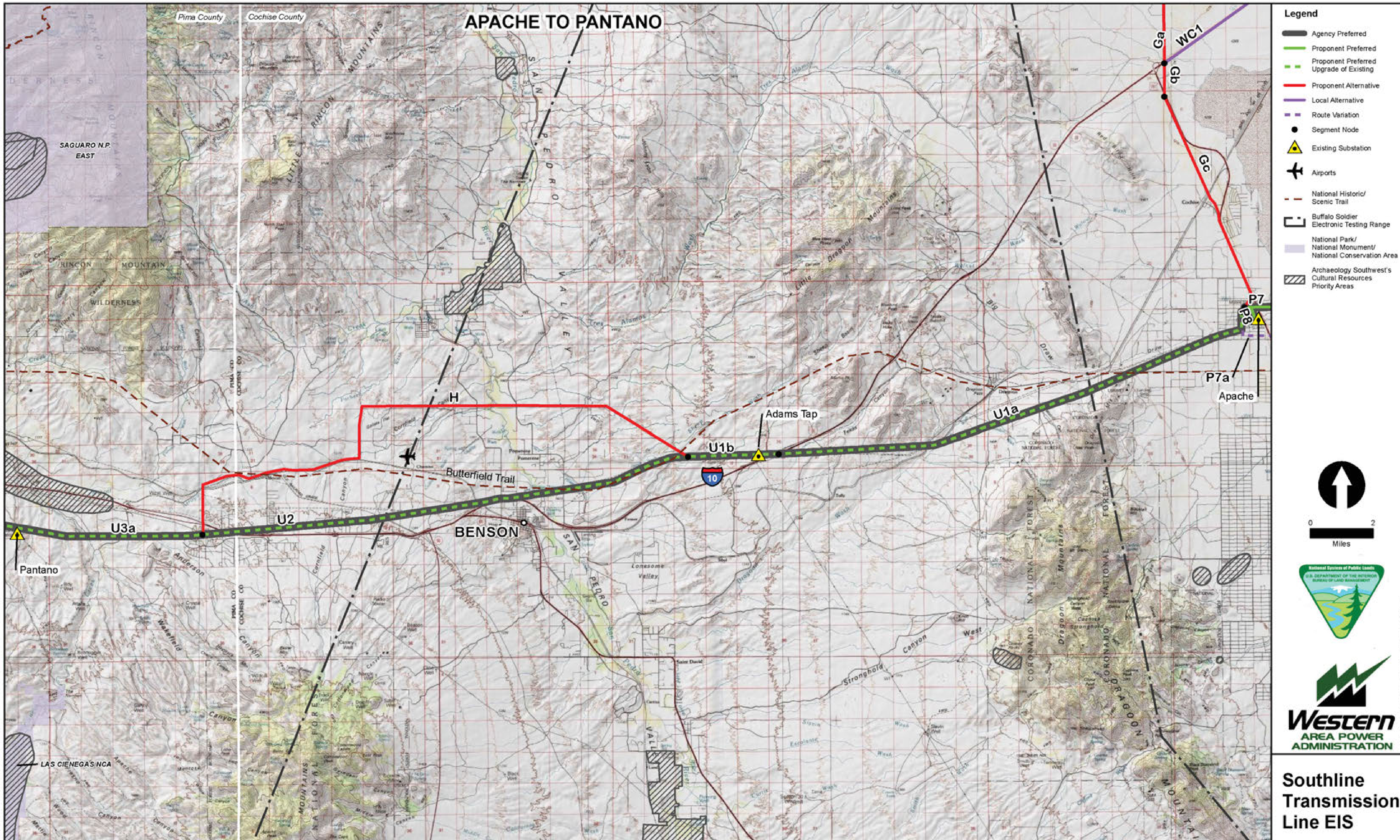


Figure 3.9-1d. Archaeology Southwest's Cultural Resources Priority Areas in route group 4.

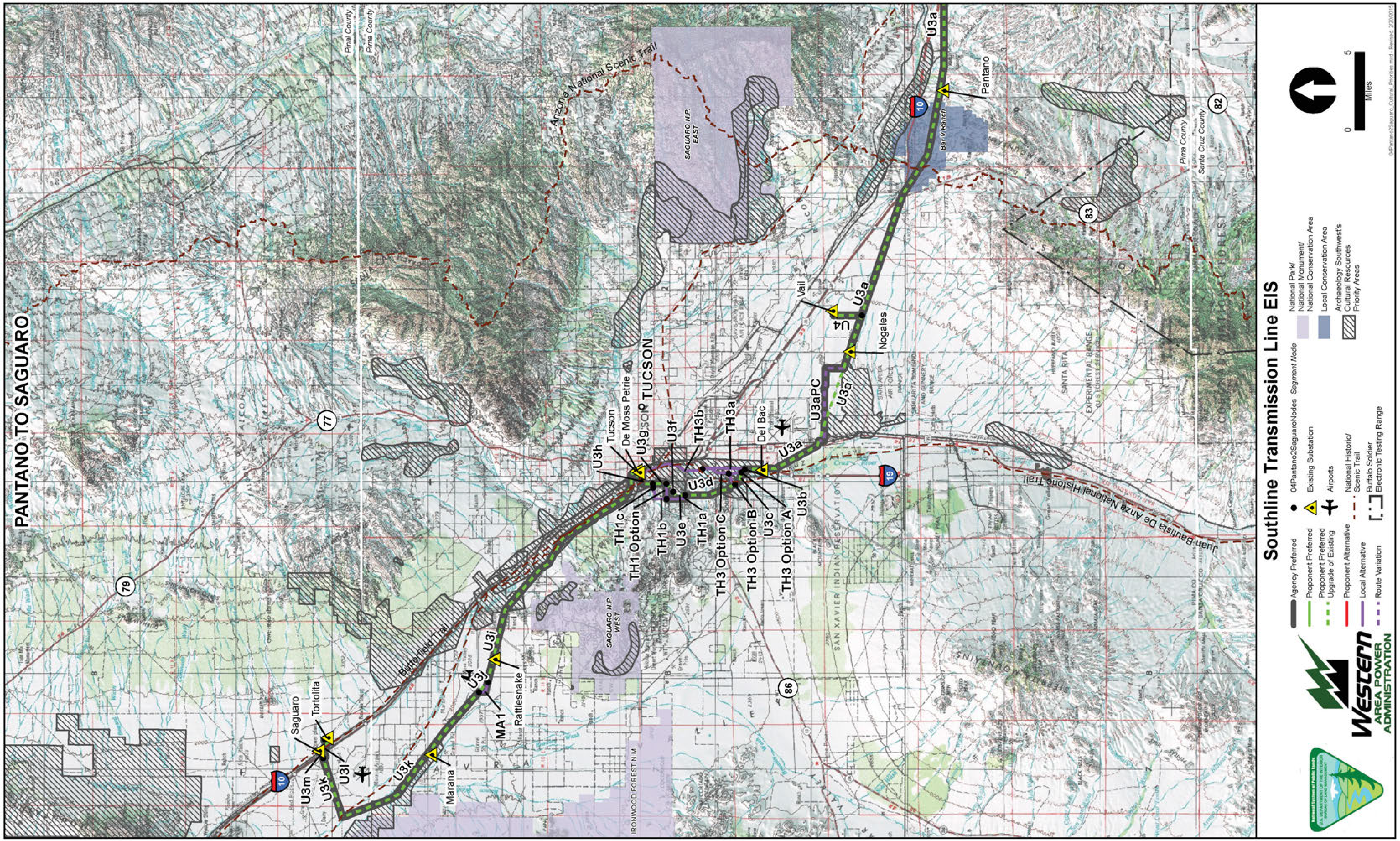


Figure 3.9-2. Tumamoc Hill and Desert Laboratory NHL with proposed alternatives.

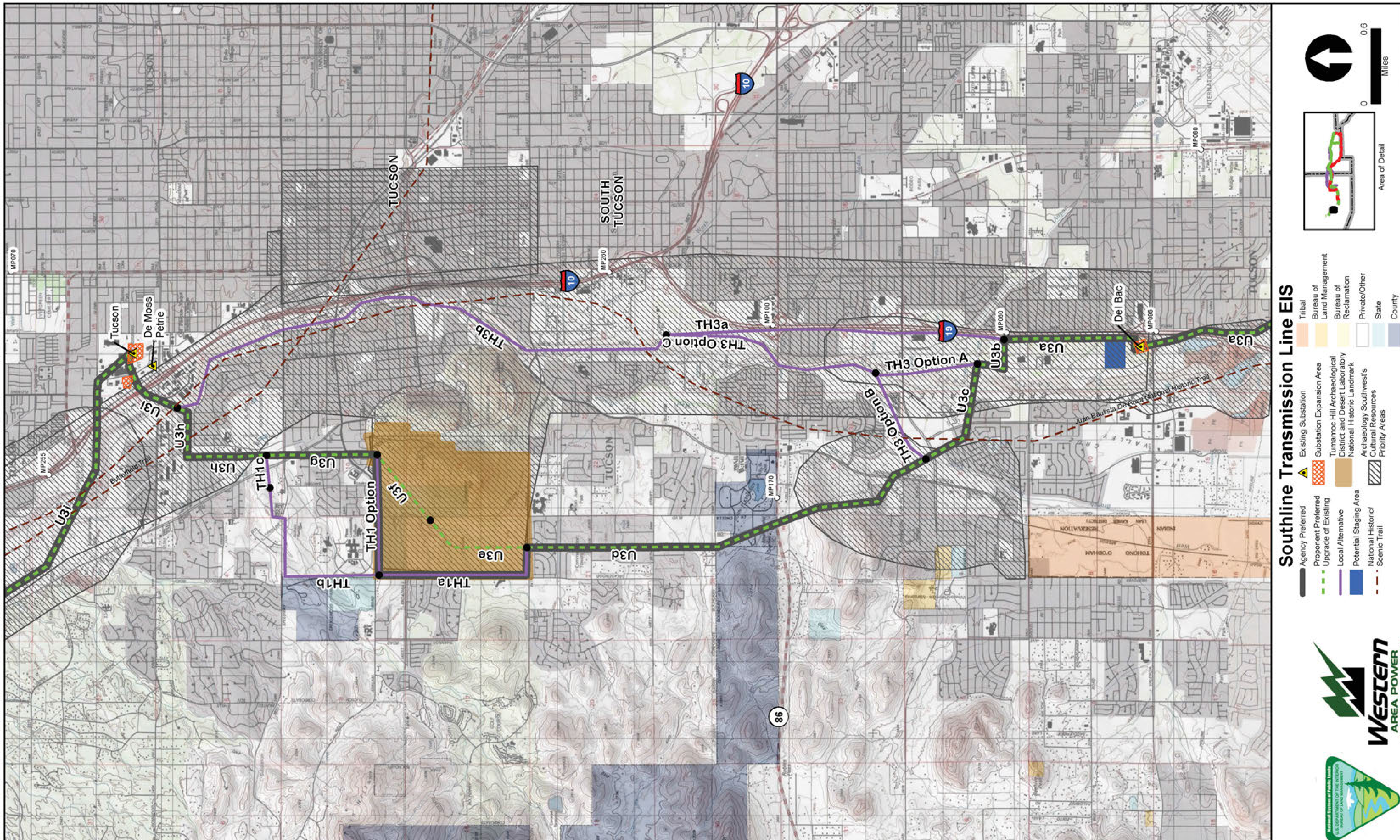


Figure 3.10-1. Proponent Preferred viewshed in the New Build Section.

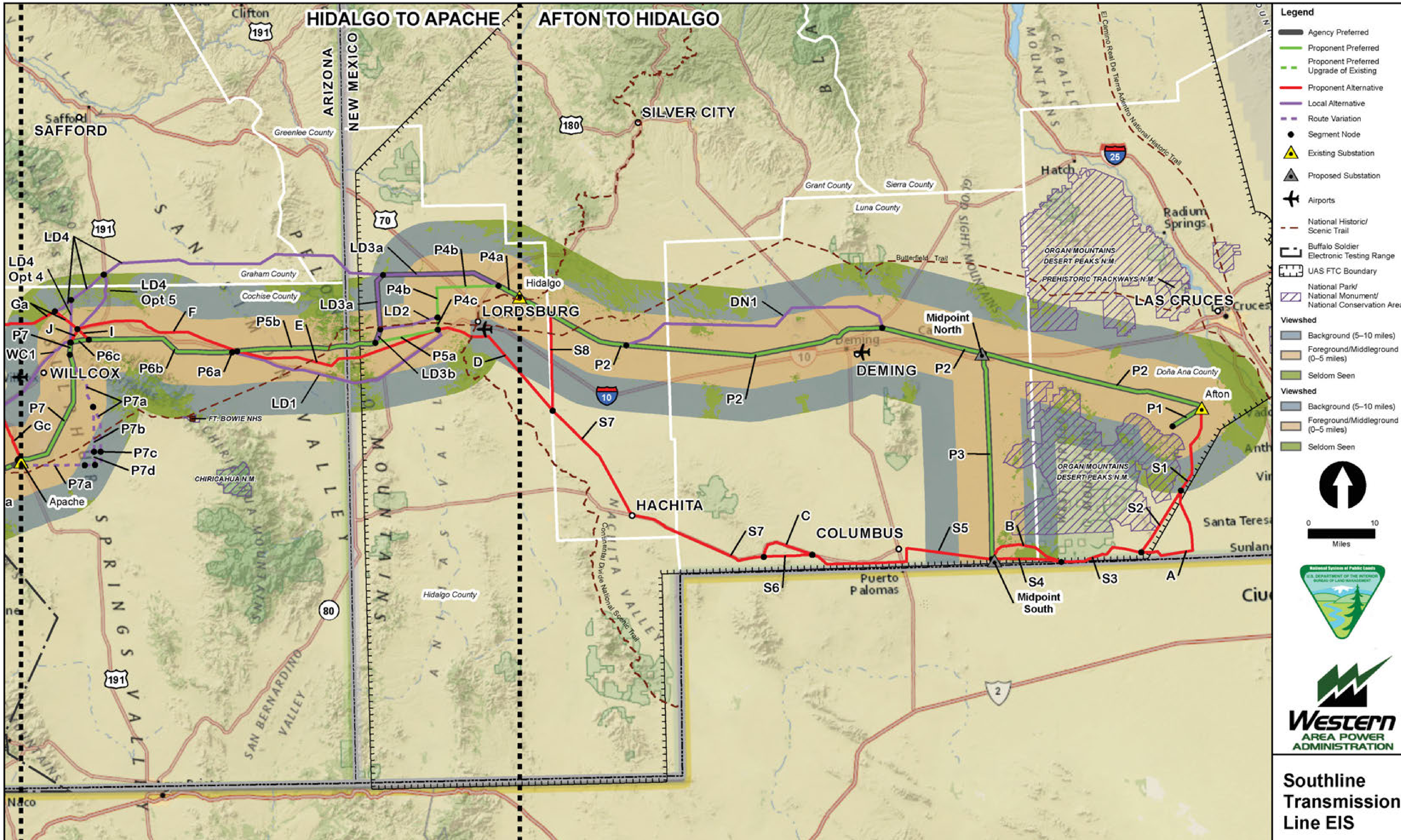


Figure 3.10-2. Proponent Preferred viewshed in the Upgrade Section.

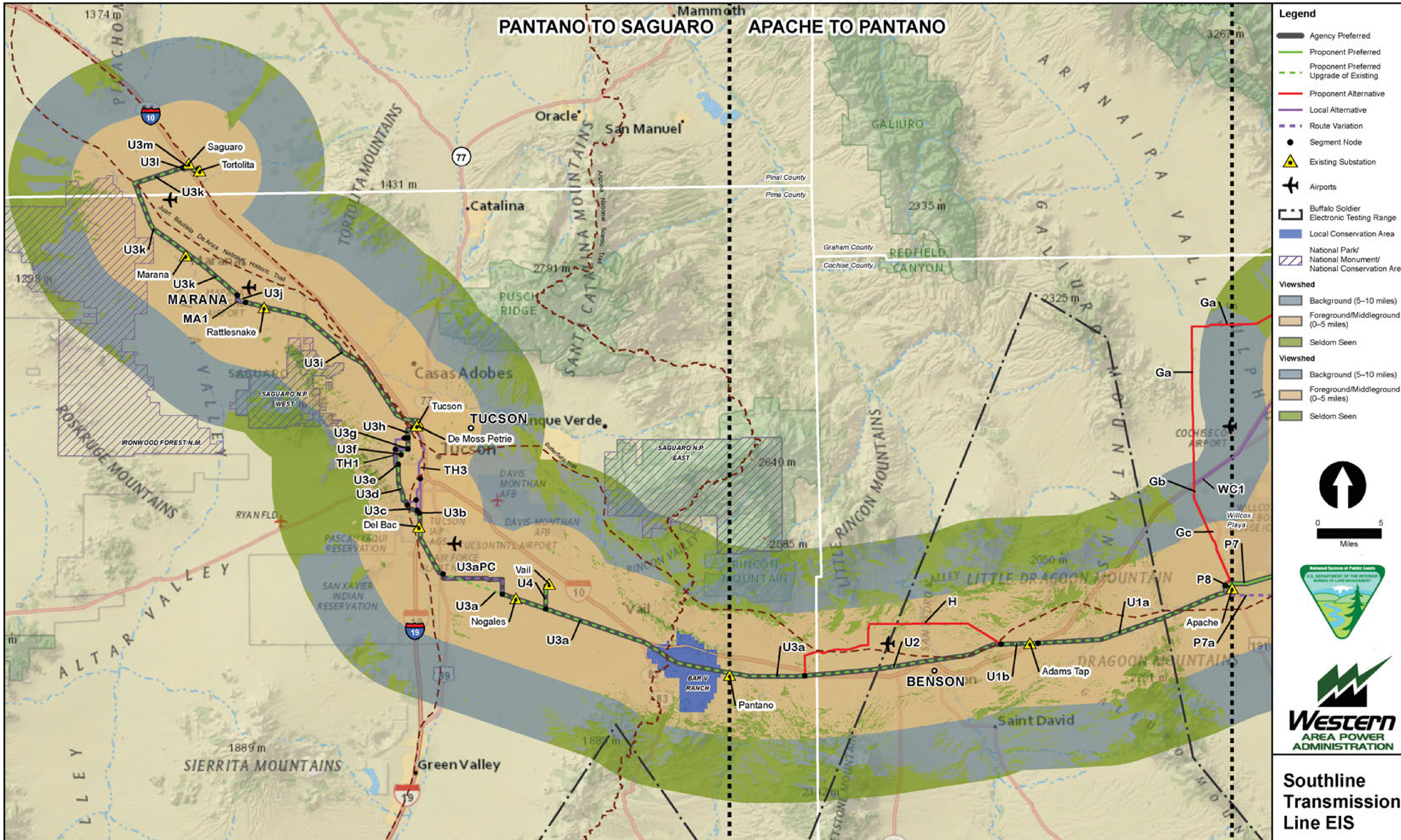


Figure 3.10-3. Proponent Alternative viewshed in the New Build Section.

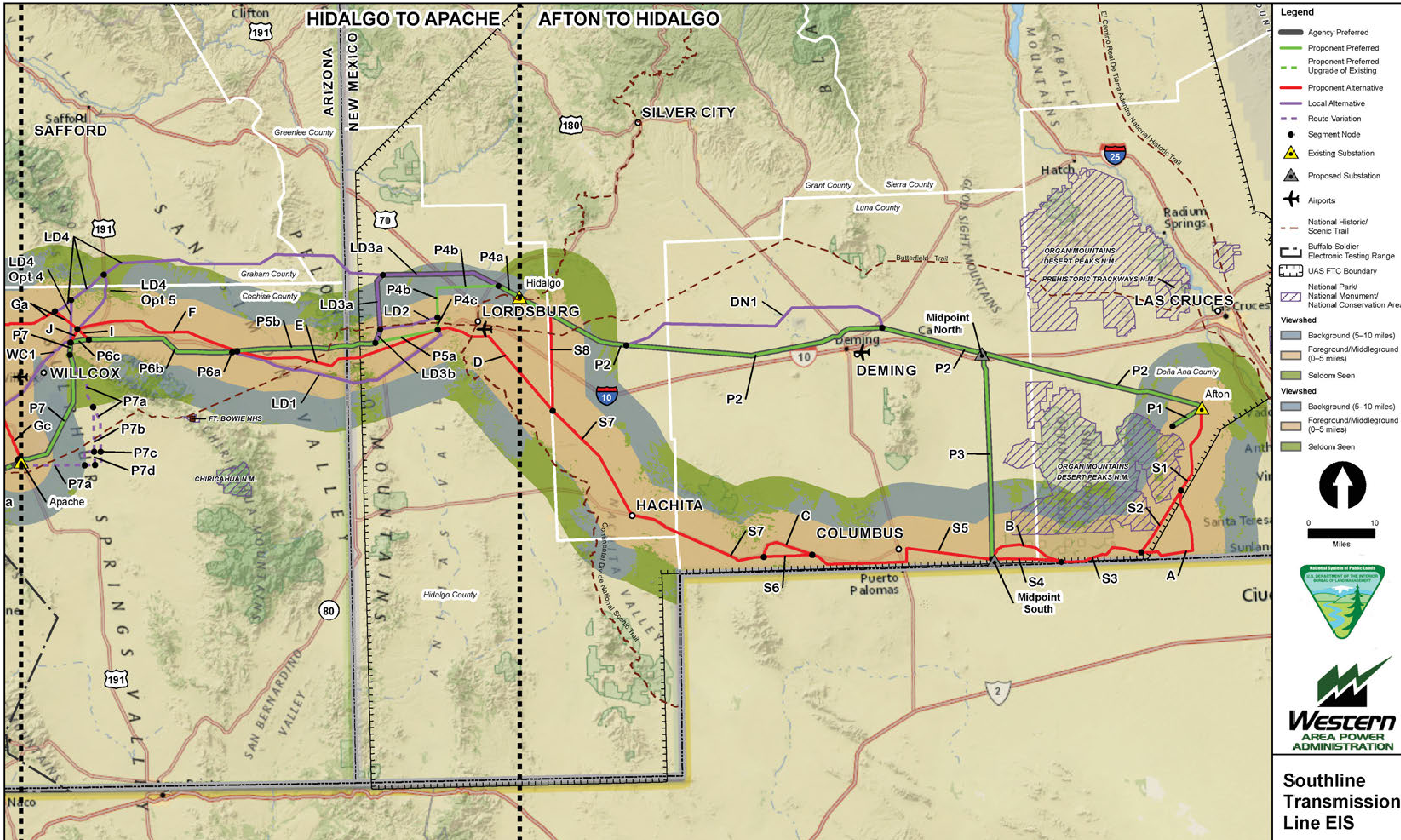


Figure 3.10-4. Proponent Alternative viewshed in the Upgrade Section.

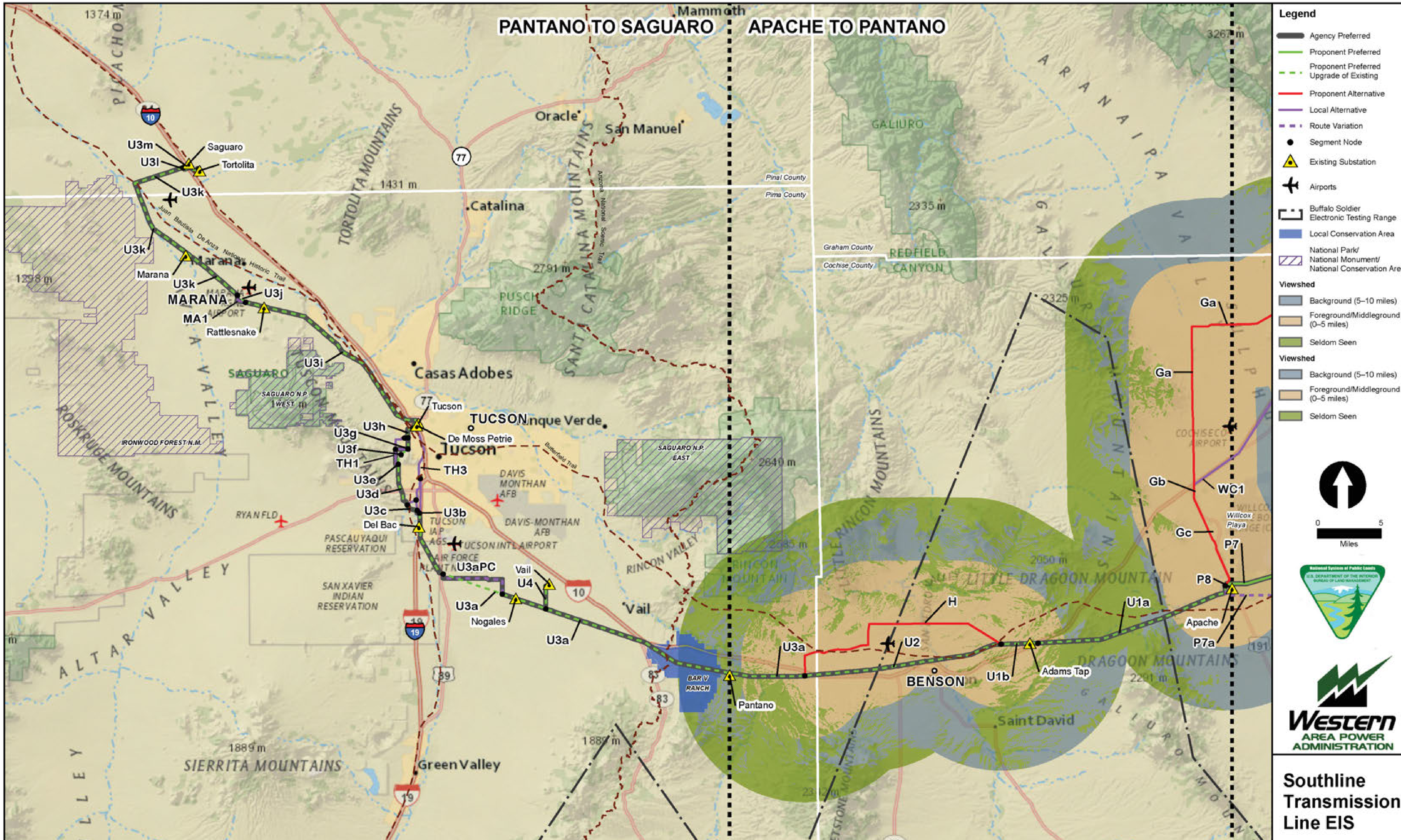


Figure 3.10-5. Local Alternative viewshed in the New Build Section.

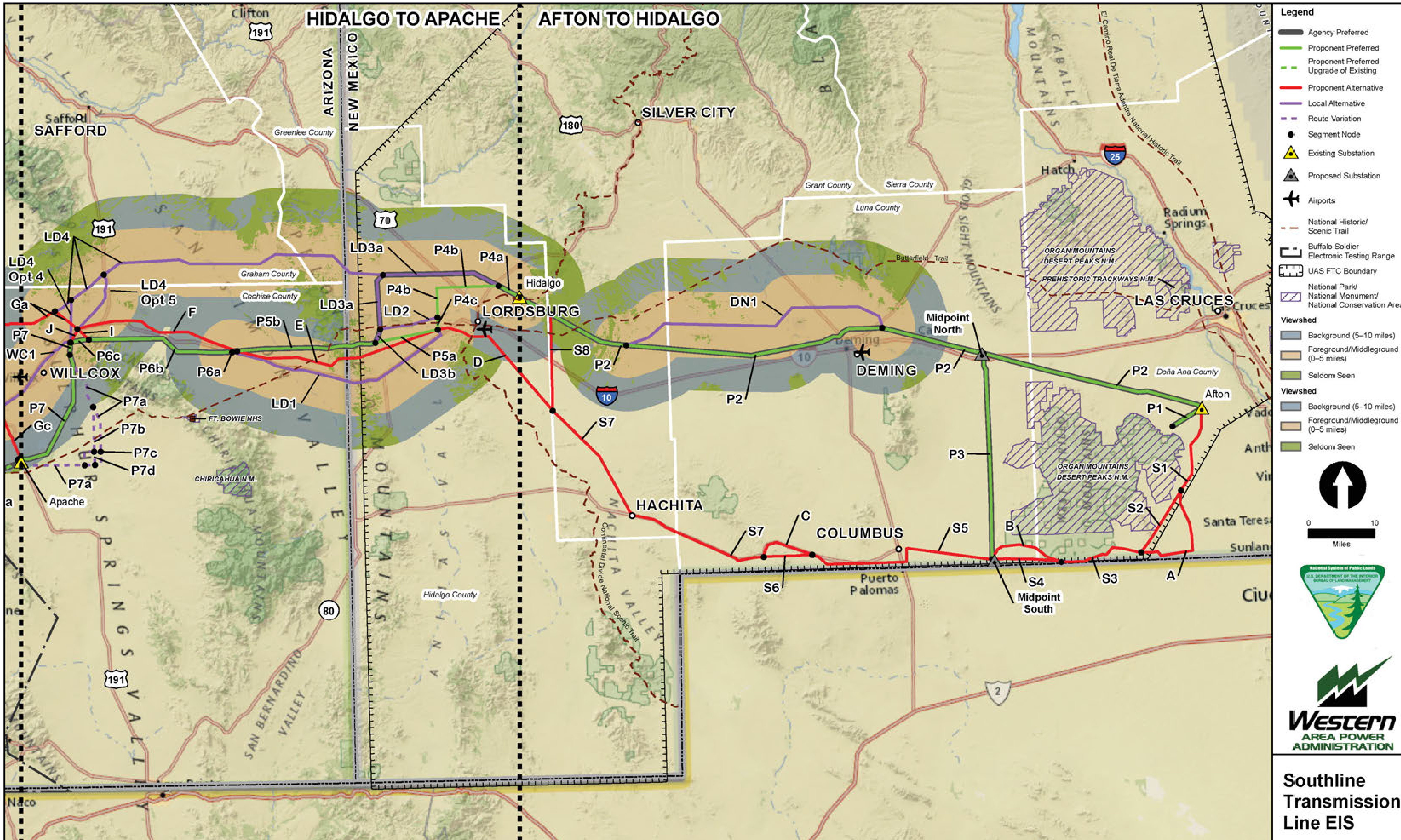


Figure 3.10-6. Local Alternative viewshed in the Upgrade Section.

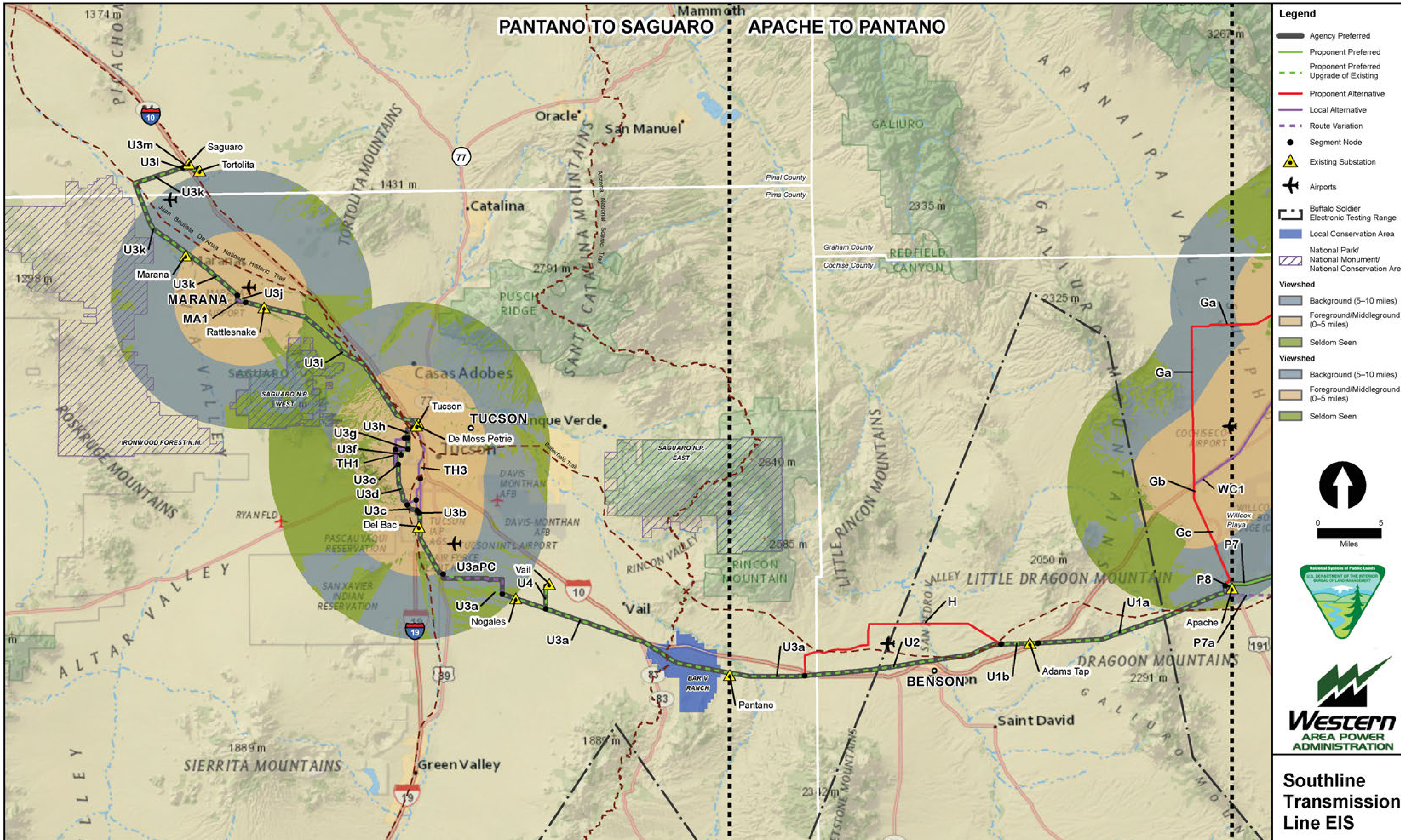


Figure 3.10-7. Agency Preferred Alternative viewshed in the New Build Section.

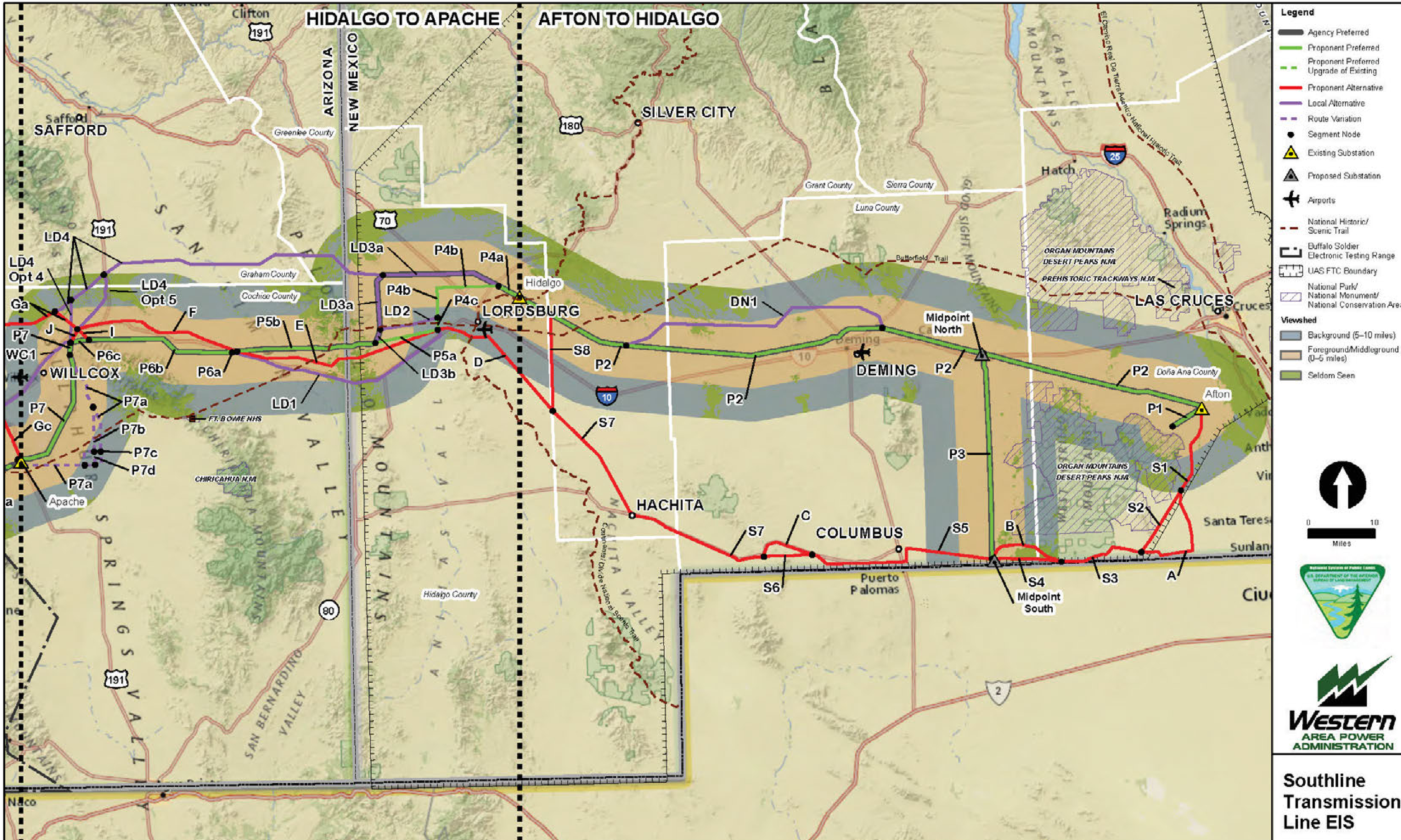


Figure 3.10-8. Agency Preferred Alternative viewshed in the Upgrade Section.

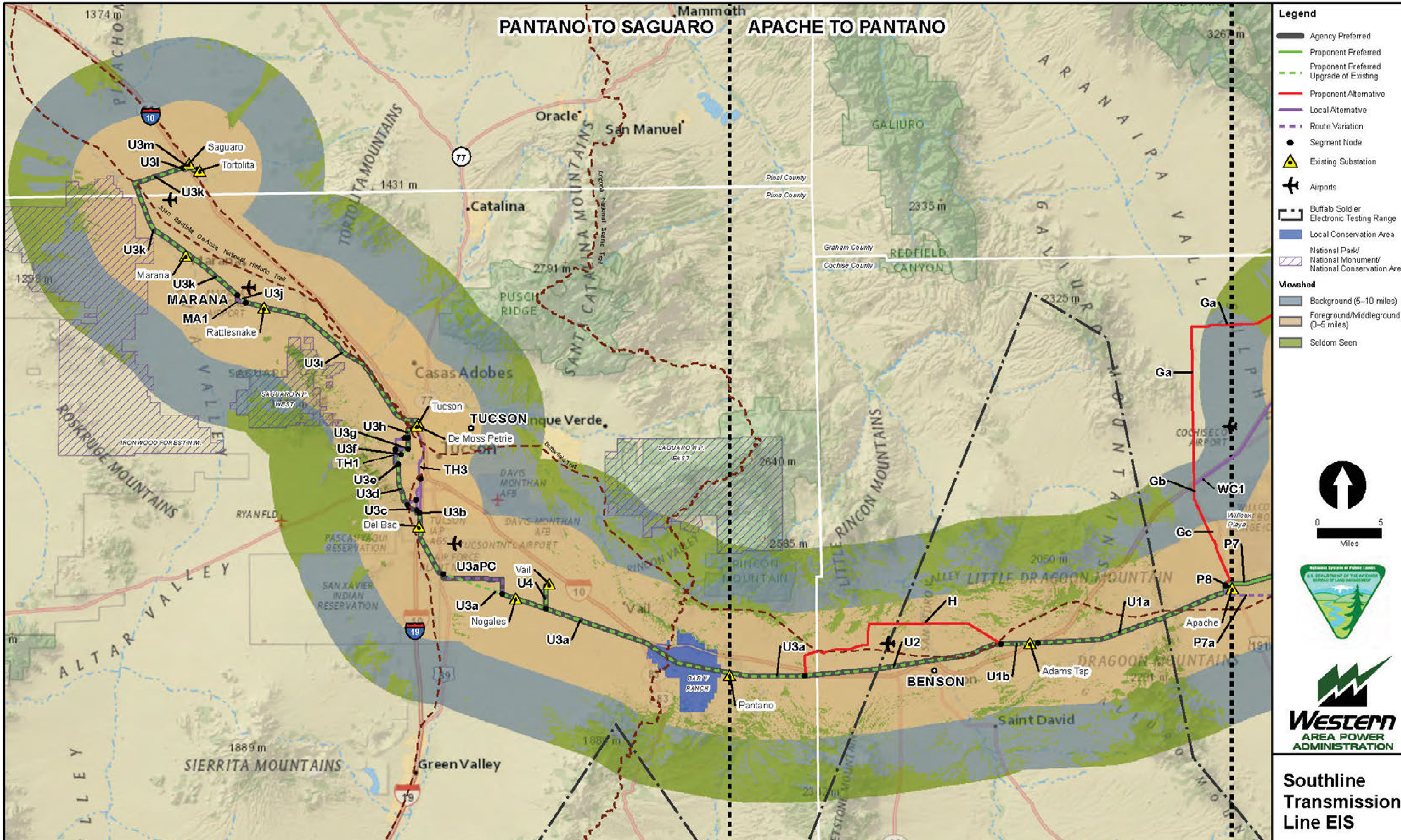


Figure 3.10-9. Route variation viewshed in the New Build Section.

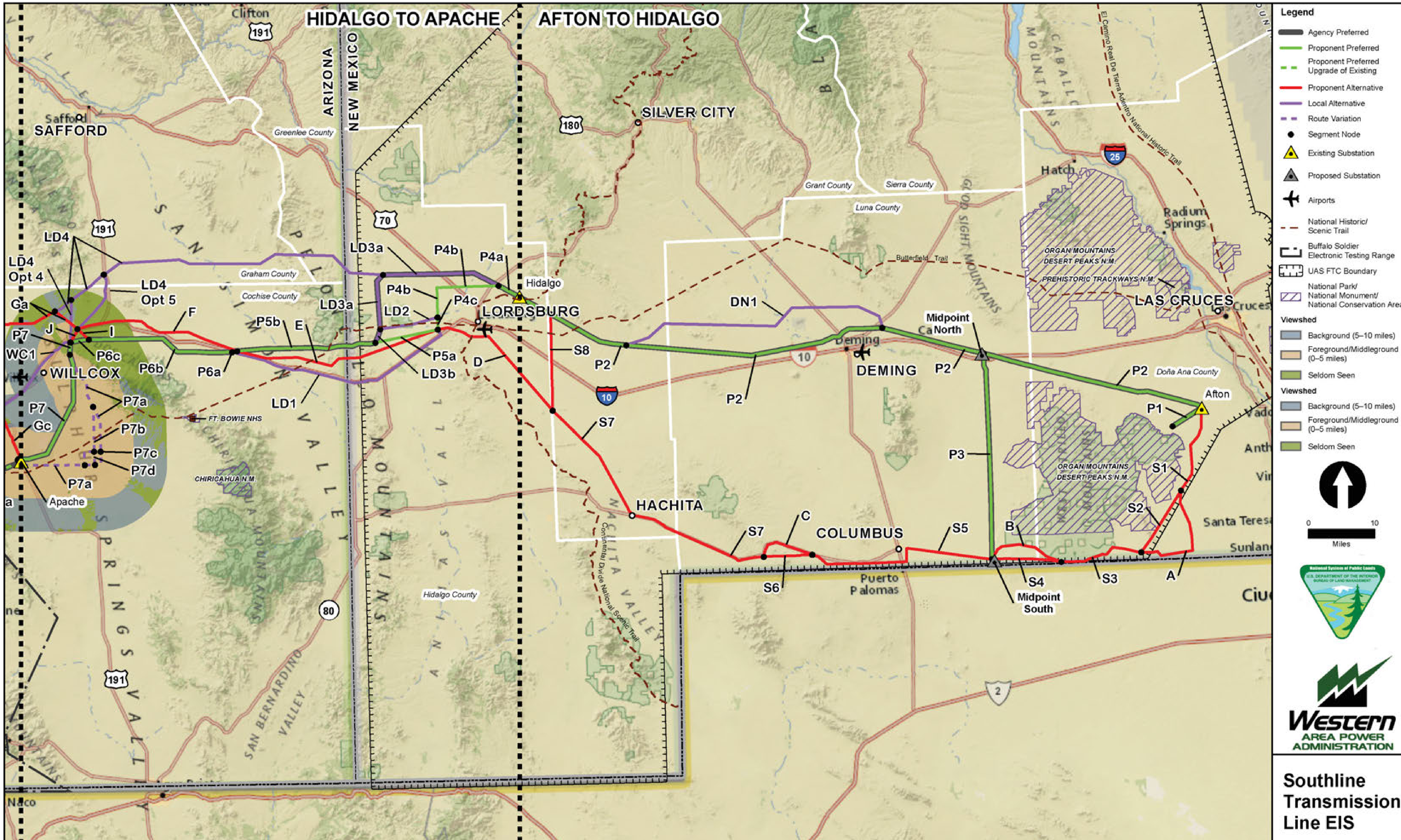


Figure 3.10-10. Route variation viewshed in the Upgrade Section.

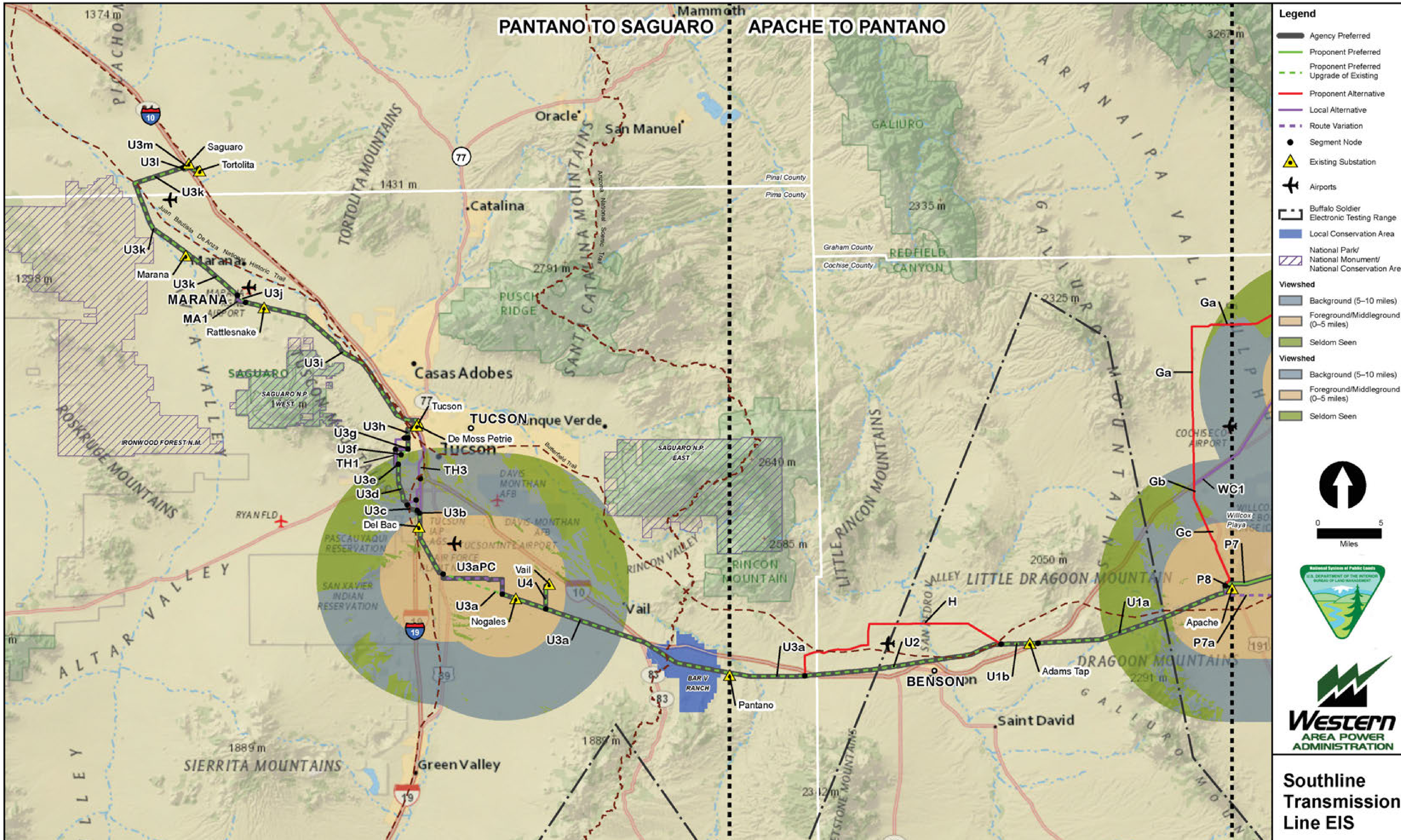


Figure 3.10-11. Locations of the KOPs in the New Build Section.

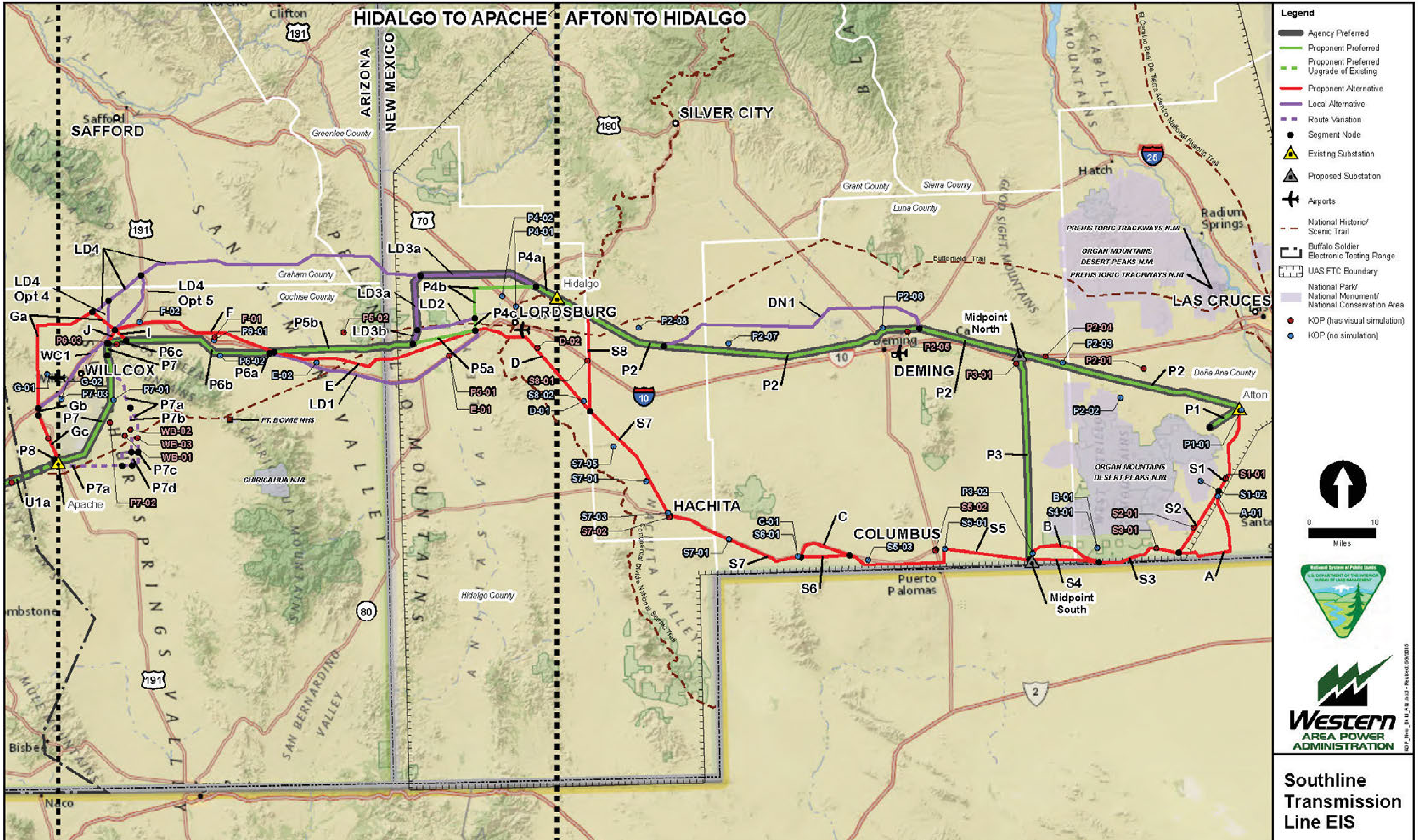


Figure 3.10-12. Locations of the KOPs in the Upgrade Section.

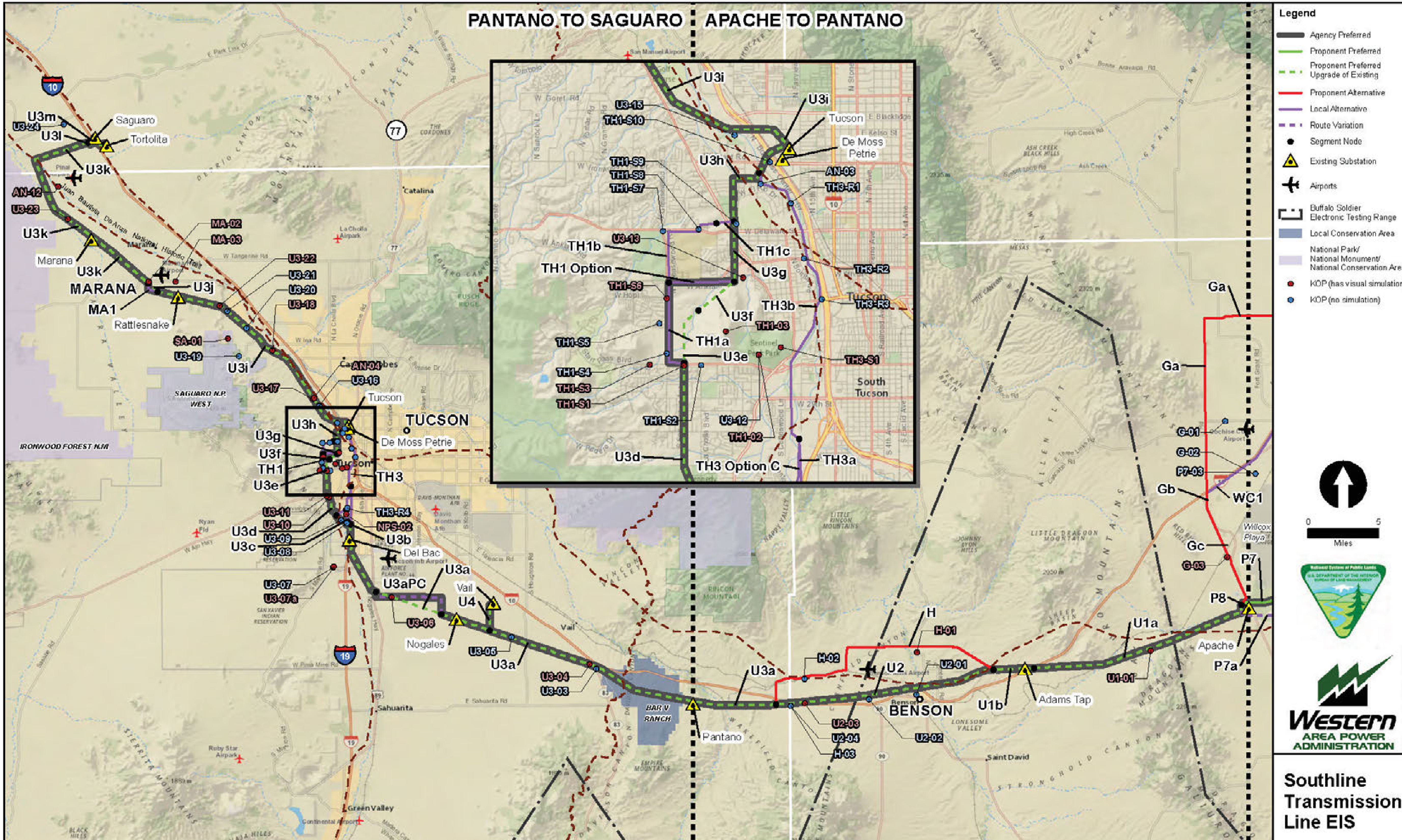


Figure 3.10-13. Scenic Quality Rating Units in the New Build Section.

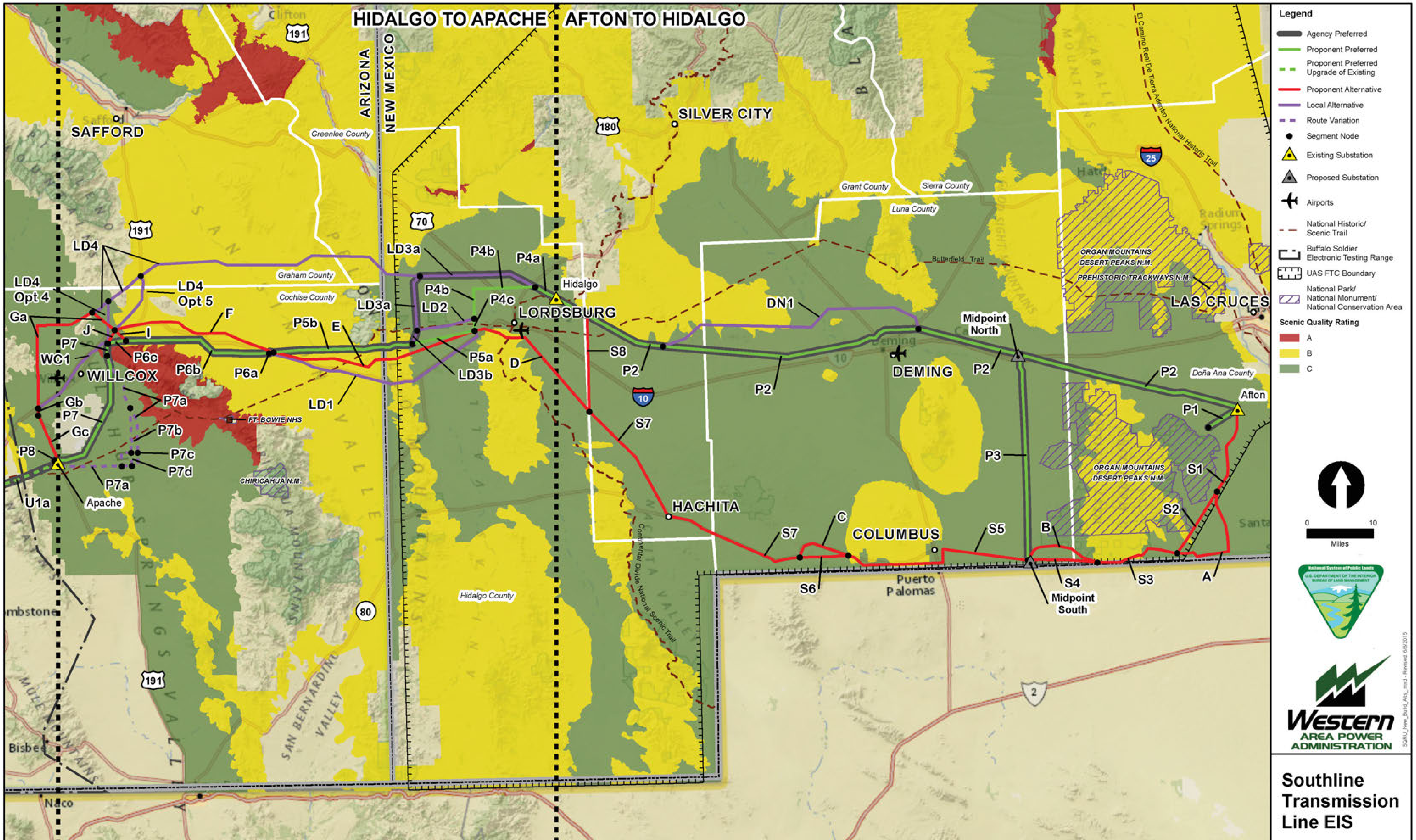


Figure 3.10-14. Sensitivity Level Rating Units in the New Build Section

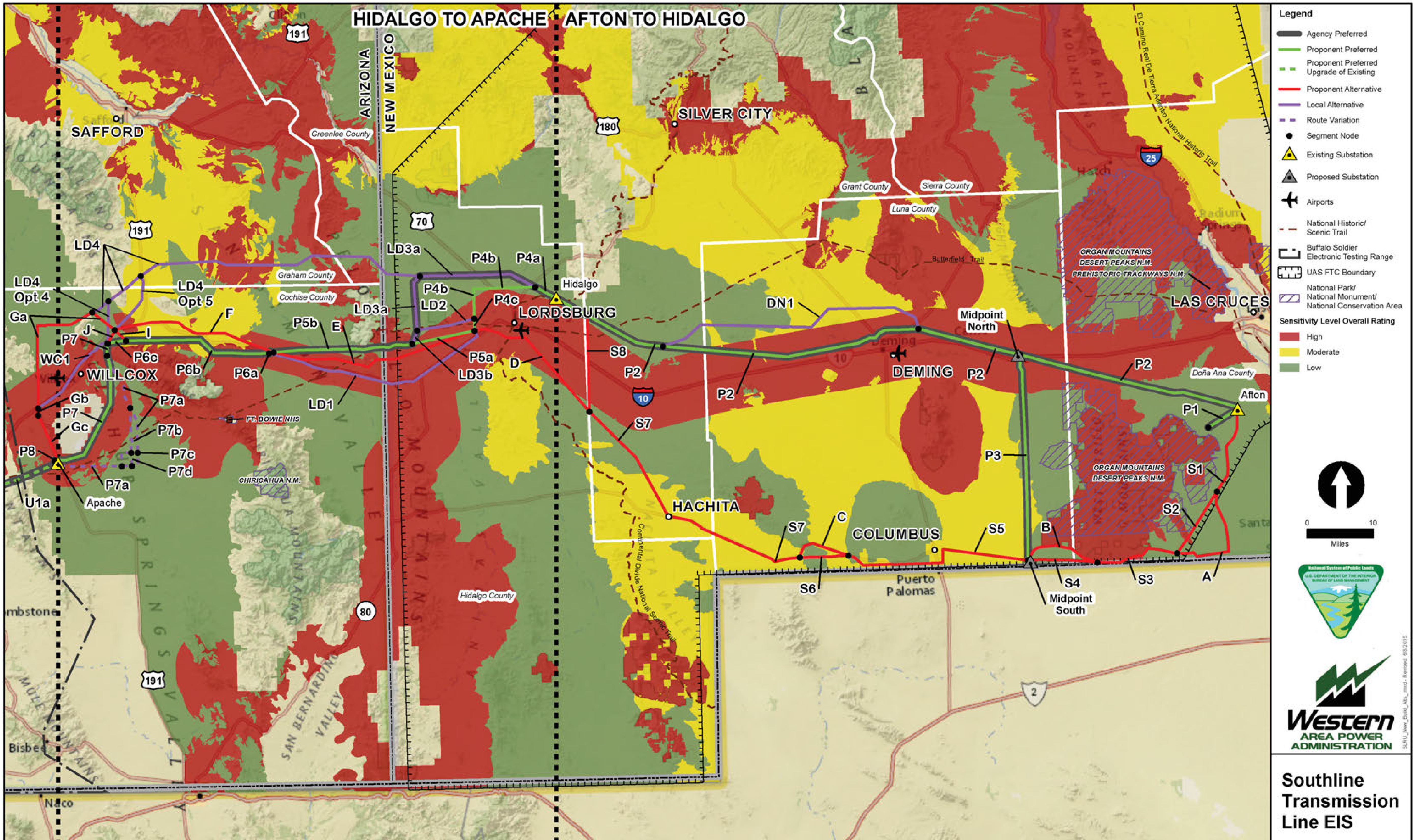


Figure 3.10-15. Visual resource inventory classes in the New Build Section.

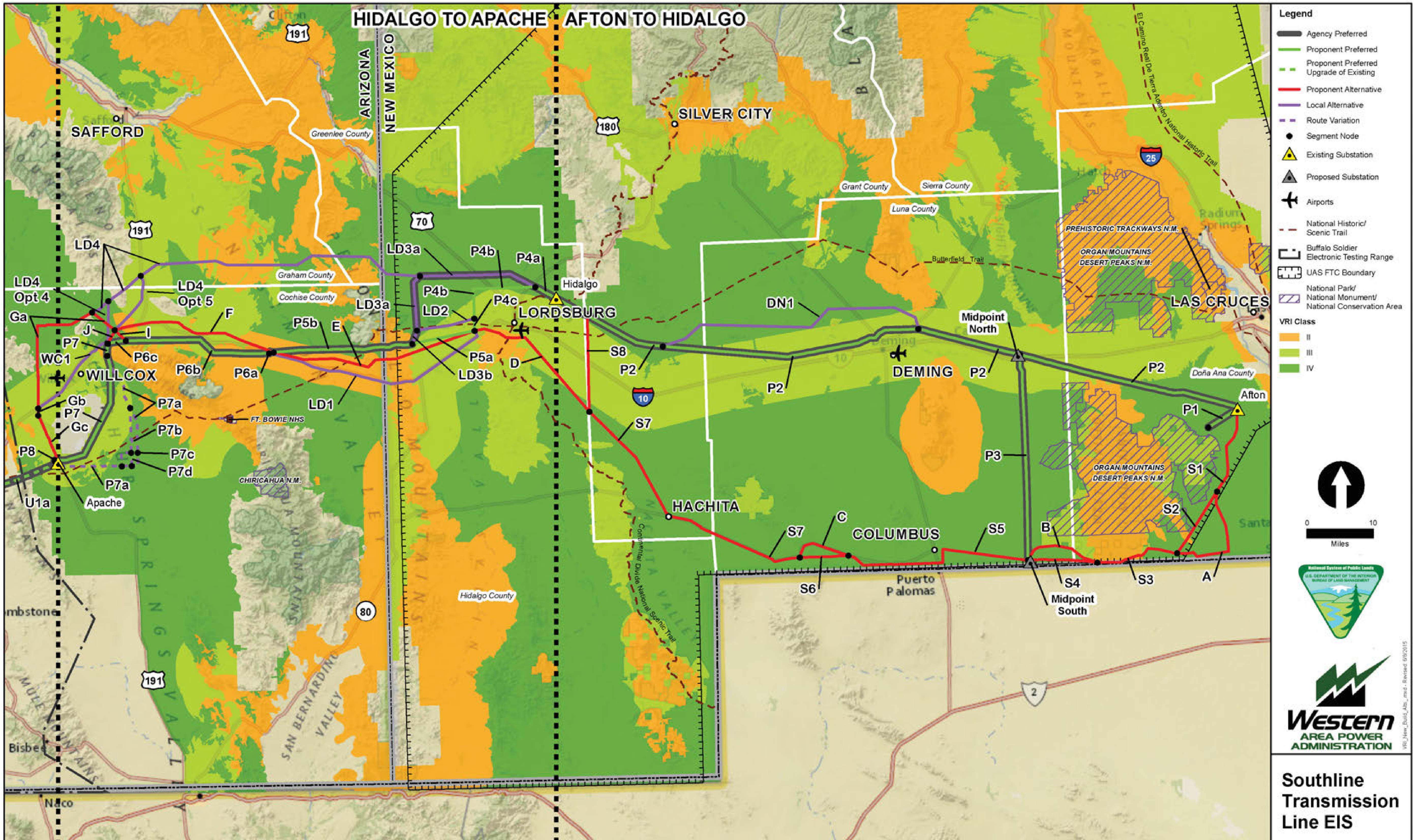


Figure 3.10-16. Visual resource management classes in the New Build Section.

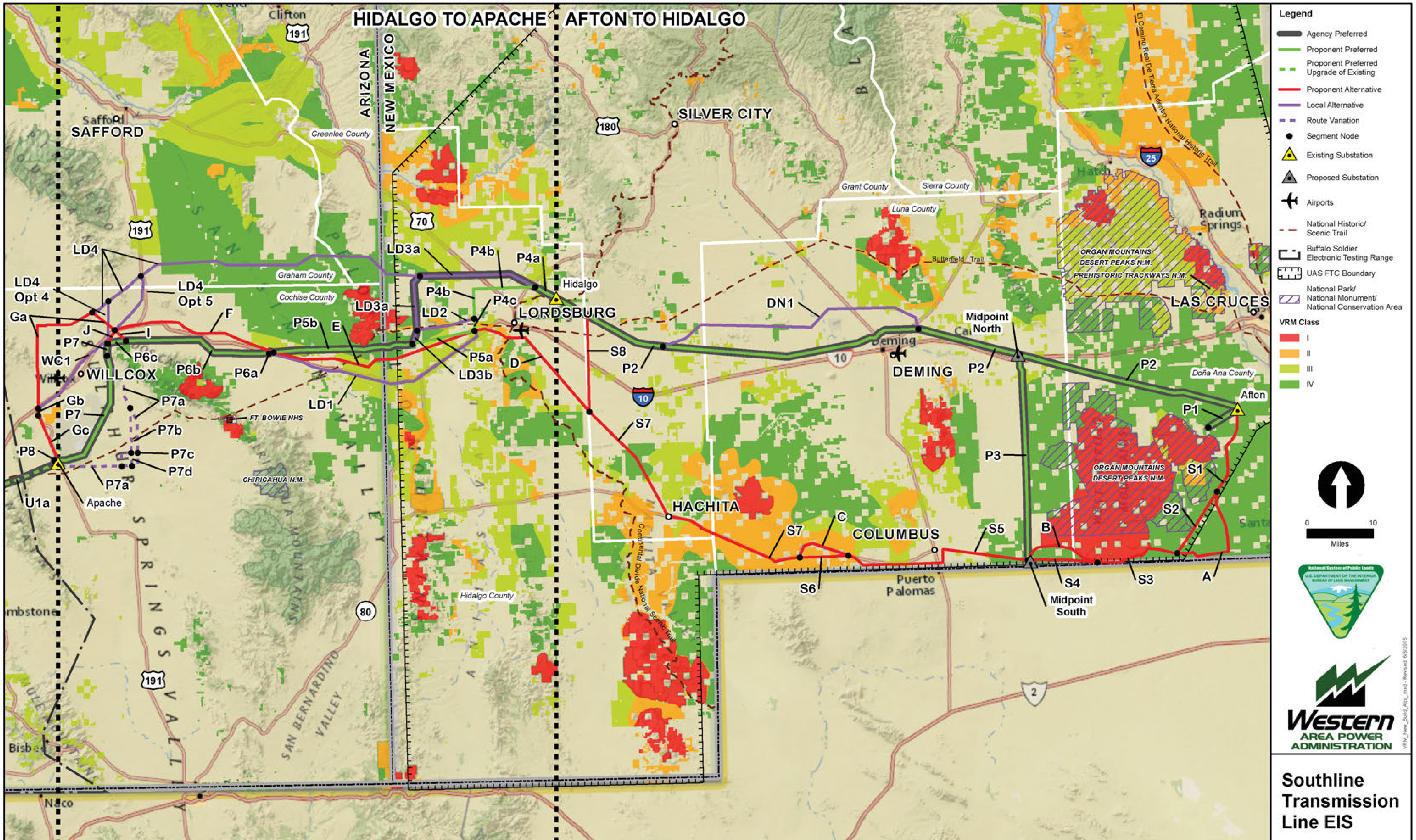


Figure 3.10-17. Scenic Quality Rating Units in the Upgrade Section.

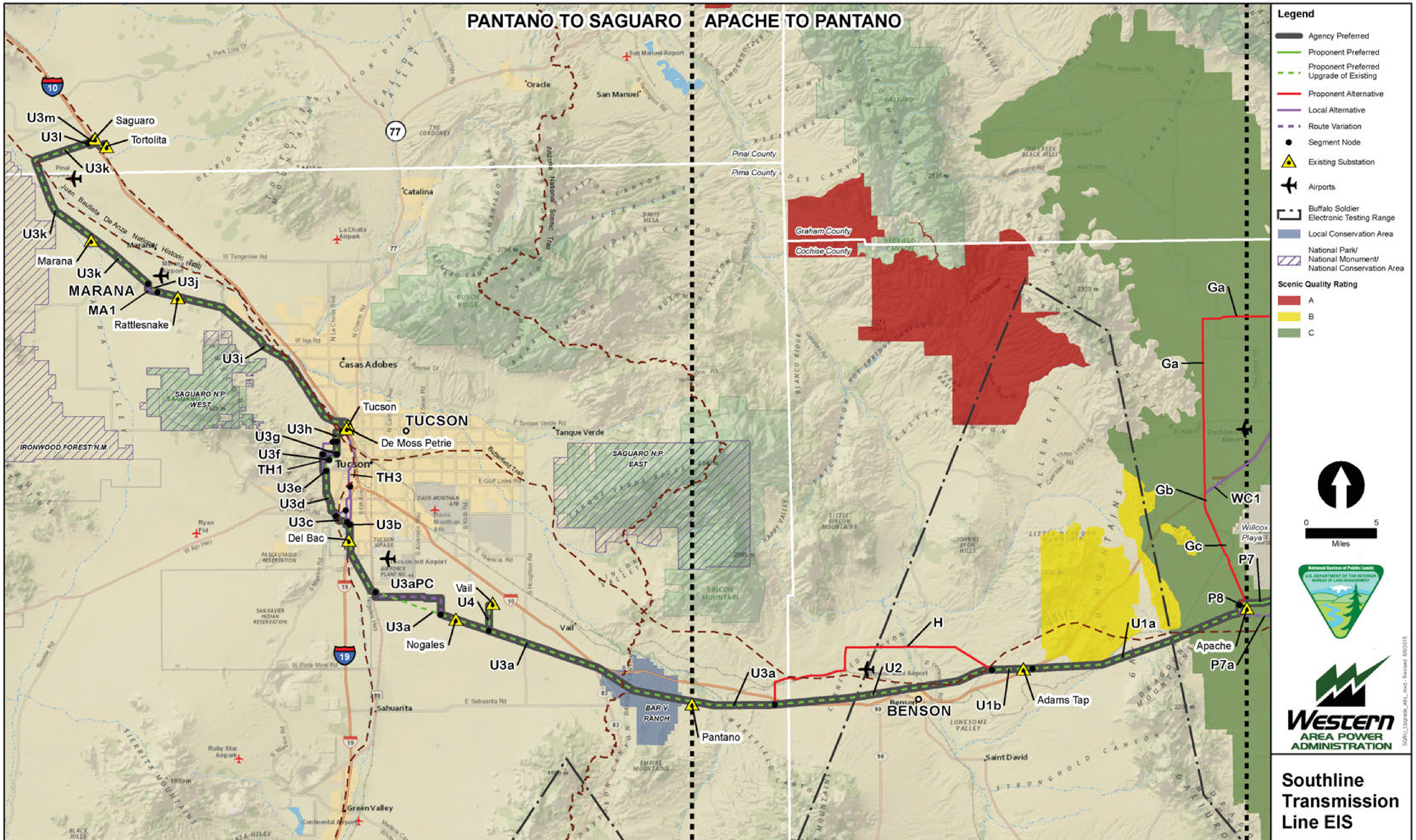


Figure 3.10-18. Sensitivity Level Rating Units in the Upgrade Section.

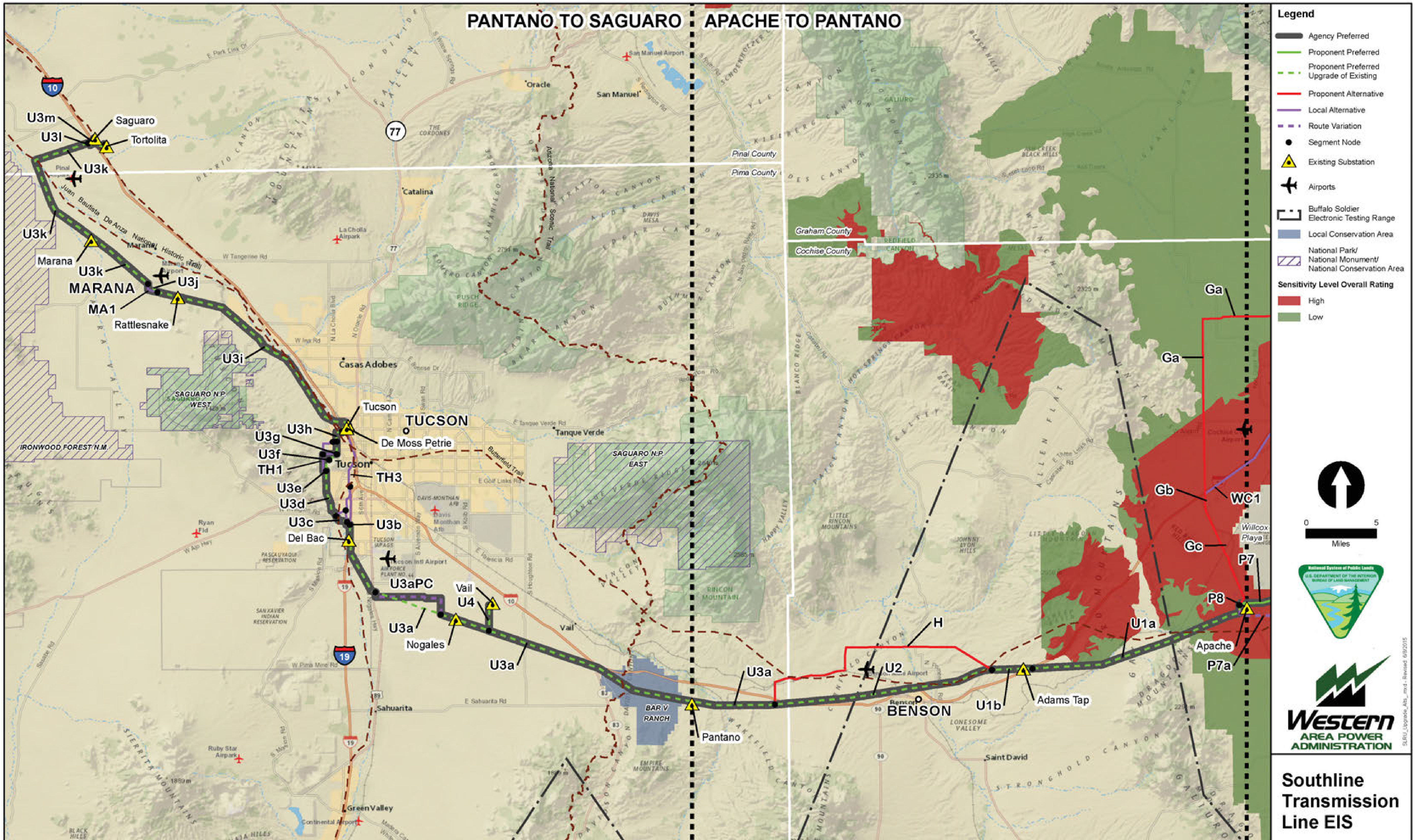


Figure 3.10-19. Visual resource inventory classes in the Upgrade Section.

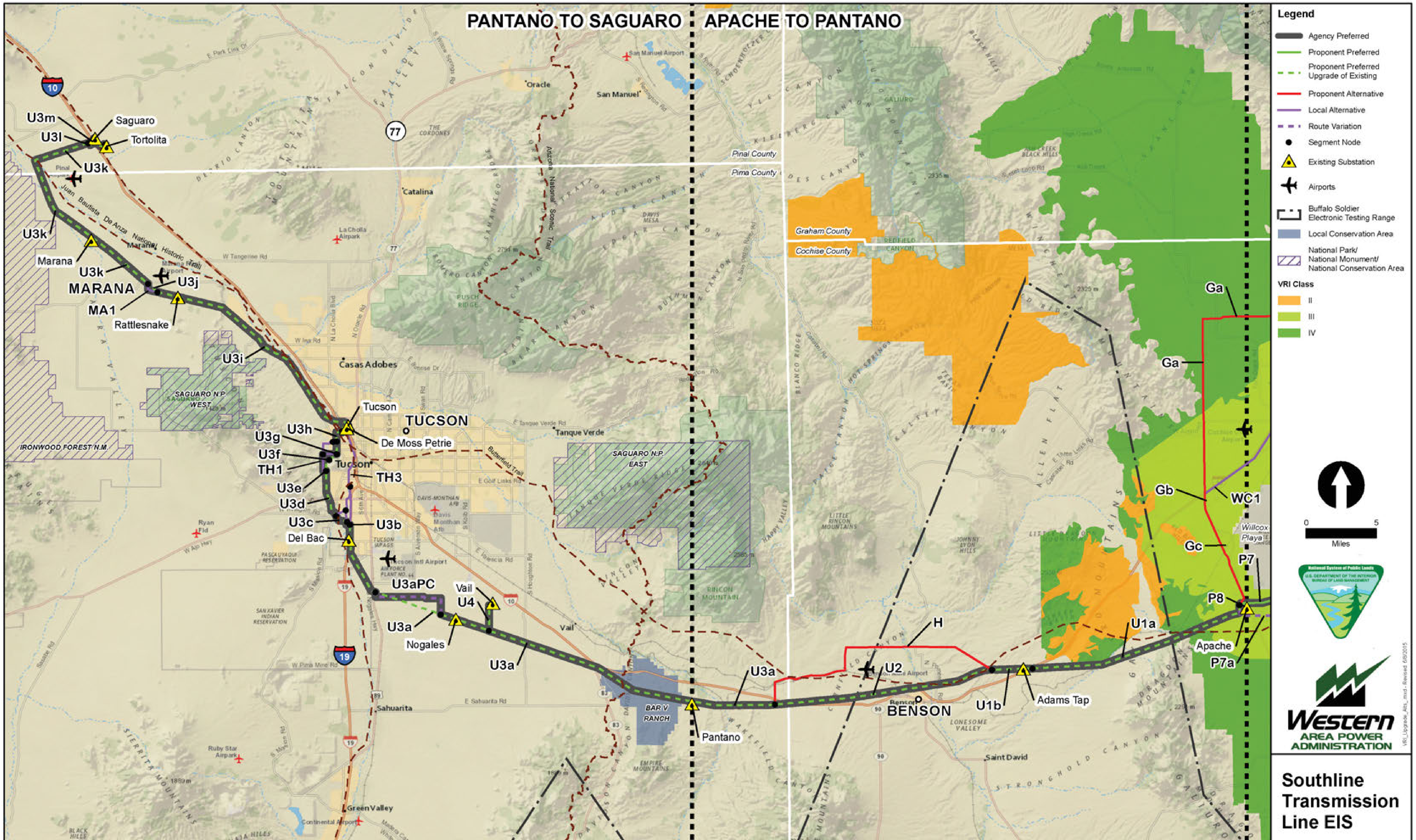


Figure 3.10-20. Visual resource management classes in the Upgrade Section.

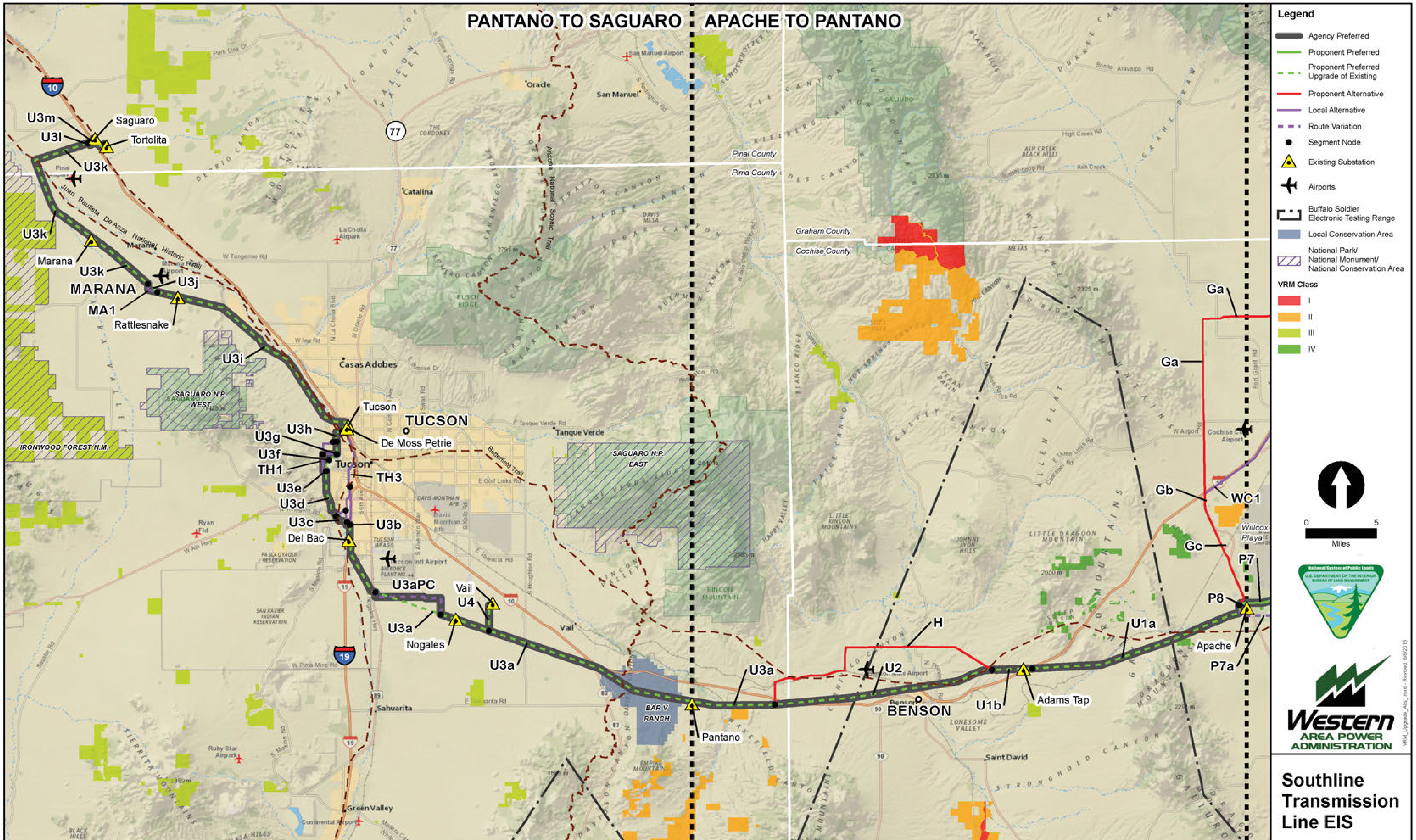


Figure 3.11-1. Land ownership in route group 1.

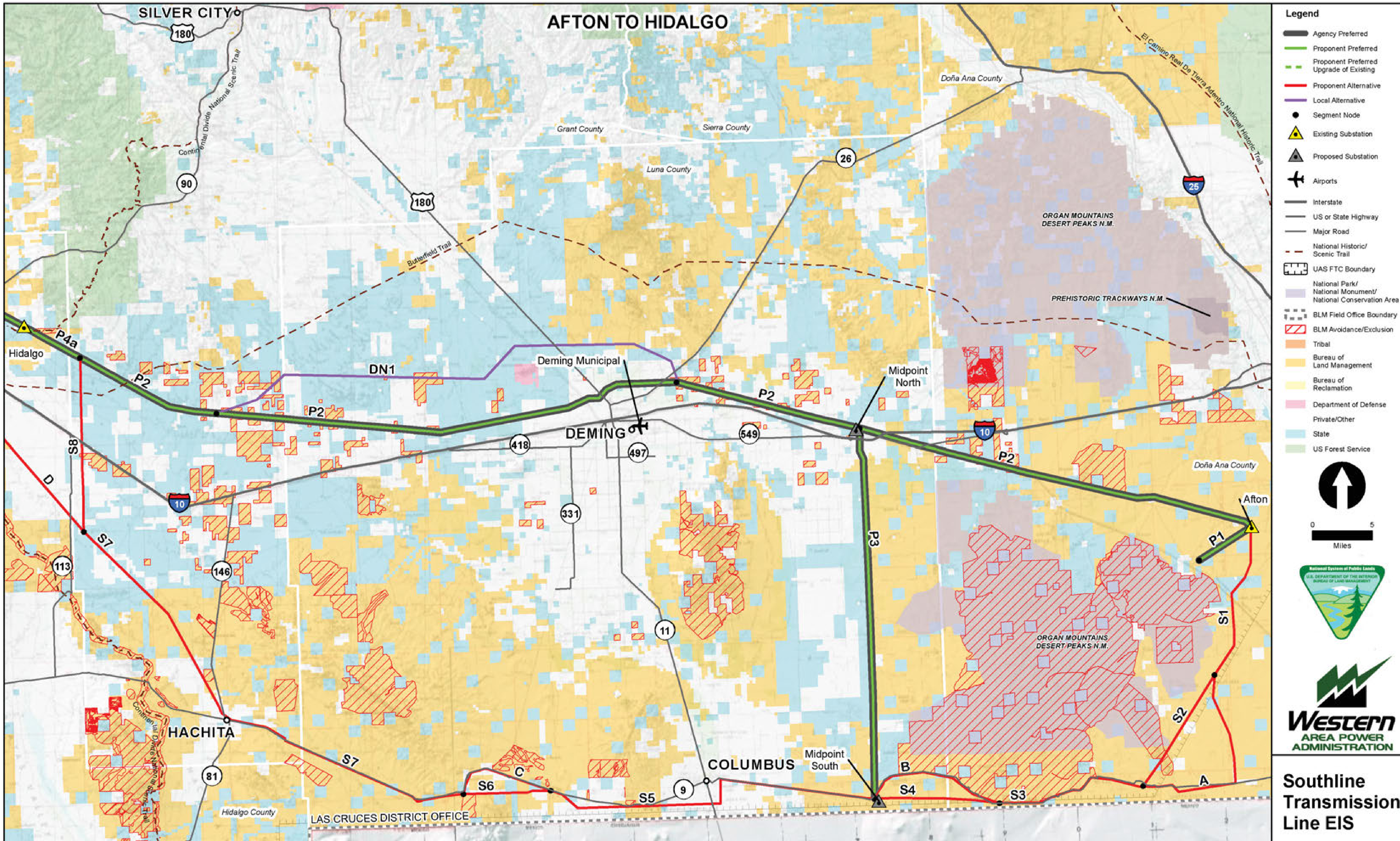


Figure 3.11-2. Land ownership in route group 2.

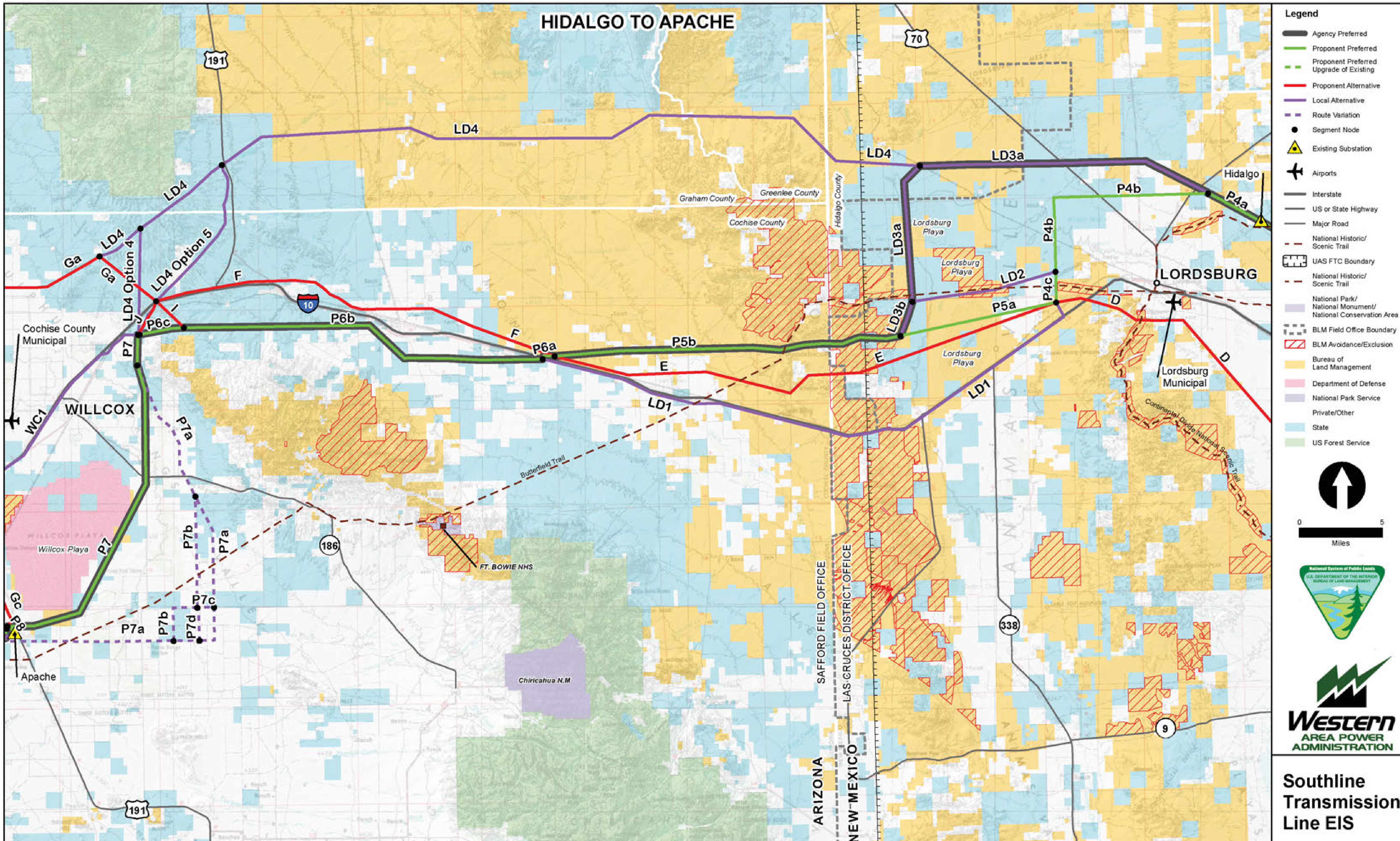


Figure 3.11-3. Land ownership in route group 3.

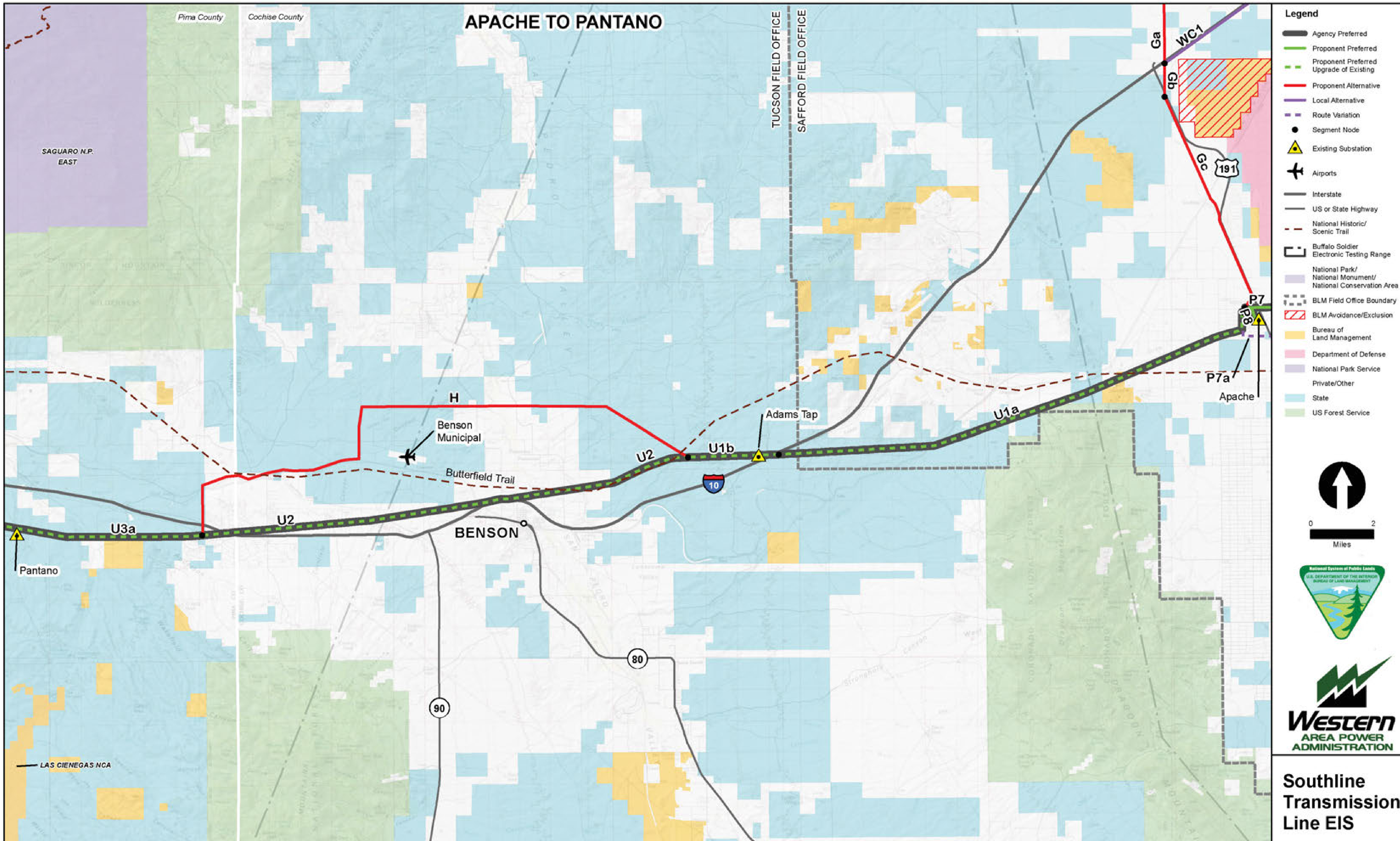


Figure 3.11-4. Land ownership in route group 4.

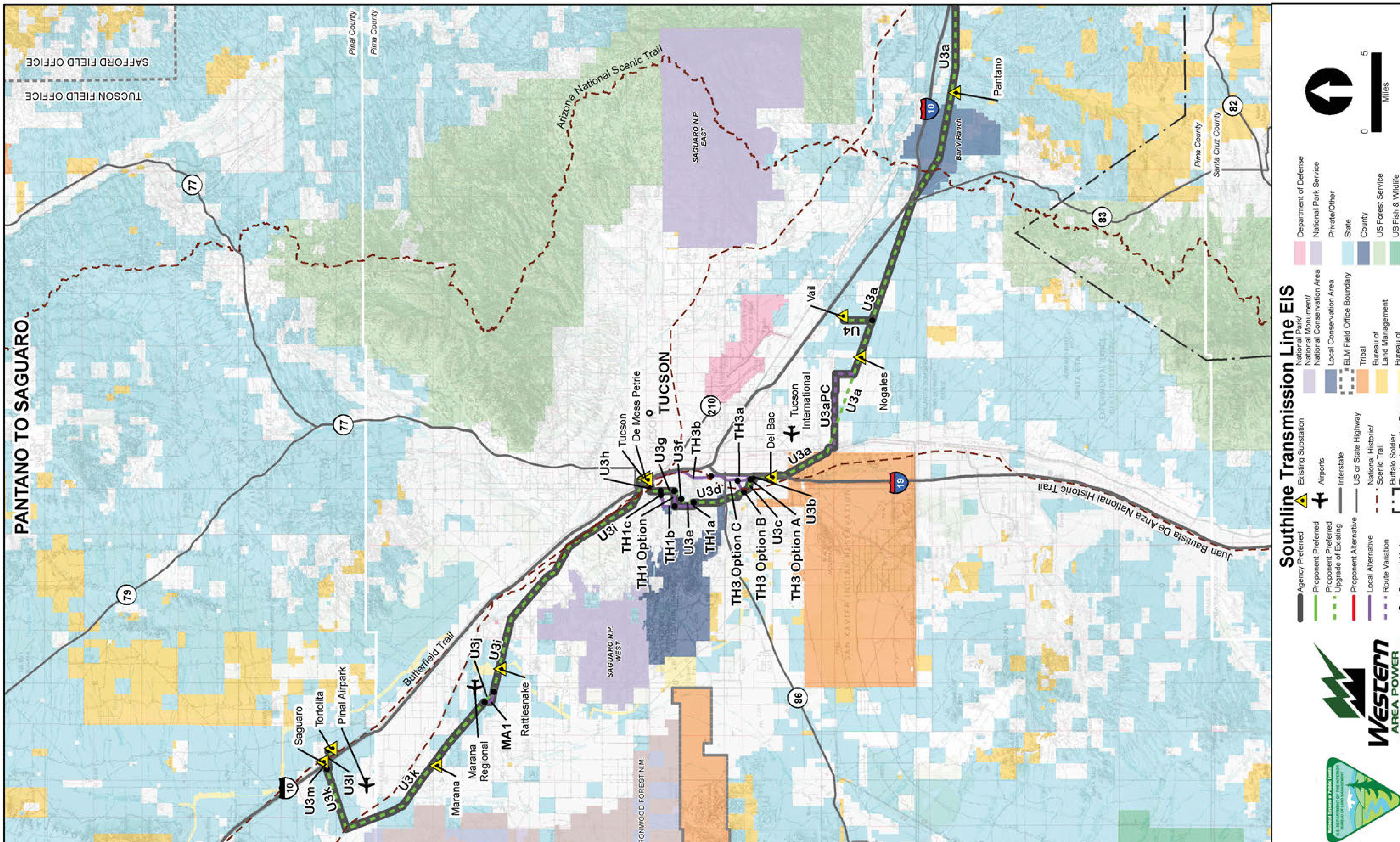


Figure 3.11-5a. Military training routes and airspace restrictions in the New Build Section.

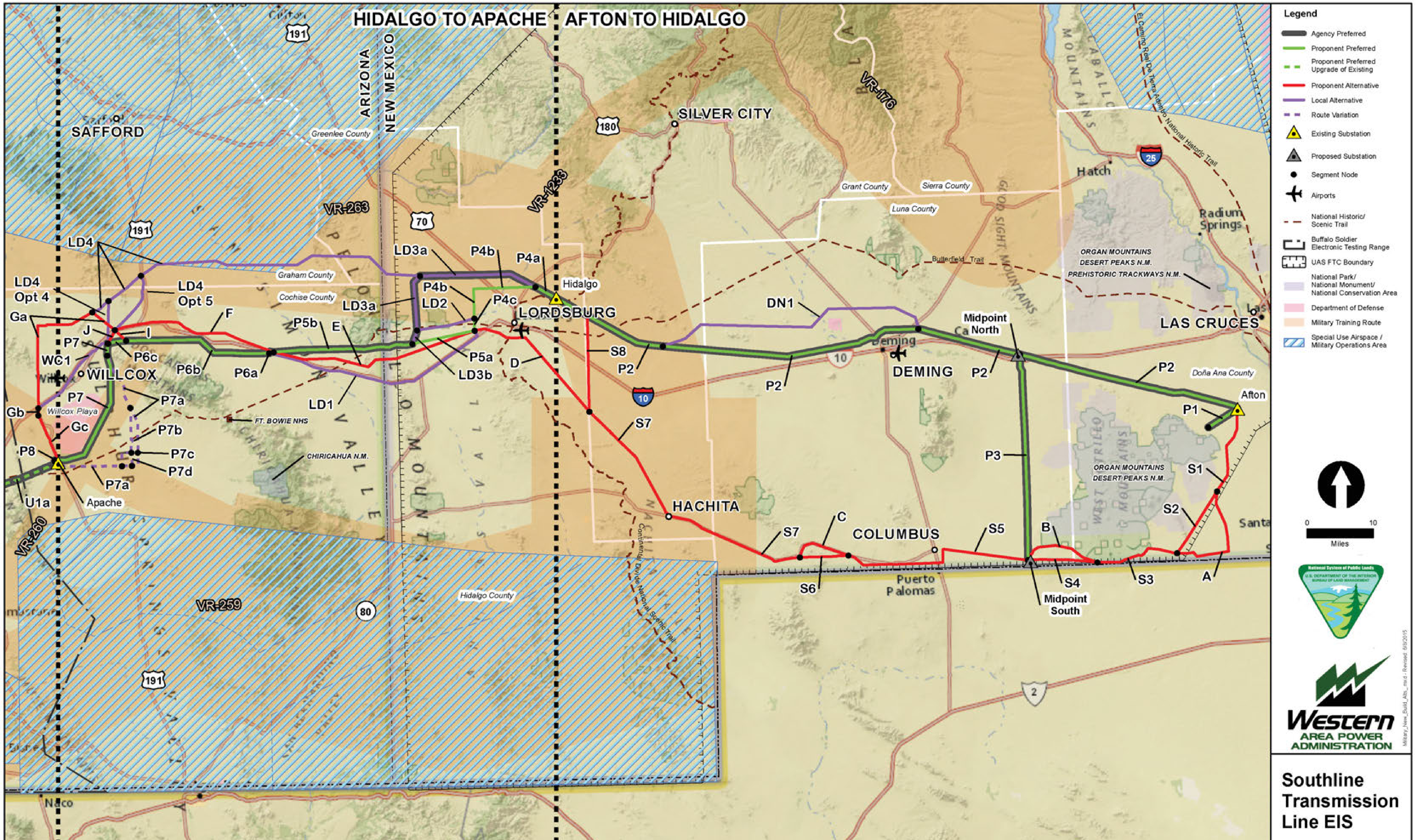


Figure 3.11-5b. Military training routes and airspace restrictions in the Upgrade Section.

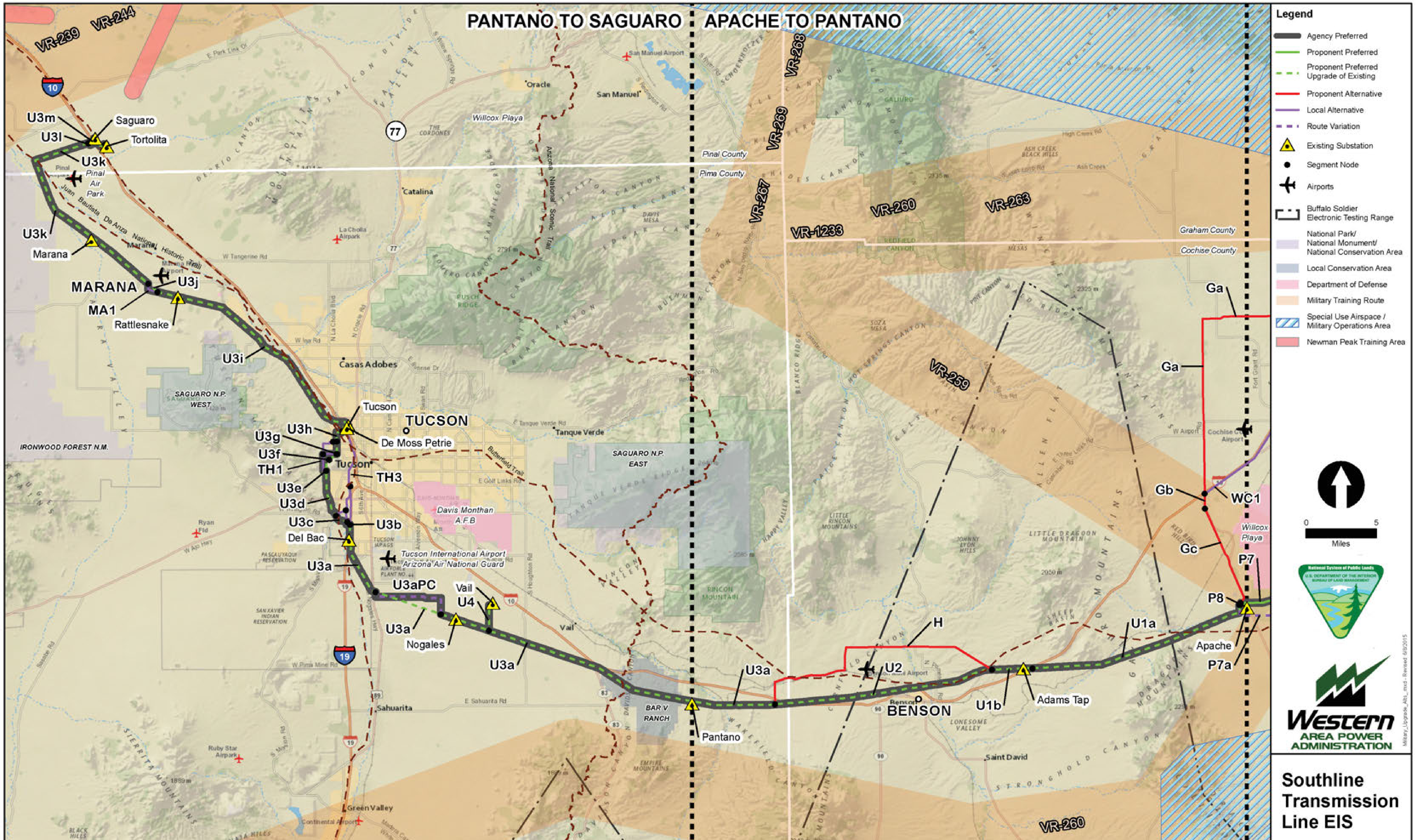


Figure 3.12-1. Special designation areas in the New Build Section.

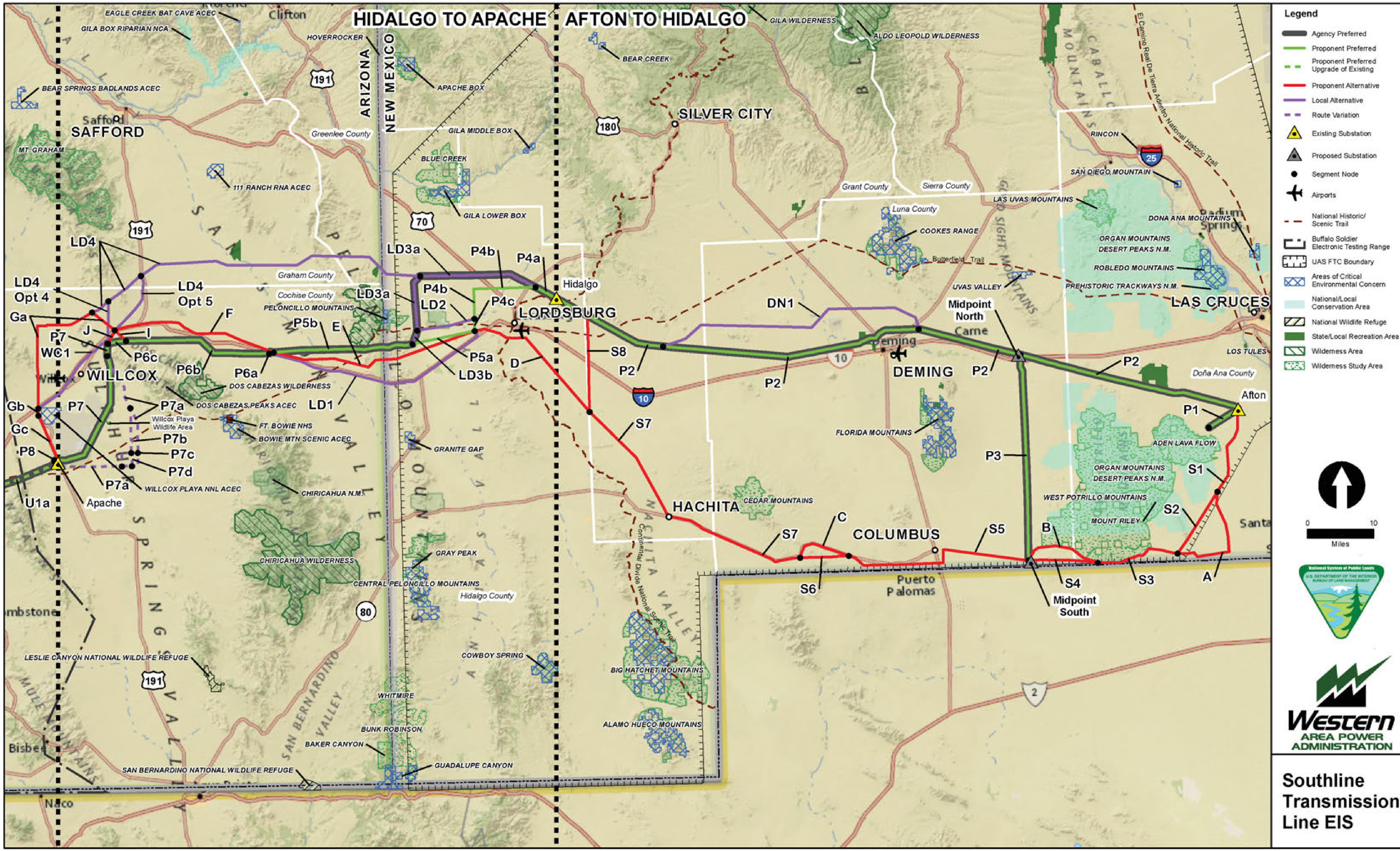


Figure 3.12-2. Special designation areas in the Upgrade Section.

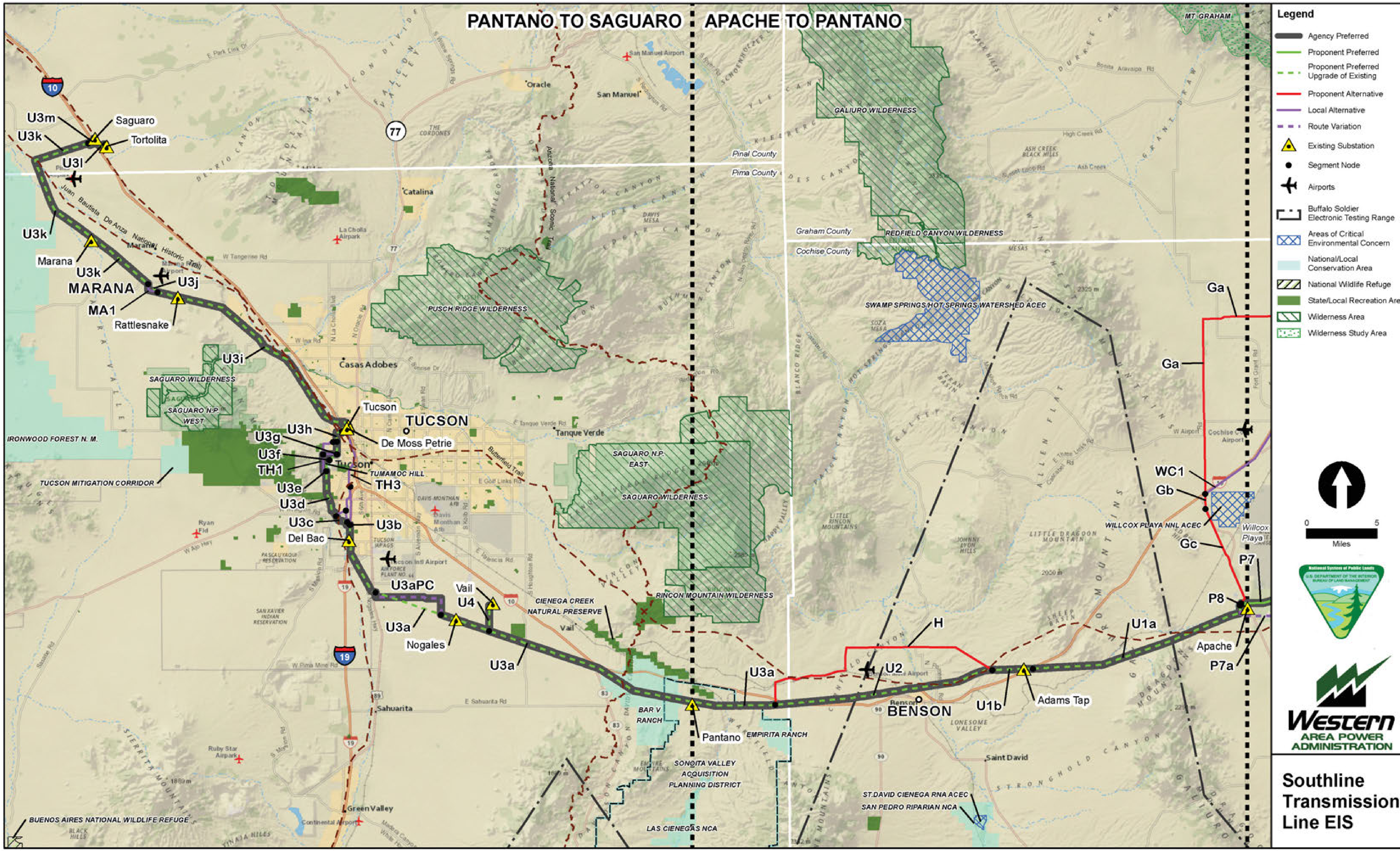


Figure 3.13-1. Wilderness characteristics in the New Build Section.

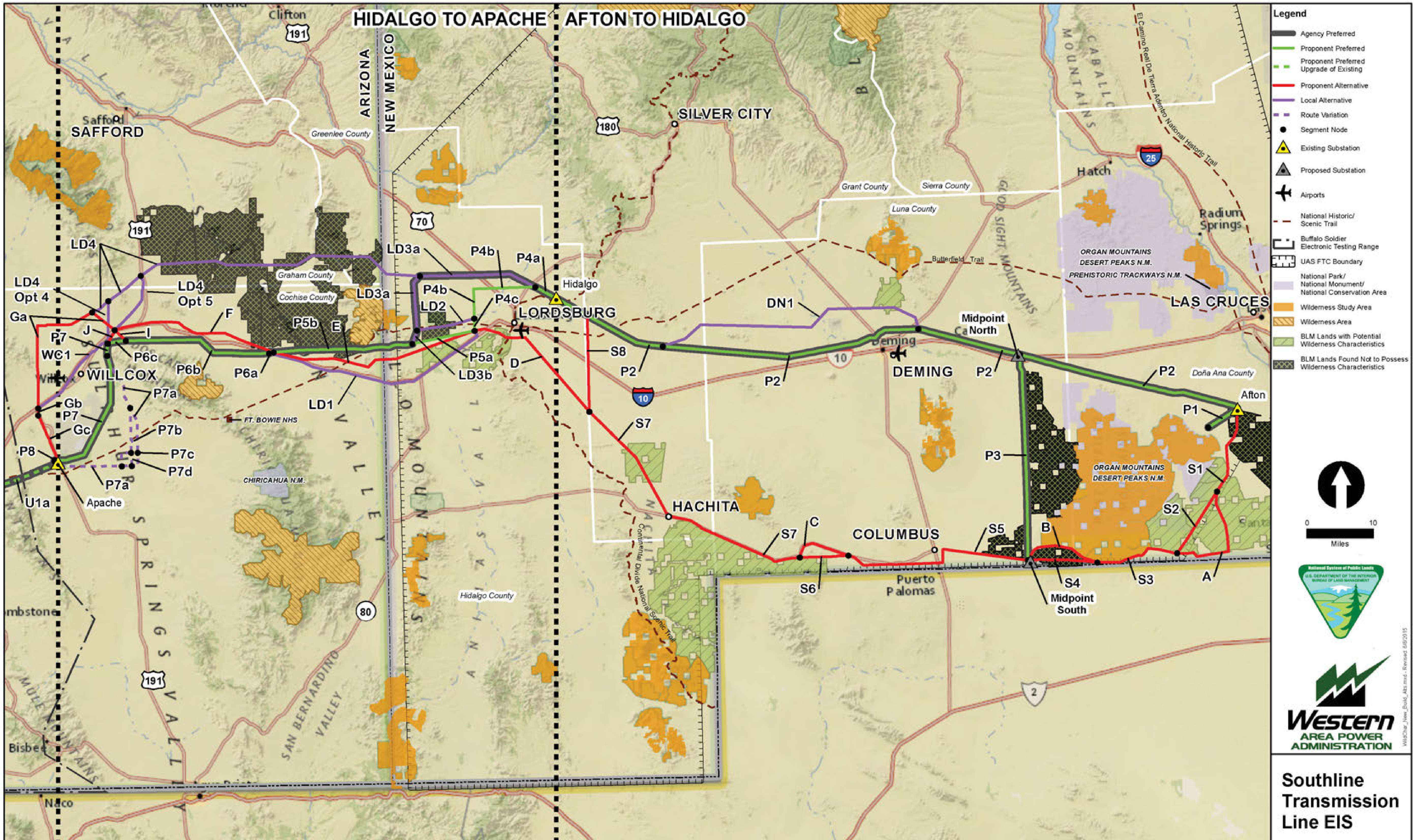


Figure 3.13-2. Wilderness characteristics in the Upgrade Section.

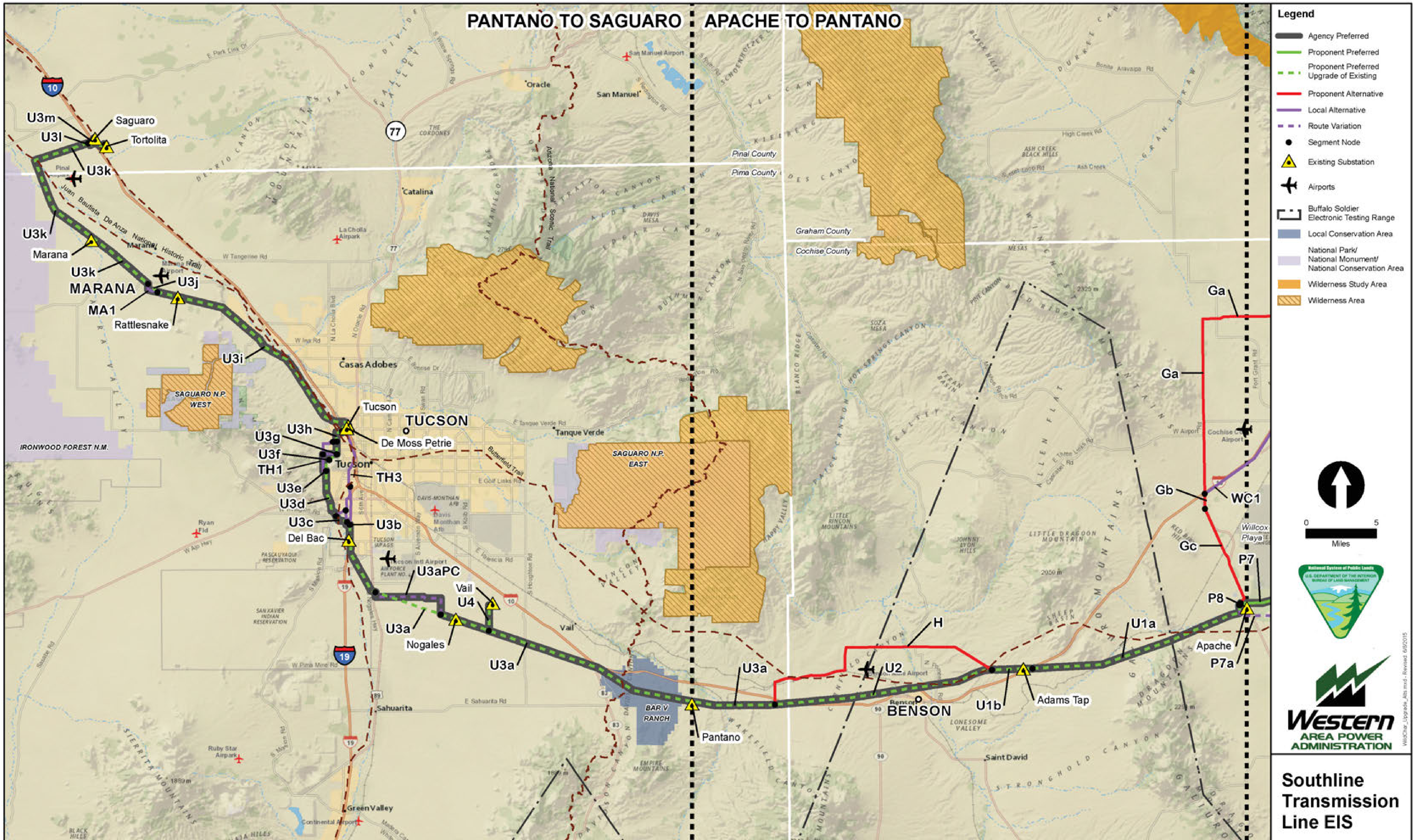


Figure 3.14-1. Recreation areas in the New Build Section.

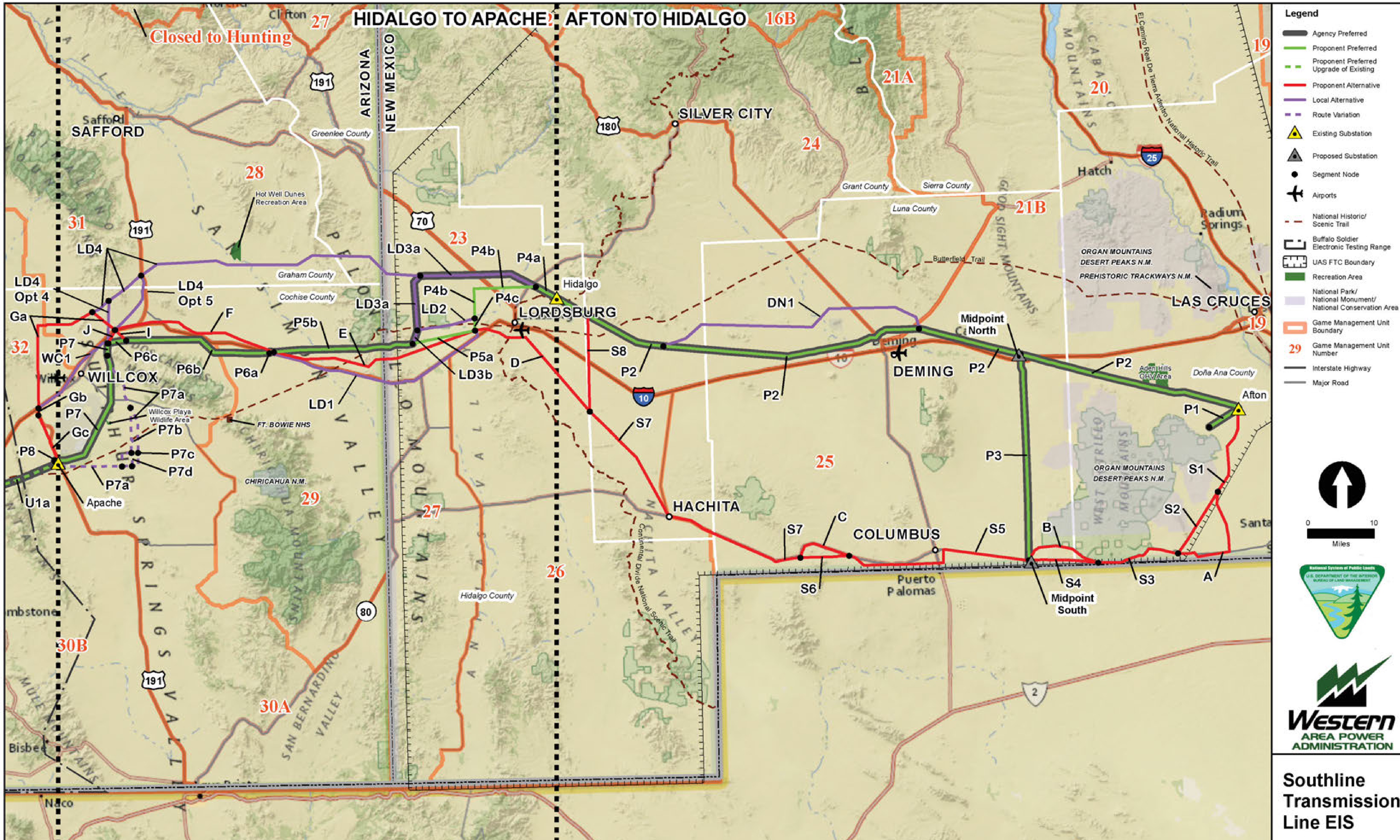


Figure 3.14-2. Recreation areas in the Upgrade Section.