Chapter 1

INTRODUCTION AND PURPOSE AND NEED

1.1 PURPOSE AND NEED

1.1.1 Introduction

Southline Transmission, LLC (Southline), a subsidiary of Hunt Power, L.P., submitted Standard Form (SF-) 299, "Application for Transportation and Utility Systems and Facilities on Federal Lands," to the Bureau of Land Management (BLM) for a right-of-way (ROW) to use BLM-administered public lands for a portion of the proposed Southline Transmission Line Project (Project) on December 4, 2009. Southline amended its application on December 22, 2010, to add an additional section to the proposed Project. The Plan of Development (POD) has also been amended in response to project changes and recommendations from the BLM, Western Area Power Administration (Western), other agencies, and public comment and to include more detail on design features and mitigation measures. This application has been assigned BLM Case File No. NMNM-124104.

Southline proposed to upgrade two of Western's existing transmission lines as part of its Project. Southline has also filed a Statement of Interest with Western's Transmission Infrastructure Program (TIP) because it may seek to use Western's borrowing authority under the 2009 amendment of the Hoover Power Plant Act (PL 98-381, Title III, § 301)) ("the Hoover Act") for the proposed Project. Western needs to determine whether it will provide Hoover Act funding for the proposed Southline Project, and if it does provide funding, the nature and extent of Western's participation in the proposed Project. Western may also participate under a trust funding agreement with the Desert Southwest Region if TIP funding is not provided. In the context of making these determinations, Western will evaluate the upgrade of its existing Saguaro–Tucson and Tucson–Apache 115-kilovolt (kV) transmission lines.

The proposed Project objective is to improve reliability in southern New Mexico and southern Arizona, mitigate existing congestion, increase the ability to meet increasing demand for electricity, and facilitate generation and public policy goals by increasing the capacity of the existing electric transmission grid initially by about 1,000 megawatts (MW). The ultimate capacity could be 1,500 to 2,000 MW.

The proposed Project would consist of two sections. The first section would entail construction of approximately 240 miles of new double-circuit 345-kV transmission line in a new 200-foot ROW between the Afton Substation, south of Las Cruces, New Mexico, and Western's Apache Substation, south of Willcox, Arizona (Afton–Apache Section or New Build Section). The second section would entail the upgrade of approximately 120 miles of Western's existing Saguaro–Tucson and Tucson–Apache 115-kV transmission lines in a 100-foot-wide existing ROW to a double-circuit 230-kV transmission line (Saguaro–Apache Section or Upgrade Section) with up to 50 feet of new ROW in places. The Upgrade Section would originate at the Apache Substation and terminate at the Saguaro Substation northwest of Tucson, Arizona (figure 1-1). Both new permanent ROW and temporary construction ROW would be required in the New Build Section and in some portions of the Upgrade Section for the transmission line, substations, access roads, and other permanent and temporary Project components; the anticipated ROW width for the Upgrade Section 230-kV transmission line would be 150 feet where expansion to that width is feasible. Through Bar V Ranch property (a local conservation area east of Tucson) and through the Tucson area from Del Bac Substation to Rattlesnake Substation (see figure 1-1), no new ROW would be acquired.

The New Build Section (Afton–Apache) would include construction and operation of:

- 205 miles of 345-kV double-circuit electric transmission line in New Mexico and Arizona with a planned bidirectional capacity of up to 1,000 MW. This section is defined by endpoints at the existing Afton Substation, south of Las Cruces in Doña Ana County, New Mexico, and Western's existing Apache Substation, south of Willcox in Cochise County, Arizona;
- 5 miles of 345-kV single-circuit electric transmission line between the existing Afton Substation and the existing Luna–Diablo 345-kV transmission line;
- 30 miles of 345-kV double-circuit electric transmission line between New Mexico State Route 9 (NM 9) and Interstate 10 (I-10) east of Deming in Luna County, New Mexico, to provide access for potential renewable energy generation sources in southern New Mexico. This segment of the proposed Project is included in the analysis, but development of this segment would be determined at a later date;
- one new substation in Luna County (proposed Midpoint Substation) to provide an intermediate connection point for future interconnection requests; and
- substation expansion for installation of new communications equipment at, and connection to, two existing substations in New Mexico and one in Arizona.

The Upgrade Section (Apache–Saguaro) would include:

- replacing 120 miles of Western's existing Saguaro–Tucson and Tucson–Apache 115-kV single-circuit electric wood-pole H-frame transmission lines, which date to 1951, with a 230-kV double-circuit electric steel-pole transmission line. In locations where needed and where possible, an additional 50 feet of ROW adjacent to the existing 100-foot ROW would be required for the new 230-kV line. This Upgrade Section is defined by endpoints at the existing Apache Substation, south of Willcox in Cochise County, Arizona, to the existing Saguaro Substation, northwest of Tucson in Pima County, Arizona;
- 2 miles of new build double-circuit 230-kV electric transmission line to interconnect with the existing Tucson Electric Power Company (TEP) Vail Substation, located southeast of Tucson and just north of the existing 115-kV Tucson–Apache line; and
- Interconnection with and upgrade of 12 existing substations along Western's existing lines in Arizona. Substation expansions would be required for installation of new communications equipment, new 230-kV bays with transformers, breakers, switches, and ancillary equipment. In some cases expansion may require a separate yard.

Under the Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1761–1771), the BLM is considering Southline's SF-299. The BLM is authorized to grant a ROW for electrical transmission lines under Title V of FLPMA. The BLM's decision would constitute a Federal action requiring compliance with the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321–4347). This environmental impact statement (EIS) has been prepared to analyze and disclose the potential effects of the proposed Project and to help inform the BLM's decision. As explained in sections 1.2.1 and 1.5, certain alternative transmission line route segments are not in conformance with the Las Cruces District Office "Mimbres Resource Management Plan" (Mimbres RMP) (BLM 1993) Visual Resource Management (VRM) Class II objectives, and one ROW avoidance area stipulation. Therefore, in conjunction with Southline's request for a ROW for the Project, the BLM is also analyzing concurrent resource management plan amendments (RMPAs). The RMPAs would address the identified non-conformance if the proposed Project is approved and a route is selected that is not in conformance with the Mimbres RMP, and would allow the BLM to grant the ROW necessary to construct and operate the proposed Project.

The BLM and Western have agreed to be joint lead agencies under NEPA regulations at 40 Code of Federal Regulations (CFR) 1501.5(b). As a land management agency, BLM administers public lands to sustain their health, diversity, and productivity. BLM manages public land surface resources for a variety of uses as well as subsurface mineral estate. Western is a power-marketing administration within the U.S. Department of Energy (DOE) that operates power transmission facilities in 15 states within the Central and Western United States, including New Mexico and Arizona. Western delivers power from U.S. Bureau of Reclamation (Reclamation), U.S. Army Corps of Engineers (USACE), and International Boundary and Water Commission hydropower generation facilities through a transmission system that it owns and operates.

The BLM New Mexico State Office has been designated the lead BLM office and will use this analysis to assist in its decision whether or not to grant a ROW on BLM-administered public lands for the proposed Project. The BLM New Mexico State Office has delegated the decision to grant the ROW to the Las Cruces District Manager. If the selected alternative requires a plan amendment, approval of this plan amendment would be included as part of the record of decision (ROD).

Western is a joint lead agency with the BLM because Southline proposes to upgrade 120 miles of existing electric transmission lines owned and operated by Western. Western will use the analysis in this EIS to determine whether to permit Southline to upgrade its transmission facilities. Western will also consider this analysis as it determines the nature and level of its participation in the proposed Project under the TIP, which could include joint ownership of the entire Project. These decisions will be made by Western's Administrator and Chief Executive Officer in the Corporate Services Office in Lakewood, Colorado.

The majority of the public lands the proposed Project and alternatives would cross are lands administered by the BLM and State land departments in Arizona and New Mexico. The existing ROW for the upgrade portion of the proposed Project and alternatives lies only in Arizona and crosses short sections of BLM, U.S. Forest Service (Forest Service) (Coronado National Forest), Reclamation, and Tohono O'odham Nation allotment lands, as well as private and State-owned lands. The proposed Project and alternatives would cross both public and private lands located in Doña Ana, Luna, Grant, and Hidalgo counties in New Mexico; and Cochise, Pima, and Pinal counties in Arizona. The proposed Project and alternatives follow existing linear corridors (such as existing power lines, roads, and highways), with a few exceptions, to the maximum extent possible with the intent of minimizing the impacts of new disturbance caused by construction of new access roads and feeder lines to connect to substations.

Southline's proposed route takes into consideration work previously done by the BLM and others in studying potential renewable energy zones in the "Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States (Arizona, California, Colorado, Nevada, New Mexico, and Utah) (FES 12-24; DOE/EIS-0403)" (Solar Energy Development PEIS) (BLM and DOE 2012), the "Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States (DOE/EIS-0386)" (Wind Energy PEIS) (BLM 2005a), and "Renewable Arizona: Restoration Design Energy Project Final Environmental Impact Statement" (RDEP) (BLM 2012a). For example, the 30-mile segment proposed between NM 9 and I-10 in New Mexico could be used as a way to provide interconnection for potential solar generation that could be developed in the area along the segment.

1.1.2 Draft and Final EIS

As guided by 40 CFR 1502.9, EISs are prepared in two stages (and may be supplemented):

- Draft EISs shall be prepared in accordance with the scope decided upon in the scoping process. The lead agency shall work with the cooperating agencies and shall obtain comments as required in 40 CFR 1503. The draft statement must fulfill and satisfy to the fullest extent possible the requirements established for final statements in section 102(2)(c) of the Act. If a Draft EIS is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion. The agency shall make every effort to disclose and discuss at appropriate points in the Draft EIS all major points of view on the environmental impacts of the alternatives including the proposed Project.
- Final EISs shall respond to comments as required in 40 CFR 1503. The agency shall discuss at appropriate points in the Final EIS any responsible opposing view which was not adequately discussed in the Draft EIS and shall indicate the agency's response to the issues raised.

Changes Between the Draft and Final EIS

Following the requirements of 40 CFR 1503, numerous minor edits to the document have been made between the Draft and this Final EIS, many in response to comments by agencies and the public. These include corrections to the text, figures, and tables, and typographical errors. Additionally, Project design has progressed between the Draft and Final EIS resulting in a more refined Project description. As a result, at four substation locations within the Upgrade Section where the proposed Project was anticipated to include expansion of existing facilities, these expansions are more accurately described as "new" substations. These four substation locations are Apache, Pantano, Marana, and Saguaro. Please note that these changes are only a refinement of the project description and do not change the disturbance areas and impact estimates presented in chapter 2 or in the analysis in chapter 4.

The most notable difference between the Draft and Final EIS is the inclusion of route variations east of Willcox Playa and south of the Tucson International Airport. These route variations are described in chapter 2 of this EIS, and were developed based on agency and public comments on concerns about impacts in these areas. These route variations include:

- P7a, P7b, P7c, and Pd are minor route variations in the New Build Section of the proposed Project. These variations were developed to shift segment P7 of the Proponent's Preferred Alternative east away from Willcox Playa to minimize avian impacts;
- U3aPC is a variation of the proposed Project in the Upgrade Section and was developed to shift segment U3a of the Proponent's Preferred Alternative away from potential conflicts with Pima County economic development efforts. U3aPC was also developed to minimize ROW encroachment conflicts and dense development around the existing Western line in the Summit area. Realigning the existing Western line along U3aPC would allow for safer and easier maintenance of the line in this area.

Following is a summary by chapter and appendix of the most notable changes made between the Draft and Final EIS (hereafter "EIS"):

Chapter	Change
1	The proponent's objectives have been updated in response to public comments and a section on the Draft EIS public comment process has been added.
2	Based on public and agency comments and updated information, text has been revised for the proposed Project description. A description of the route variations (P7a, P7b, P7c, P7d, and U3aPC) and changes to the Agency Preferred Alternative are also included.
3	Based on agency comments and updated information, particularly for vegetation and wildlife resources, text has been revised to reflect the affected environment. Text has been revised in all resource sections to reflect the affected environment for the route variations.
4	Information has been revised in all resource sections to reflect the potential impacts for the route variations, as well as based on public comments, as described in chapter 8. A description of the potential impacts has been updated in each resource section to reflect the revised Agency Preferred Alternative in this EIS.
5	Information on the public comment and consultation processes has been revised and updated.
8	A new chapter that includes the agencies' response to public comments on the Draft EIS has been included in tabular form.
Figures	Maps in the Final EIS have been revised to provide more detail, including a change in scale, in response to public comments on the Draft EIS, as well as to depict route variations and changes to the Agency Preferred Alternative.
Appendix	**Change**
D	Updates to species list made to reflect additional route variations.
E	Updates to species list to reflect additional route variations and changes in species status.
F	Updated trails maps and analysis to reflect additional trail crossing from route variations.
G	Updates made to reflect additional route variations.
H	Updates made to reflect additional route variations.
I	Added additional KOPs to reflect additional route variations.
J	Updates to BLM Las Cruces Field Office land use authorization list.
K	Added five additional visual simulations based on request in the comments on the Draft EIS.
L	The final Programmatic Agreement, prepared in accordance with Section 106 of the National Historic Preservation Act, is included in this appendix.
M	The U.S. Fish and Wildlife Service biological opinion and amendment are included in a new appendix.
N	Based on several requests in the comments on the Draft EIS, a draft NEPA POD is included in a new appendix.

1.2 AGENCY PURPOSE AND NEED

The following section describes the purpose of and need for BLM and Western's Federal actions associated with the proposed Project. The BLM and Western, serving as joint lead agencies, are both considering Federal actions that would need to be taken.

BLM must consider Southline's request to be granted a ROW on BLM-administered public lands for the construction, operation, maintenance, and decommissioning of the proposed Project. Western must consider the upgrading of two of its existing transmission lines. This environmental analysis is an important element in Western's consideration for determining the extent and nature of its participation in Southline's proposed Project, and whether to fund the proposed Project in whole or in part under the TIP.

1.2.1 Bureau of Land Management – Purpose and Need

The BLM has received a ROW application from Southline and must determine whether to allow the use of BLM-administered public lands for portions of the proposed Project. In accordance with the FLPMA

and the BLM's ROW regulations (43 CFR 2800), the BLM must manage public lands for multiple uses that take into account the long-term needs of future generations for renewable and non-renewable resources. The Secretary of the Interior is authorized to grant ROWs for "systems for generation, transmission, and distribution of electric energy" "over, upon, under, or through [public] lands" (43 U.S.C. 1761(a)(5)). Taking into account the BLM's multiple-use mandate, the need for the BLM action is established by the BLM's responsibility under FLPMA to respond to a request for a ROW grant while avoiding or minimizing adverse impacts to other resource values and to locate the uses in conformance with land use plans. The BLM's purpose for the proposed Project is to respond to a ROW application submitted by Southline to construct, operate, maintain, and decommission a transmission line (345 kV in the New Build Section and 230 kV in the Upgrade Section), substations, access roads, and associated infrastructure on public lands administered by the BLM in compliance with FLPMA, BLM ROW regulations, and other applicable Federal laws and policies.

In making its decision, the BLM must determine and consider the environmental impact on all lands crossed as a result of granting a ROW across BLM-administered public lands. In its decision to issue a ROW grant, the BLM must also consider existing RMPs and other BLM land use plans in terms of how the authorizations and actions proposed either conform or require an RMPA (43 CFR 1610.0-5(b)). The BLM will decide whether to grant, grant with modifications, or deny the application. Modifications could include granting only a portion of the proposed Project, modifying the proposed use, or changing the route or location of the proposed facilities if the BLM determines such terms, conditions, and stipulations are in the public interest (43 CFR 2805.10(a)(1)). The decisions to be made are summarized below in table 1-1. Please note that the potential land use planning decisions described in table 1-1 would only apply if the selected route is not in conformance with the Mimbres RMP.

Table 1-1. Decisions to Be Made by the BLM

Land Use Planning Decision
Amend the Mimbres RMP to change the VRM class of the affected area.
Do not amend the Mimbres RMP to change the VRM class of the affected area.
Amend the Mimbres RMP to change the stipulations of the affected ROW avoidance area.
Do not amend the Mimbres RMP to change the stipulations of the affected ROW avoidance area.
Site-Specific Decision
Grant ROW as applied for.
Grant modified ROW.
Deny ROW request.

The BLM would issue a ROD with all terms and conditions deemed appropriate by the BLM. The BLM decisions to be made are to:

- decide whether to grant, grant with modifications, or deny all or part of the ROW application for the transmission line, substation expansions, and associated access roads and facilities;
- decide whether one or more RMPs would be amended to allow for a ROW for the proposed transmission line and associated facilities;
- decide whether to approve the proposed RMPA(s) if the proposed Project is not approved;
- determine the most appropriate route across BLM-administered public lands for the transmission line, taking into consideration multiple-use objectives; and

- determine the terms and conditions (stipulations) that should be applied to the construction, operation and maintenance, and decommissioning of the transmission line on BLM-administered public lands.

FLPMA requires that the BLM "develop, maintain, and when appropriate, revise land use plans" (43 U.S.C. 1712). As indicated in the notice of intent (NOI) published in the Federal Register on April 4, 2012, the public was notified of the potential for a plan amendment for this Project. Plan conformance is discussed in section 1.5, and an amendment to one of the four BLM RMPs discussed in section 1.5 of this chapter and in section 2.3 of chapter 2 could be required, depending on the route selected on public lands where current resource management objectives would not be met by construction of the proposed Project.

Specifically, there are two potential conformance issues with the Mimbres RMP: (1) where portions of alternative route segments would cross VRM Class II areas, and (2) where portions of local alternative route segments would cross any avoidance areas designated for the Butterfield Trail near Lordsburg Playa. Section 2.3 of chapter 2 describes in detail which project segments have potential conformance issues with the Mimbres RMP and whether or not these conformance issues would require a plan amendment. If a plan amendment is needed for the selected alternative, the New Mexico State Director would make the decision. The Agency Preferred Alternative, as presented in chapter 2, would not conflict with the Mimbres RMP and thus would not require a plan amendment.

The BLM, along with Western, has prepared this EIS to meet the disclosure requirements under NEPA, to facilitate public participation, to assist the BLM decision makers in determining whether to issue a ROW grant, and to determine under what terms and conditions the ROW grant would be issued. The BLM Las Cruces District Office Manager is the agency official who will be making the decision whether or not to grant the ROW in BLM's ROD. The opportunity to appeal the BLM decision(s) in the ROD (on granting the ROW) would be allowed as provided in 43 CFR 4 and 2801.10.

1.2.2 Western Area Power Administration – Purpose and Need

Western needs to respond to the Project proposed by Southline, which would, in part, include an upgrade of two existing Western transmission lines and associated substations and the use of existing Western transmission easements. In addition, Southline has requested consideration of its proposed Project for funding under the amended Hoover Act of 1984, as described in more detail below. Western needs to determine the nature and extent of its participation in the proposed Project, and whether it will provide funding. In the context of making these determinations, Western will evaluate the upgrade of its existing Saguaro–Tucson and Tucson–Apache 115-kV transmission lines.

Western has a mandate to carry out Federal policy to facilitate renewable energy development and transmission expansion as established in the 2009 amendment of the Hoover Act. The amended Hoover Act authorizes Western to borrow funds from the U.S. Treasury to construct, finance, facilitate, plan, operate, maintain, and/or study construction of new or upgraded electric power transmission lines and related facilities. These transmission lines and related facilities must have at least one terminus in Western's marketing area and deliver or facilitate the delivery of power from renewable resources constructed or reasonably expected to be constructed after the enactment of the amended Hoover Act.

The Arizona Corporation Commission (ACC) commissioned a study that identified the need to improve system reliability in southern Arizona and facilitate the delivery of substantial amounts of power from renewable energy generation projects anticipated to be developed in south-central Arizona ("Final Report of the Arizona Renewable Resource and Transmission Identification Subcommittee," September 2009

(ACC 2009)). System reliability, which is regulated by the North American Electric Reliability Corporation (NERC) through the implementation of reliability standards, is necessary for the dependable operation of the bulk power system. Southline's proposal to upgrade Western's existing transmission lines as part of its overall proposed Project would meet some of the needs identified in ACC's report by strengthening the integrated transmission system, increasing transmission capacity, and improving power delivery. As part of Western's own efforts to maintain the reliability of its transmission system and meet system and customer needs, it has identified the upgrade of the two transmission lines and associated substation in its Desert Southwest Region's 10-year plan for construction and maintenance projects.

As part of its decision whether to use its amended Hoover Act borrowing authority to finance the proposed Project, Western would decide on the amount of funding, potential ownership of capacity rights on the upgrade, repayment provisions, and the nature and extent of its participation in the proposed Project. Specifically, funding would be used to construct the proposed transmission lines and substation upgrades, and remove the existing Western transmission lines. These decisions would be managed through contractual agreements that include defining the respective rights and obligations associated with ownership, construction, operation, and maintenance associated with the proposed Project; and that provide for acquisition of ROWs for the Project.

Before committing funds, Western must certify that the proposed Project is in the public interest; that it would not adversely impact system reliability, system operations, or other statutory obligations; that it has at least one terminus in Western's service territory; that the proposed Project will deliver, or facilitate the delivery of renewable energy; and that it is reasonable to expect that the proceeds from the Project would be adequate to repay a loan from the U.S. Treasury. The development phase would determine the feasibility of the proposed Project. Western's decision would be partially informed by the required NEPA analysis and disclosure in this EIS. If Western decides to participate in the proposed Project, Western and Southline would enter into an agreement to accomplish the upgrade.

Alternatively, Western could choose to participate with Southline with the upgrade of the two transmission lines and associated facilities without the use of its borrowing authority to advance the proposed Project. The current condition of the lines and their inclusion in Western's 10-year capital plan (Western 2012a) indicates, however, that the lines would be upgraded within the next 10 years even if Western does not participate with Southline or make use of its borrowing authority. The source of funding, the timing, and the manner of Western's participation in upgrading the lines are not expected to result in materially different environmental impacts.

Portions of the proposed Project may affect floodplains and wetlands. In accordance with DOE floodplain and wetland environmental review requirements (10 CFR part 1022), this EIS includes a floodplain and wetlands assessment (see the "Water Resources" section in chapters 3 and 4). The NOA for the Draft EIS also served as a notice of proposed floodplain or wetland action, in accordance with 10 CFR 1022.12(a). A floodplain statement of findings is included in this Final EIS (DOE 10 CFR 1022.14(c)) (see section 4.7 in chapter 4).

Western's Federal action is to respond to Southline's proposed Project. Western must make decisions about whether to participate in the Project beyond the development phase, the nature of that participation, and whether to allow the upgrade of its existing transmission lines and the use of its ROW easements. Western must also make decisions about the route of the Agency Preferred Alternative, and upgrades/expansions to the existing substations. Finally, Western must make a decision about using its borrowing authority to finance the Project, in whole or in part, contingent upon the successful completion of development and commercial agreements with Southline.

1.2.3 Role of Bureau of Land Management and Western Area Power Administration

This EIS is being prepared by the BLM and Western in compliance with NEPA, Council on Environmental Quality (CEQ) regulations for implementing NEPA, DOE 10 CFR parts 1021 and 1022, FLPMA, and applicable U.S. Department of the Interior (DOI) and BLM policies and manuals. Other applicable authorizing Federal laws, regulations, and guidelines are described in sections 1.5 and 1.6. Southline would be responsible for obtaining all permits and approvals required to complete the proposed Project, regardless of whether they are listed in this document. Southline is working directly with the Western Electricity Coordinating Council (WECC) to establish path ratings for their proposed Project and integrate their Project with regional transmission efforts. The BLM is not involved in the transmission planning process, nor is it the responsibility of BLM or Western to make any determination of regional transmission infrastructure needs, system requirements, or system rating with regard to the Southline Project. Western is a member of WECC, however, and does participate in regional transmission planning.

In the Upgrade Section, as a participant in the Southline Project, Western would need to revise, amend, and/or file new applications with the BLM and other Federal and State agencies. Western would need to update existing transmission line authorizations for the existing ROWs and obtain rights for those portions of the line where needed. Western may also need to update rights and make payments for updated rights where the proposed facility would cross private lands. Western is currently negotiating renewal of its existing ROW with the Tohono O'odham Nation tribal allottees for that portion of the line located on allotted tribal lands. Western would also need to acquire a revision or reissuance of the existing special use permit (SUP) on the portions of the Project that cross Forest Service lands.

1.3 OBJECTIVES OF SOUTHLINE TRANSMISSION, LLC

Southline worked with WECC,[1] local utilities, and other regional transmission planning groups to design the proposed Project to help solve regional transmission needs such as congestion, reliability, capacity constraints, and limited transmission access for utilities and renewable energy zones in New Mexico and Arizona. Southline's objectives are to satisfy four primary needs; these are summarized below and described in more detail in sections 1.3.1 through 1.3.4.

1.3.1 Improve Reliability of the Electric Transmission Grid in Southern New Mexico and Arizona

Reliability of the electrical grid in southern New Mexico and Arizona is affected by load growth, inadequate electrical transmission capacity, limited electrical connections in the area, and many older electrical transmission lines that are approaching the end of their useful lives.

In recent years, key transmission lines across southern New Mexico and Arizona have experienced unanticipated outages that triggered load-shedding actions by the utilities and prompted investigation by the Federal Energy Regulatory Commission (FERC) and NERC (FERC and NERC 2011).

[1] WECC and the nine other regional reliability councils were formed due to national concern regarding the reliability of the interconnected bulk power systems, the ability to operate these systems without widespread failures in electric service, and the need to foster the preservation of reliability through a formal organization. The Western Interconnection encompasses a vast area of nearly 1.8 million square miles. It is the largest and most diverse of the eight regional councils of NERC. WECC's territory extends from Canada to Mexico. It includes the provinces of Alberta and British Columbia, the northern portion of Baja California, Mexico, and all or portions of the 14 western states in between (WestConnect 2012b).

The transmission system in Cochise County has had reliability issues in the past, including the outages in 2007 that led to the ACC's requests for focused technical studies and mitigation (ACC 2008). In addition to these events, the existing Western line termination at Apache Substation is the outer edge of the Southeastern Arizona transmission system, which has several radial lines that lack redundancy (e.g., there are no other lines that would provide backup in the event of a line failure).

The condition and limited amount of the existing electrical infrastructure leads to highly utilized sections of the electrical system operating with low levels of redundancy to withstand unanticipated outages. In addition, utilities in the area have limited interconnections to hub power markets because of their location on the periphery of the WECC's grid and because of the limited existing electrical transmission capacity in the region. Therefore, access to and delivery of electricity to end users in southern New Mexico and Arizona is inadequate.

There are many older lines in the region that are reaching or beyond the end of their original design lives but that are still in service through the use of heavy maintenance regimes. For example, the Upgrade Section of the proposed Project is part of Western's South of Phoenix H-frame wood pole 115-kV transmission system, which was built in the early 1950s and is well past its engineered lifespan (Western 2012a). The wood poles have been subjected to advanced external shell rot, weathering, decay, and large cracks—conditions that can lead to reduced pole integrity and reduced ability to bear the load of mounted conductors and hardware, especially under severe weather conditions.

The proposed Project would improve system reliability in several ways. In particular, the Project would add bulk electric infrastructure to the existing grid, which would build redundant systems to resolve and allow flexibility for unanticipated and scheduled grid outages, respectively. The upgrading of the existing 115-kV lines and addition of new transmission and substation facilities would create additional connections and would increase import capability for regional utilities. Replacing aging wooden structures with steel structures would reduce maintenance and the incidence of failures. Adding new equipment, including new conductors and insulators and related substation equipment, would increase reliability. The proposed Project would also improve voltage limitations and reduce curtailment for local utilities.

The proposed Project is a transmission-only project with no specific associated generation source; Southline does not purchase power from generators, nor does it sell power to others. The proposed Project, as described in chapter 2, would interconnect with up to 14 existing stations where new or existing power generation resources could interconnect to and utilize the capacity Southline would add to the system.

1.3.2 Mitigate Existing Congestion

Existing transmission capacity in southern New Mexico and southern Arizona is presently almost fully utilized and congested. PL 109-58, the Energy Policy Act of 2005 (EPAct 2005), required that studies be completed detailing national electrical transmission congestion as well as areas where renewable energy development has been inhibited by a lack of sufficient transmission facilities or capacity. Consequently, the DOE produced the "National Electric Transmission Congestion Studies" in 2006, 2009, and 2012. The 2006 and 2009 DOE studies identified Path 47 – Southern New Mexico as one of the top congested paths, out of more than 20 paths in the West (DOE 2006, 2009). This congestion is demonstrated through the available transfer capability (ATC), which is a measure of the contractual transfer capability remaining in a transmission network for further use over and above those already committed uses (WestConnect 2012a) (table 1-2). Operators of the electrical grid in southern New Mexico and Arizona rely on a bilateral, contractual system to reserve transmission capacity and schedule operations that is indicated by the ATC. The proposed Project would be located in a region of WECC that does not have a

central transmission system operator. Rather, areas are balanced and operated by underlying entities on a bilateral contractual basis. Energy supplies and the transmission needed to deliver them are secured with bilateral contracts that ensure that an entity can reliably serve its load. Therefore, it is the contractual congestion that is critically important, as that governs the ability to schedule power deliveries.

Path 47 (the import path to southern New Mexico) is reported to be fully committed, with zero ATC,[2] and the existing lines in the upgrade portion of the Project (which are not included in Path 47) are also fully committed, with near zero ATC. This lack of available contractual capacity results in a congested condition, regardless of the electrical grid's physical state. West-to-east scheduling is congested on Path 47, as evidenced by the lack of ATC, as noted above. The southern New Mexico and El Paso areas experience large variations between periods of peak and low demand. El Paso Electric Company (EPEC) and other load-serving entities in the region need to plan their systems to be able to serve this peak load. The WECC studies (DOE 2006, 2009) show that at these peak hours, Path 47 is highly utilized. Southline studies have shown that the proposed Project would increase the import capability of the region (WECC 2011a).

The electrical grid across southern New Mexico, southeast Arizona, and west Texas faces challenges from severe demand spikes resulting from large temperature swings—especially during hot summer months. Because loads on power lines are constantly changing and utilities need to reserve capacity to meet required levels of reliability, the congested state of the electrical grid exacerbates the difficulties of local utilities to provide reliable service, even when increased electrical load can be anticipated. The poor physical condition of certain components of the transmission grid, coupled with this current state of congestion, makes the entire system itself vulnerable to cascading outages and potential regional blackouts.

The proposed Project would mitigate existing and predicted future congestion, in both the east-to-west and west-to-east directions, by adding up to approximately 1,000 MW of bidirectional capacity to the electric grid. Adding the proposed Project to the system would increase west-to-east capability and therefore mitigate the existing contractual congestion. Additional west-to-east capacity could serve multiple purposes, including increased reliability, operational flexibility, and reduced maintenance, and therefore its value is not solely in relation to local versus external power generation plans.

Table 1-2 demonstrates the existing transmission capacity in southern New Mexico and southern Arizona, including Path 47, compared with the transmission capacity that would exist at each stage of the WECC process (Phase 1 and Phase 2) if the proposed Project were built.

Table 1-2. Existing and Planned Transmission Capacity in Southern New Mexico and Southern Arizona

Southline Project Section	Existing ATC	Proposed Southline Rating (WECC Project Coordination Review Group)	Planned Southline Rating (WECC Phase 1)	Accepted Southline Rating (WECC Phase 2)*
Afton to Apache (E-W)	151 MW (4 rates)	1,000 MW	1,038 MW	In process TBD ~1,037 MW
Apache to Saguaro (E-W)	0 MW	1,000 MW	1,001 MW	In process TBD ~1,000 MW
Saguaro to Apache (W-E)	0 MW	1,000 MW	418 MW	In process TBD ~430 MW
Apache to Afton (W-E)	0 MW	1,000 MW	957 MW	In process TBD ~971 MW

Source: WestConnect (2012a).
* WECC (2015).

[2] Available at: http://www.oasis.oati.com/EPE/EPEdocs/Narrative_Explanation_for_Zero_ATC.pdf (Western 2013).

1.3.3 Increase the Ability to Meet Electrical Demand Growth in the Region

Southern New Mexico and Arizona have seen increased growth in recent years, according to the U.S. Census Bureau (Census Bureau). In the Afton–Apache Section, the average population growth in Doña Ana, Grant, Hidalgo, Luna, and Cochise counties was 12.9 percent between 2000 and 2010. In the Apache–Saguaro Section, the average population growth in Cochise, Pima, and Pinal counties was 15.6 percent between 2000 and 2010 (Census Bureau 2010a). Major load centers in the region (Tucson, Las Cruces, El Paso, and Phoenix) have grown by as much as 20 percent between 2000 and 2010 (Census Bureau 2013a). This increased growth has increased the demand for electricity and contributed to the congested state of the electrical grid in southern New Mexico and Arizona. In addition, the grid itself was designed for load conditions that existed more than 60 years ago that have since been far exceeded. The proposed Project has not been designed to induce growth, but rather to meet existing demand and existing transfer needs, as well as position utilities to meet future growth that would occur with or without the proposed Project. Most of the area is expected to continue to grow at a faster rate than the United States overall (Arizona Department of Administration (ADOA) 2013).

How regional utilities will meet future load growth depends on the availability and cost of various resources, including both transmission and generation. Utilities cannot include the proposed Project in their long-term plans until the project reaches regulatory and commercial maturity. As new transmission resources become available, the utility resource plans will evolve. In the absence of adequate transmission facilities, as is the case today, regional utilities must select generation solutions for their resource needs, and the potential types and locations for such generation may be limited. The availability of additional transmission capacity opens up a range of resource solutions, and potentially a greater universe of generation types and locations. For example, transmission that provides access to solar or wind generation zones would provide attractive options to a utility with growing resource needs and increasing renewable portfolio standards (RPSs). Similarly, the availability of transmission capacity would provide access to purchased power resources. The location of the proposed Project is not dictated by utility generation siting decisions, but instead by existing substations that are expected to expand (e.g., the Afton Substation, etc.).

The proposed Project would help meet future electric demand (or load growth) by adding 1,000 MW of capacity to the electric grid, which would improve regional transmission reliability and relieve congestion while improving access to energy sources. This would alleviate three of the primary factors that would inhibit the local utilities' ability to meet future electrical demand.

1.3.4 Facilitate Renewable Generation Development and Achievement of Public Policy Goals

Demand for transmission capacity to serve renewable resources will increase as western states attempt to meet their RPSs. Mandatory RPSs have been established to encourage the development of renewable energy sources and mandate that electricity producers obtain a minimum percentage of power from renewable energy resources before a certain date. New Mexico's RPS is 20 percent by 2020, and Arizona's RPS is 15 percent by 2025 (BLM and DOE 2012). The Public Regulation Commission of New Mexico and the ACC have specific incremental goals and timetables planned so as to be able to meet their respective 2020 and 2015 RPSs (DOE 2013).

Two Federal planning efforts identified specific locations that are well suited for renewable energy and established design features that would apply to these types of projects on BLM-administered lands. These two efforts overlap the Southline project area in Arizona and New Mexico, and include the Arizona BLM's RDEP (BLM 2012a) and the Solar Energy Development PEIS (BLM and DOE 2012).

The RDEP ROD established 192,100 acres of renewable energy development areas (REDAs) on BLM land throughout Arizona. In addition, the ROD established the Agua Caliente Solar Energy Zone (SEZ) near Dateland in western Arizona. The BLM amended eight land use plans across Arizona to include the REDAs and RDEP SEZ. While these amendments only apply to BLM-managed lands, the RDEP examined all lands in Arizona.

The Solar Energy Development PEIS identified priority areas for utility-scale production of solar energy (i.e., SEZs), including the Afton SEZ in New Mexico; exclusion areas for utility-scale solar energy development; and areas potentially available for utility-scale solar development outside exclusion areas and SEZs (variance areas). Land use plans in six western states (Arizona, California, Colorado, Nevada, New Mexico, and Utah) were also amended to establish programmatic and SEZ-specific design features for solar energy development on public lands.

The fully utilized and congested condition of the transmission grid limits the development of renewable energy generation projects. For example, the available transmission capacity for the Afton SEZ is only a small fraction of the 6,900-MW nameplate development potential for the zone and would not currently enable the export of electricity to load centers. Similarly, in Arizona in 2008, the Southeast Arizona Transmission Group described many of the local systems' needs and limitations and suggested the benefits of upgrading Western's existing 115-kV lines between Apache and Saguaro. TEP and Southwest Transmission Cooperative (SWTC) further reinforced this in 2009, identifying this upgrade as one of the top three potential renewable transmission projects in their planning area.

The proposed Project would add up to about 1,000 MW of bidirectional capacity to the existing electrical grid in southern New Mexico and Arizona and relieve congestion by adding bulk electric infrastructure, including connection with up to 14 existing substations spread across the area, which would improve the local utilities' ability to access energy sources. In doing so, the proposed Project would be consistent with public policy goals promoting the increased use of renewable energy to meet RPSs.

1.4 ELECTRIC TRANSMISSION REGULATION AND PLANNING

Traditionally, local utilities owned and controlled the electrical transmission network, but today's regulatory framework allows for third-party non-utility ownership, or independent transmission. In North America, there are four large geographic areas or "interconnections" that operate as interconnected systems in the lower 48 states, as well as the Canadian Provinces, along with a portion of northern Mexico. These are the Eastern Interconnection, Western Interconnection, and Electric Reliability Council of Texas, along with a fourth interconnection that links Québec to the Eastern Interconnection (National Renewable Energy Laboratory (NREL) 2011). The proposed Project would be a third-party, non-utility independent transmission project located within the Western Interconnection.

The electric utility industry currently operates under a variety of statutes that include the system reliability oversight provisions of the EPAct 2005. Generally, industry regulatory oversight can be separated into three main categories: interstate electricity sales, bulk electric system reliability, and physical construction of facilities. The FERC oversees interstate electricity transmission and wholesale sales, NERC oversees bulk electric system reliability, and State public utilities commissions (PUCs) or their equivalent

organizations oversee physical construction of facilities. In general, each state in the United States has a PUC or like organization charged with regulating in-state investor-owned electric utilities, municipal utilities, rural electric cooperatives, and other electricity generators. In New Mexico, the New Mexico Public Regulation Commission oversees electrical utilities, and in Arizona, the ACC Power Plant and Line Siting Committee provides oversight. Western, as a Federal agency, is not subject to State oversight even though it performs utility functions.

1.4.1 Federal Energy Regulatory Commission

At the national level, the FERC has regulatory authority over the interstate transmission and wholesale sale of electricity and operation of regional markets. FERC is an independent regulatory agency within DOE, charged with regulating interstate electricity sales and wholesale electricity rates. Independent transmission projects typically receive authority from FERC to enter into negotiated transmission rates. In January 2013, FERC released a policy statement (Docket Nos. AD12-9-000 and AD11-11-000) that now allows for independent transmission developers to enter into bilateral negotiations directly with potential customers to reach an agreement on rates, terms, and conditions, as long as the FERC process criteria are followed.

1.4.2 North American Electric Reliability Corporation

NERC has the responsibility, under FERC authority, to oversee power system reliability, operating, and planning standards in the United States. Every transmission utility in the United States and Canada participates in the NERC reliability assessment process to ensure that their transmission and generation systems meet industry standards and will perform reliably. Most of the criteria for transmission planning are based on NERC standards.

NERC oversees and works with eight regional entities to improve the reliability of the bulk power system. Each regional entity has been delegated authority from NERC for the purpose of proposing and enforcing reliability standards within their region. These entities were formed in response to national concerns regarding the reliability of the interconnected bulk power system and the ability to operate these systems without widespread service failures. The eight entities consist of the Florida Reliability Coordinating Council, Midwest Reliability Organization, Northeast Power Coordinating Council, ReliabilityFirst Corporation, SERC Reliability Corporation, Southwest Power Pool, Texas Reliability Entity, and WECC. WECC oversees Arizona and New Mexico.

1.4.3 Western Electricity Coordinating Council

WECC is the regional entity responsible for coordinating and promoting bulk electric system reliability in the Western Interconnection. WECC also provides an environment for coordinating the operating and planning activities of its members as set forth in the WECC bylaws, including oversight of the WECC Project Coordination and Path Rating Process. WECC's region encompasses all or portions of 14 western states and extends into portions of Canada and Mexico. WECC produces a 10-year regional transmission plan that is approved by its Board of Directors and provides an interconnection-wide perspective on expected future transmission and generation. In an effort to help ensure the reliability and efficiency of the Western Interconnection, the 10-year plan is meant to support decision makers in determining where and when to build new transmission or other related actions. In September 2013, WECC published its first 20-year plan (WECC 2013), which primarily uses a top-down process analyzing a broad range of strategic scenarios that cover economic conditions, technological change, environmental issues, regulatory policy, etc.

1.4.4 WestConnect

WestConnect members consist of utility companies with transmission assets in eight different states in the western United States that collaboratively assess stakeholder needs and develop cost-effective transmission enhancements. Members participate in organized subregional planning groups whose activities promote effective, open, and transparent transmission planning and assist WECC in its regional planning efforts.

1.4.5 Southwest Area Transmission

Southwest Area Transmission (SWAT) is a volunteer subregional planning organization that is supported by WestConnect. SWAT was created to provide support for the coordination, planning, and implementation of transmission throughout New Mexico and Arizona and in portions of Colorado, west Texas, southern Nevada, and the Imperial Valley area of California. SWAT operates in a public forum, performs study work cooperatively with stakeholders, and develops plans in a collaborative fashion while disseminating study results to a broad spectrum of interested and affected parties.

SWAT consists of transmission regulators/governmental entities, transmission users, transmission owners, transmission operators, and environmental entities. The goal of SWAT is to promote regional planning in the desert Southwest. The SWAT planning group includes transmission planning subcommittees and workgroups that evaluate future transmission needs and are overseen by the SWAT Oversight Committee. Specifically, the New Mexico Transmission Subcommittee oversees the New Mexico and Southwest Texas region; participants include the Public Service Company of New Mexico, EPEC, Tri-State Generation and Transmission Association, and others. The Southeastern Arizona Transmission Study (SATS) Subcommittee oversees the Southeastern Arizona Region, including the Southline Transmission Line Project. SATS participants include Arizona Public Service (APS), Central Arizona Project (CAP), EPEC, Public Service Company of New Mexico, TEP, Western, SWTC, and Reclamation.

1.5 RELATIONSHIP TO POLICIES, PLANS, AND PROGRAMS

The following section describes the proposed Project's relationship to applicable Federal, State, and local policies, plans, and programs. Where the Project would cross other Federal lands or private and State lands, it would be subject to applicable land use planning regulations, zoning ordinances, or other requirements enforced by the Federal, State, county, or local jurisdictions. Southline would need to secure necessary local permits and legal access, and ROW would also need to be obtained from all landowners where applicable.

1.5.1 Bureau of Land Management Resource Management Plans

The BLM manages public land for both multiple use and sustained yield, as directed by FLPMA, to ensure that present and future needs are considered in the management of resources. The BLM develops land use plans, or RMPs, that describe the goals and management objectives needed to achieve the multiple-use and sustained-yield objectives.

A list of BLM RMPs with BLM-administered public lands potentially crossed by the proposed Project is provided below in table 1-3. Where possible, the proposed Project has been designed to conform to existing plans. Although BLM and Western would prefer to maintain consistency with the RMPs, a plan amendment could be required in the event that BLM and Western select an alternative that does not conform to resource management objectives or decisions.

Plan conformance was reviewed for all resources in each of the applicable BLM land use plans listed in table 1-3. As discussed in section 1.2.1, there are two potential conformance issues with the Mimbres RMP: (1) where portions of six alternative route segments would cross VRM Class II areas; and (2) where portions of one of the six alternative route segments would also cross a ROW avoidance area designated for the Butterfield Trail near Lordsburg Playa and would not meet the ROW avoidance area stipulations. No plan amendments would be required or proposed for any portions of the Project in Arizona.

- A plan amendment would be required for the Mimbres RMP that would change the VRM Class II to VRM Class III or IV where the proposed Project intersects VRM Class II areas. Six Project segments, totaling approximately 28 miles within the New Build Section, intersect VRM Class II lands (see chapter 2, "Action Alternatives Requiring BLM Plan Amendments").
- A plan amendment for the Mimbres RMP would be required for the portion of the alternative route segment (an agency local alternative near the Lordsburg Playa) that parallels an avoidance area designated for the Butterfield Trail. There is a special stipulation in the Mimbres RMP that "facilities will not be located parallel to the Continental Divide National Scenic Trail or Butterfield Trail" (BLM 1993:2-17). Avoidance areas may be available for location of ROW with special stipulations, design features, and/or mitigation measures. The special stipulations would be required to reduce or mitigate impacts to the values for which the area is being avoided.

Table 1-3. Applicable BLM Land Use Plans and Planning Documents

Resource Management Plan	Plan Date	Lead Office	Project Applicability
Mimbres Resource Area*	December 1993	Las Cruces District Office	Afton–Apache
Safford RMP	August 1991	Safford District Office	Apache–Saguaro
Las Cienegas RMP	July 2003	Tucson Field Office	Apache–Saguaro
Phoenix RMP	December 1988	Phoenix District Office, Tucson Field Office, Safford Field Office	Apache–Saguaro
RDEP	January 2013	Arizona State Office	Arizona
Solar Energy Development PEIS	October 2012	BLM DOI	Arizona, New Mexico
West-wide Energy Corridor PEIS	November 2008	BLM DOI	Arizona, New Mexico

* The TriCounty RMP is in progress. When approved, the TriCounty RMP would amend the portion of the 1993 Mimbres RMP (BLM 1993) that covers Doña Ana County.

FLPMA requires that the BLM prepare and maintain on a continuing basis an inventory of visual values on all public lands. This inventory is described in BLM Manual 8400 – "Visual Resource Management" (BLM 1986a), and BLM Instruction Memorandum (IM) 2009-167, "Application of Visual Resource Management Program to Renewable Energy." The BLM VRM system requires a visual resources inventory (VRI) and the establishment of land management objectives (VRM classes) designated in the RMPs for all BLM Field Offices.

The TriCounty RMP is currently in progress and when approved would amend a portion of the Mimbres RMP. A review of the TriCounty RMP Draft EIS and the BLM preferred alternative (Alternative C) has identified that portions of the proposed Project would not be in conformance with the proposed TriCounty RMP where it would cross VRM Class II land. An analysis of Project conformance with the preferred alternative for the TriCounty RMP Draft EIS is discussed in cumulative impacts in chapter 4 of this EIS.

As discussed previously, two Federal planning efforts resulted in the amendment of RMPs: the RDEP amended plans in Arizona, and the Solar Energy Development Project amended plans in both New Mexico and Arizona. These planning documents and associated RODs identified specific locations that are well suited for renewable energy and established design features that would apply to these types of projects on BLM-administered lands. These are also listed in table 1-3.

1.5.2 Coronado National Forest Plan

The "Coronado National Forest Land and Resource Management Plan," as amended (Forest Plan) (Forest Service 1986a), governs overall management of the Coronado National Forest. A 0.5-mile of segment of Western's existing 115-kV line crosses the Coronado National Forest. If the line is upgraded as described herein, Western would need to acquire a revision or reissuance of the existing SUP.

Because the proposed Project would include the upgrade of an existing line, this portion of the Project would be consistent with various aspects of the forest plan. In accordance with management direction under "Management Prescriptions Applicable to All Areas of the Forest" (Forest Service 1986a:41),

> existing utility and transportation corridors will continue to be used for those types of uses. Every attempt should be made to locate new utilities within those existing corridors that meet the visual quality objective. Existing corridors that do not meet the visual quality objective should be relocated when construction becomes necessary. New corridors shall be located so that the visual quality objectives are met.

As discussed in chapters 3 and 4 (sections 3.10 and 4.10 for "Visual Resources"), the portion of the proposed Project that would cross Coronado National Forest lands meets the visual quality objective for these lands. Amendment(s) to the forest plan would not be needed to ensure forest plan consistency. As described in chapter 2, the existing Western Tucson–Apache 115-kV line parallels an existing SWTC 230-kV line and a 69-kV APS line across the Coronado National Forest.

1.5.3 Local Jurisdiction Plans

Each of the jurisdictional plans reviewed for this EIS are discussed in detail in Chapter 3, Section 3.11.1, "Land Use." The proposed Project would cross lands under the planning jurisdictions of Doña Ana, Luna, Grant, and Hidalgo counties in New Mexico and Graham, Greenlee, Cochise, Pima, and Pinal counties in Arizona. Table 1-4 lists the relevant local jurisdictions in the analysis area; the actual planning jurisdiction crossed by the Project would vary based on the selected route and final ROW if approved. As discussed in Chapter 4, Section 4.11.1, "Land Use," there are no requirements in any of the local jurisdictional plans that would limit the proposed Project.

Table 1-4. Summary of Local Jurisdiction in the Analysis Area

State	Municipality
New Mexico	**Doña Ana County,** including: *Unincorporated Community of Doña Ana*
New Mexico	**Luna County,** including: *City of Deming* *City of Columbus*
New Mexico	**Grant County,** including: *Unincorporated Community of Hachita*
New Mexico	**Hidalgo County,** including: *City of Lordsburg*
Arizona	**Cochise County,** including: *Unincorporated Community of San Simon* *Unincorporated Community of Bowie* *Unincorporated Community of Cochise* *Unincorporated Community of Pomerene* *City of Benson* *City of Willcox*
Arizona	**Pima County,** including: *City of Tucson* *Town of Marana* *Census Designated Place of Avra Valley*
Arizona	**Graham County**
Arizona	**Greenlee County**
Arizona	**Pinal County**

1.5.4 Permits Required or Potentially Required

Table 1-5 provides a list of major Federal, State, and local permits and approvals that could be required for construction and operation of the proposed Project. Note that this list is not exhaustive.

1.5.5 Additional Federal Actions

Following are the additional Federal actions required for the proposed Project: Bureau of Indian Affairs (BIA), Forest Service, and Reclamation.

Bureau of Indian Affairs

A 2.9-mile section of the existing Western Tucson–Apache 115-kV line crosses the San Xavier District of the Tohono O'odham Nation in the Tucson area. As previously noted, Western is currently negotiating renewal of its existing ROW with the Tohono O'odham Nation tribal allottees for that portion of the 115-kV line located on allotted tribal lands. The draft environmental assessment for the purpose of BIA's ROW decision is currently under BIA review. If the line is upgraded as proposed herein, Western would need to apply to the BIA to revise or reissue the ROW to expand the ROW by 50 feet as needed, per 25 CFR Part 169. The BIA would need to decide whether to authorize the upgrade of the line and, where needed, to expand the ROW by 50 feet. The agency official who would be making the decision is the Superintendent of the BIA Papago Agency.

U.S. Forest Service

As noted above in section 1.5.2, a 0.5-mile of segment of Western's existing Tucson–Apache 115-kV line crosses the Coronado National Forest in Arizona. Therefore, if the line is upgraded as proposed herein, Western would need to apply to revise or reissue the existing SUP, and the Forest Service would determine whether to authorize the upgrade of the line and if needed, expand the ROW by 50 feet, per 36 CFR 212.51(a)(8). The agency official who would be making the decision is the Forest Supervisor of the Coronado National Forest. The decision whether to revise or reissue the SUP for the ROW would be documented in a separate decision document by the Forest Service.

Table 1-5. List of Required Federal and State Permits and Approvals*

Regulatory Authority/Agency	Permit/Approval	Project Trigger	Relevant Law/Regulation
Federal			
BLM	ROW grant, land use plan amendment	Request for ROW across BLM lands	43 U.S.C. 1761–1771
BLM	Permit for archaeological investigations	Federal undertaking with the potential to affect historic properties	Archaeological Resources Protection Act (ARPA), Antiquities Act of 1906, FLPMA
BLM	Permit for collection of paleontological resources	Potential for disturbance of paleontological resources and need for collection	Paleontological Resources Preservation Act, FLPMA
BLM *In consultation with Western, State Historic Preservation Offices (SHPOs), Advisory Council on Historic Preservation, tribes, other Federal, State, and local agencies and consulting parties*	Compliance with Section 106 of the NHPA	Potential to disturb historic properties	NHPA (54 U.S.C. 470); 36 CFR 800
Western	Determine whether Southline can upgrade Western's lines and use existing transmission easements as part of the proposed Project; determine feasibility and impacts of proposed Project; and determine the nature of Western's participation in the proposed Project	Proposal to upgrade a segment of Western's transmission system and have Western obtain updated and new transmission line easements, and to use Western funding	Hoover Power Plant Act 98-381, as amended Reclamation Law, including but not limited to the Reclamation Act of 1902, 43 U.S.C. 391, Hayden O'Mahoney Amendment, 43 U.S.C. 391a-1 and 392a; the Reclamation Project Act of 1939, Section (c) 43 U.S.C. 485h(c); Flood Control Act of 1944, Section 5, 16 U.S.C. 825s; Department of Energy Organization Act, 42 U.S.C. 7152a; Energy Policy Act of 1992, 16 U.S.C. 796, 824j, 824k, and 824l; Energy Policy Act of 2005 Contributed Funds Act, 43 U.S.C. 395; Antideficiency Act, 31 U.S.C. 1341; and associated regulations, orders and policies

Table 1-5. List of Required Federal and State Permits and Approvals* (Continued)

Regulatory Authority/Agency	Permit/Approval	Project Trigger	Relevant Law/Regulation
Federal, cont'd.			
Reclamation	Easement or ROW use authorization. Coordination with Central Arizona Water Conservation District for Project activities affecting CAP (Reclamation) lands and facilities.	Substation and/or ROW expansion	The Reclamation Act of June 17, 1902, 32 Stat. 388, 43 U.S.C. 371, et seq., specifically 32 Stat. 389, 43 U.S.C. 421 and the Flood Control Act of 1944, 58 Stat. 887, 890, 16 U.S.C. 825s, as amended and supplemented by subsequent acts or enactments; the Reclamation Project Act of 1939, 53 Stat. 1187, 43 U.S.C. 485; the Rivers and Harbors Act of August 30, 1935, 49 Stat. 1028, 1039, 33 U.S.C. 540; the Act of May 28, 1954, Ch. 12, 68 Stat. 143, and other acts specifically applicable to this project; the Act of August 1, 1888, 25 Stat. 357, 40 U.S.C. 257, repealed and reenacted as 40 U.S.C. 3113; the Act of February 26, 1931, 46 Stat. 1421, 40 U.S.C. 3114; the Department of Energy Organization Act of August 4, 1977, 91 Stat. 565, 42 U.S.C. 7101, specifically 91 Stat. 578, 42 U.S.C 7152; and the Omnibus Appropriations Bill of FY 2009, PL 111-8
BIA	ROW Easement	Upgrade of existing Western line across tribal land	25 CFR Part 169
Forest Service	SUP	Upgrade of existing Western line across Coronado National Forest	36 CFR 212.51(a)(8)
Forest Service – Coronado National Forest	SUP	Potential for disturbance of cultural resources on the Coronado National Forest	ARPA, FLPMA
USACE	Section 404 permit	Impacts to jurisdictional waters of the U.S.	Clean Water Act, 33 U.S.C. 1251, et seq.
U.S. Fish and Wildlife Service	Biological opinion, concurrence, or incidental take permit	Potential impact to threatened or endangered species	Endangered Species Act, 16 U.S.C. 1531–1544
U.S. Environmental Protection Agency	National Pollutant Discharge Elimination System (New Mexico)	Stormwater management from potential discharges greater than 5 acres	40 CFR 122.26
DOD	Easement or ROW use authorization	Construction, operation, and decommissioning of transmission line across DOD-administered land	10 U.S.C. 2668
Federal Aviation Administration (FAA)	A "No-hazard Declaration" required if structure is more than 200 feet high	Location of structure relative to airports and airspace if structure is more than 200 feet high	FAA Act of 1958, 14 CFR 77

Table 1-5. List of Required Federal and State Permits and Approvals* (Continued)

Regulatory Authority/Agency	Permit/Approval	Project Trigger	Relevant Law/Regulation
New Mexico			
New Mexico Public Regulation Commission	Application for approval of location of transmission line and certificate of public convenience and need	Construction of a transmission line greater than 230 kV	New Mexico Statutes Annotated (NMSA) 62-9-3; 17.9.592 New Mexico Administrative Code (NMAC), and NMSA 62-9-1; 17.1.2.9 NMAC
New Mexico Department of Transportation (DOT)	Access or public highway utility accommodation permit	Upgrading access roads, use of public highway to transport oversize loads, or installation of transmission lines within DOT ROW	18.31.6 NMAC, and 17.4.2 NMAC
New Mexico State Land Office	ROW or easement permit	Construction, operation of a transmission line on State lands	NMSA 19-7-57
New Mexico SHPO		Federal undertaking with the potential to affect historic properties	NHPA, Section 106 (36 CFR 800)
New Mexico State Historic Preservation Division	Permit for archaeological investigations	Potential for disturbance of cultural resources on State land	NMSA 18-6
New Mexico Department of Energy, Minerals, and Natural Resources Forestry Division	Collection permit	Displacement or removal of any State endangered plant species	NMSA 75-6-1; 19.21.2 NMAC
Arizona			
ACC	Certificate of Environmental Compatibility	Construction of a transmission line greater than 115 kV	Title 40 Arizona Revised Statutes (ARS) Chapter 2, Article 6.2 (40-360–40-360.13)
Arizona State Land Department	ROW/right-of-entry permit	Survey, construction, operation of a transmission line or substation on State lands	ARS 37-461
Arizona DOT	Crossing or encroachment permit, permit for use of highway ROW	Construction, operation, abandonment of transmission lines within State highway ROW or use of public highway to transport oversize loads	ARS 28-7053, Arizona Administrative Code R17-3-501–509
Arizona SHPO		Federal undertaking with the potential to affect historic properties	NHPA, Section 106 (36 CFR 800)
Arizona State Museum (ASM)	Arizona Antiquities Act (AAA) blanket permit or Project-specific permit	Potential for disturbance of cultural resources on State land	AAA ARS 41-841 through 41-847
ASM	Permission to disturb human remains	Potential for disturbance of human or funerary objects remains on State or private land	AAA ARS 41-844 and ARS 41-865

Table 1-5. List of Required Federal and State Permits and Approvals* (Continued)

Regulatory Authority/Agency	Permit/Approval	Project Trigger	Relevant Law/Regulation
Arizona, cont'd.			
ASM	AAA blanket permit	Potential for disturbance of paleontological resources on State land	AAA ARS 41-841
Arizona Department of Environmental Quality	Arizona Pollutant Discharge Elimination System	Stormwater management from potential discharges greater than 5 acres	ARS 49-255.01
Tohono O'odham Nation	Permit to conduct archaeological work	Potential for disturbance of cultural resources on Tohono O'odham Nation land	Title 8, Chapter 1, "Archaeological Resources Protection" (Ordinance No. 06-84) of the Tohono O'odham Nation Tribal Code
Arizona Department of Agriculture	Application for Arizona native plant and wood removal	Displacement or removal of any listed native plant species	Native Plant Law, ARS Title 3 (Chapter 7)
Local†			
Development Services, Public Works, DOT	ROW use permit, encroachment permit	Potential encroachment onto County/City ROW	Varies; County/local ordinance or municipal code
Planning and Zoning, Community Development	Special use, conditional use permits	Change zoning or land use to allow construction of the transmission line and associated facilities	Varies; County/local ordinance or municipal code
Floodplain Departments	Floodplain use permit	Construction of project facilities in flood-prone areas as defined by Federal Emergency Management Agency	Varies; County ordinance
Public Works Department	Grading/excavation/building permit	Construction	Varies; County/local ordinance or municipal code
Department of Environmental Quality, Air Quality Districts	Fugitive dust control permits	Construction	Varies; County ordinance

* Note that this list is not exhaustive.

† Local permits are only examples of permits that may be required by various local agencies (County/City).

Bureau of Reclamation

A 0.2-mile section of the existing Western 115-kV line crosses Reclamation lands in the Tucson area, adjacent to the Del Bac Substation. If the existing Western line is upgraded and additional ROW is needed for the upgrade, and the Del Bac substation is expanded as proposed herein, Western would need to apply to revise or reissue the existing easement or ROW use authorization.

1.6 FEDERAL AND STATE LAWS AND REGULATIONS

The section below describes the laws, regulations, and guidelines that support the need for energy generation and development of transmission infrastructure.

1.6.1 Key Agency Planning Orders and Statutes

Executive Order 13212

Executive Order (EO) 13212, dated May 18, 2001, mandates that agencies act expediently and in a manner consistent with applicable laws to increase the "production and transmission of energy in a safe and environmentally sound manner." Furthermore, agencies are directed to expedite projects that would increase the transmission of energy and expedite their review of permits to accelerate the completion of such projects.

Energy Policy Act of 2005

The Federal EPAct of 2005 requires the DOI to approve at least 10,000 MW of renewable energy on public lands by 2015; BLM is an agency under the DOI. The proposed Project would allow for the transmission and distribution of energy from potential renewable generation facilities across southern New Mexico and Arizona; however, use of the transmission line would not be limited to power from renewable generation.

Section 368 of the Energy Policy Act of 2005

Section 368 of the EPAct 2005 requires the DOI, in conjunction with the U.S. Department of Agriculture (USDA), Department of Commerce (DOC), DOE, and Department of Defense (DOD), to designate pipeline and electric transmission corridors for the 11 contiguous western states and establish procedures to expedite the review of projects that would be located within established energy corridors. Section 368 specifically notes the need for upgraded and expanded electric transmission infrastructure in the western United States to improve reliability, relieve congestion, and improve the capacity of nationwide electric transmission.

In response to section 368 of the EPAct 2005, the BLM and the DOE prepared the "Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in the 11 Western States" (WWEC PEIS), with the USDA, Forest Service, DOD, and the U.S. Fish and Wildlife Service (FWS) participating as cooperating agencies (DOE and BLM 2008). The PEIS establishes energy corridors on public lands in the western United States and serves as an amendment to existing RMPs, including the Mimbres RMP (BLM 1993), "Final Safford District Resource Management Plan and Environmental Impact Statement" (Safford RMP) (BLM 1991), and "Proposed Phoenix Resource Management Plan and Final Environmental Impact Statement" (Phoenix RMP) (BLM 1988a).

Corridors established by the WWEC PEIS were developed by Federal agency staff and informed by the comments and suggestions of the public. The corridors met specific criteria, including location on Federal

lands, ability to establish connectivity with the energy grid, feasibility, legal and regulatory compliance, and compatibility with local BLM land use plans. As corridors were not established on private or State lands, the corridors are not continuous but are segments of greater or lesser length located on Federal lands only.

The WWEC PEIS designates corridors and provides guidance, best management practices (BMPs), and mitigation measures for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities. For corridors identified in the WWEC PEIS, each agency ROD amends relevant land use plans to include the new corridors; however, these modifications also designate underground-only corridors that do not necessarily allow for transmission lines or facilities. Use of the corridors identified in the PEIS is not required under land use plan modifications. Federal agencies are required to evaluate the environmental effects of projects in the newly established corridors.

The Final WWEC PEIS reviewed a number of documents to establish the need for expansion of and improvements to the existing western electricity grid and discussed the particular difficulties of reliably meeting the increasing electricity demands in the western United States (DOE and BLM 2008). The WWEC PEIS cited the Western Governors' Association in recognizing that supply centers in the western United States are often located far from load centers (such as cities) and in discussing the difficulty of transmission planning when multiple agencies and/or States are involved. The difficulty of planning and permitting long-distance transmission was also discussed in the NERC forecasts. These forecasts highlighted the deficiencies of the existing transmission infrastructure and stressed that the need for long-distance transmission is of particular importance for renewable energy resources and for western states' ability to meet their RPSs (discussed above in section 1.3.4). The WWEC PEIS also cited the DOE's "National Electric Transmission Congestion Study" (2006), which was prepared in response to section 1221(a) of the EPAct 2005 and analyzed the transmission grid to determine locations in which reliability and capacity were being impacted by congestion. The report cited several factors as contributing to congestion, including increased energy demands and lack of planning and investment in the transmission grid over the past decade.

Four action alternatives fall within a West-wide Energy Corridor; these include segments of the Proponent Preferred and Proponent Alternative routes within the New Build Section and two agency local alternatives. These are discussed in more detail in chapter 2.

Secretarial Order 3285

Secretarial Order 3285, issued by the Secretary of the Interior on March 11, 2009, under the authority of section 2 of the Reorganization Plan No. 3 of 1950, as amended, and pursuant to the provisions of section 211 of the EPAct 2005, establishes the DOI's policy of "encouraging the production, development, and delivery of renewable energy" as one of the its "highest priorities." Under this order, agencies and bureaus within the DOI are directed to work collaboratively together and with other Federal agencies, departments, States, local communities, and private landowners to encourage the timely and responsible development of renewable energy and associated transmission while protecting sensitive environmental resources.

Under section 5 of the order, a task force was developed and assigned to identify and prioritize locations in the United States best suited for large-scale production of renewable energy. In conjunction with that assignment, the task force was to identify, in cooperation with other Federal and State agencies, the electric transmission infrastructure and transmission corridors needed to deliver renewable energy to load centers and prioritize the permitting and environmental review of the associated transmission ROW applications.

1.7 MAJOR FEDERAL CONSULTATIONS

In recognition of the special relationship with the U.S. Government, the BLM and Western will continue to consult with the appropriate tribal governments at an official, executive level (government-to-government), in accordance with the National Historic Preservation Act of 1966, as amended (NHPA), EO 13175, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, and NEPA. The BLM and Western will continue to provide opportunities for tribal involvement throughout the NEPA and Project development processes and will consult with the tribes during the development of the Project-specific NHPA programmatic agreement (PA).

The BLM is the lead Federal agency for compliance with the NHPA. Section 106 of the NHPA (36 CFR 800) requires the Federal agency to evaluate the potential effects of an undertaking on historic properties (cultural resources that have been determined to be eligible for or listed in the National Register of Historic Places (NRHP)). This process requires consultations with each state's State Historic Preservation Office (SHPO), as well as Tribal Historic Preservation Offices (THPOs), tribes, State and local governments, and other parties that may have a concern with a project's effects on historic properties. Since the BLM made an "adverse effect" determination and since a PA has been prepared (see appendix L of this EIS), the agency was required to notify and invite the Advisory Council on Historic Preservation (ACHP) to join the consultations to resolve the adverse effects of the proposed Project. A PA will be prepared because the effects of this proposed Project cannot be fully determined prior to the approval of the Project (800.14(b) (1) (ii)) since BLM will be using a phased approach to the identification process. Consulting parties for the Section 106 process include SHPOs (New Mexico and Arizona), the ACHP, other Federal agencies like the USACE and Forest Service, State and local governments, THPOs, tribes, and public groups.

Consultation with the FWS is required to comply with the Section 7 of the Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 1536(a)(2)), for species listed as threatened or endangered. The BLM and Western must analyze the effects of the proposed Project on the species and on their designated critical habitat, if present. A biological assessment (BA) was prepared to identify the nature and expected extent of impacts and recommend mitigation measures to reduce potential impacts. The BA was submitted to the FWS on March 4, 2014; the FWS issued a biological opinion (BO) on December 30, 2014. Consultation with the FWS is ongoing, as of this publication, to amend the BO to address a route change (see the "Agency Preferred Alternative" section in chapter 2). The BO and BA amendment are included in this EIS in appendix M, with mitigation and conservation measures added to table 2-8 and considered in the analysis in chapter 4.

1.8 STATE CONSULTATION

1.8.1 New Mexico Public Regulation Commission

Pursuant to section 8-8-12 of the New Mexico Statutes Annotated (NMSA), the Utility Division of the New Mexico Public Regulation Commission is tasked with enforcing rules, orders, and tariffs governing New Mexico utility providers. The Utility Division serves the commission in the regulation of a variety of utilities, including electric and renewable energy resources. It also represents the public in utility matters and present testimony and exhibits to the commission supporting adequate utility services at fair, just, and reasonable rates. Within the Utility Division, it is the Electrical Engineering Bureau that is involved with the development of regional transmission and reliability issues and that interacts with agencies and organizations such as DOE, FERC, NERC, and WECC.

1.8.2 Arizona Corporation Commission

Under article 15 of the Arizona Constitution, the ACC has jurisdiction over the regulation of public service utilities in Arizona and the quality of service and rates they charge. The ACC created an independent forum, the Arizona Power Plant and Transmission Line Siting Committee, to evaluate applications to build power plants of 100 MW or more and transmission projects of 115 kV or more. The committee provides stakeholders, government bodies, private groups, and other interested parties with the opportunity to participate in the decision to locate a specific power plant or transmission line. Southline has been coordinating informally with the ACC; however, the proposed Project would be evaluated appropriately with the ACC, depending on what status it has and whether that status falls under the ACC purview.

1.9 RIGHT-OF-WAY EASEMENT ACQUISITION PROCESS FROM NON-FEDERAL OWNERS

Although Southline has applied for a ROW across BLM-administered public lands, this EIS analyzes potential impacts on all lands potentially affected by the proposed Project. Acquiring ROW for the proposed Project includes the ROW for the transmission line and also includes any access roads to the transmission line ROW that might be required. Fee ownership would only be considered for substations or substation expansions. All other land rights acquired would be easements or leases. For land rights needed on non-Federal property for a substation or substation expansion, a fee ownership would be negotiated (as needed) with individual landowners. If the proposed Project would be acquiring an easement, it would compensate landowners for use of their land in exchange for the right to construct, operate, and maintain the transmission line and associated facilities. Negotiations between the landowner and the Project could include compensation for loss of use during and after construction, loss of nonrenewable or other resources, the restoration of unavoidable impacts, and unintended damages to property during construction. If Western would be acquiring the land rights, it would compensate the landowner based on an appraisal in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. State statutes have been enacted that define the acquisition process on private and non-Federal public lands for utilities. Western may impose stipulations in easements on private lands such as restrictions on structures that would affect necessary clearances and pose a safety hazard; most common uses, however, would be permitted on the ROW easement. Additionally, other regulatory authorities at the State and/or local level may have jurisdictions over private land and may elect to impose certain stipulations as part of their permitting approval process(es).

For the New Build Section, Southline and/or Western would obtain the necessary ROW, using the contracts, terms, conditions, and other requirements in coordination with Western. If Southline is unable to negotiate an easement or obtain clear title for the land right, Western may negotiate the easement, or obtain the necessary rights through condemnation proceedings, in accordance with Federal law. Western's policy is to avoid condemnation if at all possible. Compensation for all ROWs would be based on the fair market value of the lands. Landowners would retain ownership of the property and the right to use their property, except for a few uses that could conflict with access to or the safe operation of the transmission line or the safety of the landowner or maintenance crews.

For the Upgrade Section, Western would obtain ROW, permanent and temporary, as needed, which could also include acquiring access right-of-entry, in addition to the transmission line ROW. As with the New Build Section described in more detail above, Western would obtain the necessary ROW, using appropriate contracts, terms, conditions, and other requirements. Please note that no additional ROW would be required through Bar V Ranch (a local conservation area east of Tucson) or in congested

suburban areas such as from the Del Bac Substation through Tucson to the Rattlesnake Substation, or near J-6 Ranch and Mescal. Western is presently negotiating with the Tohono O'odham Nation to renew the existing ROW across tribal allotment lands; the ROW renewal is a separate action outside of the proposed Southline Transmission Line Project EIS, and a draft environmental assessment for this is currently under review by the BIA. On Coronado National Forest and Reclamation lands, Western would need to file necessary documentation as appropriate. Western's existing ROW would be used as a foundation for any proposed lands expansion. Western would also obtain any necessary lands, which may include the use of its Federal land acquisition authority.

1.10 SCOPE OF THE ANALYSIS

The following section describes the geographic and temporal bounds of the analysis in the following document, including a description of connections, if any.

1.10.1 Geographic Scope

The geographic scope of the analysis area is shown in figure 1-1 and is based on the overall analysis area used by Southline during its initial siting and routing process. As previously noted, Southline proposes to provide interconnection to several existing substations. Four key substations in particular form the endpoints (Afton and Saguaro substations) and midpoints (Hidalgo and Apache substations) of the Project. The Afton and Saguaro substations serve as the end points of the analysis area as well (see figure 1-1).

The geographic scope of this analysis (analysis area) varies by resource and is different between the New Build Section and the Upgrade Section. Generally, the analysis area for the affected environment of the New Build Section is a 2-mile-wide corridor, and for the Upgrade Section, it is a 500-foot-wide corridor. Each resource section in chapter 3 identifies the geographic area relevant to the analysis of that resource.

1.10.2 Temporal Scope

The temporal scope of this analysis addresses both the short- and long-term effects of the proposed Project, including the no action alternative and route alternatives. Short-term effects, like those associated with construction, would occur within a 5-year time frame from the beginning of the proposed Project. Operation, maintenance, decommissioning, and abandonment effects are analyzed in the long term, which for transmission projects of this type is considered to be 50 years.

1.10.3 Connected Action Consideration

Connected actions are those that are closely related to the proposed Project and should therefore be discussed in the same impact statement (40 CFR 1508.25). These actions are those projects that cannot or would not proceed unless other actions are taken previously or simultaneously, or are interdependent parts of a larger action and depend on the larger action for their justification. There are no actions currently proposed that are connected actions to this proposed Project.

No proposed generation sources have been identified that would intend to connect to the proposed Project. If any such projects did exist, they would need to be ripe for NEPA analysis in order to be considered a connected action for purposes of this EIS. Although some electrical generating sources would likely connect to the proposed Project to transmit power, the proposed Project would proceed independently of any generation project, and no generation project, proposed or existing, is required for

the proposed Project to be feasible. Therefore, potential generation sources are not considered connected actions and are not included in the direct and indirect effects analysis of this document. To the extent that they can be identified at this time, they are considered in the cumulative impacts analysis in this EIS.

Other electrical transmission lines, both local and regional, are considered part of the larger regional planning efforts to meet the transmission system needs throughout the desert Southwest. The proposed Project is a separate and distinct project from any of those discussed in other planning efforts; any other proposed new transmission lines can and would be built and operated independently. While these other proposed transmission lines are not connected actions, those that are reasonably foreseeable are considered as part of the cumulative impacts analysis in this EIS.

1.11 COOPERATING AGENCIES

Cooperating agencies includes those Federal, State, tribal, and local agencies that have jurisdiction by law and/or special expertise (40 CFR 1508.5). BLM sent letters to 21 tribes and to 33 agencies at the Federal, State, and local level inviting participation as a cooperating agency in preparation of the EIS. Sixteen agencies accepted invitations to participate: USACE; Reclamation; DOD Clearinghouse; U.S. Environmental Protection Agency (EPA); DOD Fort Huachuca; National Park Service (NPS); Forest Service (Coronado National Forest); FWS; Arizona Game and Fish Department (AGFD); Arizona State Land Department (ASLD); New Mexico Department of Game and Fish (NMDGF); New Mexico State Land Office (NMSLO); Cochise County, Arizona; Greenlee County, Arizona; Graham County, Arizona; and City of Sierra Vista, Arizona. Chapter 5, "Consultation and Coordination," includes a list of those agencies invited to participate as cooperating agencies.

1.12 SCOPING AND PUBLIC INVOLVEMENT

As discussed in section 1.2.1, BLM purpose and need, an NOI to prepare this EIS and the potential plan amendment was published in the Federal Register on April 4, 2012. Publishing the NOI initiated a 60-day public and agency scoping period, during which the public had the opportunity to provide input on potential issues to be addressed in the EIS. The BLM and Western held two agency scoping meetings for the EIS and six public meetings at the locations listed in table 1-6.

Table 1-6. Locations of Agency and Public Scoping Meetings

Date	Location
Agency Scoping Meetings	
May 8, 2012	Las Cruces, New Mexico
May 17, 2012	Tucson, Arizona
Public Scoping Meetings	
May 8, 2012	Las Cruces, New Mexico
May 9, 2012	Deming, New Mexico
May 10, 2012	Lordsburg, New Mexico
May 15, 2012	Willcox, Arizona
May 16, 2012	Benson, Arizona
May 17, 2012	Tucson, Arizona

The public scoping period was scheduled to close after 60 days, but as a result of public requests for an extension, the BLM and Western extended the scoping comment period by 30 days. Comments received before the July 5, 2012 deadline were used to help formally scope the proposed Project. All comments that were received became a part of the administrative record and were included in the scoping comment analysis. All comments were entered into an interactive, searchable database and coded to reflect the subject matter of concern, sorted, and summarized. A detailed analysis of the scoping comments is presented in the "Scoping Summary Report" (SWCA Environmental Consultants (SWCA) 2012) available at the BLM Project website: http://www.blm.gov/nm/st/en/prog/more/lands_realty/southline_transmission.html. Issues were identified that could be used for consideration in alternatives and the development of the EIS; these are presented in the following section, in table 1-9.

Though not part of the NEPA process, Southline also conducted a series of stakeholder meetings and workshops in 2011 prior to the formal scoping period. The goals of these meetings were to give the public early notification and to solicit public input from interested stakeholders that would help Southline develop a proposed Project that could be presented to the BLM in a formal ROW application.

Southline met with local jurisdictions such as city administrators, county commissioners and supervisors, as well as State officials in both New Mexico and Arizona and representatives from local community organizations and agencies within the Project area. Table 1-7 is a list of these pre-NEPA stakeholder meetings.

Table 1-7. Locations of Pre-NEPA Meetings with Jurisdictions and Agencies

Date	Jurisdiction/Agency
July 6, 2011	City of Deming
July 6, 2011	Luna County
July 11, 2011	Las Cruces Chamber of Commerce
July 18, 2011	Southwest Transmission Cooperative
July 18, 2011	Fort Huachuca
July 19, 2011	Cascabel Working Group Tucson Audubon Community Watershed Alliance Empire-Fagan Organization
July 20, 2011	City of Willcox
July 26, 2011	New Mexico Non-governmental Organizations
July 27, 2011	New Mexico Public Regulation Commission
August 2, 2011	ASLD
August 2, 2011	Tucson Metropolitan Chamber of Commerce
August 3, 2011	Cochise County
August 4, 2011	Arizona Non-governmental Organizations
August 5, 2011	Arizona Department of Environmental Quality
August 17, 2011	City of Columbus, New Mexico
August 22, 2011	Natural Resource Defense Council
September 12, 2011	Pima County
September 13, 2011	Hidalgo County

In addition, Southline hosted pre-NEPA public meetings in Deming and Lordsburg, New Mexico (September 21–22, 2011); in Willcox, Tucson, and Marana, Arizona (September 27–29, 2011); and in Benson, Arizona (November 10, 2011). Routing workshops were hosted in Deming (September 22, 2011) and Tucson (September 28, 2011).

As a result of the Southline public outreach, the public was informed about the proposed Project, had participated in the preliminary routing process, understood Southline's approach to routing, and were familiar with the goals of the proposed Project prior to the formal agency public scoping process.

1.12.1 Draft EIS Public Involvement

The BLM and Western published an NOA for the Draft EIS/Draft RMPA in the Federal Register on April 11, 2014. The NOA announced the release of the Draft EIS and the beginning of a 90-day comment period.

The BLM and Western each distributed press releases on April 11, 2014, and paid notices were published in newspapers of record. Both the press release and notices notified the public of the availability of the Draft EIS, the beginning of the 90-day comment period, and public open house/hearing dates, times, and locations hosted by the BLM and Western.

BLM and Western hosted three public open houses/hearings and one agency meeting in each state, for a total of six public open houses/hearings and two agency meetings. These were hosted to provide information on the proposed Project, answer questions about the analysis in the Draft EIS, and encourage public comments on the Draft EIS. Dates and locations of these open houses/hearings and meetings follow in table 1-8.

Table 1-8. Locations of Public Open Houses/Hearings and Agency Meetings for Draft EIS

Date	Public Open Houses/Hearings
May 6, 2014	Las Cruces, New Mexico
May 7, 2014	Deming, New Mexico
May 8, 2014	Lordsburg, New Mexico
May 20, 2014	Benson, Arizona
May 21, 2014	Willcox, Arizona
May 22, 2014	Tucson, Arizona
Date	**Agency Meetings**
May 6, 2014	Las Cruces, New Mexico
May 22, 2014	Tucson, Arizona

A total of 89 comment submittals (letters, emails, commenters at hearings) was provided to the BLM and Western on the Draft EIS; within the 89 letters, there were 805 individual comments. All comments that were received became a part of the administrative record were entered into an interactive, searchable table and coded to reflect the subject matter of concern, sorted, and summarized. Chapter 8 of the Final EIS includes all Draft EIS comments and agency responses to these comments in tabular format. Section 1.1.1 above summarizes the changes to the EIS between the Draft and Final documents.

1.12.2 Route Variation Outreach

In December 2014, the BLM and Western sent outreach letters to property owners in the vicinity east of Willcox Playa in Cochise County and south of Tucson International Airport along Old Vail Connection Road in Pima County. The purpose of the outreach letters was to notify the property owners of the new route variations (see section 1.1.1) that are added to this EIS analysis. These comments and agency responses to those outreach letters are included in table 8-1 in chapter 8 and are considered in this EIS, along with all the comments received on the Draft EIS. A total of 35inquiries and comment submittals (letters, emails, phone calls) was provided to the BLM and Western.

1.13 ISSUES TO BE ANALYZED

As a result of the scoping process, a number of issues to be analyzed were identified and served as the basis for the development of project alternatives (see table 1-9).

1.13.1 Resource Issues

Table 1-9 provides a summary of the issues identified during the scoping process, as well as where the issues have been addressed in the EIS. Issues for each resource are discussed in detail in Chapter 3, "Affected Environment," and in Chapter 4, "Environmental Consequences."

Table 1-9. Summary of Issues Identified During Scoping

Issues	Where Addressed in EIS
PURPOSE AND NEED - Purpose and need statement should be clear and broad and reflect potential benefits of the project, public interest in cleaner energy economy, and potential alternative means of achieving that goal. - Purpose and need should provide a clear explanation in the context of the electrical power system reliability and need for additional transmission line to supply power.	Chapter 1, sections 1.2 and 1.3
PROJECT DESCRIPTION - Need more detail regarding the conditions for the new substations, detailed construction, operation and maintenance plans, descriptions of how the proposed transmission line fits into the regional renewable energy development and transmission in the West, and the extent to which the proposed transmission line would carry renewable energy versus fossil fuel–based energy.	Chapter 2, section 2.4
ALTERNATIVES - Transmission line should be routed to the west/southwest of Willcox Playa in areas that are already disturbed, farmed, or have existing utility features, largely to avoid avian concerns. - Transmission line should be located in open valleys rather than against hills and facility siting should consider avoiding or minimizing impacts to wildlife corridors and landscape connections. - Transmission line siting should consider completely avoiding Gila, Mimbres, San Francisco, and Animas watersheds. - Transmission line siting should consider locating underground. - Transmission line siting should consider locating on State lands rather than private lands, and existing lines in the Benson area should be upgraded. - Transmission line should be located near existing lines and in existing ROWs where possible. - The Nature Conservancy's "Ecoregional Assessment" and the "Sonoran Desert Conservation Plan" should be referenced during siting.	Chapter 2, sections 2.6 and 2.7

Table 1-9. Summary of Issues Identified During Scoping (Continued)

Issues	Where Addressed in EIS
AIR QUALITY AND CLIMATE CHANGE - Impacts on air quality from construction and maintenance emissions. - Possible increases in criteria pollutants in associated with the proposed Project, such as additional impacts on non-attainment from carbon monoxide and smaller particulate matter, i.e., particulate matter 10 (PM_{10}). - Analysis of how climate change could exacerbate potential Project impacts.	Chapter 3, section 3.2 Chapter 4, section 4.2

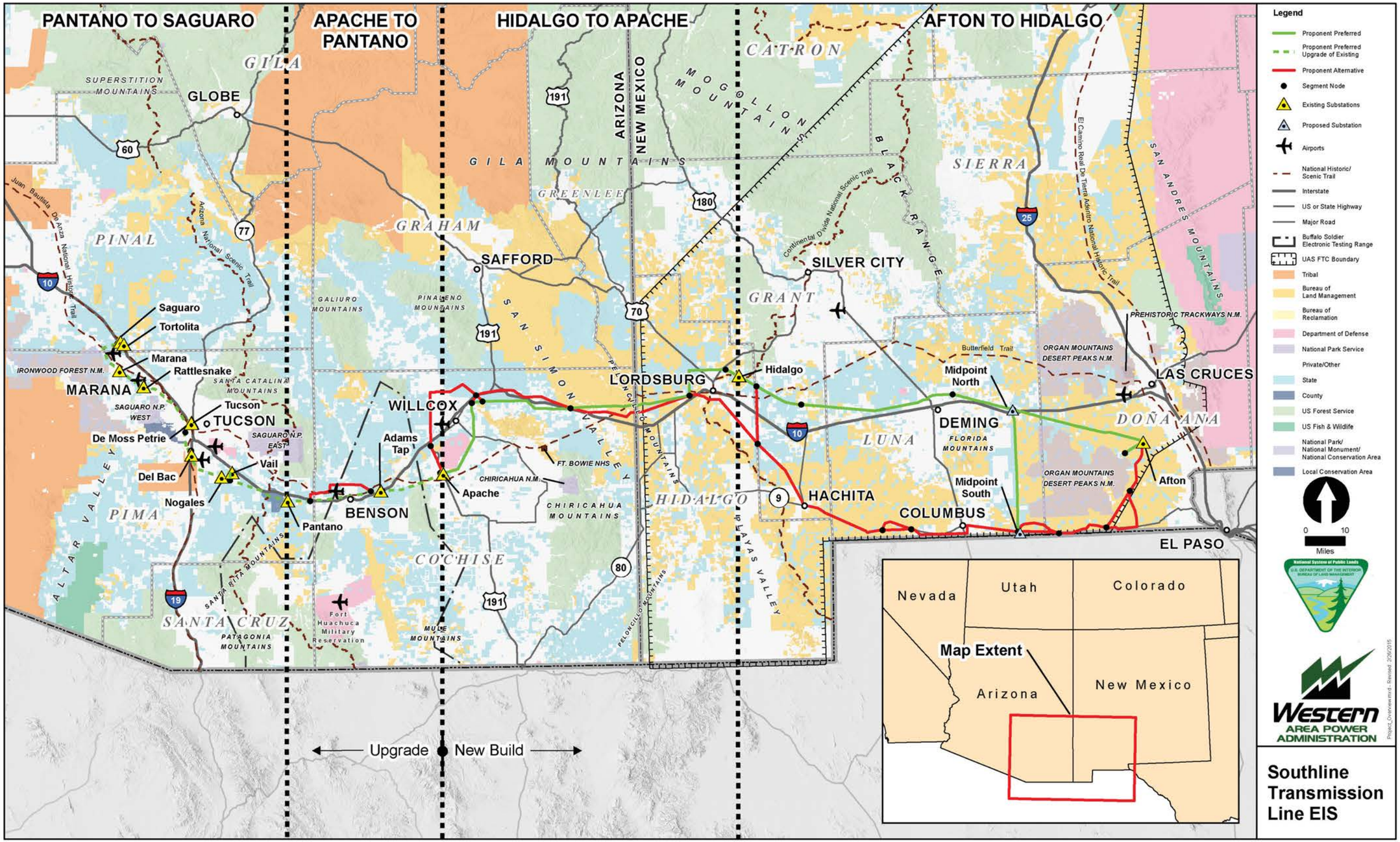
BIOLOGICAL RESOURCES
- Impacts of the proposed structures on avian resources, including but not limited to:
  - Migrating birds and raptors between Whetstone and Rincon mountains;
  - Migrating birds along the east side of the Willcox Playa;
  - The avian protection area along the Lordsburg Playas;
  - The sandhill crane winter use site and migration corridor east of Columbus, New Mexico, and at the Apache Substation;
  - Suitable habitat for the northern aplomado falcon;
  - Crossings of riparian corridors;
  - Benefits to sensitive resources of using existing ROWs;
- Impacts to natural open space and vital biological corridors, including but not limited to, Tumamoc Hill and Tucson Mountain Park;
  - Consider the Pima County "Sonoran Desert Conservation Plan" (Pima County 2009) and " Hidalgo County Comprehensive Plan Update 2011" (Hidalgo County 2011) for natural resources;
  - Impacts of new project access roads resulting in the introduction and spread of invasive species;
- Impacts of the proposed Project on native habitat and sensitive vegetative resources, including playas, riparian areas, Pima pineapple cacti, saguaro, and ironwood;
- Impacts of the proposed Project on Federal and State lists of special status wildlife species;
- Impacts of the proposed Project on wildlife travel corridors resulting from fragmentation;
- Impacts of the proposed Project on mule deer, bighorn sheep, and pronghorn antelope habitat;
- Impacts of construction activities on sewer conveyance facilities;
- Impacts to the accessibility for maintenance and repair of the line during times of flooding;
- Cumulative impacts of the proposed Project on water as a result of potential development
- Impacts of the proposed Project on water quality;
- Impacts of the proposed Project on the hydrologic balance of depressions or playa basins and ephemeral aquatic habitat;
- Impacts of the proposed Project on riparian species, habitats, and wetlands that function as corridors from the Animas drainage to the Gila and Mimbres drainages.
	Chapter 3, section 3.8
	Chapter 4, section 4.8

CULTURAL RESOURCES - Potential impacts on cultural resources, including but not limited to: the Butterfield Overland Mail Trail, Tumamoc Hill, Camino Real de Tierra Adentro National Historic Trail, and the Juan Bautista de Anza National Historic Trail in Arizona; - Potential visual impacts to cultural resource sites, including but not limited to: Juan-Bautista de Anza National Historic Trail, Los Morteros, and Fort Bowie National Historic Site; - Need for a Class I and Class III inventory to identify impacts to cultural resources; - Need for a Historic Properties Treatment Plan prior to construction.	Chapter 3, section 3.9 Chapter 4, section 4.9
TRIBAL CONCERNS - Potential impacts on physical integrity, accessibility, and use of existing sacred sites; - Explanation of government-to-government consultation and how issues were addressed in the selection of the preferred alternative; - Potential physical, visual, and social/psychological impacts to Native American traditional cultural properties and sacred landscapes.	Chapter 3, section 3.9 Chapter 4, section 4.9
FARMLANDS AND RANGELANDS - Impacts to range livestock operations associated with grazing allotments in the project area; - Impacts to pasture layout and proximity to range improvements from infrastructure placement; - Impacts to Pima County–owned preserves.	Chapter 3, section 3.11 Chapter 4, section 4.11

Table 1-9. Summary of Issues Identified During Scoping (Continued)

Issues	Where Addressed in EIS
GEOLOGY AND MINERALS - Impacts to geology and mineral resources.	Chapter 3, section 3.4 Chapter 4, section 4.4
HUMAN HEALTH AND SAFETY - Impacts of electromagnetic field from transmission lines on natural resources, humans, and Fort Huachuca's Electronic Proving Ground; - Potential increase in transmission lines in a congested area would be an easy target for a terrorist attack.	Chapter 3, section 3.16 Chapter 4, section 4.16
HAZARDOUS MATERIALS AND WASTE - Plans to reduce impacts of hazardous waste volumes and expected storage, disposal, and management plans.	Chapter 3, section 3.17 Chapter 4, section 4.17
LAND USE - Identify ASLD conceptual planning areas; - Consider co-location of compatible land use; - Consider the objectives of Federal, State, tribal, or local land use plans, policies, and controls in the project area, including but not limited to the "Pinal County Comprehensive Plan" (Pinal County 2010a) and the "Airport Master Plan for Marana Regional Airport" (Coffman Associates Airport Consultants 2007); - Impacts to private landowners, including land usage, fair market–based compensation; - Impacts of increased structure height on military training flight routes and effects on a proposed drone program near Benson; - Impacts to the uses and existence of recreation areas, including but not limited to: the Continental Divide National Scenic Trail, the Arizona National Scenic Trail, and Pima County's Tucson Mountain Park; - Impacts to State and Federal special use and designated lands in the proposed analysis area; - Impacts to wilderness qualities of BLM lands to the southeast of Fort Bowie National Historic Site; - Impacts to airspace; - Potential increase in undocumented access through implementation of the Project.	Chapter 3, section 3.11 Chapter 4, section 4.11
MILITARY USES - Potential electromagnetic interference with the mission of and use of the Buffalo Soldier Electronic Testing Range in southeastern Arizona. Also, concern regarding enabling renewable energy projects in the region, resulting in siting of renewable projects in the Buffalo Soldier Electronic Testing Range; - Potential interference with flight paths in southwestern New Mexico and southeastern Arizona.	Chapter 3, section 3.11 Chapter 4, section 4.11
SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE - Impacts to the economy of southern Arizona through deleterious impacts on recreation and the tourism industry; - Regional and local economic benefits in the form of job creation and substantial tax base, including new lines near existing or potential clean energy generation projects; - Impacts to rural areas where population growth may not occur; - Impacts to monetary value of existing and future residential properties and neighborhoods across the Project; - Impacts of the Project on power rates, including the total cost per kilowatt-hour of electricity delivered, compared with the cost of renewable generation; - Impacts to communities of rebuilding existing transmission lines; - Increased auditory impacts from the Project.	Chapter 3, section 3.15 Chapter 4, section 4.15
SOILS - Impacts of sedimentation and erosion on downstream habitat from construction vehicle traffic and road maintenance; - Impacts of construction vehicle traffic and road maintenance on soils and erosion.	Chapter 3, section 3.5 Chapter 4, section 4.5
VISUAL RESOURCES - Visual impacts of existing and proposed structures on residential areas and natural preservation areas, including the desert floor and scenic areas west of Mescal Road; - Impacts to the viewshed of Saguaro National Park; - Impacts of the proposed structures versus shorter structures with longer span lengths.	Chapter 3, section 3.10 Chapter 4, section 4.10

Figure 1-1. Project overview.



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Chapter 2

PROPOSED PROJECT AND ALTERNATIVES

2.1 INTRODUCTION

This chapter provides a description of the proposed Project and includes information on how alternatives were developed. Following the proposed Project description is a discussion of how alternatives generated from Southline's routing efforts were developed in response to internal and external scoping comments. The alternatives discussion describes alternatives evaluated within this EIS, including the proposed Project and action alternatives, route variations new to the Final EIS, the no action alternative, and those alternatives that were considered but not included for detailed analysis. The alternatives discussion also identifies the Environmentally Preferred Alternative, along with a discussion of the Agency Preferred Alternative and how it has changed since the Draft EIS.

2.2 ROUTE SELECTION PROCESS

2.2.1 Southline Transmission's Routing Study

Southline began investigating route alternatives for the proposed Project in 2009, and its efforts are documented in the April 2012 routing report (Southline 2012a); the routing report is available online.[3] As part of the routing process, Southline first identified the geographic study area within which feasible routes could be considered between the identified connection points at the Afton, Apache, and Saguaro substations. Southline then performed siting studies in consultation with stakeholders, such as State and Federal agencies, county commissioners, tribal officials, local utilities, and private landowners, to identify routing opportunities and constraints, and determine the most feasible routes within the study area.

Southline hosted a series of meetings and workshops with stakeholders between June and December 2011. Southline's public outreach efforts were conducted to understand initial public concerns from a wide range of project stakeholders so these concerns could be integrated into Southline's routing process from the outset. Initial outreach efforts focused on defining the study area, followed by meetings with stakeholders, which reviewed a number of potential route corridors. The route corridors were high-level route alignments looking at all potentially viable options (figures 2-1a and 2-1b). These corridors were presented at a round of public information meetings, and stakeholders had an opportunity to provide feedback directly onto high-resolution maps regarding potential resource and land use conflicts to guide Southline's route selection.

Finally, Southline received additional feedback from stakeholders, including feedback received from a public informational meeting in Benson, Arizona, and simultaneously winnowed the potential route corridors into a select group of potential and alternative routes to submit to the BLM and Western to use in the environmental review process. This final set of potential and alternative routes submitted to BLM and Western for consideration in the NEPA process reflects a significant amount of feedback from stakeholders.

All routing efforts prior to the publication of the NOI were conducted in order to define the proposed Project and develop the basis for the proposed Project and associated NEPA analysis. The BLM and

[3] http://southlinetransmissionproject.com/files/Routing_Report_AppA_and_Figures_042412_final.pdf

Western used Southline's routing efforts as the basis of the agency alternatives development process (see section 2.6).

The focus of the routing effort was to identify potentially viable options within the analysis area that would use previously disturbed areas by following existing linear features. Previously disturbed areas, such as those along existing linear features, were identified as an opportunity for siting the proposed Project. Using previously disturbed areas minimizes new ground disturbance and new access road construction, reduces potential adverse environmental and social impacts, and concentrates development in previously developed areas. Linear features considered reasonable routing options included roads and highways, transmission and distribution lines, railroads, pipelines, Section 368 energy corridors, and cadastral or property boundaries.

As discussed in chapter 1, the proposed Project would consist of two sections. The New Build Section would entail construction of approximately 256 miles of new double-circuit 345-kV transmission line to mitigate existing congestion by providing more transmission capacity between the Afton Substation, south of Las Cruces, New Mexico, and the Apache Substation, south of Willcox, Arizona. The existing voltage in the New Mexico facilities (Afton and Hidalgo substations) is 345-kV; thus, the New Build Section is proposed as a 345-kV transmission line. The Upgrade Section would be an upgrade of approximately 120 miles of Western's existing Saguaro–Tucson and Tucson–Apache 115-kV transmission lines to a double-circuit 230-kV transmission line originating at the Apache Substation and terminating at the Saguaro Substation, northwest of Tucson, Arizona (see figure 1-1). The Upgrade Section is proposed as a double-circuit 230-kV line in order to utilize the existing 230-kV system voltage, as well as maximize the existing ROW, particularly through the more urban Tucson area, where a 345-kV structure was determined to be too large in terms of ROW requirements. One of two methods for the Upgrade Section of the Project would be used, depending on ROW constraints: either the tear-down and rebuild-in-place method, or construction of new facilities adjacent to the existing facilities. The existing facilities would be removed after construction of the new transmission line.

Using the existing system voltage in both the New Build and Upgrade sections optimizes Project performance and minimizes Project costs. The existing high-voltage system in southern New Mexico is 345 kV. The network of existing transmission lines in southern New Mexico does not include 500-kV or 230-kV voltage; therefore, the addition of a new voltage would increase construction, operational, and maintenance costs for the proposed Project. Maintaining 345-kV voltage also provides technical benefits, as the proposed Project could use a double-circuit structure since it could more readily be absorbed into the existing system on a contingency. Higher voltages like 500 kV would require a greater project footprint, requiring two separate sets of structures as opposed to one double-circuit on a single set of structures. The Upgrade Section was designed as double-circuit 230 kV based on the width of the ROW. Further, 230 kV is also a standard voltage upgrade for Western, and therefore would minimize operational and maintenance costs.

For the New Build Section routing effort, two general types of routing criteria were considered: opportunities and constraints. Routing opportunities consisted primarily of existing linear features, existing access, and existing disturbed areas. Constraints consisted primarily of avoidance areas or sensitive areas, including wilderness areas, areas of high residential development, military reservation/installations, tribal lands, and sensitive lands (e.g., ecologically, visually, and/or culturally). Through an iterative process, more than 1,300 miles of potentially viable routing options were identified. Through early input from the BLM, Western, and other stakeholders, those routing options were further assessed to determine whether they should be retained for detailed study by Southline or eliminated from further consideration. Following that assessment, before submittal of the SF-299 application, Southline selected the proposed and alternative routes for the New Build Section.

Because the Upgrade Section of the proposed Project focused on interconnection with the 11 existing substations and upgrading an existing line, routing options were limited. Only two existing transmission lines between the Apache and Saguaro substations are available to be upgraded to a capacity that would allow transmission of up to 1,000 MW: the existing Western Saguaro–Tucson and Tucson–Apache 115-kV lines, and an SWTC 230-kV line. The routing process for the Upgrade Section included review of the existing facilities and the land use constraints in the immediate vicinity of the existing lines. This resulted in an evaluation of approximately 200 miles of viable routing options for the Upgrade Section. The SWTC route was eliminated from further consideration because it did not connect to the 11 existing substations in the Upgrade Section, and due to highly restrictive land uses along portions of the ROW and less access to existing substations in the area.

2.3 LAND USE PLAN CONFORMANCE

As stated in the NOI to prepare the EIS (published April 4, 2012), the proposed Project has the potential to require plan amendments. The principles of multiple-use management for the BLM are established through the FLPMA. Based on alternatives analyzed in the Draft EIS/Draft RMPA, there was the potential for the BLM to amend one of the RMPs that provide guidance for the planning areas crossed by the proposed Project. There are four RMPs considered for plan conformance—one in New Mexico and three in Arizona:

1. New Mexico:
    a. Mimbres Resource Area RMP[4] (December 1993); Las Cruces District Office.
2. Arizona:
    a. Final Safford District RMP and EIS (August 1991); Safford District Office.
    b. Phoenix RMP and EIS (December 1988); Tucson Field Office.
    c. "Approved Las Cienegas Resource Management Plan and Record of Decision" (BLM 2003) (Las Cienegas RMP) (July 2003); Tucson Field Office.

If a proposed project is not in conformance, the BLM can either choose to deny the proposed Project, adjust the project to conform to the RMP, or amend the plan to address the issue of nonconformance. The Agency Preferred Alternative, as presented in this EIS, would not conflict with any of the RMPs and thus would not require a plan amendment. No plan amendments are required or proposed for any portions of the proposed Project in Arizona.

As discussed in chapter 1, there are two potential conformance conflicts with the Mimbres RMP that may require a plan amendment: (1) where portions of six alternative route segments would cross VRM Class II areas; and (2) where portions of one of the six alternative route segments would cross a ROW avoidance area designated for the Butterfield Trail near Lordsburg Playa and would not meet the ROW avoidance area stipulations. As part of the ROD, the BLM would decide whether to approve the amendment analyzed in this EIS. Detailed descriptions of proposed RMP amendments can be found in section 2.10.7. The potential RMP amendments are analyzed in section 4.20 of this EIS. As there was the potential for a plan amendment to the Mimbres RMP for the conformance issues noted above, the BLM used a multistep process fully integrated with the NEPA process and CEQ guidelines (43 U.S.C. 1600). This EIS includes an analysis of the proposed RMPAs.

[4] The TriCounty RMP is currently in draft form; when approved, it will amend a portion of the 1993 Mimbres RMP in Doña Ana County.

As the Agency Preferred Alternative does not require an amendment to any of the RMPs, the potential land use planning requirements do not apply to that alternative. Should an alternative be selected that does not conform to the Mimbres RMP, a plan amendment would be required as discussed above and in chapter 1, sections 1.2.1 and 1.5.1.

2.4 PROPOSED PROJECT (PROPONENT PREFERRED)

Southline is seeking a 50-year ROW across Federal lands to accommodate the proposed Project. Southline proposes to construct a high-voltage electric transmission line and associated facilities in southern New Mexico and southern Arizona (figures 2-2a and 2-2b). The proposed Project would cross private, State, and public lands, including lands managed by the BLM (New Build and Upgrade sections), Forest Service (Upgrade Section only), Reclamation (Upgrade Section only), State (New Build and Upgrade sections), and Tohono O'odham Nation (Upgrade Section only). Additional ROW may be required along the upgrade of the existing Western lines (see "Upgrade of the Existing Western Transmission Lines" in section 2.4.3).

Project facilities, design characteristics, construction activities, and mitigation measures would be expected to be the same for all action alternatives. Following is a discussion of the site preparation and preconstruction activities, Project components, and construction, operational activities, and decommissioning of the proposed Project.

2.4.1 Site Preparation and Preconstruction Activities

If the BLM and Western issue their respective RODs, the ROW would be granted and the application would be finalized with the Project design details, including finalization of the POD (appendix N) and associated Framework Plans, mapping and access road planning, ROW acquisition, geotechnical investigations, centerline surveys, preconstruction resource surveys, and preconstruction meetings. For a given Project segment, no construction would begin until these Project tasks are complete and the BLM and Western have given formal notice to proceed. All these activities and their effects are analyzed within the bounds of this EIS analysis. However, if a new element is outside an area covered within the EIS and addressed in the ROW grant, approval from the authorized officer/administrator would be required and may require additional environmental analysis if changes to the proposed Project are substantive (see "Project Design Requirements (Variance Process)" in section 2.4.7).

Plan of Development

A POD was developed to meet the requirements outlined in 43 CFR 2804.25(b). Under these requirements the BLM may require information necessary to process the ROW application, and this information may include a detailed construction, operation, rehabilitation, and environmental protection plan, i.e., a "Plan of Development," and any needed cultural resource surveys or inventories for threatened or endangered species. On Federal lands administered by BLM, the POD is an enforceable stipulation of the BLM ROW grant and pertains not only to the construction of the proposed Project, but also to the operation and maintenance phase of the proposed Project. Where Western is involved in the proposed Project, they would adopt the stipulations and measures in the POD, where appropriate.

A draft POD was submitted to the BLM along with the SF-299 in December 2009; a more updated draft NEPA POD is included in this EIS (see appendix N) and will be updated once again for the ROD. The POD presents the proposed Project (both New Build and Upgrade sections), the ROW location, facility design factors, additional components of the ROW, agencies involved, facility construction details, preliminary assessment of resource values and environmental concerns, proposed stabilization and rehabilitation measures, operation and maintenance details, and termination and restoration techniques. Approval of the final POD is required before final notice to proceed is granted, however it is important to note that the POD would evolve over time, even after the notice to proceed.

The final POD would be the responsibility of Southline and would outline in detail how the proposed Project (both New Build and Upgrade sections) would be constructed, operated, and maintained. The final POD would include all details, mitigation, and ROW grant stipulations and would need to be approved by the BLM and Western. The final POD would be based on the EIS and would be a condition of the ROW grant. If a grant is issued, it would be the reference document for agency personnel, environmental compliance monitors, construction contractor management, and construction inspectors, etc.

References to the final POD are made throughout the Project description that follows. The final POD would include the final design details, if the proposed Project is approved and once the final route is selected. Because the detailed design process is not initiated before a project is approved, many details are not known before the final design is completed. Assumptions based on known requirements and typical transmission facility design and construction are made for the purposes of analysis in this EIS where details are not finalized. The assumptions are conservative and provide a credible basis for determining the expected level of environmental impact. The NEPA POD in appendix N of this EIS includes details known as of this publication, and also outlines the future content of the associated Framework Plans in the appendices of the NEPA POD.

While neither BLM nor Western has the authority to enforce the POD and its PCEMs on State or private lands, the BLM and Western expect that most landowners will want the same protections afforded resources on BLM administered lands to be extended to their properties as well. Therefore, the agencies anticipate that the PCEMs and other specific stipulations and methods identified in the POD will largely be implemented over the entire length of the Project, regardless of jurisdiction. The agencies also recognize that the POD is a living document and as such provisions therein may be modified, augmented, or deleted as appropriate. For non-BLM administered lands Western will likely be the lead Federal agency overseeing implementation of and compliance with the suite of PCEMs and other environmental protections identified in the EIS and supporting documents. State and private landowners may add additional requirements to those identified in the EIS and POD, or opt out of certain measures, as negotiated by Southline and/or Western with each landowner during ROW acquisition. Certain parts of the POD will not be applicable to or appropriate for non-BLM administered lands; examples include BLM reporting requirements, stipulations specific to the BLM's ROW grant, or the BLM variance process. BLM's environmental inspection and verification process is also quite different from Western's, and Western's process would be followed on State and private lands. Regardless of which agency is the lead, or the differences in the process followed, the environmental protections identified and committed to would be implemented (with the possible exception of the landowner required additions or deletions mentioned above). On BLM administered public land, all stipulations and PCEMs identified as applicable in any of the POD volumes should be adhered to for the life of the BLM ROW grant.

BLM REGIONAL MITIGATION

The BLM requires mitigation measures and conservation actions to achieve land use plan goals and objectives and provide for sustained yield of natural resources on public lands, while continuing to honor the agency's multiple-use missions. The sequence of mitigation action would be the mitigation hierarchy (avoid, minimize, rectify, reduce or eliminate over time, or compensate) identified by the CEQ (40 CFR 1508.20), BLM's "Draft Regional Mitigation Manual," Section 1794, and as described below. Certain alternatives, if selected, also may require compensatory mitigation requirements for those implementation-level activities whose impacts the agency(s) cannot adequately avoid, minimize, rectify, or reduce or eliminate over time (i.e., residual impacts).

The priority is to mitigate impacts at the site of the activity in conformance with the land use plan goals and objectives through impact avoidance, minimization, rectification, or reduction over time of the impact, including those measures described in laws, regulations, policies, and land use plans. When these types of mitigation measures are not sufficient to ameliorate anticipated direct, indirect, and cumulative impacts and substantial or significant residual impacts remain, additional measures to reduce these residual impacts to meet applicable land use plan goals and objectives would be implemented as practicable.

The Project, as described in the following sections, considers the mitigation hierarchy and identifies or incorporates by reference applicable land use plan mitigation measures for:

- Avoiding
  - Identification of avoidance areas and/or measures (e.g., ROW avoidance areas, no surface occupancy areas) already included in laws, regulations, and/or governmental decision documents (e.g., BLM RMPs, state, tribal, or county plans that govern site or permit authorizations)
  - Identification of additional avoidance measures for the BLM to consider (e.g., additional avoidance measures)
- Minimizing
  - Identification of minimization measures (e.g., surface-use controls, conservation measures, etc.) already included in BLM decision documents (e.g., RMPs; FWS BOs, other Project decision documents and ROW authorizations)
  - Identification of additional minimization measures for the BLM to consider (e.g., Proponent-proposed design features)
- Rectifying
  - Identification of measures for the BLM to consider, including repairing, rehabilitating, or restoring affected landscapes
- Reducing or eliminating
  - Identification of measures for the BLM to consider for reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- Compensating
  - Identification of measures for the BLM to consider for compensating for the impact by replacing or providing substitute resources or environments

When applying mitigation at any level of the mitigation hierarchy, there would be requirements for monitoring the effectiveness of the mitigation as well as the durability of the mitigation. This monitoring is necessary, especially in relation to durability for compensatory mitigation to identify when it may be appropriate to consider applying adaptive management concepts to ensure continued durability for the life of the Project.

Two important concepts related to durability are: (1) ecological durability, or the length of time the benefits from mitigation measures persist on and influence the landscape and meet or exceed the length of time that projected impacts would affect resources; and (2) protective durability, or ecological values in compensatory mitigation Project areas that are unaffected by future and conflicting land uses or disturbances.

The ecological durability of compensatory mitigation is greatest if the projects are large enough or properly located so that they would, either in themselves or in conjunction with other projects, adjacent landscape conditions, or climate change predictions, provide the targeted conservation benefits.

Ecological durability may be compromised when the benefits of compensatory mitigation do not persist for the full duration of the impact intended to be offset (i.e., from initial surface disturbance to final reclamation, rehabilitation, or restoration). Damage to functioning compensatory mitigation measures

may be caused by natural disturbances (such as wildfire) or anthropogenic disturbances (such as other authorized development), which shorten the intended duration of applicable mitigation.

The BLM would require that mitigation measures have a degree of protective durability. Financial protections (e.g., bonding for construction, endowment for mitigation management) are an important tool to achieve protective durability. The BLM would expressly condition its approval of the Project on the Proponent's commitment to perform or cover the costs of mitigation, both onsite and outside the area of impact.

Examples of compensatory mitigation include offsite vegetation treatments to improve migratory bird habitat; purchase of property or conservation easements to provide long-term protection for migratory bird habitats; purchase of conservation credits at an FWS-approved conservation bank to offset impacts to Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*); or appropriate mitigation for impacts to designated National Scenic and/or Historic Trails or those trails recommended suitable for Congressional designation.

FRAMEWORK PLANS

In addition to the detailed Project description, the POD includes design features and mitigation measures, and compliance activities that must be achieved for the proposed Project. As part of this compliance effort, several Framework Plans would be included as appendices to the final POD to detail the construction, operation and maintenance conditions of the ROW grant. The NEPA POD in appendix N includes the outlines of these Framework Plans for reference. The final POD would also include specifics on how compliance activities will be managed, and the roles and responsibilities of individual parties for oversight and monitoring to ensure that the Framework Plans are appropriately and completely implemented. Design features and mitigation efforts (PCEMs) are considered in the analysis in this EIS (see section 2.4.6) and would be finalized in the final POD and associated plans. These Framework Plans would include:

- Access Road Plan
- Traffic and Transportation Management Plan
- Stormwater Pollution Prevention Plan (SWPPP)
- Spill Prevention, Control, and Countermeasures (SPCC) Plan
- Historic Properties Treatment Plan (HPTP) (includes Monitoring and Discovery Plan)
- Blasting Plan
- Plant and Wildlife Species Conservation Measures Plan
- Erosion, Dust Control, and Air Quality Plan
- Hazardous Materials Management Plan (HMMP)
- Emergency Preparedness and Response Plan
- Noxious Weed Management Plan
- Fire Protection Plan
- Stream, Wetland, Well, and Spring Protection Plan
- Soil Management Plan
- Reclamation, Vegetation, and Monitoring Plan
- Health and Safety Plan (HASP)
- Avian Protection Plan (APP)
- Waste Management Plan (WMP)

- Helicopter Flight Plan/Flight and Safety Plan
- Decommissioning Plan

These Framework Plans would incorporate appropriate Federal, State, and local agency guidance and regulations. Following are descriptions of these Framework Plans and what each plan would include in terms of typical requirements.

Access Road Plan

Access road planning would be finalized if the proposed Project is approved. With the approved route known, the exact location of all access roads would be refined through detailed engineering. Once road locations are known, cultural resource and biological surveys would be conducted and road locations adjusted to avoid sensitive resources discovered during the surveys. No field disturbance would occur before the completion of these surveys and the completion of any necessary mitigation or treatment measures. Although the exact locations of final access roads are not yet known, the general location of needed access is known and is used to define the potential environmental impacts for purposes of the EIS. Access road construction and improvement would include erosion, stabilization/reclamation/revegetation, and dust control measures, as described in section 2.4.6. Access roads would be designed to ensure that slopes do not cause erosion and that turning radii are sufficient. The road locations would also be georeferenced and the location recorded, and appropriate access rights would be obtained from the landowner.

A preliminary estimate of the location and extent of potential access roads needed for the proposed Project is described later in this chapter in Section 2.4.2, “Project Components.” All roads would be constructed and maintained in accordance with Western and BLM standards for access roads and specified in the Access Road Plan, to be included as a Framework Plan in the POD.

Traffic and Transportation Management Plan

The purpose of a Traffic and Transportation Management Plan is to describe how roads would be improved and maintained for construction of the proposed Project, and to minimize the potential impacts of construction traffic at staging areas, work areas, and other places where traffic may increase. The plan would address equipment access to and from the proposed Project ROW, drainage improvements, dust control and maintenance measures, and reclamation and abandonment of roads. This plan is generally required by the BLM as a condition of the ROW grant and sometimes is required by State or local departments of transportation.

Stormwater Pollution Prevention Plan

Stormwater discharges from construction activities (such as clearing, grading, excavating, and stockpiling) that disturb one or more acres are regulated under the National Pollutant Discharge Elimination System (NPDES) stormwater program. Prior to discharging stormwater, construction operators must obtain coverage under an NPDES permit, which is administered by either EPA (as is the case in New Mexico) or the State (as in Arizona). Construction stormwater discharges are normally permitted under the Construction General Permit (CGP), which requires compliance with effluent limits and other standard permit requirements, such as the development of a SWPPP.

A SWPPP for the proposed Project would identify sources of pollutants associated with construction activity that may affect the quality of stormwater as well as stormwater management practices to abate pollutants in stormwater discharges from the construction site both during and after construction. The SWPPP would detail structural and non-structural controls that would be put in place to minimize

negative impacts caused by offsite storm water discharges, to the environment. BMPs in the plan would include specific stabilization measures and structural controls, spill prevention containment and controls, final stabilization measures to be implemented after construction, and requirements for maintenance and inspection.

Spill Prevention, Control, and Countermeasures Plan

The SPCC Plan would address requirements for petroleum spill prevention, preparedness, response, and notification to prevent oil discharges to waters and adjoining shorelines. The EPA's SPCC rule (40 CFR 112) is part of the Oil Pollution Prevention regulation, which requires specific facilities to prepare, amend, and implement SPCC Plans. The plan would addresses prevention and remediation of oil, hydraulic fluid, and petroleum fuel spills, including spills that could enter waters of the U.S. (WUS).

Historic Properties Treatment Plan

Section 106 of the NHPA requires Federal agencies to consider the effects of their undertakings on historic properties (those cultural resources presently listed or determined to be eligible for listing in the NRHP). Due to the scope and complexity of the proposed Project, and because the effects on historic properties cannot be fully determined prior to the approval of an undertaking, the BLM and Western determined early in the process that the undertaking would have an "adverse effect" on historic properties. To resolve the adverse effects, a Project-specific PA was developed among the consulting parties. A copy of the final PA is provided in appendix L.

The HPTP, which includes a Monitoring and Discovery Plan, would developed pursuant to the PA to resolve adverse effects on historic properties; the HPTP would be incorporated into the final POD. The HPTP has not yet been prepared and is not included in the Draft NEPA POD in appendix N of this EIS. The HPTP provides a framework for conducting historic resource testing and data recovery for the proposed Project. It would describe measures that would be implemented to address the avoidance of impacts, minimization of impacts, and mitigation of impacts to historic properties. As noted in the PA (see appendix L), for the purposes of Section 106 of the NHPA, decommissioning would be a new action for Section 106 review, and historic properties potentially affected by decommissioning would be considered in the BLM-approved Termination and Reclamation Plan in accordance with the pertinent laws, regulations, and policies in effect at the time

Blasting Plan

If construction of the proposed Project were to require blasting, a Blasting Plan would be developed to outline the procedures and safety measures that the proposed Project contractor would adhere to while implementing blasting activities. It would identify proposed blasting techniques, as well as blasting requirements and procedures such as proposed notification of agencies and affected landowners, along with safety, use, storage, and transportation of explosives. These procedures must be consistent with the minimum safety requirements defined by Federal, State, and local regulations. This plan would also identify and address areas of potential environmental concern as related to blasting along the proposed Project route. The Blasting Plan would be circulated to the appropriate Federal, State, and local agencies.

Plant and Wildlife Species Conservation Measures Plan

Federal agencies are required to consider the effects of their activities on protected species. The Plant and Wildlife Species Conservation Measures Plan would outline the avoidance and minimization of impacts to special status plant and wildlife species as related to proposed Project construction activities. It would summarize the avoidance and minimization measures taken during route selection of the proposed Project and describe specific measures to be implemented in the event that State or federally

listed species, BLM sensitive species, or Forest Service special status species or their habitats are identified within or adjacent to the proposed Project ROW. The Plant and Wildlife Species Conservation Plan would incorporate appropriate Federal, State, and local agency guidance and regulation, such as avoidance and mitigation measures required by the BO and BA amendment for the proposed project (FWS 2014d and BLM 2015a) and the Pima County Regional Flood Control District Regulated Riparian Habitat Mitigation Standards.

Erosion, Dust Control, and Air Quality Plan

In order to maintain air quality in the vicinity of construction areas, the Erosion, Dust Control, and Air Quality Plan would identify sources of fugitive dust, such as grading activities, driving on dirt roads, or wind-driven dust from exposed soil; and then provide appropriate dust mitigation measures such as application of water or soil additives, control of vehicle access, vehicle speed restrictions, or even work stoppage during extreme wind. The plan would also identify sensitive receptors that could be affected by dust from work areas, and outline dust monitoring and recordkeeping responsibilities. The Erosion, Dust Control, and Air Quality Plan would incorporate appropriate Federal, State, and local agency guidance and regulations and be circulated to the appropriate agencies to verify that the proposed Project is complying with the applicable air quality rules and regulations. Applicable county plans, laws, ordinances, regulations, and standards related to air quality are discussed in chapter 3 of the EIS (see table 3.2-3).

Hazardous Materials Management Plan

The purpose of the HMMP would be to reduce the risks associated with the storage, use, transportation, and disposal of hazardous materials anticipated to be used during the construction phase of the proposed Project. The HMMP would be required to meet BLM ROW grant conditions to provide a basic understanding of the hazards and techniques associated with the handling of hazardous materials so that the proposed Project personnel would be better able to protect their personal health, prevent damage to the environment, and comply with applicable laws, regulations, and policies.

Emergency Preparedness and Response Plan

The purpose of the Emergency Preparedness and Response Plan would be to help prevent emergencies, to ensure preparedness in the event emergencies do occur, and to provide a systematic and orderly response to emergencies. Emergencies may include medical, fire, hazardous materials, extreme weather, or acts of sabotage. The plan would provide project-specific details regarding steps for various types of emergencies, including emergency notification and evacuation procedures, and would take into account the level of severity of each event.

Noxious Weed Management Plan

The primary focus of the Noxious Weed Management Plan would be to minimize the introduction of any noxious weed infestations, as well as the spread of weeds, during construction of the proposed Project and to eradicate noxious weeds following construction. Regulatory authority and requirements are provided by Federal regulations, including the EO on Invasive Species and the Plant Protection Act, plus State regulations on noxious weeds. The plan would outline that invasive weeds are not controlled to the same standards as noxious weeds and would specifically address the elimination of buffelgrass from areas disturbed by the proposed Project to ensure that it does not spread to adjoining lands.

Fire Protection Plan

A Fire Protection Plan would help reduce the risk of fires and minimize the dangers posed by fires during construction and operation phases of the proposed Project. Because the proposed Project would be located in remote and isolated locations, the dangers posed by fire may be increased. The objective of this plan would be to eliminate causes of fire, minimize the potential loss of life and property by fire, and comply with Occupational Safety and Health Administration (OSHA) standards on fire prevention. It also would provide information and guidelines to assist in recognizing, reporting, and controlling fire hazards.

Stream, Wetland, Well, and Spring Protection Plan

General water quality is protected under the Federal Clean Water Act (CWA), and a permit may be required if a project would result in discharges to regulated WUS. The purpose of a Stream, Wetland, Well, and Spring Protection Plan would be to describe measures to protect those resources from potential impacts during construction, operation, and maintenance activities. The plan would describe avoidance, minimization, and mitigation measures and would be intended for use as a guide to determine the appropriate site-specific measures to be implemented during construction activities. The goals of the plan would be to prevent and control the proposed Project-related erosion and sedimentation into streams and wetlands, minimize disturbance and erosion of streambeds and banks, and protect springs and wells from Project impacts due to blasting and hazardous materials contamination. The Stream, Wetland, Well, and Spring Protection Plan would incorporate appropriate Federal, State, and local agency guidance and regulations, such as the Pima County Regional Flood Control District Regulated Riparian Habitat Mitigation Standards.

Soil Management Plan

A Soil Management Plan would define procedures for managing soils that are excavated during construction, along with plans for their storage and later reuse. This plan is often an appendix to a SWPPP. In addition to clean soil excavation, the plan would outline procedures for segregation of potentially contaminated soils, sampling and analysis of those soils, and disposal options if that becomes necessary. It also would define how topsoil would be segregated and stored, how stockpiles will be managed and protected, and used in site restoration. Use of topsoil for restoration activities would be described in the Reclamation, Vegetation, and Monitoring Plan. Erosion and sediment controls for excavated soil would also be discussed.

Reclamation, Vegetation, and Monitoring Plan

The Reclamation, Vegetation, and Monitoring Plan would be prepared for the BLM and Western to address the reconstruction of disturbed ecosystems by returning the land to a stable and productive condition. It would describe reclamation, revegetation, native plant management, and noxious and invasive weed control, with the purpose of restoring areas impacted by construction, operation and maintenance, and decommissioning. The plan would distinguish between Interim Reclamation Activities and Final Reclamation Activities with corresponding goals and objectives. Such plans typically include predisturbance site characterization, waste material management, site preparation and seeding, the use of native seeds, invasive species management, and compliance and effectiveness monitoring. Plan elements would help protect subsurface integrity and eliminate sources of ground and surface water contamination. Implementation of these elements would also maintain the biological, chemical, and physical integrity of the topsoil and subsoil, and reestablish slope stability and surface stability. The Reclamation, Vegetation, and Monitoring Plan would incorporate appropriate Federal, State, and local agency guidance and regulations, such as the Pima County Regional Flood Control District Regulated Riparian Habitat Mitigation Standards.

Health and Safety Plan

A HASP is not typically required by Federal law; however, section 18 of the Occupational Safety and Health Act of 1970 encourages States to develop and operate their own safety and health programs in the workplace. In New Mexico, the Occupational Health and Safety Bureau, part of the New Mexico Environment Department (NMED), has the responsibility of enforcing Occupational Health and Safety Regulations. In Arizona, the Arizona Division of Occupational Safety and Health is responsible for enforcement and voluntary compliance.

The purpose of a HASP would be to ensure the safety of the proposed Project employees, construction personnel, and the public. The HASP would be tailored specifically for the proposed Project and would include provisions set forth in Western's Power System Safety Manual (PSSM), established by Western Order 440.3 and which governs construction and maintenance work. The HASP would include a description of hazards that may be encountered during construction of the proposed Project, although it should be noted that electrocution is not an issue with transmission lines of the size proposed for the Project due to the necessary phase-to-ground clearances. The HASP would detail employee safety training procedures that would be used, structural and non-structural safety controls that would be put in place, personal protective equipment that would be required, emergency response procedures, protocols for project-specific procedures such as confined space entry, and applicable standards, practices, and procedures specified by OSHA (29 CFR 1910).

Avian Protection Plan

An APP would be a project-tailored plan designed to reduce avian collision mortality that result from avian interactions with electric utility facilities. The overall goal of an APP is to reduce avian mortality. The 2005 Avian Power Line Interaction Committee (APLIC) and FWS APP Guidelines (APLIC 2005) provide a framework, along with principles and examples of APPs.

The APP would be designed as a living document to be continually evaluated and refined over the life of the proposed Project. The elements of the APP would include training, permit compliance, construction design and siting standards, nest management, a reporting system, risk assessment for evaluating the risks posed to migratory birds. The plan would also identify areas and issues of concern, mortality reduction measures, and avian enhancement options.

Examples of avian protection measures that *could* be included in the APP are:

- Marking wires (bird diverters) and/or using special structure design to increase visibility to birds;
- Applying special structural design to decrease the heights of ground wires and conductors in certain areas where routing does not solve the potential conflict;
- Monitoring to ensure that mitigation measures are implemented; and/or
- Conducting additional avian studies, surveys, and/or monitoring to record the presence of birds and incidence of avian collisions, and provide data that could be useful to minimize the potential for collisions with the proposed Project, as well as with existing and future power lines in other locations.

Southline, BLM and Western would collaborate with agencies such as the FWS, AGFD, and NMDGF and other cooperating agencies on development of the APP, the goal of which is to mitigate the collision risk and loss of productivity for all birds.

Waste Management Plan

The purpose of the WMP would be to outline non-hazardous waste handling procedures to be used during the construction, operation, and maintenance phases of the proposed Project and to identify expectations for minimizing waste and recycling processes. Waste addressed in this plan would include all non-hazardous waste resulting from construction and land clearing, as well as material that is recycled, reused, salvaged, or disposed of as garbage.

The WMP would attempt to predict the quantities and types of waste that will be generated during the construction, operation, and maintenances phases of the proposed Project, identify the final destination of that waste, and estimate waste management costs. The WMP would consider waste diversion goals and objectives, and would explore recycling and reuse alternatives.

Helicopter Flight Plan/Flight and Safety Plan

If helicopters are used during the construction phase of the project, the Helicopter Flight and Safety Plan would describe the hours and estimated number of days that a helicopter would operate for construction of the proposed Project, the type and number of helicopters that would be used, and the kind of work to be performed. Additional information presented in this plan would include the location, size, and number of staging areas for helicopter takeoffs and landings, and safety measures to be implemented during helicopter operations. This plan would be reviewed and approved by the Federal Aviation Administration (FAA) prior to the commencement of helicopter operations.

Decommissioning Plan

The details of decommissioning are not known and would be established at the time decommissioning is being considered to ensure those activities are consistent with requirements in place at the time of decommissioning. The Decommissioning Plan would briefly describe how the structures and facilities of the proposed Project would be removed after the useful life of the Project is reached, and how the affected properties would be reasonably restored in accordance with the BLM ROW grant. This plan would be a general outline of how the proposed Project would be decommissioned, including revised or new versions of other applicable Framework Plans and how land would be restored to its original condition. Decommissioning procedures described would include the removal of structures, disposal of waste, and identification of what, if anything, may remain on the land upon completion. Restoration would include the stabilization and revegetation of the disturbance area to minimize erosion and return the land to productive use.

MAPPING AND ENVIRONMENTAL AWARENESS PROGRAM

The final POD would include a map package of sensitive resources to be considered during construction, operation, and maintenance. The map package would be used in the field to help guide the marking/flagging of sensitive avoidance areas and used to support a Worker Environmental Awareness Program (WEAP). All construction crews and contractors would be required to participate in WEAP training prior to starting work on the proposed Project. The WEAP training would include a review of the map package, which would depict special status species, WUS, riparian habitat, culturally sensitive areas (though not site locations), paleontological resources, and other sensitive resources that could be impacted by the proposed Project, the locations of sensitive biological resources and their legal status and protections, and measures to be implemented for avoidance of these sensitive resources. Inspectors and monitors would all use the WEAP to ensure that the protection and mitigation outlined in the documents translate to execution in the field. A record of all trained personnel would be maintained during the construction period.

Right-of-Way and Land Acquisition

New permanent and temporary ROW land rights would be required for the New Build Section. The requested ROW width for the New Build Section 345-kV double-circuit transmission line is 200 feet.

New and temporary ROW may be required in areas along the Upgrade Section, depending on the final design considerations. No new ROW is anticipated in the Upgrade Section across Bar V Ranch in Pima County, and between the Del Bac and Rattlesnake substations; in these areas, the tear-down and rebuild in place method of construction would be necessary because in these congested areas an additional 50 feet of ROW is not available. Tearing the line out and rebuilding in place requires outages on the existing line while construction is accomplished. The anticipated ROW width for most of the Upgrade Section 230-kV transmission line is up to 150 feet between the Afton Substation and the Del Bac Substation (except across Bar V Ranch), and between the Rattlesnake Substation and the Saguaro Substation. The additional ROW would allow room for construction of the new line adjacent to the existing line so that the existing line would remain in service until the new line is energized. These ROW widths have been requested to allow for the safe movement and operation of construction, operation, and maintenance equipment and to allow for sufficient clearance between conductors and buildings near the ROW edge, as well as equipment like bucket trucks, as required by OSHA and the National Electric Safety Code (NESC). To meet proper clearances in the narrower ROW, structures would have to be placed closer together. Southline is also requesting ROWs for ancillary Project facilities and for access to the transmission line.

Temporary ROWs are also being requested for construction of the proposed Project facilities. These temporary use areas would include access to work areas at transmission line structure locations, material laydown yards, tensioning and pulling areas, splicing locations, and staging areas. Construction activities would be expected to occur over a 24-month period. Where access is needed outside the transmission line ROW, permanent ROWs for access roads to structure sites are also being requested in order to conduct maintenance throughout Project operation.

Before the start of construction of a project element, Southline would obtain a complete project element ROW through a combination of a ROW grant, SUP, and easements from applicable Federal, State, and local governments, tribes, and private landowners. Close coordination with all property owners and land agencies during surveys and the construction phase of the proposed Project would be important for successful completion of the proposed Project. In the early stages of the proposed Project, landowners would be contacted to obtain right-of-entry for surveys and for geotechnical drilling at selected locations. Additional landowners would be contacted as needed throughout the proposed Project for additional surveys, including geotechnical work. Each landowner along the final centerline route would be contacted to explain the proposed Project and to secure right-of-entry and access to the ROW. Geotechnical drilling on Federal lands may require additional environmental analysis and field clearance under NEPA.

All negotiations with landowners would be conducted in good faith, and the proposed Project's effect on the parcel or other landowner concerns would be addressed. ROWs for transmission line facilities on private lands would be obtained as easements. Land for substation or regeneration stations would be obtained in fee simple where located on private land. A good-faith effort would be made to purchase the land and/or obtain easements on private lands through reasonable negotiations with the landowners. As discussed in chapter 1, section 1.9, if Southline is unable to negotiate an easement or obtain clear title for the land right, Western may negotiate the easement, or obtain the necessary rights through condemnation proceedings, in accordance with Federal law. Western's policy is to avoid condemnation if at all possible.

Additional ROW may be required, depending upon site geography and terrain. These areas are identified to the extent possible during the NEPA process; however, some needs might be identified during the final

engineering, preconstruction, or construction phases of the proposed Project. In some areas, longitudinal access roads would be sited within the transmission line ROW. In other areas, spur roads would connect existing roads to the transmission line ROW. Specific access road locations would be identified in the POD and subject to BLM approval through the ROD, as well as through the issuance of notice to proceed from the BLM. These areas would be subject to field surveys for cultural and biological resources, including native plant surveys and salvage prior to any disturbance. Planned access roads would be surveyed and specific ROW easements obtained from the landowners. All applicable design features and mitigation, as well as conditions in the POD Framework Plans, would apply.

Geotechnical Studies

Preconstruction foundation testing/geotechnical investigation activities would take place along the ROW before the start of construction. Geotechnical testing would test conditions at structure foundation locations and would involve soil borings; this testing would be used to design structure foundations appropriate for the type of soils and geology present at foundation sites. It is estimated that two 3-men crews equipped with a drill truck and a pick-up truck would perform the borings, which are typically 6 to 8 inches in diameter and 3 to 40 feet deep. These activities are not anticipated to be needed at every structure location. It is anticipated that 1 boring per mile would be required on average, with special emphasis given to major angle points and apparent changes in geology. Existing access would be used wherever possible to facilitate these surveys; however, cross-country travel may be necessary. In areas where cross-country travel is needed, this access would be designed to follow future access road routes to minimize disturbance. All preconstruction activities on public land would be authorized by the appropriate agency (e.g., BLM, State land, etc.) before implementation.

Surveying

Land survey for engineering and staking of Project facilities could occur on public and private lands before cultural resources or biological surveys, and construction. The land surveys would mark authorized boundaries for all Project elements, including the transmission line ROW, transmission line structures, access roads, etc. The ROW and access roads would also be flagged before the start of construction to indicate areas approved for activity and ground disturbances and to minimize impacts to surrounding areas. All flagging, fencing, and other markings, if used, would be maintained until postconstruction final cleanup and/or reclamation is complete. Once complete, all marking materials would be removed.

Preconstruction Resource Surveys

Before starting construction, Southline would be required to conduct resource surveys. These include both surveys performed to identify locations of sensitive resources where mitigation measures, including marking exclusion areas, would be applied to reduce impacts, and clearance surveys, which must be performed within a specified amount of time before construction begins. These latter could include surveys for listed species or for nesting birds, depending on season.

Preconstruction Meetings

Preconstruction meetings between Southline, BLM, Western, Coronado National Forest, Reclamation, New Mexico State Land Office (NMSLO), and ASLD would be held before issuance of a formal notice to proceed and before any surface-disturbing activities take place. These meetings would serve as an introduction for all the appropriate parties to understand their roles and responsibilities on the proposed Project, and would provide an understanding of Project procedures and protocols, environmental constraints, and the construction schedule.

2.4.2 Project Components

Overhead Transmission Line and Ancillary Facilities

The design characteristics for the proposed Project are described in the following sections. Project design, construction, operation, and maintenance, and decommissioning would meet or exceed current NESC requirements for safety.

TRANSMISSION LINE STRUCTURES

New Build Section 345-kV Structures

Two types of steel structures could be potentially used for the 345-kV transmission line: these include self-supporting lattice and monopole tubular structures, as shown in figures 2-3 through 2-7 (see also table 2-1).

Table 2-1. Typical Design Characteristics of the Proposed New Build Section 345-kV Transmission Line

Feature	Proposed (Description)	Option (Description)
General Description		
Structure type	Self-supporting steel lattice structures (see figures 2-3 through 2-5)	Tubular steel poles (see figures 2-6 and 2-7)
Structure height	110–170 feet	90–150 feet
Span length	1,000–1,400 feet	800–1,100 feet
Number of structures per mile*	4–5	4–6
ROW width†	200 feet	
Electrical Properties		
Normal voltage	345,000 volts (345 kV)	
Capacity	1,000 MW (initial) 2,000 MW (ultimate)	
Circuit configuration	Double-circuit	
Conductor size‡	792–1,272 kcmil ACSR (two subconductors per phase)	
Shield wire size‡	7/16-inch extra-high-strength steel wire	
Ground clearance of conductor§	30 feet	

Notes: ASCR = aluminum conductor steel reinforced; kcmil = a thousand circular mils (a unit used to express large conductor sizes).

* Variable, depending on structure type and terrain.

† During design, a wider temporary and/or permanent ROW may be needed only in specific locations to accommodate rough terrain or long spans.

‡ Shield wire size: one shield wire position to be occupied by optical ground wire about 0.5 inch in diameter with 48 optical fibers.

§ Design minimum at temperature of 100 degrees Celsius.

Figure 2-3. Typical 345-kV tangent lattice structure diagram.

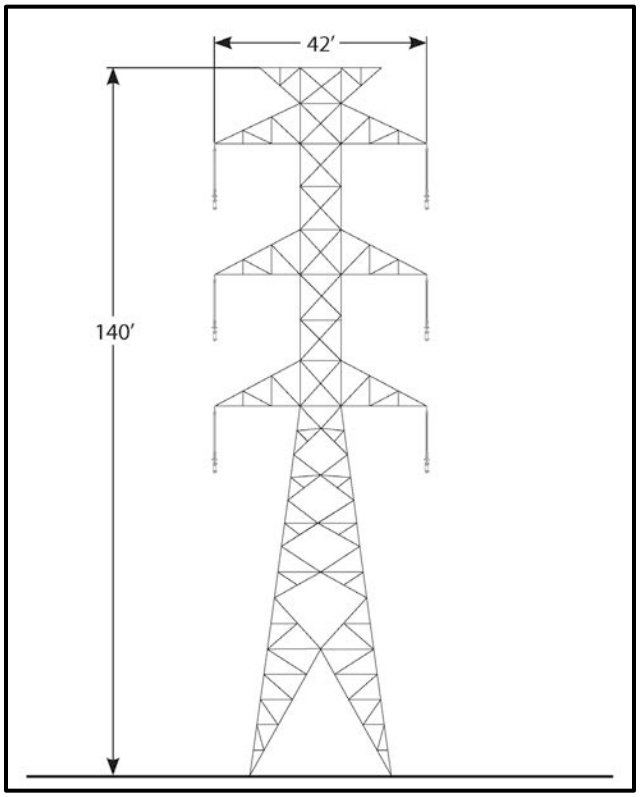


Figure 2-4. Typical 345-kV angle lattice structure diagram.

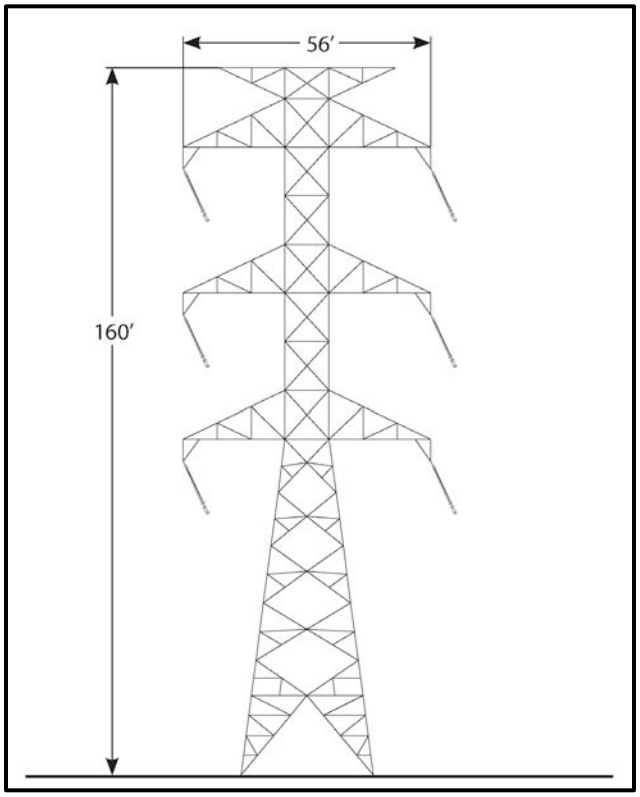


Figure 2-5. Typical 345-kV dead-end lattice structure diagram.

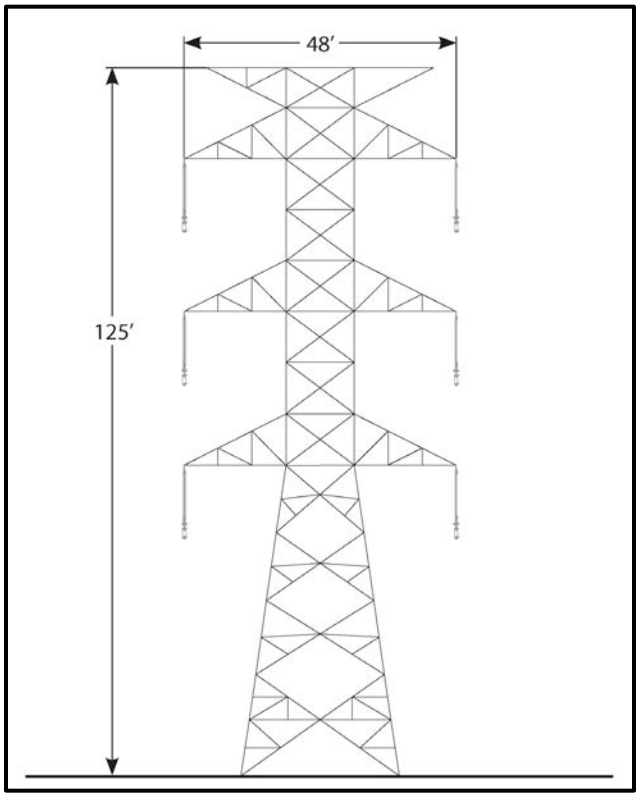


Figure 2-6. Typical 345-kV tangent tubular steel pole diagram.

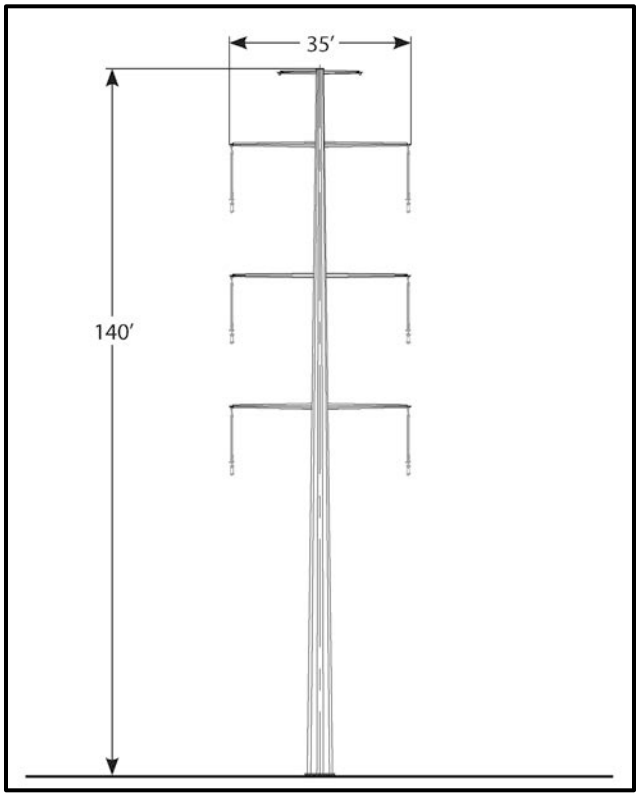
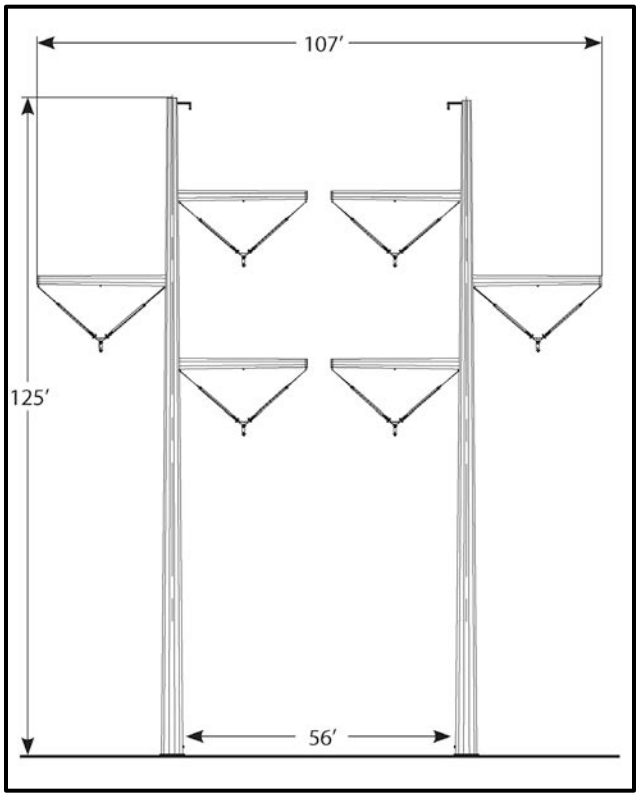


Figure 2-7. Typical 345-kV transposition tubular steel pole diagram.



The use of either a lattice structure or tubular steel structure would be primarily based on site-specific engineering design needs, as well as economic and visual considerations, or delivery timing.

The lattice structures would be constructed of galvanized steel with a height ranging from 110 to 170 feet and a width at the base of approximately 25 feet. The exact height of the structure would be determined by topography and design requirements for conductor clearance; individual structure height is based on plan and profile calculations once the route is selected and a centerline is determined. The distance between each structure would depend on site-specific characteristics but would generally be an average of 1,200 feet (or approximately 4 to 5 structures per mile). Spacing between structures would be designed to allow for the longest spans practical for this type of construction. Each lattice structure would have four legs, each set on concrete foundations placed in the ground. Foundations would be up to approximately 4 feet in diameter each, and would be from approximately 18 feet to 50 feet deep. Foundations would be designed for each structure site consistent with geotechnical conditions. See discussion below for temporary and permanent disturbance estimates for structure foundations.

To accommodate the 345-kV line, the tubular steel poles are expected to be constructed of galvanized or self-weathering steel and would range in height from 90 to 150 feet. The exact height of the structure would be determined by topography and design requirements for conductor clearance. The tubular steel poles would have an approximate diameter at the structure base of 7 to 8 feet and would range from approximately 18 feet deep up to 50 feet deep, depending on the structure type and geological conditions. Foundation depths would be consistent with geotechnical conditions at each structure site. The distance between each structure would depend on site-specific characteristics but is expected to be an average of approximately 900 feet (or approximately 5 to 6 structures per mile). Spacing between structures would be designed to allow for the longest spans practical for this type of construction. Tubular steel poles would be set on a concrete foundation placed in the ground. See discussion below for temporary and permanent disturbance estimates for structure foundations.

Structure selection and individual structure placement would be determined during the final design phase of the Project. The height and spacing of each structure would also be determined during the final design phase of the plan and profile drawings, would be based on detailed engineering, and would depend on the type of terrain. Aerial marker spheres or aircraft warning lighting may be required in certain locations in accordance with FAA requirements. Structure height and proximity to airports are the main factors in determining whether FAA regulations would apply. It should be noted that the Department of Homeland Security, U.S. Customs and Border Protection (CBP), and/or DOD may have additional requirements. Electrical properties, as described in table 2-1, indicate that the initial capacity on the New Build Section line would be 1,000 MW, but could ultimately be up to 2,000 MW. The proposed Project has been designed to meet a proposed WECC path rating of 1,000 MW in each direction. Studies conducted to date in support of the WECC path rating (WECC 2015) indicate that the proposed Project would be limited to approximately 1,000 MW to ensure a high degree of reliability in the transmission system. If the existing system is improved and the elements limiting the proposed Project's rating are upgraded, then the Project could potentially have a higher rating in the future based on its physical capacity, which would need to be confirmed with new WECC studies and additional NEPA review as appropriate.

Upgrade Section 230-kV Structures

The 230-kV double-circuit transmission line is proposed to be tubular steel structures (figures 2-8 through 2-11; see also table 2-2). To accommodate the 230-kV line, the tubular steel structures are expected to be constructed of galvanized or self-weathering steel, with a height ranging from 100 to 140 feet. The exact height of the structure would be determined by topography and safety requirements for conductor clearance. Most tubular steel poles would have an approximate diameter at the structure base of 6 feet or less.

Table 2-2. Typical Design Characteristics of the Proposed Upgrade Section 230-kV Transmission Line

Feature	Proposed (Description)
General Description	
Structure type	Tubular steel poles (see figures 2-8 through 2-11)
Structure height	100–140 feet
Span length	700–1,100 feet
Number of structures per mile*	5–6
ROW width†	150 feet
Electrical Properties	
Normal voltage	230,000 volts (230 kV)
Capacity	1,000 MW (initial) 1,500 MW (ultimate)
Circuit configuration	Double-circuit
Conductor size	1,272–kcmil ACSR (1 subconductor per phase)
Shield wire size‡	7/16-inch extra high-strength steel wire
Ground clearance of conductor§	28 feet

Notes: ACSR = aluminum conductor steel reinforced; kcmil = a thousand circular mils (a unit used to express large conductor sizes).

* Variable, depending on structure type and terrain.

† During design, a wider temporary and/or permanent ROW may be needed only in specific locations to accommodate rough terrain or long spans. Through urban Tucson, between Del Bac and Rattlesnake substations, the ROW will likely remain at the existing 100-feet width.

‡ Shield wire size: one shield wire position to be occupied by optical ground wire about 0.5 inch in diameter with 48 optical fibers.

§ Design minimum at temperature of 200 degrees Celsius.

Figure 2-8. Typical 230-kV direct embedded tangent tubular steel pole diagram.

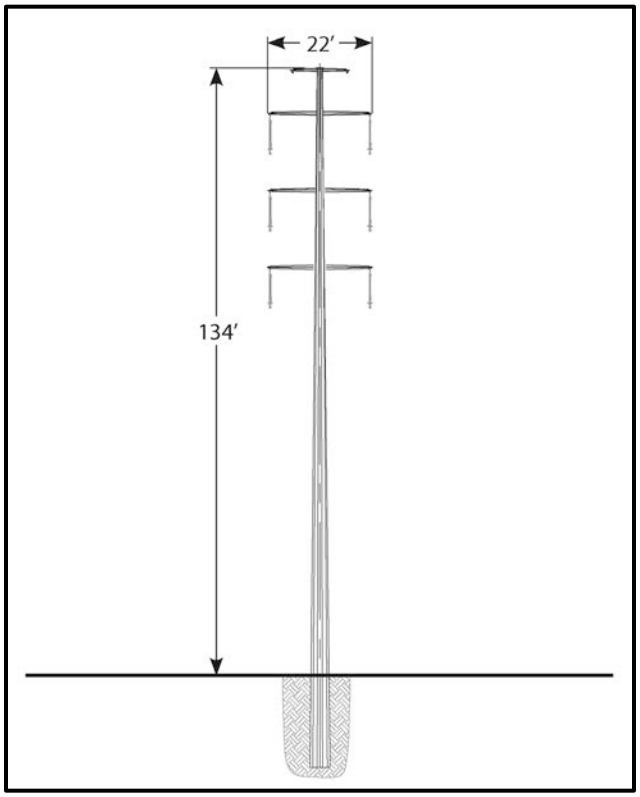


Figure 2-9. Typical 230-kV tangent tubular steel pole diagram (foundation type).

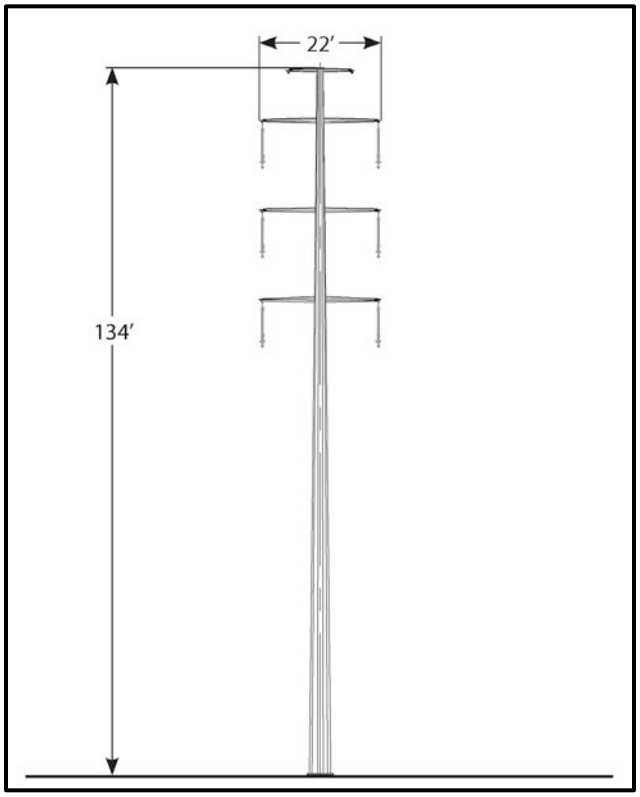


Figure 2-10. Typical 230-kV suspension angular tubular steel pole diagram.

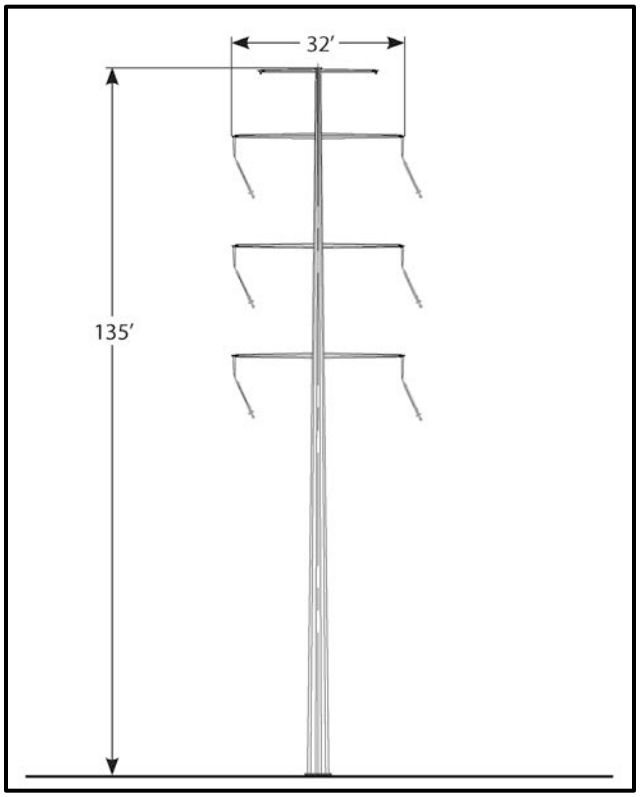
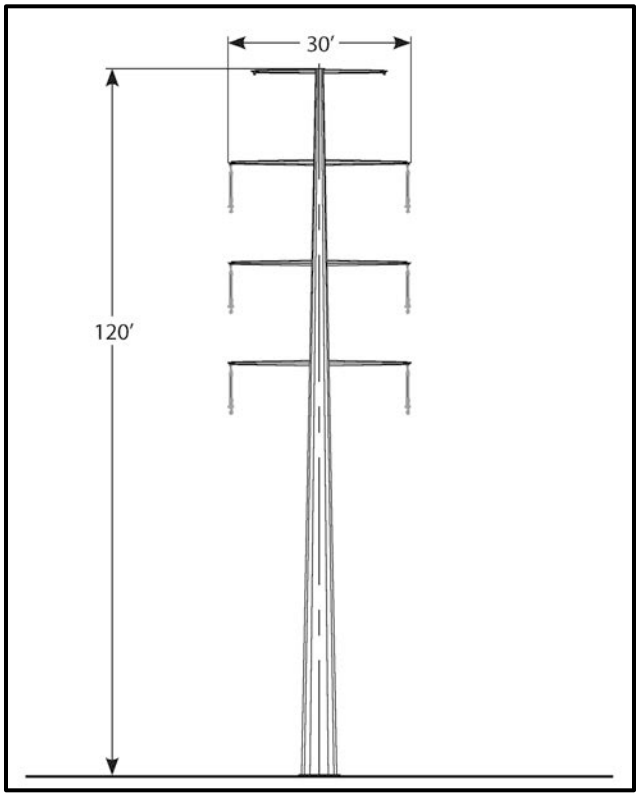


Figure 2-11. Typical 230-kV dead-end tubular steel pole diagram.

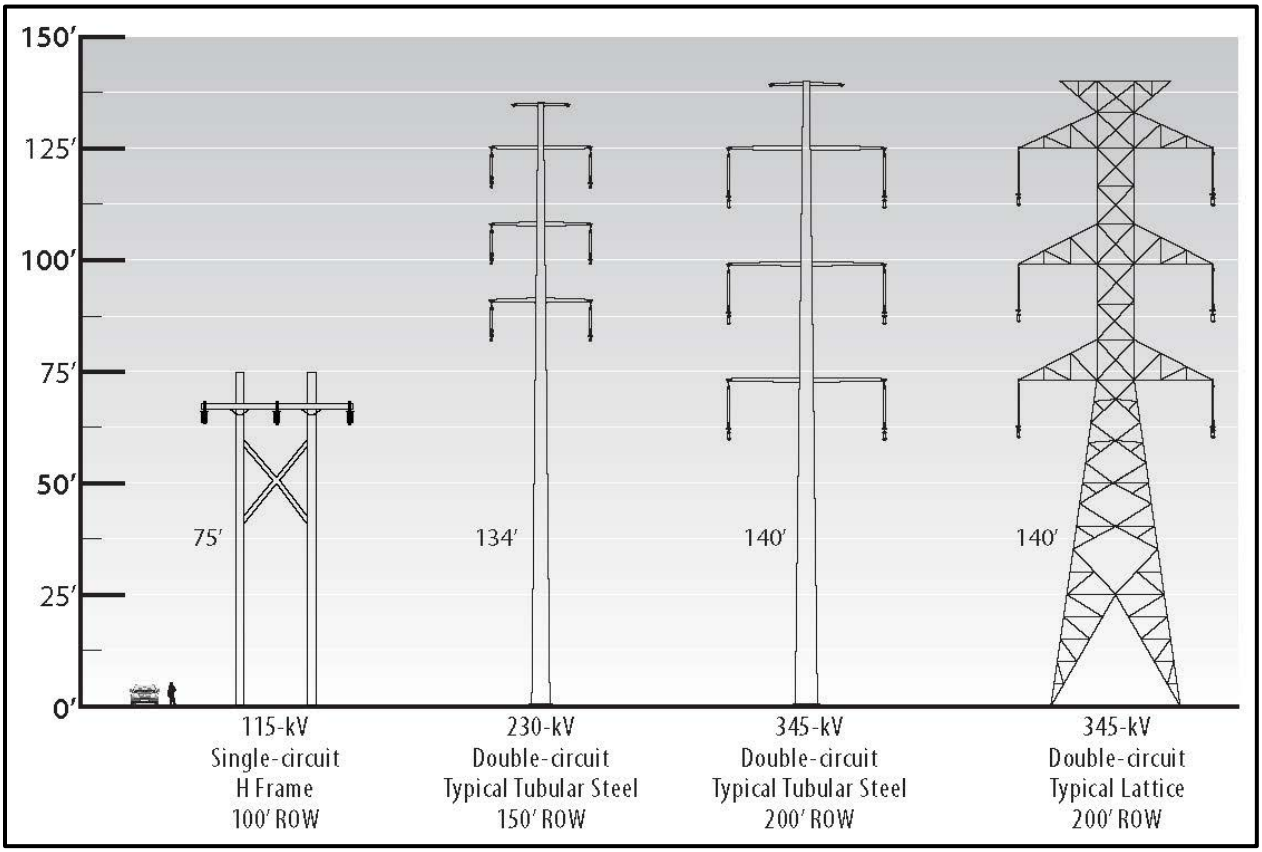


The distance between structures would depend on site-specific characteristics but is expected to be an average of 900 feet (or approximately 5 to 6 structures per mile). By comparison, the distance between existing structures averages approximately 700 feet. Therefore, although the proposed new structures that would be replacing the old structures would be taller, there would be fewer structures per mile. Spacing between the proposed structures would be designed to allow for the longest spans practical for this type of construction. Each structure would be either directly embedded or foundation mounted in concrete. See discussion below for temporary and permanent disturbance estimates.

Electrical properties, as described in table 2-2, indicate that the initial capacity on the Upgrade Section of the proposed line would be approximately 1,000 MW, but could ultimately be up to 1,500 MW. The proposed Project has been designed to meet a proposed WECC path rating of 1,000 MW in each direction. If the existing system is improved and the elements limiting the proposed Project's rating are upgraded, then the Project could potentially have a higher rating in the future based on its physical capacity, which would need to be confirmed with new WECC studies (WECC 2015).

See figure 2-12 for a comparison of existing and proposed structure types.

Figure 2-12. Comparison of typical existing and proposed structure types.



Typical Structure Foundations

Depending on soil and structure type, lattice structures and tubular steel structures are typically supported by cast-in-place drilled concrete pier foundations with detailed design to be completed once site-specific soil conditions can be evaluated. For lattice structures, steel reinforcing cages and stub angles would be installed. For tubular steel structures, either steel reinforcing cages with anchor bolts would be installed or

the poles would be embedded directly into the ground. In rocky areas, foundation holes may be excavated by methods such as drilling or detonation of small charges in the drill holes used to break up the rock, or by installing special rock anchor or micro-pile type foundations. The rock anchoring or micro-pile system would be used in areas where site access is limited or where adjacent structures could be damaged as a result of rock breaking or hauling activities.

Each structure location would be evaluated individually during final engineering design to determine the recommended foundation dimensions and types. Anticipated structure type and associated foundation disturbance identified during final engineering would be accounted for in the final POD. However, for the purposes of analysis in this EIS, the number of each structure type that would be used for both the New Build and Upgrade sections was estimated in order to approximate total foundation disturbance.

Temporary and permanent land requirements for the foundations of the various types of both lattice structures and single-pole tubular steel structures for the 345-kV and 230-kV transmission lines are presented in table 2-3.

Table 2-3. Typical Structure Foundations – Temporary and Permanent Land Requirements

New Build Section	Disturbance Area
Temporary	
Structure work area	100 x 200 feet (20,000 square feet)
Wire pulling and tensioning (dead-end/angle)	200 x 500 feet (110,000 square feet)
Permanent	
Lattice (tangent)	1,225 square feet 35 x 35–foot structure base
Lattice (angle)	1,600 square feet 40 x 40–foot structure base
Lattice (dead-end)	2,025 square feet 45 x 45–foot structure base
Single-pole tubular steel pole (tangent)	40 square feet 7-foot-diameter foundation
Single-pole tubular steel pole (dead-end/angle)	100 square feet 2 poles x 8-foot-diameter foundation
Upgrade Section	
Temporary	
Structure work area	100 x 200 feet (20,000 square feet)
Wire pulling and tensioning (dead-end/angle)	150 x 500 feet (75,000 square feet)
Permanent	
Single-pole tubular steel pole (tangent)	30 square feet 6-foot-diameter foundation
Single-pole tubular steel pole (dead-end/angle)	50 square feet 8-foot-diameter foundation

Conductors

Conductor is the wire cable strung between transmission line structures through which the electric current flows. The New Build Section 345-kV double-circuit transmission line would consist of a double-conductor bundle with two subconductors per phase; there would be three phases per circuit (six total).

The subconductors are typically spaced approximately 18 inches apart in a vertical or horizontal configuration. For the 230-kV transmission line Upgrade Section, it is anticipated that one conductor per phase would be used. The conductor would be sized to provide adequate current-carrying capacity.

To minimize wind vibration flowing over the conductors, vibration dampers would be used. The type and number of dampers needed would be determined during final design. Each conductor span is anticipated to have two Stockbridge type vibration dampers per wire; each shield wire/optical ground wire is anticipated to have four spiral dampers per wire for the 345-kV lines and two spiral dampers per wire for the 230-kV lines. Vibration dampers would also act as bird diverters by making the conductors and shield wires more visible.

The minimum design height of the conductor aboveground at the maximum operating temperature would be 30 feet on the New Build Section and 28 feet on the Upgrade Section. Conductor phase-to-phase and phase-to-ground clearance parameters are determined in accordance with NESC American National Standards Institute (ANSI) C2. This code provides recommendations for the minimum distances between the conductors and ground, crossing points of other lines and the transmission support structure and other conductors, and minimum working clearances for personnel during energized operation and maintenance activities (Institute of Electrical and Electronics Engineers (IEEE) 2007).

APLIC standards—discussed later in Section 2.4.6, “Typical Design Features and Agency Mitigation Measures”—would be used in final design to minimize avian conflicts. The configuration of the bundle would be designed to provide adequate current-carrying capacity while minimizing interference from audible noise and to radio operations. Additionally, aerial marker spheres or aircraft warning lighting may be required for the conductor on certain spans in accordance with FAA guidelines.

Other Hardware

The transmission line structures would require the installation of insulators, overhead shield wires, grounding systems, and other minor hardware.

Insulators, which are made of an extremely low-conducting material, such as porcelain, glass, or polymer, are used to suspend the conductors from each structure. Insulators inhibit the flow of electrical current from the conductor to the structure. The assemblies of insulators are designed to maintain appropriate electrical clearances between the conductor, the ground, and the structure. The New Build Section would have insulator assemblies that consist of single string or two strings of insulators, predominantly in the form of a “V.” The Upgrade Section would have insulator assemblies that consist of suspension strings or braced post insulators.

Overhead shield wires and optical ground wires would be installed between each structure for lightning protection. Current from lightning strikes would be transferred through the ground wires and structures into the ground.

For the New Build and Upgrade sections, a grounding system would be installed at the base of each transmission structure that would consist of copper or copper-weld ground rods embedded into the ground in immediate proximity to the structure foundation and connected to the structure by buried copper or other suitable conductor.

Alternating current (AC) transmission lines have the potential to induce currents on adjacent metallic structures. To address induced-current effects on metallic facilities or structures within 200 feet of the proposed Project centerline, these structures would be properly grounded as needed. This would eliminate the electric shock potential a person may experience when touching a metallic object near the proposed Project. Typically, the NESC determines what structures beyond 200 feet or more from the centerline

would require grounding. If grounding were required outside the ROW, a temporary use permit would be obtained, as needed.

In addition to the conductors, insulator, and overhead shield and optical ground wires, other associated hardware would be installed on the structure as part of the insulator assembly to support the conductors and shield wires. This hardware might include clamps, shackles, links, plates, and various other pieces composed of steel and aluminum.

Substations

The proposed Project involves interconnection with and upgrades of 14 existing substations along the Project route in New Mexico and Arizona, and the potential construction of a new substation facility proposed for Luna County, New Mexico (referred to as "Midpoint Substation") (see figure 1-1).

As described in section 1.1.2 ("Changes between Draft and Final EIS"), Project design has progressed between the Draft and Final EIS resulting in a more refined Project description. As a result, at four substation locations within the Upgrade Section where the proposed Project was anticipated to include expansion of existing facilities, these expansions would more accurately be described as "new" substations. These four substation locations are Apache, Pantano, Marana, and Saguaro. Please note that these changes are only a refinement of the project description and do not change the disturbance areas and impact estimates presented in table 2-7 later in this chapter or in the analysis in chapter 4. More detail is provided below in the "Substation Facilities: Upgrade Section" discussion.

A summary of substations associated with the proposed Project, land ownership, and the respective owner/operator is provided in table 2-4. Of the existing substations, there are two on BLM lands (Afton and Nogales), three on State lands in Arizona (Adams Tap, Pantano, and Tortolita), one on Reclamation lands (Rattlesnake), and eight on private land (Hidalgo, Apache, Vail, Del Bac, Tucson, DeMoss Petrie, Marana, and Saguaro).

Depending on the transmission line route, there are two options for the proposed Midpoint Substation in Luna County, New Mexico (see figure 1-1), along segment P3: Midpoint North, along the Proponent Preferred; and Midpoint South, along the southern Proponent Alternative. The Midpoint North Substation would be on NMSLO State and private lands, whereas Midpoint South would be located on BLM land.

Table 2-4. Project Interconnection Substations (Existing and Proposed)

Interconnection Substation	Owner/Operator	Section	Land Status
Afton	EPEC	New Build	BLM
Midpoint*	Southline (owner); operator TBD	New Build	North: NMSLO and private South: BLM
Hidalgo	EPEC	New Build	NMSLO and private
Apache**	SWTC and Southline	Upgrade	Private
Adams Tap	Western	Upgrade	ASLD
Pantano**	SWTC and Western	Upgrade	ASLD
Vail	TEP	Upgrade	ASLD and private
Nogales	Western	Upgrade	BLM
Del Bac	Western	Upgrade	ASLD
Tucson	Western	Upgrade	Private

Table 2-4. Project Interconnection Substations (Existing and Proposed) (Continued)

Interconnection Substation	Owner/Operator	Section	Land Status
DeMoss Petrie	TEP	Upgrade	Private
Rattlesnake	Western	Upgrade	Reclamation
Marana**	SWTC and Western	Upgrade	Private
Tortolita	TEP	Upgrade	ASLD
Saguaro**	APS and Western	Upgrade	ASLD and private

* Midpoint is a new proposed substation that is not interconnected with an existing adjacent substation. Apache Southline, Marana Tap-Sawtooth, and Sasco substations are new substation yards proposed to interconnect with neighboring substations; all other substations in this table are existing substations.

** See discussion below regarding Project activities at these substation locations.

As shown in table 2-4, substations along the New Build Section include the existing Afton and Hidalgo substations, as well as the proposed Midpoint Substation in New Mexico. Substations along the Upgrade Section include Apache/Apache (Southline), Adams Tap, Pantano/Pantano (Southline), Vail, Nogales, Del Bac, Tucson, DeMoss Petrie, Rattlesnake, Marana/Marana Tap-Sawtooth, Tortolita, and Saguaro/Sasco. Substation expansions and upgrades vary by substation and are described below.

SUBSTATION FACILITIES: NEW BUILD SECTION

Three substations are included in the New Build Section. These include the existing Afton and Hidalgo substations, as well as the proposed Midpoint Substation (table 2-5). As noted above, there are two options for the proposed Midpoint Substation: Midpoint North and Midpoint South. The two Midpoint substations are options; only one would be built if the Project were approved.

Estimates for temporary and permanent disturbance at each substation are described below. Permanent disturbance estimates at the existing Afton and Hidalgo substations are areas where new facilities would be constructed outside the existing perimeter of the existing substations. Additional temporary disturbance areas would be used as a work area and/or laydown yard for the substation or transmission line construction. Total permanent disturbance area for the New Build Section substations would be approximately 64 acres plus 30 acres of temporary disturbance.

Disturbance from existing substations is quantified, along with proposed permanent and temporary disturbance for each substation, as described below. An analysis of all proposed disturbance is presented in detail in chapter 4.

Table 2-5. Project Substation Expansions and Additions, New Build Section

Substation	Permanent Disturbance (acres)	Additional Temporary Disturbance (acres)	Land Ownership
Afton	10	10	BLM
Midpoint North*	25	10	NMSLO and private
Midpoint South (alternative)*	25	10	BLM
Hidalgo	29	10	Private

* Proposed (new) substation.

Afton

The Afton Substation is an existing substation owned and operated by EPEC and is located southwest of Las Cruces, New Mexico. An additional 10 acres would be required to construct a new yard to accommodate the new 345-kV lines. Existing access to the site would be used for construction, operation, and maintenance. The new yard would be built adjacent to the existing switchyard on the west side. Within the existing substation, the control building would be used and existing main buses expanded to accommodate two additional line positions.

Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus supports, and transformers. Two line positions would be terminated in the existing switchyard. In addition, two line positions from the Luna and Diablo substations would be looped into the new yard. The maximum takeoff transmission line structure height would be 80 feet. If additional equipment is needed for technical reasons, such as line and/or bus compensation equipment, shunt reactor, or shunt capacitor, they would be located within the footprint of the new yard.

There would be approximately 20 acres of disturbance, 10 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other 10 acres of which would be the permanent disturbance for the substation expansion. The majority of this proposed substation expansion area has been previously disturbed.

Hidalgo

The Hidalgo Substation is an existing substation owned and operated by EPEC and is located north of Lordsburg, New Mexico. An additional 25 acres would be required to construct a new yard to accommodate the new 345-kV transmission lines (four new line positions as well as a connection to the existing substation). Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus supports, and transformers. The existing substation buses would be expanded to accommodate an additional line position for connection to the new yard. A new control building would be required.

Transmission lines from the Midpoint (described below) or Afton substations and the Apache Substation would be terminated at Hidalgo. The maximum takeoff transmission line structure height would be 80 feet. Additional equipment like line and/or bus compensation equipment, shunt reactor, or shunt capacitor would be located within the footprint of the new yard.

There would be approximately 35 acres of disturbance, 10 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other 25 acres of which would be the permanent disturbance for the substation expansion. The existing substation is located on private land but is surrounded by NMSLO lands. As a result, depending on the final footprint of the expansion and disturbance, portions of the substation expansion and construction yard could be located on NMSLO lands. Approximately 6 acres of this proposed substation expansion area have been previously disturbed; the remainder is undisturbed lands.

Midpoint

A new substation in New Mexico is proposed as part of the Project. Depending on the transmission line route, there are two options for the proposed Midpoint. The Midpoint North Substation would be located near I-10 east of Deming, New Mexico. The Midpoint North location would be the one constructed with

the Agency Preferred Alternative. The Midpoint South Substation would be located south of NM 9 and east of Columbus, near the U.S.–Mexico border in southern New Mexico.

The new substation would include approximately 25 acres for the facility; five to six transmission lines would be terminated at the substation. Equipment installed would include 345-kV circuit breakers, disconnect switches, bus supports, transformers, transmission line termination structures, and line reactors. See figure 2-13 for an example of a 345-kV substation and what the Midpoint Substation could look like.

The maximum takeoff transmission line structure height would be 80 feet. A small control building would be constructed to accommodate necessary system communications and control equipment. Additional equipment like line and/or bus compensation equipment, shunt reactor, or shunt capacitor would be located within the footprint of the new yard.

There would be approximately 35 acres of disturbance, 10 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other 25 acres of which would be the permanent disturbance for the substation construction. Neither of the proposed Midpoint Substation locations has been previously disturbed; both are located on undisturbed lands.

Figure 2-13. Example of a 345-kV substation.

SUBSTATION FACILITIES: UPGRADE SECTION

Twelve existing substations would be improved as part of the Project Upgrade Section (table 2-6; see figures 2-2a and 2-2b). Seven of these 12 substations are located on private land, 1 is located on Reclamation land (Rattlesnake), 1 is located on BLM land (Nogales), and 3 are located on ASLD lands (Adams Tap, Pantano, and Tortolita). Substation improvements, which are needed to accommodate the 230-kV transmission line upgrade as part of the Upgrade Section, would generally include new yard expansions, line and/or bus compensation equipment, shunt reactor or shunt capacitors, switches and breakers, and installation of new transformers, in addition to construction laydown areas. See figure 2-14 for a representative photograph of a 230-kV substation.

Figure 2-14. Example of a 230-kV substation.

Total new permanent disturbance for all the existing substations would be approximately 166 acres for new yard expansions at the 12 existing substations. Permanent disturbance within substation expansion areas would include grading and leveling the surface, as well as installation of concrete footings and cable trays, a ground mat, and a thick gravel surface. Total additional temporary disturbance of up to 50 acres for the existing substations would be used for the transmission line and substation construction laydown yard, with the total disturbance area for all substation expansion approximately 216 acres. Although the design of transmission line entrances into an existing substation and/or substation expansion is typically dictated by voltage, existing configuration, and future needs, final design of these proposed Project elements would be sited in previously disturbed areas as much as possible.

Proposed permanent and temporary disturbance at each substation in the Upgrade Section is listed in table 2-6 and analyzed in chapter 4. If a proposed substation expansion area is previously disturbed, that disturbance is quantified in the substation description.

Table 2-6. Project Substation Expansions and Additions, Upgrade Section

Substation	Permanent Disturbance (acres)	Additional Temporary Disturbance (acres)	Land Status
Apache*	59.4	10	Private
Adams Tap	5.7	0	ASLD
Pantano*	20	5	ASLD
Vail	22.9	5	Private
Nogales	5.2	5	BLM
Del Bac	5.7	0	Private
Tucson	5.6	5	Private
DeMoss Petrie	4.2	0	Private
Rattlesnake	11.7	5	Reclamation
Marana*	9.5	5	Private
Tortolita	11.1	5	ASLD
Saguaro*	4.7	5	Private

* Includes the existing substation and proposed (new) facilities at that location.as defined below.

Apache

Following is a description of substation facilities at the Apache Substation location; the existing substation is owned and operated by SWTC, while the expansion, or new substation yard, would be owned and operated by Southline.

Apache (SWTC)

The Apache Substation is an existing substation owned and operated by SWTC, located southwest of Willcox Playa in Arizona. This substation is the east end of the existing Tucson–Apache 115-kV line. Existing access to the site would be used for construction, operation, and maintenance.

The existing Western 115-kV yard within SWTC's Apache Substation would be upgraded, including new circuit breaker and associated equipment and high-voltage switches. The existing 230-/115-kV power transformers would also be replaced.

Apache (Southline)

The new Apache (Southline) Substation would be located near the SWTC Apache Substation, southwest of Willcox Playa in Arizona. This substation would be the west end of the proposed 345-kV line (New Build Section) and the east end of the proposed upgrade of Western's existing Tucson–Apache 115-kV line to 230 kV (Upgrade Section). Existing access would be used for construction, operation, and maintenance.

The new 60-acre 345-/230-kV yard would be constructed to handle power on the new 345-kV line and power on the upgraded 230-kV line. Equipment that would be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus work and supports, transformers, and a static volt ampere reactive compensator. One line upgraded from 115 to 230 kV from the Adams Tap Substation, one 230-kV transmission line from Pantano Substation, and one tie line to the existing 115-kV yard in the SWTC Apache Substation would terminate at the new substation. Two 345-kV line positions from the Hidalgo Substation would terminate at the new 345-kV yard. Two transformer positions would be installed at each of the 230-kV and 345-kV yards (four total). The maximum takeoff transmission line structure height would be 80 feet. A new control building would also be required. Very little of this proposed substation expansion area has been previously disturbed.

Additional equipment, such as line and/or bus compensation equipment, a series reactor, a shunt reactor, or shunt capacitors, would be located within the footprint of the new substation. There would be approximately 70 acres of disturbance, 10 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other approximately 60 acres of which would be the permanent disturbance for the new substation.

Adams Tap

Adams Tap is an existing 115-kV substation owned and operated by Western. Adams Tap is located on lands managed by the ASLD, between Benson, Arizona, and the Apache Substation. Western's existing Tucson–Apache 115-kV line passes through this substation.

The existing switchyard would be expanded by a new 5.7-acre yard on land adjacent to the existing facility, and would accommodate 230-kV line positions from the Apache and Nogales substations. Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage

switches, transmission line termination structures, bus work and supports, and a transformer. A 230-/115-kV transformer would be installed in the new yard, converting Adams Tap to a substation. A new control building would also be required. The maximum takeoff transmission line structure height would be 60 feet.

There would be approximately 5.7 acres of permanent disturbance. No temporary disturbance is anticipated. Approximately 0.5 acre of this proposed substation expansion area has been previously disturbed; the remainder is undisturbed lands.

Pantano

Following is a description of substation facilities at the Pantano Substation location; the existing substation is owned and operated by SWTC, while the expansion, or new substation yard, would be owned and operated by Southline.

Pantano (Southline)

A new 230-kV substation would be built close to the existing Pantano Substation. The new substation would consist of three bays for five line positions but would have enough room to expand to four bays or eight line positions ultimately. New 230-kV lines from Apache and Vail substations would be routed into this substation. This substation would also loop in the existing SWTC 230-kV line from Apache to Bicknell and have a 230-kV tie to the existing Pantano facilities. Slightly expanded existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus supports, and transformers.

There would be approximately 25 acres of disturbance, 5 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other 20 acres of which would be the permanent disturbance for the substation expansion, including any new access. Approximately 2 acres of this proposed substation expansion area have been previously disturbed; the remainder is undisturbed lands.

Pantano (SWTC)

The existing Pantano Substation is owned and operated by SWTC. Equipment may need to be modified or upgraded to accommodate the new interconnection.

Vail

The existing Vail Substation is owned and operated by TEP, located between the Pantano Substation and suburban Tucson along the south side of I-10. An additional approximately 23 acres for a 230-kV yard would be required to house two additional 345-/230-kV transformer positions. Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus work and supports, and transformers. The expansion would be built to accommodate 230-kV line positions from the Pantano and Tucson substations. In addition, two 345-/230-kV transformer positions would be installed. The maximum takeoff transmission line structure height would be 60 feet.

There would be approximately 27 acres of disturbance, 5 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other 23 acres of which would be the permanent disturbance for the substation expansion. Approximately 3.5 acres of

this proposed substation expansion area have been previously disturbed; the remainder is undisturbed lands.

Nogales

The Nogales Substation is owned and operated by Western and is located on BLM land south of I-10 on South Wilmot Road. Western's existing Tucson–Apache 115-kV line passes through this substation. Nogales would be an optional termination for the Project. A new approximately 5-acre yard would be constructed to accommodate 230-kV line positions from Adams Tap and Del Bac substations. Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus work and supports, and transformers. One 230-/138-kV transformer position may be installed. The maximum takeoff transmission line structure height would be 60 feet. Additional equipment such as line and/or bus compensation equipment, a shunt reactor, or shunt capacitor would be located within the footprint of the new yard.

There would be approximately 10 acres of disturbance, 5 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other 5 acres of which would be the permanent disturbance for the substation expansion. Approximately 1.5 acres of this proposed substation expansion area have been previously disturbed; the remainder is undisturbed lands.

Del Bac

The Del Bac Substation is located on land owned in fee by Western, within a larger privately owned parcel; the substation is operated by Western. The existing substation is located on the north side of Valencia Road and west of I-19 in Tucson. Western's existing Tucson–Apache 115-kV line passes through this substation.

Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus work and supports, and transformers. An additional approximately 6 acres for a 230-kV yard would be required to accommodate 230-kV line positions from the Nogales and Tucson substations. The maximum takeoff transmission line structure height would be 60 feet.

There would be approximately 5.7 acres of permanent disturbance. No temporary disturbance is anticipated. Less than 1 acre of this proposed substation expansion area has been previously disturbed; the remainder is undisturbed lands.

Tucson

The Tucson Substation is an existing substation owned and operated by Western, located on the north side of Grant Road, east of I-10 in Tucson. Western's existing Tucson–Apache 115-kV line "ends" at, and Western's existing Saguaro–Tucson 115-kV line "begins" at, this substation.

A new 5.6-acre 230-kV yard would be built to accommodate four 230-kV line positions from the Vail, Del Bac, Rattlesnake, and Tortolita substations. Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus work and supports, and transformers. Three transformer positions would be installed, including one 230-/115-kV transformer position and 230-/138-kV transformer positions. The low side of the transformers would be

tied to existing 115-kV bus at the Tucson Substation and existing 138-kV bus at the DeMoss Petrie Substation. The maximum takeoff transmission line structure height would be 60 feet.

There would be approximately 10.6 acres of disturbance, 5.6 acres of which would be permanent disturbance used for the substation expansion, and the other 5 acres of which would be temporary disturbance used for the transmission line construction and as a substation laydown yard that would be reclaimed. All of this proposed substation expansion area has been previously disturbed.

DeMoss Petrie

The DeMoss Petrie Substation is an existing substation owned and operated by TEP, located on the north side of Grant Road, east of I-10 in Tucson. The DeMoss Petrie Substation is directly adjacent to the Tucson Substation. DeMoss Petrie Substation would interconnect to Tucson Substation through a new 138-kV line. Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the existing yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, and bus work supports. The new 138-kV line would be 800 to 1,100 feet long outside the existing substation fence, depending on the final alignment; this would require two to five monopoles between the DeMoss Petrie and Tucson substations.

The existing 138-kV buses at the DeMoss Petrie Substation would be expanded an additional 4.2 acres for two additional 138-kV line positions. All 4.2 acres would be permanent disturbance used for the substation expansion; no temporary disturbance is anticipated. All of this proposed substation expansion area has been previously disturbed.

Rattlesnake

The existing Rattlesnake Substation is owned and operated by Western and is located northwest of Twin Peaks and North Sandario roads in Tucson. Western's existing Saguaro–Tucson 115-kV line passes through this substation. A new 5-acre 230-kV yard would be constructed to accommodate 230-kV line positions from the Tucson and Marana substations. In addition, one 230-/115-kV transformer position would be installed. Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus work and supports, and transformers. The low side of the transformer would be tied to the existing facility. The maximum takeoff transmission line structure height would be 60 feet.

There would be approximately 16.7 acres of disturbance, 5 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other 11.7 acres of which would be the permanent disturbance for the substation expansion. Approximately 1 acre of this proposed substation expansion area has been previously disturbed; the remainder is undisturbed lands.

The existing substation is located on Reclamation land but is surrounded by ASLD lands. As a result, depending on the final footprint of the expansion and disturbance, portions of the substation expansion and construction yard could be on ASLD lands.

Marana

Following is a description of substation facilities at the Marana location; there is the existing Marana Tap, owned and operated by Western as well as the Marana Substation, owned and operated by SWTC.

Marana Tap (Sawtooth)

The existing Marana Tap is located at Silverbell and North Trico roads and is owned and operated by Western. The existing Marana Tap, consisting of switches mounted on poles, would be dismantled and removed from the site.

A new 9.5-acre 230-kV substation would constructed adjacent to the existing SWTC Marana Substation to accommodate 230-kV line positions from the Rattlesnake and Saguaro substations. In addition, one 230-/115-kV transformer position would be installed. Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new substation, to be named Sawtooth Substation,would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus work and supports, and transformers. The maximum takeoff transmission line structure height would be 60 feet.

There would be approximately 14.5 acres of disturbance, 5 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other 9.5 acres of which would be the permanent disturbance for the new substation. Approximately 2 acres of this proposed substation area have been previously disturbed; the remainder is undisturbed lands.

Marana Substation (SWTC)

The existing Marana Substation is located at Silverbell and North Trico roads and is owned and operated by SWTC. A minor reroute of approximately 0.5 mile of the existing line may be required out of the Marana Substation to tie to the new switchyard and avoid sensitive resources in the area. This routing would be determined during final design.

Tortolita

The existing Tortolita Substation is owned and operated by TEP, located on lands managed by the ASLD. The substation is east of I-10 and south of Red Rock. A new 11.1-acre 230-kV yard would accommodate a 230-kV line position from the Tucson Substation and a 500-/230-kV transformer position. The high side of the transformer would terminate into a new position in the existing 500-kV yard. Existing access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus work and supports, and transformers. The maximum takeoff transmission line structure height would be 60 feet.

There would be approximately 16.1 acres of disturbance, 5 acres of which would be used for the transmission line construction and as a substation laydown yard and be reclaimed, and the other 11.1 acres of which would be permanent disturbance for the substation expansion. Less than 0.5 acre of this substation expansion area has been previously disturbed; the remainder is undisturbed lands.

Saguaro

Following is a description of substation facilities at the Saguaro location; there is the existing Saguaro substation, owned and operated by APS, as well as the new proposed Sasco substation, to be owned and operated by Western.

Sasco

A new 4.7-acre 230-/115-kV Sasco Substation would be built on the west side of I-10 across from the existing Saguaro Substation. Four lines would terminate in the new SascoSubstation: a 230-kV line from the Marana, two lines to the existing 115-kV yard in the Saguaro Substation, and Western's existing Electrical District 5 115-kV transmission line would be relocated from the Saguaro 115-kV yard. Two transformer positions would be installed at each of the 230- and 115-kV yards within the new Sasco Substation (four total). Existing transmission line access roads and new access to the site would be used for construction, operation, and maintenance. Equipment to be installed within the new yard would include circuit breakers and associated equipment, high-voltage switches, transmission line termination structures, bus work and supports, and transformers. The maximum takeoff transmission line structure height would be 60 feet.

There would be approximately 9.7 acres of disturbance. Five acres would be temporarily disturbed during transmission line construction and used as a substation laydown yard; these areas would be reclaimed. Approximately 4.7 acres would be permanently disturbed during expansion of the substation. Little of this proposed substation area has been previously disturbed except for existing access roads and a recent burn-over event, which removed nearly all area vegetation.

Saguaro (APS)

The Saguaro Substation is an existing substation owned and operated by APS and located on private land north of the Tortolita Substation and east of I-10. Western's existing Saguaro–Tucson 115-kV line "ends" at this substation. The existing 115-kV yard within Saguaro Substation would be upgraded, including new circuit breaker and associated equipment and high-voltage switches.

Access Roads

Access roads would be required during construction for the movement of trucks, cranes, concrete trucks, bulldozers, and other light and heavy construction equipment to and along the ROW. Access roads would also serve as the primary means of movement for construction crews and Project materials. During operation, these roads would be needed to access transmission lines, substations, and ancillary facilities for period line inspections and scheduled and emergency maintenance over the life of the Project. As such, access roads must be sufficient to support the weight of construction equipment; upon completion of the proposed Project, access roads would be used by operation and maintenance vehicles.

The proposed Project would be designed, as feasible, to use existing access roads with minimal improvement. The level of construction for access roads would range from unimproved cross-country travel to completely bladed roads (see below for a description of access types A–E). For example, unimproved cross-country travel access (two-track) would be on flat, sparsely vegetated areas, and would be used to maintain the maximum amount of native vegetation and minimize overall disturbance instead of creating new roads, as appropriate. Improvements to existing roads that would be used as access roads would occur in areas where occasional blading would be needed on rough spots and would transition to more blading with other improvements on steep, rocky, or rough country. The intent is to do no more than is necessary to get equipment in and out safely and to prevent erosion. All roads would be within designated ROW, whether inside the main transmission line ROW, or outside in a 30-foot access road ROW.

In areas where improvements are required, access roads would be graded, as needed, to provide a smooth travel surface. Such improvements could include blading, widening of the road, or installing drainage structures, such as culverts. No graveling or paving is planned. Typically, Project access roads would have a travel surface width of 12 to 16 feet but could have a maximum width of 24 feet, depending on

site-specific circumstances, such as steep terrain, and where needed to accommodate expanded turning areas for cranes and pole trucks. After construction, wider parts of the access roads would be revegetated. Access road types that could be used for this Project include existing roads that require no improvements, existing roads that require improvements, and new access roads.

Access roads would be designed to go directly from structure to structure, except in difficult terrain or where sensitive resources need to be avoided. In such cases, the road would follow suitable topography from structure to structure and would be built in areas that generally cause the least amount of overall disturbance, which may be outside the ROW in cases of difficult terrain. Typically, where the line spans a river channel, or large steep-sided wash, access may come from either side to avoid damage to riparian vegetation. As noted above in section 2.4.1, Framework Plans associated with the project would include an Access Road Plan; all Framework Plans would comply with appropriate Federal, State, and local agency requirements. In Pima County, roads spanning washes with impacts to Regulated Riparian Habitat (RRH) may also have additional mitigation or avoidance requirements.

The Access Road Plan for the proposed Project assumes that five primary types of access would be used:

- **Access Type A** – Access from adequate private roads. This type of access would be used when there is no existing road adjacent or parallel to the alignment, but where there is a patchwork of existing roads in the area that would be crossed by the proposed Project ROW, and could be used to access the ROW and get close to the structure locations. Grading between the existing roads and each structure location would only be conducted where necessary and would depend on site conditions. Grading and other improvements may not be necessary, depending on site conditions. Typically, overall disturbance would be limited to a width of 16 feet or less. The purpose of using existing access from private roads would be to minimize overall disturbance.
- **Access Type B** – Parallel to maintained public roads. This type of access would be used when the alignment roughly parallels a nearby public road that is either paved or has gravel surfacing. Short spur roads would be used from the existing roads to each structure location as described below under access type E. Except in rare cases, the existing roads would not be upgraded, but any damage to public roads from construction activities would be repaired. The purpose of access roads parallel to a nearby public road would be to consolidate and minimize overall disturbance.
- **Access Type C** – Parallel to existing utility roads. This type of access would be used when the alignment roughly parallels an existing utility that already has an existing access road. Spur roads would be used from the existing utility roads to each structure location as described below under access type E. Generally, the existing utility roads would be improved. Grading between the existing utility roads and each structure location would only be conducted where necessary and would depend on site conditions. Grading and other improvements may not be necessary, depending on site conditions. Typically, overall disturbance would be limited to a width of 16 feet or less. The purpose of access roads parallel to a utility road would be to consolidate and minimize overall disturbance.
- **Access Type D** – New down-ROW primary access. This type of access would only be used when access types A–C are not feasible. It would consist of a 16-foot-wide road (12-foot travel surface plus 2 feet on either side for berms/ditches). As much as possible, new access would be entirely within the ROW. Typically, new down-ROW access would be used if any parallel roads are more than 700 feet from the alignment. This access type would also normally be used for alignments that parallel interstate highways and railroads because the owners of those facilities generally place restrictions on the use of their ROWs; these restrictions do not allow for the addition of spur roads or their related ROW crossings and gates in ROW fences.

- **Access Type E –** Spur roads–improved and unimproved access. Spur roads would be used to connect type A, B, and C access roads to the ROW and for temporary access to stringing and splicing sites. Spur roads would be unimproved (two-track) roads except in areas where grading may be required based on terrain, with an average of one new spur road per mile for temporary access and approximately 5 spur roads per mile in areas where type A, B, and C access roads are used for permanent access to structure locations. Only where necessary, spur roads would be improved, and the roads would be graded to 10 to 12 feet wide. Otherwise, spur roads would not be improved in areas with flat terrain and within grassland, desertscrub, sand scrub, and sand dune vegetation communities. Vegetation on unimproved roads may be crushed by driving, but cropping or blading vegetation would not be conducted. This would avoid removal of root mass and organics in the soil (no surface soil would be removed). The purpose of unimproved spur roads would be to preserve the maximum amount of native vegetation and minimize overall disturbance.

Once design is finalized, all access roads described above would be surveyed, appropriate ROW would be acquired, and ROW would be mapped and incorporated into the Access Road Plan and Management Plan. Construction details are outlined in “Access Road Construction” in section 2.4.3. Table 2-7 includes a summary of proposed Project components, including access roads mileage and disturbance by subroute, segment, and local alternative.

Table 2-7. Summary of Project Components and Estimated Temporary and Permanent Disturbance by Subroute, Segment, and Local Alternative

Subroute	Total Length (miles)	Land Ownership (miles)								Access Road Type (miles)					Total Length Access Roads (miles)	Total New Disturbance Access Roads (acres) (using road type C and D at 16-foot width less any existing disturbance and road type E at 12-foot width)	Subroute Structure Ground Disturbance Estimates				Substation Expansion (acres)		Construction Laydown Yard (acres)	Total Temporary Disturbance (acres) (structure, substation, and construction laydown yards)	Total Permanent Disturbance (acres) (access, substation expansion, and structure foundations)
																	Temporary Disturbance		Permanent Disturbance						
		BLM	BIA	DOD	Forest Service	Reclamation	State	County	Private	A	B	C	D	E			Acres	Acres/ Mile	Acres	Acres/ Mile	Temp	Perm			
New Build Route Group 1: Afton (New Mexico) to Hidalgo (New Mexico)																									
Subroute 1.1																									
P1	5.1	3.0	0.0	0.0	0.0	0.0	1.9	0.0	0.2	0.0	0.0	0.0	5.1	0.0	5.1	9.9	28.7	5.6	0.5	0.1				28.7	10.4
P2	102.0	32.8	0.0	0.0	0.0	0.0	31.3	0.0	37.9	4.9	11.8	98.1	0.0	29.3	144.1	125.9	571.0	5.6	10.2	0.1			80.0	651.0	136.1
P3	31.1	25.4	0.0	0.0	0.0	0.0	1.4	0.0	4.2	0.0	0.0	0.0	31.1	0.0	31.1	60.3	174.2	5.6	3.1	0.1			20.0	194.2	63.4
P4a	8.9	4.2	0.0	0.0	0.0	0.0	3.7	0.0	1.1	0.0	0.0	8.8	0.0	1.9	10.7	10.2	50.0	5.6	0.9	0.1				50.0	11.1
Total	**147.1**	**65.5**	**0.0**	**0.0**	**0.0**	**0.0**	**38.3**	**0.0**	**43.4**	**4.9**	**11.8**	**106.9**	**36.2**	**31.2**	**206.3**	**206.3**	**824.0**		**14.7**		**20**	**35**	**100.0**	**944.0**	**256.0**
Subroute 1.2																									
S1	13.4	10.9	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	4.3	9.0	0.6	13.9	20.4	74.9	5.6	1.3	0.1			20.0	94.9	21.8
S2	11.1	9.8	0.0	0.0	0.0	0.0	1.0	0.0	0.3	0.0	0.0	0.0	11.0	0.0	11.0	21.3	62.0	5.6	1.1	0.1			20.0	82.0	22.4
S3	12.9	12.3	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	12.9	0.0	0.0	4.9	17.8	7.1	72.0	5.6	1.3	0.1			20.0	92.0	8.4
S4	10.6	10.5	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	10.5	0.0	10.5	20.4	59.5	5.6	1.1	0.1			20.0	79.5	21.4
S5	29.7	12.1	0.0	0.0	0.0	0.0	3.7	0.0	13.9	3.7	13.9	5.3	7.4	5.9	36.1	27.3	166.3	5.6	3.0	0.1			20.0	186.3	30.2
S6	7.4	4.4	0.0	0.0	0.0	0.0	2.4	0.0	0.5	1.0	0.0	0.0	6.4	0.3	7.7	12.9	41.2	5.6	0.7	0.1			20.0	61.2	13.6
S7	41.5	22.2	0.0	0.0	0.0	0.0	10.4	0.0	8.9	0.0	21.0	1.0	19.4	6.6	47.9	48.0	232.6	5.6	4.2	0.1			20.0	252.6	52.2
S8	14.6	0.2	0.0	0.0	0.0	0.0	5.8	0.0	8.5	0.0	0.0	0.0	14.5	0.0	14.5	28.2	81.6	5.6	1.5	0.1			20.0	101.5	29.7
Total	**141.1**	**82.5**	**0.0**	**0.0**	**0.0**	**0.0**	**26.4**	**0.0**	**32.2**	**4.7**	**47.8**	**10.6**	**78.2**	**18.2**	**159.5**	**185.6**	**790.1**		**14.1**		**20**	**35**	**160.0**	**970.1**	**234.7**

Table 2-7. Summary of Project Components and Estimated Temporary and Permanent Disturbance by Subroute, Segment, and Local Alternative (Continued)

Subroute	Total Length (miles)	Land Ownership (miles)								Access Road Type (miles)					Total Length Access Roads (miles)	Total New Disturbance Access Roads (acres) (using road type C and D at 16-foot width less any existing disturbance and road type E at 12-foot width)	Subroute Structure Ground Disturbance Estimates				Substation Expansion (acres)		Construction Laydown Yard (acres)	Total Temporary Disturbance (acres) (structure, substation, and construction laydown yards)	Total Permanent Disturbance (acres) (access, substation expansion, and structure foundations)
																	Temporary Disturbance		Permanent Disturbance						
		BLM	BIA	DOD	Forest Service	Reclamation	State	County	Private	A	B	C	D	E			Acres	Acres/ Mile	Acres	Acres/ Mile	Temp	Perm			
New Build Route Group 1: Afton (New Mexico) to Hidalgo (New Mexico), cont'd.																									
Route Group 1 Local Alternatives																									
Deming 1 (DN1)	42.5	6.9	0.0	0.0	0.0	0.0	29.3	0.0	6.4	0.0	0.0	0.0	42.5	4.3	46.8	88.6	238.2	5.6	4.3	0.1				238.2	92.9
A	17.5	14.7	0.0	0.0	0.0	0.0	1.1	0.0	1.8	0.0	8.1	8.4	1.2	6.3	24.1	19.7	98.0	5.6	1.8	0.1				98.0	21.5
B	12.2	9.9	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	12.0	0.0	0.0	4.1	16.1	6.0	68.2	5.6	1.2	0.1				68.2	7.2
C	9.0	3.9	0.0	0.0	0.0	0.0	1.6	0.0	3.4	0.3	7.7	0.0	1.2	2.0	11.2	5.2	50.2	5.6	0.9	0.1				50.2	6.1
D	22.8	6.8	0.0	0.0	0.0	0.0	2.5	0.0	13.5	0.0	0.0	13.1	9.6	0.6	23.3	25.8	127.6	5.6	2.3	0.1			20.0	147.6	28.1
New Build Route Group 2: Hidalgo (New Mexico) to Apache (Arizona)																									
Subroute 2.1																									
P4b	13.9	0.5	0.0	0.0	0.0	0.0	9.6	0.0	3.7	0.0	0.0	0.0	13.8	0.0	13.8	26.7	77.7	5.6	1.4	0.1				77.7	28.1
P4c	1.9	0.4	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	1.9	0.0	1.9	3.7	10.4	5.6	0.2	0.1				10.4	3.9
P5a	9.6	6.1	0.0	0.0	0.0	0.0	1.3	0.0	2.2	0.0	0.0	9.6	0.0	1.6	11.2	10.5	53.9	5.6	1.0	0.1				53.9	11.4
P5b	21.1	17.9	0.0	0.0	0.0	0.0	1.0	0.0	2.2	0.0	0.0	21.2	0.0	2.7	23.9	19.4	118.1	5.6	2.1	0.1			20.0	138.1	21.5
P6a	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.1	0.8	0.6	4.9	5.6	0.1	0.1			20.0	24.9	0.7
P6b	22.5	0.2	0.0	0.0	0.0	0.0	12.6	0.0	9.7	0.0	0.0	20.8	2.3	2.7	25.8	23.5	125.9	5.6	2.2	0.1				125.9	25.8
P6c	2.8	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	2.8	0.0	0.4	3.2	2.9	15.8	5.6	0.3	0.1			20.0	35.8	3.2
P7	22.3	2.3	0.0	0.2	0.0	0.0	8.5	0.0	11.3	0.0	0.5	22.1	0.0	3.8	26.4	21.6	125.1	5.6	2.2	0.1			20.0	145.1	23.8
P8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.1	2.8	5.6	0.1	0.1				2.8	0.1
Total	**95.5**	**28.3**	**0.0**	**0.2**	**0.0**	**0.0**	**37.3**	**0.0**	**29.6**	**0.5**	**0.5**	**77.2**	**18.0**	**11.3**	**107.5**	**109.0**	**534.5**		**9.5**		**20**	**53**	**80.0**	**634.5**	**171.5**

Table 2-7. Summary of Project Components and Estimated Temporary and Permanent Disturbance by Subroute, Segment, and Local Alternative (Continued)

Subroute	Total Length (miles)	Land Ownership (miles)								Access Road Type (miles)					Total Length Access Roads (miles)	Total New Disturbance Access Roads (acres) (using road type C and D at 16-foot width less any existing disturbance and road type E at 12-foot width)	Subroute Structure Ground Disturbance Estimates				Substation Expansion (acres)		Construction Laydown Yard (acres)	Total Temporary Disturbance (acres) (structure, substation, and construction laydown yards)	Total Permanent Disturbance (acres) (access, substation expansion, and structure foundations)
																	Temporary Disturbance		Permanent Disturbance						
		BLM	BIA	DOD	Forest Service	Reclamation	State	County	Private	A	B	C	D	E			Acres	Acres/ Mile	Acres	Acres/ Mile	Temp	Perm			
New Build Route Group 2: Hidalgo (New Mexico) to Apache (Arizona), cont'd.																									
Route Group 2 Route Variations																									
P7a	31.2	0.0	0.0	0.0	0.0	0.0	10.6	0.0	20.6	0.4	9.1	15.9	5.3	5.4	36.1	31.6	174.7	5.6	3.1	0.1			20.0	194.7	34.8
P7b	10.5	0.0	0.0	0.0	0.0	0.0	4.4	0.0	6.1	0.0	3.1	4.6	2.7	1.0	11.4	10.6	58.7	5.6	1.0	0.1				58.7	11.6
P7c	1.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.5	0.0	0.0	1.0	0.0	0.1	1.1	0.4	5.7	5.6	0.1	0.1				5.7	0.5
P7d	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.3	2.3	1.3	11.3	5.6	0.2	0.1				11.3	1.5
Subroute 2.2																									
E	31.8	18.8	0.0	0.0	0.0	0.0	4.2	0.0	8.8	2.5	0.0	0.0	29.2	0.9	32.6	58.0	178.2	5.6	3.2	0.1			20.0	198.2	61.2
F	25.3	3.1	0.0	0.0	0.0	0.0	15.1	0.0	7.1	6.8	0.0	7.6	12.0	2.4	28.8	30.6	141.6	5.6	2.5	0.1			20.0	161.6	33.1
Ga	25.7	0.0	0.0	0.0	0.0	0.0	13.3	0.0	12.4	5.2	0.9	8.6	11.4	2.5	28.7	32.2	143.9	5.6	2.6	0.1			20.0	163.9	35.7
Gb	1.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.9	0.2	0.0	0.0	0.8	0.0	1.0	1.6	6.0	5.6	0.1	0.1			20.0	26.0	1.7
Gc	7.4	0.0	0.0	0.0	0.0	0.0	0.9	0.0	6.6	1.2	3.8	2.4	0.0	1.3	8.6	3.8	41.6	5.6	0.7	0.1				41.6	4.6
I	2.3	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	2.3	0.0	2.3	4.4	13.1	5.6	0.2	0.1				13.1	4.7
J	2.3	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	2.3	0.0	0.4	2.7	2.8	13.0	5.6	0.2	0.1				13.0	3.0
Total	**96.0**	**21.9**	**0.0**	**0.0**	**0.0**	**0.0**	**38.3**	**0.0**	**35.7**	**15.9**	**4.7**	**20.9**	**55.8**	**7.5**	**104.7**	**134.4**	**537.4**		**9.6**		**20**	**53**	**80.0**	**637.4**	**197.0**
Route Group 2 Local Alternatives																									
LD1	35.4	19.5	0.0	0.0	0.0	0.0	6.8	0.0	9.1	6.1	0.0	10.8	19.0	5.7	41.6	53.0	198.1	5.6	3.5	0.1			60.0	258.1	56.5
LD2	8.9	3.6	0.0	0.0	0.0	0.0	5.0	0.0	0.2	0.0	0.0	0.0	8.9	0.0	8.9	17.3	49.7	5.6	0.9	0.1				49.7	18.1
LD3a	26.6	11.7	0.0	0.0	0.0	0.0	11.8	0.0	3.1	0.0	0.4	17.3	11.4	3.0	32.1	41.2	168.4	5.6	3.0	0.1			20.0	168.8	43.9
LD3b	2.2	1.3	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	2.2	0.0	2.2	4.2	12.2	5.6	0.2	0.1			20.0	32.2	4.4
LD4	53.7	39.7	0.0	0.0	0.0	0.0	14.0	0.0	0.0	0.0	0.0	0.0	51.5	5.4	56.9	107.7	300.6	5.6	5.4	0.1				300.6	113.1
LD4-Option 4	6.4	0.0	0.0	0.0	0.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0	6.5	0.6	7.1	13.5	36.0	5.6	0.6	0.1				36.0	14.2

Table 2-7. Summary of Project Components and Estimated Temporary and Permanent Disturbance by Subroute, Segment, and Local Alternative (Continued)

Subroute	Total Length (miles)	Land Ownership (miles)								Access Road Type (miles)					Total Length Access Roads (miles)	Total New Disturbance Access Roads (acres) (using road type C and D at 16-foot width less any existing disturbance and road type E at 12-foot width)	Subroute Structure Ground Disturbance Estimates				Substation Expansion (acres)		Construction Laydown Yard (acres)	Total Temporary Disturbance (acres) (structure, substation, and construction laydown yards)	Total Permanent Disturbance (acres) (access, substation expansion, and structure foundations)
																	Temporary Disturbance		Permanent Disturbance						
		BLM	BIA	DOD	Forest Service	Reclamation	State	County	Private	A	B	C	D	E			Acres	Acres/ Mile	Acres	Acres/ Mile	Temp	Perm			
New Build Route Group 2: Hidalgo (New Mexico) to Apache (Arizona), cont'd.																									
Route Group 2 Local Alternatives, cont'd.																									
LD4-Option 5	12.3	0.0	0.0	0.0	0.0	0.0	10.7	0.0	1.6	0.0	0.0	9.9	0.0	1.2	11.1	20.9	68.7	5.6	1.2	0.1				68.7	22.2
WC1	14.8	0.0	0.0	0.0	0.0	0.0	4.4	0.0	10.4	0.0	0.0	2.4	12.5	0.4	15.3	26.9	83.0	5.6	1.5	0.1			20.0	103.0	28.3
Upgrade Route Group 3: Apache (Arizona) to Pantano (Arizona)																									
Subroute 3.1																									
U1a	16.1	0.4	0.0	0.0	0.5	0.0	8.8	0.0	6.4	4.9	0.0	11.9	0.0	7.0	23.9	18.9	81.9	5.1	0.2	0.01				81.9	19.1
U1b	2.9	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	2.7	0.0	0.1	2.8	2.5	14.8	5.1	0.0	0.01			20.0	34.8	2.5
U2	15.8	0.0	0.0	0.0	0.0	0.0	3.3	0.0	12.5	1.5	0.0	21.0	0.0	7.0	29.6	28.1	80.6	5.1	0.2	0.01				80.6	28.2
U3a	35.6	0.2	2.9	0.0	0.0	0.2	20.7	0.0	11.6	0.8	0.0	36.2	0.0	3.9	40.9	32.0	181.4	5.1	0.4	0.01			60.0	241.4	32.4
Total	**70.3**	**0.6**	**2.9**	**0.0**	**0.5**	**0.2**	**35.7**	**0.0**	**30.5**	**7.2**	**0.0**	**71.9**	**0.0**	**18.1**	**97.1**	**81.4**	**358.7**		**0.7**		**0.0**	**5.7**	**80.0**	**438.7**	**87.8**
Route Group 3 Local Alternative																									
H	19.3	0.0	0.0	0.0	0.0	0.0	15.3	0.0	4.0	0.0	0.0	20.8	0.0	6.5	27.3	24.6	98.4	5.1	0.2	0.01				98.4	24.8

Table 2-7. Summary of Project Components and Estimated Temporary and Permanent Disturbance by Subroute, Segment, and Local Alternative (Continued)

Subroute	Total Length (miles)	Land Ownership (miles)								Access Road Type (miles)					Total Length Access Roads (miles)	Total New Disturbance Access Roads (acres) (using road type C and D at 16-foot width less any existing disturbance and road type E at 12-foot width)	Subroute Structure Ground Disturbance Estimates				Substation Expansion (acres)		Construction Laydown Yard (acres)	Total Temporary Disturbance (acres) (structure, substation, and construction laydown yards)	Total Permanent Disturbance (acres) (access, substation expansion, and structure foundations)
																	Temporary Disturbance		Permanent Disturbance						
		BLM	BIA	DOD	Forest Service	Reclamation	State	County	Private	A	B	C	D	E			Acres	Acres/ Mile	Acres	Acres/ Mile	Temp	Perm			
Upgrade Route Group 4: Pantano (Arizona) to Saguaro (Arizona)																									
Subroute 4.1																									
U3b	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2	0.0	0.2	0.0	0.1	0.5	0.3	2.3	5.1	0.0	0.01				2.3	0.3
U3c	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.7	0.0	0.0	0.0	0.1	0.8	0.2	4.9	5.1	0.0	0.01				4.9	0.2
U3d	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.0	3.1	0.0	1.7	0.0	1.0	5.8	2.7	17.5	5.1	0.0	0.01				17.5	2.8
U3e	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.9	0.0	0.0	0.9	0.7	4.5	5.1	0.0	0.01				4.5	0.7
U3f	0.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.0	0.0	0.7	0.0	0.0	0.7	0.5	3.5	5.1	0.0	0.01				3.5	0.6
U3g	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.0	0.3	0.0	0.1	1.3	0.4	4.6	5.1	0.0	0.01				4.6	0.4
U3h	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.9	0.0	0.0	0.0	0.1	1.0	0.1	5.6	5.1	0.0	0.01				5.6	0.2
U3i	18.2	0.0	0.0	0.0	0.0	0.2	2.7	0.0	15.3	7.4	0.0	12.8	0.0	2.1	22.3	13.9	93.0	5.1	0.2	0.01			20.0	113.0	14.1
U3j	0.9	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	1.6	0.0	0.0	0.0	0.5	2.1	0.7	4.5	5.1	0.00	0.01				4.5	0.7
U3k	16.7	0.0	0.0	0.0	0.0	0.0	10.8	0.0	5.9	3.3	0.0	15.0	0.0	5.7	24.1	21.1	85.2	5.1	0.2	0.01			20.0	105.2	21.3
U3l	1.6	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.4	0.6	0.0	0.4	0.2	0.3	1.6	1.3	7.9	5.1	0.0	0.01				7.9	1.3
U3m	0.6	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4	0.4	0.0	0.0	0.0	0.1	0.5	0.1	3.0	5.1	0.0	0.01				3.0	0.2
U4	1.9	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	1.8	0.0	0.5	2.3	1.6	9.8	5.1	0.0	0.01				9.8	1.6
Total	**48.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**18.0**	**0.4**	**29.6**	**19.1**	**0.0**	**34.0**	**0.2**	**10.7**	**64.1**	**43.8**	**246.2**		**0.5**		**36.0**	**45.4**	**40.0**	**322.2**	**89.7**
Route Group 4 Route Variation																									
U3aPC	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	4.7	1.5	0	1.3	7.5	3.1	31.6	5.1	0.1	0.01				31.6	3.2

Table 2-7. Summary of Project Components and Estimated Temporary and Permanent Disturbance by Subroute, Segment, and Local Alternative (Continued)

Subroute	Total Length (miles)	Land Ownership (miles)								Access Road Type (miles)					Total Length Access Roads (miles)	Total New Disturbance Access Roads (acres) (using road type C and D at 16-foot width less any existing disturbance and road type E at 12-foot width)	Subroute Structure Ground Disturbance Estimates				Substation Expansion (acres)		Construction Laydown Yard (acres)	Total Temporary Disturbance (acres) (structure, substation, and construction laydown yards)	Total Permanent Disturbance (acres) (access, substation expansion, and structure foundations)
																	Temporary Disturbance		Permanent Disturbance						
		BLM	BIA	DOD	Forest Service	Reclamation	State	County	Private	A	B	C	D	E			Acres	Acres/ Mile	Acres	Acres/ Mile	Temp	Perm			
Upgrade Route Group 4: Pantano (Arizona) to Saguaro (Arizona), cont'd.																									
Route Group 4 Local Alternatives																									
MA1	1.1	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	1.0	0.0	0.0	0.0	0.2	1.2	0.3	5.6	5.1	0.0	0.01				5.6	0.3
TH1a	1.4	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.2	0.0	1.5	0.0	0.0	0.2	1.7	0.3	7.2	5.1	0.0	0.01				7.2	0.3
TH1b	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.4	0.2	1.7	0.0	0.0	0.8	2.6	1.1	8.0	5.1	0.0	0.01				8.0	1.1
TH1c	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.0	0.0	0.0	0.1	0.5	0.1	1.3	5.1	0.0	0.01				1.3	0.1
TH1-Option	1.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.3	0.0	0.4	0.0	0.0	0.1	0.5	0.1	5.0	5.1	0.0	0.01				5.0	0.1
TH3-Option A	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.8	0.0	0.0	0.0	0.6	2.4	0.9	4.2	5.1	0.0	0.01				4.2	0.9
TH3-Option B	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.4	0.0	0.4	0.0	0.2	1.0	0.6	4.2	5.1	0.0	0.01				4.2	0.6
TH3-Option C	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	1.0	0.0	0.3	1.4	2.5	9.2	5.1	0.0	0.01				9.2	2.5
TH3a	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	3.0	0.0	1.1	0.0	1.2	5.3	2.6	13.9	5.1	0.0	0.01				13.9	2.7
TH3b	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	2.7	0.6	1.6	0.0	1.3	6.2	3.3	23.0	5.1	0.0	0.01				23.0	3.3

Communication Systems

The proposed Project would include a communications system consisting of a fiber-optic network necessary for control and protection of the transmission system (referred to as supervisory control and data acquisition). For redundancy purposes, a secondary communications path would be provided via a power line carrier or microwave system. The type of communication system would be determined during final design.

FIBER-OPTIC COMMUNICATIONS

The communication system is needed to transfer data for operation of the line and substations. The system would be reserved for the operation of the power system only, and would not be made available for commercial use. Primary communications for relaying and control would be provided via one optical ground wire that would be installed on one of the shield wire positions on the transmission line structures.

As the optical data signal is passed through the optical fiber cable, the signal degrades with distance. Consequently, communication regeneration stations are required to amplify the signals if the distance between communication regeneration stations exceeds approximately 50 miles.

Approximately two new communication regeneration stations would be required along the New Build Section: one between Apache and Hidalgo substations, and one between the Hidalgo and Midpoint substations. The two new fiber-optic regeneration sites would be located next to or in the ROW such that they would be accessed by access roads already required for transmission line maintenance. The existing substations along the Upgrade Section of the Project are close enough together that required communication equipment would be located within the substation perimeter (either existing or proposed new yards, as described above).

New communication regeneration sites would typically be 100 x 100 feet, with a fenced-in area of 75 x 75 feet. A 12 x 12 x 9–foot tall building (metal or concrete) would be placed on the site, and access would be available from the transmission line access roads. Entrances above the door of each building would be lit to allow for safe entrance and exit, but the rest of the site would not be lit at night. Power would likely be provided from a local electric distribution line, located in proximity to the regeneration site. The voltage of the distribution supply line is typically 12 kV or lower and carried on wooden poles. For the estimated two new sites, it would be necessary to extend the electric distribution line from a take-off point on the existing distribution line to the new site. The location and routing of the existing distribution lines to the new sites would be determined during the final design process.

An emergency generator system would be needed to prevent a power interruption to the site from impacting the function of the system as a whole during short service outages. The emergency generator, equipped with a liquid propane gas fuel tank, would be installed at the communication regeneration site inside the fenced area. The communication regeneration station would also provide communication support for transmission line patrol and maintenance operations and allow emergency operations independent of commercial common carrier.

MICROWAVE REGENERATION SITES

Microwave regeneration sites would be co-located with fiber-optic sites if possible along the Upgrade Section, and are only anticipated to be needed along the New Build Section of the Project. As above, the existing substations along the Upgrade Section of the Project are close enough together that required communication equipment would be located within the substation perimeter (either existing or proposed new yards, as described above). The two new microwave regeneration sites along the New Build Section,

would be located off the ROW and their final location would be determined based on line of sight between substations. These locations would be determined during final engineering but would be located such that they would be accessed by access roads already required for transmission line maintenance.

New microwave communication regeneration sites would typically be 100 x 100 feet, with a fenced-in area of 75 x 75 feet. A typical site consists of a microwave equipment building, which houses telecommunication and network equipment, backup batteries, and chargers. The building would be approximately 12 x 12 x 9 feet tall and, where possible, microwave regeneration sites would be co-located with the fiber-optic regeneration site buildings (i.e., all equipment would be housed in the same building). Buildings would be finished to minimize visual impact, and lighting at night would be limited to an entrance light above the door for security and to allow for safe entrance and exit. The site would also have a microwave antenna installed on a self-standing tower approximately 100 feet tall.

2.4.3 Project Construction Activities

This section provides typical construction specifications relative to the proposed Project, including construction seasons, major construction activities, and the design features of the proposed Project. The following descriptions are preliminary and could potentially be refined during final engineering design. Any changes to the final design would be within the parameters identified within this NEPA analysis; therefore, the analysis would still be valid.

Given the location of the proposed Project, construction would generally occur year-round. Sporadic activities would occur at any given structure site over a period of months as each crew type comes and goes. Some crews could stay only a few hours (e.g., access road crew), and some could stay several days (e.g., tower assembly crew). It is anticipated that the total number of days each site would be visited by a crew would vary from 10 to 20 days; however, for a typical structure, only about 5 of those days would have a crew onsite for more than 4 hours.

Weather conditions are not anticipated to impact Project scheduling, financing, design, and/or material delivery. It is also anticipated that outages associated with interconnecting facilities would not hinder the proposed Project's critical path. There would be a need to take portions of the existing Western lines out of service to complete construction of the Upgrade Section where it crosses constrained (suburban) areas. Taking line segments out of service would result in a temporary disruption of power flow over that circuit, and detailed planning would be needed to provide an alternate power source for affected parties. The residents nearby would still get power from their utility company. It is the bulk delivery that would be affected. Outages would be planned when load is light and other transmission facilities can assume the load. There could also be some brief outages necessary to cut in the sub-expansions.

Transmission Line Construction

As discussed in section 2.4.6, Southline has incorporated design features in the proposed Project description that provide environmental protective measures. These design features, as well as agency mitigation measures developed by the BLM, Western, cooperating agencies and the public. All design features and agency mitigation would be followed on any route selected, as site-specific circumstances dictate.

Construction of the New Build Section and upgrading of the existing Western lines are described in the following sections, according to the sequence of construction activities, as listed below. Table 2-7 (above) presents estimated temporary and permanent disturbance by Project component, and includes:

- Temporary work area preparation;
- Access road construction;
- Typical structure work area preparation;
- Structure foundation installation;
- Structure erection;
- Conductor, shield wire, and fiber-optic ground wire stringing; and
- Disposal, cleanup, and reclamation.

TEMPORARY WORK AREA PREPARATION

There would be six types of temporary work areas: equipment staging and construction yards, concrete batch plants, temporary use areas at each transmission line structure, tensioning and pulling sites, wire splicing sites, and helicopter fly yards. In some areas, only minimal site preparation would be required, and in general, previously disturbed sites requiring minimal site preparation would be preferred. In the Upgrade Section many of these temporary work areas would be inside the existing ROW, with no additional acreage disturbed. However, some areas may need to be scraped by a bulldozer and overlaid with a temporary layer of rock to provide an all-weather surface. Unless otherwise directed by the agency or landowner, the rock would be removed from the staging area(s) upon completion of construction. The work areas would be used only during the construction phase of the proposed Project and would be returned to their prior condition through reclamation activities (see "Postconstruction: Cleanup and Reclamation" in section 2.4.3) upon completion of construction activities.

Temporary work areas would be cleared of vegetation and/or graded to allow for the safe construction of the structures and to facilitate access for future Project operation and maintenance. Clearing of vegetation at each structure work area, as well as the larger Project ROW, would be performed in compliance with Western Operation and Maintenance clearing practices and construction specifications, NESC ANSI A300, Part 7, "American Operations Integrated Vegetation Management" (BLM's Integrated Vegetation Management Handbook – H 1740-02, March 25, 2008a), electric utility ROWs, and International Society of Automation BMPs. Vegetation removal and management activities would be based on NERC Reliability Standard FAC-003-1.

EQUIPMENT STAGING AND CONSTRUCTION YARDS

Temporary construction yards and equipment staging areas would be required for storing materials, construction equipment, and vehicles, as meeting areas where work crews would assemble on a daily basis prior to traveling to the various work sites via vans and trucks, and for partial structure assembly and in some cases for concrete batch plants. The construction yards would be approximately 20 acres in size; they would be located approximately every 20 miles, with 10 estimated along the New Build Section and 6 along the Upgrade Section. The construction yards would be fenced with locked gates and security, as needed. Previously disturbed areas have been identified for use as equipment staging and construction yards, and would all be located along existing access roads, as close to the ROW as practicable and adjacent to existing public roads.

In general, minimal site preparation is proposed; however, some areas may require scraping 6 to 8 inches of topsoil and adding a temporary layer of rock to provide an all-weather surface. Construction yards

would not be lit at night, but if lighting is deemed necessary for a yard due to theft or other site-specific issues, local lighting and dark sky ordinances will be followed. Rock and fencing would be removed once use of the construction yard is complete. The disturbed area would be reclaimed and revegetated to preconstruction conditions unless otherwise directed by the landowner.

CONCRETE BATCH PLANTS

Some construction yards would be used for concrete batch plant operations. Concrete batch plants would be needed to mix concrete for use in transmission line tower foundations, etc. As discussed above, the preference would be to locate concrete batch plants on previously disturbed sites.

It is assumed that concrete is available in the major towns (Deming, Lordsburg, Willcox, Benson, and Tucson) and that concrete for any tower locations within 15 miles of the boundaries of those towns would be serviced by those facilities. Where concrete sources are not available within 15 miles, concrete batch plants would be required.

An estimated seven concrete batch plants would be required along the New Build Section of the Project. These seven plants are likely to be located in Doña Ana County (one plant), Luna County (three plants), Grant County (one plant), and Cochise County (two plants). An estimated four concrete batch plants would be required along the Upgrade Section of the Project. These four plants are likely to be located in Cochise County (one plant) and Pima County (three plants).

Site preparation at each batch plant would include removal of the top 6 to 8 inches of soil; soil would be removed by a bulldozer or motor grader and replaced with temporary gravel. A crane would be used to set the concrete equipment. Unless otherwise requested by the landowner, any topsoil removed would be stored and used to reclaim the site after work is completed.

Water would be needed to make the concrete, and would be obtained from existing sources along the ROW. Water would be trucked in from a variety of existing sources, and no wells would be drilled. No new water sources would be developed for this proposed Project. Approximately 3 million gallons (or 10 acre-feet) of water would be required for foundation construction and be used at the concrete batch plants. The construction contractors would be responsible for obtaining aggregate from private sources. If expansion of existing aggregate borrow pits is needed for the proposed Project, cultural and biological surveys of the expansion areas would be required, if not already completed.

Batch plants are anticipated to be in operation for 3 to 6 months. The hours of operation would vary but would generally be 6 a.m. to 6 p.m., Monday through Saturday. Approximately 70 percent (55,000 to 65,000 cubic yards) of the concrete needed for the proposed Project would be derived from concrete batch plants. Each batch plant location would be reclaimed using any topsoil that was removed and revegetated to preconstruction conditions, unless otherwise requested by the landowner.

For the purpose of analysis, these batch plants would be located within the footprint of the construction yards discussed. As noted above, previously disturbed areas have been identified for use as equipment staging and construction yards, and would all be located along existing access roads.

TEMPORARY USE AREAS AT STRUCTURES

At each structure site, areas would be needed to facilitate the safe operation of equipment such as construction cranes or line trucks. The area required for the location and safe operation of cranes and line trucks would be approximately 100 x 200 feet. All disturbances are assumed to occur within the ROW for these temporary use areas. Rock hauling, hammering, or blasting may be required if solid rock is encountered at structure locations, but would be used only as necessary.

TENSIONING AND PULLING SITES

Tensioning and pulling sites would be required at dead-end and heavy-angle structures and every 2.0 to 3.5 miles along the ROW.

For the New Build Section, the temporary disturbance would be 200 x 500 feet for mid-span conductor and shield-wire set up sites (approximately every 10,000 feet), 100 x 500 feet for fiber-optic cable set-up sites (approximately every 18,000 feet), and 200 x 550 feet at all dead-end structures and heavy-angle structures with greater than 25-degree line angles. For the Upgrade Section, the temporary disturbance area would be 150 x 450 feet for mid-span conductor and shield-wire set-up sites (approximately every 10,000 feet), 100 x 450 feet for fiber-optic cable set-up sites (approximately every 18,000 feet), and 150 x 500 feet at all dead-end structures and heavy-angle structures with greater than 25-degree line angles.

All tensioning and pulling sites would be located on lands within and adjacent to the ROW. Sites outside the ROW on BLM-managed lands would require a separate short-term ROW authorization and would be primarily located at angle points in the transmission line, at a 180-degree angle to the ROW.

When construction occurs in the steep and rough terrain, these sites may require larger, less symmetrical pulling and tensioning areas. Equipment at sites required for pulling and tensioning activities would include tractors and trailers with spooled reels that hold the conductors and shield wire and trucks with the tensioning equipment. To the extent practicable, pulling and tensioning sites would be located within the ROW. Depending on topography, minor grading may be required at some sites to create level pads for equipment.

WIRE SPLICING SITES

Specific work areas are needed for wire splicing activities about halfway between each pair of wire pulling/tensioning sites (approximately every 10,000 feet). The temporary disturbance area would be 200 x 500 feet on the New Build Section and 150 x 450 feet on the Upgrade Section. Generally, wire splicing would occur in the ROW where the project work would be straight and not on an angle. All wire splicing sites would be located on lands either within or adjacent to the ROW. Sites outside the ROW on BLM-managed lands would require a separate short-term ROW authorization.

All fiber-optic cable would be spliced at structure sites within the temporary disturbance area of the structure. It is assumed that standard methods will be used for conductor and shield wire splicing, rather than implosive sleeves. It is anticipated that woven wire grips would be used to join two reels of wire at the tension site. After pulling, the wire would be lowered to the ground at the splicing site, and the woven wire grips would be replaced with full tension splices.

HELICOPTER FLY YARDS

Based on the terrain in the proposed Project area, helicopter operations during construction are expected to be minimal. Should such operations be needed, the helicopter fly yards would be incorporated in the footprint of the appropriate temporary work areas identified above; however, if fly yards were needed that were not included within the footprint, appropriate environmental clearances would be conducted before the area would be used. No additional disturbance is considered for the purpose of analysis.

ACCESS ROAD CONSTRUCTION

Access roads would consist of existing roads with no improvements, existing roads requiring improvement, or new roads. As described previously in “Access Roads” in section 2.4.2, to limit the

amount of new road construction for the Project, existing paved and unpaved access roads would be used to the fullest extent possible. Affected landowners and agencies would be consulted and ROW procured before any road improvements or new road construction begins. Relevant road construction criteria of the affected landowners and agencies, including BLM and Western, would be outlined in the final POD. The POD would also document specific plans for the construction, rehabilitation, and/or maintenance of the roads based on site-specific conditions and final engineering.

All existing roads would be left in a condition equal to, or better than, their condition prior to construction activities. Where existing roads could be used for construction and operation purposes, only spur roads to the Project ROW or work areas would be needed. For the purpose of analysis, where needed, all new and improved access roads would typically have a 12-foot-wide travel surface, plus 2 feet on each side for berms/ditches, for an overall road width of 16 feet. Final travel surface widths of any particular new and improved access road would be identified in the final POD. In some circumstances in steeper terrain, the travel surface width could be a maximum of 24 feet for radius of curves, depending on site-specific conditions and as specified in the POD. The disturbance analyzed is likely greater than the footprint needed for the proposed Project.

Where new access roads are required, they may be built as either temporary or permanent access roads. Wherever possible, new access roads would be constructed within the transmission line ROW. Typically, permanent access roads would be obtained on private lands through the acquisition of easements or property. Permanent access roads on BLM, Reclamation, Coronado National Forest, or State lands would be identified in coordination with the respective agency. Temporary access roads would be used when required for construction purposes only or in temporary work areas. Temporary roads serve the needs for Project access during the construction phases but are not anticipated to be necessary for operation and maintenance purposes.

Upon completion of construction activities, temporary access roads would be reclaimed in accordance with the procedures specified in the reclamation plan in the final POD. Where grading would be required, surface restoration would be implemented as required by the landowner or BLM authorized officer. The method of restoration would normally consist of returning disturbed areas back to their normal contour, replacing topsoil, reseeding (where required), etc. The Reclamation, Vegetation, and Monitoring Plan would include final details on restoration.

All operations access routes would be carefully sited, and vehicle use would be confined to designated access. To reduce the severity of the proposed Project disturbance where it is unwarranted to blade a new road or make other improvements, unimproved roads would be used to reduce impacts to vegetation and minimize disturbance to select access points along the proposed ROW. Vegetation would be crushed but not cropped, thereby avoiding removal of vegetative root mass and organics in the soil, as no surface soil would be removed. This type of access may be used in areas with flat terrain and within grassland, desertscrub, sand scrub, and sand dune vegetation communities. Use of unimproved spur roads would be used to preserve the maximum amount of native vegetation and minimize overall disturbance.

Estimates of potential permanent access road requirements for the proposed Project (see table 2-7) were developed using overlays of route alternatives in Google Earth to collect data on the existing adjacent road system and terrain conditions. Existing roads were evaluated to determine the approximate percentage that could be used as either access type A, B, or C and to collect data such as road widths, required spur road lengths, and apparent need for upgrading. If an existing road appeared to be in need of upgrading, then it was automatically categorized as access type C. Access type D was assigned only when one of the other three access types was not feasible. Access type E would include spur roads (improved and unimproved) used for short distances to access specific points of the proposed ROW. To better estimate average lengths of parallel/down-line access roads that would be required for the Project, this

Google Earth overlay method was used to assess the terrain along each road segment. Estimated total lengths were then modified, as necessary, relative to the terrain along the corridor length.

The following assumptions were used to estimate permanent access road disturbance:

- All 345-kV segments would use a 200-foot ROW, with 4.5 structures per mile.
- All 230-kV segments would use a 150-foot ROW, with 5.5 structures per mile.
- All existing parallel access would be outside the Project ROW.
- All new down-line access would be within the Project ROW.
- Spur roads would be outside the Project ROW, except for the first 100 feet for 345-kV segments and the first 75 feet for 230-kV segments.
- The total width of spur roads, including berms and ditches if needed, would be 12 feet.

Additional temporary spur roads would be required for stringing and splicing sites with access types A, B, and C. Table 2-7 describes estimated miles of access roads by type (A, B, C, D, or E) and by Project component.

FOUNDATION INSTALLATION

Each structure would require the installation of foundations, which are typically drilled concrete piers; direct embedded foundation systems for tubular steel poles may be used as well. For drilled concrete piers, drilled shafts would be excavated for each structure, which means four excavated holes approximately 4 feet in diameter for each lattice structure and one excavated hole approximately 6 to 8 feet in diameter for each single shaft tubular steel pole. Foundation depths would be dependent on geotechnical conditions at the structure site and the structure type. Typical hole depths for tangent structures range from 18 to 30 feet deep, while angle and dead-end structure foundation depths range from 22 to 50 feet deep. It is anticipated that soil borings would be obtained at each major angle point and at representative locations in between. The holes would be drilled using a truck-mounted excavator equipped with an auger specifically sized for the type of structure being installed. Spoil material would be used to backfill the boring, and any excess would be spread thinly across the surface surrounding the hole.

For tubular steel poles, steel reinforcing cages and anchor bolt cages would be installed after excavation and before concrete placement and structure installation. For lattice structures, steel reinforcing cages and stub angles would be installed after excavation and before concrete placement and structure installation. The foundations would be designed to meet or exceed all applicable design codes.

Water would be required for concrete mixing. Each structure would require approximately 1,500 gallons of water. Water would be needed to make the concrete, and would be obtained from existing sources along the ROW. Water would be trucked in from a variety of existing sources, and no wells would be drilled. No new water sources would be developed for this proposed Project.

The concrete mixing would not occur at each structure site. Rather, mixing would occur at the previously identified concrete batch plants or existing commercial plants and would be delivered to the structure as part of the already prepared concrete mix. Typically, concrete would be delivered directly to the site in concrete trucks with a capacity of up to 10 cubic yards. However, in areas with limited access or environmental constraints, the concrete would be placed in the excavation with either a crane and garbo bucket, or pumped from a distance of several hundred feet. Each structure would have a finished foundation reveal that would extend approximately 2 feet above the ground level. The foundation reveal is used to provide some protection to the steel structure from vehicles and from potential steel corrosion due to corrosive soils and cathodic protection.

Although unlikely for this proposed Project, where solid rock is encountered, blasting, rock hauling, or the use of a rock anchoring or mini-pile system may be required. The rock anchoring or mini-pile system would be used in areas where site access is limited or where adjacent structures could be damaged as a result of blasting or rock-hauling activities. Such anchoring systems may also be used where economically and technically justified. In areas where it is not possible to operate large drilling equipment due to access or environmental constraints, hand digging may be required. Materials used for rock anchoring or mini-pile systems would be stored in the staging areas and not on the ROW. Foundation holes left open or unguarded would be covered to protect the public and wildlife. If practical, temporary safety fencing may be used.

STRUCTURE ASSEMBLY

To erect the structures, which would be either lattice or monopole, materials would be fabricated, staged, and assembled at temporary work areas. From the temporary work areas, material and subassemblies would be delivered to the structure work areas via flatbed truck. Subsequent to full or partial assembly, sections of the structure would be assembled adjacent to the structure location and lifted onto the foundation using a large crane of suitable capacity. The crane would move along the access road and ROW as structures are erected. More than one structure assembly crew and crane could be working concurrently.

CONDUCTOR STRINGING

Conductor, fiber-optic, and non-fiber shield wire would be placed on the structures by a process called stringing. Overhead shield wires would be located at the top of each structure and above the conductors and function to intercept lightning that would otherwise strike the conductor. If a single shield wire is used, it would be a fiber-optic shield wire. If dual shield wires are installed, one would include fiber-optic bundle and one would be a normal steel cable shield wire. Additionally, a grounding system would be installed at the base of each structure that would consist of copper or copper weld ground rods embedded into the ground in immediate proximity to the structure foundation and connected to the structure by buried copper lead.

The first step to conductor and shield wire stringing would be to install insulators and stringing sheaves. Stringing sheaves are large pulleys that are temporarily attached at the end of the insulator strings at each structure to allow conductors to be pulled along the line. Once the stringing sheaves have been installed, the initial stringing operation would commence. This would consist of pulling a sock line or pulling line or high-strength rope through the sheaves. The sock line is attached to the hard line, which follows the sock line as it is pulled through the sheaves. The hard line would then be attached to the conductor or shield wire to pull it through the sheaves into its final location. Pulling a line may be accomplished by attaching it to a specialized vehicle or to a small helicopter that moves along the ROW. Shield wire and conductor would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end.

Additionally, temporary clearance structures called guard structures would be erected over highways, railroads, transmission lines, structures, and other obstacles prior to conductor stringing. The guard structures are typically vertical wood poles with cross arms and are erected at road crossings or crossings with other energized electric and communication lines to prevent contact during stringing activities. Bucket trucks may also be used to provide temporary clearance. Bucket trucks are trucks fitted with a hinged arm ending in an enclosed platform called a “bucket,” which can be raised to let the worker in the bucket service aerial equipment.

All guard structures would be located within the Project ROW. The temporary disturbance associated with installation of guard structures would consist of an approximately 100 x 100–foot work area at the base of each guard structure and two holes approximately 3 feet in diameter. The installation method of the guard structures would be direct embedding with crushed rock and excavated material. All excavated material for the guard structures would be used to backfill these guard structures. As such, no excavated material would require offsite removal. All topsoil would be salvaged, stockpiled, and replaced on removal of the guard structures and initiation of reclamation activities.

UPGRADE OF THE EXISTING WESTERN TRANSMISSION LINE

One of two methods of construction for the Upgrade Section of the Project would be used, depending on ROW constraints: the tear-down and rebuild in place method; or construction of the new facilities adjacent to the existing facilities. In locations where possible, the new 230-kV line would be built 50 feet away from the edge of the existing 100-foot ROW, parallel to the existing line. A total of 50 feet of new ROW would be obtained where possible in order to accommodate this construction method. This would allow the existing line to remain in service until the new line is energized, at which point the existing line would be decommissioned and removed. Seventy-five feet of the existing 100-foot ROW would then be abandoned, and the remaining 25 feet adjacent to the new transmission line would be incorporated to form the new 150-foot permanent ROW. This is the preferred method of construction, as it would minimize the outage time on the existing line, and the risk of outages for local consumers during the upgrade process. Most of the disturbance in the old ROW would occur within 50 to 75 feet of the existing ROW centerline to remove old structures or old conductors. Western would work with private landowners during the micro-siting process to minimize potential impacts to landowners.

In places, such as across Bar V Ranch in Pima County, and the congested urban areas from the Del Bac Substation through Tucson to the Rattlesnake Substation, it may not be physically possible or prudent to construct the upgrade line in this manner. In these cases, a tear down and rebuild in place method would need to be used, centered on the existing 100-foot ROW. The old line would need to be taken out of service and torn out and the new line constructed in the original 100-foot, or somewhat expanded, ROW. This work would likely be subject to seasonal restrictions to minimize the outage impacts on system reliability.

Figures 2-15a and 2-15b are examples of typical ROW configuration for the New Build and Upgrade sections of the Project.

Disturbance Estimates

Table 2-7 (above) presents estimated temporary and permanent disturbance by Project segment. Following is a discussion of the basic assumptions used to develop these disturbance estimates. These disturbance estimates are also the foundation of the impact analysis presented in chapter 4. Both potential temporary and permanent disturbance estimates take into account existing infrastructure and access points where appropriate. Potential temporary disturbance would result primarily from the following construction activities (also included in table 2-7):

- Upgrade of existing roads or improvement of new roads for access;
- Construction of new, or expansion of existing, substations;
- Preparation of structure work areas (temporary work areas, tensioning and pulling sites, equipment staging and construction yards, etc.), and concrete batch plants;

Figure 2-15a. Typical ROW configuration, New Build Section.

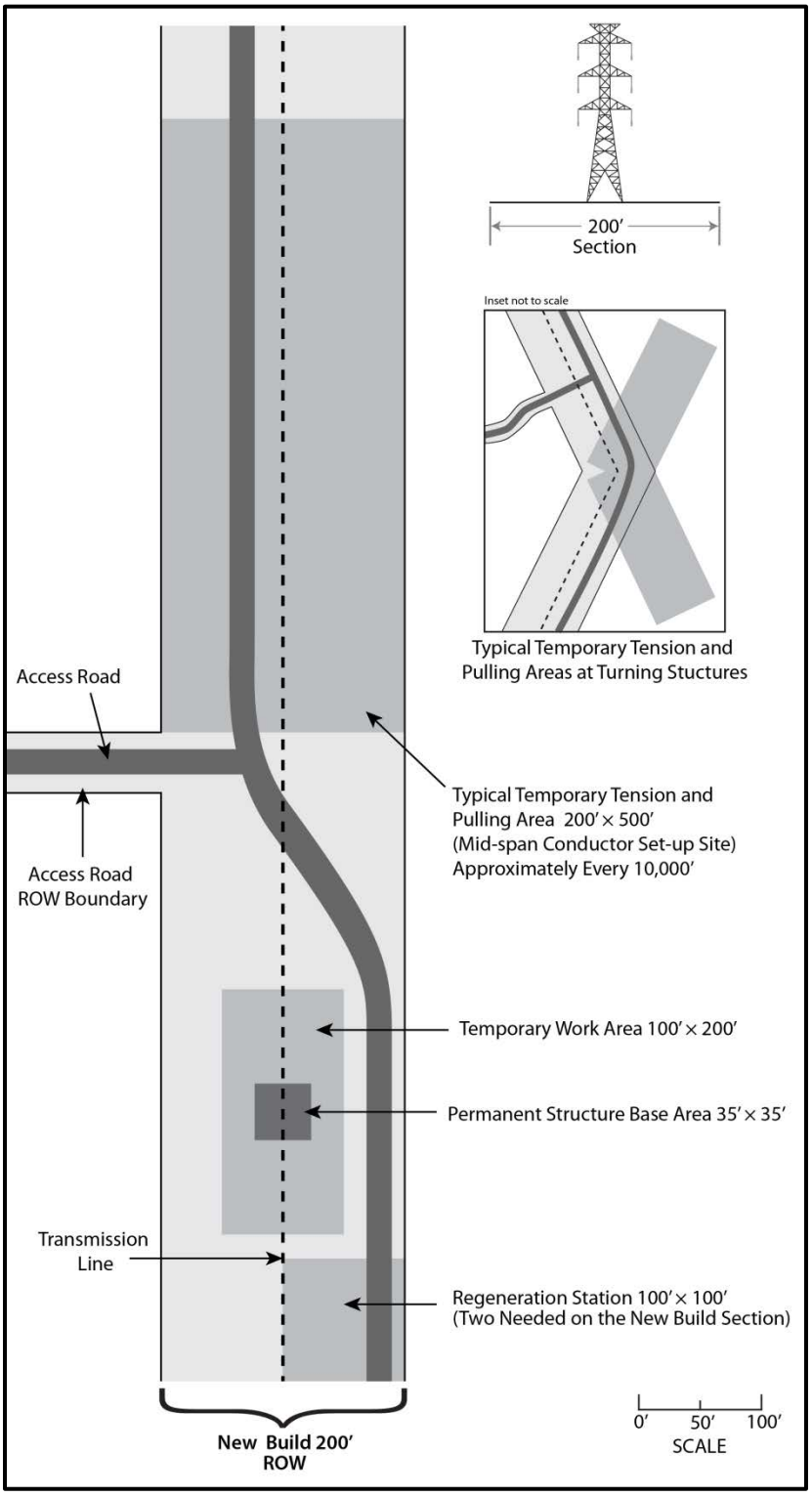
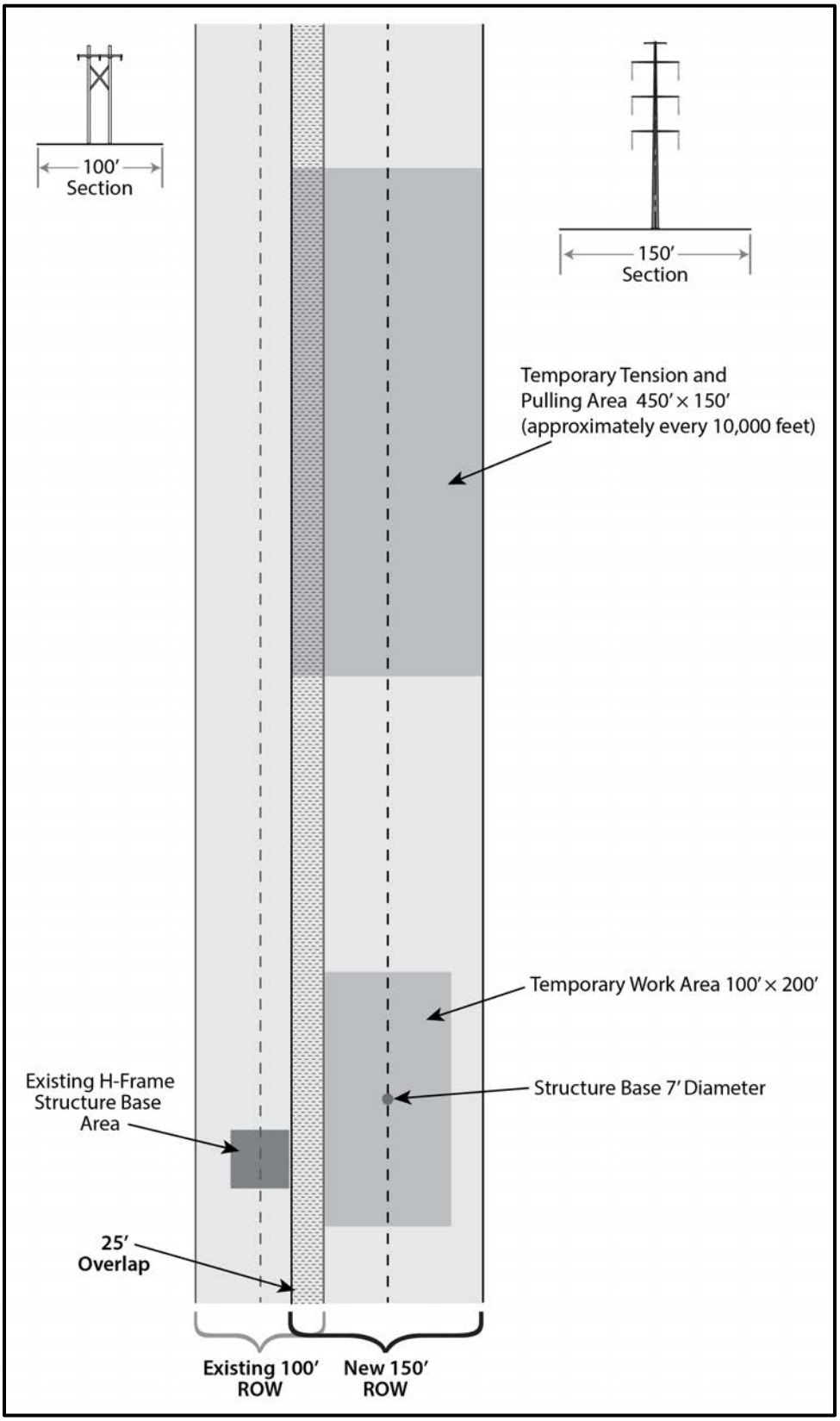


Figure 2-15b. Typical ROW configuration (150-foot), Upgrade Section.



Permanent ground disturbance is estimated to include transmission line structure base areas, substations, ancillary facilities, and permanent access roads. Impacts associated with ancillary facilities—including, but not limited to, new substations and access roads are accounted for in the disturbance estimates.

Following are the assumptions used to estimate total temporary and permanent disturbance as presented in table 2-7:

- Maximum disturbance based on lattice structures was assumed for construction of structures in the New Build Section, resulting in 5.6 acres of temporary disturbance and 0.1 acres of permanent disturbance per mile of transmission line built;
- Maximum disturbance based on pole structures was assumed for construction of structures in the Upgrade Section, resulting in 5.1 acres of temporary disturbance and 0.01 acres of permanent disturbance per mile of transmission line built;
- Substation expansion areas (see tables 2-5 and 2-6) are included in the estimates;
- Temporary construction yards (estimated at 20 acres of ground disturbance every 20 miles) are included in the Subroute disturbance calculations; and
- Access road types A and B would not create any new ground disturbance while types C and D ground disturbance would be 16 feet wide and type E would be 12 feet wide.

Substations

As described previously, the proposed Project involves interconnection with and upgrades of 14 existing substations along the Project route in New Mexico and Arizona and the potential construction of a new substation facility proposed for Luna County, New Mexico (referred to as “Midpoint Substation”). See table 2-4 for a summary of substations associated with the proposed Project. The following discussion is an overview of the types of construction activities that could take place at the new and existing substations, depending on the level of work required. Table 2-7 describes estimated temporary and permanent disturbance by Project component.

SOIL BORING

Typically, soil borings would be made at three to four locations in the substation, particularly at the approximate location of large structures and equipment, such as transmission line dead-ends, transformers, microwave tower, and regeneration building sites, to determine the engineering properties of the soil. Additionally, surveys that could involve small borings to identify any existing soil contamination would be used if necessary, Borings would be made with truck or truck-mounted equipment. The borings would be approximately 4 inches in diameter, would range from 30 to 60 feet in depth, and would be backfilled with the excavated material upon completion of soil sampling.

CLEARING AND GRADING

Clearing of all vegetation would be required for all new substation areas, as well as for substation expansion areas. Cleared and graded material would be disposed of in accordance with local ordinances. Topsoil would be stockpiled adjacent to the cleared area and used for dressing the slopes outside fenced areas. Clearing of all vegetation would occur within the entire substation areas, including to a distance of 10 feet outside the substation fence. This is required for personnel safety due to grounding concerns and because of lower clearances to energized conductors within the substation, compared with transmission lines. These lower clearances are allowed by the NESC because the entire substation is fenced.

Stormwater runoff containment ponds would be installed to moderate the discharge of stormwater offsite if determined to be necessary in the course of design. Typically, a 4- to 6-inch layer of aggregate crushed rock obtained from local sources would be applied to the graded surface of the substation area. The substation would be treated with a soil sterilizer.

CONSTRUCTION YARDS

Construction material storage or laydown yards would be required in support of substation construction (see tables 2-5 and 2-6). Construction material storage and laydown yards would be located within the substation property or proposed expansion area to the extent feasible. Previously disturbed areas would be used as available. As appropriate and feasible, Southline and its construction contractor would implement topsoil segregation and conservation practices at construction yards within substation sites and as directed by the BLM and Western. If an external area is necessary for a construction material storage or laydown yard, sites outside the ROW on BLM-managed lands would require a separate short-term ROW authorization. After construction is completed, all debris and unused materials would be removed and the construction material storage or laydown yards returned to preconstruction conditions as required by the surface managing entity/landowner.

GROUNDING

A grounding system is needed at each substation for detection of faults and for personnel safety. The grounding system generally consists of buried copper conductor arranged in a grid system and driven ground rods measuring 8 to 10 feet long. The ground rods and equipment are connected to the grounding conductor. Ground grid is extended to approximately 4 feet outside the perimeter fence to prevent unsafe reach or touch potential.

FENCING

Security fencing would be installed around the entire perimeter of each new or expanded substation to protect equipment and prevent accidental contact with energized electrical equipment by authorized and unauthorized personnel. The fence would be a 7-foot-tall chain-link fence with steel posts; it would have 1 foot of barbed wire installed on top of the fence, for a total fence height of 8 feet, and would be properly grounded. Locked gates would be installed at appropriate locations for authorized vehicle and personnel access.

FOUNDATION INSTALLATION

Foundations for supporting structures at substations would be of the drilled pier type. Pier foundations would be placed in a hole generally made by a truck-mounted auger. Reinforcing steel and anchor bolts would be placed into the hole using truck-mounted crane. The portion of the foundation above ground would be formed. The portion below ground would use the undisturbed earth of the augured hole as the form. After the foundation has been poured, the forms would be removed, the excavation backfilled, and the surface of the foundation dressed.

Equipment foundations for circuit breakers and transformers would be slab-on-grade type. These foundations would be placed by excavating the foundation area, placing forms and reinforcing steel and anchor bolts, and pouring concrete into the forms. After the foundation has been poured, the forms would be removed and the surface of the foundation dressed.

Where necessary, provisions would be made in the design of the foundations to mitigate potential problems due to frost. Reinforcing steel and anchor bolts would be transported to each site by truck, either as a prefabricated cage or as loose pieces, which would then be fabricated into cages on the site. Concrete

would be hauled to the site in concrete trucks. Excavated material would be spread at the site or disposed of in accordance with local ordinances and/or per agreement. Structures and equipment would be attached to the foundation by means of threaded anchor bolts embedded in the concrete. Some equipment, such as transformers, may not require anchor bolts and would be secured to the foundation by other means.

OIL CONTAINMENT

Transformers at substations would be filled with an insulating mineral oil. Containment structures would be required to prevent equipment oil from getting into the ground or water bodies in the event of a rupture or leak. These structures take many forms, depending on site requirements, environmental conditions, and regulatory restrictions. The simplest type of oil containment is a pit, of a calculated capacity, located under the oil-filled equipment that has an oil impervious liner. The pit is filled with rock to grade level. In the event of an oil leak or rupture, the oil captured in the containment pit would be pumped into tanks or barrels and transported to a disposal facility. If required, more elaborate oil containment systems would be installed. This may take the form of oil-water separator method, depending on site requirements. Though not listed as a required Framework Plan, operating utilities may require an Oil Spill Prevention Preparedness Plan.

STRUCTURE AND EQUIPMENT INSTALLATION

Supporting steel structures at substations would be erected on concrete foundations. These would be set with a truck-mounted crane and attached to the foundation anchor bolts by means of a steel base plate. These structures would be used to support the energized conductors and certain types of equipment. This equipment would be lifted onto the structure by means of a truck-mounted crane and bolted to the structures, and electrical connections would then be made. Some equipment, such as transformers and circuit breakers, would be mounted directly to the foundations without supporting structures. These would be set in place by means of a truck-mounted crane. Some of this equipment would require assembly and testing on the pad. Electrical connections to the equipment would then be made.

CONDUCTOR INSTALLATION

Two main types of high-voltage conductors could be used in substations: tubular aluminum for rigid bus sections and/or stranded aluminum conductor for strain bus and connections to equipment. Rigid bus sections would be supported by porcelain insulators installed on steel supports. The bus sections would be welded together and attached to special fittings for connection to equipment. Stranded aluminum conductors would be used as flexible connectors between the rigid bus sections and the station equipment.

CONDUIT AND CONTROL CABLE INSTALLATION

Typically, substation equipment requires low-voltage connections to power relaying and control circuits. These circuits allow metering, protective functions, and control (both remote and local) of the power system. Connections would be made from the control building to the equipment through multi-conductor control cables installed in conduits or in a precast concrete cable trench system.

CONTROL BUILDING CONSTRUCTION

One or more control buildings would be required at each substation to house protective relays, control devices, battery system for primary control power, control panels, communication equipment, and remote control and monitoring equipment. The size and construction of the building depend on individual substation requirements. Typically, the control building would be constructed of concrete block, pre-engineered metal sheets, or composite surfaced materials. Once the control building is erected, equipment would be mounted and wired inside. In the case of a pre-engineered building, all internal wirings would

be performed at the building manufacturer factory. New control buildings would be required at the Midpoint, Hidalgo, Apache, Adams Tap, Pantano, Vail, Tucson, Marana, Saguaro, and Tortolita substations. Existing control buildings would be used at the Afton, Nogales, Del Bac, DeMoss Petrie, and Rattlesnake substations. Nighttime lighting would be the minimal amount needed for safety and security of new substations and would be downward-shielded to minimize the effects of sky glow and glare on the surrounding areas.

SUBSTATION ACCESS ROADS: MIDPOINT SUBSTATION

New all-weather access to either of the proposed Midpoint Substations (North or South) would be required. Substation roads are constructed using a bulldozer or grader, followed by a roller to compact and smooth the ground. Front-end loaders would be used to move the soil locally or offsite. Either gravel obtained from a local source or asphalt would be applied as a base layer. Gravel, chip seal, or asphalt would be applied to the prepared base layer. Substation access roads would typically be 12 to 16 feet wide. Existing permanent roads for existing substations would likely fulfill the access requirements for proposed Project substation upgrade and expansion activities.

Construction Workforce and Equipment

Construction activities for all substation work would be expected to occur over a 24-month period, beginning after all necessary permits and approvals. The estimated number of workers and types of equipment necessary to construct the proposed Project are shown in tables A-1 and A-2 in appendix A. Additional equipment may be required on an as-needed basis to mobilize, maintain, and demobilize the other equipment.

The construction workforce for the substations would vary by substation size and stage of construction, but typically consist of approximately 40 crew members. At the peak of construction, approximately 6 teams of 40 crew members would be active at the same time across multiple substations. Typical equipment used during substation construction and expansion efforts would include large material delivery trucks, bulldozers, scrapers, water trucks, rollers, loaders, excavators, forklifts and man lifts, and cranes.

A typical work schedule for the construction workforce would be 7 a.m. to 5 p.m., Monday through Saturday. The hours may be adjusted throughout the year to account for daylight and temperature fluctuations. Workdays may be extended occasionally to complete a task (e.g., a concrete pour). Construction on Sundays is possible on occasion, especially to make up for days when weather has prohibited work. Night work would only occur rarely but would sometimes be used in the summer, primarily during the foundation construction phase to keep concrete temperatures within acceptable limits during placement.

Postconstruction: Cleanup and Reclamation

The Project ROWs, temporary or permanent, would be kept in an orderly condition and free of trash throughout the construction period. Refuse and trash, including stakes and flagging, would be collected at the temporary use areas in a closeable container until removed from the sites and disposed of in an approved manner. Oils and fuels would not be dumped on the ROW. All construction crews would have proper training and would have spill kits onsite; leaking equipment would be fixed immediately and in the interim, absorbent materials would be placed under leaking equipment immediately to prevent ground contamination. All construction waste, including trash and litter, garbage or solid waste, petroleum products, and other materials, would be removed to a disposal facility authorized to accept such materials.

Construction would generate nonhazardous solid wastes, including concrete, hardware, packing material such as wood, cardboard, plastic wrap, and scrap metal. However, the volume of these wastes is not expected to be significant. Cleanup activities would occur continuously throughout construction. All waste and scrap material would be removed from the site and recycled, or disposed of in local permitted landfills in accordance with local ordinances.

RECLAMATION PLAN

Generally, vegetation would be managed within the proposed Project ROWs and in access and service roads to minimize system reliability issues, to address safety issues, and to facilitate operation and maintenance activities. See also the "Vegetation Management" section below.

In terms of the Reclamation Plan, the BLM is required by law (FLMPA of 1976) to ensure that authorized actions are carried out in a manner that does not result in "permanent impairment of the productivity of the land or the quality of the environment." In order to promote a consistent and science-based approach to reclamation, minimum information and operational requirements, along with performance-based criteria would be established that are expected to ensure the goals of the Reclamation Plan are achieved.

Projects that include activities resulting in surface disturbance are required to implement approved reclamation plans. The result of such activities is intended to provide surface and subsurface stability and a functioning plant community that consists of native plants and reduces the opportunity for invasive species to occur. Following implementation of the final Reclamation Plan, the disturbed area should be compatible with land use objectives developed by the BLM for any given area. The Reclamation Plan would be a dynamic document that explains the extent and timing of reclamation activities, setting up monitoring schedules, success criteria, and reporting requirements. Elements of the plan would include treatment of soil, seed bed preparation, identification of the appropriate seed mix approved by BLM, and treatment of noxious weeds. The following provides a general description of the elements of a reclamation plan. Both an interim and final Reclamation Plan would be developed by Southline for review and approval by the BLM prior to initiating any ground-disturbing activities.

Standards-based reclamation focuses on using the desired end condition as the ultimate determinant of reclamation success. Reclamation procedures are designed to provide soil stabilization while expediting the return of a functional and desirable plant community. These standards are to be location specific (specific to the local ecosystem) and strictly adhered to unless a written exception is granted by the authorized officer. There are numerous other sources of guidance (e.g., BMPs) to aid operators in achieving reclamation success.

Topsoil and Spoil Treatment

Surface disturbances resulting from construction activities associated with the proposed Project would be subject to reclamation standards described in the Reclamation Plan. It is important to note that reclamation success criteria that would be described in the Reclamation Plan are considered standards that, through the authorized officer, are subject to adaptation, depending on site-specific reclamation challenges (i.e., physical or biological constraints beyond the operator's control).

Ground disturbance would be minimized where practical; however, there would still be extensive areas of soil disturbance due to the nature of the work and existing topography. The final Reclamation Plan would identify locations where the management of topsoil is warranted, such as areas where topsoil supports native plant species or is important to a private landowner (e.g., agricultural soils). Generally, topsoil is considered the uppermost 6 to 12 inches, but this can vary by soil type, particularly in desert ecosystems.

Right-of-Way Reclamation

Reclamation of temporarily disturbed areas would involve replacing stockpiled subsoil and topsoil (where applicable), restoring preexisting contours, installing permanent erosion control structures (i.e., water bars), and reestablishing vegetation.

Some areas may not have extensive vegetation before proposed Project construction, such as areas of shallow bedrock, shallow topsoil, steep slopes, or dry desert soils. These areas would be identified during preconstruction surveys. Where appropriate, other reclamation activities (e.g., restoring preconstruction contours) would be conducted.

Preconstruction surveys may be required to identify baseline conditions, including the following types of information: existing land use, surface water hydrology, vegetation, presence of listed species, active migratory bird nests, soil features, soil mapping, soil inhibiting factors, photodocumentation, species density, and known weed infestations. These data would inform the development of the Reclamation Plan, which would provide more detailed information on the methods described in the following sections.

Seeding

As part of the reclamation process, the seedbed would be prepared to facilitate the restoration of vegetation to preconstruction conditions. General measures are discussed as follows, and habitat-specific seedbed measures would be provided in the final Reclamation Plan.

Soil amendments are intended to minimize soil erosion and subsequent sedimentation, conserve soil moisture, provide cover, and moderate temperatures to facilitate the germination of seeds.

Unless otherwise directed, following seedbed preparation, only native seed would be used and would be applied using a broadcast spreader, drill, and/or hydroseeder, depending on site conditions and seed mix. Seeding would be done on portions of the proposed Project where ground-disturbing activities are complete and at the appropriate time of year (preferably in the fall or, if fall is not an option, the spring). If there is a lag time between the end of ground-disturbing activities and seeding, BMPs from the SWPPP would be implemented.

The choice of seed mixtures would be dependent on the existing vegetation types, the availability of commercial, weed-free live seed at the time of seeding, and landowner approval. The choice of seed mixtures would also utilize a plant palette reflective of the local ecosystem as much as possible. The final Reclamation Plan would identify proposed seed mixes based on specific vegetation communities (e.g., desertscrub, grassland, etc.) and would include the species, cultivar (if applicable), percent seed mix, pure live seeds per acre, and the application rate. Seed mixes would also take into account vegetation management requirements under transmission lines to avoid species that would frequently exceed height requirements. Proposed mixes would not be applied prior to landowner notification. In most cases, the BLM process would be followed on all lands unless specific landowners objected.

Some permanently disturbed areas would be reseeded as well. The Upgrade Section of the proposed Project would use primarily existing roads. Roads created for the proposed Project, primarily associated with the New Build Section, which would be necessary for the long-term operation and maintenance of the transmission line, are considered a permanent impact. Upon terminating and decommissioning of the proposed Project, these permanent disturbances would be reseeded. Therefore, the final Reclamation Plan would also include one or more seed mixes that would be used as a BMP for permanently disturbed areas.

POSTCONSTRUCTION MONITORING AND REPORTING

Postconstruction surveys would be conducted for a period of time based on the interim and final Reclamation Plans approved by the BLM following the conclusion of ground-disturbing activities.

Successful revegetation would be determined by monitoring reclaimed areas against existing conditions prior to construction activities. It some areas, preconstruction surveys may be required to identify protected species. Species and relative density would be assessed annually and compared with baseline data collected prior to the start of ground-disturbing activities. Reclamation would be determined successful if the seeded areas have germinated and are demonstrating that they would, over time, achieve a distribution and diversity similar to preconstruction conditions. Specific success criteria would be established for the various vegetation communities within the project area. If after a second growing season problem areas have been identified (e.g., seed germination is lower than expected; prevalence of noxious-weed species), the area would be treated and reseeded. Treatment may include additional seedbed preparation, control of noxious weeds, use of soil amendments, and/or use of another appropriate seed mix. Monitoring reclamation activities and remedial measures on private lands or lands managed by State agencies, counties, or other municipalities would be up to the landowner or land managers and agreements they negotiate with the responsible Project operator.

The construction contractor would document preconstruction observations, construction reclamation activities, and postconstruction monitoring on federally managed lands in an annual report for a period of time as stipulated in the final Reclamation Plans approved by the BLM. Annual reports would be prepared for submittal to Federal entities that administer public lands in the project area. The reports would provide a summary of Project reclamation activities and observations and include recommendations for additional corrective actions if necessary.

The final Reclamation Plan would be prepared prior to the start of construction. As Southline better defines the construction order and schedule, the final Reclamation Plan would be updated to include the schedule for baseline vegetation and weed surveys and identification of any areas for preconstruction noxious-weed treatment, along with a more detailed reclamation schedule and plan.

Operation and Maintenance

Following Project construction, operation and maintenance would commence. The following section provides information relative to the ongoing and long-term activities that would occur along the ROW for the anticipated operation and maintenance requirements for the proposed Project. This includes transmission line and substation inspection and maintenance, ROW and access road repair, vegetation management, and emergency response. Table 2-7 describes estimated temporary and permanent disturbance by Project component.

INSPECTION AND MAINTENANCE

Regular inspection of transmission lines, substations, and support systems is critical for safe, efficient, and economical operation. Early identification of items needing maintenance, repair, or replacement would ensure continued safe operation of the proposed Project. The proposed Project must comply with industry standard codes and practices such as NESC (ANSI C2) (ANSI 2012), which governs the design and operation of high-voltage electric utility systems.

TRANSMISSION LINE MAINTENANCE

Regular ground and aerial inspections would be performed in accordance with applicable Western/Southline requirements, which are in turn based on regulations, industry standards, and best management practices. The conductors would be inspected for corrosion, equipment misalignment, loose fittings, physical damage, and other mechanical problems. Climbing inspections would be conducted to coincide with bolt checking and tightening on lattice structures. The need for vegetation management would also be determined during inspection patrols. Annual maintenance activities are typically conducted by using helicopters, ground vehicles (4 x 4 trucks or all-terrain vehicles (ATVs)), or on foot. Visual or infrared inspections of the entire Project would be conducted annually. Typically, 10 percent of all structures would be inspected during annual structure-climbing inspections, so that each structure is inspected every 10 years.

Detailed ground inspections would be conducted as needed and are anticipated to occur every 2 to 3 years. Inspections assess the condition of the line and hardware to determine whether any component needs to be repaired or replaced and whether other conditions exist that may require maintenance or modification. Inspections also assess any unauthorized encroachments and/or trash dumping in the ROW that could constitute a safety hazard. Aerial inspection would be conducted by helicopter, generally in the spring and fall.

Maintenance would be performed as needed during operations. Routine maintenance activities typically consist of bolt tightening, and repair or replacement of individual components, and as standard practice do not include new ground-disturbing activities. Electrical equipment that may require repair or replacement (usually due to isolated damage such as lightning or gunshot) includes conductors, insulators, shield wires, fiber-optic lines, and related equipment. Typically, equipment repair or replacement would be conducted by a four-person crew with two or three trucks, a boom or line truck, an aerial truck, and an assist truck. Maintenance on transmission lines can often be completed safely using live-line techniques in order to avoid interruption of service to critical transmission line infrastructure.

Routine operation and maintenance activities on the proposed Project would minimize the need for most emergency repairs; however, emergency repairs are often necessary to address natural hazard, fire, or human-caused damage to a line. Emergency maintenance may be needed to repair downed wires during storms and correct unexpected outages. Emergency maintenance activities can involve prompt response by repair crews to repair or replace damaged equipment. When emergency repair work is required, an attempt would be made to notify landowners in advance of repairs. Restoration and reclamation procedures following completion of emergency repair activities would be similar to those used during construction. See “Fire Protection and Emergency Response” later in this section.

SUBSTATION AND REGENERATION STATION MAINTENANCE

Substation and regeneration stations are unmanned. Monitoring and control are performed remotely. Regeneration sites would provide communications support for transmission line patrol and maintenance operations and would allow emergency operations independent of commercial common carrier. Unauthorized entry into facilities is discouraged with the provision of fencing and locked gates. Warning signs would be posted, and entry to the operating facilities would be restricted to authorized personnel. Remotely monitored security systems would be installed. Several forms of security would be planned for each of the locations. Security measures may include fire detection in the control building via the remote monitoring system; alarming for forced entry; and a perimeter security system coupled with remote sensing infrared camera equipment in the fenced area of the station to provide visual observation to the system operator of disturbances at the fence line.

Maintenance activities would include equipment testing, equipment monitoring and repair, and emergency and routine procedures for service continuity and preventive maintenance. It is anticipated that maintenance at each substation would require approximately six trips per year by a two- to four-person crew. Routine operations would require one or two workers in a light utility truck to visit the substations monthly. Typically, a major substation maintenance inspection would take place once per year, requiring up to 15 personnel for 1 to 3 weeks.

Regeneration stations would be visited every 2 to 3 months by 1 individual in a light truck to inspect the facilities. Annual maintenance would be performed by a 2-person crew in a light truck over a 2- to 5-day period.

Minimal lighting for routine needs at the substation would be provided inside the substation fence. Maintenance crews would bring adequate lighting in the event that emergency repair work is required. All lighting would be shielded downwards to minimize contributions to sky glow.

ACCESS ROAD AND STRUCTURE WORK AREA REPAIR

Inspection and maintenance activities would be done using roads for which all appropriate ROWs have been obtained from the landowner.

ROW repairs would include grading or repair of existing maintenance access roads and structure foundation bases, and spot repair of sites subject to flooding or scouring. Activities related to ROW repair are usually conducted outside the rainy season. Required maintenance equipment may include a small bulldozer that would be trailered to the work site and offloaded for use as needed, a backhoe, a 4-wheel-drive pickup truck, a front-end loader, and, on rare occasion, a motor grader. The bulldozer and loader have steel tracks or large tires, whereas the grader, backhoe, and truck typically have rubber tires.

VEGETATION MANAGEMENT

Vegetation management practices along the ROW would be in accordance with NESC ANSI A300 Part 7, “American Operations Integrated Vegetation Management” (BLM’s Integrated Vegetation Management Handbook – H 1740-02, March 25, 2008a), Western Operation and Maintenance clearing practices and construction specifications, electric utility ROWs, and International Society of Arboriculture BMPs. The Vegetation Management Plan would be part of the POD as one of the Framework Plans and would be based on NERC Reliability Standard FAC-003-1 (see appendix N of this EIS).

Vegetation management activities would focus on establishing sustainable native plant communities that are compatible with the electric facilities. Establishment of vegetation would also reduce the potential for noxious weeds to become established in the ROW. Where practicable, vegetation that does not pose a fire hazard or physical impedance would not be cleared.

The goal of vegetation management activities during operation and maintenance is to proactively manage vegetation within the transmission line ROW, to control or minimize impacts of wildfires, and to minimize the likelihood of transmission outages resulting from smoke effects and/or vegetation intrusion on the line.

The proposed Project primarily crosses areas of low-growing shrubs and grasses. Where needed, vegetation would be removed using mechanical and manual equipment, such as weed trimmers, rakes, shovels, mowers, and brush hooks. Large shrubs and other obstructions would be regularly removed near structures to ensure safety and to facilitate inspection and maintenance of equipment, comply with NERC Reliability Standard FAC-003-1, and ensure system reliability. In limited areas, chain saws may be required for trimming larger trees. The duration of activities and the size of crew and equipment required would depend on the amount and size of the vegetation to be trimmed or removed. For analysis purposes, a crew size of 4 with a working foreman would be assumed to complete 2 miles a day of vegetation

maintenance. Although unlikely to be necessary, species-dependent herbicide could be applied subsequent to vegetation clearing to prevent regrowth of that vegetation and/or noxious and invasive weeds. Only herbicides, as approved by agencies with jurisdiction (i.e., BLM, Coronado National Forest, NMSLO, and ASLD), would be used. All pesticide and herbicide applications would be performed by a licensed applicator and in accordance with all label instructions and Federal, State, and local regulations, and in compliance with land management agency and/or landowner requirements. Aerial application of herbicide would not be performed.

The responsible Project operator would comply with agency requirements regarding management of noxious weeds within the ROW, along access roads, and at temporary use areas (e.g., cleaning equipment to prevent spread of noxious weeds). Chemical treatment within or adjacent to the ROW generally would be limited only to areas with noxious weeds, and only if absolutely necessary and in accordance with the Noxious Weed Management Plan, to be developed. If required, only herbicides or pesticides that are agency-approved would be used, and only upon prior approval of the BLM authorized officer or landowner.

FIRE PROTECTION AND EMERGENCY RESPONSE

Fire protection jurisdictions would be consulted to ensure implementation and effectiveness of safety requirements and procedural protocols, including Fire Response Plans. The following practices may be implemented to prevent fire during construction and maintenance/repair activities: brush clearing prior to work, stationing a water truck at the job site to keep the ground and vegetation moist in extreme fire conditions, enforcing red flag warnings, and providing “fire behavior” training to all pertinent personnel.

Emergencies are events requiring immediate response to a condition and may include fires, car-to-pole contact, downed poles, conductors, or ground wires, transformer outages, vandalism, etc. All applicable fire laws and regulations, including BLM fire safety standards, would be observed during the operation period. If extreme fire conditions occur, the BLM and other land management agency representatives would be contacted and access could be restricted. Maintenance personnel would coordinate with the agency representatives and implement practical measures to report and suppress fires. Measures may include brush clearing, stationing a water truck at the site to keep ground vegetation moist in extreme fire conditions, enforcing red flag warnings, etc.

2.4.4 Right-of-Way Renewal

The proposed Project would have a minimum projected operational life of 50 years or longer. A ROW grant issued for 50 years with the option of renewal would be necessary for the operation, maintenance, and decommissioning of the transmission facilities located on BLM-managed public land or any other ROW lease that would be obtained for the proposed Project. At the end of the ROW grant term (50 years), the responsible Project operator would have the option to renew the ROW grant or lease past 50 years to continue operation of the line. The terms and conditions included in the original ROW grant or lease could be modified for the renewed ROW grant or lease.

2.4.5 Decommissioning

At the end of its service life, the transmission line would be removed if the facilities are no longer needed. The decommissioning of transmission lines would involve the removal of wire, insulators, hardware, and structures from the ROW. Structures would be removed and foundations removed to below ground surface. Foundations and direct-embedded structures (if used) would be cut off 1 foot below ground. Material would be disposed of in an appropriate manner. Wire and steel could be salvaged and sold; if structures are in good condition, some may be sold to utilities for reuse. The equipment required to safely remove the wires and structures would be nearly the same as that required for installation.

Removal operations would be anticipated to occur at an average rate of approximately 4 miles per week per crew. Each removal crew would consist of about 60 workers for the New Build Section and about 50 workers for the Upgrade Section. All work would occur within the same disturbance limits identified for construction. Following abandonment and removal of the transmission line structures and equipment from the ROW, any areas disturbed during line dismantling would be restored and rehabilitated in accordance with requirements of a Decommissioning Plan.

Similarly, if any of the New Build Section substations are no longer required, the substation structures and equipment would be dismantled and removed from the site. Substations would be similarly decommissioned, with all remaining equipment disposed of in an appropriate manner and foundations cut off 1 foot below ground. The substation structures would be disassembled and either reused at another station, sold for scrap, or recycled. Major equipment, such as breakers, transformers, and reactors, would be removed, refurbished, and stored for use at another facility, depending on the age and condition of the equipment. Foundations would be either abandoned in place or cut off below ground level and buried. Removal operations are anticipated to occur at an average rate of one substation per month per crew. Each crew would consist of about 20 workers for the Upgrade Section and 40 workers for the New Build Section. All work would occur within the same disturbance limits identified for construction.

Service roads would be reclaimed following abandonment in accordance with land management agency or landowner agreements. Access roads would be reclaimed and seeded in accordance with the requirements of the Reclamation Plan. A Restoration Plan would be submitted for approval but is expected to include leveling and seeding of the Project access roads, structure sites, and other areas disturbed during removal operations. Equipment and manpower for restoration operations would be similar to that required at the end of construction. In some cases, reseeding may not be necessary, given the existing amount of soil compaction and vegetation currently in place. Where required by the land management agency or landowner, compacted areas would be ripped and appropriate sediment control measures would be implemented.

2.4.6 Typical Design Features and Agency Mitigation Measures

Activities authorized for the proposed Project would include environmental protection measures that are required and an integral part of the proposed Project. These measures include design features developed during the project design by the Proponent (Proponent Proposed Measure (PPM)), as well as agency mitigation developed over the course of the NEPA process; these together form the Proponent Committed Environmental Measures (PCEMs) presented in table 2-8.

Project design features are described in table 2-8 for the following:

- Standard mitigation
- Reclamation (site restoration, revegetation)
- Air quality and climate change
- Cultural resources
- Hazardous materials and waste
- Health and human safety
- Farmlands and rangeland
- Land use
- Military operations
- Noise
- Paleontology
- Recreation
- Wilderness Characteristics
- Soils
- Socioeconomics
- Transportation
- Biological resources (wildlife, vegetation)
- Visual resources
- Water resources

Table 2-8. Project PCEMs by Resource

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Standard Mitigation						
	X	The boundaries of construction activities would be predetermined and staked or flagged prior to any construction activity. No permanent markings would be applied to rocks or vegetation.	X			
	X	Prior to construction, all construction personnel would be instructed on the protection of cultural and ecological resources.	X			
	X	All vehicle movement would be restricted to designated access, contracted acquired access, or public roads.	X	X	X	X
	X	To limit disturbance, existing access roads would be used to the extent practicable, provided that doing so does not additionally impact resource values. Widening and grading of roads would be kept to the minimum required for access by Project construction equipment.	X	X	X	X
	X	Structures and/or ground wire would be marked with high-visibility devices such as aerial marker balls, where required by government agencies such as the FAA.	X	X	X	
	X	Transmission line materials would be designed and tested to minimize audible noise, radio interference, electromagnetic interference (EMI), and television interference due to corona.	X	X	X	
	X	No widening or upgrading of existing roads would be undertaken in the area of construction and operations, except for repairs or modifications to make roads safely passable, where soils and vegetation are sensitive to disturbance, in areas of critical habitat for vegetation or wildlife, in areas of habitat for BLM special status species, or where such activities could harm historic properties.		X	X	
	X	During operation of the transmission lines, the ROW would be maintained free of non-biodegradable debris. Desert vegetation would be crushed in place to promote seeding and revegetation, and reduce erosion potential.			X	
	X	BLM and Western road construction specifications would be followed where unimproved spur roads cannot be employed.		X	X	
	X	Unimproved spur roads would be used to the extent practicable in areas where no grading would be warranted to access work areas, within the approved ROW. Unimproved spur roads would be used to access a site without specifically blading a road or significantly modifying the landscape. All vehicle movement would be restricted to designated access, even if that is unimproved access. Vegetation would be crushed where feasible, not cut. For all access types, soil would be compacted, but not removed, except when grading requires displacement of surface soil.		X	X	X
	X	Where new roads would be required, water bars and/or rolling dip cross-drains would be utilized to minimize erosion. Details of their use would be documented in the SWPPP.	X	X	X	
	X	Structures would be placed to avoid, and/or to allow conductors to span, sensitive features such as riparian areas, waterways, roads, trails, and cultural sites within limits of standard transmission line structure design. This would minimize the amount of sensitive features disturbed and/or reduce visual contrast.	X	X	X	
	X	Clearing of trees in and adjacent to the ROW would be minimized to the extent practicable to satisfy conductor-clearance requirements (NESC and up to 10 years' timber growth). Trees and other vegetation would be selectively removed to blend the edge of the ROW into adjacent vegetation patterns, as appropriate.		X	X	
	X	Separation between transmission lines and existing utilities, roads, and railroads would be minimized to the extent practicable. Opportunities to share portions of adjacent ROWs would also be explored.	X			
	X	All construction vehicle movement would be restricted to predesignated access, contractor-acquired access, and public roads.		X		
	X	The width of construction and new temporary access roads would be sited to keep to the minimum needed to avoid sensitive areas and to limit ground disturbance.		X		
	X	Surface elevations would be returned to approximate pre-Project conditions, as practicable.		X		X
WILD-1		A WEAP would be prepared. All construction crews and field contractors would be required to participate in WEAP training prior to starting work on the Project. The WEAP training would include instructions for crews to report any issues; a review of the special status species; WUS; riparian habitat; cultural, paleontological, and other sensitive resources that could be impacted by the proposed Project; the locations of sensitive biological resources and their legal status and protections; and measures to be implemented for avoidance of these sensitive resources. A record of all trained personnel would be maintained during the construction period.	X	X		
	X	The process by which the BLM, Western, and Southline and its construction contractor would conduct environmental monitoring, compliance, and reporting activities during construction would be described in a Project compliance plan that would be prepared by the construction inspection contractor (CIC) after they have been selected and reviewed by BLM. After issuance of the notice to proceed, a CIC, designated by the BLM and Western, would provide environmental oversight and compliance monitoring on BLM-managed lands during Project construction to ensure compliance with all design features and mitigation measures.	X	X		

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Reclamation						
	X	A Reclamation, Vegetation, and Monitoring Plan would be developed and implemented.		X	X	X
	X	Reclamation would be accomplished with native species unless otherwise approved.		X	X	X
	X	Seeding would occur between November and March to ensure a greater chance of success. This would be tied to replacement of conserved topsoil with its natural seed stock.		X	X	X
Air Quality and Climate Change						
	X	Project activities would be in compliance with all applicable Federal, State, and local laws and regulations concerning prevention and control of air pollution during construction and operation.		X	X	
	X	An Erosion, Dust Control, and Air Quality Plan would be prepared as part of the final POD. The plan would be developed and implemented to minimize and mitigate potential air quality and climate change impacts. The Erosion, Dust Control, and Air Quality Plan would include a section detailing the Construction Emissions Mitigation Plan (CEMP). See appendix N of this EIS for an outline of the information in the Erosion, Dust Control, and Air Quality Plan, including the CEMP.	X	X	X	X
	X	All necessary air quality permits would be obtained prior to construction or operating equipment that would result in regulated atmospheric or fugitive dust emissions.	X			
	X	Trackout control devices such as grizzly bars, wheel washers, gravel pads, etc., would be located at all entrances and exits.		X		
	X	Where implementation of these measures would have a meaningful impact on air quality, haul-truck cargo beds would be covered with tarps and travel speeds would be limited to no more than 15 miles per hour (mph) on unpaved roads.		X		
	X	Combustion emissions from mobile sources would be minimized by proper maintenance of equipment.		X	X	
AIR-1		Dust control measures consistent with all applicable State or local standards, as outlined in the Erosion, Dust Control, and Air Quality Plan, would be implemented; these include the following reasonable precautions: (1) frequent watering (no new water sources developed), stabilization, or covering (as appropriate) of excavations, spoils, access roads, storage piles, and other sources of fugitive dust (parking areas, staging areas, other) if construction activity causes visible emissions of fugitive dust beyond the work area; (2) reduction in the amount of disturbed area where possible; (3) planting of vegetative ground cover, as appropriate, in disturbed areas after construction activities have ended; and/or (4) treatment of actively disturbed areas with BLM-approved dust palliatives.		X		
AIR-2		To reduce the potential for greenhouse gas emissions, only properly trained Project personnel would handle sulfur hexafluoride, and a sulfur hexafluoride recovery and recycling program would be implemented.		X	X	X
Cultural Resources						
	X	Cultural resources would continue to be considered during post-EIS phases of work. Specific cultural resource inventory, protection, and mitigation measures to be employed would be outlined in the Project-specific PA, in accordance with Section 106 of the NHPA. The final POD would include the signed PA and the HPTP.	X	X	X	X
	X	A Native American Graves Protection and Repatriation Act (NAGPRA) Plan of Action would be developed to outline the procedures to be followed in the event that human remains are encountered during ground disturbance. The NAGPRA Plan of Action would be applicable to discoveries of human remains on Federal and Tribal land, and compatible with State laws from Arizona and New Mexico, which protect human remains on State or private lands. For State and private lands in Arizona, “burial agreements” are developed through the Arizona State Museum with each tribe that may claim cultural affiliation to possible human remains discoveries.	X	X	X	
CR-1	X	The area of potential effects would be defined in the PA and would consist of the approved alternative corridor and appropriate buffers; all areas and ancillary features that would sustain ground disturbance (access roads, construction yards, etc.) would be subjected to a Class III, 100 percent–coverage pedestrian inventory to identify all historic properties that may be affected by the proposed Project. Survey and reporting requirements would follow BLM Handbook 8110 requirements for a Class III Intensive Field Survey (BLM 2004a).	X			
CR-2		Before construction, and as described in the WEAP, Southline and its construction contractor would provide cultural resources sensitivity training to all construction personnel so that Project personnel understand the procedures in the monitoring and discovery portion of the HPTP.	X	X		
CR-3		An HPTP would be developed and implemented to avoid, minimize, and mitigate the adverse effects of the Project on historic properties. Mitigation measures may range from avoidance and preservation in place to data recovery excavations conducted before the destruction of a site if avoidance is not feasible. The HPTP would include a Monitoring and Discovery Plan detailing procedures to be followed in the inadvertent discovery of a potentially significant archaeological site or human remains.	X	X	X	
CR-4		Ground-disturbing activities and other proposed Project components would be sited to avoid or minimize direct impacts on cultural resources listed as, or potentially eligible for listing as, unique archaeological sites, historical resources, or historic properties.	X	X	X	

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Cultural Resources, cont'd.						
CR-5		Establish and maintain a protective buffer zone around each recorded archaeological site within or immediately adjacent to the ROW that would be treated as an "environmentally sensitive area" within which construction activities and personnel are not permitted.	X	X		
CR-6		Evaluate the significance of archaeological resources, buildings, and structures in the area of potential effects in terms of their eligibility for inclusion in the NRHP.	X			
CR-7		Activities would minimize ground surface disturbance within the bounds of significant archaeological sites, historical resources, or historic properties.	X	X		
CR-8		During construction, it is possible that previously unknown archaeological or other cultural resources or human remains could be discovered. Prior to construction, the Proponent would prepare a Construction Monitoring and unanticipated cultural resources Discovery Plan to be implemented if an unanticipated discovery is made.		X		
Hazardous Materials and Waste						
	X	Framework Plans prepared as part of the final POD would be developed and implemented to minimize and mitigate potential hazardous materials and waste; plans include SWPPP; SPCC Plan; Soil Management Plan; and HMMP. These plans would include requirements by the EPA, OSHA, Arizona Department of Environmental Quality, and the New Mexico and Arizona Departments of Transportation.	X	X	X	X
	X	The SWPPP would include BMPs to address the storage and handling of hazardous materials and sediment runoff during construction activities to minimize the risk of an accidental release. The SWPPP is required by, and enforced by, the EPA in New Mexico, and the Arizona Department of Environmental Quality in Arizona.	X	X	X	
	X	Construction, operation, and maintenance crew members who handle oil or other hazardous substances described in the SPCC Plan would be properly trained to deal with a spill, and appropriate spill response or containment material would be available for use at applicable work sites. Careful handling and designation of specific equipment repair and fuel storage areas, as outlined in the SPCC Plan, would reduce the potential for oil and fuel spills. In the event that there is an oil or fuel spill, immediate measures would be taken to control the spill, and the BLM, National Response Center, and/or Arizona Department of Environmental Quality or New Mexico Environment Department would be notified as defined in the SPCC Plan.	X	X	X	X
	X	Personnel, contractors, and transporters involved with hazardous materials management would be required to comply with Federal and State regulations established for the transportation, storage, handling, and disposal of hazardous substances, materials, and wastes. "Hazardous substances" means any substance, pollutant, or contaminant that is listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.		X	X	X
HAZ-1		The Project-specific HMMP and program would outline proper hazardous materials use, storage, and transport requirements and applicable handling procedures. EPA procedures for handling and storage of hazardous materials, OSHA requirements for proper storage and labeling on the job site, and New Mexico and Arizona Department of Transportation requirements for transportation of hazardous materials would be followed.	X	X	X	X
HAZ-2		If backfill material to be used is derived from a site that could possibly have contamination, it would be sampled and determined to be free of regulated contaminants before it is used to fill excavations. The results of any tested soils should be shared with the appropriate surface managing agency. No contaminated soils would be used as fill material for the Project.		X		
HAZ-3		New or expanded substation locations that involve the purchase or long-term leasing of land, purchased transmission line ROWs, and any other property to be acquired would be screened for environmental liabilities. The degree and level of screening would be based on knowledge or information available on the property to determine the probability of contaminants of concern or other environmental impairment. A Phase I Environmental Site Assessment would be conducted if preliminary screening indicates a reasonable risk that such environmental conditions may exist on the property and the property continues to be targeted for acquisition by the Project, consistent with American Society for Testing and Materials Standard E1527-13.	X			
HAZ-4		The Soil Management Plan would provide guidance for the proper handling, onsite management, and disposal of contaminated soil, if encountered during construction, operation, and maintenance activities. Appropriately trained personnel would be onsite during preparation, grading, and related earthwork activities to monitor the soil conditions encountered.	X	X	X	X
HAZ-5		In the event of a spill, workers in the immediate area would cease work, begin spill cleanup operations, and notify appropriate agencies as required by law and specified in the SPCC Plan. Southline and its construction contractor(s) are responsible for cleanup and assume liability for any and all releases of hazardous substances disposed on public land, in accordance with State, Federal, and local laws and regulations. Southline would immediately notify the BLM authorized officer of any and all releases of hazardous substances on public land.		X	X	X
HAZ-6		All construction and demolition waste, including trash and litter, garbage, and other solid waste, would be removed and transported to an appropriately permitted recycling or disposal facility. Southline and its construction contractor would prepare a Construction Waste Disposal Plan for all nonhazardous wastes generated during construction of the Project. The plan would contain a description of all nonhazardous solid and liquid construction wastes, recycling plans, and waste management methods to be used for each type of waste.		X		X
HAZ-7		Southline or the applicable contractors would maintain all vehicles in good working order. Equipment would be properly tuned and maintained to avoid leaks of fluids.		X	X	X
HAZ-8		Service and refueling procedures would not be conducted within 500 feet of a seep, wash, or other water body. Routine service of any vehicles or equipment would not be done within the ROW.		X	X	X

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Health and Human Safety						
HEA-1 HEA-3		The HASP and Fire Protection Plan prepared as part of the final POD would be developed and implemented to minimize and mitigate potential health and human safety impacts. Southline and its contractors would work with the appropriate surface-managing agencies to incorporate any fire restrictions that are put into effect during construction, operation, and decommissioning of the Project.	X	X	X	X
HEA-2		Southline and its construction contractor would locate overhead and underground utilities that may reasonably be expected to be encountered during construction. If a utility service interruption is known to be unavoidable, Southline and its construction contractor would coordinate with the service provider to notify members of the public, the jurisdiction, and the service providers affected by the interruption via letters and newspapers notices published no later than 7 days prior to the first interruption. Copies of the notices would be provided to the BLM and Western following notification.	X	X		
HEA-4		All permanent metallic objects within the Project's transmission line ROWs would be grounded in accordance with industry standards.	X	X	X	
		Southline and its construction contractor would provide a safety representative at all times with the construction crews, first aid kits stored in each construction vehicle, a worker trained in first aid included in each work group during construction, and the development and implementation of a HASP.		X		
	X	The HASP would address potential situations that workers could encounter during construction and maintenance. The purpose and goal of the worker safety and environmental training would be to communicate Project-related environmental and safety concerns and appropriate work practices to all field and construction personnel prior to the start of construction, including spill prevention, emergency response measures, accident prevention, use of protective equipment, medical care of injured employees, safety education, and fire protection. Training would encompass environmental training related to road designations and speed limits, promote "good neighbor" policies, and institute BMPs for construction. The training would emphasize site-specific physical conditions to improve hazard prevention in accordance with OSHA requirements (29 CFR 1910 and/or 1926, as applicable).	X	X	X	
Land Use						
		Although disturbance to Pima County Conservation Lands would primarily occur within the existing Western ROW for the existing line, every effort would be made to minimize and avoid impacts to these lands (such as Bar V Ranch, Tumamoc Hill, etc.), to the extent practicable.		X	X	
Farmlands and Rangeland						
FARM-1	X	Fences and gates would be repaired or replaced to their original, predisturbed condition (or better), as required by the landowner, BLM authorized officer, or other land managing entity if they are damaged or destroyed by construction activities. New temporary and/or permanent gates would be installed only with the permission of the landowner or the BLM. Temporary gates not required for postconstruction access control would be removed following construction completion and in accordance with the POD.		X		X
	X	Water facilities (e.g., tanks, developed springs, water lines, wells, etc.) would be repaired or replaced to their predisturbed condition if they are damaged or destroyed by construction, operation, or maintenance activities, as required by the landowner of land management agency. Temporary watering facilities would be provided for wildlife and livestock until permanent repair or replacement is complete.		X	X	X
	X	Laydown areas and substation development would be located on previously disturbed land, where possible, to reduce the impact to farm operations and production in active farmlands. If laydown areas cannot avoid farmlands, Southline would receive approval from the landowner of the farmland to lease the land required for the laydown area.	X	X		
	X	Temporary gates would be installed to prevent livestock from escaping rangelands and accessing roadways. Fences and gates would be repaired or replaced to their original, predisturbed condition, as required by the landowner or the BLM authorized officer if they are damaged or destroyed by construction activities. Cattle guards would be installed at access points to prevent livestock from exiting unsecured gates onto roadways.	X	X		
	X	On agricultural land, ROWs would be aligned, in so far as practicable, to reduce the impact to farm operations and agricultural production. This would typically be done in conjunction with negotiating ROW agreements with landowners.	X	X		
Geology and Minerals						
GEO-1		Southline would prepare a geotechnical engineering study prior to the final project design to identify site-specific geological conditions and potential geological hazards. The data collected from the study would be used to guide sound engineering practices and mitigate potential geological hazards.	X			

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Military Operations						
DoD-1	X	The transmission line operator would work with Buffalo Soldier Electronic Testing Range (BSETR) to coordinate, and possibly limit, interconnections to the upgraded Tucson-Apache 230-kV transmission line to the extent allowed by Western's Open Access Transmission Service Tariff and FERC Orders. The transmission line operator would work with interconnection applicants to locate any future interconnection points on Western's upgraded Tucson-Apache 230-kV transmission line outside the BSETR and within 1 mile of its boundaries. New transmission facilities are defined to include substations, switchyards, and converter stations. Western's Open Access Transmission Service Tariff and the Federal Power Act, as amended, provide the framework, in accordance with Federal law, to consider interconnection requests. Western's Tariff substantively conforms with FERC Orders 888, 889, 890, 2003, and 2006, and ensures open access to Western's transmission system on an equal footing with regulated utilities.	X			
DoD-2	X	Southline and Western would work with BSETR to identify micro-siting opportunities during Project design.	X			
DoD-3	X	The transmission line operator would coordinate with BSETR during the design phase of the proposed Project to limit EMI. The proposed Project would be constructed using the best available construction techniques and technology (i.e., use of grounding, selective conductor type and arrangement, and conductor surface gradients), to the extent feasible and reasonably economical, in order to minimize EMI.	X			
DoD-4	X	The transmission line operator would coordinate with BSETR to allow for an updated measure of the "floor value" of the proposed Project over the first 6 months of operation once the proposed line is energized. Such cooperation could include provision of real-time operating and load information to BSETR to help calibrate the floor value of EMI.	X	X	X	
DoD-5	X	The transmission line operator would coordinate with BSETR to develop reporting standards, for potential inclusion in the transmission line maintenance and inspection program, to the extent allowable by FERC and NERC reliability standards. While normal inspection maintenance would take care of typical EMI issues, specific incidents such as storm damage or vandalism would need to be responded to outside of the normal maintenance cycle. If not detectable through transmission line monitoring, the operator would need to hear from someone experiencing interference in order to respond.	X	X	X	
DoD-6	X	The transmission line operator would coordinate planned outages (curtailment of power line operations for BSETR to implement testing) with BSETR to the extent feasible in order to meet necessary contractual commitments, utility mandates, laws and regulations, and power system requirements. The operator is very limited in the timing and duration of potential outages; outages stress the rest of the system, which can cause system failures.	X		X	
X		Use the optional structure height of 90 feet in areas intersecting the military training route (MTR) VR-263, which has a 100 feet above ground level flight altitude. Additionally, do not erect any structures exceeding 200 feet in height in areas intersecting MTRs VR-260 and VR-1233. Towers crossing the MTRs should also have anti-collision lighting to the maximum extent possible in order to make the hazard of transmission lines more apparent to pilots flying low altitude at night. These measures would mitigate impacts to military training and airspace usage, as well as contribute to the safe conduct of missions.	X	X		
X		Chart the transmission lines before they are erected.	X			
X		Identify transmission structures with high-visibility markers in areas where they intersect or parallel MTRs.	X	X		
MIL-1		The appropriate military scheduler(s) and U.S. Border Patrol representative(s) would be contacted to schedule airspace usage for any construction or maintenance activity on lands that could be used by the military and/or U.S. Border Patrol for training activities or other flights. Coordination would occur with the applicable scheduling office to schedule necessary airspace usage prior to maintenance activities.	X	X		
MIL-2		The proposed Project would comply with FAA regulations, including lighting regulations, to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.	X	X	X	
Noise						
	X	Schedule construction activities and route construction traffic to minimize disruption to nearby residents and existing operations surrounding the Project.		X		
	X	Noisy construction activities (including blasting) should be limited to the least noise-sensitive times of day (daytime only between 7 a.m. and 10 p.m.) and to weekdays. In sensitive wildlife areas, they should be limited to between 1.5 hours after sunrise and 1.5 hours before sunset.		X		
	X	If warranted, in extreme circumstances, erect temporary wooden noise barriers around areas where construction equipment would disturb sensitive receptors[5] near substations. Barriers may reduce noise by 3 to 10 A-weighted decibels (dBA) (EPA 1971).		X		
	X	To the extent possible, locate noisy equipment away from sensitive receptors.		X		
	X	Whenever feasible, schedule noise-generating activities to occur at the same time, since additional sources of noise generally do not add noise. That is, less-frequent noise activities would be less annoying than frequent less-noisy activities.		X		
	X	If blasting or other activities that cause loud bursts of noise are required during the construction period, nearby residents would be notified in advance.		X		
	X	If possible, minimize trips for surveillance and monitoring of Project transmission lines.			X	

[5] As identified in the EIS, noise sensitive receptors include residential areas, schools and day care facilities, hospitals, long-term care facilities, places of worship, libraries, parks, and recreational areas specifically known for their solitude and tranquility (such as wilderness areas).

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Noise, cont'd.						
NOI-1		Construction would comply with local noise ordinances. There may be a need to work outside the local ordinances to perform work during available line outage windows in order to take advantage of low electrical draw periods during nighttime hours. The construction contractor would comply with variance procedures required by local authorities.		X		
NOI-2		Construction equipment would be maintained in good working order in accordance with manufacturer's recommendations.		X		X
NOI-3		Idling of construction equipment and vehicles would be minimized during construction.		X		
NOI-4		Workers would be provided with appropriate hearing protection, if necessary, as described in the HASP.		X	X	X
Paleontology						
	X	The Project would avoid Potential Fossil Yield Classification (PFYC) 3 and 4 geological units where possible by spanning resource areas.	X			
PAL-1	X	In consultation with the appropriate land management agencies, Southline and its contractor would develop a Paleontological Monitoring Plan to address paleontological resources within the project area. This plan would address personnel education, predisturbance surveys, monitoring of ground disturbance, and the deposition and curation of fossils in a qualified repository.	X	X		
PAL-2		If scientifically significant fossils are encountered during construction, construction activities would be temporarily diverted away from the discovery and the authorized officer of the BLM would be notified. BLM would then implement the appropriate measures to avoid, protect, and/or recover the fossil remains.		X		
Recreation						
REC-1		Southline would not site additional workspace areas, such as contractor yards, in recreation areas in order to minimize impacts on recreational users during construction.	X	X		
REC-2		Southline and its contractor would coordinate with the BLM to display appropriate "closed" signage at the entrance to new spur roads to structure locations and access roads located on BLM-managed lands. This includes temporary signs during the construction phase of the Project and permanent signs and/or vehicle barriers that would close the spur routes to public travel during the operational phase. Signs would be removed as appropriate upon decommissioning.	X	X	X	X
REC-3		If temporary short-term closures to recreational areas are necessary for construction activities, Southline and its contractor would coordinate those closures with recreational facility owners. To the extent practicable, Southline and its construction contractor would schedule construction activities to avoid heavy recreational use periods (e.g., holidays or tournaments). Southline and its construction contractor would coordinate with the facility owner to post notice of the planned closure onsite 14 calendar days prior to the closure.	X	X	X	X
	X	Construction would be limited to certain areas of the ROW during specified hunting seasons (e.g., big-game hunting seasons) by sequencing construction activities along the ROW, in coordination with NMDGF and AGFD, in accordance with each agency's hunting regulations. Such coordination would allow the agencies to notify hunters of potential for T-line construction activities to affect their hunt. Where construction cannot avoid hunting seasons (e.g., mountain lion, "varmint," and other species with year-round hunting seasons) hunters would be required to avoid discharging firearms adjacent to the construction areas, in accordance with NMDGF and AGFD hunting regulations.	X	X		
	X	If the Arizona National Scenic Trail must be temporarily closed during construction, an alternate trail route (detour) would be provided during the closure. If it is necessary for trail users to leave the trail during the temporary closure, trail users would need to obtain permission from the ASLD.	X	X		X
Wilderness						
	X	Wilderness Inventory Unit users would be notified by publication of the construction schedule in local media, posting the schedule at administering agency offices, posting the schedule at trailheads or other recreation access points to Wilderness Inventory Units, or other means of reaching visitors. This notification process would alert wilderness users to the potential temporary impacts of presence and sound of construction on opportunities for experiences of solitude and primitive recreation settings, and allow visitors to decide whether they want to reschedule their visit.	X	X		X
	X	Feather the edges of the shrubs and trees adjacent to the ROW when recontouring and revegetating the construction ROW in vegetation communities with a large shrub or tree component, to reduce the line or edge that would be apparent between the shrubs and trees and the grass of the reclaimed ROW.	X	X		X
Trails						
	X	In accordance with the "Design Features and Best Management Practices for National Trails and Associated Resources" (see Appendix 1 in Manual 6280 (BLM 2012d)), proposed projects within a National Trail Management Corridor would be designed and located in a manner that is compatible with trail purposes.	X	X		
	X	Minimize visual contrast of Project through use of Project design such as using low profile buildings; siting using the natural topography to hide or screen development, reducing the aerial extent of impact by clustering developments, using vegetative screening; mimicking the line, form, and texture of the surrounding landscape; painting infrastructure, using colors that camouflage the development and prevent glare; and other techniques developed to address the site-specific conditions (BLM 2012d).	X	X		
	X	Avoid the use of dye, restrict administrative vehicle travel off of designated routes to minimize spread of exotic and invasive species with the National Trail Management Corridor, and consider alternative treatment methods such as use of backpacker sprayer (BLM 2012d).	X	X		

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Soils						
SOIL-1		As appropriate and feasible, Southline and its construction contractor would implement topsoil segregation and conservation practices at substation sites and as directed by the BLM and Western.		X		
	X	In construction areas (i.e., temporary use areas, structure sites, access roads, etc.) where grading is required, surface restoration would be implemented as required by the landowner or BLM authorized officer. The method of restoration would normally consist of returning disturbed areas back to approximately their normal contour, replacing topsoil, reseeding (where required), installing cross drains for erosion control, placing water bars in the road, and/or filling ditches. The Reclamation, Vegetation, and Monitoring Plan would include final details on the details of restoration.		X		
Socioeconomics						
	X	Southline should maximize local hiring, to the extent feasible, during construction. Local hiring could both maximize local economic benefits from the proposed Project, and help reduce potential housing issues and new public service demands.	X	X		
	X	Southline would develop plans for housing the temporary construction workforce during the periods of time when construction would focus on the western portions of the New Build Section (e.g., Hidalgo County) and the eastern portion of the Upgrade Section (e.g., northeastern Cochise County). If the Proponent Alternative is selected, housing planning should also include southern Luna County. The plan should be developed with input and review from local authorities in those areas to both minimize potential impacts on housing and public services and inform the communities of potential challenges associated with construction.	X	X		
Transportation						
TRA-1		Prior to the start of construction, Southline and its construction contractor would prepare a Traffic and Transportation Management Plan for the Project to address the timing and routing of Project trips in an effort to minimize Project impacts on local streets, highways, and railroad operations.	X			
TRA-2		At least 90 days prior to any construction-related helicopter use on the Project, Southline and its construction contractor would coordinate with the FAA for review and approval of plans for any helicopter flights that would take place during construction and operation. Southline and its construction contractor would then provide information to the BLM and Western regarding the intended need and use of helicopters during construction and operation of the Project, including the Flight and Safety Plan; the estimated number of days and hours that the helicopter would operate; the type and number of helicopters that would be used; the location, size, and number of staging areas for helicopter takeoffs and landings; and written approval from property owners for use of helicopter staging areas.	X	X	X	
	X	If any existing roads were to be damaged by Southline or its construction contractor during construction activities and/or truck traffic, the road would be repaired.		X		
	X	In order to mitigate traffic impacts on primary roads in metropolitan areas, shift changes for construction crews would not occur during the peak hours for the road during construction. Oversize or overweight vehicle movements would be planned for nighttime hours, where practical and not detrimental to safety or evening residential noise levels, or those specified in permitting regulations in order to minimize traffic disruptions.	X	X		
	X	In order to reduce public access to BLM roads and adjacent lands that are not currently accessible by the public, the Proponent would fence off or place restricted access signage at new access roads, where appropriate.	X	X	X	
	X	Throughout the permitting and design phase, the Proponent would correspond with Federal, State, and local transportation agencies in order to avoid Project inconsistencies with current and future transportation plans.	X			
	X	Throughout the permitting and design phase, the Proponent would correspond with Federal, State, and local airports in order to ensure that the FAA criteria for structures near airports are met, and to avoid Project inconsistencies with identified airport plans.	X			
	X	Identify transmission structures with high-visibility markers in areas where they intersect or parallel MTRs.			X	
	X	Provide gates and fencing in areas where off-highway vehicle use would be restricted due to military operations, or to protect sensitive resources.		X	X	X
Vegetation						
VEG-1	X	Efforts would be made to minimize vegetation removal and permanent loss at construction sites to the extent practicable. Access would not be graded unless necessary for erosion control or other engineering reason. Final structure and spur road locations would be selected to avoid special status vegetation to the greatest extent feasible.		X		
VEG-2	X	Southline and its construction contractor would develop a Reclamation, Vegetation, and Monitoring Plan that would guide restoration and revegetation activities for all disturbed lands associated with construction of the Project and its eventual termination and decommissioning. The plan would address all land disturbances, regardless of ownership. It would be developed in consultation with appropriate agencies and landowners and would be provided to these entities for review and input. The plan would provide details on topsoil segregation and conservation, vegetation treatment and removal, salvage of appropriate species, and revegetation methods, including use of native seed mixes, application rates, transplants, and criteria to monitor and evaluate revegetation success.	X	X	X	X
VEG-3	X	Special-status plants, including the Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*), would be avoided. Where avoidance is not possible, special status plants would be conserved by relocating plants and/or reseeding, replacing topsoil with existing topsoil that was removed, and regrading in compliance with local ordinances (Pima County, Tohono O'odham Nation). Measures to conserve special status plants would be implemented through the Reclamation, Vegetation, and Monitoring Plan.	X	X		X

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Vegetation, cont'd.						
VEG-4	X	Removal of riparian scrubland vegetation would be avoided where possible. Natural regeneration of native plants would be supported by selectively cutting vegetation with hand tools, mowing, trimming, or using other removal methods that allow root systems to remain intact.		X	X	X
VEG-5	X	In consultation with local BLM field offices and local resource agencies, Southline and its construction contractor would develop and implement a Noxious Weed Management Plan.	X	X	X	X
VEG-6	(see also PPC-3 and 4)	As required, equipment would be cleaned before ingress to minimize the potential for the spread of invasive species. These details would be described in the Noxious Weed Management Plan. Buffelgrass (*Pennisetum ciliare*) would be specifically addressed in the plan, which would outline efforts to control it within areas disturbed by the proposed Project to ensure that it does not spread to adjoining lands.	X	X	X	X
	X	Preconstruction native plant inventories and surveys for noxious weed species as stipulated by the appropriate land management agency would be conducted once transmission line center line, access road, and transmission line structure sites have been located.	X			
	X	Although the 150-foot ROW across the San Xavier District of the Tohono O'odham Nation was surveyed for Pima pineapple cactus in summer 2014, additional preconstruction species-specific surveys for the Pima pineapple cactus would be conducted once transmission line center line, access road, and transmission line structure sites have been located, as needed.	X			
	X	Preconstruction coordination with Pima County, the University of Arizona, and other appropriate groups would be conducted to minimize impacts to Tumamoc globeberry (*Tumamoca macdougalii*) monitoring plots and plants on Tumamoc Hill. Measures to conserve this plant, as well as other special status plants, would be implemented through the Reclamation, Vegetation, and Monitoring Plan.	X	X		X
	X	In construction areas where grading is not required, vegetation would be left in place wherever feasible, and original contours would be maintained to avoid excessive root damage and allow for regrowth. All existing roads would be left in a condition that is equal to or better than their condition before the construction of the transmission lines, as determined by the appropriate land management agency.		X		
		Field presence/absence surveys would be conducted for special status species in locations where such species are likely to occur within the Project ROW, and specifically locations where vegetation would be impacted, prior to any actual impacts. Surveys would be conducted following established protocols by qualified biologists approved by BLM.	X			
	X	Southline and its construction contractor would provide training to all appropriate field personnel working on the Project to identify noxious weeds and prevent spread. Training would discuss known invasive and noxious weed species, known locations, identification methods, and treatment protocols. Training materials and a list of Project personnel completing the course would be provided to the BLM and Western.		X		
	X	Invasive and noxious weed populations would be mapped and reported to BLM/Western. BLM and Western would determine which areas would necessitate vehicle washing, based on the results of the invasive/noxious weed surveys.	X	X		
	X	Noxious weeds and other exotic, invasive plant species would be inventoried by a qualified biologist in the immediate proximity to any sensitive plant communities and any special status species populations. This noxious weed inventory would then provide information to supplement mitigation plans for sensitive plant communities and/or special status species habitats, to prevent the expansion of any noxious weeds or other exotic invasive plant species into those locations. Mitigation planning shall be included as part of the Plant and Wildlife Species Conservation Measures Plan.	X			
	X	Southwest Regional Gap Analysis Project plant associations (communities) that are considered to be environmentally sensitive would be included in ground-truthing field surveys, such as wetlands, riparian areas, drainages, and special status species habitats, to confirm the presence and extent of such communities. If any such sensitive plant communities are identified and documented, the first response would be a determination regarding whether the sensitive community can be avoided. If avoidance is not possible, a mitigation plan (included as part of the Plant and Wildlife Species Conservation Measures Plan) would be developed as needed for those vegetation communities, including options to reduce impacts to those communities. Exclusion zones (at least 10 feet around the perimeter of the plant community) would be delineated around any such plant communities and marked with flagging. Construction monitoring shall be employed around any such sensitive plant communities, and the biological monitor shall have the authority to halt any construction activity deemed intrusive and causing impacts beyond those stated in the mitigation plan. Any changes in construction plans that occur after the Project approval would require additional field presence/absence surveys for such sensitive plant communities and would require a variance request from the BLM if such communities are found, and the above mitigation measures would apply.	X			
	X	A compensation plan would be developed as part of the Plant and Wildlife Species Conservation Measures Plan, to meet BLM requirements and approval. The compensation plan would include calculations of compensation ratios and mitigation acreages for special status plant species requiring additional mitigation. Compensatory mitigation could include payment of an in-lieu fee; acquiring mitigation land or conservation easements; or a combination of the two.	X			
	PPC-1	For Pima pineapple cactus that cannot be avoided, Southline would purchase credits in an FWS-approved conservation bank for Pima pineapple cactus, corresponding to the area of permanent disturbance to occupied Pima pineapple cactus habitat. Alternatively, Southline may purchase suitable mitigation lands within Pima County's Pima pineapple cactus Priority Conservation Areas.	X			
	PPC-2	In compliance with EO 13112 regarding invasive species, all disturbed soils that would not be landscaped or otherwise permanently stabilized by construction shall be seeded using species native to the project vicinity.			X	
	PPC-3	Also in compliance with EO 13112 regarding invasive species, all earthmoving and hauling equipment shall be washed at the contractor's storage facility prior to arriving onsite to prevent the introduction of invasive species.			X	
	PPC-4	To prevent invasive species propagules from leaving the site, the contractor shall inspect all construction equipment and remove all attached plant/vegetation and soil/mud debris identified prior to leaving the construction site.			X	

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Vegetation, cont'd.						
	PPC-5	Any Pima pineapple cactus that are not within the area of permanent disturbance, but are present within the Project vicinity, shall be flagged by a qualified biologist prior to the commencement of work to avoid accidental damage during construction. Flagging would be removed following construction.	X	X		
	PPC-6	Any Pima pineapple cactus that cannot be avoided would be conserved by relocating plants within the existing ROW, but outside of the area of any ongoing disturbance.	X	X		
	BO-CM (Biological Opinion-Conservation Measures)	BLM and Western would coordinate with the Arizona-Sonoran Desert Museum in salvaging for the museum's collection if individual Pima pineapple cactus cannot be relocated for some reason.	X	X		
		Pre-construction surveys for Chihuahua scurfpea and other special status plant species would occur in suitable habitat and ground disturbance in occupied habitat would be avoided to the extent practicable.	X	X		
Visual Resources						
VIS-1		In order to restore disturbed areas to an appearance that would blend back into the overall landscape, seeding and/or planting would be conducted in any area that has been cleared or disturbed during construction. Seed mix would be tailored to an area's soil type, existing vegetation, and native species.		X		X
VIS-2	X	The alignment of any new access roads (including unimproved spur roads) would stay within the designated access ROW and would follow the designated area's landform contours and avoid steep areas as much as feasible, provided that such alignment does not additionally impact resource values. This would minimize ground disturbance and/or reduce scarring (visual contrast).	X	X		
VIS-3		During the construction period, dust suppression measures would be used to minimize the creation of dust clouds potentially associated with the use of access roads.		X		
VIS-4	X	The Project would incorporate nonspecular conductors into the Project design to decrease reflectivity and visibility of Project features.	X	X		
	X	Non-transmission line structures such as operations and maintenance buildings, microwave equipment buildings, regeneration structures, emergency generators, and other associated structures would be treated or painted with non-reflective, flat-toned surface treatment. The color of the structures would be painted BLM Environmental Color Chart "Shadow Gray", unless otherwise directed by the authorized officer based on a field evaluation of color choices that will demonstrate better measurable performance over Shadow Gray. BLM VRM staff shall be consulted and shall approve color selection relative to site-specific structures to be painted.		X	X	
	X	All lattice towers shall be "dulled" non-specular metal and monopoles properly color treated (BLM Environmental Color Chart "Shadow Gray").	X	X		
	X	Aerial markers or warning lights would be installed on conductors or structures if required by FAA, CBP, and DOD regulations for structures over 130 feet. The use of red strobe lighting would reduce potential impacts from artificial night lighting and would reduce impacts from night brightness and viewing of night skies. The minimum number and intensity of lights would be used, given that the tallest structures are under the 200-foot FAA requirement (FAA Advisory Circular 70/7460-1K (FAA 2007)). Exterior lights installed on conductors or other facilities would be aviation warning lights, or FAA L-864 aviation red-colored flashing lights with 20 to 40 flashes per minute standard flashing range.		X	X	
	X	The alignment of new access roads or cross-country routes would follow the landform contours where practicable to minimize ground disturbance and reduce visual scarring of the landscape, provided that the alignment does not affect other resource values.	X	X	X	
	X	Clearing of trees in and adjacent to the ROW would be minimized to reduce visual contrast to the extent practicable to satisfy conductor-clearance requirements. Trees and other vegetation would be removed selectively to blend the edge of the ROW into adjacent vegetation patterns, as practicable and appropriate.	X	X	X	
	X	All new or improved access that would not be required for maintenance would be closed or rehabilitated to make it less visually apparent.	X	X	X	
		Tower design may be modified, or an alternative tower type may be selected, to minimize visual contrast as appropriate (BLM 2013o).	X	X	X	
	X	Standard tower design would be modified to correspond to spacing of existing transmission structures, where feasible and within the limits of standard tower design, to reduce visual contrast (BLM 2013o).	X	X		
	X	At highway, canyon, and trail crossings, towers would be placed at the maximum feasible distance from the crossing within the limits of standard tower design to reduce visual impacts.	X	X		

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Water Resources						
WAT-1		A Project-specific construction SWPPP would be prepared prior to the start of construction of the transmission line and substations in compliance with CWA Section 402, if required. The SWPPP would use BMPs to address the storage and handling of hazardous materials and sediment runoff during construction activities to minimize the risk of an accidental release. As part of the SWPPP, soil disturbance at structure construction sites and access roads would be the minimum necessary for construction and would be designed to prevent long-term erosion, through activities such as restoration of disturbed soil, revegetation, and/or construction of permanent erosion control structures. A USACE permit would be obtained prior to the start of construction of the transmission line and substations for the discharge of dredged or fill material in compliance with CWA Section 404, if required. Activities in and around streams and wetlands would be designed to avoid, minimize, and mitigate impacts to WUS.	X	X		
WAT-2		Construction equipment would be kept out of flowing stream channels, unless feasible alternatives are not available. Structures would be located to avoid active drainage channels, especially downstream of steep slope areas, to minimize the potential for damage by flash flooding and mud and debris flows.	X	X		X
WAT-3		Flood-control devices would be located where required to protect structures from flooding or erosion. Appropriate design of structure foundations would be used to prevent scour or inundation by a 100-year flood and to avoid disturbed areas. The locations of transmission structures would be designed to avoid steep, disturbed, or otherwise unstable slopes. If drainages cannot be avoided by structure placement, Southline and its construction contractor would design drainage crossings to accommodate estimated peak flows and ensure that natural volume capacity can be maintained throughout construction and upon post-construction restoration.	X	X		
	X	Roads would be built as close as possible to right angles to the streams and washes. Culverts or temporary bridges would be installed where conditions warrant. All construction and operations activities shall be conducted in a manner that would minimize disturbance to vegetation, drainage channels, and intermittent or perennial stream banks.		X		
	X	If a route is approved near the internal border, construction activities should be accomplished in a manner that does not change historic surface runoff characteristics at the international border. Copies of any hydrologic or hydraulic studies and site-specific drawings for work proposed in the vicinity of the international boundary would be submitted to the U.S. International Boundary and Water Commission.	X	X	X	X
	X	To the extent practicable, structures would be sited with a minimum distance of 200 feet from streams.	X			
Wildlife						
WILD-2		In consultation with the BLM and Western, Southline and its construction contractor would prepare and implement a Biological Monitoring Plan prior to issuance of a notice to proceed and prior to construction that would specify the level of biological monitoring to be provided throughout construction activities in all construction zones with the potential for presence of sensitive biological resources. The number of monitors and monitoring frequency would be specified for each work zone.	X	X		
WILD-3		Preconstruction surveys would be required in areas where Sonoran desert tortoise (now a separate species: Morafka's desert tortoise (*Gopherus morafkai*)), and Gila monster (*Heloderma suspectum*) are expected to occur. In consultation with the BLM and Western, Southline and its construction contractor would hire qualified biologists to conduct preconstruction surveys in ground disturbance areas within suitable habitat for appropriate special status species.	X			
WILD-4		To reduce impacts on the Sonoran (Morafka's) desert tortoise, known to exist in the western portion of the project area, only authorized biologists with a valid AGFD permit would handle desert tortoises if encountered within the Project area, following the most current desert tortoise handling guidelines published by the AGFD (see also BO-CM, appendix C).		X		X
WILD-5		To reduce impacts on all species protected by the Migratory Bird Treaty Act (MBTA), (1) Southline and its construction contractor would conduct preconstruction surveys for active nests, and consult with the appropriate agencies (BLM or FWS) on a case-by-case basis when active nests are found in Project areas, unless directed to do otherwise by these same agencies; (2) a buffer would be placed around active bird nests, and nests would not be moved during breeding season, in compliance with the MBTA, unless the Project is expressly permitted to do so by the FWS or BLM, depending on the location of the nest; (3) all active nests and disturbance or harm to active nests would be reported to the FWS or BLM, upon detection; and (4) work would halt if it is determined that active nests would be disturbed by construction activities, until further direction or approval to work is obtained from the appropriate agencies.	X	X		
WILD-6		To reduce impacts on golden eagles and other raptors, Southline and its construction contractor would develop and implement an APP, in coordination with the BLM and Western for approval. The plan would be prepared in accordance with guidance provided by the FWS and in consultation with best practices such as the "Suggested Practices for Avian Protection on Power Lines" (APLIC 2006).	X	X	X	X
WILD-7		Southline and its construction contractor would follow Pima County guidelines for surveys prior to disturbance located in Pima County for western burrowing owls (*Athene cunicularia*). Surveys for western burrowing owl would also be conducted in Cochise County near agricultural fields surrounding the Willcox Playa.	X	X		
		Surveys for western burrowing owl in New Mexico would follow the NMDGF "Guidelines and Recommendations for Burrowing Owl Surveys and Mitigation" (NMDGF 2007).	X	X		
WILD-8		Final structure and spur road locations would be adjusted to avoid sensitive wildlife resources to the greatest extent feasible.	X	X	X	
AGFD-1	X	Preconstruction surveys for non-game sensitive species such as ornate box turtle (*Terrapene ornata*), western burrowing owl (*Athene cunicularia*), Texas horned lizard (*Phrynosoma cornutum*), kit fox (*Vulpes macrotis*), etc. Timing of the surveys would be determined through consultation with AGFD and NMDGF.	X			
		Preconstruction surveys for species listed under the ESA or specified by the appropriate land management agency as sensitive or of concern would be conducted in areas of known occurrences or suitable habitat. Timing of the surveys would be determined by FWS-approved, species-specific survey protocol.	X			

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Wildlife, cont'd.						
	X	Monitoring of construction activities would be required in some areas to ensure that effects on these species are avoided during construction. If bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*) nests are identified during preconstruction surveys, seasonal restrictions on construction within a specified buffer would be implemented where applicable, according to FWS protocols, to comply with the Bald and Golden Eagle Protection Act. Preconstruction nesting-season surveys for migratory birds and surveys for burrowing owls in suitable habitat would be conducted as needed to comply with the MBTA.		X		
	X	Surveys for bat roosts would be conducted within 0.25 mile of the Project ROW in areas that potentially contain caves, karst features, or mines. Occupied bat roosts would be avoided.	X			
	X	Clearing, grubbing, blading, and access road improvements occurring within identified sensitive areas would be conducted outside the breeding season for most desert-nesting migratory birds.	X	X		
	X	Construction holes left open overnight would be appropriately fenced or covered to prevent damage to wildlife or livestock.		X		
	X	Except where otherwise posted or allowed, a Project speed limit of 25 mph would be designated for all construction areas, spur roads, and new access roads to minimize the potential for construction equipment collisions with wildlife. In areas with mountainous terrain and/or poor site distances, the Project speed limit would be 15 mph.		X		
	X	In construction areas where recontouring is not required, vegetation would be left in place wherever possible, to avoid excessive root damage and allow for resprouting.		X		
	X	If designated suitable bighorn sheep (*Ovis canadensis*) habitat along subroute 1.2 in segment S2 were to become occupied by bighorn sheep, then no Project facilities except transmission lines would be built in that area, if that route is selected.		X		
	X	To avoid impacting roosting bats at the Ina Road bridge, blasting activities would be restricted to less than 130 decibels (dB) at the project site. If this dB limit cannot be met, then blasting activities would be limited to after sunset when the majority of adult bats would be away from the roost foraging, and/or blasting would not occur in April or May while the bat colony is present.		X		
AGFD-2	X	Southline would fund the relocation of Crane Lake, including acquisition of land if necessary, construction of the lake and associated infrastructure, revegetation, visitor facilities. This would include operation and maintenance costs of the lake and infrastructure for the life of the Project, with the renewal of commitment upon future renewal of the Project permit.	X	X	X	
AGFD-3	X	Southline would provide funding to improve riparian emergent wetlands on three historic ponds near Kansas Settlement Road. Wetlands would be constructed to AGFD specifications and adequately equipped with pumps, liners, and drains to ensure that wildlife values are maintained.	X	X	X	
AGFD-4	X	Southline would fund the removal of non-native flora and revegetation with native flora on the Willcox Playa Wildlife Area.	X	X	X	
	LNB-1	All paniculate agaves (*Agave palmeri*, *A. parryi*, and *A. chrysantha*) and saguaros (*Carnegiea gigantea*) would be inventoried within the proposed ROW, and the potential to avoid or salvage each plant would be assessed. The priority would be avoidance when feasible.	X	X		
	LNB-2	All suitable (e.g., healthy, undamaged, not flowering) paniculate agaves that cannot be avoided would be salvaged using methods approved by the BLM/Western and FWS, but mature agaves would be given preference for avoidance when feasible. Plants salvaged from areas of permanent disturbance would be used to reclaim areas of temporary disturbance, or replanted outside disturbed areas if necessary.	X	X		
	LNB-3	Other species of agaves such as *A. schottii* that are not primary food plants for nectar-feeding bats would be salvaged and used for reclamation in accordance with to the Reclamation, Vegetation, and Monitoring Plan.	X	X		
	LNB-4	Saguaros less than 15 feet in height would be salvaged, unless prevented by site-specific conditions or poor plant health. Plants salvaged from areas of permanent disturbance would be used to reclaim areas of temporary disturbance, or replanted outside of disturbed areas if necessary. Larger saguaros would be avoided whenever feasible, but would be topped or removed if necessary.	X	X		
	LNB-5	Agave and saguaro salvage would be augmented, as necessary within 3 years after completion of initial restoration activities. Augmentation would occur within the ROW in areas of higher value to bats (e.g., in the vicinity of active roosts, within areas of high concentration of agaves) to achieve a goal of no net loss of forage plants. Plant stocks from local sources or approved nursery-grown plants would be used.	X	X		
	LNB-6	Salvaged plants would be monitored following reclamation for a period of 3 years, as described in the POD. Supplementary water would be provided, if monitoring indicates that rainfall is insufficient to achieve the goal of no net loss of forage plants. Plant survival through the monitoring period would be reported annually to the BLM/Western and FWS.	X	X		
	WF-1	All non-emergency construction and maintenance in riparian woodlands at the San Pedro River, Cienega Creek, and the Santa Cruz River would take place between September 15 and March 1, to avoid disturbance of breeding or nesting southwestern willow flycatchers (*Empidonax traillii extimus*).		X		
	WF-2 YBC-2	Line marking devices would be placed at the proposed crossings of the San Pedro River, Cienega Creek, and the Santa Cruz River to minimize the potential for avian collisions with transmission lines.		X		
	YBC-1	All non-emergency construction and maintenance in riparian woodlands at the San Pedro River, Cienega Creek, and Santa Cruz River would take place between September 15 and March 1, to avoid disturbance of breeding or nesting yellow-billed cuckoos (*Coccyzus americanus*).		X		

Table 2-8. Project PCEMs by Resource (Continued)

PCEM	Agency	Feature by Resource	Preconstruction	Construction	Operation and Maintenance	Decommissioning
Wildlife, cont'd.						
	BAT-1	Construction activities that create sudden and sporadic loud noise (e.g., blasting) within 0.5 mile of the Volcano Mine complex would be limited to Spring (preferably April 1 to May 31), depending on the presence of bats to protect maternity roosts and potential hibernacula.		X		
	BO-CM	BLM and Western would work with FWS, AGFD, and NMDGF to implement recovery actions for lesser long-nosed bat (*Leptonycteris yerbabuenae*), Mexican long-nosed bat (*Leptonycteris curasoae*), southwestern willow flycatcher, and yellow-billed cuckoo.	X			
	BO-CM	BLM and Western would work with FWS, AGFD, and NMDGF to participate in recovery planning and implementation of conservation actions for northern Mexican gartersnake (*Thamnophis eques megalops*), particularly on efforts to remove harmful nonnative species from occupied northern Mexican gartersnake habitat.	X			
	BO-CM	BLM, Western, and Southline would use the smallest mesh size possible (<0.5 inch) for erosion-control products, or products that do not contain any mesh- or net-like attributes near occupied northern Mexican gartersnake habitat. BLM, Western, and Southline would refrain from using erosion-control products (such as wattles), that contain a mesh size of 0.5 inch (or 1.27 cm) within proposed critical habitat for the northern Mexican gartersnake.		X		
	BO-CM (appendix B)	Preconstruction surveys would take place in habitat classified as moderate or high suitability for the northern aplomado falcon (*Falco femoralis septentrionalis*) within the proposed ROW and a 1-mile buffer. Surveys should be conducted several times from January 15 to June 30 in order to detect breeding activity.	X			
	BO-CM (appendix B)	All existing raptor nests or other large nests found during preconstruction surveys would be preserved in place, if possible, or relocated if necessary. No relocation of active nests would occur, and no nests would be relocated until after consultation with the Federal action agencies and FWS.	X	X		
	BO-CM (appendix B)	Construction would not take place within 1 mile of occupied northern aplomado falcon nests between January 15 and September 1. Aplomado falcons are frequently observed on their breeding territories in southern New Mexico in January. Therefore, January 15 is the start date for seasonal restrictions.		X		
	BO-CM (appendix C)	Preconstruction desert tortoise surveys would be conducted in suitable habitat. A WEAP that includes information on desert tortoises would be implemented. Any desert tortoises encountered during preconstruction surveys or during construction activities would be handled in accordance with the AGFD "Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects" (AGFD 2007).	X			

The goal of the PCEMs is to reduce or avoid potential environmental impacts resulting from Project-related activities. All PCEMs listed in table 2-8 would be followed on any route selected, as site-specific circumstances dictate. The impact analysis, found in chapter 4, was conducted based on the proposed Project description, including all PCEMs. It is important to note that for the purpose of analyzing impacts, none of these measures are selective.

Application of PCEMs will be considered and authorized, as part of detailed design and included in the final POD and associated Framework Plans. Because the POD and Framework Plans are subject to approval by the BLM authorized officer, and the PCEMs found in table 2-8 are also included in the POD, each PCEM is subject to review and approval by the BLM authorized officer.

BLM requires that a grant holder post a surety bond to ensure compliance with the terms, conditions, and stipulations of the grant, if issued, which would include PCEMs and agency mitigation. The grant authorization, if issued, would be contingent upon Southline's complying with a list of terms, conditions, and stipulations.

2.4.7 Project Design Refinements (Variance Process)

Southline and its construction contractors would conduct all activities associated with the proposed Project within the authorized limits of the ROW. The responsible Project operator would construct, operate, and maintain the facilities, improvements, and structures within the BLM ROW in strict conformity with the final POD approved and made part of the ROW. Any relocation, additional construction, or use on BLM land that is not in accordance with the approved POD (a "variance") would not be initiated without the prior written approval of the authorized officer using a variance request. Any variance request on non-BLM land would have its own approval process. A process for requesting and obtaining variances would be included in the final POD; that process would be detailed in the Environmental Compliance Management Plan.

The variance process, as detailed in the Environmental Compliance Management Plan, would identify how requests to the BLM and Western would be tracked, approved, or not approved, as well as how it would be ensured that the requests have been covered by the analysis in the EIS. 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.

A copy of the complete ROW agreement, including all stipulations and the final approved POD, would be available onsite during construction for all Project components. Minor changes to the approved POD may be necessary to accommodate or mitigate onsite circumstances. When the variance requested is for an action that meets the following criteria: (1) has been assessed in the EIS for the Project, (2) occurs within the area inventoried at the Class III level with no historic properties present, (3), adheres to the BO and amendment conservation measures, including preconstruction species surveys, and (4) has a resulting disturbance area within the existing approved temporary and permanent ROW, then the construction inspection contractor (CIC) would have the authority to approve or deny the variance if authority is delegated by the authorized officer. Enabling the CIC to approve minor variances within areas analyzed for disturbance would expedite the Project while protecting resource values.

When the variance requested is outside an area covered within the EIS and addressed in the ROW grant, approval from the authorized officer would be required. In these cases, additional environmental analysis may be required. If the variance requested would be on non-federal lands (i.e., private, state, county), Southline and its construction contractors would be required to obtain consent from those agencies and landowners separately from this variance process.

Minor changes that occur would not require amending the ROW. The CIC and environmental monitors would review the POD and the area of minor change to identify any additional avoidance concerns. Examples of changes that could be approved by the CIC include the following:

- **Structure locations:** Minor changes include adjustment of structure locations within the approved temporary and permanent ROW to avoid sensitive plant or animal species or sensitive cultural sites.
- **Disturbance areas:** Minor changes include modification of disturbance areas within the authorized ROW and temporary work area boundaries.
- **Power lines:** Minor changes include moving the location of erosion control devices, temporary fences, tensioning locations, temporary work areas, access points to poles/structures, and material storage locations within the authorized ROW and temporary work area boundaries.
- **Access roads:** Minor changes include moving culvert locations to better accommodate natural drainages and meandering roads within authorized ROW to avoid impacts to plants and wildlife, and to use existing previously disturbed roads.

2.5 NO ACTION ALTERNATIVE

In addition to considering the proposed Project, as described in section 2.4, the no action alternative "provides a benchmark, enabling decision makers to compare the magnitude of environmental effects of the action alternatives" (CEQ 1981:question 3) (40 CFR 1502.14). The no action alternative provides the environmental baseline against which the other alternatives are compared.

Under the no action alternative, the BLM would not grant the ROW for construction and operation of the proposed Project. The Project facilities, including transmission lines and substations, would not be built or expanded, and existing land uses and present activities in the analysis area would continue. An amendment to the Mimbres RMP would not be required.

Western would not provide Hoover Act funding and Western would not participate in the proposed Project. It is likely, however, that Southline would pursue the Upgrade Section of the proposed Project under other funding sources. The existing Western 115-kV lines would continue to serve the existing transmission system. However, while the existing Western lines would not be upgraded as part of the proposed Project, upgrades to the existing line are in Western's capital improvement plan. Western could adopt this EIS and determine whether additional supplemental analyses are needed. As noted in section 1.2.2, an upgrade of the existing lines is planned for in Western's 10-year capital improvement plan (Western 2012a) because the lines are old, require an inordinate amount of maintenance, and need to be upgraded, not only because of age but because of increased power demand. Existing customers are currently getting the power they need, but the system is approaching capacity, with little contingency if a major power system link goes down. There may be differences in the timing of upgrading the existing Tucson–Apache and Saguaro–Tucson lines whether it is part of the proposed Project described herein, or as part of Western's 10-year capital plan (Western 2012a). However, the type of upgrades and associated potential impacts are not expected to be materially different.

In terms of new energy generation projects along Western's existing lines, any future energy projects would need to submit an interconnection request to Western, in accordance with Western's Open Access and Transmission Tariff requirements and the Federal Power Act. Western would determine how the new generation project would impact the existing system and determine whether upgrades to the existing transmission system would be required to accommodate the new energy source. A NEPA analysis would be conducted in accordance with DOE NEPA implementing guidelines, and would assess the impacts of

constructing and operating the energy project, which would be enabled by Western's execution of the interconnection agreement and upgrades to their existing transmission system (the Federal actions).

2.6 ACTION ALTERNATIVES

The alternatives development process began with the initial routing efforts completed by Southline to identify the Project used for the BLM ROW grant application, followed by public and agency scoping. Issues noted during public and agency scoping were used to develop agency alternatives. The agency alternatives do not constitute wholesale route alternatives, but rather are local alternatives that provide additional route options addressing specific identified resource issues or issue areas. These processes are described below (see section 2.6.1).

Route variations not included in the Draft EIS are included in the Final EIS for alternatives in route group 2 and route group 4. These route variations include P7a, P7b, P7c, and P7d near Willcox Playa (route group 2) and U3aPC near the Tucson International Airport (route group 4).These variations of routes analyzed in the Draft EIS are included in this Final EIS based on requests from the public and cooperating agencies (see chapter 8).

Names for the various routing alternatives used throughout this EIS are defined as:

- Proponent Preferred – Southline's preferred route as proposed in their ROW grant application (considered a subroute, composed of segments);
- Proponent Alternative – Southline's alternative route as proposed in their ROW grant application (considered a subroute, composed of segments);
- Local alternative – Localized route options proposed by Southline or developed by BLM and Western in coordination with cooperating agencies to address specific resource issues; and
- Route variation – Minor variations in routes developed by BLM and Western in response to comments on the Draft EIS.

2.6.1 Process

Alternatives Developed by Southline

As described in Section 2.2, "Route Selection Process," Southline prepared a routing study to identify viable routes, evaluate potential environmental and land use constraints associated with those routes, and identify the optimal route alternatives for the proposed Project. Through this process, Southline submitted "proponent preferred routes" to BLM for the ROW grant application. The process of preparing the routing study and selecting Southline's preferred routes was needed to develop a Project proposal for review by the agencies and to initiate the NEPA process.

Southline's siting process was iterative, wherein a number of reasonable routes or segments were identified as possible alternatives and then studied using a geographic information system (GIS)-based evaluation process. For the siting process, Southline collected data, identified major on-the-ground features, and coordinated with land management agencies and landowners. Southline also adjusted possible alternative routes in response to input from its stakeholder outreach, and from early outreach with the BLM and Western.

The primary focus of the routing process for the New Build Section was to analyze existing linear facilities to identify and eliminate those initial route segments that did not conform to the overall

objectives of the Project. These included route segments that were duplications of other options that had better overall routing potential, as well as other segments that were unusable because of their alignment/direction.

The screening process was augmented by a public engagement program that was designed to identify stakeholders and to work closely with these stakeholders to discuss the Project and obtain their input to the routing study process through direct interaction with the Project team. This approach was used for both the New Build and Upgrade sections of the line. Through this siting process, Southline ultimately selected a set of preferred alternatives ("Proponent Preferred" and "Proponent Alternative") and eliminated a number of routes, some due to public input and others as a result of constraints or because they did not meet the technical needs of the Project.

Southline's routing process is described in detail in the "Southline Transmission Project Routing Report" (Southline 2012a); the report is available online.[6]

Alternatives Developed by the Bureau of Land Management and Western Area Power Administration

The BLM and Western, in coordination with the interdisciplinary (ID) team and cooperators, developed alternatives to the proposed route in order to address issues raised by Federal land management, State and local agencies, and the public. WWEC data were considered (figures 2-16a and 2-16b), and Southline provided input on the reasonableness and suitability of the BLM- and Western-developed alternatives.

Because Southline's routing process was so interactive and included extensive stakeholder outreach and early screening with Western and BLM, agency alternatives developed through the NEPA process resulted in only small route variations around local resource conflicts. Through the Federal scoping process, routes identified by Southline were considered, and, in some cases, new local alternatives were added, based on the public and agency comments, ID team, and cooperating agency input. The alternatives development process included the evaluation of the following:

- Environmental concerns expressed during scoping, including the potential for major environmental impacts;
- Consideration of the BLM and DOE NEPA guidelines, including recommendation to evaluate or dismiss; and
- Review of all route alternatives and rationale by cooperating agencies and the ID team.

2.7 TRANSMISSION LINE ROUTE ALTERNATIVES

Southline's Proponent Preferred and Proponent Alternative routes were divided into four route groups and then into subroutes within each route group. Route groups were established based on geography, common resource issues, and interconnection points (substations), as shown in figures 2-16a and 2-16b. These four geographic route groups allow for localized comparisons among subroutes and local alternatives.

Transmission line route alternatives developed by the agencies are "local alternative" options that attempt to avoid or minimize negative impacts to specific environmental or socioeconomic conditions. The naming convention and labeling style for each local alternative is based on nearby geographic landmarks (e.g., north of Deming (DN); local alternative No. 1 (DN1)).

[6] Available at: http://www.southlinetransmissionproject.com/files/Routing_Report_AppA_and_Figures_042412_final.pdf.

The four route groups are:

1. Route group 1: Afton Substation to Hidalgo Substation (New Build Section);
2. Route group 2: Hidalgo Substation to Apache Substation (New Build Section);
3. Route group 3: Apache Substation to Pantano Substation (Upgrade Section); and
4. Route group 4: Pantano Substation to Saguaro Substation (Upgrade Section).

Local alternatives were developed consistent with NEPA (40 CFR 1502.14), which requires Federal agencies to "rigorously explore and objectively evaluate" a range of alternatives to the proposed Federal action. In addition, the route alternative alignments were sited to address issues raised by land management agencies, local government, individuals, and organizations. Agency cooperators and the ID team provided input on the reasonableness and suitability of these BLM- and Western-developed local alternatives.

The following considerations were used to further evaluate alternatives:

1. Did the alternative meet the underlying Project stated objectives for the proposed Project?
2. Is the route alternative consistent with the policy objectives for the management of the area (e.g., in conformance with land use plans)?
3. Is it substantially similar in design or does it have substantially similar effects as an alternative that is already being analyzed?
4. Did the route alternative address and resolve resources conflicts and/or identified issues?
5. Did the route alternative cause fewer adverse environmental effects (fewer detrimental effects, less severe effects, or shorter-term effects) than the proposed route for at least some resources?

Some local alternatives were considered but eliminated from detailed study because they do not meet the criteria for a reasonable alternative (listed above). A discussion of alternatives considered but eliminated can be found in section 2.9.

Route groups, subroutes, local routes and route variations are listed in table 2-9, followed by a description of each alternative subroute and local alternative presented by route group. An overview of the route groups and segments is depicted in figures 2-17a through 2-17d; details of the route groups and segments are depicted in figures 2-18a through 2-18j.

Table 2-9. Summary of Route Groups, Subroutes, Route Variations, and Local Alternatives

Subroutes	Total Miles	Segments
Route Group 1: Afton Substation to Hidalgo Substation		
Subroute 1.1, Proponent Preferred	147.1	P1, P2, P3, P4a
Subroute 1.2, Proponent Alternative	141.1	S1, S2, S3, S4, S5, S6, S7, S8
Route Group 1 Local Alternatives	–	DN1, , B, C, D
Route Group 2: Hidalgo Substation to Apache Substation		
Subroute 2.1, Proponent Preferred	95.5	P4b, P4c, P5a, P5b, P6a, P6b, P6c, P7, P8
Subroute 2.2, Proponent Alternative	96.0	E, F, Ga, Gb, Gc, I, J
Route Group 2 Route Variations	–	P7a, P7b, P7c, P7d
Route Group 2 Local Alternatives	–	LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, WC1

Table 2-9. Summary of Route Groups, Subroutes, Route Variations, and Local Alternatives (Continued)

Subroutes	Total Miles	Segments
Route Group 3: Apache Substation to Pantano Substation		
Subroute 3.1, Proponent Preferred	70.3	U1a, U1b, U2, U3a
Route Group 3 Local Alternatives	–	H
Route Group 4: Pantano Substation to Saguaro Substation		
Subroute 4.1, Proponent Preferred	48.3	U3b, U3c, U3d, U3e, U3f, U3g, U3h, U3i, U3j, U3k, U3l, U3m, U4
Route Group 4 Route Variation	–	U3aPC
Route Group 4 Local Alternatives	–	MA1, TH1a, TH1b, TH1c, TH1-Option, TH3-Option A, TH3-Option B, TH3-Option C, TH3a, TH3b

2.7.1 Route Group 1: Afton Substation to Hidalgo Substation

General Description and Issues

This route group falls within the New Build Section. The critical public concerns expressed for the proposed Project in this route group include north-south-trending wildlife linkage and migratory bird pathways, potential habitat fragmentation, potential conflict with national scenic and historic trails, and potential conflict with land uses. Specifically, there are known migration pathways for sandhill crane (*Grus canadensis*) that bisect this area in two general northeast-southwesterly flight paths. In addition, several agency and public comments indicated that the Proponent Alternative (subroute 1.2) traverses largely untouched open space, agricultural areas, and important wildlife habitat.

In addition, this route group crosses near several visually and environmentally important mountain ranges and natural topographic features, such as the Florida Mountains, Potrillo Mountains, Cedar Mountains, Lewis Flats, and Playas Valley, which support important wildlife connections and include the West Potrillo Mountains, Aden Lava Flow, Mount Riley, and Florida Mountains Wilderness Study Areas. Finally, within this route group, the proposed Project and alternative route each cross the Continental Divide National Scenic Trail (CDNST) and the Butterfield Overland Mail and Stage Route/Butterfield Overland Trail National Historic Trail (Butterfield Trail) in three places.

Subroute 1.1, Proponent Preferred

Subroute 1.1 (Proponent Preferred, New Build Section) extends approximately 147 miles between Las Cruces and Lordsburg and generally heads west along I-10 and north around Deming, “ending” just east of Lordsburg at the existing Hidalgo Substation. This route also includes a 31-mile-long, north-south alignment west of the Potrillo Mountains. Subroute 1.1 includes segments P1, P2, P3, and P4a (see figure 2-17a). More than 75 percent of subroute 1.1 is adjacent to, and routed along, linear features such as existing transmission and gas lines (table 2-10).

Table 2-10. Summary of Project Segments in Route Group 1 and Proximity to Existing Linear Infrastructure

Segment	Route Length (miles)	Route Length Paralleling Existing Infrastructure (miles)	Pipelines	Roadways	Railroads	Transmission Lines	SunZia Transmission Line
Subroute 1.1							
P1	5.1	-				X	
P2	102.0	102.0	X		X	X	X
P3	31.1	-					
P4a	8.9	8.9	X		X	X	X
Subroute 1.2							
S1	13.4	-					
S2	11.1	-					
S3	12.9	12.9		X			
S4	10.6	-					
S5	29.7	12.9		X			
S6	7.4	-					
S7	41.5	21.2		X			
S8	14.6	14.6				X	
Route Group 1 Local Alternatives							
DN1	42.5	42.5					X
A	17.5	8.1		X			
B	12.2	12.2		X			
C	9.0	9.0		X			
D	22.8	1.5	X				

The primary segments that comprise the east-west alignment of subroute 1.1 are P2 and P4a. The subroute begins at the Afton Substation, which is located southwest of Las Cruces, New Mexico. The subroute follows an existing EPEC 345-kV transmission line northwest of I-10, past the Aden Hills off-highway vehicle (OHV) area. The subroute then heads north around Deming; from the Deming area, the line follows the existing 345-kV line to the Hidalgo Substation. Segment P2 is located within an existing West-Wide Energy Corridor (segment 81-213) (see figure 2-17a).

Segment P1 is a short (5.1-mile) segment (in and out loop) between the existing Afton Substation and the existing Luna–Diablo 345-kV transmission line (see figures 2-17a and 2-18a). Segment P3 is a 31.1-mile-long connector segment (for interconnection to potential future solar generation), running north-south between I-10 and NM 9, located approximately 9 miles west of the West Potrillo Mountains Wilderness Study Area (WSA) (see figure 2-18b).

No amendment to the Mimbres RMP would be required for subroute 1.1. Subroute 1.1 is the Agency Preferred Alternative, as described in section 2.10.5.

Subroute 1.2, Proponent Alternative

Subroute 1.2 (Proponent Alternative, New Build Section) is a southern alternative for the New Build Section of the Project between the Afton and Hidalgo substations in New Mexico. Subroute 1.2 includes S1, S2, S3, S4, S5, S6, S7, and S8 (see figure 2-17a). Approximately 44 percent of subroute 1.2 is adjacent to, and routed along, existing linear features such as transmission lines and roadways (e.g., Columbus Road and NM 9) (see table 2-10).

Subroute 1.2 extends south and southwest of the existing Afton Substation for approximately 30 miles, crossing the Union Pacific Railroad (UPRR) and NM 9 near the U.S.–Mexico border. The subroute then extends generally west along Columbus Road for another 30 miles across the Doña Ana County–Luna County line to near Columbus, New Mexico. The subroute drops south of the town of Columbus approximately 1 mile north of the international border before paralleling NM 9. The subroute then heads due west, running south of NM 9 before rejoining NM 9 and heading north-northwest for approximately 15 miles to the Luna and Grant county lines. From the county line, the subroute extends west along NM 9 to the intersection of NM 9 and NM 146. From there, the subroute extends northwest for approximately 23 miles to just east of the border of Luna and Grant counties, New Mexico. The final segment (S8) of subroute 1.2 extends north-south toward segment P4a of subroute 1.1. Subroute 1.2 does not itself connect with the Hidalgo Substation. Segment S8 parallels an existing Tri-State Generation and Transmission 230-kV line.

Segments S5, S6, and S7 would cross VRM Class II lands. An amendment to the Mimbres RMP would be required. Where the proposed 200-foot Project ROW crosses VRM Class II lands, the VRM class would be modified and reclassified (see section 2.10.8 for a discussion of proposed plan amendments).

Local Alternatives

Local alternatives within route group 1 include DN1, A, B, C, and D. Local alternative DN1 is a routing option for subroute 1.1, and local alternatives A, B, C, and D are routing options for subroute 1.2.

Local alternatives C and D would cross VRM Class II lands. An amendment to the Mimbres RMP would be required. Where the proposed 200-foot Project ROW crosses VRM Class II lands, the VRM class would be modified and reclassified.

DN1

DN1 is an approximately 43-mile local alternative developed by the BLM and Western. DN1 provides a co-location option with the approved but not yet constructed SunZia Southwest Transmission Line Project (SunZia project). The full length of DN1 (100 percent) would parallel the SunZia project. This local alternative would include a combined ROW with the SunZia project along the SunZia and BLM preferred segments B60, B90, and B120a of the SunZia project. The shared use of 48 miles of ROW for DN1 would result in a minimum common corridor width of 800 feet (400 feet of ROW for the two 500-kV SunZia project lines, in addition to 150 feet of ROW for Southline, separated by a minimum of 250 feet). If for any reason the SunZia project is not constructed, DN1 would be located within a 200-foot corridor like the rest of the New Build Section of the Project. DN1 does not otherwise parallel or follow existing transmission lines, pipelines, or roadways. DN1 is approximately 43 miles long, crossing NM 26 (Hatch Highway), the EPEC 345-kV line, U.S. Route (U.S.) 180, a Public Service Company of New Mexico 230-kV line, and an El Paso Natural Gas Company pipeline (see figure 2-18c).

A

Local alternative A is approximately 18 miles long and would largely follow existing unpaved county roads. Where alternative A intersects NM 9, the alignment turns due west and parallels NM 9, ending approximately 2.5 miles southwest of the East Potrillo Mountains (see figure 2-18a). Local alternative A is an option to provide an alternate location for segments of subroute 1.2 to avoid local environmental conflicts.

B

Local alternative B is approximately 12 miles long and parallels NM 9 for the entire 12 miles, beginning approximately 4 miles east of the Luna and Doña Ana county line (see figure 2-18b). Like local alternative A, local alternative B is an option to provide an alternate location for segments of subroute 1.2 to avoid local environmental conflicts.

C

Local alternative C is approximately 9 miles long and would parallel NM 9 for the entire 9 miles (see figure 2-18d). Like local alternative A, local alternative C is an option to provide an alternate location for segments of subroute 1.2 to avoid local environmental conflicts.

D

Local alternative D is approximately 23 miles long, beginning just east of the Hidalgo and Grant county line in New Mexico (see figures 2-18e and 2-18f). Proceeding northwest, alternative D follows an abandoned railroad bed and crosses the CDNST approximately 2 miles south of Lordsburg. South of Lordsburg, local alternative D turns to the west before proceeding northwest and ending approximately 1 mile north of I-10. The eastern end of local alternative D is located within West-Wide Energy Corridor segment 81-213. Like local alternative A, local alternative D is an option to provide an alternate location for segments of subroute 1.2 to avoid local environmental conflicts.

2.7.2 Route Group 2: Hidalgo Substation to Apache Substation

General Description and Issues

This route group falls within the New Build Section. The Lordsburg and Willcox playas were identified as important waterfowl destinations (for both wildlife and ecotourism/birders). The Lordsburg Playa is the only known location in New Mexico for the Lynch tadpole shrimp (*Lepidurus lemmoni*) and the Bowman's fairy shrimp (*Streptocephalus thomasbowmani*) and is a designated recreation management area (RMA). In the area of the Willcox Playa there are migratory birds, including sandhill crane, particularly in the Sulphur Springs Valley, along with western burrowing owl (*Athene cunicularia*) habitat. In addition, portions of the Willcox Playa have been used both by the military (portions are currently under a military withdrawal) and by the public for recreational and community events. Therefore, route alternatives that avoid direct impacts to both playas were included in this route group.

In addition, this route group includes several visually and environmentally important mountain ranges such as the Peloncillo Mountains (west of Lordsburg); Pinaleño Mountains (west of Lordsburg and north of Willcox); and Dos Cabezas and Chiricahua mountains (east and south of Willcox), which support wildlife connections and habitat of bighorn sheep and mule deer, as well as other sensitive species.

Subroute 2.1, Proponent Preferred

Subroute 2.1 (Proponent Preferred, New Build Section) extends from roughly the Hidalgo Substation located north of Lordsburg to the Afton Substation through southwestern New Mexico and southeastern Arizona (see figures 2-18f through 2-18h). Subroute 2.1 includes segments P4b, P4c, P5a, P5b, P6a, P6b, P6c, P7, and P8. 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 (table 2-11).

Table 2-11. Summary of Project Segments in Route Group 2 and Proximity to Existing Linear Infrastructure

Segment	Route Length (miles)	Route Length Paralleling Existing infrastructure (miles)	Pipelines	Roadways	Railroads	Transmission Lines	SunZia Transmission Line
Subroute 2.1							
P4b	13.9	-					
P4c	1.9	-					
P5a	9.6	9.6	X				
P5b	21.1	21.1	X	X			
P6a	0.9	0.9	X				
P6b	22.5	22.5	X	X			
P6c	2.8	2.8	X				
P7	22.3	22.3	X			X	
P8	0.5	0.5		X			
Subroute 2.2							
E	31.8	4.6		X	X		
F	25.3	25.3		X	X	X	
Ga	25.7	13.2	X			X	X
Gb	1.1	-					
Gc	7.4	7.4		X		X	
I	2.3	-					
J	2.3	2.3	X				
Route Group 2 Route Variations							
P7a	31.2	24.3	X	X		X	
P7b	10.5	6.2		X			
P7c	1.0	1.0		X			
P7d	2.0	2.0		X			

Table 2-11. Summary of Project Segments in Route Group 2 and Proximity to Existing Linear Infrastructure (Continued)

Segment	Route Length (miles)	Route Length Paralleling Existing infrastructure (miles)	Pipelines	Roadways	Railroads	Transmission Lines	SunZia Transmission Line
Route Group 2 Local Alternatives							
LD1	35.4	24.9	X	X	X		
LD2	8.9	-					
LD3a	26.6	17.4	X			X	X
LD3b	2.2	-					
LD4	53.7	53.7				X	X
LD4-Option 4	6.4	1.6				X	
LD4-Option 5	12.3	12.3	X			X	
WC1	14.8	2.4		X			

Beginning about north of Lordsburg, subroute 2.1 departs the existing 345-kV transmission line and extends roughly 14 miles west and south around Lordsburg (segment P4b). The subroute then heads west for approximately 30 miles (segments P5a and P5b) across the New Mexico–Arizona state line to an intersection with I-10 west of San Simon, Arizona (near milepost (MP) 383 on I-10). Once the subroute crosses I-10, it extends another 25 miles due west (segments P6b and P6c), where it intersects an existing SWTC 230-kv line. From this area northeast of Willcox, the subroute extends south and then southwest around the east side of the Willcox Playa; this segment is P7, which measures approximately 22 miles (see figure 2-18h).

No amendment to the Mimbres RMP would be required for subroute 2.1. Subroute 2.1 is the Agency Preferred Alternative, as described in section 2.10.5.

Subroute 2.2, Proponent Alternative

Like subroute 2.1, subroute 2.2 (Proponent Alternative, New Build Section) would connect the Hidalgo and Apache substations. Subroute 2.2 includes segments E, F, Ga, Gb, Gc, I, and J (see figures 2-18f through 2-18h). Subroute 2.1 would require use of segments P4a, P4b, and P4c (from subroute 2.1) to connect to the Hidalgo Substation. More than 55 percent of subroute 2.2 is adjacent to, and routed along, linear features such as existing transmission lines (see table 2-11).

Subroute 2.2 starts south of the Lordsburg Playa and extends 32 miles (segment E) across the New Mexico–Arizona state line to an area north of San Simon, Arizona. From the San Simon area, the subroute would extend west-northwest, roughly paralleling two existing 230-kV transmission lines for 25 miles (segment F) to an area north of the Dos Cabezas Mountains.

Segments Ga, Gb, and Gc head northwest, west, and then south to provide a western route around the Willcox Playa. Portions of segments Ga and Gc parallel TEP 345-kV and APS 69-kV lines (see figures 2-18f through 2-18h).

No amendment to the Mimbres or Safford RMPs would be required for subroute 2.2 or any of the local alternatives described below, except LD2.

Route Variations

Route variations new to the EIS and located within route group 2 include P7a, P7b, P7c, and P7d. These four options were developed to allow for a viable route to be considered, if a conflict was discovered. These are described below.

P7A

P7a is approximately 31 miles long and would stretch from segment P7 near the northeastern edge of Willcox Playa south to Kimzey Road (see figure 2-18h). Almost 80 percent of P7a is adjacent to, and routed along, existing linear features, most of which are pipelines or roadways (see table 2-11). Leaving P7 from the north, P7a would generally follow an existing El Paso Natural Gas line for approximately 10 miles then run north-south along Narita Lane to Kimzey Road. From the intersection of Narita Lane and Kimzey Road, P7a would run west for approximately 4 miles along Kimzey Road before turning south and west again around a center pivot agricultural field. P7a would run west to the Apache Substation for a distance of approximately 8 miles. This route variation was developed to avoid potential avian and wildlife recreation impacts along segment P7 within subroute 2.1.

P7B

P7b is a connection option on the east side of Willcox Playa. P7b is approximately 11 miles long, and instead of running along Narita Lane, it would run north-south along Wayward Winds Road for approximately 6.5 miles (see figure 2-18h). It would then turn west along Chambers Road before turning south along Tall Grass Road. This route variation was developed to avoid potential avian and wildlife recreation impacts along segment P7.

P7C

P7c is a short, approximately 1-mile-long, east-west connection option along Chambers Road (see figure 2-18h). This route variation was developed to avoid potential avian and wildlife recreation impacts along segment P7.

P7D

P7d is a short, approximately 2-mile-long, north-south connection option between Narita Lane and Tall Grass Road (see figure 2-18h). This route variation runs along existing roadways and was developed to avoid potential avian and wildlife recreation impacts along segment P7.

Local Alternatives

Local alternatives within route group 2 include LD1, LD2, LD3a, LD3b, LD4, LD4-Option 4, LD4-Option 5, and WC1 (see figure 2-17b).

LD1

LD1 is approximately 35 miles long, 98 percent of which is adjacent to, and routed along, existing linear features (see table 2-11). LD1 begins at the existing El Paso Natural Gas pipeline, approximately 1 mile north of I-10, east of the Lordsburg Playa, then proceeds to the southwest across the Peloncillo Mountains and into Arizona, following I-10 and two existing El Paso Natural Gas pipelines. LD1 continues to follow

I-10, turning to the northwest upon entering Arizona, to the town of San Simon. LD1 ends on the south side of I-10, approximately 7 miles northwest of the town of San Simon at MP 373 (see figure 2-18f). LD1 was developed to avoid crossing through the Lordsburg Playa.

LD2

LD2 is approximately 9 miles long, beginning approximately 6 miles northwest of Lordsburg. LD2 does not follow existing transmission lines or pipelines. LD2 proceeds to the southwest, between the smaller northern playa and the larger, southern playa that form Lordsburg Playa. LD2 ends approximately 4 miles east of the Arizona border, 7 miles north of I-10 (see figure 2-18f). Like LD1, LD2 was developed to avoid impacts to the Lordsburg Playa by crossing between the north and south playas.

Local alternative LD2 would cross VRM Class II lands. An amendment to the Mimbres RMP would be required. Where the proposed 200-foot Project ROW crosses VRM Class II lands, the VRM class would be modified and reclassified. Additionally, where the proposed 200-foot Project ROW would parallel the Butterfield Trail along local alternative LD2, the ROW avoidance area stipulation in the Mimbres RMP would be modified.

LD3A AND LD3B

LD3a and LD3b were developed to avoid the Lordsburg Playa by being routed around the north side of the playa. LD3a and LD3b head generally west and then south down to segment P5b from the Proponent Preferred (subroute 2.1) (see figure 2-18f). Segment LD3a is approximately 27 miles, 17 of which parallel existing linear features; LD3b measures roughly 2 miles.

As described in the Draft EIS, a portion of local alternative LD3a crossed VRM Class II lands; however, for this EIS, LD3a has been slightly shifted to the east to avoid potential VRM Class II conflicts. As analyzed in this EIS, no amendment to the Mimbres RMP would be required because LD3a does not intersect any VRM Class II lands. Local alternatives LD3a and LD3b form part of the Agency Preferred Alternative, as described in section 2.10.5.

LD4

Like DN1, LD4 is a local alternative developed by the BLM and Western that provides a co-location option with the not yet constructed SunZia project. LD4 is approximately 54 miles long, beginning 3 miles east of the Peloncillo Mountains and Arizona border. LD4 does not follow existing transmission lines or pipelines as it traverses the Peloncillo Mountains and the San Simon Valley in Graham County, Arizona. Approximately 3 miles east of U.S. 191, LD4 intersects an existing TEP 345-kV line and turns to the southwest, following this transmission line across the southern foothills of the Pinaleño Mountains, ending where it intersects segment Ga of the Proponent Alternative (see figures 2-18f and 2-18g). LD4 would include the shared use of approximately 50 miles of ROW with the not yet constructed SunZia project, measuring 800 to 1,400 feet or more in width.

LD4-Option 4

LD4-Option 4 is approximately 6 miles long, beginning in the southern foothills of the Pinaleño Mountains in Graham County, Arizona. Proceeding due south across I-10, LD4-Option 4 intersects and follows the existing SWTC 230-kV line and ends 1 mile south of I-10 at the northwest corner of the Dos Cabezas Mountains, 6 miles northeast of Willcox (see figure 2-18g).

LD4-Option 5

LD4-Option 5 follows an existing SWTC 230-kV line and is approximately 12 miles long. This local alternative runs roughly southwest between LD4 and P6c (see figure 2-18g).

WC1

WC1 is a local alternative developed by the BLM and Western that measures approximately 15 miles long. WC1 would roughly parallel I-10 (but would not be located within the ROW) (see figure 2-18g). This local alternative was developed to avoid potential avian and wildlife recreation impacts along segment P7 within subroute 2.1.

2.7.3 Route Group 3: Apache Substation to Pantano Substation

General Description and Issues

The Apache to Pantano route group falls within the Upgrade Section and extends west from the Apache Substation beyond the town of Benson just across the Pima County line (see figure 2-17c) to the Pantano Substation. Issues within this route group largely include conflicts with potential land development (e.g., residential development) to the north of Benson, as well as the existing aviation facility (Benson Municipal Airport), the proposed extension of State Route (SR) 90 north through Benson, and the San Pedro River. Sensitive environmental issues within the Apache to Pantano route group include wildlife linkages between the Rincon Mountains and the Santa Rita and Whetstone mountains. Additionally, potential electromagnetic interference (EMI) issues have been identified at the Fort Huachuca Buffalo Soldier Electronic Testing Range (BSETR), which includes the town of Benson and surrounding areas north and south of I-10.

Subroute 3.1, Proponent Preferred

Subroute 3.1 (Proponent Preferred, Upgrade Section) extends from Apache Substation to the Pantano Substation, connecting to the Adams Tap Substation east of Benson. Subroute 3.1 includes segments U1a, U1b, U2, and U3a. One-hundred percent of subroute 3.1 is the existing Western 115-kV line (table 2-12).

Table 2-12. Summary of Project Segments in Route Group 3 and Proximity to Existing Linear Infrastructure

Segment	Route Length (miles)	Route Length Paralleling Existing infrastructure (miles)	Pipelines	Roadways	Railroads	Transmission Lines	SunZia Transmission Line
Subroute 3.1							
U1a	16.1	16.1	X			X	
U1b	2.9	2.9	X			X	
U2	15.8	15.8	X			X	
U3a	35.6	35.6				X	
Route Group 3 Local Alternative							
H	19.3	19.3				X	

Beginning at the existing Apache Substation near the community of Cochise, Arizona, the proposed route includes the upgrade of the existing Western 115-kV line as it exits the Apache Substation and heads due west, approximately 1 mile south of the community of Dragoon. This stretch of the proposed route crosses approximately 0.5 mile of the Coronado National Forest. The proposed route crosses the existing UPRR at Dragoon Wash, where it turns to the northeast until it connects to the existing Adams Tap Substation. It crosses I-10 at MP 314, approximately 20 miles west of the Apache Substation. From the Adams Tap Substation, located north of I-10 and west of Z R Ranch Road (exit 312 on I-10), the proposed route continues west, extending another 20 miles to north of the town of Benson and north of I-10 until the line crosses south of I-10 at MP 296 near the Pima and Cochise county line. This stretch of the Proponent Preferred alternative includes segments U1a, U1b, and U2 (see figures 2-17c, 2-18h, and 2-18i).

No amendment to the Safford, Las Cienegas, or Phoenix RMPs would be required for subroute 3.1. Subroute 3.1 is the Agency Preferred Alternative, as described in section 2.10.5.

Local Alternatives

There is one local alternative within route group 3. Local alternative H was developed by Southline as a local option around the north side of the town of Benson (see figure 2-17c).

H

Alternative H is approximately 19 miles long and begins at Sheep Wash, approximately 1 mile north of I-10. From Sheep Wash, Alternative H travels in a northeastern direction along the existing Western 115-kV line, then turns due west across the San Pedro River valley. Alternative H turns due south for 2 miles, approximately 2 miles northwest of the Benson Municipal Airport. Alternative H turns due west, paralleling the UPRR for 5 miles before turning due south and crossing I-10, approximately 2 miles west of the town of Mescal. Alternative H ends approximately 1 mile east of the Pima and Cochise county line (see figures 2-18h and 2-18i). Local alternative H is an option to provide an alternate location for segments of subroute 3.1 to avoid housing and development in the Benson area. One-hundred percent of local alternative H is adjacent to, and routed along, existing transmission or railroad lines.

2.7.4 Route Group 4: Pantano Substation to Saguaro Substation

General Description and Issues

The Pantano to Saguaro route group falls within the Upgrade Section and extends through the greater Tucson metropolitan area including several sensitive environmental, socioeconomic, and land use areas. Important environmental issues in this area include potential conflicts with the historic Tumamoc Hill area in Tucson, crossing Pima County Conservation Lands System lands like Bar V Ranch, riparian habitat along the Santa Cruz River, potential visual conflict within close proximity to established residential areas in Tucson and surrounding communities, and potential conflict with scenic trails such as the Arizona National Scenic Trail (Arizona NST) and Juan Bautista de Anza National Historic Trail (Anza NHT), as well as with the Pinal and Marana aviation facilities.

Subroute 4.1, Proponent Preferred

Subroute 4.1 (Proponent Preferred, Upgrade Section) extends from the Pantano Substation to the Saguaro Substation, connecting to the Nogales, Vail, Del Bac, DeMoss Petrie, Tucson, Rattlesnake, Marana,

Tortolita, and Saguaro substations (see figure 2-17d). Subroute 4.1 includes segments U3b, U3c, U3d, U3e, U3f, U3g, U3h, U3i, U3j, U3k, U3l, U3m, and U4. One-hundred percent of subroute 4.1 is the existing Western 115-kV line (table 2-13).

Table 2-13. Summary of Project Segments in Route Group 4 and Proximity to Existing Linear Infrastructure

Segment	Route Length (miles)	Route Length Paralleling Existing infrastructure (miles)	Pipelines	Roadways	Railroads	Transmission Lines	SunZia Transmission Line
Subroute 4.1							
U3b	0.5	0.5		X		X	
U3c	1.0	1.0				X	
U3d	3.4	3.4				X	
U3e	0.9	0.9				X	
U3f	0.7	0.7				X	
U3g	0.9	0.9				X	
U3h	1.1	1.1				X	
U3i	18.2	18.2				X	
U3j	0.9	0.9				X	
U3k	16.7	16.7				X	
U3l	1.6	1.6	X			X	
U3m	0.6	0.6				X	
U4	1.9	1.9		X		X	
Route Group 4 Route Variation							
U3aPC	6.2	5.0		X		X	
Route Group 4 Local Alternatives							
MA1	1.1	0.5		X			
TH1a	1.4	1.4	X	X			
TH1b	1.6	0.8	X	X			
TH1c	0.3	-					
TH1-Option	1.0	1.0		X			
TH3-Option A	0.8	0.8		X			
TH3-Option B	0.8	-					
TH3-Option C	1.8	1.8		X			
TH3a	2.7	2.7		X			
TH3b	4.5	4.5		X			

From the Pima and Cochise county line, the existing Western line exits the Pantano Substation and proceeds northwest to the Nogales Substation for a distance of approximately 30 miles. This portion of the route is located south of Vail and south of I-10. In this area, the proposed route includes a 2-mile-long, north-south connection to the existing Vail Substation (segment U4); the existing Vail Substation is located southwest of I-10 near MP 273, west of Rita Road.

From the Nogales Substation, located south of MP 272 on I-10 on Wilmot Road, the proposed route extends approximately 8 miles, where it crosses the Nogales Highway. It then heads north-northwest for approximately 4 miles around the Tucson International Airport, where it crosses to the west side of I-10 near downtown Tucson before connecting to the existing Del Bac Substation on the north side of Valencia Road and west of I-19. From the Del Bac Substation, the proposed route (segments U3b–h) heads northwest and north across Tumamoc Hill for approximately 10 miles. It then heads back across I-10 to the east side, connecting to the Tucson Substation north of Grant Road and east of Flowing Wells Road. From the Tucson Substation, the route extends west 0.5 mile, crossing I-10 and then running north-northwest through the Silverbell Golf Course. It roughly parallels the Silverbell Road alignment for approximately 18 miles until it connects with the existing Rattlesnake Substation (segment U3i). From the Rattlesnake Substation at Twin Peaks and Sandario roads, the route extends approximately 9 miles northwest to connect with the existing Marana Substation near Trico and Marana roads (segments U3j and U3k). From the Marana Substation, the route extends an estimated 9 miles north-northwest around the west side of the Pinal Airpark. From there, the route turns sharply east-northeast, extending approximately 5 miles to connect to the existing Saguaro Substation on the west side of I-10 just north of MP 229 (segments U3l and U3m) (see figure 2-17d).

No amendment to the Tucson or Phoenix RMPs would be required for subroute 4.1 or any of the local alternatives described below.

Route Variations

One route variation, segment U3aPC, is new to the EIS and is located within route group 4. A description follows.

U3APC

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. U3aPC would run north off of segment U3a for 1 mile on the west side of the Arizona State Prison in Tucson and then head west for roughly 5 miles along Old Vail Road. U3aPC would connect to segment U3 just of Nogales Highway (see figure 2-18i). Route variation U3aPC is the Agency Preferred Alternative, as described in section 2.10.5.

Local Alternatives

All of the local alternatives within route group 4 were developed by BLM and Western. These local alternatives include TH1a, TH1b, TH1c, TH1-Option, TH3-Option A, TH3-Option B, TH3-Option C, TH3a, TH3b, and MA1 (see figure 2-18j).

The nine local alternatives beginning with “TH” are various options for replacing the portion of the existing Western line that crosses over Tumamoc Hill in Tucson (see figure 2-18j). All but two of the “TH” local alternatives follow existing linear features (see table 2-13).

TH1A

TH1a is over 1 mile long; it is located along the western boundary of Tumamoc Hill, beginning at the corner of West Starr Pass Boulevard and South La Cholla Boulevard. TH1a turns to the north, paralleling South Greasewood Road and ending at West Anklam Road, where it connects to TH1B. Local alternative TH1a forms part of the Agency Preferred Alternative, as described in section 2.10.5.

TH1B

TH1b is approximately 2 miles long, beginning at the intersection of West Anklam Road and North Greasewood Road, just west of Pima Community College–West Campus. Proceeding north, TH1b parallels North Greasewood Road, turning east at West Speedway Boulevard. TH1b crosses to the north side of West Speedway Boulevard and ends northwest of the intersection of West Speedway Boulevard and North Silverbell Road, where it connects to TH1C.

TH1C

TH1c is less than 0.5 mile long and begins northwest of the intersection of West Speedway Boulevard and North Silverbell Road. It proceeds east across North Silverbell Road and ends just west of the El Rio Golf Course's western boundary, where it connects back to the Proponent Preferred segment U3h.

TH1-OPTION

TH1-Option is 1.0 mile long and begins at the northwest corner of Tumamoc Hill, at the intersection of West Anklam Road and South Greasewood Road. It proceeds east along St. Mary's Road and connects back to the Proponent Preferred segment U3g. Local alternative TH1-Option forms part of the Agency Preferred Alternative, as described in section 2.10.5.

TH3-OPTION A

TH3-Option A is approximately 1 mile long, beginning along the east banks of the Santa Cruz River, 0.5 mile north of West Drexel Road. Proceeding north, TH3-Option A follows the existing Western 115-kV line across West Irvington Road, ending in the Santa Cruz River 0.25 mile north of West Irvington Road, where it connects to TH3-Option C.

TH3-OPTION B

TH3-Option B is approximately 1 mile long, beginning just northeast of the intersection of West Irvington Road and South Mission Road, 3 miles south of Tumamoc Hill. TH3-Option B proceeds northeast along an existing drainage channel, ending at the Santa Cruz River, where it connects to TH3-Option C.

TH3-OPTION C

TH3-Option C is approximately 2 miles long, beginning in the Santa Cruz River 0.2 mile north of West Irvington Road. Proceeding north, TH3-Option C follows the Santa Cruz River's west bank. It crosses West Ajo Way and ends approximately 0.6 mile southwest of the intersection of I-10 and I-19 in the Santa Cruz River bed, where it connects to TH3B.

TH3A

TH3a is approximately 3 miles long, beginning just north of West Drexel Road and the I-19 intersection. TH3a proceeds north and parallels the west side of I-19 along the existing Western 115-kV line, ending 0.6 mile southwest of the intersection of I-10 and I-19 in the Santa Cruz River bed, where it connects to TH3B.

TH3B

TH3b is approximately 5 miles long, beginning in the Santa Cruz River bed. It proceeds north and follows the Santa Cruz River as it continues north along the I-10 corridor. TH3b ends 0.25 mile southwest of the West Grant Road and I-10 interchange in the Santa Cruz River bed, where it connects back to Proponent Preferred segment U3i.

MA1

MA1 was developed to avoid future expansion of the Marana Regional Airport and provides an angular connection (L-shaped) west of the existing Western line. MA1 is approximately 1 mile long and is located southwest of the Marana Regional Airport. MA1 traverses agricultural fields before turning north on North Sanders Road, ending just south of West Avra Valley Road (see figure 2-18i). Local alternative MA1 forms part of the Agency Preferred Alternative, as described in section 2.10.5.

2.8 SUBSTATION ALTERNATIVES

There are two substation alternatives proposed by Southline; they are options for the location of the proposed Midpoint Substation, located within route group 1. The proposed Midpoint Substation would interconnect segment P3, either at the north or south end of segment P3, to the Project and would be built when needed to connect future generation along segment P3.

The proposed Midpoint North Substation would be located at the north end of P3 and north of I-10 in Luna County, New Mexico (see figure 2-18b). The proposed Midpoint South Substation would be located at the south end of P3, south of NM 9 in Luna County, New Mexico (see figure 2-18b).

2.9 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

This section describes the route alternatives to the proposed Project that were considered but are proposed for elimination from detailed analysis. As a requirement of CEQ regulations, an EIS must “rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their having been eliminated” (40 CFR 1502.14(a)).
The BLM NEPA Handbook (H-1790-1, Section 6.6.3 (BLM 2008b)) states that an alternative can be dismissed from detailed analysis if:

- it is ineffective (it would not respond to the stated objectives);
- it is technically or economically infeasible;
- it is inconsistent with the basic policy objectives for the management of the area (such as not being in conformance with the land use plan);
- its implementation is remote or speculative;

- it is substantially similar in design to an alternative that is proposed for detailed analysis; and/or
- it would have substantially similar effects as an alternative that is proposed for detailed analysis.

Southline's routing process (Southline 2012a) included an extensive screening of route options throughout the routing study area that were ultimately dropped from consideration. Although those routes are not described in this section as they were part of Southline's pre-NEPA screening process, it is worth noting that those alternatives were considered and eliminated due to environmental and technical constraints, pre-NEPA stakeholder outreach, and early discussions with BLM and Western, detailed in the project routing report (Southline 2012a). BLM and Western were aware of, and involved in, Southline's pre-NEPA routing efforts and are knowledgeable regarding why other routes were eliminated. After further review of constraints and other routing possibilities, the agencies did not identify any viable major new routes that had not been previously reviewed by Southline; they did, however, identify local alternatives around particular resource issues.

The overall approach to the alternatives development process included the following primary elements and assumptions:

1. Consideration of each agency's purpose and need (see section 1.2);
2. Consideration of the applicant objectives (see section 1.3);
    - Including applicant objective to connect to all 14 substations as a requirement in terms of being connection points for the proposed Project. These are the fixed points that form the beginning and end of the study area and indicate where the transmission line routes would connect. In essence, transmission line routes must connect to all 14 substations proposed as part of the Project.

The overall objectives of the alternatives development process were to:

1. Evaluate potential resource conflicts for the proposed Project or proposed Project alternatives, as presented to the public during scoping in spring 2012.
2. Evaluate previous routing efforts by the applicant (see section 2.2.1) and determine whether those routes resolved any issues or potential resource conflicts identified by the public, agency ID team, or cooperating agencies.
3. Ensure that alternatives analyzed in detail resolve resource conflicts and are responsive to the agency's purpose and need and applicant objectives.

As described above, input from the public and various agencies resulted in the addition, modification, or elimination of alternative transmission line routes. Following is a summary of the local alternatives considered but eliminated from detailed study in this EIS.

2.9.1 Transmission Line Route Alternatives

The following discussion provides a summary and rationale of six local alternatives for the Project (figures 2-19a and 2-19b) that were considered but eliminated from detailed analysis based on the criteria from the BLM NEPA Handbook listed above. No alternatives in route group 1 were eliminated from detailed analysis.

Alternatives Eliminated in Route Group 2

One local alternative was eliminated in route group 2: DC1. This local alternative, and the rationale for its elimination from detailed analysis, is provided below.

DC1

Dos Cabezas 1 (DC1) was developed in response to comments from the public expressing concerns about avian and wildlife conflicts along the southeast edge of the Willcox Playa. DC1 would start southwest of the Lordsburg Playa and extend approximately 58 miles[7] west-southwest through the Dos Cabezas Mountains along an existing natural gas pipeline ROW. DC1 would have shifted the route south across the San Simon and Sulphur Springs valleys, across somewhat mountainous terrain and through rural and semi-primitive motorized areas on the east and west side of the Dos Cabezas Mountains. DC1 would have avoided the Willcox Playa and irrigated agricultural areas, following what is now one of the route variations (P7a) just south of Narita Lane and Arzberger Road west into the Apache Substation.

On the east side of the Dos Cabezas Mountains, DC1 would have traversed San Simon Valley. No other development or linear infrastructure is located in this valley, with the exception of two parallel gas lines along one of which DC1 would have been routed. As such, San Simon Valley consists of relatively unfragmented wildlife habitat. Through the Apache Pass just south of the Dos Cabezas Mountains, DC1 would have paralleled the existing gas pipelines as they weave through the Dos Cabezas Mountains, just north of the Fort Bowie National Scenic Historic Site and Bowie Mountains Scenic Area of Critical Environmental Concern (ACEC). Through Apache Pass, the route would have paralleled or passed by Fort Bowie, Apache Pass Road, the two gas lines, and a distribution line; the surrounding Dos Cabezas Mountains are relatively undisturbed. As such, nearly 90 percent of DC1 would have traversed a generally undeveloped, unfragmented landscape, generally similar to the landscape along subroute 2.1 and 2.2.

The AGFD expressed concerns during alternatives development that DC1 cut through mountainous, undeveloped terrain between the Dos Cabezas and Chiricahua mountains and they encouraged avoidance of such habitat by new infrastructure development. According to the AGFD, this alternative would pass through areas ranked very highly in the State Wildlife Action Plan.

In comparison, subroutes 2.1 and 2.2 would have paralleled other aboveground infrastructure such as existing transmission lines and the interstate (I-10). Therefore, these routes would be located in areas that have already been impacted by a combination of highways, transmission and distribution lines, railroads, and gas lines.

DC1 would have connected to LD1 at the east end of the proposed Project and into the Apache Substation at the west end. In combination with a portion of LD1, DC1 would have replaced segments P5a, P5b, P6a, P6b, P6c, P7, and P8 from subroute 2.1 and been roughly 10 miles shorter than subroute 2.1. Like route variation P7a, DC1 would have minimized potential avian impacts along segment P7 at Willcox Playa. Although DC1 would have presented a shorter option for the proposed Project, the BLM Safford Field Office expressed concerns that the benefits of DC1 to those avian and wildlife resources associated with the Willcox Playa did not offset or outweigh the potential wildlife conflicts in the Dos Cabezas Mountains and through the Apache Pass. For the concerns mentioned above, the BLM eliminated this alternative because it would have offered no environmental advantage over the action alternatives in route group 2.

Alternatives Eliminated in Route Group 3

Two local alternatives were eliminated in route group 3: BE1 and BE2. These two local alternatives, and the rationale for their elimination from detailed analysis, are provided below.

[7] Please note that the alignment in the Final EIS (figures 2-19a and 2-19b) is modified from what was depicted in the Draft EIS. The alignment in the Final EIS is a correction.

BE1

Benson 1 (BE1) was developed in response to comments from the public expressing concerns about potential private land and residential, as well as aviation facility (airport), conflicts near the town of Benson, Arizona, and initial concerns from DOD, as well as Cochise County and the City of Sierra Vista regarding interference in BSETR. Like DN1 and LD4, BE1 would have provided an opportunity to collocate a portion of the not yet constructed SunZia project with the Southline Project. BE1 would have gone to the north of Benson and avoided proposed future development, an aviation facility, and the proposed extension of SR 90. BE1 would have been constructed in addition to upgrading 35 miles of Western's existing 115-kV transmission line.

Of the 44-mile route, BE1 would have included the shared use of 26.5 miles of ROW with the not yet constructed SunZia BLM preferred alternative, along with two TEP Springerville–Vail 345-kV lines. These three transmission projects would form one corridor through the BSETR. The total minimum ROW width along this 26.5-mile stretch would have been 1,400 feet. The remaining 17.5 miles of the 44-mile route would not share the corridor with the SunZia BLM preferred alternative but would still parallel the two TEP Springerville–Vail 345-kV lines. The total minimum ROW width along this 17.5-mile stretch would be 750 feet.

BE1, like other action alternatives in route group 3, would cross through the BSETR. Although initially developed to potentially address concerns regarding EMI at the BSETR, later discussions with the military concluded that the combination of the not yet constructed SunZia project, Southline Project, new TEP line, and the existing two TEP 345-kV lines would result in more EMI than upgrading the existing Western line. Although BE1 would move the line toward the north end of the testing range, the combined impact of placing the five lines together in a common corridor has not been studied but would risk the creation of more EMI within the testing range. Additionally, the military indicated that they use the far northern part of the range for many testing efforts.

The DOD preferred the BE1 alignment during early alternatives discussions with cooperating agencies because it is the farthest north within the BSETR and away from testing sites near Willcox Playa (DOD 2013). However, the BE1 option still would require a connection to Apache Substation and upgrade of the section of existing Western line across the BSETR west of Apache Substation. As such, BE1 would actually result in both a new transmission line and an upgraded transmission line crossing the BSETR, a worse scenario for the DOD. The upgrade of the existing Western transmission line would change the electronic signature of that line, and a new potential source of interference would be created by the additional line or lines in the BE1 location. Southline's proposed route would entail only upgrading Western's line in the same location. The location of potential interference would not change, and is already accounted for by the military. The level of interference could actually decrease, compared with the existing line, as the new line would be of modern design to reduce EMI, the new line would be tighter with no electrical arcing, and the conductors would be cleaner with fewer nicks and less of the wear-and-tear damage that increases EMI. The Electronic Proving Ground (EPG) has provided recommended mitigation, incorporated into this EIS, and indicated that they do not have issues with the current Western 115-kV line being upgraded in its existing path (Roxberry 2013).

BE1 could also lead to more total disturbed area, greater vegetation impacts, and a higher risk of cultural resources impacts due primarily to the additional miles of transmission line and the need for two new crossings of the San Pedro River, compared with the upgrade of a single existing crossing. The five lines (TEP, SunZia, and Southline) would cross the San Pedro River together between the Little Rincon Mountains and Johnny Lyon Hills through the Middle San Pedro River valley in a common 1,400-foot-wide ROW. Several resource conflicts are noted in the SunZia Final EIS (BLM 2013a) regarding

potential impacts to the Middle San Pedro River valley, including impacts to conservation lands along the San Pedro River, riparian birds, and multiple threatened and endangered species in this area.

BE1 also poses potential conflicts with areas identified as critical by the AGFD in the "State Wildlife Action Plan" (2012a). AGFD also expressed concerns about impacts crossing the south end of the Winchester Mountains and crossing the San Pedro River in this location. These critical areas include wildlife links between the Rincon, Santa Rita, and Whetstone mountains; these linkages are designated to maintain connectivity for more than 20 sensitive species of wildlife with habitat and migration patterns between the mountains.

For the potential technical and environmental considerations mentioned above, this alternative was eliminated because it would have presented military operations concerns and because environmental impacts would be higher, thus offering no environmental advantage over the action alternatives in route group 3.

BE2

Similar to BE1, BE2 was developed in response to comments from the public expressing concerns about being too close to future development in and around Benson, existing aviation facilities, and wildlife linkages. BE2 would have been constructed in addition to upgrading 20 miles of Western's existing 115-kV transmission line.

BE2 would have included the construction of two transmission line segments to meet technical requirements for transmission connection. One double-circuit 345-kV line would be needed between I-10 and Apache Substation to interconnect with the New Build Section of the proposed Project, and a second 230-kV line would be needed to interconnect the Upgrade Section of the proposed Project with the Apache Substation. In total, BE2 would be 26 miles long and would have replaced 20 miles of subroute 3.1 between the Apache and Adams Tap substations. BE2 would have required additional crossovers, complicating the approach to the substation. This alternative route would have gone north of the Apache Substation along U.S. 191 to I-10 before heading southwest along the I-10 corridor from the Willcox Playa to Adams Tap Substation.

Like BE1, BE2 would cross through the BSETR, and if BE2 were selected, Western would not be able to remove its existing line segment due to the need to remain connected to the rest of the system. Therefore, current EMI along the Western line would continue and potentially increase when Western later elects to upgrade the existing line to 230-kV on its own as part of its capital improvement program (as discussed in the no action alternative).

For the potential technical considerations mentioned above, this alternative was eliminated because it would have offered no environmental advantage over the action alternatives in route group 3, in particular because of BSETR and EMI conflicts and because the existing Western lines would not be removed.

Alternatives Eliminated in Route Group 4

Two local alternatives were eliminated in route group 3: TU1 and TH2. These two local alternatives, and the rationale for their elimination from detailed analysis, are provided below.

TU1

TU1 was developed in response to comments from the public expressing concerns about residential development (established and future) and recreational facility conflicts near Vail, Arizona, in the Tucson

metropolitan area. TU1 would have been constructed instead of upgrading 3 miles of Western's existing 115-kV transmission line, shifting the line farther south of I-10.

TU1 would have included the construction of a new 4-mile-long "L-shaped" transmission line along East Andrada Road and North Calle Rinconado, following an existing SWTC 69-kV line. TU1 would move potential residential impacts from the area to the north where the Western transmission line exists to the existing 69-kV line to the south. This route would still cross through low-density residential development, with a residential development just to the southwest. Any benefits to the developer would more than be offset by the electrical issues of crossing the smaller lines and avoiding the small substation at the point of the "L." The existing lines and substation would complicate the use of the re-route because of the need for additional line crossovers and would severely compromise future lines from entering or exiting this substation or any future expansion of it.

This route does not resolve, minimize, or reduce overall resource conflicts; implementation of TU1 would minimize impacts to the developer at the expense of private landowners in the TU1 area. Implementation of TU 1 would also substantially complicate the power system in the area. It is not substantially different in terms of effects of the proposed Project. For this reason, this alternative was eliminated because it would have offered no environmental advantage over the action alternatives in route group 4.

TH2

Several local alternatives to upgrading the existing line across Tumamoc Hill were developed out of public concern over impacts to this sensitive area. TH2 is one of three options developed at an outreach stakeholder workshop held in Tucson, Arizona, in summer 2012. TH2 would have been constructed instead of upgrading 2 miles of Western's existing 115-kV transmission line.

TH2 option is a 2-mile alternative that relocates 2 miles of the existing Western line and follows an existing Kinder-Morgan buried pipeline through Tumamoc Hill. This route continues north at Anklam Road along North La Cholla Boulevard before heading northeast along a disturbed ROW to connect back to the TH1 alternative.

TH2 in particular was developed to parallel, or follow, the existing Kinder-Morgan gas line that runs north-south across the west side of Tumamoc Hill. However, TH2 runs across an area within Tumamoc Hill that is topographically higher in elevation. Thus, it would be in a more prominent location and be more visible than the existing line. In a subsequent stakeholder outreach meetings, stakeholders unanimously agreed that the primary goal for alternatives around Tumamoc Hill would include relocating the transmission line off of Tumamoc Hill and consolidating transmission lines into a single utility corridor.

This route does not resolve, minimize, or reduce resource conflicts and is not substantially different in terms of effects of the other local alternatives or the proposed Project across Tumamoc Hill and stakeholders agreed it would have a greater visual impact than all other alternatives. For this reason, this alternative was eliminated because it would have offered no environmental advantage over the action alternatives for Tumamoc Hill in route group 4.

Alternatives Eliminated in Route Groups 3 and 4

The SunZia project commented on the Draft EIS, suggesting that additional alternatives be considered (see chapter 8 of this EIS). The suggested routes include the construction of a new 230-kV line in a separate or adjacent ROW paralleling the existing SWTC and TEP transmission lines, as well as the approved, but not yet constructed SunZia project.

UPGRADE OF OTHER REGIONAL TRANSMISSION LINES

The specific routes proposed by SunZia in its comment letter on the Draft EIS include:

- Approximately 84 miles of existing SWTC 115-kV transmission line corridor in Cochise and Pinal counties between the Apache Power Plant, Winchester Substation, San Manuel Substation, Oracle Substation, and Saguaro Substation;
- Approximately 38 miles of existing TEP 138-kV and Western 230-kV lines located within the Pantano Wash and the Rillito River corridors in Tucson; and
- Approximately 91 miles not yet constructed SunZia project corridor (BLM preferred alternative Subroute 4C2c) between the Winchester Substation and the Saguaro Substation in Cochise, Pima, and Pinal counties.

These suggested routes were proposed; however, they were not proposed as a solution to resolve, minimize, or reduce resource or socioeconomic conflicts. In fact the construction, operation, and maintenance of 38 to 91 miles of new 230-kV line in a separate or adjacent ROW plus an additional 21 miles of new ROW necessary for connection would generate additional ground disturbance and resource impacts. These routes (see figures 2-19a and 2-19b) do not connect to all 12 substations (Apache, Adams Tap, Pantano, Nogales, Del Bac, DeMoss Petrie, Tucson, Rattlesnake, Marana, Tortolita, and Saguaro), an objective of the proposed Project and a routing requirement (see discussion in section 2.6 above). For this reason, these alternatives do not meet the purpose of and need for the proposed Project and are not carried forward for detailed analysis.

Technology and Design Alternatives

UNDERGROUND TRANSMISSION

In response to public comments on the Draft EIS, an alternative to construct and operate all or some of the proposed Project underground is considered here. In theory, burying transmission lines would eliminate many of the visual impacts, as aboveground poles would not be required and all cable would be buried underground. However, burial of the line would require 100 percent disturbance of the ROW and likely require all or portions of the ROW to be kept clear of vegetation.

Burial of extended lengths or all of the proposed lines is considered technically infeasible due to potential reliability concerns, operational risks, environmental impacts, and high construction costs. High-voltage underground transmission lines (including 230 kV and 345 kV) have very different technological requirements and are more difficult to place underground than lower voltage underground distribution lines, which provide electricity to individual homes and businesses. Underground high-voltage lines have been constructed in some parts of the country, primarily for short distances and usually where circumstances dictated that overhead lines were not feasible (e.g., in the vicinity of airports and urban centers). Options for underground transmission cable systems include gas-insulated line (GIL), high-pressure fluid-filled (HPFF), self-contained fluid-filled (SCFF), and extruded dielectric. Summaries of each of the technological capabilities and their feasibility can be found in the Project Record.

Underground transmission lines would result in complete disturbance of the ROW using typical open-cut trench excavation required for the entire length of the transmission line route. Vaults and reactive compensation stations, similar to a substation in appearance, would be required every 10 to 20 miles, depending on the voltage level, terrain, and cable technology.

While underground transmission lines are more immune to weather conditions, compared with overhead transmission lines, they are more vulnerable to washouts, seismic activity, and accidental excavation, all of which can result in extensive, expensive, and time-consuming repairs. Underground lines are also

subject to joint failure, which can be serious concern because it is hard to locate and repair (Patrick Engineering 2010). While underground transmission lines have fewer forced outages than overhead lines, damage to the cable or components often results in longer outage durations. When a failure does occur, overhead lines can be quickly visually inspected and repaired. In contrast, underground line cable failures cannot be visually diagnosed. The cable or fluid system must be tested with specialized equipment to locate the damaged sections of the cable. Upon locating the faulty component or cable or determining whether there is leaking that is potentially causing contamination, specially trained workmen must be mobilized to repair or replace the failed components or cable resulting in potential outages of weeks or months; depending on the type of failure to be repaired, the failure location, and the availability of replacement materials. A catastrophic failure of any portion of the system—underground cable, splices, terminations, or fluid systems—could result in the system's being inoperable and out of service.

Increased cost estimates range from approximately 10 times more expensive to 12 to 17 times more expensive (Forest Service 2006).

Because of the high cost of an underground line, compared with overhead 230-kV and 345-kV lines, reliability issues for long distances, and increased overall impacts with 100 percent of the ROW expected to be disturbed, the alternative of placing all or portions of the 230-kV or 345-kV proposed Project underground was not considered feasible for the proposed Project. Additionally, this alternative does not resolve, minimize, or reduce overall resource conflicts; it would result in increased overall disturbance due to complete denuding of the ROW, further resulting in visual impacts and increased vegetation and wildlife impacts. For these reasons, this alternative was eliminated because it would have offered no environmental advantage over the action alternatives in route group 4.

ALTERNATIVES TO NEW TRANSMISSION

During the development of the Draft EIS, BLM management requested that the EIS process consider an alternative to minimize the environmental footprint of new transmission projects and, as such, to consider a technological/design alternative. During review of the Draft EIS, several public comments were received requesting that the BLM and Western consider potential alternatives to building new transmission lines. In response to these questions and comments, the following descriptions are provided, including the discussion of load management, new generation, and distributed generation.

Technical/Design Alternative

Section 503 of the FLPMA directs the BLM to minimize the proliferation of ROWs across public lands and to consider minimizing the environmental footprint of projects on public lands. As such, BLM management directed that a new technological/design alternative be considered for a portion of the Southline Project wherein Southline would acquire capacity on the not yet constructed SunZia project rather than constructing a new adjacent ROW, as proposed in alternatives DN1 and LD4.

The SunZia project is a not yet constructed new transmission line project with a recently issued ROD (BLM 2015b) and pending ROW grant. The project consists of a proposal to construct an approximately 500-mile-long transmission line between a new substation in Lincoln County, New Mexico, and the Pinal Central Substation in Arizona, with up to four new substations between the two terminals. The SunZia Final EIS (BLM 2013a) presents several different design alternatives; one would be the construction of two 500-kV AC lines; another would be one AC line and one 500-kV direct current (DC) line.

Both the SunZia project and the Southline Project are proposed to stretch between New Mexico and Arizona and in several areas are geographically very close. In New Mexico, the two projects would be geographically close east of Deming, where the yet to be constructed SunZia project would turn west and continue to the Hidalgo Substation. West of the Hidalgo Substation, the SunZia BLM preferred alternative is in relatively close proximity to the proposed Southline Project route until they reach the San

Pedro Valley in eastern Arizona, at which point the two projects diverge, as the not yet constructed SunZia project would head north and the Southline Project would continue west to the Tucson area.

For this technological/design alternative, new transmission line would still be constructed for the not yet constructed SunZia project, but an additional two substations would be necessary where the Southline Project would enter and exit the SunZia project lines. Under this alternative, the Southline Project would begin at Afton Substation and extend along the Proponent Preferred route to a location north of Deming, New Mexico. At this point, the Southline Project would need to enter a substation before joining the SunZia project; this would be a new substation not currently proposed by either SunZia or Southline that would be shared with SunZia. Southline would then use SunZia's facilities for approximately 140 to 160 miles along alternatives DN1 and LD4, where it would enter another new substation that would also be shared with SunZia and is not currently proposed by either SunZia or Southline. From this point, the two proposed projects would then diverge and follow separate routes to their respective proposed termini.

Screening of this alternative involved examining the feasibility in detail on multiple levels: technically, commercially, economically, legally, and environmentally. Details of the feasibility screening are summarized below:

- **Technically.** The design for this alternative would need to be studied further for both the SunZia and Southline projects before it could be determined whether it is technically feasible. On the face of it, the proposal does not look reasonable or feasible. If Southline were to acquire 1,000 MW of capacity in the middle of SunZia's not yet constructed line, this could create an operational "bottleneck" in the middle of SunZia's line and leave stranded capacity on either end. Also, because both SunZia and Southline would be merchant transmission projects, neither project could provide the ancillary service capability that would be needed for the line to operate.
- **Commercially**. This alternative would mandate that Southline relinquish sections of its proposed Project and instead become a customer of the yet-to-be-constructed SunZia project. SunZia involves multiple capacity holders, and as such, each owner and project participant would have specific rights to SunZia's capacity. Consequently, Southline would have to negotiate with each entity separately, on a piecemeal basis, in order to obtain 1,000 MW of capacity that would enter and exit in the middle of the proposed SunZia project. There is no guarantee that capacity on the SunZia project is available or that Southline could acquire this sort of capacity on the SunZia project line at rates and terms that would be commercially viable, and no guarantee that the not yet constructed SunZia project would be constructed to begin with.
- **Economically**. Because SunZia would have multiple capacity holders, as stated above, the rates and terms of negotiated capacity would likely be different with each holder and subject to periodic change. Southline would not necessarily be able to acquire the needed capacity at rates necessary to make the Project economically viable. This alternative would also force Southline to underwrite additional risk by taking on SunZia's risk, both of being constructed and of having viable transmission rates. Further, this alternative would require a substantial modification to both the Southline and SunZia projects in order to combine the two proposed projects onto one line. There would be added costs from additional substations, and from back-tracking Western's line to the Apache Substation, depending on the exit point. This would require detailed design and technical studies, as well as restarting the WECC approval process for both proposed projects; this would cost a considerable amount of additional time and money for both projects.
- **Legally.** The FERC regulates the allocation of interstate electric transmission line capacity and has imposed specific restrictions on the allocation of SunZia capacity rights in order to ensure open and non-discriminatory access to that capacity for all interested parties (FERC Docket No. EL-11-24-000) (FERC 2011). Therefore, it is unknown whether 1,000 MW of capacity would be available on the SunZia project, since FERC has authorized a portion of their capacity to be

reserved for 'anchor' tenants, with the balance to be allocated through the formal 'open season' process. Additionally, the not yet constructed SunZia project currently has an accepted WECC path rating of 3,000 MW for two 500-kV AC lines in the east-to-west direction (WECC 2011b and SunZia 2015). Because the plan of service is for transmission in an east-to-west direction, obtaining capacity on the SunZia project would cause Southline to lose its bidirectional rating and would not satisfy one of Southline's stated objectives, which is to provide bidirectional capacity.

- **Environmentally**. This alternative would require two new 500-/230-kV substations, which were not planned by either project, as well as a new 230-kV line segment back to the existing Western alignment. One of the new substations and the new 230-kV line segment would be located in the environmentally sensitive area of San Pedro Valley and adjacent to the BSETR, thus creating additional environmental impacts to both biological and military resources.

This route alternative is ineffective. It does not resolve, minimize, or reduce resource conflicts, and it could contribute to additional environmental disturbance, compared with other alternatives that would achieve the same purpose. It is also technically problematic and is economically infeasible. Further, it does not meet the applicant's stated objectives, and it likely would prevent Western from participating as a TIP project; funding and ownership would become too complicated and problematic. For these reasons, this technical/design alternative for Southline to acquire capacity on the approved, but not yet constructed SunZia project line has not been carried forward for detailed analysis.

Other System Upgrades

Public comments on the Draft EIS suggested that Southline's objectives (see section 1.3) could be met by considering other system upgrades. No additional information on what those upgrades could be or on what resource conflict or other issue would be solved by these unidentified upgrades was provided. For this reason, this alternative is not carried forward for detailed analysis.

Load Management

Load management programs, also referred to as demand side management, are implemented by electric utilities to encourage consumers to modify their levels and patterns of energy consumption. Load management programs were originally intended to help delay the need for new sources of power, including new generating and transmission facilities. Currently, load management is typically implemented to manage energy consumption during peak hours. It achieves load reduction through various programs and customer agreements, including interrupting the power supply to individual appliances or equipment, requesting that customers (usually large commercial and industrial customers) reduce energy use during peak hours, and shifting loads (such as the use of certain appliances) from on-peak to off-peak hours. Utilities also promote energy efficiency to reduce overall energy consumption. Energy efficiency programs reduce consumption over many hours during the year through use of energy saving appliances and lighting, whereas load management programs achieve an immediate reduction in peak load.

Load management and energy-efficiency programs are valuable tools that allow load-serving entities (utilities) to manage the demand for and consumption of energy on a local, temporary basis. However, implementing a load management program instead of the proposed Project is not consistent with the objectives of the proposed Project (see section 1.3), which are to mitigate existing congestion, increase the ability to meet increasing demand for electricity, and facilitate generation and public policy goals by increasing the capacity of the existing electric transmission grid initially by about 1,000 MW. Additionally, load management measures that make sense and are economically viable are already being implemented, leaving little opportunity for additional realistic gains. Because load side management and energy-efficiency programs do not address these needs, they are not carried forward for detailed analysis.

New Generation

In response to public comments stating that the need for new transmission lines could potentially be met by constructing new renewable generation facilities, new generation was considered as an alternative to construction and operation of the proposed Project.

As discussed in section 1.3.2, PL 109-58, the Energy Policy Act of 2005 (EPAct 2005), required that studies be completed detailing national electrical transmission congestion as well as areas where renewable energy development has been inhibited by a lack of sufficient transmission facilities or capacity. The DOE produced the National Electric Transmission congestion studies in 2006, 2009, and 2014 (DOE 2006, 2009, 2014). The DOE reports noted that a large number of both wind and solar projects that have applied for interconnection to the transmission grid cannot be built due to insufficient transfer capability. In addition, the Western Renewable Energy Zone (WREZ) study identified 11,300 MW of potential wind resources near the eastern terminus of the Project, and 10,500 MW of solar potential in southwest New Mexico and southeast Arizona. However, it notes that "lack of cost effective transmission access was, and remains, the greatest impediment to the rapid development" of these resources (WGA and DOE 2009).

However, implementing new generation instead of the proposed Project is not consistent with the objectives of the proposed Project (see section 1.3), which are to mitigate existing congestion, increase the ability to meet increasing demand for electricity, and facilitate generation and public policy goals by increasing the capacity of the existing electric transmission grid initially by about 1,000 MW. Adding new generation to the system would only increase the capacity bottleneck. Because new generation does not address these needs, it is not carried forward for detailed analysis.

Distributed Generation

Distributed generation resources are small-scale power generation technologies that are usually installed at or near the location where the generated power is used. These systems range in size from approximately 5 kilowatts to 10 MW, in contrast to centralized generation resources, which range from 10 MW to more than 1,000 MW per site. Distributed generation resource technologies include photovoltaic, energy storage devices, microturbines, solar, wind, and fuel cells. The most common example of distributed generation is rooftop solar panels.

Distributed generation would provide small-scale local renewable energy generation opportunities. Distributed generation may increase local regional transfer capability by decreasing the regional load. However, it would not mitigate existing congestion, increase the ability to meet increasing demand for electricity, or facilitate generation and public policy goals by increasing the capacity of the existing electric transmission grid initially by about 1,000 MW. Because BLM and Western are responding to a request from Southline, and distributed generation does not address the needs above, it is not carried forward for detailed analysis.

2.10 COMPARISON OF ALTERNATIVES

This section of the document provides a summary of the impacts of each subroute, by segment, as well as the local alternatives. This summary is based on the analysis in chapter 4. The BLM and Western Preferred Alternative description follows the route group summaries.

- Route group 1: Afton Substation to Hidalgo Substation
- Route group 2: Hidalgo Substation to Apache Substation

- Route group 3: Apache Substation to Pantano Substation
- Route group 4: Pantano Substation to Saguaro Substation

Tables 2-15 through 2-18 later in this chapter include a comparison of land ownership and estimated temporary and permanent ground disturbance, as well as comparison of resource impacts associated with each of the subroutes and local alternatives.

2.10.1 Route Group 1: Afton Substation to Hidalgo Substation

Route group 1 includes subroutes 1.1 and 1.2 (Proponent Preferred and Proponent Alternative, New Build Section) extending between the Afton and Hidalgo substations in New Mexico. Segments within each route group cross BLM, NMSLO, and private lands. Subroute 1.1 is 147.1 miles long, of which 45 percent is BLM land, 26 percent is NMSLO land, and the rest is private. Subroute 1.2 is 141.1 miles long; 58 percent of subroute 1.2 is BLM land, 19 percent is NMSLO, and the rest is private.

Subroute 1.1 follows an existing EPEC 345-kV transmission line near I-10 west of the Afton Substation, past the Aden Hills OHV area. The subroute then heads north around Deming; from the Deming area, the line follows the existing 345-kV line to the Hidalgo Substation. A portion of subroute 1.1 is located within an existing West-Wide Energy Corridor (segment 81-213). Subroute 1.1 crosses aplomado falcon (*Falco femoralis septentrionalis*) suitable habitat and a CDNST corridor designated as avoidance areas in the Mimbres RMP. In terms of cultural resources, subroute 1.1 could have potential direct and indirect impacts to the Butterfield Trail, the Mormon Battalion Trail, and the Janos Copper Road. Subroute 1.1 has the potential to impact more than 1,000 acres of wildlife habitat, of which 337 acres could impact northern aplomado falcon habitat and 375 acres could impact Sprague's pipit (*Anthus spragueii*) habitat. This subroute could impact 512 acres of floodplains. Subroute 1.1 does not cross any VRM Class II lands.

Subroute 1.2 extends south and southwest of the existing Afton Substation for approximately 30 miles, then extends generally west along the international border before heading northwest near the Luna and Grant county line. From the county line, the subroute extends west along NM 9 to the intersection of NM 9 and NM 146. From there, the subroute extends northwest for approximately 23 miles to just east of the border of Luna and Grant counties, New Mexico. Subroute 1.2 does not itself connect with the Hidalgo Substation. The western end of subroute 1.2 parallels an existing Tri-State Generation and Transmission 230-kV line. This subroute crosses bighorn sheep (*Ovis canadensis nelsoni*) habitat designated as an avoidance area in the Mimbres RMP. Like subroute 1.1, subroute 1.2 could have potential direct and indirect impacts to the Butterfield Trail, the Mormon Battalion Trail, the Janos Copper Road, and the abandoned El Paso and Southwestern railroad. Subroute 1.2 would parallel the abandoned railroad in places. Subroute 1.2 has the potential to impact more than 1,200 acres of wildlife habitat, of which 312 acres could impact northern aplomado falcon habitat and 325 acres of Sprague's pipit habitat. This subroute could impact 2 WUS and 302 acres of floodplains. Subroute 1.2 crosses 468.5 acres of VRM Class II lands managed by the Mimbres RMP.

2.10.2 Route Group 2: Hidalgo Substation to Apache Substation

Route group 2 includes subroutes 2.1 and 2.2 (Proponent Preferred and Proponent Alternative, New Build Section) extending between the Hidalgo Substation in New Mexico and the Apache Substation in Arizona. Segments within each route group cross BLM, NMSLO, and private lands. Subroute 2.1 is 95.5 miles long, of which 29 percent is BLM land, 39 percent is NMSLO, and the rest is private. Subroute 2.2 is 96.0 miles long; 23 percent of subroute 2.2 is BLM land, 40 percent is ASLD and NMSLO, and the rest is private.

Subroute 2.1 departs an existing 345-kV transmission line north of Lordsburg and extends roughly 14 miles west and south around Lordsburg. The subroute then heads west for approximately 30 miles across the New Mexico–Arizona state line to an intersection with I-10 west of San Simon, Arizona. Once the subroute crosses I-10, it extends another 25 miles due west, where it intersects an existing SWTC 230-kV line. From this area northeast of Willcox, the subroute extends south and then southwest around the east side of the Willcox Playa. Subroute 2.1 crosses bighorn sheep suitable habitat and a CDNST corridor designated as avoidance areas in the Mimbres RMP. In terms of cultural resources, subroute 2.1 could have potential direct and indirect impacts to the Butterfield Trail. Subroute 2.1 has the potential to impact more than 575 acres of wildlife habitat, of which 263 acres could impact northern aplomado falcon habitat, 277 acres could impact Sprague's pipit habitat, and 349 acres could impact lesser long-nosed bat habitat (*Leptonycteris curasoae yerbabuenae*) and Mexican long-nosed bat (*Leptonycteris nivalis*) habitat. This subroute could impact 3 WIUs, 2 wetlands, and 182 acres of floodplains. Subroute 2.1 crosses no VRM Class II lands managed by the Mimbres and Safford District RMPs.

Subroute 2.2 starts south of the Lordsburg Playa and extends 32 miles across the New Mexico–Arizona state line to an area north of San Simon, Arizona. This EIS considers approximately ±30 miles of route variations of subroute 2.2 near the Willcox Playa (P7a, P7b, P7c, and P7d) (see section 2.7.2). From the San Simon area, the subroute would extend west-northwest, roughly paralleling two existing 230-kV transmission lines for 25 miles to an area north of the Dos Cabezas Mountains. Subroute 2.2 crosses bighorn sheep suitable habitat and a CDNST corridor designated as avoidance areas in the Mimbres RMP. In terms of cultural resources, subroute 2.1 could have potential direct and indirect impacts to the Butterfield Trail and the Zuñiga Route. Subroute 2.2 has the potential to impact more than 522 acres of wildlife habitat, of which 210 acres could impact northern aplomado falcon habitat, 243 acres could impact Sprague's pipit habitat, and 324 acres could impact lesser long-nosed bat habitat and Mexican long-nosed bat habitat. This subroute could impact 3 WUS and 265 acres of floodplains. Subroute 2.2 crosses no VRM Class II lands managed by the Mimbres RMP.

2.10.3 Route Group 3: Apache Substation to Pantano Substation

Route group 3 includes one subroute: subroute 3.1, which comprises the existing Western transmission line, extending from Apache Substation to the Pantano Substation, connecting to the Adams Tap Substation east of Benson. Subroute 3.1 is 70.3 miles long, of which 1 percent is BLM land, 4 percent is tribal (Tohono O'odham), 1 percent is Coronado National Forest, 51 percent is ASLD, and 43 percent is private.

Subroute 3.1 crosses the Butterfield Trail, the Mormon Battalion Trail, and the projected Zuñiga Route, and could have direct and indirect impacts to these trails and routes. Subroute 3.1 has the potential to impact more than 376 acres of wildlife habitat, including disturbance to 50 acres of Sprague's pipit habitat, impacts to northern Mexican gartersnake (*Thamnophis eques megalops*) proposed critical habitat at Cienega Creek and San Pedro River where the existing line crosses these water bodies, disturbance to 323 acres of lesser long-nosed bat habitat, and disturbance to 251 acres of Sonoran desert tortoise (*Gopherus morafkai*) habitat. Subroute 3.1 could impact 7 WUS, 2 wetlands, and 36 acres of floodplains. Subroute 3.1 does not cross any VRM Class I or II lands.

2.10.4 Route Group 4: Pantano Substation to Saguaro Substation

Route group 4 includes one subroute: subroute 4.1, which comprises the existing Western transmission line, extending from the Pantano Substation to the Saguaro Substation, connecting to the Nogales, Vail,

Del Bac, DeMoss Petrie, Tucson, Rattlesnake, Marana, Tortolita, and Saguaro substations in Arizona. This EIS considers approximately ±6 miles of route variation U3aPC south of the Tucson International Airport (see section 2.7.4). Subroute 4.1 is a total of 48.3 miles long, of which less than 1 percent is Reclamation land, 37 percent is ASLD land, 1 percent is county-owned, and 61 percent is private.

Subroute 4.1 crosses the Tumamoc Hill Archaeological District and Desert Laboratory National Historic Landmark (NHL), the Anza NHT, the Butterfield Trail, and the Mormon Battalion Trail. Subroute 4.1 has the potential to impact more than 622 acres of wildlife habitat, including disturbance to 263 acres of lesser long-nosed bat habitat and disturbance to 183 acres of Sonoran desert tortoise habitat. Subroute 4.1 could impact 6 WUS, 4 wetlands, and 275 acres of floodplains. Subroute 4.1 does not cross any VRM Class I or II lands.

2.10.5 Selection of the Agency Preferred Alternative

Changes Between the Draft and Final EIS

The Agency Preferred Alternative in the Draft EIS included segments P1, P2, P3, P4a, P7, and P8, in combination with local alternatives LD3a, LD4, and LD4-Option 5, in the New Build Section and segments U1a, U1b, U2, U3a, U3b, U3c, U3d, U3f, U3g, U3h, U3i, U3k, U3l, U3m, and U4, in combination with local alternatives TH1a, TH1-Option, and MA1, in the Upgrade Section. Public and agency comments on the Draft EIS expressed concern that portions of the Agency Preferred Alternative in the New Build Section (segment LD4) would parallel the not yet constructed SunZia project for more than 50 miles and that the exceptionally wide ROW that would be required for separation of two high voltage lines would negate the consolidation of impacts into one utility corridor. Additional comments expressed concern about potential avian conflicts along segment P7 on the southeastern side of the Willcox Playa. The Agency Preferred Alternative for this Final EIS has changed to consider those public and agency comments, including changing the route for the Agency Preferred Alternative near Lordsburg Playa and including portions of the U3aPC route variation south of Tucson (see figures ES2a and ES2b). The Agency Preferred Alternative in the Final EIS also includes additional mitigation provided by the AGFD to minimize impacts to the Willcox Playa Wildlife Area from segment P7. A description of the Agency Preferred Alternative follows.

New Build Section

The BLM and Western (Agency) Preferred Alternative for the New Build Section for this EIS consists of a combination of the Proponent Preferred, Proponent Alternative, and local alternative segments within route groups 1 and 2. The Agency Preferred Alternative for the New Build Section would include Proponent Preferred segments P1, P2, P3, P4a, P5b, P6a, P6b, P6c, P7, and P8 in combination with local alternatives LD3a and LD3b, for a total of 245.9 miles. Approximately 85 percent of the Agency Preferred Alternative would parallel existing linear infrastructure in the New Build Section of the project.

This route was selected by the BLM and Western as the Agency Preferred Alternative because it would:

- Use existing linear ROWs by paralleling existing infrastructure and transmission lines;
- Minimize impacts to visual resources and eliminate the need for plan amendments through conformance with existing land use plans;
- Minimize impacts to military operations at and near the Willcox Playa; and
- Minimize impacts to sensitive resources, particularly near the Lordsburg Playa.

The Agency Preferred Alternative would start at the existing Afton Substation south of Las Cruces and include segment P1 and a portion of segment P2 between the Afton and proposed Midpoint North substations; these proposed Project segments parallel an existing EPEC 345-kv transmission line. From the proposed Midpoint North Substation, the Agency Preferred Alternative extends west along and parallel to an existing Public Service Company of New Mexico 345-kV line and includes proposed Project segment P3 and a portion of segment P4a to the Hidalgo Substation. Segment P1 is a short (5-mile) segment (in and out loop) between the existing Afton Substation and the existing Luna–Diablo 345-kV transmission line. Segment P3 is a 31-mile-long connector segment (for interconnection to potential future solar generation), running north-south between I-10 and NM 9, located approximately 9 miles west of the West Potrillo Mountains WSA.

The Agency Preferred Alternative extends west along segment P4a from the existing Hidalgo Substation, connecting to local alternatives LD3a and LD3b around the north and west sides of Lordsburg Playa. The east-west segment of LD3a parallels the existing Public Service Company of New Mexico 345-kV line. LD3b connects to segment P5b, which would roughly parallel an existing El Paso Natural Gas line for approximately 20 miles before connecting to P6a. The Agency Preferred Alternative would follow the Proponent Preferred along segments P6a, P6b, and P6c (also along existing El Paso Natural Gas lines), P7 (which parallels an existing SWTC 230-kV transmission line around the southeast side of the Willcox Playa), and P8, which would connect to the existing Apache Substation.

Upgrade Section

The Agency Preferred Alternative for the Upgrade Section consists of a combination of the Proponent Preferred, new route variation south of the Tucson International Airport, and local alternatives at Tumamoc Hill and near the Marana Regional Airport, within route groups 3 and 4. The Agency Preferred Alternative for the Upgrade Section would include Proponent Preferred segments U1a, U1b, U2, U3a, U3b, U3c, U3d, U3f, U3g, U3h, U3i, U3k, U3l, U3m, and U4, in combination with route variation U3aPC, as well as local alternatives TH1a and TH1-Option around Tumamoc Hill, and MA1 near the Marana Regional Airport. The Agency Preferred Alternative for the Upgrade Section would be 120.9 miles, of which 109.5 miles would be the upgrade of Western's existing Saguaro–Tucson and Tucson–Apache 115-kV transmission lines. Approximately 98 percent of the Agency Preferred Alternative in the Upgrade Section would be parallel to existing or proposed linear infrastructure such as transmission lines, gas line, and roadways.

This route was selected by the BLM and Western as the Agency Preferred Alternative because it would:

- Maximize use of the existing ROW and facilities currently used for Western's existing Saguaro–Tucson and Tucson–Apache 115-kV transmission lines;
- Address cultural resources and visual concerns regarding upgrading the existing Western line across Tumamoc Hill;
- Reduce existing conflicts in the community of Summit, and minimize impacts to future Pima County economic development plans south of the Tucson International Airport; and
- Minimize impacts to military training operations at the Marana Regional Airport.

The Agency Preferred Alternative would start at the existing Apache Substation south of Willcox, Arizona, and extend through Benson, upgrading the existing Western 115-kV line. The Agency Preferred Alternative between Apache and Del Bac substations includes proposed Project segments U1a, U1b, U2, U3a and U4, as well as route variation U3aPC. From the Del Bac Substation, the Agency Preferred Alternative includes upgrading the existing Western 115-kV line north along segments U3b, U3c, and U3d. From the south side of Tumamoc Hill at Starr Pass Boulevard, the Agency Preferred Alternative

would then connect segment U3d to local alternative TH1a west along Starr Pass Boulevard and then north along Greasewood Road. Local alternative TH1a would then connect to TH1-Option east along St. Mary's Road, connecting back up to the existing Western line and ROW at segment U3g. The Agency Preferred Alternative would then include the upgrade of the existing Western line north to the Saguaro Substation (segments U3h, U3i, U3k, U3l, U3m, and U4), except for reroute using local alternative MA1 near the Marana Regional Airport.

2.10.6 Environmentally Preferred Alternative

The Environmentally Preferred Alternative is the alternative that will promote the national environmental policy as expressed in Section 101(B) of the National Environmental Policy Act. This means that the Environmentally Preferred Alternative is the "alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources" (CEQ 1981:question 6a). To determine the Environmentally Preferred Alternative, BLM and Western considered the results of the environmental analyses presented in chapter 4. Each alternative was evaluated in terms of a range of potential adverse environmental impacts by route.

While BLM and Western are required to identify an Environmentally Preferred Alternative in their ROD, they are not required to select the Environmentally Preferred Alternative as the Agency Preferred Alternative for analysis or in their decision. For the Environmentally Preferred Alternative, action alternatives were evaluated according to the nature and magnitude of their environmental consequences.

Of the alternatives and routes considered in detail, there are some segments that have fewer environmental impacts on the whole than others, and it is the combination of those collective segments that forms the Environmentally Preferred Alternative. The Environmentally Preferred Alternative for the New Build Section consists of the Proponent Preferred segments P1, P2, P3, P4a, P5b, P6a, P6b, P6c, Gb, and Gc in combination with local alternatives LD3a, LD3b, and WC1 around the Lordsburg and Willcox playas.

The Environmentally Preferred Alternative for the Upgrade Section would be upgrade in Western's existing Saguaro–Tucson and Tucson–Apache 115-kV transmission line ROW, with no local alternatives. Rebuilding a transmission line in place on an existing ROW with its associated existing access roads, etc., in a location where it has been for over 60 years would obviously result in the least environmental impact, since the baseline already includes any existing impacts. However, responsible transmission line planning also looks for opportunities to reduce existing impacts, or address changing attitudes about the values and weights of impacts. Tumamoc Hill is an excellent example of this sort of planning, where concerned parties are willing to incur new impacts to other resources in exchange for reducing existing impacts on a resource considered more important. Situations such as this are one reason an Agency Preferred Alternative can vary from an Environmentally Preferred Alternative.

The main difference between the Environmentally Preferred Alternative and the Agency Preferred Alternative (see section 2.10.5) is the area around Willcox Playa. The Environmentally Preferred Alternative would follow the Proponent Preferred segments (segments P5b, P6a, P6b, P6c) between the existing Afton Substation, routing north around Willcox Playa via local alternative WC1, and then connect to the Apache Substation along the west side of the playa via segments Gb and Gc of the Proponent Alternative (see figure 2-16a). This alternative would minimize impacts through routing north (WC1) and west of Willcox Playa (Gb and Gc), because it would avoid avian impacts and issues along the southeast side of Willcox Playa (at Proponent Preferred segment P7) and follow the I-10 corridor (WC1). However, the Agency Preferred Alternative in the Final EIS now includes additional mitigation

provided by the AGFD intended to minimize impacts to the Willcox Playa Wildlife Area along segment P7 (see table 2-8).

2.10.7 Action Alternatives Requiring BLM Plan Amendments

As discussed in chapter 1 and in section 2.3 of chapter 2, management direction on public land and resources is provided in land use plans or RMPs for each BLM Field or District Office. The BLM must review relevant land use plans and RMPs to determine whether a proposed project is in conformance with the management decisions and objectives of those plans. If the proposed project is not in conformance, the BLM can either choose to deny the project, adjust the project to conform to the RMP, or amend the plan to address nonconformance.

Subroutes, segments, and local alternatives have been evaluated by the respective BLM field offices for conformance with each of the four BLM RMPs that cover the project area (see section 2.3). There are two potential conformance issues with the Mimbres RMP: (1) where portions of alternative route segments would cross VRM Class II areas, and (2) where portions of the alternative route segments would cross ROW avoidance areas designated the Butterfield Trail near Lordsburg Playa. The following section (2.10.8) describes in detail which Project segments have potential conformance issues with the Mimbres RMP and whether or not these conformance issues would require a plan amendment.

A screening of the four relevant RMPs indicates there are six Project segments or local alternatives where construction, operation, and maintenance of the Project would not conform to the RMP because the Project would not comply with VRM objectives or a stipulation for a ROW avoidance area. These six Project segments or local alternatives would cross lands covered by the Mimbres RMP.

The following segments and local alternatives would intersect with VRM Class II lands and would therefore not be in conformance with the Mimbres RMP:

1. Route group 1
    a. Local alternatives C and D
    b. Subroute 1.2, segments S5, S6, and S7
2. Route group 2
    a. Local Alternative LD2

The local alternative LD2 within route group 2 would intersect a ROW avoidance area and conflict with the stipulations of that ROW avoidance area. The Mimbres RMP stipulates that a proposed project in a ROW avoidance area must not parallel the Butterfield Trail. The proposed Project segment listed below would roughly parallel the Butterfield Trail and therefore would not be in conformance with the Mimbres RMP.

2.10.8 Proposed Plan Amendments

A plan amendment for the Mimbres RMP would be required for the portion of the alternative route segment (local alternative LD2 near the Lordsburg Playa) that parallels an avoidance area designated for the Butterfield Trail. A plan amendment would also be required for the Mimbres RMP that would change the VRM Class II to VRM Class III or IV for six project segments within the New Build Section that intersect VRM Class II lands. Four plan amendment alternatives have been identified for the Mimbres RMP. These options include: (1) the no action, (2) modifying VRM Class II to Class III, (3) modifying VRM Class II to Class IV, and (4) allowing a ROW to parallel the Butterfield Trail in a ROW avoidance area. No plan amendment would be required for the Agency Preferred Alternative.

Table 2-14 provides a summary of the existing VRM Class II areas and the acreage of potential change (either to VRM Class III or IV) within the Mimbres RMP. No other plan amendments would be required for subroutes, segments, or local alternatives crossing the Safford RMP, Las Cienegas RMP, or Phoenix RMP lands.

Table 2-14. Mimbres RMP Plan Conformance and Proposed Amendment Summaries for VRM Class II

Segments/Local Alternatives	Proposed Project Intersection with Existing VRM Class II (miles)	Acres of Proposed Project That Would Result in VRM Class II Modification
S5	1.2	29.8
S6	4.4	107.7
S7	13.7	331.0
C	3.7	87.5
D	1.8	43.1
LD2	3.1	74.0

Impacts associated with the plan amendment alternatives are described in chapter 4. The Agency Preferred Alternative would not intersect any VRM Class II lands or ROW avoidance area noted above; therefore, no Agency Preferred plan amendment alternative is proposed.

No Action

If no action is taken, then the ROW for the proposed Project would not be granted, and no amendment to the Mimbres RMP would be necessary.

Modify VRM Class II to Class III

Under this plan amendment option, where the proposed 200-foot Project ROW crosses VRM Class II lands, the VRM class would be modified and reclassified to VRM Class III.

Modify VRM Class II to Class IV

Under this plan amendment option, where the proposed 200-foot Project ROW crosses VRM Class II lands, the VRM class would be modified and reclassified to VRM Class IV.

Modify ROW Avoidance Area Stipulation

Under this plan amendment option, where the proposed 200-foot Project ROW would parallel the Butterfield Trail along local alternative LD2, the ROW avoidance area would be modified. The special stipulations for ROWs in the Mimbres RMP would be modified from “Facilities will not be located parallel to the Continental Divide National Scenic Trail or Butterfield Trail” to “Facilities will not be located parallel to the Continental Divide National Scenic Trail or Butterfield Trail, except for a 9.1-mile-long by 200-foot-wide linear transmission ROW at the Lordsburg Playa.”

Tables 2-15 through 2-18 include a comparison of land ownership and estimated temporary and permanent ground disturbance, as well as comparison of resource impacts associated with each of the subroutes and local alternatives.

Table 2-15. Comparison Summary for Route Group 1: Afton Substation to Hidalgo Substation

Route Group 1			Subroute 1.1 - Proponent Preferred	Subroute 1.2 - Proponent Alternative	Local Alternative Segments					Agency Preferred Alternative
					DN1	A	B	C	D	
Subroute Length (miles)			147.1	141.1	42.5	17.5	12.2	9.0	22.8	147.1
Land Ownership (miles crossed)	BLM		65.5	82.5	6.9	14.7	9.9	3.9	6.8	65.5
	BIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	DOD		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Forest Service		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Reclamation		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	State		38.3	26.4	29.3	1.1	2.2	1.6	2.5	38.3
	County		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Private		43.4	32.2	6.4	1.8	0.0	3.4	13.5	43.4
Ground Disturbance	Temporary	Acres	944.0	970.1	238.2	98.0	68.2	50.2	147.6	944.0
		Acres/Mile	6.4	6.9	5.6	5.6	5.6	5.6	6.5	6.4
	Permanent	Acres	256.0	234.7	92.9	21.5	7.2	6.1	28.1	256.0
		Acres/Mile	1.7	1.7	2.2	1.2	0.6	0.7	1.2	1.7
BLM RMP Conformance	VRM	Acres crossing VRM Class II Lands	None	468.5	None	None	None	87.5	43.1	None
	ROW avoidance areas under the Mimbres RMP		Crosses CDNST corridor designated as an avoidance area.	Crosses bighorn sheep habitat designated as an avoidance area.	No impact	No impact	No impact	No impact	Crosses CDNST corridor designated as an avoidance area.	Same as subroute 1.1
	Plan Conformance		No conflict	BLM plan non-conformance crossing VRM Class II lands.	No conflict	No conflict	No conflict	BLM plan non-conformance crossing VRM Class II lands.	BLM plan non-conformance crossing VRM Class II lands.	No conflict
Air Quality			Fugitive dust and equipment emissions would occur under all subroutes and alternatives; emissions would be relative to the length of the subroute and alternative(s) chosen. Does not traverse any nonattainment or maintenance areas. **Impact Intensity: Minor**	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1
Noise and Vibration			Approximately 56 noise sensitive receptors (NSRs) are located along this subroute, primarily in Deming, New Mexico. The nearest NSR is approximately 100 feet from the ROW. **Impact Intensity: Major but temporary**	Approximately 55 NSRs are located along this subroute, primarily in Columbus and Hatch, New Mexico. The nearest NSR is approximately 50 feet from the ROW. **Impact Intensity: Major but temporary**	This alternative avoids the town of Deming, New Mexico, avoiding those NSRs (approximately 40). Two additional NSRs would be impacted, the nearest at a distance of approximately 100 feet from the ROW. **Impact Intensity: Major but temporary**	Does not avoid or pick up any NSRs from the subroute being substituted for. **Impact Intensity: Major but temporary**	Same as segment A	Same as segment A	This alternative would pick up about 12 more NSRs than the subroute it is substituting for, as it passes closer to Lordsburg, New Mexico, than the subroute. **Impact Intensity: Major but temporary**	Same as subroute 1.1

Table 2-15. Comparison Summary for Route Group 1: Afton Substation to Hidalgo Substation (Continued)

Route Group 1			Subroute 1.1 - Proponent Preferred	Subroute 1.2 - Proponent Alternative	Local Alternative Segments					Agency Preferred Alternative
					DN1	A	B	C	D	
Geology and Mineral Resources			Geology: No impacts Mineral Resources: No more than 0.14% of any active mining district is crossed. No active mines are crossed. Minor, short-term future impacts possible due to temporary preclusion of access to mineral resources if transmission line structures need to be moved to accommodate surface mining. No unavoidable adverse impacts, no long-term loss of productivity, and no irretrievable or irreversible commitment of resources. **Impact Intensity: Minor**	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1
Soil Resources			Wind erosive soils in all segments and alternatives in route group 1. **Impact Intensity: Minor**	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1
Paleontological Resources			Potential to disturb high sensitivity geological units that may contain important fossils. **Impact Intensity: Moderate**	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	No key issues for paleontological resources. **Impact Intensity: No Impact**	Same as segment C	Same as subroute 1.1 **Impact Intensity: Moderate**
Groundwater, Surface Water, and Wetlands			4 WUS 0 wetlands 562 acres of floodplains Mimbres River special consideration **Impact Intensity: No impact**	2 WUS 0 wetlands 319 acres of floodplains **Impact Intensity: No impact**	3 WUS 2 wetlands 95 acres of floodplains Mimbres River special consideration **Impact Intensity: No impact**	0 WUS 1 wetland 0 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 0 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 27 acres of floodplains **Impact Intensity: No impact**	2 WUS 0 wetlands 9 acres of floodplains **Impact Intensity: No impact**	4 WUS 0 wetlands 562 acres of floodplains Mimbres River special consideration **Impact Intensity: No Impact**
Biological Resources (Vegetation)			Crosses through region of existing disturbance. No ESA-listed species have the potential to occur along the subroute. Three sensitive plant species—dune prickly pear (*Opuntia polyacantha* var. *arenaria*), Gregg night-blooming cereus (*Peniocereus greggii* var. *greggii*), and Parish's alkali grass (*Puccinellia parishii*)—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur along the subroute. Sensitive species—dune prickly pear, Gregg night-blooming cereus, Parish's alkali grass, and Chihuahua scurfpea (*Pediomelum pentaphyllum*)—have potential to occur. Tamarisk (*Tamarix* spp.) was observed in sections S1–S8. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur along the subroute. Sensitive species—Sneed's pin-cushion cactus, dune prickly pear, and Gregg night-blooming cereus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur along the subroute. Sensitive species—Sneed's pin-cushion cactus, dune prickly pear, and Gregg night-blooming cereus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur along the subroute. Sensitive species—Sneed's pin-cushion cactus, dune prickly pear, and Gregg night-blooming cereus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur along the subroute. Sensitive species—Sneed's pin-cushion cactus, dune prickly pear, Gregg night-blooming cereus, and Parish's alkali grass—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur along the subroute. Sensitive species—Sneed's pin-cushion cactus, dune prickly pear, and Gregg night-blooming cereus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur along the subroute. Sensitive species—dune prickly pear, Gregg night-blooming cereus, and Parish's alkali grass have the potential to occur.—have potential to occur. **Impact Intensity: Minor**

Table 2-15. Comparison Summary for Route Group 1: Afton Substation to Hidalgo Substation (Continued)

Route Group 1			Subroute 1.1 - Proponent Preferred	Subroute 1.2 - Proponent Alternative	Local Alternative Segments					Agency Preferred Alternative
					DN1	A	B	C	D	
Biological Resources (Wildlife)	General Wildlife		Disturbance to wildlife habitat on 944 acres.	Disturbance to wildlife habitat on 970 acres.	Disturbance to wildlife habitat on 238 acres.	Disturbance to wildlife habitat on 98.1 acres.	Disturbance to wildlife habitat on 68 acres.	Disturbance to wildlife habitat on 50 acres.	Disturbance to wildlife habitat on 148 acres.	Disturbance to wildlife habitat on 944 acres.
	Federally Listed Species		Disturbance to 348 acres of northern aplomado falcon and Sprague's pipit habitat.	Disturbance to 291 acres of northern aplomado falcon Sprague's pipit habitat.	Disturbance to 176 acres of northern aplomado falcon and Sprague's pipit habitat t.	Disturbance to 2 acres of northern aplomado falcon and Sprague's pipit habitat.	Disturbance to 3 acres of northern aplomado falcon and Sprague's pipit habitat.	Disturbance to 18 acres of northern aplomado falcon and Sprague's pipit habitat.	Disturbance to 188 acres of northern aplomado falcon and Sprague's pipit habitat.	Disturbance to 348 acres of northern aplomado falcon and Sprague's pipit habitat.
	BLM Sensitive Species		Disturbance to habitat for 16 BLM Sensitive Species.	Disturbance to habitat for 16 BLM Sensitive Species.	Disturbance to habitat for 14 BLM Sensitive Species.	Disturbance to habitat for 15 BLM Sensitive Species.	Disturbance to habitat for 15 BLM Sensitive Species.	Disturbance to habitat for 15 BLM Sensitive Species.	Disturbance to habitat for 15 BLM Sensitive Species.	Disturbance to habitat for 16 BLM Sensitive Species.
	New Mexico Wildlife Conservation Act Species		Disturbance to habitat for 11 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 11 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 10 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 11 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 10 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 10 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 10 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 11 New Mexico Wildlife Conservation Act Species.
	New Mexico Species of Greatest Conservation Need		Disturbance to habitat for 16 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 12 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 12 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 15 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 12 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 12 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 12 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 16 New Mexico Species of Greatest Conservation Need.
	Migratory Birds		Disturbance to migratory bird habitat on 944 acres. Not near any high ridges or low passes.	Disturbance to migratory bird habitat on 970 acres. Near several high ridges and low passes, which increases likelihood for collisions with transmission lines. Disturbance to a sandhill crane (*Grus canadensis*) migratory flyway and wintering habitat.	Disturbance to migratory bird habitat on 238 acres.	Disturbance to migratory bird habitat on 98 acres.	Disturbance to migratory bird habitat on 68 acres.	Disturbance to migratory bird habitat on 50 acres. Crosses a low pass between the Cedar Mountains and the Carrizalillo Hills.	Disturbance to migratory bird habitat on 148 acres. Near a low pass in the Pyramid Mountains.	Disturbance to migratory bird habitat on 944 acres. Not near any high ridges or low passes.
	Wildlife Special Designation Areas		Disturbance to northern aplomado falcon designated habitat (35 acres) and the Big Burro Mountains to Cedar Mountains Potential Cougar Corridor (73 acres).	Disturbance to northern aplomado falcon (34 acres) and desert bighorn designated habitat (5 acres). Avoids the Big Burro Mountains to Cedar Mountains Potential Cougar Corridor.	Disturbance to northern aplomado falcon designated habitat (less than 0.1 acre) and the Big Burro Mountains to Cedar Mountains Potential Cougar Corridor (32 acres).	None present; no impacts.	None present; no impacts.	Disturbance to northern aplomado falcon designated habitat (11 acres).	None present; no impacts.	Disturbance to northern aplomado falcon designated habitat (35 acres) and the Big Burro Mountains to Cedar Mountains Potential Cougar Corridor (73 acres).
	All Wildlife		**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**

Table 2-15. Comparison Summary for Route Group 1: Afton Substation to Hidalgo Substation (Continued)

Route Group 1			Subroute 1.1 - Proponent Preferred	Subroute 1.2 - Proponent Alternative	Local Alternative Segments					Agency Preferred Alternative
					DN1	A	B	C	D	
Cultural Resources			Potential for direct/visual impacts to the Butterfield Trail, the Mormon Battalion Trail, and the Janos Copper Road. Potential direct impact to 2 known NRHP-eligible resources and 26 forecast (Forecast Resources) and 454 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Major**	Potential for direct/visual impacts to the Butterfield Trail, the Mormon Battalion Trail, and the Janos Copper Road. Potential direct impact to 6 known NRHP-eligible resources and 45 forecast (Forecast Resources) and 418 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Major**	Potential for direct/visual impacts to the Mormon Battalion Trail and the Janos Copper Road. Potential direct impact to 93 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Major**	Potential direct impact to 1 known NRHP-eligible resource and 3 forecast (Forecast Resources) and 59 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Minor**	Potential direct impact to 2 known NRHP-eligible resources and 9 forecast (Forecast Resources) and 42 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Moderate**	Potential for direct/visual impacts to the Janos Copper Road. Potential direct impact to 1 known NRHP-eligible resource and 3 forecast (Forecast Resources) and 30 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Moderate**	Potential direct/visual impact to 1 listed resource, the Town of Shakespeare, and direct impacts to 9 forecast (Forecast Resources) and 63 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Moderate**	Same as subroute 1.1. **Impact Intensity: Major**
Visual Resources			Crosses mostly Class C scenery (96%). High sensitivity viewers along I-10 and NM 549 and where segment P4a crosses the CDNST. Low impacts are anticipated because the new transmission lines would follow existing transmission lines. **Impact Intensity: Minor**	Crosses mostly Class C scenery (85.8%). Higher sensitivity viewers are located at the Pancho Villa State Park, CDNST, and in dispersed rural residences. There would be moderate impacts where new transmission structures are introduced into largely undeveloped areas. 19.4 miles of segments S5, S6, and S7 cross VRM Class II lands and would require a plan amendment. **Impact Intensity: Moderate**	Avoids high sensitivity viewers along I-10. **Impact Intensity: Minor**	Local segments follow existing roads. Segment D crosses perpendicular to the CDNST. There would be moderate impacts where new transmission structures are introduced. 3.7 miles of segment C and 1.8 miles of segment D cross VRM Class II lands, 13.9 miles less than subroute 1.2. Segment B is located along the West Potrillo Mountains WSA boundary and there would be greater visibility from the WSA of segment B over subroute 1.2. **Impact Intensity: Moderate**	Same as segment A	Same as segment A	Same as segment A	Crosses mostly Class C scenery (96%). High sensitivity viewers along I-10 and NM 549 and where segment p4a crosses the CDNST. Low impacts are anticipated because the new transmission lines would follow existing transmission lines. **Impact Intensity: Minor**
Land Use, Including Farm and Range Resources and Military Operations			Occurs within or along existing transmission ROW. Crosses lands identified for disposal. Crosses military training route (MTR) VR-263. No significant impacts to farmlands or rangelands are expected to occur. Runs parallel to existing linear features for approximately 107 miles (73%) of the ROW. **Impact Intensity: Minor**	Occurs along existing transportation ROW and along old railroad bed. Crosses bighorn sheep habitat designated as an avoidance area. Crosses grassland restoration areas designated as an avoidance area. Crosses MTR VR-263. Would result in a 21% impact to farmlands of statewide importance. No significant impacts to rangelands are expected to occur. Runs parallel to existing linear features for approximately 62 miles (44%) of the ROW. **Impact Intensity: Minor**	Does not occur within existing ROWs. Crosses lands identified for disposal. Would result in a 12% impact to farmlands of statewide importance. No significant impacts to rangelands are expected to occur. Would parallel not yet constructed SunZia transmission line for entire length of local alternative. Would cross MTR VR-263. **Impact Intensity: Moderate**	No impact to land use. No significant impacts to farmlands or rangelands. **Impact Intensity: No impact**	No impact to land use. No significant impacts to farmlands or rangelands. **Impact Intensity: No impact**	No impact to land use. No significant impacts to farmlands or rangelands. **Impact Intensity: Minor**	Crosses CDNST corridor designated as an avoidance area. Would result in a significant (73%) impact to farmlands of statewide importance and prime farmlands if they are irrigated. No significant impacts to rangelands are expected to occur. Would cross MTR VR-263 **Impact Intensity: Minor**	Occurs within or along existing transmission ROW. Crosses lands identified for disposal. Crosses MTR VR-263. 272 acres of Farmland of Statewide Importance would be temporarily impacted during construction. No significant impacts to rangelands are expected to occur. Runs parallel to existing linear features for approximately 107 miles (73%) of the ROW. **Impact Intensity: Minor**

Table 2-15. Comparison Summary for Route Group 1: Afton Substation to Hidalgo Substation (Continued)

Route Group 1			Subroute 1.1 - Proponent Preferred	Subroute 1.2 - Proponent Alternative	Local Alternative Segments					Agency Preferred Alternative
					DN1	A	B	C	D	
Special Designations			Crosses CDNST once. Crosses Butterfield Trail once. **Impact Intensity: Minor**	Crosses Butterfield Trail once. **Impact Intensity: Minor**	Would not intersect special designations. **Impact Intensity: No impact**	Would not intersect special designations. **Impact Intensity: No impact**	Adjacent to Mount Riley/West Potrillo Mountains WSA. **Impact Intensity: Minor**	Would not intersect special designations. **Impact Intensity: No impact**	Crosses CDNST once. **Impact Intensity: Minor**	Crosses CDNST once. Crosses Butterfield Trail once. **Impact Intensity: Minor**
Wilderness Characteristics			Does not cross any WIUs **Impact Intensity: No Impact**	Crosses 7 WIUs, for a total of 33 miles. **Impact Intensity: Moderate**	Crosses 1 WIU for a total of 2.1 miles. **Impact Intensity: Minor**	Crosses 4 WIUs for a total of 8 miles. **Impact Intensity: Moderate**	Does not cross any WIUs **Impact Intensity: No Impact**	Crosses 1 WIU for a total of 0.1 mile. **Impact Intensity: Minor**	Crosses 1 WIU for a total of 2.3 miles. **Impact Intensity: Minor**	Does not cross any WIUs **Impact Intensity: No impact**
Recreation			Adjacent to the Aden Hills OHV Special Recreation Management Area (SRMA). **Impact Intensity: Minor**	Crosses bighorn sheep habitat in Game Management Unit 25. **Impact Intensity: Minor**	Crosses lands available for dispersed recreation that are not along existing ROWs or transportation corridors. **Impact Intensity: Minor**	No impacts. **Impact Intensity: No impact**	No impacts. **Impact Intensity: No impact**	No impacts. **Impact Intensity: No impact**	Negligible impacts. **Impact Intensity: Minor**	Adjacent to the Aden Hills OHV SRMA. **Impact Intensity: Minor**
Socioeconomics and Environmental Justice			Project would directly and indirectly support an estimated 235 local jobs, along with 246 non-local workers, in the New Build Section during 2-year construction period. Corresponding increases in labor income, output, and tax revenues. Construction could create short-term shortages of temporary housing, and short-term increases in the demand for local services, in the more remote western portion of the New Build Section. Ongoing operations could benefit local communities through increased property tax revenues and improved electrical capacity to serve future growth. Given the prevalence of low-income and minority populations throughout the area, disproportionate impacts on low-income and minority populations are likely inevitable under any feasible transmission route. **Impact Intensity: Minor**	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1

Table 2-15. Comparison Summary for Route Group 1: Afton Substation to Hidalgo Substation (Continued)

Route Group 1			Subroute 1.1 - Proponent Preferred	Subroute 1.2 - Proponent Alternative	Local Alternative Segments					Agency Preferred Alternative
					DN1	A	B	C	D	
Public Health and Safety			Increased potential for occupational safety hazards to occur. Increased potential for public exposure to electromagnetic fields. **Impact Intensity: Minor**	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1
Hazardous Materials and Hazardous and Solid Waste			No impacts. **Impact Intensity: No impact**	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1
Transportation			Temporary short-term increase in traffic during construction. Approximately 36 miles of access road type D and 31 miles of access road type E would be constructed. **Impact Intensity: Minor**	Same as subroute 1.1 Approximately 78 miles of access road type D and 18 miles of access road type E would be constructed.	Same as subroute 1.1 Approximately 43 miles of access road type D and 4 miles of access road type E would be constructed.	Same as subroute 1.1 Approximately 1 mile of access road type D and 4 miles of access road type E would be constructed.	Same as subroute 1.1 Approximately 4 miles of access road type E would be constructed.	Same as subroute 1.1 Approximately 1 mile of access road type D and 2 miles of access road type E would be constructed.	Same as subroute 1.1 Approximately 10 miles of access road type D and 1 mile of access road type E would be constructed.	Approximately 36 miles of access road type D and 31 miles of access road type E would be constructed.
Intentional Acts of Destruction			Increase in potential targets for acts of sabotage or terrorism. Decrease in the potential for acts of sabotage or terrorism to cause service disruption and/or potential reduction in duration of service disruption. **Impact Intensity: No impact**	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1	Same as subroute 1.1

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Subroute Length (miles)			95.5	96.0	35.4	8.9	26.6	2.2	53.7	6.4	12.3	14.8	31.2	10.5	1.0	2.0	98.8
Land Ownership (miles crossed)	BLM		28.3	21.9	19.5	3.6	11.7	1.3	39.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.3
	BIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	DOD		0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	Forest Service		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Reclamation		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	State		37.3	38.3	6.8	5.0	11.8	0.8	14.0	6.4	10.7	4.4	10.6	4.4	0.6	0.0	37.6
	County		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Private		29.6	35.7	9.1	0.2	3.1	0.0	0.0	0.0	1.6	10.4	20.6	6.1	0.5	2.0	26.8
Ground Disturbance	Temporary	Acres	654.5	637.4	258.1	49.7	168.8	32.2	300.6	36.0	68.7	103.0	194.7	58.7	5.7	11.3	693.5
		Acres/Mile	6.6	6.6	7.3	5.6	6.4	14.8	5.6	5.6	5.6	7.0	6.2	5.6	5.6	5.6	7.0
	Permanent	Acres	171.5	197.0	56.5	18.1	43.9	4.4	113.1	14.2	22.2	28.3	34.8	11.6	0.5	1.5	176.4
		Acres/Mile	1.8	2.1	1.6	2.0	1.7	2.0	2.1	2.2	1.8	1.9	1.1	1.1	0.5	0.8	1.8
BLM RMP Conformance	VRM	Acres crossing Class II Lands	None	None	None	74.0	None	None	None	None	None	None	None	None	None	None	None
	ROW avoidance areas under the Mimbres RMP		Crosses CDNST corridor designated as an avoidance area. Crosses bighorn sheep habitat designated as an avoidance area.	Crosses CDNST corridor designated as an avoidance area. Crosses bighorn sheep habitat designated as an avoidance area.	Crosses bighorn sheep habitat designated as an avoidance area.	Crosses and parallels Butterfield Trail corridor designated as an avoidance area.	Crosses Butterfield Trail corridor designated as an avoidance area.	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	Crosses CDNST and Butterfield Trail corridors, and bighorn sheep habitat, designated as avoidance areas.
	Plan Conformance		No conflict	No conflict	No conflict	BLM plan non-conformance for paralleling the Butterfield Trail in a ROW avoidance area and crossing VRM Class II lands.	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Air Quality			Fugitive dust and equipment emissions would occur under all subroutes and alternatives; emissions would be relative to the length of the subroute and alternative(s) chosen. Does not traverse any nonattainment or maintenance areas. Potential conflict with prevailing winds and dust storms on the Lordsburg and Willcox playas causing flashover on the transmission line. **Impact Intensity: Minor**	Same as subroute 2.1. Less potential conflict with prevailing winds and dust storms on the Lordsburg and Willcox Playas causing flashover on the transmission line.	Same as subroute 2.1.	Same as subroute 2.1. Potential conflict with prevailing winds and dust storms on the Lordsburg Playa causing flashover on the transmission line.	Same as subroute 2.1. Less potential conflict with prevailing winds and dust storms on the Lordsburg Playa causing flashover on the transmission line.	Same as subroute 2.1. Less potential conflict with prevailing winds and dust storms on the playa causing flashover on the transmission line.	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1. Less potential conflict with prevailing winds and dust storms on the Willcox Playa causing flashover on the transmission line.	Same as subroute 2.1.	Same as subroute 2.1.	Same as subroute 2.1.	Same as subroute 2.1.	Same as subroute 2.1
Noise and Vibration			Approximately 5 noise sensitive receptors (NSRs) are located along this subroute. The nearest NSR is located within 50 feet from the ROW. No NSRs are present near the Lordsburg Playa, and 2 NSRs are present near Willcox Playa. **Impact Intensity: Major but temporary**	Greater than 100 NSRs are located along this subroute. The nearest NSR is located within 50 feet from the ROW. No NSRs are present near the Lordsburg Playa, and 36 NSRs are present near Willcox Playa. **Impact Intensity: Major but temporary**	This alternative follows I-10 more closely than the subroute it is substituting for. This alternative would pick up a greater number of NSRs than the subroute; however, the existing baseline noise conditions are higher from traffic from the interstate. Approximately 85 NSRs are present near Lordsburg Playa. **Impact Intensity: Major but temporary**	Does not avoid or pick up any NSRs from the subroute being substituted for. No NSRs near Lordsburg Playa. **Impact Intensity: Major but temporary**	Same as segment LD2. One NSR near Lordsburg Playa.	Same as segment LD2. No NSRs near Lordsburg Playa.	This alternative would avoid the NSRs clustered along I-10. This alternative picks up approximately 8 additional NSRs while avoiding approximately the same number. **Impact Intensity: Major but temporary**	Does not avoid or pick up any NSRs from the subroute being substituted for. **Impact Intensity: Major but temporary**	Same as segment LD4-Option 4.	This alternative passes through Willcox, Arizona, and thus picks up more than 100 additional NSRs than the subroute. Approximately 102 NSRs near Willcox Playa. **Impact Intensity: Major but temporary**	Approximately 15 NSRs are located along this variation. The nearest NSR is located within 50 feet from the ROW. Avoids the Lordsburg Playa and crosses largely agricultural areas. **Impact Intensity: Major but temporary**	Same as segment P7a. This alternative picks up approximately 10 additional NSRs while avoiding approximately the same number. **Impact Intensity: Major but temporary**	Same as segment P7a. Does not avoid or pick up any NSRs from the subroute being substituted for. **Impact Intensity: Major but temporary**	Same as segment P7a. Does not avoid or pick up any NSRs from the subroute being substituted for. **Impact Intensity: Major but temporary**	Approximately 4 NSRs are located along this subroute. The nearest NSR is located within 50 feet from the ROW. **Impact Intensity: Major but temporary**

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Geology and Mineral Resources			Geology: No impacts. Mineral Resources: All mining districts crossed are inactive. Minor short-term future impacts are possible due to temporary preclusion of access to mineral resources if transmission line structures need to be moved to accommodate surface mining. No unavoidable adverse impacts, no long-term loss of productivity, and no irretrievable or irreversible commitment of resources. No mining districts would be crossed in the Lordsburg and Willcox playa areas. **Impact Intensity: Minor**	Same as subroute 2.1. 74 acres of mining districts would be crossed in the Lordsburg Playa area. No mining districts would be crossed near Willcox Playa.	Same as subroute 2.1. 13 acres of mining districts would be crossed near Lordsburg Playa.	Same as subroute 2.1. No mining districts would be crossed near Lordsburg Playa.	Same as subroute 2.1. 125 acres of mining districts would be crossed near Lordsburg Playa.	Same as subroute 2.1. No mining districts would be crossed near Lordsburg Playa.	Same as subroute 2.1. 123 acres of the active Bowie Mining District would be crossed in the San Simon River Valley.	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1. No mining districts would be crossed near Willcox Playa.	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1. 917 acres (combined) of the active Aden Mining District (715 acres), the inactive Lordsburg Mesa Mining District (125 acres), and the inactive Kimball District (77 acres) would be crossed by the Agency Preferred Alternative.
Soil Resources			Wind erosive soils are in all segments and alternatives in route group 2. Has moderately (~320 acres) and highly erodible soils (~23 acres) near Lordsburg Playa. Has moderately (~270 acres) and highly erodible soils (~41 acres) near Willcox Playa. **Impact Intensity: Minor**	Same as subroute 2.1. Has moderately (~350 acres) and highly erodible soils (~12 acres) near Lordsburg Playa. Has moderately erodible soils (~103 acres) near Willcox Playa.	Same as subroute 2.1. Has moderately (~325 acres) and highly erodible soils (~8 acres) near Lordsburg Playa.	Same as subroute 2.1. Has moderately (~117 acres) and highly erodible soils (~33 acres) near Lordsburg Playa.	Same as subroute 2.1. Has moderately (~391 acres) and highly erodible soils (~205 acres) near Lordsburg Playa.	Same as subroute 2.1. Has moderately erodible soils (~4 acres) near Lordsburg Playa.	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1. Has moderately erodible soils (~220 acres) near Willcox Playa.	Has moderately (~251 acres) and highly erodible soils (~38 acres) near Willcox Playa.	Has moderately (~104 acres) erodible soils near Willcox Playa	Has moderately (~11 acres) erodible soils near Willcox Playa	Has moderately (~1 acres) near Willcox Playa	Same as subroute 2.1

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Paleontological Resources			Potential to disturb high sensitivity geological units in segment P5b only. **Impact Intensity: Minor**	Potential to disturb high sensitivity geological units considered to have “high potential” in segment E only on approximately 16 acres near Lordsburg Playa. **Impact Intensity: Minor**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	No key issues for paleon-tological resources. **Impact Intensity: No impact**	Potential to disturb high sensitivity geological units in segment P5b only. No key impacts for the remaining segments. **Impact Intensity: Minor**
Groundwater, Surface Water, and Wetlands			3 WUS 2 wetlands 185 acres floodplain Lordsburg Playas special considerations **Impact Intensity: Minor**	3 WUS 0 wetlands 281 acres of floodplains Lordsburg and Willcox Playas special considerations **Impact Intensity: No impact**	3 WUS 0 wetlands 89 acres of floodplains **Impact Intensity: Minor to Moderate**	0 WUS 0 wetlands 0 acres of floodplains . **Impact Intensity: No impact**	0 WUS 0 wetlands 0 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 0 acres of floodplains **Impact Intensity: No impact**	4 WUS 0 wetlands 124 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 0 acres of floodplains **Impact Intensity: No impact**	1 WUS 0 wetlands 12 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 142 acres of floodplains **Intensity: No impact**	0 WUS 0 wetlands 43 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 0 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 0 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 12 acres of floodplains **Impact Intensity: No impact**	3 WUS 2 wetlands 182 acres of floodplains **Impact Intensity: Minor**

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2	Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments: LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	Route Variation: P7a	P7b	P7c	P7d	Agency Preferred Alternative
Biological Resources (Vegetation)	Crosses the southeastern portion of the Willcox Playa, but impacts are expected to be temporary and minimal. No ESA-listed species have the potential to occur. Sensitive species— Gregg night-blooming cereus, Parish's alkali grass, button cactus (*Epithelantha micromeris*), devilthorn hedgehog cactus (*Echinocereus pseudopectinatus*), playa spider plant (*Cleome multicaulis*), San Carlos wild-buckwheat (*Eriogonum capillare*), slender needle corycactus (*Coryphantha scheeri* var. *valida*), varied fishhook cactus (*Mammillaria viridiflora*), and Wilcox pincushion cactus (*Mamillaria wrightii* var. *wilcoxii*)—have potential to occur. Tamarisk is known to occur in segment P5. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species— Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus (*Echinomastus erectocentrus* var. *erectocentrus*), and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus—have potential to occur. Tamarisk could be present on route segment LD1. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus—have potential to occur. Hoary cress (*Cardaria* spp.) could be present on route segment LD3a. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—Gregg night-blooming cereus, Parish's alkali grass, button cactus, devilthorn hedgehog cactus, playa spider plant, San Carlos wild-buckwheat, slender needle corycactus, varied fishhook cactus, needle-spined pineapple cactus, and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—slender needle corycactus, devilthorn hedgehog cactus, varied fishhook cactus, button cactus, needle-spined pineapple cactus, dune prickly pear, Gregg's night-blooming cereus, and San Carlos wild buckwheat have the potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—slender needle corycactus, devilthorn hedgehog cactus, varied fishhook cactus, button cactus, needle-spined pineapple cactus, dune prickly pear, Gregg's night-blooming cereus, and San Carlos wild buckwheat have the potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—slender needle corycactus, devilthorn hedgehog cactus, varied fishhook cactus, button cactus, needle-spined pineapple cactus, dune prickly pear and Gregg's night-blooming cereus have the potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—slender needle corycactus, devilthorn hedgehog cactus, varied fishhook cactus, button cactus, and needle-spined pineapple cactus have the potential to occur. **Impact Intensity: Minor**	No ESA-listed species have the potential to occur. Sensitive species—button cactus, Gregg night-blooming cereus, Chihuahua scurfpea, Parish's alkali grass, slender needle corycactus, devilthorn hedgehog cactus, Wilcox pincushion cactus, San Carlos wild - buckwheat, varied fishhook cactus button cactus, playa spider plant, dune prickly pear, and needle-spined cactus— have potential to occur. **Impact Intensity: Minor**

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Biological Resources (Wildlife)	General Wildlife		Disturbance to wildlife habitat on 635 acres.	Disturbance to wildlife habitat on 637 acres.	Disturbance to wildlife habitat on 258 acres.	Disturbance to wildlife habitat on 50 acres.	Disturbance to wildlife habitat on 169 acres.	Disturbance to wildlife habitat on 32 acres.	Disturbance to wildlife habitat on 300 acres.	Disturbance to wildlife habitat on 36 acres.	Disturbance to wildlife habitat on 69 acres.	Disturbance to wildlife habitat on 103 acres.	Disturbance to wildlife habitat on 195 acres.	Disturbance to wildlife habitat on 58 acres.	Disturbance to wildlife habitat on 6 acres.	Disturbance to wildlife habitat on 11 acres.	Disturbance to wildlife habitat on 694 acres.
	Federally Listed Species		Disturbance to 249 acres of northern aplomado falcon and 261 acres of Sprague's pipit habitat. Disturbance to 346 acres of lesser long-nosed bat habitat and 256 acres of Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher (*Empidonax traillii extimus*) and Chiricahua leopard frog (*Lithobates chiricahuensis*). Indirect impacts only.	Disturbance to 205 acres of northern aplomado falcon and Sprague's pipit habitat. Disturbance to 363 acres of lesser long-nosed bat habitat and 304 acres of Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 61 acres of northern aplomado falcon and 77 acres of Sprague's pipit habitat. Disturbance to 127 acres of lesser long-nosed bat habitat and Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 39 acres of northern aplomado falcon and Sprague's pipit habitat. Disturbance to 49 acres of lesser long-nosed bat habitat and Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 9109 acres of northern aplomado falcon and Sprague's pipit habitat. Disturbance to 143 acres of lesser long-nosed bat habitat and 33 acres of Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 9 acres of northern aplomado falcon and Sprague's pipit habitat. Disturbance to 12 acres of lesser long-nosed bat habitat and Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 213 acres of northern aplomado falcon and 54 acres of Sprague's pipit habitat. Disturbance to 214 acres of lesser long-nosed bat habitat and Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 23 acres of Sprague's pipit and northern aplomado falcon habitat. Disturbance to 32 acres of lesser long-nosed and Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 35 acres of Sprague's pipit habitat. Disturbance to 55 acres of lesser long-nosed bat, Mexican long-nosed bat and northern aplomado falcon habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 58 acres of northern aplomado falcon and Sprague's pipit habitat. Disturbance to 63 acres of lesser long-nosed and Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 97 acres of northern aplomado falcon and 108 acres of Sprague's pipit habitat. Disturbance to 113 acres of lesser long-nosed bat, and 14 acres of Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 36 acres of northern aplomado falcon, 37 acres of Sprague's pipit, lesser long-nosed bat, and Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 3 acres of northern aplomado falcon and Sprague's pipit habitat and 4 acres of lesser long-nosed bat, and Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 5 acres of northern aplomado falcon, lesser long-nosed bat, and Mexican long-nosed bat habitat. Disturbance to 8 acres of Sprague's pipit habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.	Disturbance to 256 acres of northern aplomado falcon and 196 acres of Sprague's pipit habitat. Disturbance to 407 acres of lesser long-nosed bat habitat and 237 acres of Mexican long-nosed bat habitat. No habitat disturbed for southwestern willow flycatcher and Chiricahua leopard frog. Indirect impacts only.
	BLM Sensitive Species		Disturbance to habitat for 18 BLM Sensitive Species. No habitat disturbance for Colorado River toad (*Anaxyrus alvarius*) and lowland leopard frog (*Lithobates yavapaiensis*). Indirect impacts only.	Disturbance to habitat for 18 BLM Sensitive Species.	Disturbance to habitat for 18 BLM Sensitive Species.	Disturbance to habitat for 16 BLM Sensitive Species.	Disturbance to habitat for 16 BLM Sensitive Species.	Disturbance to habitat for 16 BLM Sensitive Species.	Disturbance to habitat for 17 BLM Sensitive Species.	Disturbance to habitat for 16 BLM Sensitive Species.	Disturbance to habitat for 15 BLM Sensitive Species.	Disturbance to habitat for 15 BLM Sensitive Species.	Disturbance to habitat for 15 BLM Sensitive Species.	Disturbance to habitat for 15 BLM Sensitive Species.	Disturbance to habitat for 15 BLM Sensitive Species.	Disturbance to habitat for 7 BLM Sensitive Species.	Disturbance to habitat for 18 BLM Sensitive Species
	New Mexico Wildlife Conservation Act Species		Disturbance to habitat for 7 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 7 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 7 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 7 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 7 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 5 New Mexico Wildlife Conservation Act Species.	Disturbance to habitat for 7 New Mexico Wildlife Conservation Act Species.	This local alternative does not occur in New Mexico.	This local alternative does not occur in New Mexico.	This local alternative does not occur in New Mexico.	This route variation does not occur in New Mexico.	This route variation does not occur in New Mexico.	This route variation does not occur in New Mexico.	This route variation does not occur in New Mexico.	Disturbance to habitat for 7 New Mexico Wildlife Conservation Act Species.
	Arizona Wildlife Species of Concern		Disturbance to habitat for 8 Arizona Wildlife Species of Concern.	Disturbance to habitat for 8 Arizona Wildlife Species of Concern.	Disturbance to habitat for 8 Arizona Wildlife Species of Concern.	This local alternative does not occur in Arizona.	This local alternative does not occur in Arizona.	This local alternative does not occur in Arizona.	Disturbance to habitat for 7 Arizona Wildlife Species of Concern.	Disturbance to habitat for 6 Arizona Wildlife Species of Concern.	Disturbance to habitat for 6 Arizona Wildlife Species of Concern.	Disturbance to habitat for 6 Arizona Wildlife Species of Concern.	Disturbance to habitat for 6 Arizona Wildlife Species of Concern.	Disturbance to habitat for 6 Arizona Wildlife Species of Concern.	Disturbance to habitat for 3 Arizona Wildlife Species of Concern.	Disturbance to habitat for 1 Arizona Wildlife Species of Concern.	Disturbance to habitat for 8 Arizona Wildlife Species of Concern.

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
	New Mexico Species of Greatest Conservation Need		Disturbance to habitat for 18 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 17 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 14 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 12 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 12 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 10 New Mexico Species of Greatest Conservation Need.	Disturbance to habitat for 12 New Mexico Species of Greatest Conservation Need.	This local alternative does not occur in New Mexico.	This local alternative does not occur in New Mexico.	This local alternative does not occur in New Mexico.	This route variation does not occur in New Mexico.	This route variation does not occur in New Mexico.	This route variation does not occur in New Mexico.	This route variation does not occur in New Mexico.	Disturbance to habitat for 18 New Mexico Species of Greatest Conservation Need.
	Arizona Species of Greatest Conservation Need		Disturbance to habitat for 6 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 6 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 5 Arizona Species of Greatest Conservation Need.	This local alternative does not occur in Arizona.	This local alternative does not occur in Arizona.	This local alternative does not occur in Arizona.	Disturbance to habitat for 5 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 5 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 5 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 5 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 4 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 3 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 4 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 3 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 8 Arizona Species of Greatest Conservation Need.
	Migratory Birds		Disturbance to migratory bird habitat on 635 acres. Significant risk of collision for many species of waterfowl, waders, and shorebirds documented at Willcox Playa. Additional collision hazard, October–March, sandhill cranes have a daily migration between playa and agricultural fields to the southeast. PCEMs would reduce the risk of collision near Willcox Playa. The risk would be mitigated with use of line marking devices and the relocation of Crane Lake. Near low passes in Peloncillo Mountains and Dos Cabezas Range.	Disturbance to migratory bird habitat on 637 acres. Significant risk of collision for many species of waterfowl, waders, and shorebirds documented at Willcox Playa. The risk would be mitigated with use of line marking devices. Crosses Powers Canyon, a low pass in the Peloncillo Mountains.	Disturbance to migratory bird habitat on 258 acres. Significant risk of collision for many species of waterfowl, waders, and shorebirds documented at Willcox Playa. The risk would be mitigated with use of line marking devices. Crosses low pass in the Peloncillo Mountains.	Disturbance to migratory bird habitat on 50 acres. Crosses Powers Canyon, a low pass in the Peloncillo Mountains.	Disturbance to migratory bird habitat on 169 acres.	Disturbance to migratory bird habitat on 32 acres.	Disturbance to migratory bird habitat on 300 acres.	Disturbance to migratory bird habitat on 36 acres.	Disturbance to migratory bird habitat on 69 acres.	Disturbance to migratory bird habitat on 103 acres.	Disturbance to migratory bird habitat on 195 acres. Significantly reduced risk of collision for many species of waterfowl, waders, and shorebirds documented at Willcox Playa. The route variation avoids a major collision hazard by routing the line south and east, and farther from the daily migration corridor. The route variation would pose a minor collision hazard.	Disturbance to migratory bird habitat on 58 acres. Significantly reduced risk of collision for many species of waterfowl, waders, and shorebirds documented at Willcox Playa. The route variation avoids a major collision hazard by routing the line south and east, and farther from the daily migration corridor. The route variation would pose a minor collision hazard.	Disturbance to migratory bird habitat on 6 acres. Significantly reduced risk of collision for many species of waterfowl, waders, and shorebirds documented at Willcox Playa. The route variation avoids a major collision hazard by routing the line south and east, and farther from the daily migration corridor. The route variation would pose a minor collision hazard.	Disturbance to migratory bird habitat on 11 acres. Significantly reduced risk of collision for many species of waterfowl, waders, and shorebirds documented at Willcox Playa. The route variation avoids a major collision hazard by routing the line south and east, and farther from the daily migration corridor. The route variation would pose a minor collision hazard.	Disturbance to migratory bird habitat on 694 acres. Collision hazard near Willcox Playa will be reduced with implementation of PCEMs such as line marking devices and relocation of Crane Lake. This is a minor collision hazard.

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
	Wildlife Special Designation Areas		Disturbance to desert bighorn designated habitat (17 acres). Disturbance to the Willcox Playa-Winchester-Pinaleño-Dos Cabezas (70 acres) and the Pinaleño-Dos Cabezas-San Simon Valley linkages (166 acres). Segment P7 is adjacent to the Willcox Playa Wildlife Area and would cross the Willcox Playa/Lake Cochise Important Bird Area (with disturbance to approximately 46 acres).	Disturbance to desert bighorn designated habitat (17 acres). Disturbance to the Willcox Playa-Winchester-Pinaleño-Dos Cabezas (141 acres) and the Pinaleño-Dos Cabezas-San Simon Valley linkages (161 acres).	Disturbance to northern aplomado falcon (24 acres) and desert bighorn designated habitat (10 acres). Disturbance to the Peloncillo Bighorn Avoidance Area (8 acres). Disturbance to the Willcox Playa-Winchester-Pinaleño-Dos Cabezas (66 acres) and Pinaleño-Dos Cabezas-San Simon Valley linkages (161 acres).	This local alternative does not cross any wildlife special designation areas.	This local alternative does not cross any wildlife special designation areas.	Disturbance to desert bighorn designated habitat (1 acre).	Disturbance to the Willcox Playa-Winchester-Pinaleño-Dos Cabezas (38 acres), the Pinaleño-San Simon Valley (10 acres) and the Pinaleño-Dos Cabezas-San Simon Valley linkages (25 acres).	This local alternative does not cross any wildlife special designation areas.	Disturbance to the Willcox Playa-Winchester-Pinaleño-Dos Cabezas (12 acres), the Pinaleño-San Simon Valley (6 acres) and the Pinaleño-Dos Cabezas-San Simon Valley linkages (50 acres).	Disturbance to the Willcox Playa-Winchester-Pinaleño-Dos Cabezas and the Pinaleño-Dos Cabezas-San Simon Valley linkages (82 acres). Would cross the Willcox Playa/Lake Cochise Important Bird Area (~2 acres).	Disturbance to the Willcox Playa-Winchester-Pinaleño-Dos Cabezas (53 acres) linkages. Avoids the Willcox Playa/Lake Cochise Important Bird Area (~6 acres).	Disturbance to the Willcox Playa-Winchester-Pinaleño-Dos Cabezas (4 acres) linkages. Avoids the Willcox Playa/Lake Cochise Important Bird Area.	This route variation does not cross any wildlife special designation areas.	This route variation does not cross any wildlife special designation areas.	Disturbance to desert bighorn designated habitat (17 acres). Disturbance to the Willcox Playa-Winchester-Pinaleño-Dos Cabezas (70 acres) and the Pinaleño-Dos Cabezas-San Simon Valley linkages (166 acres). Would disturb approximately 46 acres of the Willcox Playa/Lake Cochise Important Bird Area.
	All Wildlife		**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**
Cultural Resources			Potential for direct/visual impacts to the Butterfield Trail. Potential direct impact to 4 known NRHP-eligible resources and 19 forecast (Forecast Resources) and 69 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Moderate**	Potential for direct/visual impacts to the Butterfield Trail and the Zuñiga Route. Potential direct impact to 3 known NRHP-eligible resources and 16 forecast (Forecast Resources) and 34 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Major**	Potential for direct/visual impacts to the Butterfield Trail. Potential direct impact to one known NRHP-eligible resource and 7 forecast (Forecast Resources) and 41 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Moderate**	Potential for direct/visual impacts to the Butterfield Trail. Potential direct impact to 24 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Moderate**	Potential for direct/visual impacts to the Butterfield Trail. Potential direct impact to 63 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Moderate**	Potential direct impacts to 5 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Minor**	Potential for direct/visual impacts to the Zuñiga Route. Potential direct impact to one known NRHP-eligible resources and12 estimated NRHP-eligible resources (Index of Total Potential Effect model). **Impact Intensity: Moderate**	No key issues for cultural resources. **Impact Intensity: No impact**	No key issues for cultural resources. **Impact Intensity: No impact**	Potential direct impact to 89 resources with unknown number of NRHP-eligible resources. **Impact Intensity: Moderate**	Potential for direct/visual impacts to the Butterfield Trail. Potential direct impact to 2 NRHP-eligible forecast resources (Forecast Resources). **Impact Intensity: Moderate**	Potential for direct/visual impacts to the Butterfield Trail. Potential direct impact to 7 NRHP-eligible forecast resources (Forecast Resources). **Impact Intensity: Moderate**	No key issues for cultural resources. **Impact Intensity: No impact**	No key issues for cultural resources. **Impact Intensity: No impact**	Potential for direct impacts to 6 NRHP-eligible sites and 19 forecast NRHP-eligible sites. Potential for direct/visual impacts to the Butterfield Trail and AZ FF:1:34(ASM). **Impact Intensity: Moderate**

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Visual Resources			Crosses primarily Class B and C scenery. There are moderately sensitive viewers from the Peloncillo Mountains, Dos Cabezas Wilderness, Fort Bowie, and the Willcox Playa. There would be moderate impacts to viewers where there are unobstructed views of new structures. Crosses VRM Classes III and IV near Lordsburg Playa and VRM Class IV near Willcox Playa. **Impact Intensity: Moderate**	Crosses primarily Class B and C scenery. Because dispersed recreation viewers would have views of the segments where they are adjacent to existing transmission facilities, impacts to viewers from the Willcox Playa are expected to be low. Crosses VRM Classes III and IV near Lordsburg Playa. **Impact Intensity: Minor**	Local alternative segments cross Class B and C scenery. There are high sensitivity views of the local alternative segments from I-10. Where local alternative segments follow existing transmission lines, there would be low to moderate impacts to scenic quality. **Impact Intensity: Moderate to Major**	Same as segment LD1. Crosses VRM Class II on 3.1 miles near Lordsburg Playa.	Same as segment LD1	Same as segment LD1	Same as segment LD1.	Same as segment LD1.	Same as segment LD1.	Same as segment LD1.	Crosses primarily Class C scenery. There would be low to moderate impacts to scenic quality. There are high sensitivity views of route variation P7a from several domestic farm winery tasting rooms and private properties on the Willcox Bench. Impacts to sensitive viewers would be moderate. **Impact Intensity: Moderate to major**	Same as variation P7a	Same as variation P7a	Same as variation P7a	Crosses primarily Class B and C scenery. There are low to moderate impacts to unobstructed views of new structures within Class B lands near the Willcox Playa. There are no segments crossing VRM Class II included in the Agency Preferred Alternative. **Impact Intensity: Low to moderate**

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Land Use, Including Farm and Range Resources and Military Operations			Occurs within existing ROWs. Crosses bighorn sheep habitat designated as an avoidance area. Crosses military training routes (MTRs) VR-259, VR-260, VR-263, and VR-1233 - No significant impacts to farmlands or rangelands. Parallels existing SWTC 230 kV. Would be farthest away from the BSETR. Runs parallel to existing linear features for approximately 80 miles (83%) of the ROW. Near Willcox Playa, 100% of segment P7 parallels existing linear features. **Impact Intensity: Minor**	Occurs within existing ROWs. Crosses CDNST corridor designated as an avoidance area. Crosses bighorn sheep habitat designated as an avoidance area. No significant impacts to farmlands or rangelands. Crosses MTRs VR-259 and VR-260. - Runs parallel to existing linear features for approximately 53 miles (55%) of the ROW. Near Willcox Playa, 51% of segment Ga parallels existing linear features. Subroute closer to military testing areas. **Impact Intensity: Minor**	Does not occur within existing ROWs or along existing corridors. Crosses bighorn sheep habitat designated as an avoidance area. Would result in a 28% impact to farmlands of statewide and unique importance. No significant impacts to rangelands. **Impact Intensity: Moderate**	Does not occur within existing ROWs or along existing corridors. Crosses Butterfield Trail corridor designated as an avoidance area. Would result in a significant (64%) impact to farmlands of statewide importance. No significant impacts to rangelands. **Impact Intensity: Moderate**	Does not occur within existing ROWs or along existing corridors. Crosses MTRs VR-263 and VR-1233. - Would result in a 27% impact to farmlands of statewide importance. No significant impacts to rangelands. **Impact Intensity: Moderate**	Does not occur within existing ROWs or along existing corridors. Would result in a 47% impact to farmlands of statewide importance. No significant impacts to rangelands. **Impact Intensity: Moderate**	Does not occur within existing ROWs or along existing corridors. Occurs within the Morenci Military Operations Area. Crosses MTRs VR-260, VR-263, and VR-1233. - No significant impacts to statewide or unique farmlands, or rangelands. Would parallel not yet constructed SunZia transmission line for entire length of local alternative. **Impact Intensity: Moderate**	Does not occur within existing ROWs or along existing corridors. No significant impacts to statewide or unique farmlands, or rangelands. **Impact Intensity: Moderate**	Does not occur within existing ROWs or along existing corridors No significant impacts to statewide or unique farmlands, or rangelands. Crosses MTRs VR-260, VR-263, and VR-1233. **Impact Intensity: Moderate**	Does not occur within existing ROWs or along existing corridors. No significant impacts to statewide or unique farmlands, or rangelands. Would roughly parallel I-10. Crosses MTR VR-259. **Impact Intensity: Moderate**	Occurs along existing primitive and rural roadways. Would be located adjacent to existing and proposed domestic farm wineries near Willcox Playa. No significant impacts to statewide or unique farmlands, or rangelands. Would cross MTRs VR-259 and VR-260. **Impact Intensity: Minor**	Occurs along existing rural roadways. Would be located adjacent to existing and proposed domestic farm wineries near Willcox Playa. No significant impacts to statewide or unique farmlands, or rangelands. Would cross MTRs VR-259 and VR-260. **Impact Intensity: Minor**	Occurs along existing rural roadways. Would be located adjacent to existing and proposed domestic farm wineries near Willcox Playa. No significant impacts to statewide or unique farmlands, or rangelands. **Impact Intensity: Minor**	Occurs along existing rural roadways. Would be located adjacent to existing and proposed domestic farm wineries near Willcox Playa. No significant impacts to statewide or unique farmlands, or rangelands. Would cross MTR VR-259. **Impact Intensity: Minor**	Occurs within existing ROWs as well as outside existing ROWs or existing corridors. Crosses MTRs VR-260, VR-263, and VR-1233. Would be farthest away from the BSETR. Parallels existing linear features for approximately 97 miles (98%) of the ROW. Near Willcox Playa, 100% of segment P7 parallels existing linear features. **Impact Intensity: Minor** **Farm and Range** 207 acres of farmland of statewide importance, 33 acres of farmland of unique importance, 248 acres of prime farmland (irrigated), and 65 acres of prime farmland (other) would be temporarily impacted during construction. No significant impacts to rangelands are expected to occur. **Impact Intensity: Minor**

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Special Designations			Crosses Butterfield Trail two times. Segment P7 is adjacent to the Willcox Playa Wildlife Area. Segment P7 would cross the Willcox Playa/Lake Cochise Important Bird Area (~200 acres). **Impact Intensity: Minor**	Adjacent to the Willcox Playa National Natural Landmark (NNL) ACEC. Adjacent to the Willcox Playa NNL ACEC. **Impact Intensity: Minor**	Crosses Butterfield Trail once near Lordsburg Playa. **Impact Intensity: Minor**	Crosses Butterfield Trail once near Lordsburg Playa. **Impact Intensity: Minor**	Crosses Butterfield Trail once near Lordsburg Playa. **Impact Intensity: Minor**	Would not intersect special designations. **Impact Intensity: No impact**	Would not intersect special designations. **Intensity: No impact**	Would not intersect special designations. **Intensity: No impact**	Would not intersect special designations. **Intensity: No impact**	Same as segment LD4. Would cross the Willcox Playa/Lake Cochise Important Bird Area (~2 acres).	Crosses Butterfield Trail in two locations near Willcox Playa. **Impact Intensity: Minor**	Crosses Butterfield Trail in one location near Willcox Playa. **Impact Intensity: Minor**	Would not intersect special designations. **Intensity: No impact**	Would not intersect special designations. **Intensity: No impact**	Segments P5b and LD3a would cross the Butterfield Trail. Segment P7 is adjacent to the Willcox Playa Wildlife Area. Segment P7 would cross the Willcox Playa/Lake Cochise Important Bird Area. **Impact Intensity: Minor**
Wilderness Characteristics			Does not cross any WIUs. **Impact Intensity: No impact**	Crosses 1 WIU for a total of 4 miles **Impact Intensity: Minor**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Recreation			Adjacent to Willcox Playa/Lake Cochise Important Bird Area, Willcox Wildlife Area, and Willcox Playa NNL ACEC; however, would follow existing ROWs. Would cross Game Management Unit (GMU) 27 near Lordsburg Playa and GMUs 30A and 30B near Willcox Playa. **Impact Intensity: Minor**	Same as subroute 2.1. Would cross GMUs 27 and 28 near Lordsburg Playa. **Impact Intensity: Minor**	Crosses Butterfield Trail once, would be nearby Fort Bowie. Would cross Game Management Unit (GMU) 27 near Lordsburg Playa and GMUs 30A and 30B near Willcox Playa. **Impact Intensity: Minor**	Crosses Butterfield Trail once. Crosses lands available for dispersed recreation that are not along existing ROWs or transportation corridors. Would cross GMU 27 near Lordsburg Playa. **Impact Intensity: Moderate**	Crosses lands available for dispersed recreation that are not along existing ROWs or transportation corridors. Would cross GMU 27 near Lordsburg Playa. **Impact Intensity: Minor**	Crosses lands available for dispersed recreation that are not along existing ROWs or transportation corridors. Would cross GMU 27 near Lordsburg Playa. **Impact Intensity: Minor**	Crosses State recreation area in the Peloncillo Mountains. Adjacent to Hot Wells Dunes Special Recreation Management Area (SRMA). **Impact Intensity: Minor**	Crosses lands available for dispersed recreation that are not along existing ROWs or transportation corridors. **Impact Intensity: Minor**	Crosses lands available for dispersed recreation that are not along existing ROWs or transportation corridors. **Impact Intensity: Minor**	Crosses lands available for dispersed recreation that are not along existing ROWs or transportation corridors. Would cross GMU 30 near Willcox Playa. **Impact Intensity: Minor**	Crosses lands available for dispersed recreation subject to private land owner permission that are along existing transportation corridors. Most land would be unavailable for recreation since it is under cultivation. Crosses Butterfield Trail in two locations. **Impact Intensity: Minor**	Crosses lands available for dispersed recreation subject to private land owner permission that are along existing transportation corridors. Most land would be unavailable for recreation since it is under cultivation. Crosses Butterfield Trail in one location. **Impact Intensity: Minor**	Crosses lands available for dispersed recreation subject to private land owner permission that are along existing transportation corridors. Most land would be unavailable for recreation since it is under cultivation. **Impact Intensity: Minor**	Crosses lands available for dispersed recreation subject to private land owner permission that are along existing transportation corridors. Most land would be unavailable for recreation since it is under cultivation. **Impact Intensity: Minor**	LD3a crosses lands available for dispersed recreation that are not along existing ROWs or transportation corridors. Crosses GMU 27 near Lordsburg Playa. Adjacent to Willcox Playa/Lake Cochise Important Bird Area, Willcox Wildlife Area, and Willcox Playa NNL ACEC; however, would follow existing ROWs in these areas. Crosses State recreation area in the Peloncillo Mountains. Adjacent to Hot Wells Dunes SRMA. **Impact Intensity: Minor**

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Socioeconomics and Environmental Justice			Project would directly and indirectly support an estimated 235 local jobs, along with 246 non-local workers, in the New Build Section during 2-year construction period. Corresponding increases in labor income, output, and tax revenues. Construction could create short-term shortages of temporary housing, and short-term increases in the demand for local services, in the more remote western portion of the New Build Section. Ongoing operations could benefit local communities through increased property tax revenues and improved electrical capacity to serve future growth. Multiple low-income and minority populations in the study area may be disproportionately negatively affected by localized construction and operation impacts. Given the prevalence of low-income and minority populations throughout the area, disproportionate impacts on low-income and minority populations are likely inevitable under any feasible transmission route. **Impact Intensity: Minor**	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1

Table 2-16. Comparison Summary for Route Group 2: Hidalgo Substation to Apache Substation (Continued)

Route Group 2			Subroute 2.1 - Proponent Preferred	Subroute 2.2 - Proponent Alternative	Local Alternative Segments								Route Variation				Agency Preferred Alternative
					LD1	LD2	LD3a	LD3b	LD4	LD4-Option 4	LD4-Option 5	WC1	P7a	P7b	P7c	P7d	
Public Health and Safety			Increased potential for occupational safety hazards to occur. Increased potential for public exposure to electromagnetic fields. **Impact Intensity: Minor**	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1
Hazardous Materials and Hazardous and Solid Waste			No impacts. **Impact Intensity: No impact**	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1
Transportation			Temporary short-term increase in traffic on primary roadways during construction. Approximately 18 miles of access road type D and 11 miles of access road type E would be constructed. **Impact Intensity: Minor**	Same as subroute 2.1. Approximately 56 miles of access road type D and 8 miles of access road type E would be constructed.	Same as subroute 2.1. Approximately 19 miles of access road type D and 6 miles of access road type E would be constructed.	Same as subroute 2.1. Approximately 9 miles of access road type D would be constructed.	Same as subroute 2.1. Approximately 11 miles of access road type D and 3 miles of access road type E would be constructed.	Same as subroute 2.1. Approximately 2 miles of access road type D would be constructed.	Same as subroute 2.1 Approximately 52 miles of access road type D and 5 miles of access road type E would be constructed.	Same as subroute 2.1 Approximately 7 miles of access road type D and 1 mile of access road type E would be constructed.	Same as subroute 2.1 Approximately 1 mile of access road type E would be constructed.	Same as subroute 2.1. Approximately 13 miles of access road type D and 0.4 mile of access road type E would be constructed.	Same as subroute 2.1. Approximately 5 miles of access road type D and 5 miles of access road type E	Same as subroute 2.1. Approximately 3 miles of access road type D and 1 mile of access road type E would be constructed.	Same as subroute 2.1. Approximately 0.1 mile of access road type E would be constructed.	Same as subroute 2.1. Approximately 0.3 mile of access road type E would be constructed.	Same as subroute 2.1. Approximately 16 miles of access road type D and 13 miles of access road type E would be constructed.
Intentional Acts of Destruction			Increase in potential targets for acts of sabotage or terrorism. Decrease in the potential for acts of sabotage or terrorism to cause service disruption and/or potential reduction in duration of service disruption. **Impact Intensity: No impact**	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1	Same as subroute 2.1

Table 2-17. Comparison Summary for Route Group 3: Apache Substation to Pantano Substation

Route Group 3			Local Alternative Segment		
			Subroute 3.1 - Proponent Preferred (Upgrade)	**H**	**Agency Preferred Alternative**
Subroute Length (miles)			70.3	19.3	65.4
Land Ownership (miles crossed)	BLM		0.6	0.0	0.6
	BIA		2.9	0.0	2.9
	DOD		0.0	0.0	0.0
	Forest Service		0.5	0.0	0.5
	Reclamation		0.2	0.0	0.2
	State		35.7	15.3	34.6
	County		0.0	0.0	0.0
	Private		30.5	4.0	26.6
Ground Disturbance	Temporary	Acres	438.7	98.4	413.6
		Acres/Mile	6.2	5.1	6.3
	Permanent	Acres	87.8	24.8	87.8
		Acres/Mile	1.2	1.3	1.3
BLM RMP Conformance	VRM	Acres crossing Class II Lands	None	None	None
	ROW Avoidance Areas		No impact	No impact	No impact
	Plan Conformance		No conflict	No conflict	No conflict
Air Quality			Fugitive dust and equipment emissions would occur under all subroutes and alternatives; emissions would be relative to the length of the subroute and alternative(s) chosen. Does not traverse any nonattainment or maintenance areas. **Impact Intensity: Minor**	Same as subroute 3.1	Same as subroute 3.1

Table 2-17. Comparison Summary for Route Group 3: Apache Substation to Pantano Substation (Continued)

Route Group 3			Local Alternative Segment		
			Subroute 3.1 - Proponent Preferred (Upgrade)	**H**	**Agency Preferred Alternative**
Noise and Vibration			More than 100 noise sensitive receptors (NSRs) exist along this subroute around the cities of Benson and Tucson, Arizona. The nearest NSRs in both cities are within 50 feet of the ROW. Few NSRs exist along this subroute outside the cities. **Impact Intensity: Major but temporary**	This alternative avoids the city of Benson, Arizona, and so has considerably fewer NSRs than the subroute it is substituting for. Approximately 20 NSRs are added from this alternative, however. The nearest NSR to this alternative would be approximately 400 feet. **Impact Intensity: Major but temporary**	Same as subroute 3.1
Geology and Mineral Resources			Geology: No impacts. Mineral Resources: No impacts. **Impact Intensity: No impact**	Same as subroute 3.1	Same as subroute 3.1
Soil Resources			Wind erosive soils are in all segments and alternatives in route group 3. Has moderately (~321 acres) and highly erodible soils (~223 acres). **Impact Intensity: Minor**	Has moderately (~226 acres) and highly erodible soils (~56 acres). same as subroute	Same as subroute 3.1
Paleontological Resources			Potential to disturb moderately sensitive geological units in segment U2 only. **Impact Intensity: Minor**	No key issues for paleontological resources. **Impact Intensity: No impact**	Same as subroute 3.1 **Impact Intensity: Minor**
Groundwater, Surface Water, and Wetlands			7 WUS 3 wetlands 36 acres of floodplains San Pedro River and Cienega Creek special considerations **Impact Intensity: No impact**	2 WUS 1 wetland 48 acres of floodplains San Pedro River special considerations **Impact Intensity: No impact**	7 WUS 3 wetlands 36 acres of floodplains San Pedro River and Cienega Creek special considerations **Impact Intensity: No impact**

Table 2-17. Comparison Summary for Route Group 3: Apache Substation to Pantano Substation (Continued)

Route Group 3			Local Alternative Segment		
			Subroute 3.1 - Proponent Preferred (Upgrade)	**H**	**Agency Preferred Alternative**
Biological Resources (Vegetation)			The Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*), listed as endangered under the ESA, has some potential to be present on segment U2. The Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) may be present on the San Xavier Indian Reservation on segment and U3a. Sensitive species—broadleaf ground cherry (*Physalis latiphysa*), button cactus, devilthorn hedgehog cactus, magenta-flowered hedgehog cactus (*Echinocereus fasciculatus*), giant sedge (*Carex ultra* var. *spissa*), kelvin cholla (*Cylindropuntia kelvinensis*), night-blooming cereus, littleleaf false tamarind (*Lysiloma watsonii*), needle-spined pineapple cactus, Pima Indian mallow (*Abutilon parishii*), San Carlos wild-buckwheat, San Pedro River wild-buckwheat (*Eriogonum terrenatum*), staghorn cholla (*Cylindropuntia versicolor*), Tumamoc globeberry (*Tumamoca macdougalii*) varied fishhook cactus, and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**	The Huachuca water umbel, listed as endangered under the ESA, has some potential to be present. Sensitive species—devilthorn hedgehog cactus, giant sedge, littleleaf false tamarind, needle-spined pineapple cactus, San Carlos wild-buckwheat, San Pedro River wild buckwheat, varied fishhook cactus, and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**	The Huachuca water umbel has some potential to be present on segment U2. The Pima pineapple cactus may be present on the San Xavier Indian Reservation on segment and U3a, Sensitive species—broadleaf ground cherry button cactus, devilthorn hedgehog cactus, magenta-flowered hedgehog cactus giant sedge, kelvin cholla, night-blooming cereus, littleleaf false tamarind, needle-spined pineapple cactus, Pima Indian mallow, San Carlos wild-buckwheat, San Pedro River wild-buckwheat, staghorn cholla, Tumamoc globeberry, varied fishhook cactus, and Wilcox pincushion cactus—have potential to occur. **Impact Intensity: Minor**

Table 2-17. Comparison Summary for Route Group 3: Apache Substation to Pantano Substation (Continued)

Route Group 3			Local Alternative Segment		
			Subroute 3.1 - Proponent Preferred (Upgrade)	**H**	**Agency Preferred Alternative**
Biological Resources (Wildlife)	General Wildlife		Disturbance to wildlife habitat on 439 acres.	Disturbance to wildlife habitat on 98 acres.	Disturbance to wildlife habitat on 414 acres.
	Federally Listed Species		Would cross northern Mexican gartersnake proposed critical habitat at Cienega Creek and San Pedro River. Siting of transmission line structure to avoid disturbance to critical habitat would minimize impacts. Disturbance to 349 acres of lesser long-nosed and 332 acres of Mexican long-nosed bat habitat. Disturbance to 252 acres of Sonoran desert tortoise habitat.** No habitat disturbed for southwestern willow flycatcher and western yellow-billed cuckoo (*Coccyzus americanus occidentalis*). Indirect impacts only.	. Would cross northern Mexican gartersnake proposed critical habitat at the San Pedro River. Siting of transmission line structure to avoid disturbance to critical habitat would minimize impacts. Disturbance to 77acres of Sonoran desert tortoise, habitat. Disturbance to 95 acres of lesser long-nosed bat, and Mexican long-nosed bat habitat.	Would cross northern Mexican gartersnake proposed critical habitat at Cienega Creek and San Pedro River. Siting of transmission line structure to avoid disturbance to critical habitat would minimize impacts. Disturbance to 349 acres of lesser long-nosed and 332 acres of Mexican long-nosed bat habitat. Disturbance to 252 acres of Sonoran desert tortoise habitat. No habitat disturbed for southwestern willow flycatcher and western yellow-billed cuckoo. Indirect impacts only.
	BLM Sensitive Species		Disturbance to habitat for 19 BLM Sensitive Species.	Disturbance to habitat for 19 BLM Sensitive Species.	Disturbance to habitat for 19 BLM Sensitive Species.
	Coronado National Forest Sensitive Species		Disturbance to habitat for 12 Coronado National Forest Sensitive Species.	This local alternative does not intersect the Coronado National Forest.	Disturbance to habitat for 12 Coronado National Forest Sensitive Species.
	Coronado National Forest Management Indicator Species		Disturbance to habitat for 3 Coronado National Forest Management Indicator Species.	This local alternative does not intersect the Coronado National Forest.	Disturbance to habitat for 3 Coronado National Forest Management Indicator Species.
	Arizona Wildlife Species of Concern		Disturbance to habitat for 15 Arizona Wildlife Species of Concern.	Disturbance to habitat for 15 Arizona Wildlife Species of Concern.	Disturbance to habitat for 15 Arizona Wildlife Species of Concern.

Table 2-17. Comparison Summary for Route Group 3: Apache Substation to Pantano Substation (Continued)

Route Group 3			Local Alternative Segment		
			Subroute 3.1 - Proponent Preferred (Upgrade)	**H**	**Agency Preferred Alternative**
	Arizona Species of Greatest Conservation Need		Disturbance to habitat for 5 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 3 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 5 Arizona Species of Greatest Conservation Need.
	Migratory Birds		Disturbance to migratory bird habitat on 439 acres.	Disturbance to migratory bird habitat on 98 acres.	Disturbance to migratory bird habitat on 414 acres.
	Wildlife Special Designation Areas		Disturbance to Pima County Biological Core Management Areas (4.6 acres), Important Riparian Areas (4 acres), and Multiple Use Management Areas (12 acres). Disturbance to Pima County Priority Conservation Areas for rufous-winged sparrow (*Aimophila carpalis*) (39 acres) and Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) (98.9 acres). Disturbance to Bar V Ranch (31 acres). Disturbance to the Galiuro-Winchester-Dragoon PLZ (23 acres) and the Rincons-Whetstone-Santa Rita linkages (12 acres).	Disturbance to Pima County Biological Core Management Areas (13 acres) and Important Riparian Areas (0.4 acre). Disturbance to the Rincons-Whetstone-Santa Rita linkages (10 acres).	Disturbance to Pima County Biological Core Management Areas (4.6 acres), Disturbance to Pima County Priority Conservation Areas for rufous-winged sparrow (39 acres) and Pima pineapple cactus (98.9 acres). Disturbance to Bar V Ranch (31 acres). Disturbance to the Galiuro-Winchester-Dragoon PLZ (23 acres) and the Rincons-Whetstone-Santa Rita linkage (12 acres).
	All Wildlife		**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**
Cultural Resources			Potential direct/visual impact to the Butterfield Trail, the Mormon Battalion Trail, and the Zuñiga Route, as well as one listed historic property:; the Empirita Ranch Historic District. Potential direct disturbance to 2 NRHP-eligible resources and 8 forecast NRHP-eligible resources (Forecast Resources). **Impact Intensity: Moderate**	Potential direct/visual impact to the Butterfield Trail, the Mormon Battalion Trail, and the Zuñiga Route. Potential direct disturbance to 2 NRHP-eligible resources and 6 forecast NRHP-eligible resources (Forecast Resources). **Impact Intensity: Moderate**	Same as subroute 3.1. **Impact Intensity: Moderate**

Table 2-17. Comparison Summary for Route Group 3: Apache Substation to Pantano Substation (Continued)

Route Group 3			Local Alternative Segment		
			Subroute 3.1 - Proponent Preferred (Upgrade)	**H**	**Agency Preferred Alternative**
Visual Resources			Crosses primarily Class B scenery (93%). There are high sensitivity viewers from communities along the subroute. There would be low to moderate impacts where there is some existing construction access and with the replacement of existing transmission line. There are no BLM lands along subroute 3.1. **Impact Intensity: Moderate**	Crosses primarily Class B scenery. Avoids the communities of Pomerene and Mescal and the city of Benson. Requires construction of a new transmission line parallel to an existing H-frame transmission line. Impacts to viewers would be low because the replacement structures would be similar to existing landscape. There are no BLM lands for segment H. **Impact Intensity: Minor**	Crosses primarily Class B scenery (93%). There are high sensitivity viewers from communities along the Agency Preferred Alternative, although it has been routed to be located further from Summit, Pomerene, Mescal, and Benson. There would be low to moderate impacts where there is some existing construction access and with the replacement of existing transmission line. There are no BLM lands along this portion of the Agency Preferred Alternative. **Impact Intensity: Moderate**
Land Use, Including Farm and Range Resources and Military Operations			Occurs within existing utility corridors. Occurs within the BSETR. Crosses MTR VR-259. No significant impacts to statewide or unique farmlands, or rangelands. Runs parallel to existing linear features for 100% of the ROW. **Impact Intensity: Minor**	Occurs within existing utility corridors. Occurs within the BSETR. No significant impacts to statewide or unique farmlands, or rangelands. Runs parallel to existing linear features for 100% of the ROW. **Impact Intensity: Minor**	Occurs within existing utility corridors. Occurs within the BSETR but would be located along the I-10 corridor, which is not actively used for military operations. Crosses MTR VR-259. 58 acres of prime farmland (irrigated) and 90 acres of prime farmland (other) would be temporarily impacted during construction. No significant impacts to rangelands are expected to occur. Parallels existing linear features for 100% of the ROW. **Impact Intensity: Minor**

Table 2-17. Comparison Summary for Route Group 3: Apache Substation to Pantano Substation (Continued)

Route Group 3			Local Alternative Segment		
			Subroute 3.1 - Proponent Preferred (Upgrade)	**H**	**Agency Preferred Alternative**
Special Designations			Crosses Butterfield Trail three times and the Arizona NST one time. Crosses SVAPD. **Impact Intensity: Minor**	Crosses Butterfield Trail twice. **Impact Intensity: Minor**	Crosses Butterfield Trail three times and the Arizona NST one time. Crosses SVAPD. **Impact Intensity: Minor**
Wilderness Characteristics			Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**
Recreation			Crosses Butterfield Trail three times, crosses Arizona NST and Anza NST each one time. **Impact Intensity: Minor**	Crosses Butterfield Trail twice. **Impact Intensity: Minor**	Crosses Butterfield Trail three times. **Impact Intensity: Minor**

Table 2-17. Comparison Summary for Route Group 3: Apache Substation to Pantano Substation (Continued)

Route Group 3			Local Alternative Segment		
			Subroute 3.1 - Proponent Preferred (Upgrade)	**H**	**Agency Preferred Alternative**
Socioeconomics and Environmental Justice			Project would directly and indirectly support an estimated 138 local jobs, along with 132 non-local workers, in the Upgrade Section during 2-year construction period. Corresponding increases in labor income, output, and tax revenues. Construction could create short-term shortages of temporary housing, and short-term increases in the demand for local services, in the more remote eastern portion of the Upgrade Section. Ongoing operations could benefit local communities through increased property tax revenues and improved electrical capacity to serve future growth. Multiple low-income and minority populations in the study area may be disproportionately negatively affected by localized construction and operation impacts. Given the prevalence of low-income and minority populations throughout the area, disproportionate impacts on low-income and minority populations are likely inevitable under any feasible transmission route. **Impact Intensity: Minor**	Same as subroute 3.1	Same as subroute 3.1

Table 2-17. Comparison Summary for Route Group 3: Apache Substation to Pantano Substation (Continued)

Route Group 3			Local Alternative Segment		
			Subroute 3.1 - Proponent Preferred (Upgrade)	**H**	**Agency Preferred Alternative**
Public Health and Safety			Increased potential for occupational safety hazards to occur. Increased potential for public exposure to electromagnetic fields. **Impact Intensity: Minor**	Increased potential for occupational safety hazards to occur. Increased potential for public exposure to electromagnetic fields. **Impact Intensity: Minor**	Same as subroute 3.1
Hazardous Materials and Hazardous and Solid Waste			No impacts. **Impact Intensity: No impact**	Same as subroute 3.1	Same as subroute 3.1
Transportation			Temporary short-term increase in traffic on primary roadways during construction. Approximately 18 miles of access road type E would be constructed. **Impact Intensity: Minor**	Temporary short-term increase in traffic on primary roadways during construction. Approximately 7 miles of access road type E would be constructed. **Impact Intensity: Minor**	Same as subroute 3.1 Approximately 18 miles of access road type E would be constructed.
Intentional Acts of Destruction			Increase in potential targets for acts of sabotage or terrorism. Decrease in the potential for acts of sabotage or terrorism to cause service disruption and/or potential reduction in duration of service disruption. **Impact Intensity: No impact**	Increase in potential targets for acts of sabotage or terrorism. Decrease in the potential for acts of sabotage or terrorism to cause service disruption and/or potential reduction in duration of service disruption. **Impact Intensity: No impact**	Same as subroute 3.1

**On October 6, 2015, FWS determined the Sonoran desert tortoise does not warrant protection under the ESA and is no longer a candidate species.

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Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation

Route Group 4			Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
				MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Subroute Length (miles)			48.3	1.1	1.4	1.6	0.3	1.0	0.8	0.8	1.8	2.7	4.5	6.2	55.5
Land Ownership (miles crossed)	BLM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	BIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	DOD		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Forest Service		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Reclamation		0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	State		18.0	1.1	0.2	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	18.9
	County		0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
	Private		29.6	0.0	1.2	1.4	0.3	0.3	0.8	0.8	1.8	2.7	4.5	6.2	36.0
Ground Disturbance	Temporary	Acres	322.2	5.6	7.2	8.0	1.3	5.0	4.2	4.2	9.2	13.9	23.0	31.6	359.1
		Acres/Mile	6.7	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	6.5
	Permanent	Acres	89.7	0.3	0.3	1.1	0.1	0.1	0.9	0.6	2.5	2.7	3.3	3.2	92.2
		Acres/Mile	1.9	0.3	0.2	0.7	0.6	0.1	1.1	0.8	1.4	1.0	0.7	0.5	1.7
BLM RMP Conformance	VRM	Acres crossing Class II Lands	None	None	None	None	None	None	None	None	None	None	None	None	None
	ROW Avoidance Areas		No impact	None	None	None	None	None	None	None	None	None	None	No impact	No impact
	Plan Conformance		No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict	No conflict
Air Quality			Fugitive dust and equipment emissions would occur under all subroutes and alternatives; emissions would be relative to the length of the subroute and alternative(s) chosen. The subroute and all the alternatives would traverse the Tucson carbon monoxide maintenance area and the Rillito particulate matter 10 non-attainment area. **Impact Intensity: Minor**	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 3.1	Same as subroute 4.1

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4	Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
		MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Noise and Vibration	More than 100 noise sensitive receptors (NSRs) exist along this subroute, particularly around Tucson. The nearest NSRs are within 50 feet of the ROW. The local alternatives still occur within the city of Tucson; therefore, they have little net impact on the quantity or proximity of NSRs to the ROW. **Impact Intensity: Major but Temporary**	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	This variation avoids traversing portions of Summit, Arizona and associated potential NSRs. The variation is within 50 feet of potential NSRs. However, the amount of NSRs impacted would be less than the subroute it is substituting for. **Impact Intensity: Major but temporary**	Same as subroute 4.1
Geology and Mineral Resources	Geology: No impact. Mineral Resources: No impact. **Impact Intensity: No impact**	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 3.1	Same as subroute 4.1
Soil Resources	No key issues with soil resources in route group 4. **Impact Intensity: No impact**	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Has moderately erodible soils (~1 acre). same as subroute 4.1	Same as subroute 4.1
Paleontological Resources	No key issues for paleontological resources. **Impact Intensity: No impact**	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	No key issues for paleontological resources. **Impact Intensity: No impact**	Same as subroute 4.1 **Impact Intensity: No impact**
Groundwater, Surface Water, and Wetlands	6 WUS 4 wetlands 266 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 19 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 2 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 0 acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 0acres of floodplains **Impact Intensity: No impact**	0 WUS 0 wetlands 3 acres of floodplains **Impact Intensity: No impact**	1 WUS 1 wetland 2 acres of floodplains **Impact Intensity: No impact**	1 WUS 0 wetlands 10 acres of floodplains **Impact Intensity: No impact**	2 WUS 2 wetland 7 acres of floodplains **Impact Intensity: No impact**	1 WUS 0 wetland 3 acres of floodplains **Impact Intensity: No impact**	1 WUS 5 wetlands 31 acres of floodplains **Impact Intensity: Minor to moderate**	0 WUS 0 wetlands 4 acres of floodplains **Impact Intensity: No impact**	6 WUS 4 wetlands 269 acres of floodplains **Impact Intensity: No impact**

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4	Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
		MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Biological Resources (Vegetation)	The Pima pineapple cactus, listed as endangered under the ESA, has potential to be present on the southern parts of segments U3 and U4. Sensitive species— button cactus, desert barrel cactus (*Ferocactus cylindraceus*), Engelmann prickly pear (*Opuntia engelmannii* var. *flavispina*), giant sedge, littleleaf false tamarind (*Lysiloma watsonii*), magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow (*Abutilon parishii*), San Carlos wild-buckwheat, staghorn cholla (*Cylindropuntia versicolor*), Thornber's fishhook cactus (*Mammillaria thornberi*), Tumamoc globeberry (*Tumamoca macdougalii*), and hybrid Kelvin cholla (*Opuntia kelvinensis*)—have potential to occur. Buffelgrass *Pennisetum ciliare)* is known to be present in segment U3, and likely to occur in segment U4. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species— desert barrel cactus, magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species—magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species—magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species—magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species—magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species—magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species—magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species—magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species—magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. Field bindweed (*Convolvulus arvensis*) and hydrilla (*Hydrilla verticillata*) could be present in TH3a. **Impact Intensity: Minor**	No ESA-listed species occur in this segment. Sensitive species—magenta-flowered hedgehog cactus, night-blooming cereus, Pima Indian mallow, staghorn cholla, Tumamoc globeberry, and hybrid Kelvin cholla—have potential to occur. Buffelgrass is known to occur in this segment. **Impact Intensity: Minor**	The Pima pineapple cactus, listed as endangered under the ESA, has some potential to be present on route variation U3aPC. Sensitive species- magenta-flowered hedgehog cactus, kelvin cholla, staghorn cholla, Tumamoc globeberry, and varied fishhook cactus have some potential to occur in route variation U3aPc. **Impact Intensity: Minor**	The Pima pineapple cactus, listed as endangered under the ESA, has potential to be present on the southern parts of segments U3, U3a PC and U4. Sensitive species-button cactus, desert barrel cactus, Engelmann prickly pear, giant sedge, littleleaf false tamarind, Pima Indian mallow, slender-needle corycactus, Thornber fishhook cactus, Tumamoc globeberry, magenta-flowered hedgehog cactus, kelvin cholla, and staghorn cholla—have potential to occur. Buffelgrass is known to occur in segment U3 and likely to occur in segment U4. **Impact Intensity: Minor**

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4		Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
			MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Biological Resources (Wildlife)	General Wildlife	Disturbance to wildlife habitat on 323 acres.	Disturbance to wildlife habitat on 6 acres.	Disturbance to wildlife habitat on 7 acres.	Disturbance to wildlife habitat on 8 acres.	Disturbance to wildlife habitat on 1 acre.	Disturbance to wildlife habitat on 5 acres.	Disturbance to wildlife habitat on 4 acres.	Disturbance to wildlife habitat on 4 acres.	Disturbance to wildlife habitat on 9 acres.	Disturbance to wildlife habitat on 14 acres.	Disturbance to wildlife habitat on 23 acres.	Disturbance to wildlife habitat on 32 acres.	Disturbance to wildlife habitat on 359 acres.
	Federally Listed Species	Disturbance to 237 acres of lesser long-nosed bat habitat. Disturbance to 143 acres of Sonoran desert tortoise habitat. No habitat 12 acres of southwestern willow flycatcher and western yellow-billed cuckoo foraging habitat.	This local alternative occurs in an agricultural area. No impacts on Federally Listed Species.	Disturbance to 5 acres of lesser long-nosed bat habitat and 4 acres of Sonoran desert tortoise habitat.	Disturbance to 7 acres of lesser long-nosed bat habitat and Sonoran desert tortoise habitat.	This local alternative occurs in a developed area. Disturbance to 1 acre of lesser long-nosed bat habitat.	Disturbance to 7 acres of lesser long-nosed bat habitat and Sonoran desert tortoise habitat.	Disturbance to 4 acres of lesser long-nosed bat habitat and Sonoran desert tortoise habitat.	Disturbance to 4 acres of lesser long-nosed bat habitat and 2 acres of Sonoran desert tortoise habitat.	Disturbance to 5 acres of lesser long-nosed bat habitat and 2 acres of Sonoran desert tortoise habitat.	Disturbance to 17 acres of lesser long-nosed bat habitat and 10 acres of Sonoran desert tortoise habitat.	Disturbance to 23 acres of lesser long-nosed bat habitat and 2 acres of Sonoran desert tortoise habitat.	Disturbance to 32 acres of lesser long-nosed bat habitat and 25 acres of Sonoran desert tortoise habitat.	Disturbance to 273 acres of lesser long-nosed bat habitat. Disturbance to 167 acres of Sonoran desert tortoise habitat. Disturbance to 10 acres of riparian vegetation along the Santa Cruz River for southwestern willow flycatcher and western yellow-billed cuckoo foraging habitat.
	BLM Sensitive Species	Disturbance to habitat for 22 BLM Sensitive Species.	Disturbance to habitat for 1 BLM Sensitive Species.	Disturbance to habitat for 17 BLM Sensitive Species.	Disturbance to habitat for 17 BLM Sensitive Species.	This local alternative occurs in a developed area. No impacts on BLM Sensitive Species.	Disturbance to habitat for 17 BLM Sensitive Species.	Disturbance to habitat for 17 BLM Sensitive Species.	Disturbance to habitat for 17 BLM Sensitive Species.	Disturbance to habitat for 17 BLM Sensitive Species.	Disturbance to habitat for 17 BLM Sensitive Species.	Disturbance to habitat for 17 BLM Sensitive Species.	Disturbance to habitat for 11 BLM Sensitive Species.	Disturbance to habitat for 23 BLM Sensitive Species.
	Arizona Wildlife Species of Concern	Disturbance to habitat for 26 Arizona Wildlife Species of Concern.	Disturbance to habitat for 1 Arizona Wildlife Species of Concern.	Disturbance to habitat for 18 Arizona Wildlife Species of Concern.	Disturbance to habitat for 18 Arizona Wildlife Species of Concern.	Disturbance to habitat for 2 Arizona Wildlife Species of Concern.	Disturbance to habitat for 18 Arizona Wildlife Species of Concern.	Disturbance to habitat for 19 Arizona Wildlife Species of Concern.	Disturbance to habitat for 18 Arizona Wildlife Species of Concern.	Disturbance to habitat for 18 Arizona Wildlife Species of Concern.	Disturbance to habitat for 18 Arizona Wildlife Species of Concern.	Disturbance to habitat for 11 Arizona Wildlife Species of Concern.	Disturbance to habitat for 16 Arizona Wildlife Species of Concern.	Disturbance to habitat for 26 Arizona Wildlife Species of Concern.
	Arizona Species of Greatest Conservation Need	Disturbance to habitat for 16 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 1 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 11 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 11 Arizona Species of Greatest Conservation Need.	This local alternative occurs in a developed area. No impacts on Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 11 Arizona Species of Greatest Conservation Need	Disturbance to habitat for 11 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 11 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 11 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 11 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 11 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 1 Arizona Species of Greatest Conservation Need.	Disturbance to habitat for 16 Arizona Species of Greatest Conservation Need.
	Pima County Species	Disturbance to habitat for 15 Pima County Species.	Disturbance to habitat for 1 Pima County Species.	Disturbance to habitat for 10 Pima County Species.	Disturbance to habitat for 10 Pima County Species.	This local alternative occurs in a developed area. No impacts on Pima County Species.	Disturbance to habitat for 10 Pima County Species.	Disturbance to habitat for 10 Pima County Species.	Disturbance to habitat for 12 Pima County Species.	Disturbance to habitat for 10 Pima County Species.	Disturbance to habitat for 10 Pima County Species.	Disturbance to habitat for 10 Pima County Species.	Disturbance to habitat for 2 Pima County Species	Disturbance to habitat for 15 Pima County Species.

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4		Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
			MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
	Migratory Birds	Disturbance to migratory bird habitat on 323 acres. Near an unnamed ridge near Ajo Way and Rattlesnake Pass in the Tucson Mountains.	Disturbance to migratory bird habitat on 6 acres.	Disturbance to migratory bird habitat on 7 acres.	Disturbance to migratory bird habitat on 8 acres.	Disturbance to migratory bird habitat on 1 acre.	Disturbance to migratory bird habitat on 5 acres.	Disturbance to migratory bird habitat on 4 acres.	Disturbance to migratory bird habitat on 4 acres.	Disturbance to migratory bird habitat on 9 acres.	Disturbance to migratory bird habitat on 14 acres.	Disturbance to migratory bird habitat on 23 acres.	Disturbance to migratory bird habitat on 32 acres.	Disturbance to migratory bird habitat on 359 acres. Near an unnamed ridge near Ajo Way and Rattlesnake Pass in the Tucson Mountains.
	Wildlife Special Designation Areas	Disturbance to Pima County Biological Core Management Areas (5 acres), Important Riparian Areas (25 acres), Multiple Use Management Areas (67 acres), and Agricultural Inholdings (17 acres). Disturbance to Pima County Priority Conservation Areas for groundsnake (75 acres), western burrowing owl (*Athene cunicularia hypugaea*) (134 acres), cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*) (91 acres), and Pima pineapple cactus (9.8 acres). Disturbance to Santa Cruz River Park om less than 1 acre, Tumamoc Hill on 4 acres and Tucson Mountain Park on 2 acres.	Disturbance to 5 acres of Pima County Priority Conservation Area for western burrowing owl.	Disturbance to Pima County Multiple Use Management Areas on 7 acres. Disturbance to Tumamoc Hill on 6 acres.	No Wildlife Special Designation Areas would be crossed by this local alternative.	No Wildlife Special Designation Areas would be crossed by this local alternative.	No Wildlife Special Designation Areas would be crossed by this local alternative.	Disturbance to Pima County Important Riparian Areas (2 acres) and Multiple Use Management Areas (1 acre). Disturbance to the Santa Cruz River Park on 1 acre. Disturbance to Pima County western burrowing owl priority conservation areas on 3 acres.	Disturbance to less than 1 acre of Pima County Important Riparian Areas, Multiple Use Management Areas, and the Santa Cruz River Park. Disturbance to Pima County western burrowing owl priority conservation areas on 3 acres.	Disturbance to Pima County Important Riparian Areas (3 acres) and Multiple Use Management Areas (4 acres). Disturbance to the Santa Cruz River Park on 3 acres. Disturbance to Pima County western burrowing owl priority conservation areas on 6 acres.	Disturbance to Pima County Important Riparian Areas (2 acres) and Multiple Use Management Areas (less than 1 acre). Disturbance to Pima County western burrowing owl priority conservation areas on 9 acres.	Disturbance to Pima County Important Riparian Areas (20 acres) and Multiple Use Management Areas (2 acres). Disturbance to the Santa Cruz River Park on 10 acres. Disturbance to Pima County western burrowing owl priority conservation areas on 15 acres.	Disturbance to 7 acres of Pima County Priority Conservation Area for western burrowing owl and 31.6 acres of the Pima pineapple cactus PCA.	Disturbance to Pima County Biological Core Management Areas (5 acres), Important Riparian Areas (26 acres), and Agricultural Inholdings (9 acres). Disturbance to Pima County Priority Conservation Areas for cactus ferruginous pygmy owl (91 acres), groundsnake (75 acres), western burrowing owl (134 acres), cactus ferruginous pygmy owl (96 acres), and Pima pineapple cactus (41.4 acres).
	All Wildlife	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**	**Impact Intensity: Minor**

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4	Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
		MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Cultural Resources	Potential direct/visual impact to Tumamoc Hill Archaeological District and Desert Laboratory NHL, the Butterfield Trail , and the Mormon Battalion Trail. Potential direct impacts to the Los Robles Archaeological District, AZ BB:13:315(ASM), and the Valencia Site (NRHP-listed), 16 NRHP-eligible resources, and 66 forecast NRHP-eligible resources (Forecast Resources). However, route is an existing transmission line, meaning reduced ground disturbance; however, the Valencia Site is located in the expansion footprint of the Del Bac Substation. **Impact Intensity: Moderate**	No key issues for cultural resources. **Impact Intensity: No impact**	Potential direct/visual impact to Tumamoc Hill Archaeological District and Desert Laboratory NHL. Potential direct impact to 2 forecast NRHP-eligible resources (Forecast Resources). **Impact Intensity: Moderate**	Potential direct/visual impact to Tumamoc Hill Archaeological District and Desert Laboratory NHL. Potential direct impact to 10 NRHP-eligible resources (Forecast Resources). **Impact Intensity: Moderate**	Potential direct/visual impact to the Mormon Battalion Trail. **Impact Intensity: Minor**	Potential direct/visual impact to Tumamoc Hill Archaeological District and Desert Laboratory NHL. Potential direct impact to 4 NRHP-eligible resources (Forecast Resources). **Impact Intensity: Moderate**	Potential direct impact to 1 NRHP-eligible resource and 3 forecast NRHP-eligible resources (Forecast Resources). **Impact Intensity: Minor**	No key issues for cultural resources. **Impact Intensity: No impact**	Potential direct/visual impact to the Zuñiga Route. Potential direct impact to 1 NRHP-eligible resource and 17 forecast NRHP-eligible resources (Forecast Resources). **Impact Intensity: Minor**	Potential direct/visual impact to the Zuñiga Route. Potential direct impact to 1 NRHP-eligible resource and 7 forecast NRHP-eligible resources (Forecast Resources). **Impact Intensity: Minor**	Potential direct/visual impacts to the Butterfield Trail. Potential direct impact to 3 eligible resources and 16 forecast eligible resources (Forecast Resources). **Impact Intensity: Moderate**	Potential to impact the Mormon Battalion Trail and the Gila Trail. **Impact Intensity: Minor**	Potential direct/visual impact to Tumamoc Hill Archaeological District and Desert Laboratory NHL, and the Butterfield Trail. Potential direct impacts to the Los Robles Archaeological District, AZ BB:13:315(ASM), and the Valencia Site, (NRHP-listed), 15 NRHP-eligible resources, and 58 forecast NRHP-eligible resources. The route is an existing transmission line meaning reduced ground disturbance; however, the Valencia Site is located in the expansion footprint of the Del Bac Substation. **Impact Intensity: Moderate**

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4	Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
		MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Visual Resources	Crosses primarily Class C scenery. There are sensitive viewers located at Sentinel Peak, along the Anza NHT, the Butterfield Trail, the Arizona NST, at Saguaro National Park, and within pockets of urban recreational places, linear biking, and pedestrian trails. There would low to moderate impacts; the replacement structures and line would similar in form to the existing line, but would be taller. Although the structures would be taller, the increased height would barely be distinguishable viewed against the backdrop of the valley floor, surrounding development, and surrounding hills. **Impact Intensity: Moderate**	Crosses Class C landscape and has a sensitivity level of low to moderate, given the proximity to existing development and existing transmission line. Visual impact would be low. **Impact Intensity: Minor**	Visual impact is considered moderate to high in this area because of the increased scenic quality and visual sensitivity associated with Tumamoc Hill. **Impact Intensity: Moderate to major**	Same as segment TH1a	Same as segment TH1a	Visual impact is considered moderate to high in this area because of the increased scenic quality and visual sensitivity associated with Tumamoc Hill. **Impact Intensity: Moderate to major**	Crosses Class C scenery with low sensitivity because of its proximity to human-made development as well as being located within a corridor with existing lattice transmission line structure transmission lines. **Impact Intensity: Minor**	Same as segment TH3-Option A	Same as segment TH3-Option A	Crosses Class C scenery with low sensitivity given the location parallel to a major transportation corridor. **Impact Intensity: Minor**	Same as segment TH3a	Crosses primarily Class B scenery. Avoids Summit, Arizona. Requires construction of a new transmission line paralleling existing transmission ROW. Impacts to viewers would be low because of the distance from sensitive viewers and that the replacement structures would be similar to those in the existing landscape. There are no BLM lands for variation U3aPC. **Impact Intensity: Minor**	TH1-TH1a: Visual impact is considered moderate to high in this area because of the increased scenic quality and visual sensitivity associated with Tumamoc Hill. Alternative is located outside BLM-administered land. **Impact Intensity: Moderate to major** MA1: Crosses Class C landscape and has a sensitivity level of low to moderate, given the proximity to existing development and existing transmission line. Visual impact would be low. **Impact Intensity: Minor**

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4	Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
		MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Land Use, Including Farm and Range Resources and Military Operations	Follows existing ROW. Crosses SVAPD. No significant impacts to statewide or unique farmlands, or rangelands. Runs parallel to existing linear features for 100% of the ROW. Minor impacts to Pinal Airpark and Silverbell Army Heliport from the introduction of new towers and potential radio transmission interference. **Impact Intensity: Minor**	No impacts to land use or military. No significant impacts to statewide or unique farmlands, or rangelands. **Impact Intensity: No impact**	Same as segment MA1	Same as segment MA1	Same as segment MA1	Same as segment MA1	Same as segment MA1	Same as segment MA1	No impacts to land use or military. Would result in a 10.3% impact to farmlands of unique importance. No significant impacts to rangelands. **Impact Intensity: Minor**	Same as segment MA1	No impacts to land use or military. Would result in a 31% impact to farmlands of unique importance. No significant impacts to rangelands. **Impact Intensity: Minor**	Occurs along existing rural roadways paralleling existing transmission line ROWs and would not affect existing land uses. No significant impacts to statewide or unique farmlands, or rangelands. **Impact Intensity: Minor**	Follows existing ROW. Crosses SVAPD. Parallels existing linear features for approximately 54 miles (98%) of the ROW. 31 acres of farmland of unique importance, 338 acres of prime farmland (irrigated), and 276 acres of prime farmland (other) would be temporarily impacted during construction. No significant impacts to rangelands are expected to occur. No significant impact to military operations. **Impact Intensity: Minor**
Special Designations	Crosses Arizona NST. Crosses Anza National Historic Trail (NHT) four times. Crosses Butterfield Trail two times. **Impact Intensity: Minor**	Would not intersect special designations. **Impact Intensity: No impact**	Would not intersect special designations. **Impact Intensity: No impact**	Would not intersect special designations. **Impact Intensity: No impact**	Would not intersect special designations. **Intensity: No impact**	Would not intersect special designations. **Intensity: No impact**	Crosses Anza NHT two times. **Impact Intensity: Minor**	Crosses Anza NHT. **Impact Intensity: Minor**	Would not intersect special designations. **Intensity: No impact**	Would not intersect special designations. **Intensity: No impact**	Crosses Anza NHT three times. Crosses Butterfield Trail. **Impact Intensity: Minor**	Would not intersect special designations. **Intensity: No impact**	Crosses Arizona NST. Crosses Anza NHT six times. Crosses Butterfield Trail two times. Crosses SVAPD. **Impact Intensity: Minor**
Wilderness Characteristics	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**	Does not cross any WIUs. **Impact Intensity: No impact**

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4	Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
		MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Recreation	Crosses Bar V Ranch. Crosses Arizona NST. Crosses Anza NHT four times. Crosses Butterfield Trail two times. Crosses Tucson Mountain Park. Crosses Tumamoc Hill. Crosses Joaquin Murrieta Park. Crosses Christopher Columbus Park. **Impact Intensity: Minor**	Negligible impacts. **Impact Intensity: No impact**	Would not substantially change existing recreation settings, experiences, or opportunities. **Impact Intensity: Minor**	Negligible impacts. **Impact Intensity: No impact**	Negligible impacts. **Impact Intensity: No impact**	Negligible impacts. **Impact Intensity: No impact**	Would not substantially change existing recreation settings, experiences, or opportunities. **Impact Intensity: Minor**	Crosses Santa Cruz River Park. Crosses Anza NHT. **Impact Intensity: Minor**	Negligible impacts. **Impact Intensity: No impact**	Crosses Santa Cruz River Park. **Impact Intensity: Minor**	Crosses Santa Cruz River Park. Crosses Anza NHT three times. Crosses Butterfield Trail. **Impact Intensity: Minor**	Negligible impacts. **Impact Intensity: No impact**	Crosses Arizona NST and Anza NHT six times. Crosses Butterfield Trail two times. Crosses Bar V Ranch, Tucson Mountain Park, Tumamoc Hill. Joaquin Murrieta Park, Santa Crus River Park, and Christopher Columbus Park. **Impact Intensity: Minor**

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4			Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
				MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Socioeconomics and Environmental Justice			Project would directly and indirectly support an estimated 138 local jobs, along with 132 non-local workers, in the Upgrade Section during 2-year construction period. Corresponding increases in labor income, output, and tax revenues. Construction could create short-term shortages of temporary housing, and short-term increases in the demand for local services, in the more remote eastern portion of the Upgrade Section. Ongoing operations could benefit local communities through increased property tax revenues and improved electrical capacity to serve future growth. Multiple low-income and minority populations in the study area may be disproportionately negatively affected by localized construction and operation impacts. Given the prevalence of low-income and minority populations throughout the area, disproportionate impacts on low-income and minority populations are likely inevitable under any feasible transmission route. **Impact Intensity: Minor**	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1

Table 2-18. Comparison Summary for Route Group 4: Pantano Substation to Saguaro Substation (Continued)

Route Group 4			Subroute 4.1 - Proponent Preferred (Upgrade)	Local Alternative Segments										Route Variation	Agency Preferred Alternative
				MA1	TH1a	TH1b	TH1c	TH1-Option	TH3-Option A	TH3-Option B	TH3-Option C	TH3a	TH3b	U3aPC	
Public Health and Safety			Increased potential for occupational safety hazards to occur. Increased potential for public exposure to electromagnetic fields. **Impact Intensity: Minor**	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Increased potential for occupational safety hazards to occur. Increased potential for public exposure to electromagnetic fields. **Impact Intensity: Minor**	Same as subroute 4.1
Hazardous Materials and Hazardous and Solid Waste			No impact. **Impact Intensity: No impact**	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1
Transportation			Temporary short-term increase in traffic on primary roadways during construction. Approximately 0.2 mile of access road type D and 11 miles of access road type E would be constructed. **Impact Intensity: Minor**	Same as subroute 4.1 Approximately 0.2 mile of access road type E would be constructed.	Same as subroute 4.1 Approximately 0.2 mile of access road type E would be constructed.	Same as subroute 4.1 Approximately 0.8 mile of access road type E would be constructed.	Same as subroute 4.1 Approximately 0.1 mile of access road type E would be constructed.	Same as subroute 4.1 Approximately 0.1 mile of access road type E would be constructed.	Same as subroute 4.1 Approximately 0.6 mile of access road type E would be constructed.	Same as subroute 4.1 Approximately 0.2 mile of access road type E would be constructed.	Same as subroute 4.1 Approximately 0.3 mile of access road type E would be constructed.	Same as subroute 4.1 Approximately 1 mile of access road type E would be constructed.	Same as subroute 4.1 Approximately 1 mile of access road type E would be constructed.	Temporary short-term increase in traffic on primary roadways during construction. Approximately 1 mile of access road type E would be constructed. **Impact Intensity: Minor**	Same as subroute 4.1. Approximately 0.2 mile of access road type D and 11 miles of access road type E would be constructed.
Intentional Acts of Destruction			Increase in potential targets for acts of sabotage or terrorism. Decrease in the potential for acts of sabotage or terrorism to cause service disruption and/or potential reduction in duration of service disruption. **Impact Intensity: No impact**	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Same as subroute 4.1	Increase in potential targets for acts of sabotage or terrorism. Decrease in the potential for acts of sabotage or terrorism to cause service disruption and/or potential reduction in duration of service disruption. **Impact Intensity: No impact**	Same as subroute 4.1

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Figure 2-1a. Potential routing options considered for New Build Section.

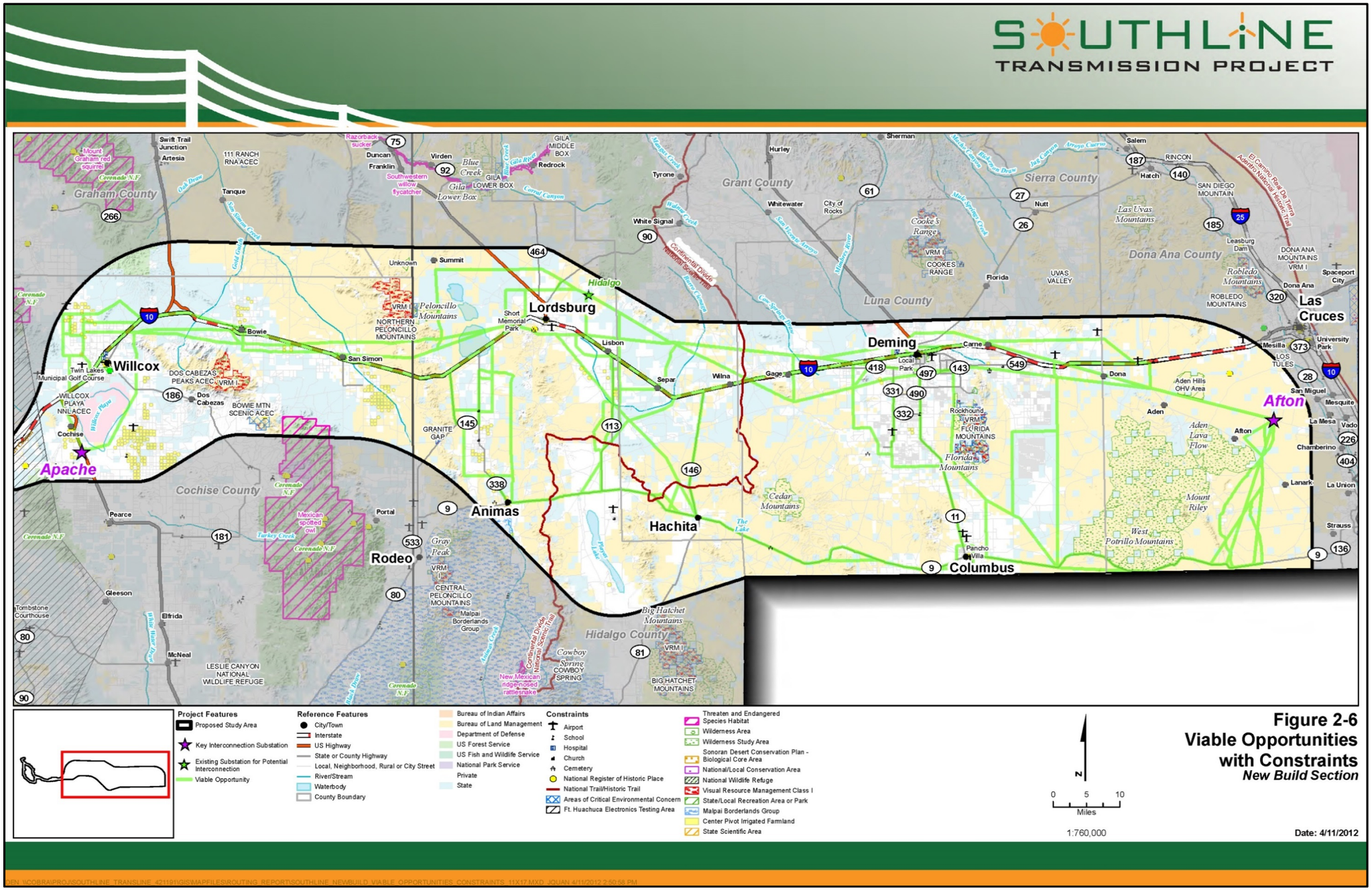


Figure 2-1b. Potential routing options considered for Upgrade Section.

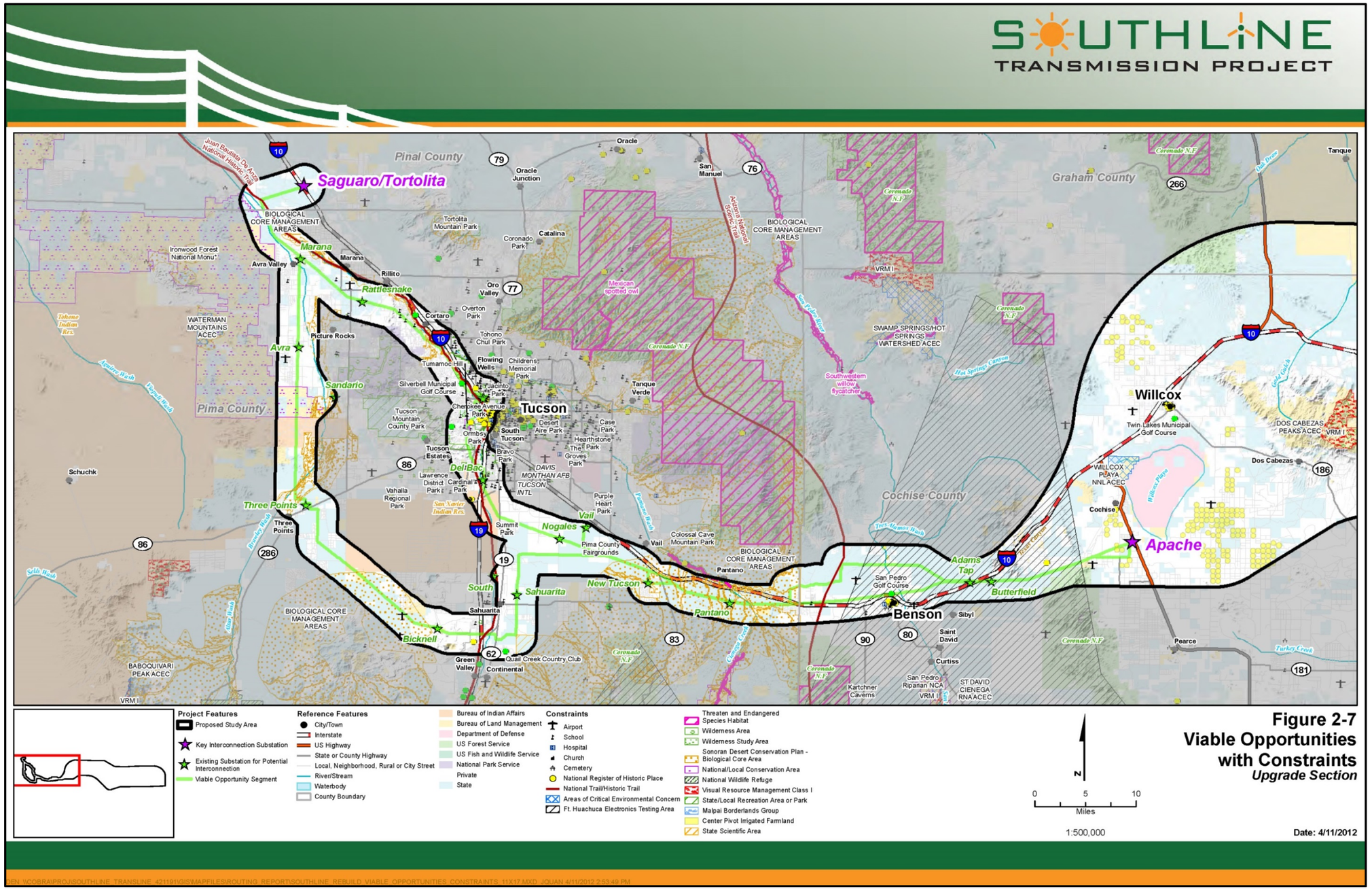


Figure 2-2a. Project overview of the New Build Section.

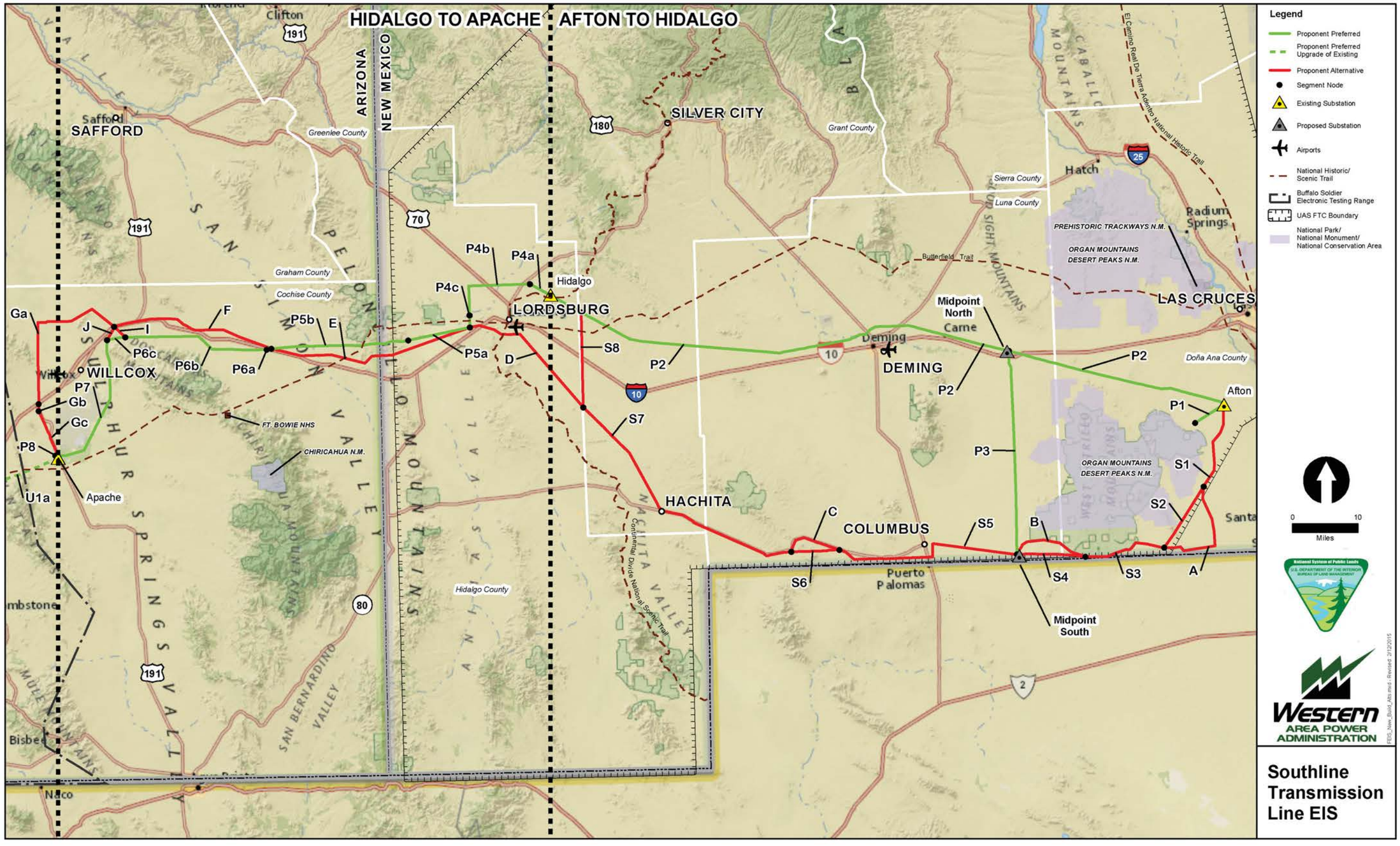


Figure 2-2b. Project overview of the Upgrade Section.

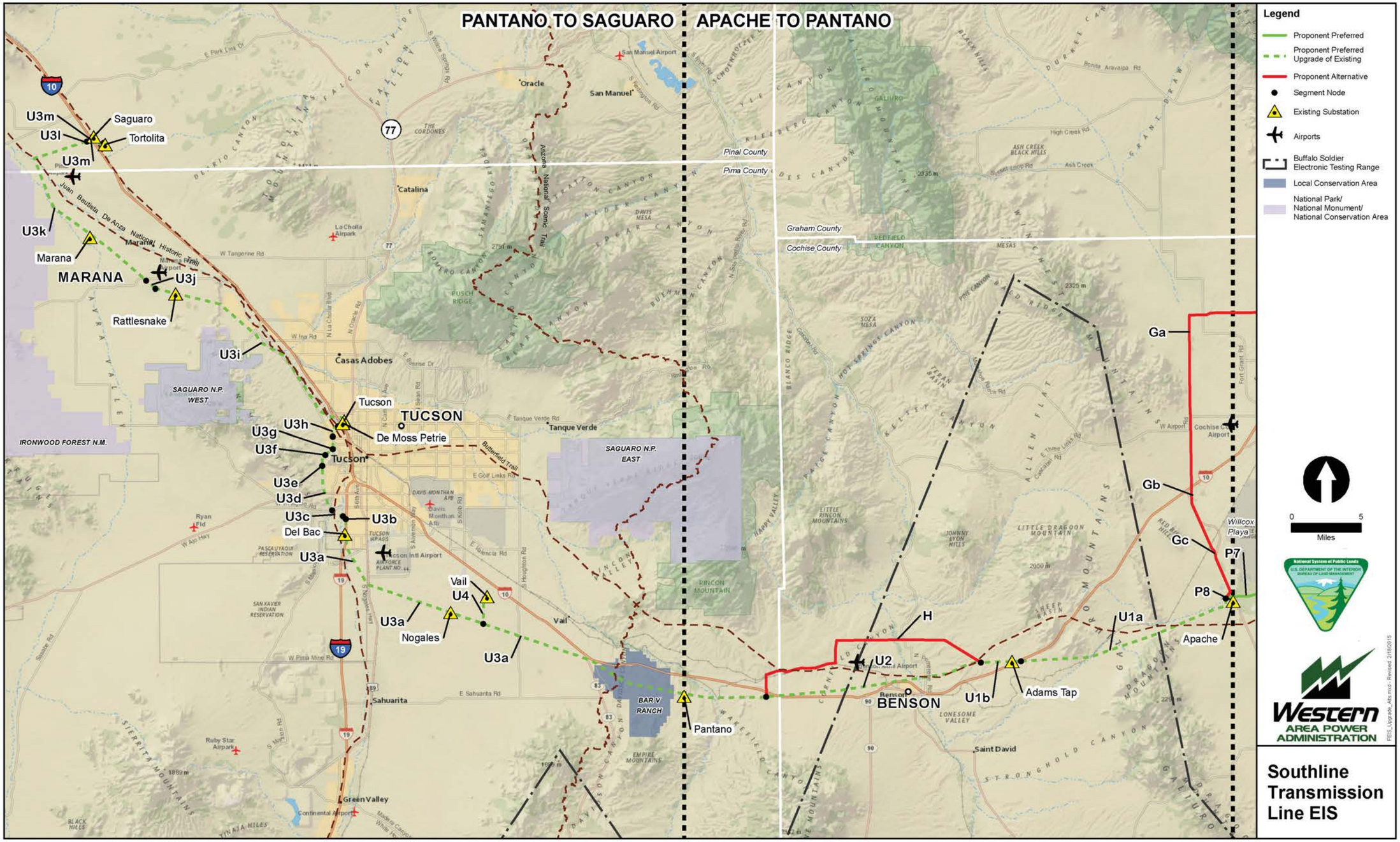


Figure 2-16a. Overview of New Build Section with transmission line route and substation alternatives considered in detail.

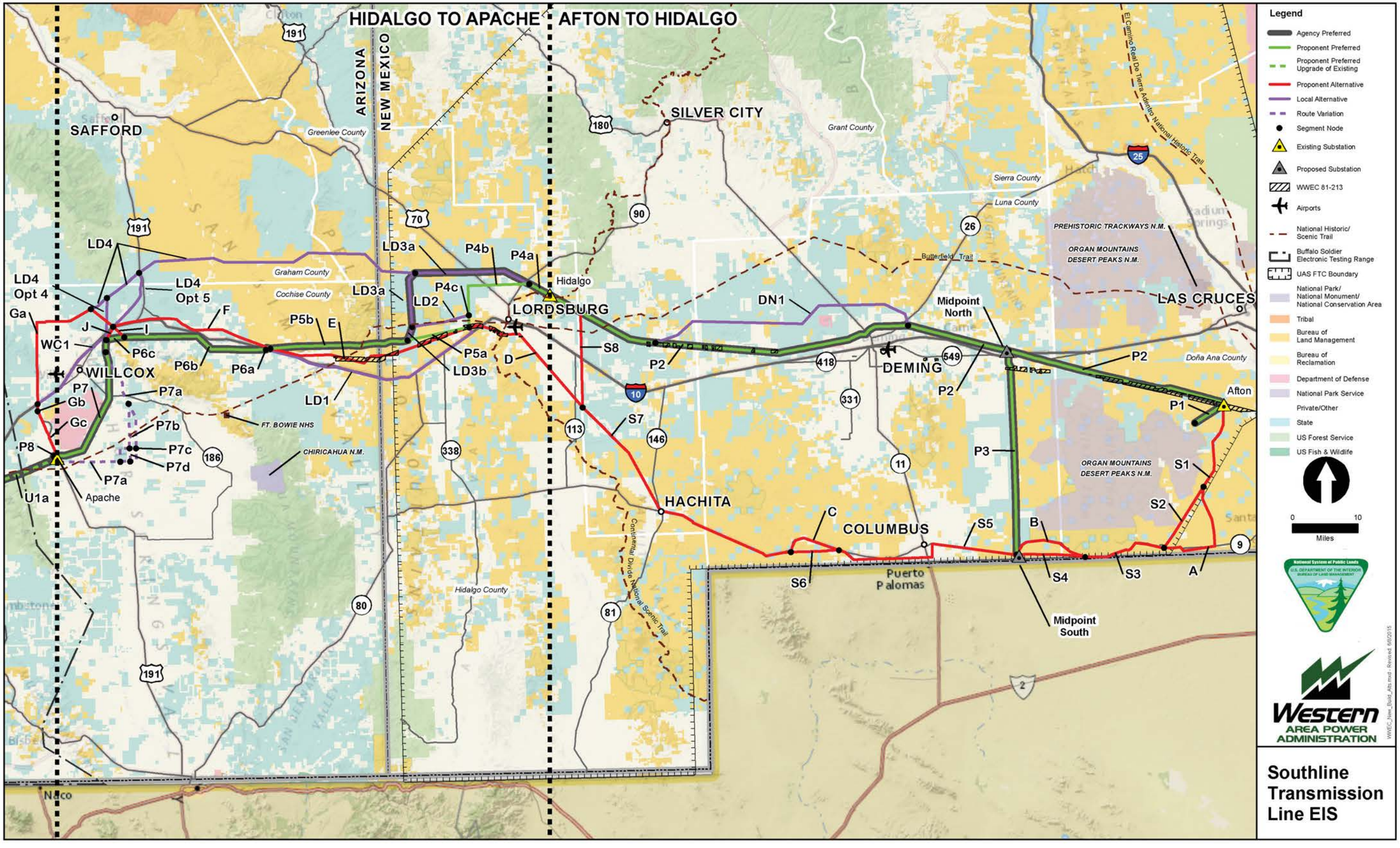


Figure 2-16b. Overview of Upgrade Section with transmission line route alternatives considered in detail.

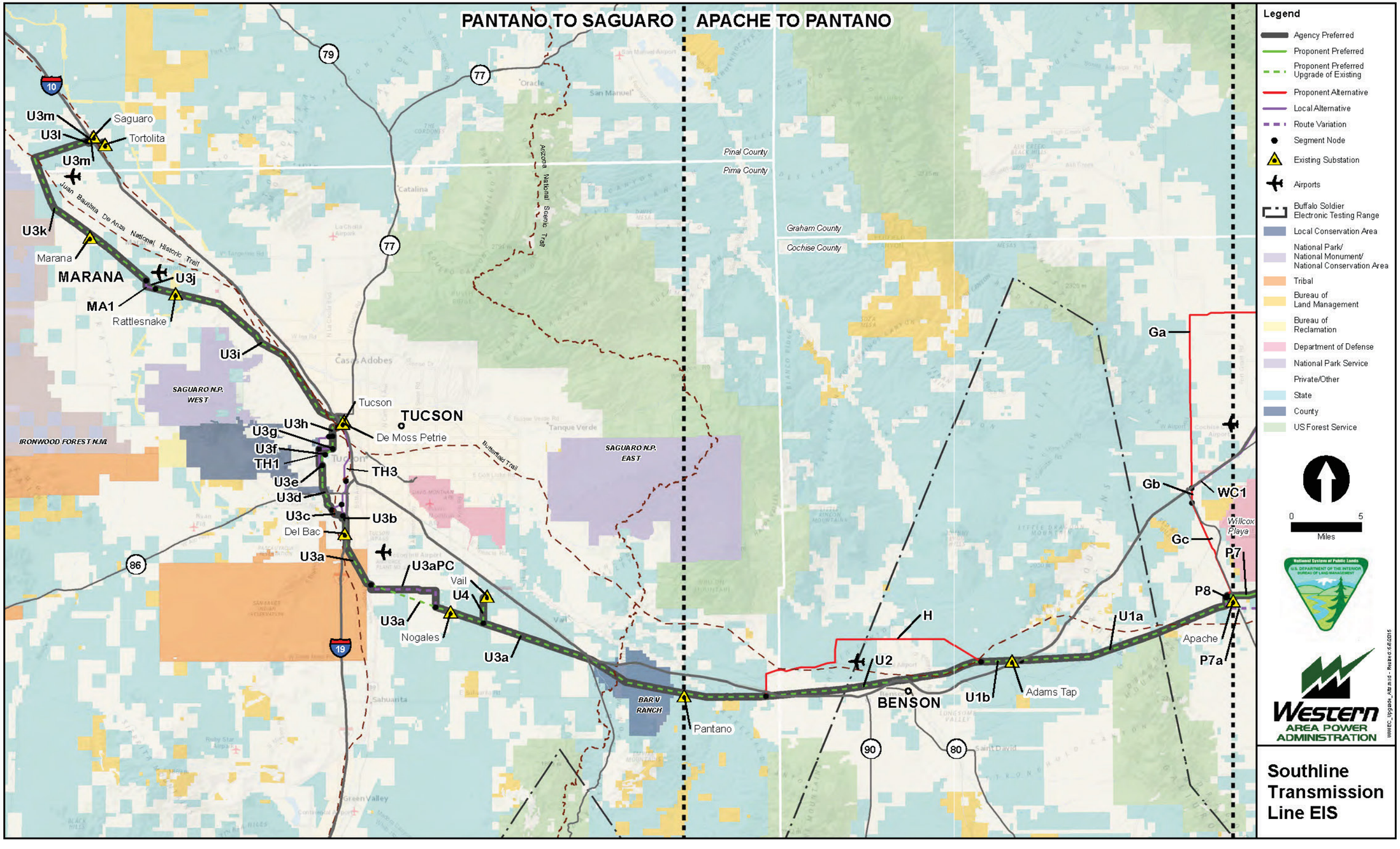
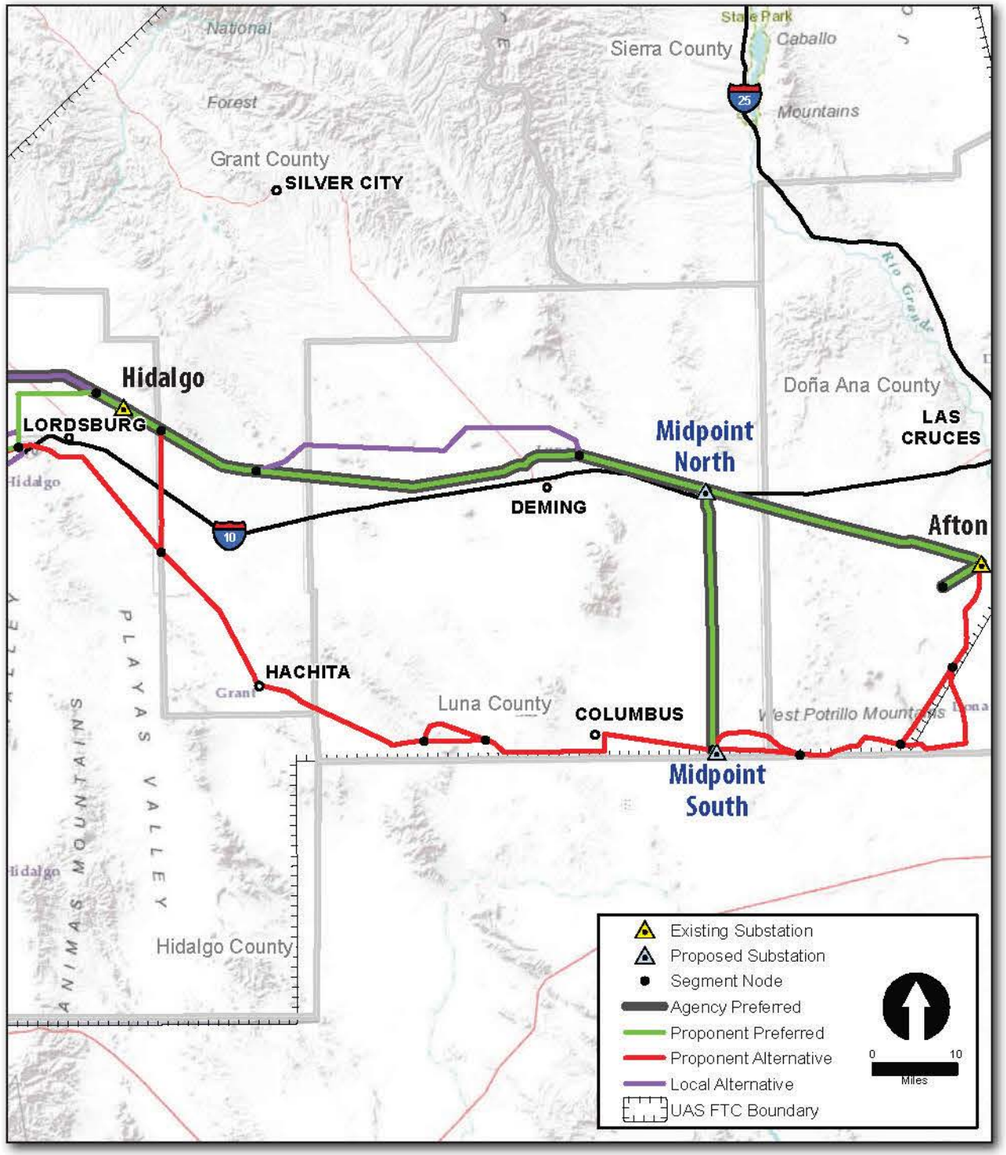
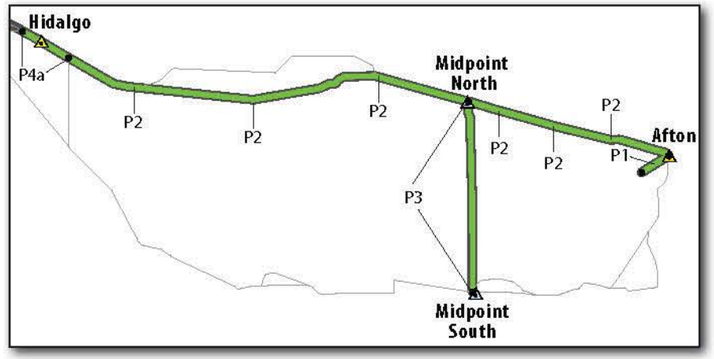


Figure 2-17a. Overview of route group 1: Afton Substation to Hidalgo Substation subroutes, segments, and local alternatives.

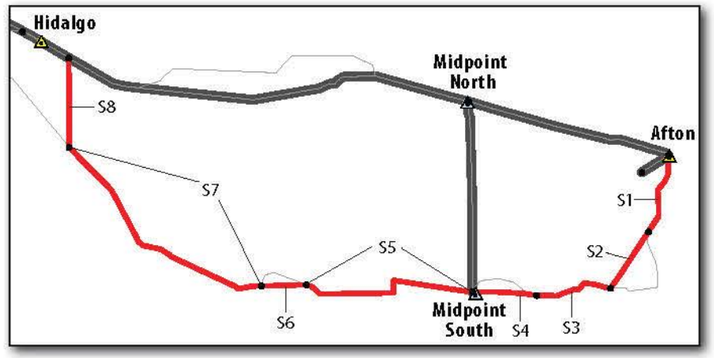
ROUTE GROUP 1

Afton Substation to Hidalgo Substation

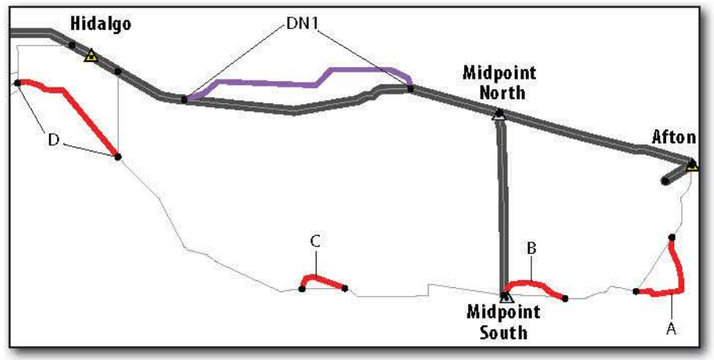




Subroute 1.1



Subroute 1.2

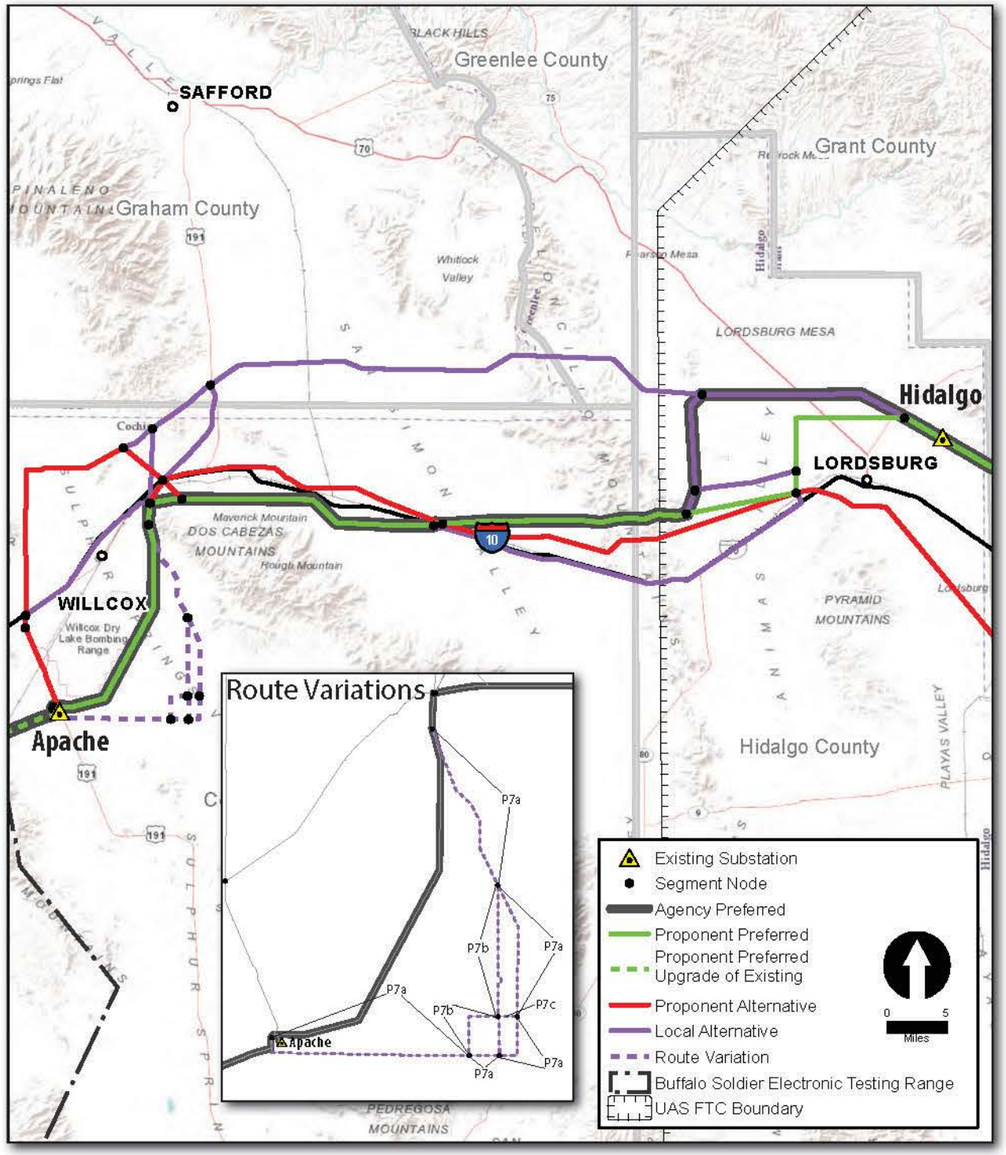


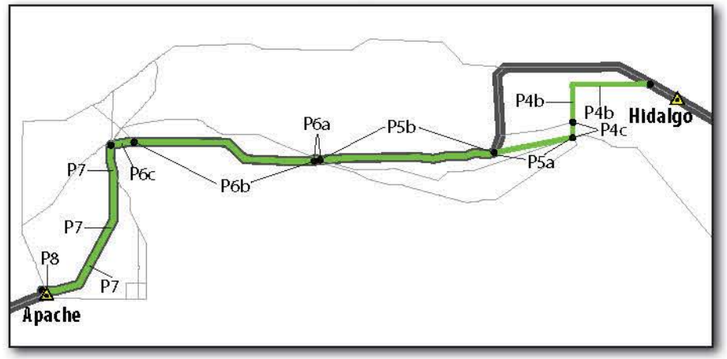
Route Group 1
Local Alternatives

Figure 2-17b. Overview of route group 2: Hidalgo Substation to Apache Substation subroutes, segments, and local alternatives.

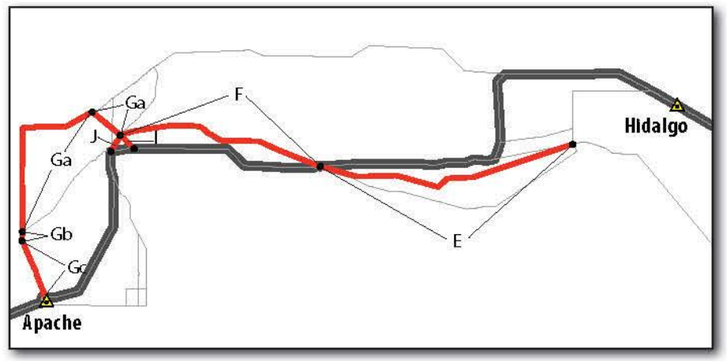
ROUTE GROUP 2

Hidalgo Substation to Apache Substation

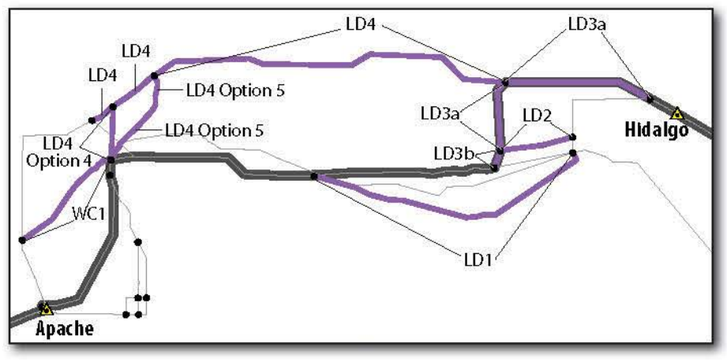




Subroute 2.1



Subroute 2.2

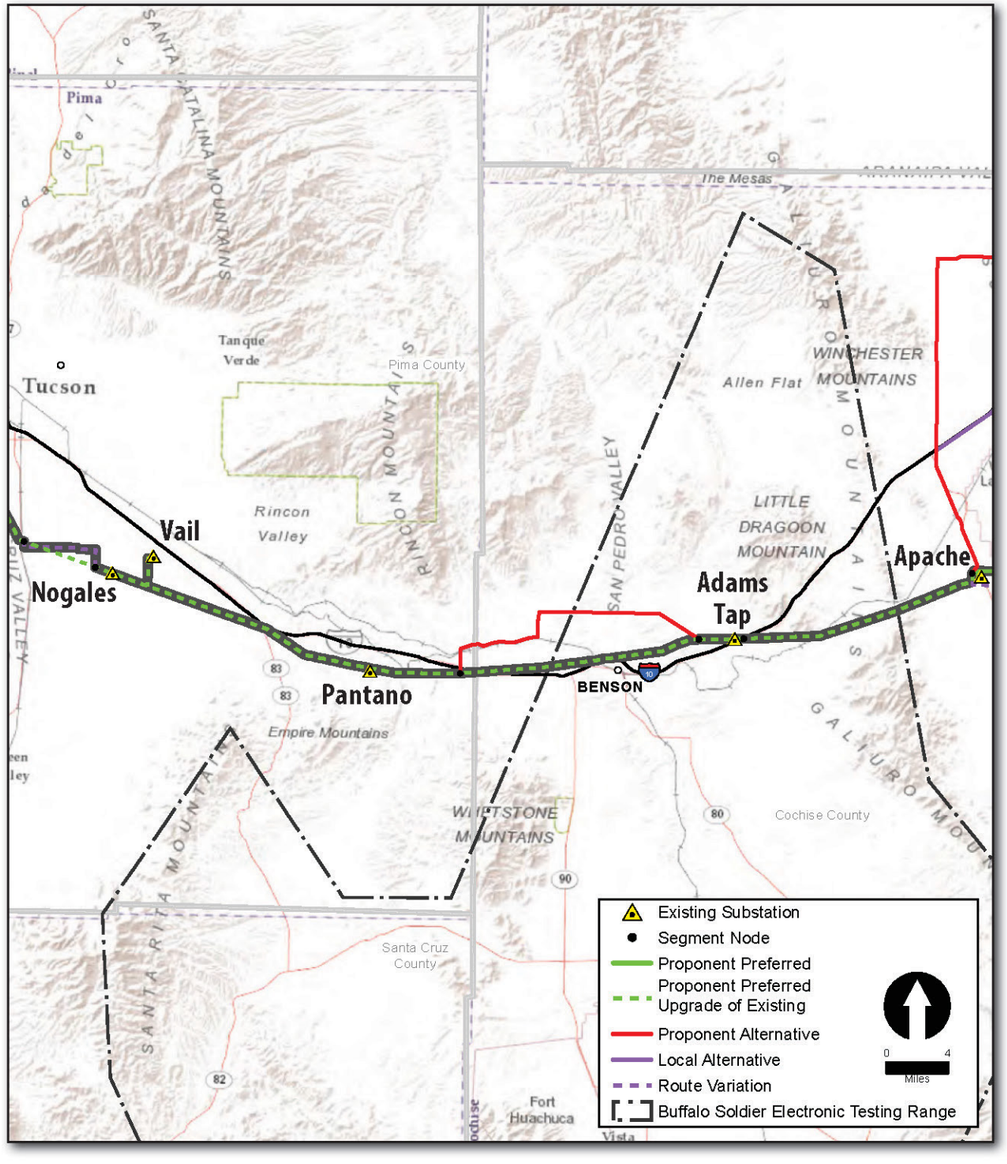


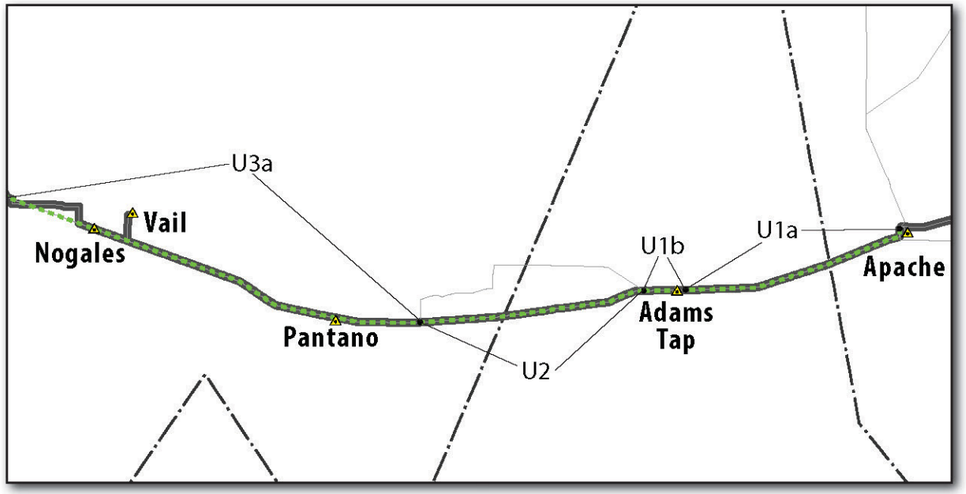
Route Group 2
Local Alternatives

Figure 2-17c. Overview of route group 3: Apache Substation to Pantano Substation subroutes, segments, and local alternatives.

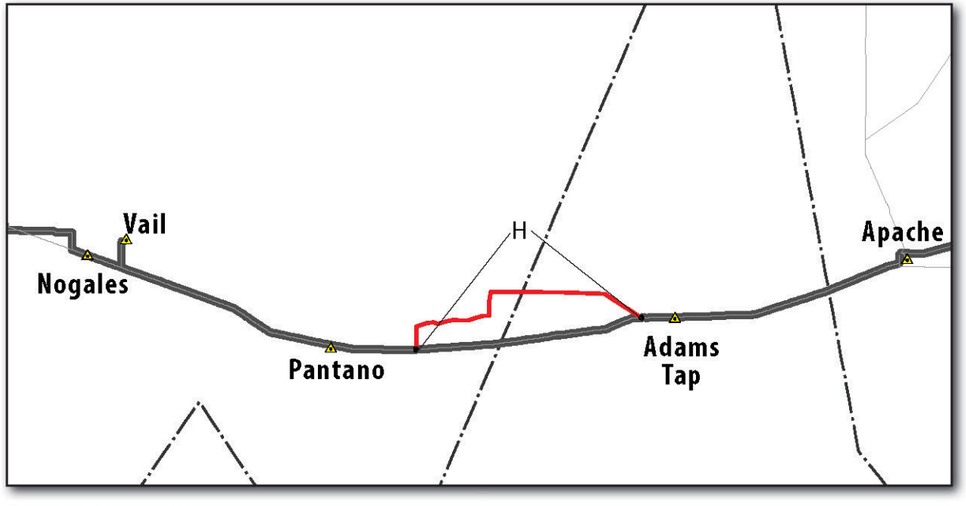
ROUTE GROUP 3

Apache Substation to Pantano Substation





Subroute 3.1



Route Group 3
Local Alternative
Route Variations

Figure 2-17d. Overview of route group 4: Pantano Substation to Saguaro Substation subroutes, segments, and local alternatives.

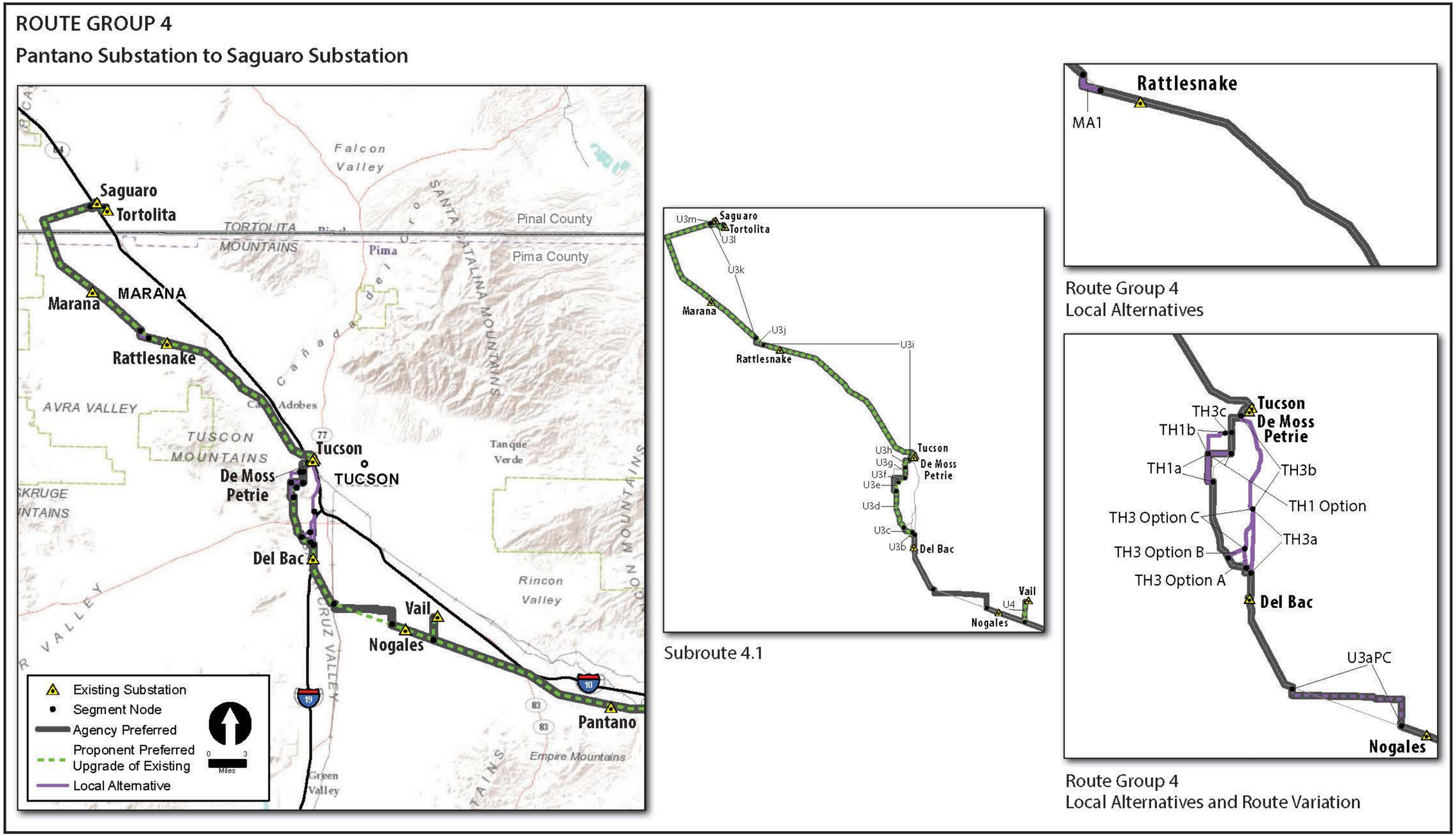
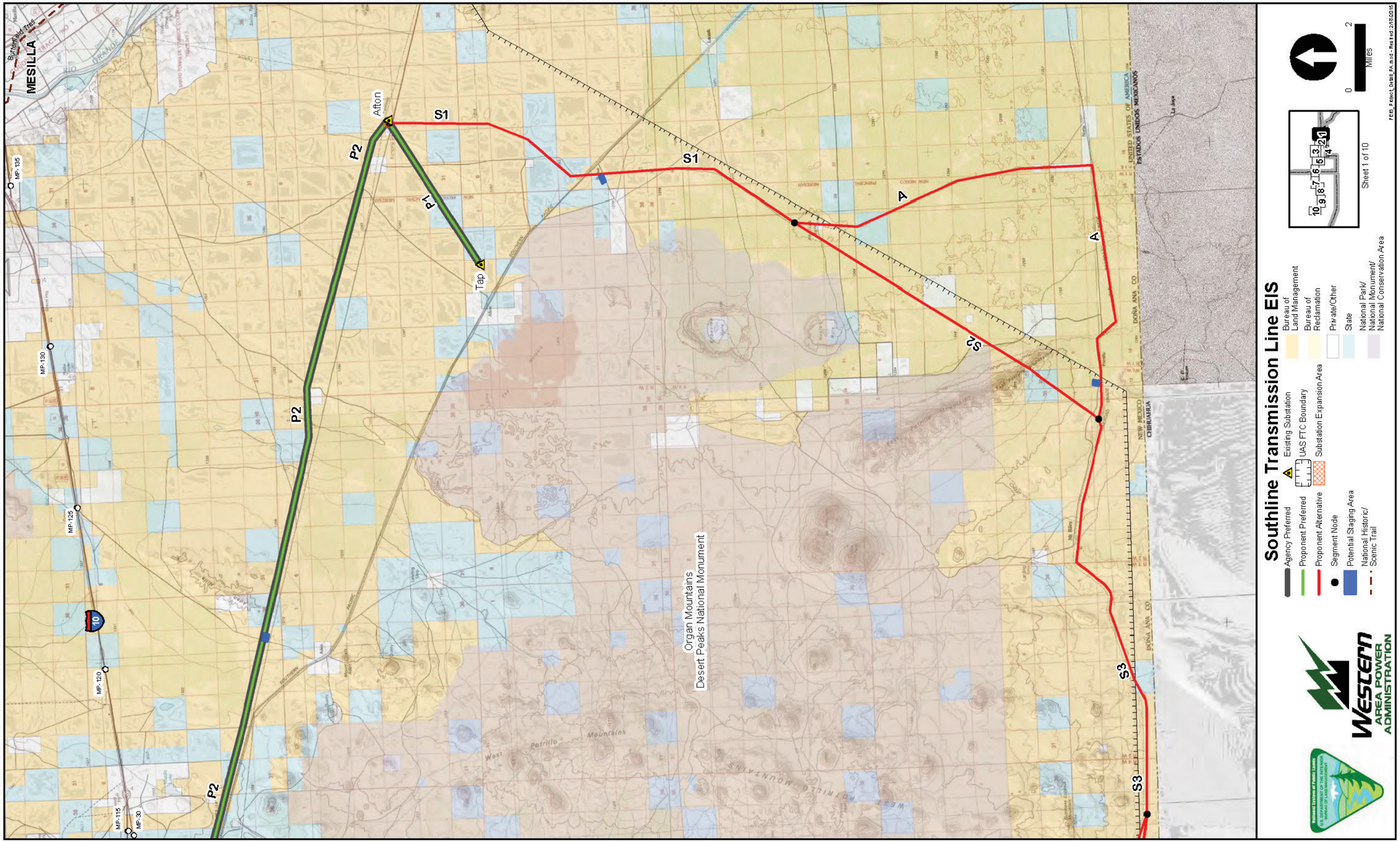


Figure 2-18a. Transmission line route and alternatives detail.



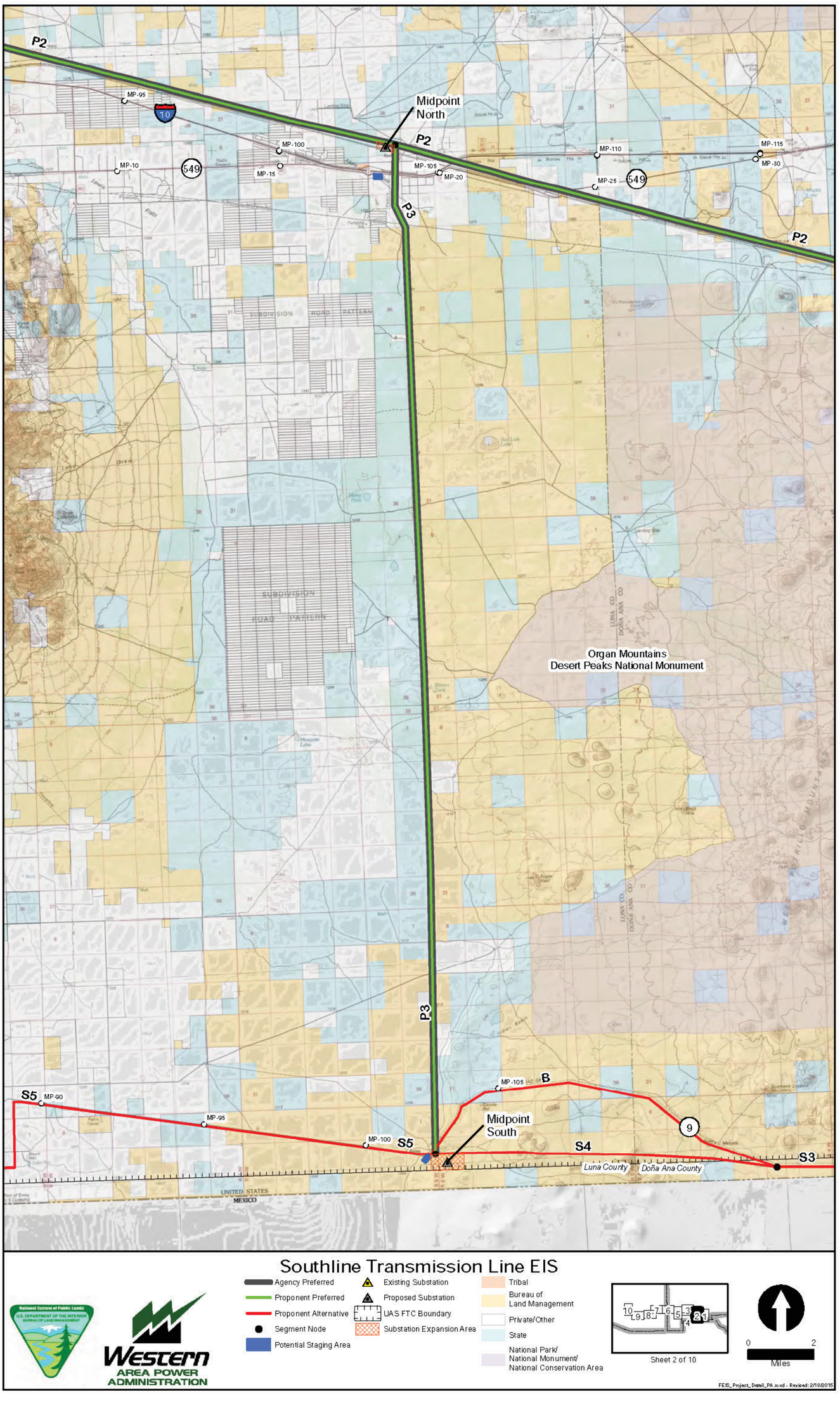


Figure 2-18b. Transmission line route and alternatives detail.

Figure 2-18c. Transmission line route and alternatives detail.

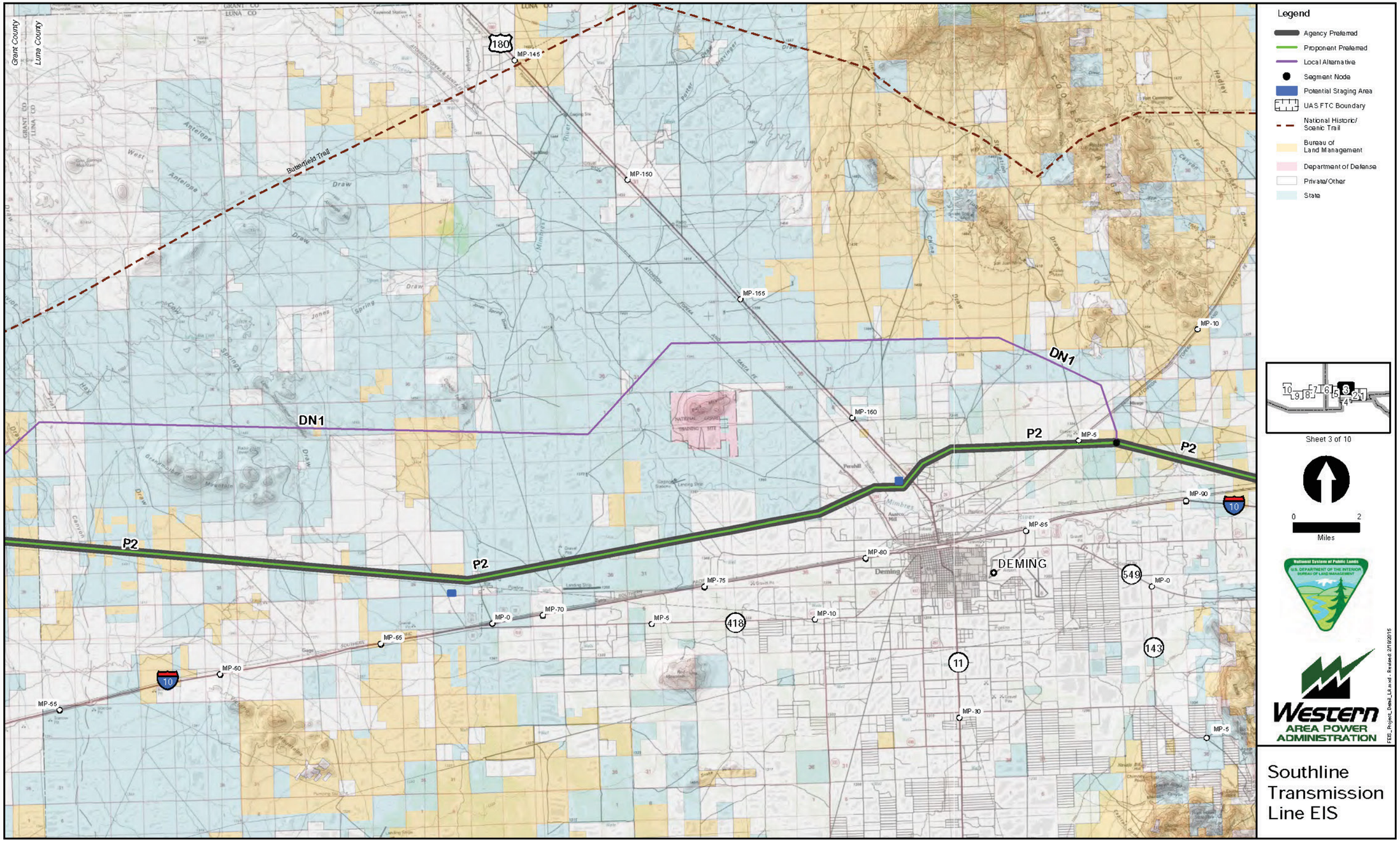


Figure 2-18d. Transmission line route and alternatives detail.

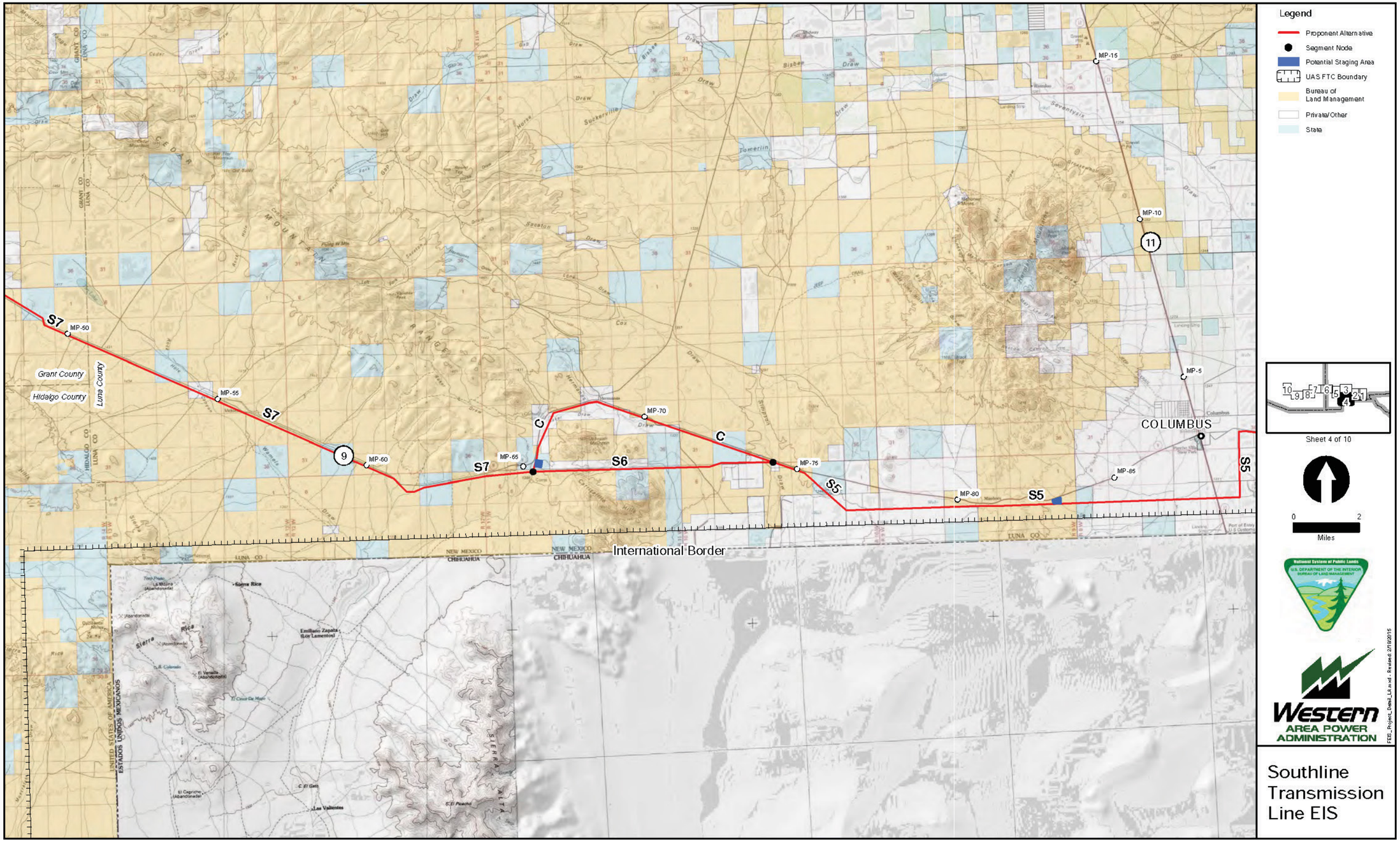


Figure 2-18e. Transmission line route and alternatives detail.

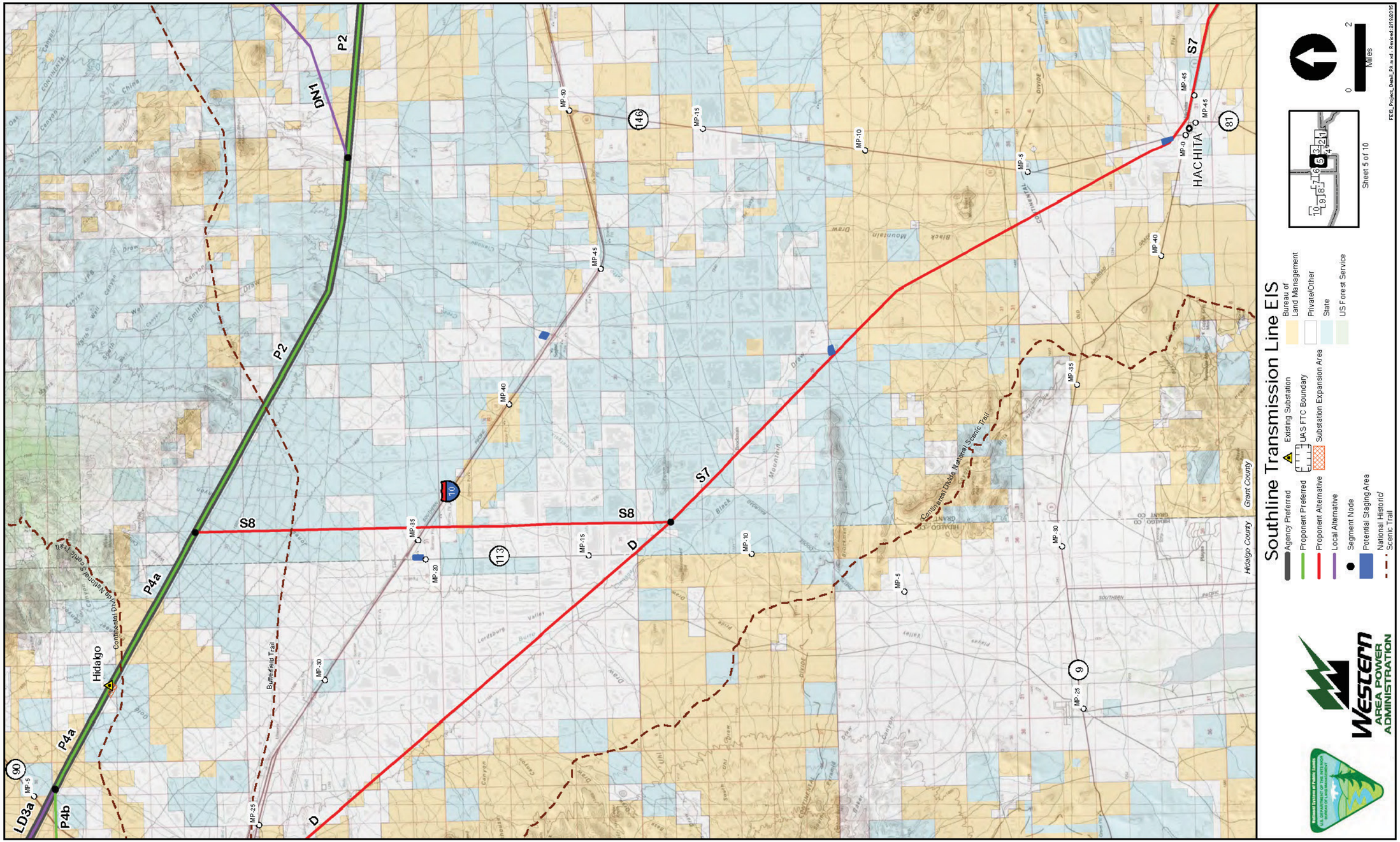


Figure 2-18f. Transmission line route and alternatives detail.

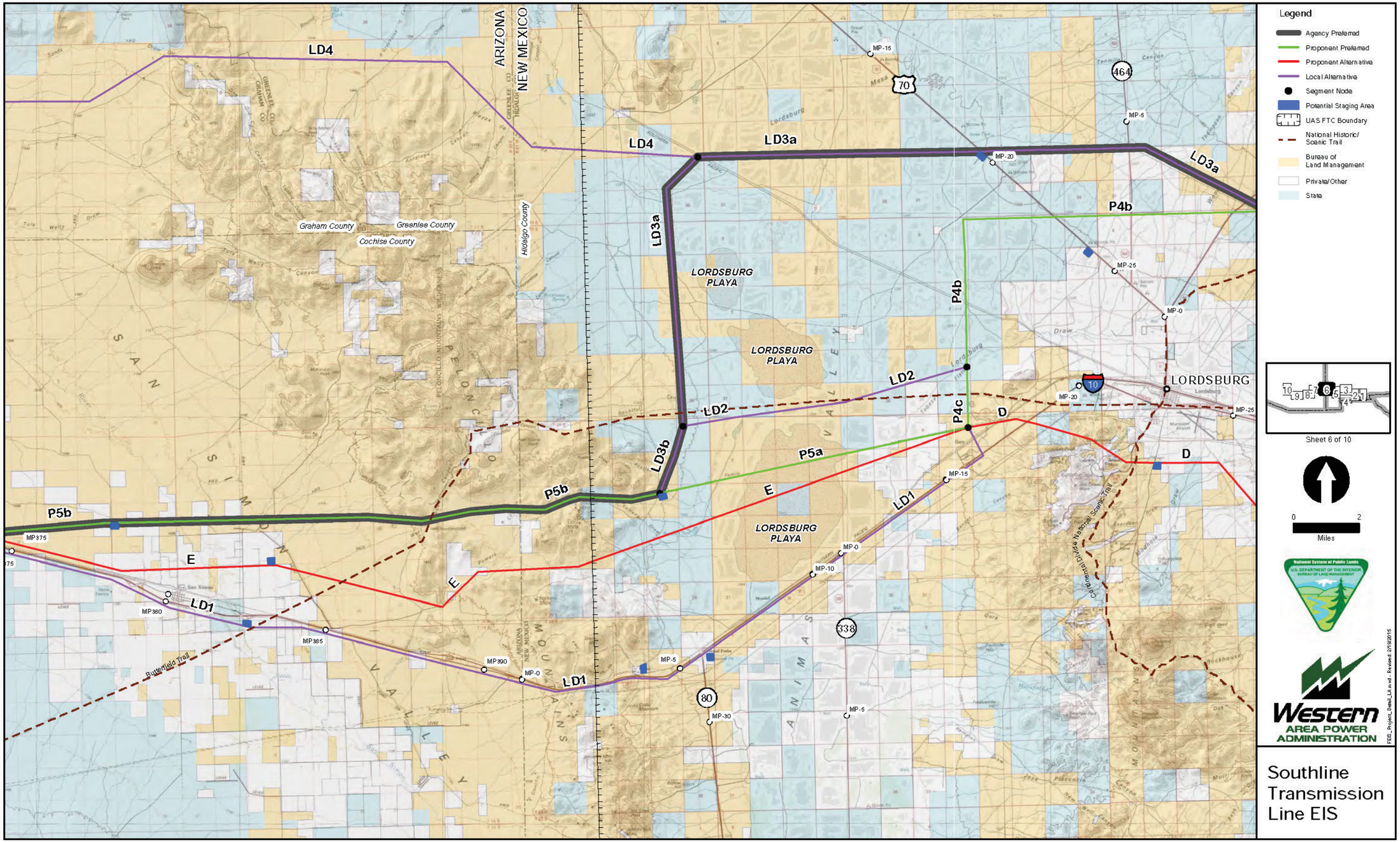


Figure 2-18g. Transmission line route and alternatives detail.

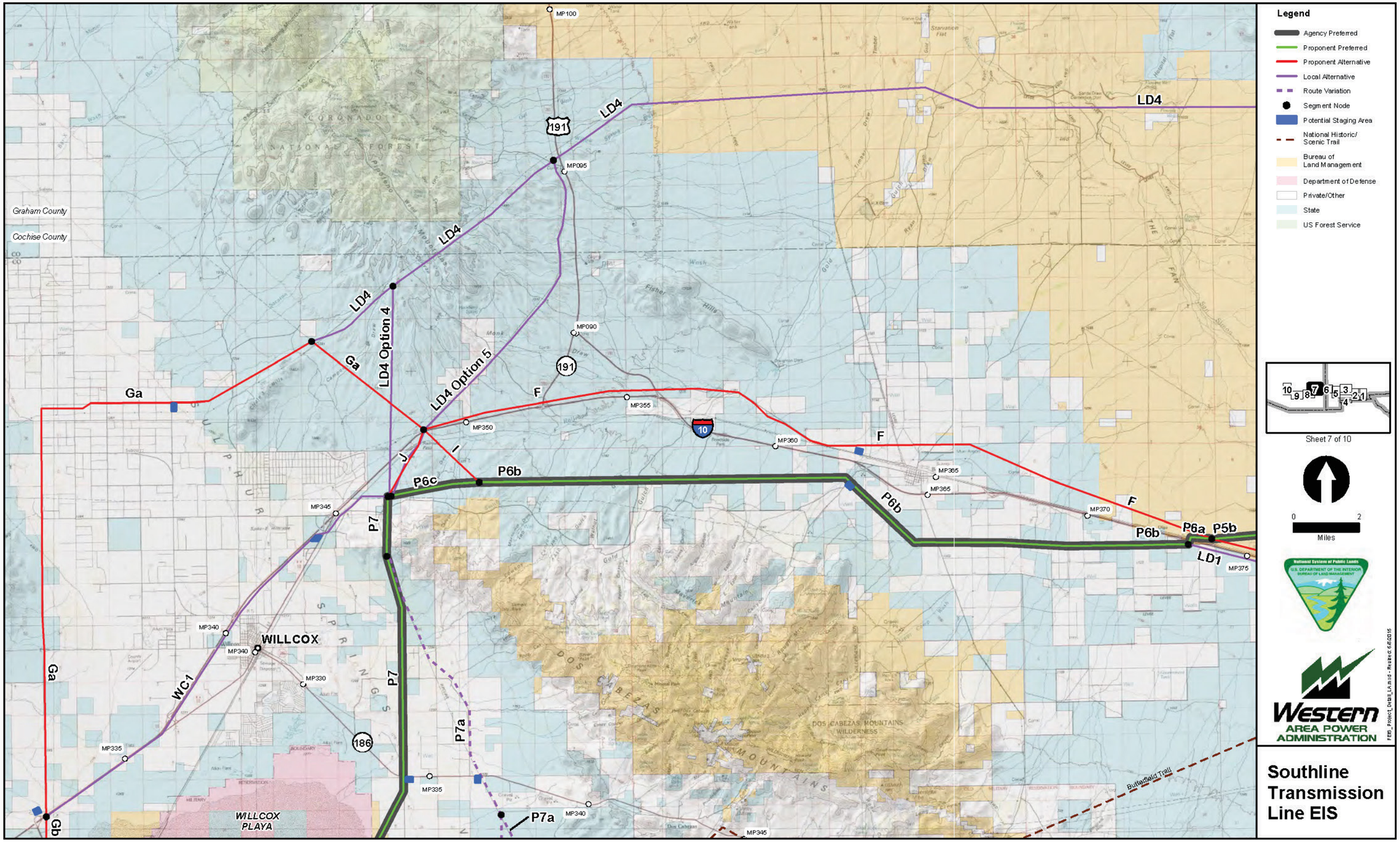


Figure 2-18h. Transmission line route and alternatives detail.

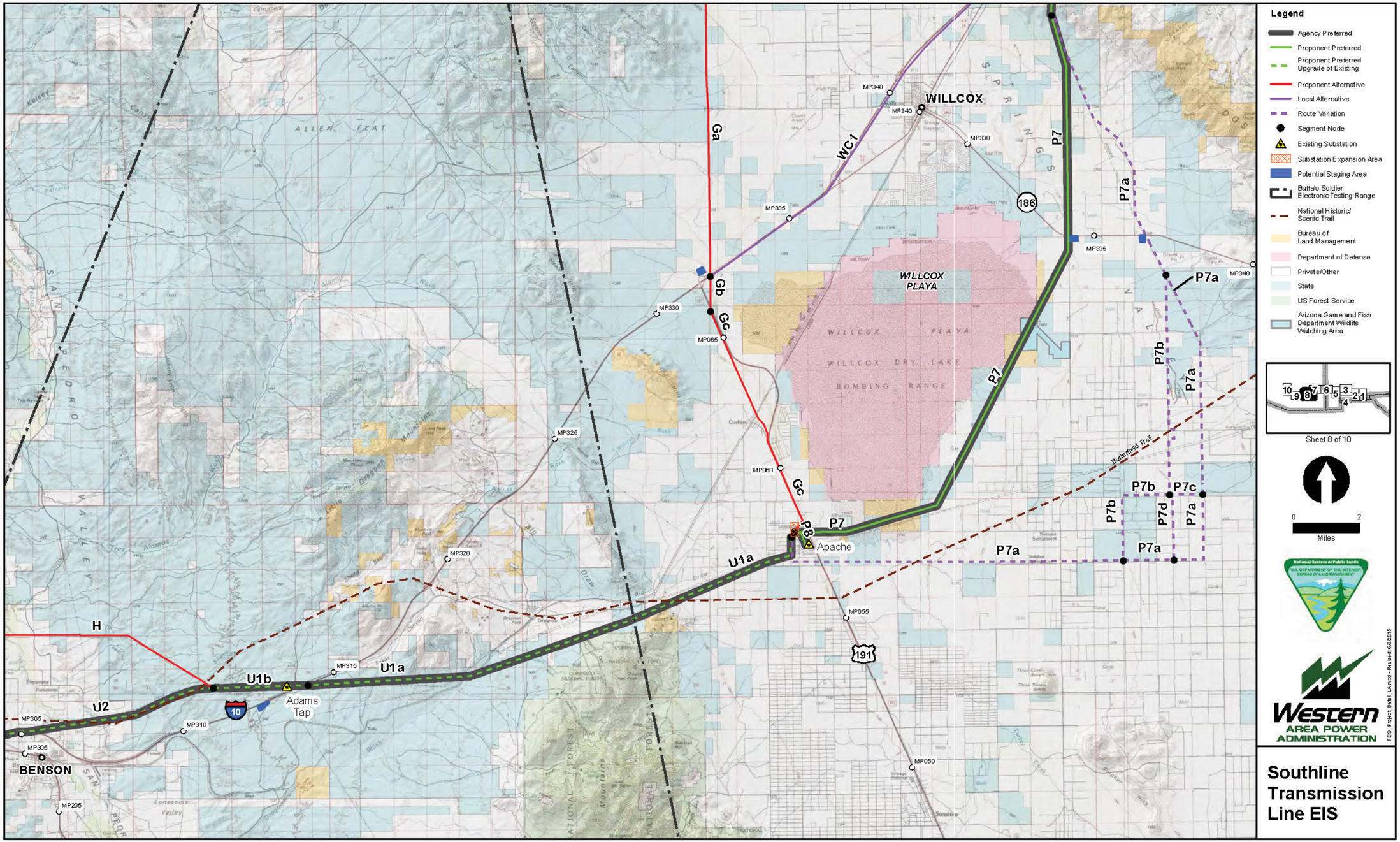


Figure 2-18i. Transmission line route and alternatives detail.

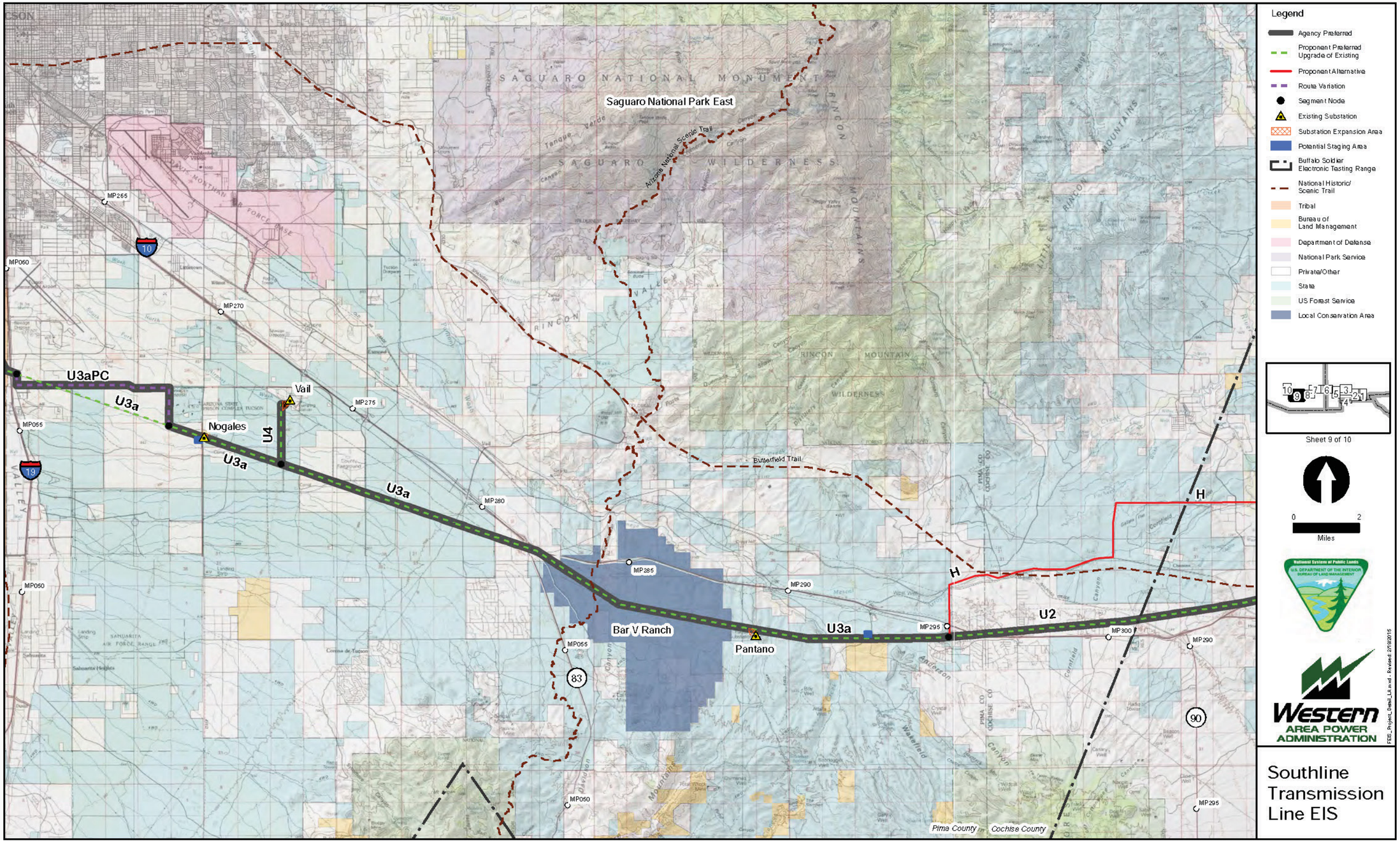


Figure 2-18j. Transmission line route and alternatives detail.

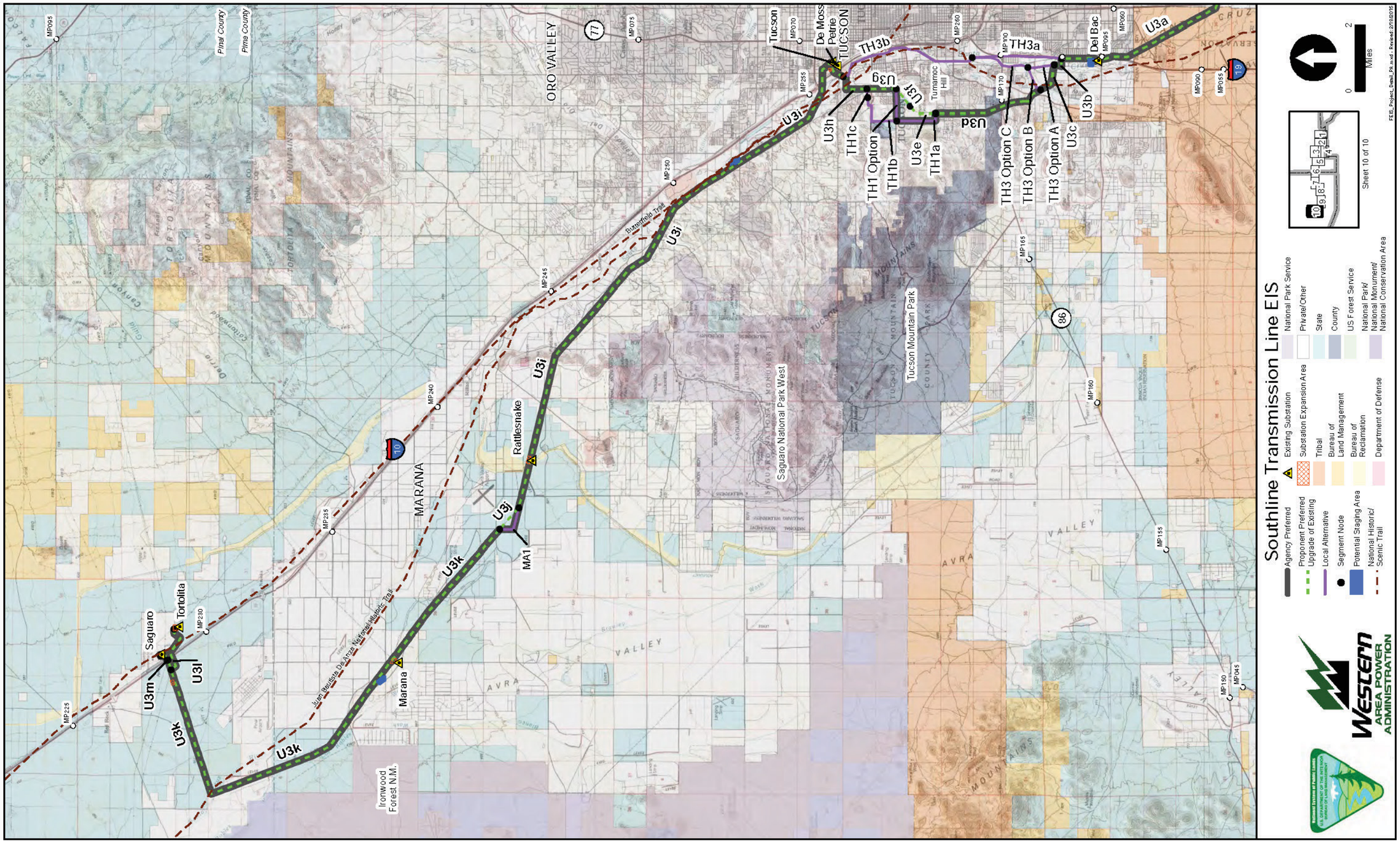


Figure 2-19a. Overview of alternatives considered but eliminated from detailed analysis – New Build Section.

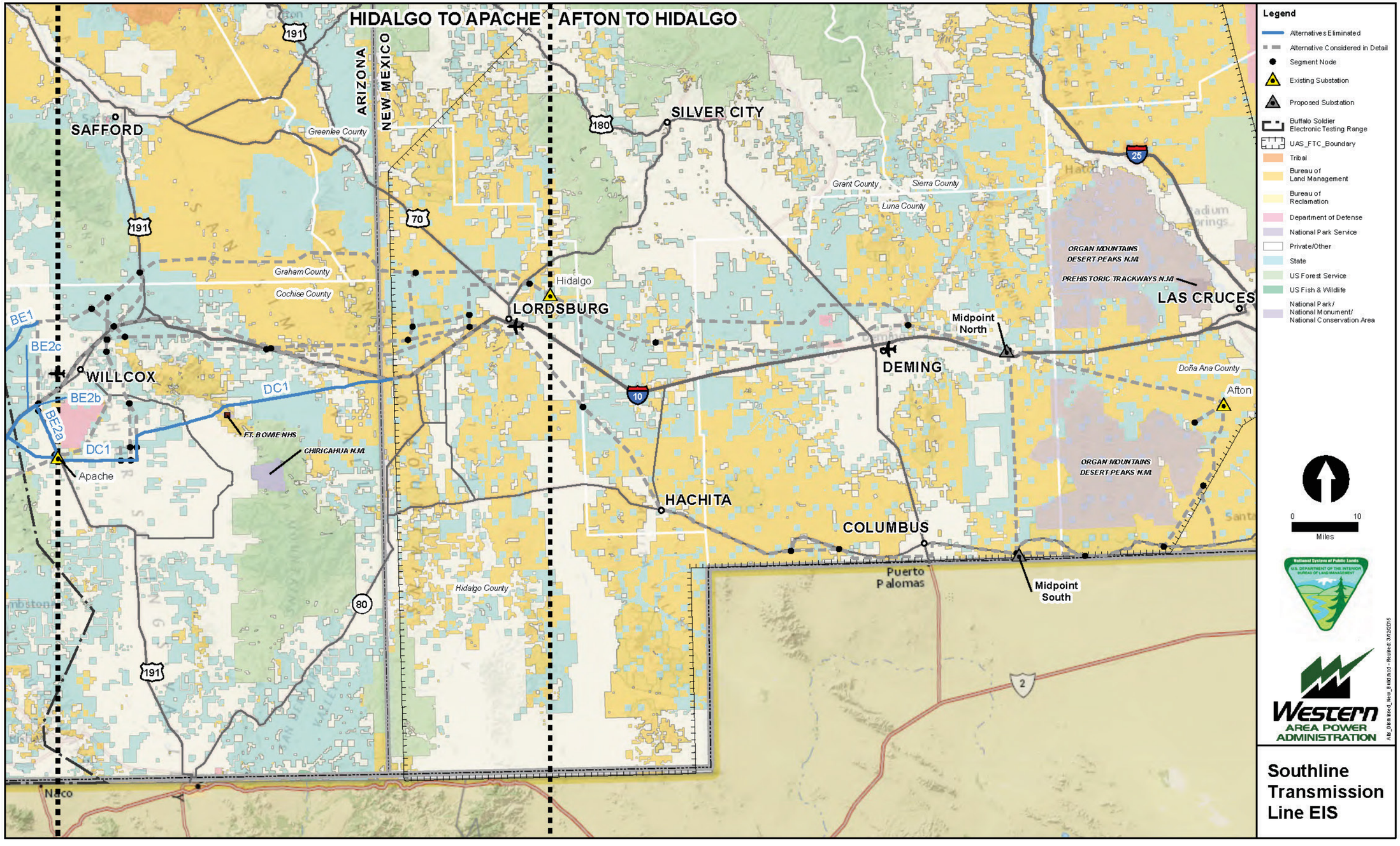


Figure 2-19b. Overview of alternatives considered but eliminated from detailed analysis – Upgrade Section.