TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

This page intentionally left blank.

CHAPTER 2 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

This chapter fully describes the Proposed Action, three additional Action Alternatives, a Sub-alternative, and the No Action Alternative. The additional Action Alternatives are: Alternative 1, the Proposed Action with a widened multiuse utility corridor located north and south of SR 74; Alternative 2, ROW and widened multiuse utility corridor located south of SR 74; Alternative 3, Carefree Highway Alignment; and, a Sub-alternative: State Trust land Route Variation.

This chapter includes the following:

Section 2.1 introduces the chapter content.

Section 2.2 describes the process used to develop and screen alternatives to arrive at the alternatives evaluated in this EIS.

Section 2.3 describes the actions that BLM is proposing to take.

Section 2.4 provides a detailed description of the Proposed Action, which includes the Proposed RMPA, the route that the transmission line would follow, the processes for construction, operation, maintenance, termination, decommissioning, and rehabilitation of the Project. This section also contains temporary and permanent disturbance estimates and lists Environmental Protection Measures (EPMs) and Best Management Practices (BMPs) that would be employed.

Section 2.5 provides detailed descriptions of Action Alternatives 1, 2, and 3, plus the Sub-alternative, including temporary and permanent disturbance estimates.

Section 2.6 describes the No Action Alternative and assumes there would be no development of the Proposed Action or other Action Alternatives; it serves as the baseline for environmental conditions.

Section 2.7 briefly describes the alternative routes considered but eliminated from detailed analysis, providing a rationale for elimination based on the screening process described in **Section 2.2**.

Section 2.8 compares and summarizes the Proposed Action and Action Alternatives' Project components and environmental impacts.

Section 2.9 outlines the monitoring and mitigation requirements identified for the Project.

Section 2.10 presents the Agency Preferred Alternative.

All figures referenced in the text of this chapter are found in the Figures section of Volume II.

2.2 DEVELOPMENT OF ALTERNATIVES

This section describes the method by which alternatives to the Proposed Action were identified and screened for consideration for detailed analysis in this Final EIS and Proposed RMPA. The Proposed Action route, for which APS submitted an application to the BLM for a 200-foot wide ROW, is within the wider route (ranges between approximately 1,000 to 3,000 feet) that was certificated by the ACC (see **Section 1.1.2**).

The BLM is required to consider and analyze a range of alternatives that are considered "reasonable," usually defined as alternatives that are realistic (not speculative), technologically and economically feasible, and that respond to the purpose of and need for the Project (BLM NEPA Handbook H-1790-1, 6.6.3, BLM 2008a). To ensure the consideration of a wide range of potential alternatives, the use of different engineering technologies (undergrounding, splitting circuits, etc.) and routing alternatives were initially developed for further consideration.

As a part of the CEC application process discussed in **Section 1.1.2**, APS went through a process of developing and considering multiple route options from early 2007 through 2009, when APS conducted technical and environmental studies within an approximate 400-square mile study area. During the public scoping process for this Final EIS and Proposed RMPA, the BLM, with input from the public, identified several other possible transmission line routes or technological approaches within the study area. Although some of the other possible routes had been considered and eliminated previously by APS during the CEC application process, the BLM reevaluated the feasibility of the routes brought forth during the CEC scoping process. In addition, other routes that were not previously considered by APS were considered, but eliminated from detailed analysis by the BLM in this EIS.

Using the routes and route segments identified during the public scoping process, in conjunction with those considered during the ACC process, a total of 14 potential routes were developed that offered either technological or route options, or a combination thereof, to the Proposed Action.

These options/routes were screened to determine:

- Whether the option/route met the purpose and need and APS' objectives for the Project (**Sections 1.2** and **1.3**),
- Whether the option/route was technologically feasible,
- Whether the option/route was economically feasible and reasonable,
- Whether the option/route was environmentally reasonable, and/or
- Whether the route would have substantially similar effects or be substantially similar in design.

Where alternative technology was considered, determinations of technological feasibility were based on the maturity of the technology as reflected in its current use in this country and around the world. Otherwise, technological feasibility was determined by the degree of engineering or logistical challenges. Economic feasibility of routes/approaches was determined by comparing the overall cost of a route/approach based on cost estimates

provided by APS. Information on environmental conditions for a route was gathered from APS' CEC Application, Exhibit B-1, Environmental Report (APS 2008b), as most route segments were described in that report.

Routes and/or technological approaches that met the above criteria were carried forward as Action Alternatives to the Proposed Action for further evaluation relative to the applicable CEQ guidelines, and are described in **Section 2.5**. **Section 2.7** describes the routes and options considered but eliminated from detailed analysis, providing a rationale for elimination based on the screening process.

2.3 DESCRIPTION OF POTENTIAL RMPA AND ROW ACTIONS

2.3.1 Resource Management Plan Amendment

Depending upon the Action Alternative selected, the BLM might need to amend the Bradshaw-Harquahala RMP to designate either a single-use 200-foot wide or a larger multiuse utility corridor on public lands that would support a 500/230kV connection between the Sun Valley Substation and the existing Morgan Substation. In addition, a change to the existing VRM Class designations (from Class III to Class IV) could be needed on public land to allow for the utility corridor.

An amendment to the 2010 Bradshaw-Harquahala RMP would be necessary if a ROW for the proposed transmission line was issued on BLM-managed public land outside of an existing and designated utility corridor. The current RMP requires high-voltage transmission lines crossing BLM-managed public lands to be within designated utility corridors, and a utility corridor for the proposed ROW on public lands was not established. In addition, the VRM Class designation would need to be amended and downgraded from VRM Class III to VRM Class IV for those BLM-managed public lands where the objectives of the current VRM designation would not be met. The VRM Class may also be changed for lands surrounding the Project in order to avoid creating narrow linear strips designated as different VRM Classes, thus facilitating effective future management.

The decisions from the current Bradshaw-Harquahala RMP (BLM 2010a) that could potentially be affected and/or are related to this Project include:

Decisions Applicable to Entire Planning Area - Lands and Realty Management (LR)

Land Use Allocations

LR-2. Utility Corridors: Utility corridors are designated to meet future expected demands for energy and water transmission facilities. These designations conform to the utility regulations of the Arizona Corporation Commission and are consistent with the Approved Resource Management Plan Amendments and Record of Decision for Designation of Energy Corridors on Bureau of Land Management-Administered Lands in the 11 Western States.

Facilities significant enough to be the basis for corridor designation are the following:

- Natural gas and other pipelines at least 10 inches in diameter,
- Electric transmission facilities accommodating 115 kV lines or greater voltage, and
- Significant canals delivering water to urban areas.

Management Actions

Utility and Transportation Corridors

LR-15. All major utilities will be routed through designated corridors. Encourage new rights-of-way within designated corridors to promote the maximum use of existing routes. Encourage joint use whenever possible.

LR-16. Co-locate smaller utility lines needed for local service near corridors or within a corridor unless doing so would limit the opportunity to co-locate other major utility lines in the corridor.

LR-18. Whenever possible, design or route utility transmission lines to minimize adverse visual impacts to the surrounding lands and vistas.

Land Use Authorizations

LR-24. Continue to issue land use authorizations (rights-of-way, leases, permits, easements) on a case-by-case basis and in accordance with resource management prescriptions in this land use plan.

Decisions Specific to the Castle Hot Springs Management Unit

Land and Realty Management (LR)

Land Use Allocations

LR-30. No new utility corridors are designated within this Management Unit.

Recreation Management (RR)

Desired Future Conditions

RR-75. Emphasize preserving open space and retaining scenic and visual qualities. Sustain recreation, cultural, and biological assets while recognizing and protecting private property rights. Retain and acquire legal access to public lands.

Visual Resource Management (VR)

Land Use Allocations

VR-6. Project proposals that could result in surface disturbance or may contain visible components will be analyzed using procedures outlined in BLM Handbook H-8431-1, Visual Contrast Rating, to determine their conformance with the VRM allocation of the project area. If necessary, modifications will be made to the project, including design changes or a change of location, for the project to meet the VRM Class objective. In any case, regardless of VRM Class, an effort will be made to make any project proposal with a visible component as visually compatible with its surroundings as practical.

2.3.2 Issuance of Rights-of-Way

A ROW grant issued for 30 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. In addition, short-term ROWs would be required from the BLM to accommodate temporary construction activities, such as access roads and associated gates,

material/equipment staging, geotechnical testing, and other temporary short-term uses on those portions of the Project on public land.

2.4 PROPOSED ACTION

As stated in **Section 1.3**, the BLM's purpose and need is to respond to the APS request for a ROW grant for access across public lands. The Proposed Action under consideration in this analysis is the BLM's authorization of APS' proposal to construct, operate, maintain, and decommission a 500/230kV overhead transmission line within a 200-foot wide ROW within the ACC-certificated route for the transmission line (see **Section 1.1.2** and **Figure 2.4-1a**). The total length of the Proposed Action route would be approximately 38.2 miles, approximately 9 miles of which would cross BLM-managed public land. The ROW would contain a total of 926 acres, 219 acres of which would occur on BLM-managed public land.

Under the proposed Project (referred to as the Proposed Action throughout this document), an RMPA would establish the needed 200-foot wide ROW (100 feet on each side of the proposed centerline of the transmission line) as a single-use utility corridor on BLM-managed land paralleling SR 74. In addition, the existing VRM Class designation would be amended from VRM Class III to VRM Class IV for those areas of BLM-managed land where views would be dominated by the transmission line, and thus would not meet the objectives of the current VRM designation. The VRM Class designation would also be changed for those public lands north and south of SR 74 surrounding the proposed transmission line ROW (i.e. the existing transportation corridor north of SR 74 and the key-shaped public land piece south of SR 74) in order to avoid creating narrow linear strips designated as different VRM Classes. Approximately 3,375 acres would be changed from VRM Class III to VRM Class IV (**Figure 2.4-1b**).

From the Sun Valley Substation, the Proposed Action route follows the CAP canal for approximately two miles, portions which are on BLM land and within an existing BLM designated utility corridor, to approximately the 275th Avenue alignment. The route then turns northwest for approximately two miles following an existing 500kV transmission line. At the Happy Valley Road alignment the route turns north for approximately 4.5 miles, then east for approximately five miles paralleling the Lone Mountain Road alignment to the north. The route then turns north following 235th Avenue for approximately 3.5 miles then east following the Joy Ranch Road alignment, for approximately seven miles until it approaches SR 74. The route parallels the south side of SR 74 for approximately two miles before crossing and paralleling SR 74 to the north on BLM-managed public land for approximately five miles. The route again crosses SR 74 to parallel the south side of the highway for approximately three miles, crossing the Agua Fria River. The route then turns south for one mile, and turns east for less than one mile following the Cloud Road alignment to connect to the Morgan Substation.

Of the Proposed Action route, approximately nine miles would be located on public lands managed by the BLM within the Castle Hot Springs Management Unit of the Bradshaw-Harquahala Planning Area. In addition to crossing BLM-managed public land, the route crosses a substantial amount of State Trust land administered by the ASLD, USBR land, and privately owned lands. Because the ROW over public lands is needed to complete APS' proposed Project, which spans approximately 38 miles on mostly non-federal lands, and

cannot be separated out, BLM is analyzing the impacts of the entire transmission line for the purpose of analyzing the Project; however, the BLM decision would only apply to the portion of the transmission line route on federal lands.

The double circuit transmission line in most instances would typically be constructed on single-pole steel structures, approximately 135 to 195 feet tall, with non-reflective conductors. The line may need to be constructed as two, single circuits at various angle locations along the route.

The 500kV circuit would be installed for a proposed 2016 in-service date and the 230kV circuit would be strung on the same structures in the future when necessitated by load growth, currently projected beyond 2021. The design of the structures and selected structure type (monopole, lattice, or H-frame) may vary based on engineering criteria due to terrain features, and visibility of the structures.

The Proposed Action would be economically practical and feasible, with an overall cost estimate of $127 million (includes Project construction and ROW/easement acquisition costs).

2.4.1 Proposed Facilities and Infrastructure

According to APS, the design, construction, operation, maintenance, and decommissioning of the transmission line would meet or exceed the requirements of the National Electrical Safety Code (NESC), U.S. Department of Labor, Occupational Safety and Health Standards, and APS requirements for safety and protection of landowners and their property. The design characteristics for the transmission line are summarized in **Table 2.4-1** and are discussed in detail along with construction methods in the following sections.

Table 2.4-1 Design Characteristics of the Transmission Line

FEATURE	DESCRIPTION	
Type of Structures	Monopole, Lattice, H-Frame	
Structure Height	135 to 195 feet (Monopole), 175 to 190 feet (Lattice), 60 to 85 feet (H-Frame)	
Span Length	800 to 1,400 feet	
Number of Structures per Mile	4 to 7, between 36 to 63 structures on BLM lands	
Right-of-way Width	200 feet	
ELECTRICAL PROPERTIES		
	230kV Line	**500kV Line**
Nominal Voltage	230kV	525kV
Capacity	3185 amp	4860 amp
Circuit Configuration	Single or Double Conductor Vertical	3 Bundle Vertical
Conductor Size	2156 84/19kcmil*	(3) 1780 84/19kcmil
Shield Wire Size	.656" OD OPGW**	.656" OD OPGW
Ground Clearance of Conductor	25 feet 6 inches minimum	31 feet 6 inches minimum

*kcmil – 1000 circular mills
**OD OPGW – Outside Diameter Optical Ground Wire

2.4.1.1 Transmission Line Support Structures

Three types of steel structures could potentially be used for the transmission line, they include monopole/tubular, lattice self-supporting, and H-frame structures, shown in **Figures 2.4-2** through **2.4-5**. Decisions on what type of structures that would ultimately be used would be dependent upon future detailed engineering design and coordination with the appropriate land-managing agency.

The typical structures would vary in height from 60 to 195 feet tall, depending on the type of structure used, based on engineering considerations and site conditions. Dead-end or turning structure heights may be lower or higher depending on design constraints, but would remain less than 195 feet. The typical span length between monopole structures would generally vary between 800 and 1,400 feet, according to terrain conditions, and to achieve site-specific objectives. Lattice structures would achieve similar span lengths with typical structure heights of 175 to 195 feet. H-Frame structures would be used only in instances where height restriction of structures was necessary and would have typical spans of 700 to 800 feet with typical structure heights of 60 to 85 feet.

The pole structures would be dulled galvanized steel or self-weathering steel; dulled structures would be finished utilizing manufacturing techniques that would aim to approximate a gray color (i.e., Shadow Gray as portrayed in the BLM color chart or similar color) approved by the BLM, to reduce visibility of the structures in the landscape. The self-weathering finish is not available for lattice structures, therefore they would have a galvanized finish, if used. Paint or other finishes applied after manufacturing would not be used.

Structure selection and individual structure placement would be determined in the detailed design phase of the Project to minimize potential impacts of the facility. The height of and spacing between each structure would be determined based on detailed engineering and be dependent on the type of structure used and the terrain. Transmission line structures would comply with Federal Aviation Administration (FAA) Guidelines to minimize aircraft hazards (FAA 1993).

Although structure placement would avoid drainage channels and other problematic areas, it may be necessary to place one or more permanent structures within a floodplain, where an allowable span is not sufficient to cross a wide floodplain. If this becomes necessary, APS would prepare a scour analysis and acquire a floodplain use permit for such placements. Depending on the project, the Flood Control District of Maricopa County may request that APS demonstrate that the structures would not cause a displacement or increase the flood level. Based on the scour analysis, APS would place the appropriate structure type and design and any diversion needed to mitigate for potential displacement of flood flows.

The typical structure foundation for monopoles would be 6 feet in diameter and approximately 25 feet deep. The typical structure foundation for lattice structures would be three feet in diameter and approximately 15 to 20 feet deep at each of the four corners of each structure. The typical foundation for H-frame structures would be 5 feet in diameter and approximately 20 feet deep for each of the two poles comprising the structure. An area around each structure would be graded, as required, to provide a level pad for structure construction. The typical pad area would be approximately 100 x 200 feet, excluding cut and

fill slopes. Actual foundation size and depth may vary depending on soil, terrain, design, or other limitations.

2.4.1.2 Transmission Line Hardware

Conductor

The 500kV transmission line would be designed as a tri-bundled conductor three phase circuit (nine wires total) and the 230kV transmission line would be either a single conductor three phase circuit (three wires total) or a twin bundled conductor (six wires total). The 500kV and 230kV line would be strung on the same structures on separate sets of V-string insulators. The 230kV lines would be strung in the future when necessitated by expected load growth and reliability requirements. Conductors would have a low-reflective (non-specular), dulled finish to reduce visibility of the transmission line in the landscape. The minimum height of the 500kV conductor above the ground would be 31 feet 6 inches; the minimum height of the 230kV conductor above the ground would be 25 feet 6 inches.

Communication Systems

The Project would include two 96-pair fiber optic/static neutral cables at the top of the structures that would serve the dual purpose of a static wire or a single 96-pair fiber optic/static neutral cable with a single steel static shield wire. Static wires would have a low-reflective (non-specular), dulled finish to reduce visibility. A static wire is a grounded wire at the very top of the structures intended to protect lower conductors from lightning and is sometimes called a shield wire. These lines would provide data transfer for operation of the lines and substation equipment. The fiber optic cables would be used solely by APS or other partners in the Project. They would not be made available for any other commercial use. No special equipment or repeaters would be required for this Project.

The fiber optic cable requires splice points approximately every two to four miles along the transmission line route. At splice points, the fiber optic cable would be terminated at the top of the structure and routed down the structure to a splice box approximately 15 feet above ground level.

2.4.1.3 Access Roads

Transmission line construction would require the movement of trucks, large vehicles, and construction equipment along the ROW. Unpaved access roads would be used for construction, operation, maintenance, and decommissioning activities on the transmission line. Graveling dirt access roads is not anticipated or proposed, although it may be necessary where access roads intersect paved roads to prevent trackout. Existing roads would be used for construction, to the extent practicable, where they provide adequate access to the line. Only designated access roads would be used during construction in accordance with the APS requirements for transmission line access roads. If required by the underlying land owner or if APS finds it to be warranted, access roads could be gated to prevent access by unauthorized personnel. Gates would only be installed after APS obtained any appropriate authorizations/permits/ROWs, as needed.

The 14–foot-wide permanent access road would be within the granted ROW and when temporary construction access or access for operations and maintenance outside of the ROW

is necessary, authorization would be required on associated BLM lands. The permanent access road would be placed to minimize impacts to natural or cultural resources. Future authorized access, level of use, and the specific location would be in consultation and approval with the underlying land owner. If necessary, permanent spur roads approximately 14 feet wide and averaging 75 feet in length would be constructed from the access roads to the structure sites. Actual length of spur roads is dependent on terrain, engineering, and other conditions and may exceed 75 feet in some instances. Each spur road would lead to a construction pad for a support structure. Temporary construction access roads leading from SR 74 and U.S. Route 60 (US 60) and to the ROW would be 14 feet wide. Arizona crossings (a standard crossing/ford on an ephemeral stream) would be installed at drainages and wash crossings. Paved acceleration and deceleration lanes would be constructed where temporary access roads intersect SR 74 and US 60, disturbing approximately three acres in each location. APS would not remove these lanes and reclaim the land unless required to do so by the entity with jurisdiction over the roadway and/or property. APS would coordinate with ADOT following Project approval to determine the exact locations of all acceleration and deceleration lanes and whether they would be temporary or permanent based up operational and maintenance needs. Depending on the condition of other existing roads that would be used for access, road improvements may be required. APS would minimize vegetation disturbance outside of the transmission line ROW, particularly in drainage channels and along stream banks, and would reseed native areas of construction disturbance outside of the transmission line ROW after construction has been completed.

Access road construction and improvement would include dust-control measures (e.g., watering roads) as required. All existing roads would be left in a condition at least equal to their condition prior to the construction of the transmission line. The exact location of all access roads would be further refined and specified once the Project is approved, the final route selected, and detailed engineering is actually prepared. This detailed information would be thoroughly described in the Implementation Plan of Development that would be finalized once the NEPA process is completed. A preliminary estimate of the location and extent of potential access roads to reach the ROW and potential upgrade locations are provided and discussed in **Section 4.12**.

All roads would be constructed in accordance with the APS requirements for transmission line access roads based upon a Road Specification Plan that would be developed by APS specifically for this Project and in compliance with local jurisdictional regulations. Construction access roads would be repaired, as necessary, but would not be routinely graded.

2.4.1.4 Temporary Use Areas

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 construction equipment would be approximately 100 feet wide within the 200-foot ROW. At each site, a work area of approximately 20,000 square feet (less than 0.5-acre) within or adjacent to the ROW would be required for the location of structures, assembly, and positioning of the structures. Two material laydown areas, each approximately 40 acres in size, would be located on private land. Laydown areas provide storage areas for

the transmission line construction materials during the life of the Project. Approximately every two to three miles, tensioning or pulling sites would be required and each would be approximately 80,000 square feet in size (less than two acres each), on lands within and adjacent to the ROW. It is estimated that up to three tensioning or pulling sites could be situated on public lands within and/or adjacent to the ROW. Sites located outside the ROW on BLM-managed public land would require a short-term ROW authorization.

2.4.2 Construction

2.4.2.1 Overview

Construction of the transmission line between the Sun Valley and Morgan Substations could be performed in the following sequence of activities: pre-construction engineering surveys (months prior to construction); surveying and staking of the centerline; construction mobilization, construction of access roads; locating and establishing material and construction yards; installing foundations and anchors; assembling and erecting the structures; installing ground rods and counterpoise; installing conductors, shield wires, and fiber optic cables; commissioning the line, cleanup and site reclamation. See **Figure 2.4-6**.

Structure components and associated hardware would be shipped to each structure site by truck or other means of transportation, including helicopter use. Structures would be assembled and associated line hardware would be mounted, at each pole or structure site using cranes and bucket trucks. After the structures are assembled, insulators, hardware, and stringing sheaves would be delivered to each structure site. The structures would then be rigged with insulator strings and stringing sheaves at each shield wire and conductor position. Structures would be erected in sections. For public protection during wire installation, guard structures would be erected over highways, railroads, transmission lines, buildings, and other obstacles.

2.4.2.2 Construction Requirements

Schedule

Upon obtaining all permits and ROW approvals, APS would commence construction activities. The schedule for construction of the entire 38-mile transmission line would span approximately 22 months, although some of the phases would overlap. **Table 2.4-2** below outlines the construction phase and anticipated duration.

Table 2.4-2 Construction Schedule

PHASE	DURATION
Road Construction	4 months
Foundation Construction	10 months
Transmission Line Installation	10 months
Reclamation	2 months*

*Note: Some items of reclamation such as the establishment of vegetation from seeds would exceed the duration listed and some of the phases would overlap with each other.

Equipment and Work Force

The number of workers and type of equipment expected to be used to construct the transmission line are shown in **Table 2.4-3**. However, this information is typical construction practice for APS and is not project-specific at this point of the Project.

Table 2.4-3 Typical Transmission Line Construction Personnel and Equipment

CONSTRUCTION PHASE	NUMBER OF PERSONNEL	EQUIPMENT REQUIRED
ROW/Construction	8 (including maintenance)	2 bulldozers (D-6 or D-8) 1 motor grader 2 pickup trucks 1 water truck (for construction and maintenance)
Survey	3	2 pickup trucks
Hole Digging and Installation of Foundations	10	2 hole diggers 1 bulldozer (D-6) 1 truck (2-ton) 1 water truck 2 pickup trucks 1 backhoe 2 dump trucks 2 wagon drills concrete trucks
Structure Haul	10	2 pole haul trucks 2 yard cranes (heavy duty) 1 water truck 2 pickup trucks
Structure Erection	10	1 crane (60-ton) 2 pickup trucks 1 water truck 2 trucks (2-ton)
Conductoring	25	1 helicopter and fly ropes 3 drum pullers (1 light, 1 medium, 1 heavy) 2 splicing trucks 2 double-wheeled tensioners (1 light, 1 heavy) 6 wire reel trailers 2 diesel tractors 1 crane (20-ton) 1 drag 1 sagging equipment 4 trucks (5-ton) 6 pickup trucks 5 two-man lifts 1 water truck

Table 2.4-3 Typical Transmission Line Construction Personnel and Equipment (Continued)

CONSTRUCTION PHASE	NUMBER OF PERSONNEL	EQUIPMENT REQUIRED
Clean-up	4	2 pickup trucks
Reclamation	4	1 bulldozer (D-8) 1 motor grader 1 pickup truck
Total Personnel Required	74 (more personnel may be utilized if needed to meet schedule)	

Construction Utilities

Generally, no new electric power distribution, temporary water, sewer or communications would be required for construction of any of the transmission line facilities. Temporary construction power would be provided by portable on-site generators. Sewer would be provided by temporary portable facilities. Communications would be provided by existing cellular telephone providers and through existing 800 megahertz (MHz) radio communication facilities.

During construction, water would be necessary for transmission line structure foundations, dust control, grading and site work, and landscaping, where required. The water would be provided through available local sources.

Short-term construction yards, and major material yards, would require electric power distribution, water, sewer and communications. Locations for these sites would be selected based on the availability of these services from local providers. Short-term construction yards are part of the material laydown areas and APS would plan to use private, previously disturbed lands for these purposes, if available.

Dust Control

Water application by truck would be the primary means of dust control at areas impacted by construction and near sensitive receptors and would typically require an average of 48,000 gallons of water per day during construction activities, although the actual amounts of water used on any given day would vary, potentially greatly, over the construction period of the Project in response to the activities being performed. Areas of higher erosion or poor soils, outside of desert tortoise habitat, may require application of a palliative dust reducing agent. Any application of palliatives or other dust reducing agents (potential options could include: calcium chloride, dust oils, bentonite, etc.), other than water must first be approved by the BLM. Speed limits on designated access roads would be set and strictly enforced. Gravel or other similar material would be used where dirt access roads intersect paved roadways to prevent mud and dirt track-out. All paved roads would be kept clean of objectionable amounts of mud, dirt, or debris, as necessary.

A complete Dust Control Plan would be prepared by APS specifically for this Project and would be implemented throughout the Project. This plan would be submitted as part of the Maricopa County Dust Control Permit application and would be included in the approved Plan of Development (POD).

Helicopters may be used for a portion of the construction to string conductors, transport materials, workers and equipment and to erect structures. Helicopters, if utilized, would be fueled at the lay down areas, which are expected to be located on private land. Additionally, refueling may also be performed at public or commercial airstrip, airports, or heliports. In the event that onsite storage of regulated petroleum products (fuel, oil, etc.) exceeds 1,320 gallons stored in containers that hold 55 gallons or more, then a Spill Prevention Control and Countermeasure (SPCC) plan would be required, and included in the approved POD. Helicopter landing and fueling areas would be watered as necessary for safety and dust abatement.

Stormwater/Wastewater Management and Erosion Control

During construction, stormwater would be managed according to the stormwater permit issued by the State of Arizona to APS for the Project. In general, construction erosion control would consist of BMPs, including techniques such as hay bales, silt fences, and revegetation, to minimize or prevent soils exposed during construction from becoming sediment carried off the site.

Wastewater would be generated during construction from:

- Concrete loads emptied from trucks
- Washing of exteriors of construction equipment and vehicles to remove accumulated dirt, which if required, would be performed offsite.

APS would manage wastewater from concrete truck washdown and cleaning of construction equipment such that there would be no discharge to surface waters. In addition, appropriate topography would be selected for the washout areas in order to avoid ponding, as pooled water can be attractive to desert tortoises and other wildlife species. Following construction, erosion control on disturbed areas would include revegetation (detailed in **Section 2.4.2.8**) in addition to the aforementioned techniques.

BMPs for the Project include measures that can be applied to the Project as a whole or may be used at site-specific locations where resource sensitivity is high. The BMP measures referenced in **Section 2.4.5** and described in **Appendix 2A** provide guidelines and types of measures that may be used to decrease impacts to resources as a result of the Project. Appropriate BLM and State representatives would supervise implementation of the mitigation measures specified.

2.4.2.3 Preconstruction Activities

Survey and Marking the ROW

Preconstruction foundation testing/geotechnical investigation activities would take place along the ROW in advance of the start of construction. These surveys would test foundation conditions at numerous locations and could include core boring or seismic refraction surveys. These activities are not anticipated to be needed at every structure location. Short-term access

would be required to facilitate these surveys and overland/cross-country travel is expected to be used. All preconstruction activities on public land would be authorized by the BLM prior to implementation.

Land surveying on public and private lands would occur across the entire Project in advance of construction. These surveys would mark authorized boundaries for all Project components including the transmission line ROW boundaries, angle points, individual transmission structures, guard structures and splice sites, access roads, etc.

Prior to any construction activities, the ROW and access roads would be flagged or staked to indicate approved activity areas to minimize impacts to surrounding areas. Preconstruction surveys (biological, cultural, etc.) would be used to identify areas to avoid during construction. Colored plastic ribbon (flagging) would be used to distinguish between areas that can be used and areas to be avoided. Flagging would provide a ground reference for construction crews, equipment operators, environmental monitors, and inspectors to use to make decisions in the field. No paint or permanent markings would be used on rocks or plants to indicate the ROW. Construction fencing would also be used to indicate areas to avoid. Flagging, fencing, and other markings would be maintained until final cleanup and/or reclamation is completed, after which they would be removed.

Construction Mobilization

Construction mobilization activities outside of the ROW include the construction contractor obtaining local construction permits and mobilization of their labor force and the necessary equipment to accomplish the construction of the transmission line. Also during mobilization and other preconstruction activities, contractor-required off-ROW material storage yards and construction yards would be identified and established.

2.4.2.4 Clearing and Grading

Work areas needed for the various stages of construction are described in **Section 2.4.1.4, Temporary Use Areas**. The actual number of work areas and locations would be determined once access roads are determined. Vegetation in the work areas would be trampled, not cleared, unless clearing is approved by the BLM (or ASLD on State Trust land or the private owner on private land). All activities would be conducted in accordance to the Arizona Native Plant Law. APS would comply with the notice and salvage requirements of the Arizona Native Plant Law and shall, to the extent feasible, minimize the destruction of native plants during Project construction. Nursery locations for salvaged plants would be identified after the plant salvage process begins and prior to construction. APS would also relocate salvaged plants to the edge of the ROW as an option to establishing nursery locations, in coordination with the appropriate land management owner/representative(s). After line construction, all disturbed areas not needed for normal transmission line maintenance would be graded to blend, as near as possible, with the natural contours, and revegetated where required.

Clearance of some natural vegetation may be required; however, selective clearing would be performed, only when necessary, to provide for surveying, electrical clearance, line reliability, and construction and maintenance operations. Pruning or removal of mature vegetation under or near the conductors would be done as needed to provide adequate

electrical clearance as required by NESC and North American Electric Reliability Corporation (NERC) standards. For more information on vegetation management, refer to **Section 2.4.3.4**. Procedures for inventory, transplant, and possible removal of saguaros are contained in **Appendix 2A**.

All ground clearing/disturbance activities that could affect sensitive species or habitat would be monitored. Specifically, a qualified biologist would be retained to monitor, and advise the construction contractor during preconstruction activities to minimize or prevent impacts to Sonoran desert tortoises and active migratory bird nests, as well as Hohokam agave. The qualified biologist would meet qualifications for GS-0486 series Wildlife Biologist according to the U.S. Office of Personnel Management (opm.gov) and be approved by the BLM. Surveys would be conducted in the layout/project planning phase and then again immediately prior (within a few days) to construction. If desert tortoises are encountered, any potential tortoise shelter sites in harm's way would be cleared for tortoises and then rendered unusable (filled in, blocked off with rocks, etc.). APS would follow the BLM's *Strategy for Desert Tortoise Habitat Management on Public Lands in Arizona* and any appropriate guidance issued by Arizona Game and Fish Department (AGFD) and U.S. Fish and Wildlife Service (USFWS). Preconstruction and construction crews would look out for and avoid tortoises. If tortoises must be moved to avoid harming them, they would be moved according to AGFD "Guidelines for Handling Sonoran Desert Tortoises" (2007).

In addition, cultural resource monitors would be retained as needed for clearing and grading activities near identified cultural resource sites.

2.4.2.5 Transmission Line Construction

Construct Structure Foundations

Foundations for the transmission line support structures would be reinforced concrete, with a minimal portion of the foundation visible above ground. The size of the foundation would depend on the terrain, soil conditions, and structure type (see **Section 2.4.1.1**). Excavations for poles/structures would be made with power equipment. Where the soil conditions allow, a vehicle-mounted power auger or backhoe would be used. In rocky areas, the foundation holes may be excavated by drilling and blasting, or special rock anchors may be installed. Blasting requires drilling holes in the area to be excavated and breaking the rock with explosives. Safeguards, such as blasting mats, may be used when needed to protect the adjacent property. After the foundation hole is excavated, a rebar cage and anchor bolts are set and then the hole is backfilled with concrete. The poles/structures would then be set and bolted to the anchor bolts after the concrete has cured. Remaining spoil material would be spread on the ground where practicable and any areas sensitive for resource consideration would be avoided. The foundation excavation and installation would require access to the site by a power auger, crane, flat bed semi-truck, and concrete trucks along with providing clearance for maneuvering and operation.

Erect Support Structures

Tubular-steel monopoles would be assembled in sections at each site. Lattice structures would be assembled either in sections in the laydown area with final assembly at each site or the full structure assembly may be completed at each structure site. The method used would

be determined by terrain and available space next to the structure site. Typically structure and pole sections would be erected by truck-mounted cranes with helicopters being used in extremely challenging terrain.

String Conductors

Temporary pulleys would be attached to the structure cross arms. A small diameter "pilot" line would be pulled (strung) from structure to structure by helicopter or all-terrain vehicle. A larger diameter, stronger line would then be attached to the pilot line and strung. This is called the pulling line. This process would be repeated until the permanent shield wire or conductor is pulled through.

The shield wire and conductor would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end. Sites for tensioning equipment and pulling equipment would typically be two to three miles apart.

The tensioning site would be an area approximately 200 feet by 400 feet (approximately two acres). Tensioners, line trucks, wire trailers, and tractors, which are needed for stringing and anchoring the shield wire or conductor, would be located at this site. The tensioner, along with the puller, maintains tension on the shield wire or conductor. Maintaining tension maintains ground clearance and is necessary to avoid damage to the shield wire, conductor, or any objects below them during the stringing operation. The same area could be used as a pulling site where a line puller, line trucks, and tractors, which are needed for pulling and temporarily anchoring the shield wire and conductor, would be located.

2.4.2.6 Special Construction Techniques

Helicopter Construction

If necessary, APS would employ helicopter services to deliver construction laborers, equipment, and materials to structure sites; for hardware installation and wire stringing. Helicopter staging areas would be approximately 10 to 15 acres and be situated along the Project ROW to facilitate fly time of four to eight minutes; typically five-mile intervals. The number of helicopter staging areas would be determined based on final Project design. A flight path map would be provided and contained in the approved POD.

Use of Guard Structures

Temporary guard structures (wooden poles that are temporarily installed and removed after wires/conductors stringing has been completed) would be placed on either side of a road or other obstacle within the ROW. These structures prevent shield wire, conductors, or equipment from falling on an obstacle. Equipment for erecting guard structures would include augers, line trucks, pole trailers, and cranes. Guard structures may not be required for small roads; however, other safety measures such as barriers, flagmen, or other traffic control would be used as necessary.

2.4.2.7 Safety Requirements during Construction

A Project Health and Safety (H&S) Plan would be developed to address health and safety risks and requirements during the construction stage of the Project and would be contained in the approved POD. As the Project moves into the operational stage, the components of the

H&S Plan would be modified to adapt to operational and maintenance activities. Components of the H&S Plan would include, but are not limited to: risk management analysis, emergency response, H&S planning and procedures, implementation, monitoring and reporting results, setting performance targets, incident classification, investigation and reporting results, audits and inspections, and H&S management review. APS H&S and environmental compliance documents would be developed as the Project nears the start of construction.

H&S requirements would be included in the H&S Plan. These requirements include personal protective equipment, housekeeping, maintaining a safe workplace, fire prevention, safe work practices, etc. APS contractors would be expected to comply with these requirements at a minimum. Contractors would have their own site specific H&S plans, and they would be reviewed for compliance.

2.4.2.8 Cleanup and Site Reclamation

Cleanup

Construction sites, material storage yards, and access roads would be kept in an orderly condition throughout the construction period. Refuse and trash, including stakes and flagging, would be removed from the sites and disposed of in an approved manner; there would be no open burning or on-site disposal of construction trash at any time during the life of the Project.

APS would adhere to Arizona's Native Plant Law, and would work with the applicable jurisdictions to implement restoration and reseeding of construction-disturbed areas sites, in accordance with BLM, State, and local requirements. As noted in **Section 2.4.2.4**, plants would be salvaged on State Trust lands, while safeguarded and salvage restricted plants protected by the Arizona Native Plant Law would likely be salvaged on BLM and private lands, pending a decision by the BLM. A salvage plan would be prepared and approved by the BLM prior to initiating construction activities for the Project. All plant material not salvaged could either be broken up to potentially aid in revegetation efforts and/or completely removed from the area and disposed of at an appropriate disposal facility.

Soil Stabilization

Disturbed surfaces would be restored to as near the original contour of the land surface as possible. Water diversions would be constructed along the ROW, as needed, to control surface water and minimize soil erosion. Temporary construction roads, not required for future maintenance access, would be restored after construction of the Project is complete. For example, access roads to staging areas would not be required once the staging area is regraded and vegetated. Areas of soil compaction, including temporary roads and reclaimed existing roads, would be scarified as needed. Seeding would be used where appropriate to reestablish soil stability.

Revegetation

Appropriate site-specific seed mixes for revegetation would be used where conditions vary. Salvaged native plants would be used for revegetation, if appropriate, along with seeding using BLM-recommended and approved seed mixes. Preferably, seed would be planted

during the months from November to January following transmission line construction. Seed would be planted as directed by the BLM. Specific details for revegetation activities would be described in the approved POD or within a specific Reclamation Plan prepared for this Project.

2.4.2.9 Temporary Disturbance Estimates

The estimated acreage of temporary disturbance required for construction of the Proposed Action is detailed in **Table 2.4-4**. Temporary disturbance areas would only be used during the Project construction phase and the areas would be immediately reclaimed following termination of their use. Where there would be overlap of temporary and permanent disturbance, the areas of disturbance are included in the permanent disturbance acreages presented in **Table 2.4-7**. Impacts associated with temporary disturbance are discussed in **Chapter 4**. Please refer to **Section 2.8** for a comparison of temporary disturbance under all alternatives.

Table 2.4-4 Proposed Action Temporary Disturbance Estimates

TEMPORARY DISTURBANCE AREAS		FEDERAL LANDS	STATE TRUST LANDS	PRIVATE LANDS	TOTAL
New/improved Access outside the ROW[1]	Miles	6	3	<1	10
	Acres	10	5	<1	16
Laydown/material sites[2]	Sites	0	0	2	2
	Acres	0	0	80	80
Transmission structure/pole pad construction area[3]	Sites	50	125	25	200
	Acres	23	58	12	93
Transmission conductor pulling/tensioning sites[4]	Sites	6	14	2	22
	Acres	11	26	4	41
Total	Acres	44	89	97	230

[1]Assumes road width of 14 feet. Estimated disturbance represents the maximum amount of temporary disturbance that would be expected in conjunction with the Project.
[2]Laydown/material sites are assumed to be 40 acres each.
[3]Number of sites and locations depend on route terrain, number of turning poles, and final design to reflect actual distance apart. Calculations assume the use of monopoles averaging 1,100 feet apart and pad areas of 100 feet by 200 feet.
[4]Assumes that each pulling/tensioning site is approximately 1.84 acres.

2.4.3 Operations and Maintenance

The APS mission is to provide their customers with a reliable supply of electricity while maintaining the overall integrity of the regional electrical grid. Additionally, APS must comply with industry standard codes and practices such as the NESC (American National Standards Institute [ANSI] C2) (ANSI 2012), which governs the design and operation of high-voltage electric utility systems.

Operation and maintenance activities would include transmission line inspections, climbing inspections of support structures, support structure maintenance, wire maintenance, insulator inspections as needed, access road maintenance and repairs, signage, vegetation

management, emergency response and fire protection, and termination and restoration. APS would keep necessary work areas around all structures clear of vegetation and would limit the height of vegetation along the ROW. The following sections provide details on the anticipated operation and maintenance activities.

2.4.3.1 ROW Safety Requirements

Land uses that comply with local regulations would be permitted adjacent to the Project ROW. Compatible uses of the ROW on public lands would have to be approved by the appropriate agency and APS if those uses (e.g., retention basins, trails, roads, etc.) traverse an approved Project ROW. APS would obtain the necessary land rights for the Project through exclusive electric transmission easements or by purchasing private property in fee. Licenses or permits would be obtained when crossing State Trust lands or other entities facilities or land rights.

2.4.3.2 Transmission Line Inspections and Maintenance

Following construction, the transmission line would typically be inspected annually, or as required, by using fixed-wing aircraft, helicopters, ground vehicles (4x4 trucks or 4x4 all-terrain vehicles [ATVs]), or on foot in accordance with APS' established policies and procedures for transmission line inspection and maintenance. The transmission lines would be inspected for corrosion, equipment misalignment, loose fittings, vandalism, and other mechanical problems. The need for vegetation management also would be determined during inspection patrols.

Detailed ground inspections would take place on an as-needed basis. The inspector would assess the condition of the transmission line and hardware to determine if any components need to be repaired or replaced, or if other conditions exist that require maintenance or modification activities. The inspector would also note any unauthorized encroachments and trash dumping on the ROW that could constitute a safety hazard. Typically, the inspector would access locations along the line and use binoculars and spotting scopes to perform this inspection.

Maintenance would be performed as needed during operations. Where access is required for routine (non-emergency) maintenance and repairs, the same precautions and procedures used during construction would be implemented to minimize ground disturbance, vegetation impacts, and other impacts to the area. APS would notify the BLM at least 30 days prior to any routine or planned maintenance activity and provide protocols for BLM's review and approval. The BLM would have a designated representative (employee or contractor) on site monitoring during these maintenance activities.

Routine maintenance activities typically consist of repair or replacement of individual components and as standard practice does not include new ground-disturbance activities. Routine maintenance is performed by relatively small crews using minimum equipment, over a short period of time (a few hours up to a few days). Equipment required for this work may include 4-wheel drive trucks, flatbed trucks, bucket trucks, boom trucks (high reach), or man lifts. Typical items that may require periodic replacement include insulators, hardware, or pole members on specific support structures.

Maintenance on the transmission lines can be completed safely using live-line techniques, avoiding interruption of service to critical transmission line infrastructure. High reach bucket trucks along with other equipment are used to conduct these activities.

Emergency maintenance (such as in the case of a power outage) would involve prompt response by repair crews to repair or replace damaged equipment. When emergency repair work is required, every attempt would be made to contact the land owner and notify them of the work. In the event notification is not successful, repair operations would proceed. Although restoration of the line would have priority under emergency conditions, all efforts would be made to protect the environment and other resources. Restoration and reclamation procedures following completion of repair work would be similar to those utilized during construction.

Storm damage repair can require the same types of equipment used during construction, including power augers for hole boring, backhoes for excavation, and/or concrete trucks and cranes for structure erection. Other required equipment may include power tensioners, pullers, wire trailers, crawler tractors, and trucks and pickups for hauling materials, tools, and work crews. Under certain conditions, a helicopter could be used to haul in material and erect support structures or string conductors in those areas where access and/or terrain conditions preclude the use of conventional methods. Site and access road disturbance such as ruts created during storm damage operations would be restored to original condition following rehabilitation procedures.

APS would submit annual monitoring reports detailing activities conducted within the ROW, the status of ongoing rehabilitation, and any other items specified by the BLM in the ROW grant. Reports would be submitted at the close of each calendar year for a minimum of five years after completion of construction.

2.4.3.3 Permanent Access Roads along the ROW

APS would maintain work areas and approved access roads adjacent to transmission structures and along the ROW for vehicle and equipment access necessary for operations, maintenance, and repair. Permanent ROW access roads would be allowed to naturally revegetate, but would be maintained, as needed, by APS to ensure safe and usable conditions. Gates would be installed, as required by the land owner or land managing agency, or if APS finds it to be warranted, to restrict unauthorized vehicular access to the ROW. A regular maintenance program may include but is not limited to grading, ditching, culvert installation, and surfacing.

2.4.3.4 Vegetation Management

For public safety and service reliability, APS is required to control vegetation growing in proximity to high-voltage transmission lines in conformance with NESC and NERC guidelines.

The electric voltage carried by a particular transmission line determines the conductor clearing requirements within transmission line ROWs. Other important considerations can include vegetation species types and growth rates, species structural failures that would allow a branch or tree to break and fall, local climate and rainfall patterns, terrain and elevation,

location of vegetation within a span, accessibility, and the risk of fire danger. Areas where vegetation grows much faster and taller than the surrounding vegetation may require greater clearance as well as a more frequent cycle interval in order to maintain industry compliance.

APS has in place a Transmission Vegetation Management Program (TVMP; see **Appendix 2B**) with the primary objective of improving the reliability of the transmission system by minimizing risks of vegetation-caused power outages to the greatest extent permissible. It is APS' goal to accomplish the work in compliance with all applicable regulations including ANSI A300 (Part-1)-2001 Pruning, industry safety standards, and according to science-based BMPs.

Additionally, APS has implemented the practice of Integrated Vegetation Management (IVM), which is based on ANSI A300 (Part-1)-2001 Pruning, which involves selectively controlling tall-growing vegetation while preserving low-growing herbaceous and woody plant communities. Vegetation management on transmission ROWs is accomplished year-round and may involve the use of mechanized equipment, herbicide application, trucks, ATVs, chainsaws, and heavy equipment (i.e. mower consisting of a rotary cutting device mounted on an arm on a rubber tire or tracked vehicle).

The desired outcome of IVM is stable shrub communities that do not interfere with overhead transmission lines, pose a fire hazard, or hamper access. A stable, low-growing shrub community contributes to reduced erosion and the establishment of a sustainable supply of forage and cover for wildlife as well as corridors for wildlife movement.

When the ROW is cleared for vegetation maintenance, APS' plan is to remove all tall-growing vegetation within the wire zone that can encroach into the under clearance (**Table 2.4-5**) and arcing/flashover (**Table 2.4-6** NERC Arcing/Flashover Conditions Clearance 2 Distances[1] (in feet)

6) distances. It is important to note that distances listed in the tables are current estimations and may change over the life of the Project as industry standards change. APS is required to control vegetation in proximity to high-voltage transmission lines in conformance with standards set by the NESC and NERC (FAC 003).

Most vegetation within the wire zone would be limited to low shrubs. The border zone is the remainder of the ROW and is managed to establish small trees and taller shrubs. Structurally unsound hazard trees and/or portions of trees located in the border zone along the ROW edges that could strike electric facilities would be identified for removal.

Examples of species expected to be maintained within the wire zone and border zone include desert broom (*Baccharis sarothroides*), desert hackberry (*Celtis ehrenbergiana*), California barrel cactus (*Ferocactus cylindraceus*), ocotillo (*Fouquieria splendens*), cholla species (*Cylindropuntia sp.*), and creosote (*Larrea tridentata*). Species expected to be removed include mesquite (*Prosopis velutina*), Palo Verde (*Parkinsonia sp.*), acacia (*Acacia greggii*), saltcedar (*Tamarisk sp.*), ironwood (*Olneya tesota*), and saguaro (*Carnegiea gigantea*).

Vegetation management specific to treatment of saguaros is detailed in **Appendix 2A**, specifying the circumstances under which saguaros would be transplanted versus removed, and the procedures that would be followed.

Table 2.4-5 Minimum Safe Clearance Zone at the Time of Maintenance

VOLTAGE	SIDE CLEARANCE DISTANCE	OVERHANG CLEARANCE DISTANCE	UNDER CLEARANCE DISTANCE
230.1-345kV	20' 4"	None permitted	35' 8"
345.1-500kV	24' 0"	None permitted	41' 4"

Table 2.4-6 NERC Arcing/Flashover Conditions Clearance 2 Distances[1] (in feet)

ALTITUDE	230KV	500KV
0-2,953	5.10	14.70
2,954-3,937	5.21	15.00
3,938-4,926	5.36	15.44
4,927-5,906	5.51	15.88
5,907-6,890	5.67	16.32
6,891-7,874	5.82	16.76
7,875-8,859	5.97	17.20
8,860-9,843	6.12	17.64
9,844-11,811	6.38	18.38

[1] Clearance 2 Distances refer to the shortest distance between conductive parts.

2.4.3.5 Permanent Disturbance around Structures

Shrubs, trees, large cactus, and other obstructions would be regularly removed near transmission line structures to facilitate inspection and maintenance of equipment and to ensure system reliability. All woody vegetation, including shrubs and trees would be cut down and treated with herbicides underneath each structure and 40 feet out from the foot of the structure. An area approximately 0.2-acre in size surrounding each monopole structure would be permanently disturbed and would not be returned to natural contours.

2.4.3.6 Emergency Response and Fire Protection

APS would prepare an Emergency Response Plan (ERP) for the Project. Copies of the ERP would be provided to all emergency services prior to the Project commencing construction (and would be contained in the approved POD).

All onsite employees for both construction and operations would receive annual fire prevention and response training by a professional fire safety training firm. The appropriate fire departments would be asked to participate in this training. Employees would be prohibited from smoking outside of company vehicles during dry summer months. The details of the plan would be provided as design is completed.

2.4.3.7 Permanent Disturbance Estimates

The estimated acreage of permanent disturbance required for operation of the Proposed Action is detailed in **Table 2.4-7**. Permanent disturbances are those areas that would persist for the life of the Project (through operations, maintenance, and decommissioning). Where there would be overlap of temporary and permanent disturbance, the areas of disturbance are included in the permanent disturbance acreages presented below. Please refer to **Section 2.8** for a comparison of disturbance under all alternatives.

Table 2.4-7 Proposed Action Permanent Disturbance Estimates

PERMANENT DISTURBANCE AREAS		FEDERAL LANDS	STATE TRUST LANDS	PRIVATE LANDS	TOTAL
Transmission structures[1]	Structures	50	125	25	200
	Acres	9	23	5	37
Transmission line spur roads[2]	Number	25	62	12	99
	Miles	0.4	0.9	0.2	1.4
	Acres	1	2	<1	3
Access road along the ROW[3]	Miles	10	25	5	40
	Acres	17	42	9	68
Total	Acres	27	67	14	108

[1] Number, type, and location of structures depend on route terrain, number of turning poles, and final design to reflect actual distance apart. Calculations assume the use of monopoles averaging 1,100 feet between structures and a permanent disturbance area of approximately 0.2 acres for each monopole structure.
[2]Assumes road width of 14 feet and length of 75 feet.
[3]Assumes road width of 14 feet.

2.4.4 Termination, Decommissioning, and Reclamation

2.4.4.1 Removal of Conductor and Structures

First, the conductors, insulators, and hardware would be dismantled from the transmission line structures and removed from the ROW. The decommissioning activity most notable to the general public would be the removal of the transmission poles and towers. The disassembly and removal of this equipment would essentially be the same as its installation, but in reverse order.

2.4.4.2 Obliteration of Structure Foundations

Once the structures have been removed, the foundations would be removed to below-ground surface. The concrete and steel within the deeper transmission pole foundations would be broken-up and removed to a depth of 36 inches below grade (industry standard). Fully removing the transmission pole foundations would require major excavation/disturbance at each tower site, as well as additional truck haul-away traffic. These factors could contribute to an unnecessary negative environmental impact to native plants and wildlife, increase soil compaction, as well as contribute to a potential reduction in air quality resulting from additional dust and truck emissions. The foundation sections below 36 inches, that are proposed to remain, are composed of non-leaching/natural elements (concrete, rock, and

steel) that should not present a hazard to the environment. All concrete and steel debris from foundation demolition would be removed from the site and be disposed of at an approved landfill facility. Voids left by the removed concrete foundations would be filled with native material and restored to original grade.

2.4.4.3 Reclamation of Roads

The land owner would have the choice when the Project is decommissioned as to which Project access roads are to be removed. If any roads are left, maintenance of the roads would become the responsibility of the land owner. Once all the necessary equipment and materials have been removed from an area and the road to that area is no longer needed, it can be removed. The road surface and any bed materials (i.e. gravel or rock for drainage crossings) would be removed down to its original grade if any cut and fill activities were required in originally constructing the road. Any materials native to the site would be scattered across the site, and foreign materials would be removed. Removed roads would be regraded to original contours if cuts and fills make such regrading practical.

2.4.4.4 Stabilization and Revegetation of Disturbed Areas

The area around transmission line towers and abandoned access roads would be reclaimed according to BLM stipulations in the ROW grant and the final reclamation plan. Where facilities or materials are removed, the land would be regraded back to preconstruction contours or as close as possible. Reclamation practices would incorporate soil stabilization measures to prevent erosion and sedimentation and revegetation as described above under **Section 2.4.2.8**.

2.4.5 Applicant-Committed Environmental Protection Measures and Best Management Practices

Activities under the Proposed Action and Action Alternatives (**Sections 2.5** through **2.7**) would include EPMs that are an integral part of the Project. These measures include BMPs established by the BLM for construction, operation, and maintenance of the Sun Valley to Morgan 500/230kV Transmission Line Project and other related facilities in this region (**Appendix 2A**). These BMPs, typical for a transmission line project of this nature, would be followed to avoid or minimize the potential for adverse environmental effects resulting from Project-related activities.

BMPs are described for the following:

- Air pollution prevention
- Landscape preservation and impact avoidance
- Erosion and sediment control
- Utility construction
- Biological resources (wildlife, vegetation)
- Cultural resources
- Paleontological resources
- Noxious and invasive weed management

- Reclamation (site restoration, revegetation)
- Visual resources
- Water pollution prevention and monitoring
- Noise prevention
- Hazardous material storage, handling, and disposal, and safety measures
- Socioeconomics

In addition to the BMPs, to ensure public health and safety, APS would comply with FAA permit requirements for Project components that may present aviation hazards. The FAA is the oversight agency that determines aerial marking requirements for aviation hazards.

2.5 ACTION ALTERNATIVES

A total of three Action Alternatives and one Sub-alternative to the Proposed Action have been identified and are described in the following sections. All portions of the Project west of US 60 and to the Sun Valley Substation are identical and common to the Proposed Action, and each of the Action Alternatives, including the Sub-alternative. The description and details for the facilities, construction, operation, and decommissioning activities, including EPMs and BMPs, described for the Proposed Action throughout **Section 2.4** would also apply to the Action Alternatives and Sub-Alternative described in the following sections. With exception of Alternative 1, the alternatives described in the sections that follow have segments outside the ACC-certificated route. Implementation of those routes could only occur if the ACC amended the CEC that has been issued for the Project. The ACC's consideration for amending the CEC would open the entire route decision up for public review and consideration, and would not be limited to discrete portions; a process that could conceivably be as lengthy and involved as the consideration of the original ACC application filed by APS, taking approximately one to three years (depending on whether the route would be a modification to an existing alternative or a new alternative route). As a result, construction of the 500kV transmission line would be delayed, and potentially the 230kV line as well, depending on the length of the ACC amendment process.

2.5.1 Alternative 1: Proposed Action with Additional Corridor

This alternative was developed to evaluate the establishment of a multiuse utility corridor as opposed to a single-use utility corridor as described under the Proposed Action. Co-location of future utilities within the corridor would be environmentally advantageous by consolidating similar land uses and disturbance in a discrete area.

Under this alternative, the route of the transmission line between the Sun Valley and Morgan Substations would be the same as the Proposed Action route. However, a multiuse utility corridor would also be established on BLM-managed public lands that would begin at the centerline of SR 74 and extend 0.5 mile north, and also include the entire block of BLM lands south of SR 74 (**Figure 2.5-1a**). This alternative would also require an RMPA to change those areas' VRM designation from VRM Class III to VRM Class IV to accommodate the proposed Project, as well as any future utilities within the multiuse utility corridor that may not meet VRM Class III objectives. Approximately 3,375 acres would be included in the multiuse utility corridor and changed from VRM Class III to VRM Class IV

(**Figure 2.5-1b**). Additionally, a ROW for the portions of BLM-managed public land within an existing BLM-designated multiuse corridor near the Sun Valley Substation would still be required under this alternative.

BLM-managed public lands that would lie within the multiuse utility corridor north of SR 74 are already contained within a transportation corridor designated by the Bradshaw-Harquahala RMP to allow for future planned expansion of SR 74. This allows BLM to consider additional linear ROWs within the same corridor. Any additional ROW applications would be considered on a case-by-case basis.

The total length of the Alternative 1 route would be the same as the Proposed Action - approximately 38.2 miles, approximately 9 miles of which would cross BLM-managed public land. The structures would require a ROW width of 200 feet, for a total of 926 acres, 219 acres of which would occur on BLM-managed public land.

The acres of temporary and permanent disturbance for Alternative 1 would be the same as the Proposed Action. Right-of-way acquisition and construction costs for Alternative 1 would be the same as the Proposed Action, approximately $23 million and $104 million respectively, for a total of $127 million.

2.5.2 Alternative 2: ROW South of SR 74

This alternative was developed in order to eliminate multiple crossings of SR 74 by keeping the transmission line on one side of SR 74 in response to visual and safety concerns. In addition, it would reduce the amount of BLM-managed public lands that would potentially be impacted, by moving the line onto private lands.

Under Alternative 2, a five-mile long segment that parallels the south side of SR 74 from the 163rd Avenue alignment to just west of the El Mirage Road alignment on private land would replace an approximately 5-mile long segment of the Proposed Action north of SR 74 on public lands, likewise being located within a 200-foot wide ROW.

Besides this five-mile long segment, all other segments of the Alternative 2 route would remain within the ACC-certificated route and would follow the Proposed Action route (**Figure 2.5-1a**).

Alternative 2 would also include an RMPA to establish a multiuse utility corridor on the entire key-shaped block of BLM-managed public lands immediately south of SR 74 and to change the VRM designation from VRM Class III to VRM Class IV in this same entire block area, approximately 1,013 acres **(Figure 2.5-1c)**. A ROW for the portions of BLM-managed public land within an existing BLM-designated multiuse corridor near the Sun Valley Substation would still be required under this alternative.

The total length of the Alternative 2 route would be approximately 37.4 miles, four miles of which would be on BLM-managed public lands. The structures would require a ROW width of 200 feet, for a total of 907 acres, 96 acres of which would occur on BLM-managed public land. The multiuse utility corridor that would be designated by the RMPA under Alternative 2 would be approximately 1,013 acres south of SR 74.

The estimated acreage of disturbance required for construction and operation of Alternative 2 is detailed in **Tables 2.5-1** and **2.5-2**. Right-of-way acquisition costs for Alternative 2 are

estimated to be $26 million due to the need for acquisition of private land primarily in the Saddleback Heights development. Construction costs are estimated to be $101 million. Total Project costs are estimated at approximately $127 million.

Table 2.5-1 Alternative 2 Temporary Disturbance Estimates

TEMPORARY DISTURBANCE AREAS		FEDERAL LANDS	STATE TRUST LANDS	PRIVATE LANDS	TOTAL
New/improved Access outside the ROW[1]	Miles	2	3	3	8
	Acres	4	5	5	14
Laydown/material sites[2]	Sites	0	0	2	2
	Acres	0	0	80	80
Transmission structure/pole pad construction area[3]	Sites	25	130	40	195
	Acres	12	60	18	90
Transmission conductor pulling/tensioning sites[4]	Sites	2	14	5	21
	Acres	4	26	10	40
Total	Acres	20	91	113	224

[1]Assumes road width of 14 feet. Preliminary road locations identified on **Figure 4.9-1** and discussed in **Section 4.12**.
[2]Laydown/material sites are assumed to be 40 acres each.
[3]Number of sites and locations depend on route terrain, number of turning poles, and final design to reflect actual distance apart. Calculations assume the use of monopoles averaging 1,100 feet apart and pad areas of 100 feet by 200 feet.
[4]Assumes that each pulling/tensioning site is approximately 1.84 acres.

Table 2.5-2 Alternative 2 Permanent Disturbance Estimates

PERMANENT DISTURBANCE AREAS		FEDERAL LANDS	STATE TRUST LANDS	PRIVATE LANDS	TOTAL
Transmission structures[1]	Structures	25	130	40	195
	Acres	4.5	23	7	35
Transmission line spur roads[2]	Number	12	65	20	97
	Miles	<1	1	<1	2
	Acres	<1	2	<1	3
Access road along the ROW[3]	Miles	5	26	8	39
	Acres	9	44	14	66
Total	Acres	14	69	21	104

[1] Number, type, and location of structures depend on route terrain, number of turning poles, and final design to reflect actual distance apart. Calculations assume the use of monopoles averaging 1,100 feet between structures and a permanent disturbance area of approximately 0.2 acres for each monopole structure.
[2]Assumes road width of 14 feet and length of 75 feet.
[3]Assumes road width of 14 feet.

2.5.3 Alternative 3: Carefree Highway Route

This alternative was developed in order to eliminate the need for an RMPA for both the establishment of a utility corridor and VRM Class change, and to reduce the amount of BLM-managed public lands that would potentially be impacted. However, a ROW for the portions of BLM-managed public land within an existing BLM-designated multiuse corridor near the Sun Valley Substation would still be required under this alternative. Additionally, this alternative would move the transmission line onto private lands planned for residential and commercial land uses.

Alternative 3 would replace an approximately nine-mile long segment of the Proposed Action route north of SR 74 from the 179th Avenue alignment to the Morgan Substation by using the Carefree Highway alignment. See **Figure 2.5-1a**. This alternative was the original APS proposal to the ACC during the State CEC process. The alternative extends south from the Proposed Action route at SR 74 along the 179th Avenue alignment and continues south two miles to the Carefree Highway alignment. The route then follows the Carefree Highway alignment east for about 8 miles to about 99th Avenue, where the alignment approaches the existing Salt River Project Navajo 500kV and Western Area Power Administration 230kV transmission line corridor. From that point, Alternative 3 turns northeast and follows the transmission corridor to the Morgan Substation.

Aside from this nine-mile long segment, all other segments of the Alternative 3 route would remain within the ACC-certificated route and would follow the Proposed Action route.

The total length of the Alternative 3 route would be approximately 38.4 miles, approximately 2.5 miles of which would cross BLM-managed public lands near the Sun Valley Substation that are within a BLM-designated multiuse corridor. The structures would require a ROW width of 200 feet, for a total of 931 acres, 45 acres of which would occur on BLM-managed public land. No new corridors would be designated on BLM-managed public lands under this alternative and no changes to existing VRM classifications would be needed, thereby eliminating the need for an RMPA.

The estimated acreage of disturbance required for construction and operation of Alternative 3 is detailed in **Tables 2.5-3** and **2.5-4**. Approximated ROW acquisition costs for Alternative 3 are estimated to be $29 million due to need for private land acquisition in the Vistancia, Saddleback Heights, and Lake Pleasant Heights developments. Construction costs are estimated to be $101 million. Total project costs are estimated at $130 million.

Table 2.5-3 Alternative 3 Temporary Disturbance Estimates

TEMPORARY DISTURBANCE AREAS		FEDERAL LANDS	STATE TRUST LANDS	PRIVATE LANDS	TOTAL
New/improved Access outside the ROW[1]	Miles	<1	3	6	9
	Acres	<1	5	10	15
Laydown/material sites[2]	Sites	0	0	2	2
	Acres	0	0	80	80
Transmission structure/pole pad construction area[3]	Sites	15	140	45	200
	Acres	7	65	21	93
Transmission conductor pulling/tensioning sites[4]	Sites	1	16	5	22
	Acres	2	30	9	41
Total	Acres	9	100	120	229

[1]Assumes road width of 14 feet. Preliminary road locations identified on **Figure 4.9-1** and discussed in **Section 4.12**.
[2]Laydown/material sites are assumed to be 40 acres each.
[3]Number of sites and locations depend on route terrain, number of turning poles, and final design to reflect actual distance apart. Calculations assume the use of monopoles averaging 1,100 feet apart and pad areas of 100 feet by 200 feet.
[4]Assumes that each pulling/tensioning site is approximately 1.84 acres.

Table 2.5-4 Alternative 3 Permanent Disturbance Estimates

PERMANENT DISTURBANCE AREAS		FEDERAL LANDS	STATE TRUST LANDS	PRIVATE LANDS	TOTAL
Transmission structures[1]	Structures	15	140	45	200
	Acres	3	25	9	37
Transmission line spur roads[2]	Number	7	70	22	99
	Miles	<1	1	<1	2
	Acres	<1	2	<1	3
Access road along the ROW[3]	Miles	3	28	9	40
	Acres	5	48	15	68
Total	Acres	8	75	25	108

[1] Number, type, and location of structures depend on route terrain, number of turning poles, and final design to reflect actual distance apart. Calculations assume the use of monopoles averaging 1,100 feet between structures and a permanent disturbance area of approximately 0.2 acres for each monopole structure.
[2]Assumes road width of 14 feet and length of 75 feet.
[3]Assumes road width of 14 feet.

2.5.4 Sub-alternative: State Trust Land Route Variation

This Sub-alternative was developed in response to a request made to the BLM by the ASLD, a cooperating agency in the NEPA process and a major governmental land management agency responsible for administration of State Trust lands along the Proposed Action route.

The Sub-alternative route would replace a four-mile section of the Proposed Action route that would also be common to all Action Alternatives (**Figure 2.5-1a**); therefore, it could be combined with any of the Action Alternatives. The Sub-alternative route would begin at the intersection of 235th Avenue and the Cloud Road alignment, just north of US 60. From that intersection point, the Sub-alternative would parallel the north side of the Cloud Road alignment, east for three miles to the intersection with 211th Avenue. The Sub-alternative would then parallel the west side of 211th Avenue for one mile north, where it would rejoin the portion of the Proposed Action route that is common to all Action Alternatives at the Joy Ranch Road alignment. The entire four-mile length of the Sub-alternative route would be outside the ACC-certificated route. Therefore, implementation of the Sub-alternative route could only occur if the ACC amended the CEC that has been issued for the Project, as described in **Section 2.5**.

Both the Sub-alternative route and the Primary Segment of the Proposed Action route would cross State Trust lands exclusively; there would be no change in the overall acreage of disturbance under the Sub-alternative route compared with the Proposed Action route in this area, as the only change would be the route that the ROW would take crossing three sections of State Trust land. The overall distance and area occupied by the ROW would be exactly the same under both the Proposed Action and the Sub-alternative.

The ASLD requested that BLM analyze the subject route in order to reduce the social and economic impacts that could result from dividing this block of State Trust land between SR 74 and Cloud Road west of 211th Avenue. It is ASLD's obligation and mission to manage these lands to enhance values and optimize economic return for the Trust's beneficiaries (ASLD 2012a). This Sub-alternative is being analyzed and presented only for environmental analysis purposes as requested by ASLD, and does not affect the BLM's decision-making process as it would not require the BLM issuance of a ROW or an RMPA.

The State Trust lands crossed by both the Sub-alternative and the primary portion of the Proposed Action route are within the jurisdiction of the City of Surprise. The City of Surprise General Plan designation for the affected State Trust lands is for rural residential development. There are numerous master planned communities in the area. ASLD has asserted that master planning is easier with large, self-contained blocks of land where infrastructure can be designed to avoid piecemealing, open space can be incorporated into the design, and development standards can be amended to take into consideration unusual land forms or constraints (ASLD 2012b). Neither this four-mile Sub-alternative route nor the Primary Segment of this area involves any BLM administered lands.

In addition, ASLD maintains that the subject block of State Trust land is a large uninterrupted assemblage of land that lends itself to master planning. Price surveys have shown that raw land prices are higher where the land is within a master planned area versus land outside of an area. ASLD believes that bisecting the land along the Cloud Road alignment under the Proposed Action route could compromise the future ability to utilize the lands for a master planned community, thereby reducing the economic value of those State Trust lands to the Trust. Further, ASLD believes that the Sub-alternative route would maintain the development integrity of the land, and result in a higher economic return of the State Trust lands for the larger parcel (ASLD 2012b).

2.6 NO ACTION ALTERNATIVE

Under the No Action Alternative, BLM would not approve either of the proposed portions of the ROW grant on BLM-managed public lands and the Bradshaw-Harquahala RMP would not be amended to designate a utility corridor (single-use or multiuse) or change the existing VRM designations. The 500/230kV transmission line would not be constructed across federal lands as proposed by APS. The No Action Alternative would not provide APS with a ROW for the approximately two miles of BLM-managed public land near the Sun Valley Substation which is in a BLM-designated multiuse corridor. Any future requests for a ROW grant on BLM lands in this area not analyzed in this current EIS or other existing NEPA documents would require additional NEPA analysis. NEPA regulations require the No Action Alternative to be included in the alternatives analysis of an EIS (CEQ Regulation Section 1502.14(d)). The No Action Alternative forms the baseline against which the potential impacts of the Proposed Action and the other Action Alternatives are compared.

A decision by the BLM to select a No Action Alternative would not respond to the APS Project objectives described in **Section 1.2** to increase reliability and import capability for renewable energy; however, it would not preclude APS from satisfying the Project objectives through alternative routes for the transmission line. Since the majority of the Project is not located on public lands, but the Project would still be necessary to meet the APS objectives regardless of location, APS may pursue other options to develop the Project without using public lands as described in this Final EIS and Proposed RMPA. Other potential development options could include pursuing approval to construct the Project on other Federal, State, or private lands. In this case, environmental or other resource impacts associated with construction and operation of the Project may still occur within the general vicinity.

Under the No Action Alternative, if APS were to pursue other potential routes outside the ACC-certificated route, implementation could only occur if the ACC amended the CEC that has been issued for this Project. Even if any future routes would include portions of the previously certificated route, the ACC's consideration of amending the CEC would open the entire route decision up for review and consideration, and would not be limited to discrete portions; a process that could conceivably be as lengthy and involved as the consideration of the original ACC application filed by APS, taking approximately one to three years (depending on whether the route would be a modification to an existing alternative or a new alternative route).

2.7 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

This section describes the alternatives to the Proposed Action that were considered but not carried forward in the detailed analysis for various reasons. These alternatives were generated and derived from discussions and alternative identification exercises that occurred at the public scoping meetings in Phoenix, Wittmann, and Peoria, from the Economic Strategy Workshop, and/or from internal scoping, comments submitted during the public scoping period, and comments received on the Draft EIS.

Using the process described in **Section 2.2**, several technological and routing options were eliminated from consideration for detailed analysis because they would not meet the purpose

and need for the Project or the Project objectives; or because they were not found to be technically or economically practical and feasible; or environmentally reasonable. The following sections provide background information on technological options, describe the routes eliminated, provide an overview of conditions along the routes, and contain the screening results that precluded them from further analysis.

In addition to not meeting various screening criteria, either portions of these routes or the routes in their entirety described in the following sections would be outside the ACC-certificated route; therefore, implementation of those routes would require the ACC to amend the CEC that has been issued for the project. The ACC's consideration of amending the CEC would open the entire route decision up for review and consideration, and would not be limited to discrete portions; a process that could conceivably be as lengthy and involved as the consideration of the original ACC application filed by APS.

2.7.1 Cloud Road Route

2.7.1.1 Route Description

The Cloud Road route would extend east from the Proposed Action route at the 235th Avenue alignment near Circle City for approximately 17.5 miles to the Morgan Substation, replacing the approximately 19-mile long portion of the Proposed Action route that would extend north on the 235th Avenue alignment, then east on the Joy Ranch Road alignment, and paralleling SR 74 to the Morgan Substation. All other segments of the route would remain within the ACC-certificated route and would follow the Proposed Action route. See **Figure 2.7-1**.

2.7.1.2 Route Overview and Screening

The portion of the route between 235th Avenue and 171st Avenue crosses a mixture of State Trust and private lands, which are primarily undeveloped with a small number of existing residences.

Local land use plans call for low-density residential uses in this area. The planned Grand Vista development will include residential, recreation, and golf course uses.

Between 171st Avenue and the Morgan Substation, private lands adjacent to Cloud Road are within the City of Peoria and are generally vacant and undeveloped. Local land use plans call for low to medium density residential uses and natural areas within the planned Saddleback Heights and Lake Pleasant Heights developments. The route would bisect the planned Saddleback Heights and Grand Vista residential developments and the Lake Pleasant Heights residential development, which is in its preliminary planning stage (APS 2008b). Near the Morgan Substation, the route crosses an existing 230kV line and the New Waddell Canal. Right-of-way acquisition and construction costs for the Cloud Road route are estimated to be $25 million and $96 million respectively, for a total of $121 million.

The screening process found that the Cloud Road route meets the purpose and need and APS' objectives for the Project; and it is technically and economically practical and feasible. However, this route would essentially have the same effects as and be very similar to Alternative 3, the Carefree Highway route. For this reason the Cloud Road route was not carried forward for detailed analysis.

2.7.2 Hassayampa-Western SR 74 Route

2.7.2.1 Route Description

The Hassayampa-Western SR 74 route would replace an approximately 25-mile long segment of the Proposed Action route that extends from the Sun Valley Substation northeast to the Deer Valley Road alignment, north to the Lone Mountain Road alignment, east to the 235th Avenue alignment, north to the Joy Ranch Road alignment, and east to the 179th Avenue alignment at SR 74. All other segments of the route would remain within the ACC-certificated route and would follow the Proposed Action route. See **Figure 2.7-1**.

2.7.2.2 Route Overview and Screening

The segment of the Hassayampa-Western SR 74 route between the Sun Valley Substation and Joy Ranch Road is characterized by undeveloped private land, with some agricultural uses near the south end. This segment would cross an existing 500kV transmission line. In addition, the route would also require a line directly over the CAP Hassayampa pump station (JBR 2011). The segment could interrupt the continuity of the Festival by Lyle Anderson development in three different places. Planned development of private lands in this area includes low and medium density residential within the Festival Ranch development, and potential parks/preservation land (associated with the Hassayampa River floodplain). In this segment, the route would also be sited within or would cross the Hassayampa River. Although the river is normally a dry riverbed, during certain times of the year there can be unusual and severe flooding. APS prefers to avoid placing structures in floodplains, to the extent possible. If floodplains cannot be avoided and structure foundations must be situated within a floodplain, a scour study would be completed and the foundations would include engineering measures to mitigate risk.

Proximity of the transmission line to the river would expose it to flood hazards, and if a flood event occurred, access to transmission facilities could be impaired. Repairs and maintenance could be delayed until flood water subsides and the ground dries. APS cannot predict what a typical restoration time would be required for repairs, as these failures are not typical; repair efforts would be hindered as long as flood conditions persist. Placement of towers in the riverbed would require deep, reinforced foundations (JBR 2011), which typically requires additional temporary disturbance at the time of construction. Between Joy Ranch Road and 235th Avenue, the line would cross vacant/undeveloped private land along the river; roughly following US 60, a 69kV transmission line, and railroad main line, eventually becoming parallel with SR 74. In the small community of Morristown, the Castle Well Airport is approximately 1,200 feet north of SR 74. In this location, the line would be perpendicular to the airport runway, potentially conflicting with flight patterns and other airport operations (APS 2008b).

The Maricopa County Zoning Ordinance (Maricopa County 2012) established the SR 74 scenic corridor overlay zoning district. The SR 74 Scenic Corridor encompasses lands within 500 feet of the ROW centerline from approximately 0.5-mile west of the Agua Fria River to 1.5 miles east of US 60. (However, according to the City of Peoria, the SR 74 Scenic Corridor within their jurisdiction does not apply.) The ordinance sets standards for residential and nonresidential uses. Standards are set for components such as setbacks, heights, and

screening. The ordinance states that utility lines are required to be buried. Utility lines are not defined in the ordinance; however, this requirement is clarified in the SR 74 Scenic Corridor Guidelines (Maricopa County n.d. c), a part of the Maricopa County 2020 Eye to the Future Comprehensive Plan. The guidelines state, "New utility lines should be located underground, except 69kV or greater electric transmission lines." Because this Project proposes a combined 230kV and 500kV transmission line, the ordinance does not apply to this Project. While the Scenic Corridor guidelines allow for a proposed 500/230kV overhead transmission line, it would impact on the visual resources of SR 74.

Right-of-way acquisition costs for The Hassayampa-Western SR 74 route are estimated to be $24 million. Construction costs are estimated to be $110 million as soil conditions would require deep foundations, and the route would have a relatively higher number of angle structures. Total Project costs are estimated at $134 million.

The screening process found that this route meets the purpose and need and APS' objectives for the Project, and it would require an RMPA for plan conformance for both establishing a utility corridor and VRM Class designation changes. It is technically feasible given the constraints of possible construction in the river floodplain and economically practical with an overall cost estimate of approximately 6 percent more than that of the Proposed Action. However, it was not found to be environmentally reasonable, because unlike the Proposed Action and Action Alternatives, this route would be sited within the Hassayampa River floodplain and could interrupt the continuity of small portions of one development in three different places. In addition, biological and cultural resources are expected to be more abundant within and adjacent to the Hassayampa River, thus potentially increasing the likelihood of impacts to these resources for this route. For this reason, the Hassayampa-Western SR 74 route was not carried forward for detailed analysis.

2.7.3 Hassayampa-Joy Ranch Road Route

2.7.3.1 Route Description

The Hassayampa-Joy Ranch Road route would replace an approximately 18-mile long segment of the Proposed Action route that extends from the Sun Valley Substation north to the Lone Mountain Road alignment, east to the 235th Avenue alignment, and north to the Joy Ranch Road alignment. All other segments of the route would remain within the ACC-certificated route and would follow the Proposed Action route. See **Figure 2.7-1**.

2.7.3.2 Route Overview and Screening

The segment between the Sun Valley Substation and Joy Ranch Road is described under **Section 2.7.2**, Hassayampa-Western SR 74 route.

The segment of this route on Joy Ranch Road between 275th Avenue and US 60 is mostly State Trust lands, with vacant/undeveloped private land and rural residential uses. The route would cross, or be in close proximity to, existing rural residences near west Rice Road and just west of US 60. This segment would cross 1.25 miles of State Trust lands and be adjacent to the proposed Broadstone Ranch community (APS 2008b). Local land use plans in this area call for low-density residential uses.

Between US 60 and 235th Avenue, where it meets the ACC-certificated route, this route would cross existing residences in Circle City and place the line immediately perpendicular to the north end of the Thunder Ridge Airpark, potentially affecting flight patterns and operations (APS 2008b), since the runway runs north and south. The owner of the Thunder Ridge Airpark has expressed strong opposition to the Project (JBR 2011).

Right-of-way acquisition costs for the Hassayampa-Joy Ranch Road route are estimated to be $23.5 million. Construction costs are estimated to be $105 million. Similar to the Hassayampa-Western SR 74 route, soil conditions along the Hassayampa-Joy Ranch Road route would require deep foundations; however, the Hassayampa-Western SR 74 route would be approximately one and one-half miles longer than the Hassayampa-Joy Ranch Road route, and would have a relatively higher number of angle structures. Total Project costs are estimated at $128.5 million.

The screening process found that the Hassayampa-Joy Ranch Road route meets the purpose and need and objectives for the Project, and it would require an RMPA for plan conformance for both establishing a utility corridor and VRM Class designation changes. It is technically feasible given the constraints of possible construction in the river floodplain and economically practical with an overall cost estimate of approximately 2 percent more than that of the Proposed Action. However, it was not found to be environmentally reasonable, because unlike the Proposed Action or Action Alternatives, this route would be sited within the Hassayampa River floodplain (previously described in **Section 2.7.2.2**) and could interrupt the continuity of small portions of one development in three different places. In addition, biological and cultural resources are likely to be possibly more abundant within and adjacent to the Hassayampa River, thus potentially increasing the likelihood of impacts to these resources for this route. Also, the Hassayampa-Joy Ranch route would potentially impact operations at the Thunder Ridge Airpark. For these reasons, this route was not carried forward for detailed analysis.

2.7.4 CAP Complete Route

2.7.4.1 CAP Background Information

The CAP, owned and constructed by the USBR, is a 336-mile long system of aqueducts (canals), tunnels, pumping plants, and pipelines that carry water across Arizona from Lake Havasu to southwest of Tucson. The CAP is designed to bring 1.5 million acre-feet of Colorado River water per year to Pima, Pinal, and Maricopa Counties (CAP 2011a).

The Central Arizona Water Conservation District (CAWCD) was organized to provide a means for Arizona to repay the federal government for the reimbursable costs of construction of the CAP, and is also responsible for the care, operation, maintenance, and management of the system. CAWCD's Land Department is responsible for managing all land associated with the CAP for the benefit of CAWCD and its water customers. Water delivery is CAWCD's primary mission; therefore all proposed uses of CAP land are evaluated to determine the overall effect on the CAP. Requests for land use require submission of an application to the CAWCD Land Department. In its land use decisions, CAWCD must abide by the agreements it has with the United States, and land use activities may not diminish, compromise, ignore, or subordinate any of the CAWCD's rights to manage CAP land uses (CAP 2011a). It is the

policy of the USBR and CAWCD to disallow lateral encroachment (i.e., other right-of-way uses along the CAP right-of-way) unless USBR determines a benefit for the CAP (CAP 2011b). However, CAWCD and USBR are supportive of the transmission line laterally encroaching on the CAP right-of-way finding appropriate CAP benefit for so doing (CAP 2011b).

The canal is not open for fishing or swimming to ensure maximum safety for animals and humans. However, when reasonable and possible, the USBR acquired sufficient land and located the fence to allow for a 10 to 20-foot wide trail to be developed outside the fenced right-of-way, generally along the downhill side of the canal (CAP 2011a).

2.7.4.2 Route Description

The CAP Complete route is an approximately 26-mile long segment that generally parallels the north side of the CAP canal from just west of the 267th Avenue alignment to the Navajo South transmission line corridor, then turns northeast and parallels the transmission corridor to the Morgan Substation. It would replace an approximately 34-mile long segment of the Proposed Action route that extends north from 275th Avenue to the Lone Mountain Road alignment, east to the 235th Avenue alignment, north to the Joy Ranch Road alignment, east to SR 74, east on SR 74 to about 99th Avenue, and southeast to the Morgan Substation. The only segment of the route that would follow the Proposed Action route and remain within the ACC-certificated route would be the segment in the CAP corridor between the Sun Valley Substation and 267th Avenue on the west end of the route. See **Figure 2.7-1**.

2.7.4.3 Route Overview and Screening

The average size of the canal near Lake Havasu City is 80 feet across the top, 24 feet across the bottom, and the water is 16.5 feet deep. The federal lands that contain the CAP, which are primarily administered by the USBR, vary in width. At the narrowest point between the two substations, the federal lands encompassing the CAP are approximately 230 feet wide (**Figure 2.7-2**). Near the eastern end of the portion of the CAP that falls within the Project Area, the canal is undergrounded through a tunnel on mountainous federal lands for approximately 3,752 feet. Private lands adjoin the federal lands that contain the CAP. In some areas, homes are built in close proximity to the CAP property boundary.

The proposed 500/230kV transmission line requires a 200-foot wide right-of-way, 100 feet either side of the centerline of the transmission line. In addition, the line would be required to be separated from the canal by a distance equal to the pole height, which would be a maximum of 195 feet. The capability of the federal lands containing the CAP to also contain the transmission line and its associated right-of-way would depend on the width of the CAP lands and the relative location of the canal within those lands. A minimum of 380 feet in width would be required to accommodate the CAP, the required separation, and the transmission line with its associated right-of-way. If the canal were located in the center of the CAP lands in areas where the width is 700 feet or wider, the federal lands could contain the CAP canal, the required separation, and the transmission line with its associated right-of-way.

In the area of the LAFB Auxiliary Field #1, northeast of the Sun Valley Substation, the CAP is located immediately adjacent to the northern end of the runway. The Auxiliary Field is

used for training operations where aircraft approach the Auxiliary Field from the northwest; dropping to within 150 to 300 feet above the ground; however they do not currently land at the Field.

Accident Protection Zones (APZs) have been identified by LAFB where history has shown the majority of flight accidents occur. The APZs correlate to the flight paths aircraft use to approach and depart from the Field (BLM 2011a). The CAP passes to the northwest of the Auxiliary Field, within an area designated as the Clear Zone for land planning purposes. The Air Force Base (AFB) does not allow above ground transmission lines within the Clear Zone and APZ I (BLM 2011a) for safety reasons. Therefore, the only way the transmission line along the CAP Complete route could traverse the LAFB Auxiliary Field #1 would be underground. Undergrounding the transmission line through LAFB would require close coordination with LAFB to avoid hazards and conflicts with Auxiliary Field #1 operations.

A ROW would be required on CAP lands administered by the USBR. The lands adjoining either side of the CAP lands are a mixture of State Trust and private lands. The CAP route passes through several residential areas at various stages of development ranging from conceptual to currently developed, including the Vistancia (final plat) and Lake Pleasant Heights (preliminary platting stage) developments, and the northern portion of Asante North, a large conceptual residential subdivision, both of which are zoned for development.

The route would be in close proximity to over 20 existing residences, some of which would be within 100 feet of the centerline of the transmission line route. The route is also near three smaller conceptual subdivisions (Vista Montañas, Tierra Rico, and Sierra Norte). The segments of the CAP Complete route that parallel the north side of the CAP canal would be adjacent to existing low-density rural residential properties and residential developments adjacent to the canal. There would need to be acquisition of at least four residences north of the CAP. Acquisition of lands, rights-of-way, or easements outside the CAP to achieve separation from the canal and/or allow for the necessary right-of-way for the transmission line would also increase the cost of the line. Acquisition of additional lands, rights-of-way, or easements would change the local land use.

The CAP Complete route would provide a 500kV transmission line between the Sun Valley and Morgan Substations. However, this route would not supply 230kV service to the northwest valley locations.

The federal lands containing the CAP do not describe a straight path; numerous turning structures would be required to follow this irregular route, which would increase the cost of constructing the transmission line. In the area where the CAP canal is undergrounded through a tunnel, the terrain is mountainous and may require special construction techniques (such as extensive use of helicopters to deliver supplies, equipment, and personnel, and use of the helicopter for erection and stringing of lines), which would be costly. Right-of-way acquisition costs for the CAP Complete route are estimated to be $41 million. Construction costs are estimated to be $140 million, for a total Project cost of $181 million.

The screening process found that this potential route does not meet the purpose and need for the Project as it would not access the northwest valley location with a 230kV line nor would it meet APS' objectives of co-locating the two lines for the Project. The overhead portion of this route is not considered to be technically feasible because LAFB does not allow overhead

transmission lines for safety reasons within the Clear Zone and APZs that would be crossed by the CAP Complete route.

Undergrounding the segment crossing LAFB, may be technically feasible under close coordination with the Base. The overhead portion of the CAP Complete route makes this route economically impractical, because it would require acquisition of additional lands, ROWs, or easements to supplement federal lands containing the CAP.

There are homes built in close proximity to the CAP that would need to be acquired. Additionally, numerous angle structures would be required. All of these characteristics would increase the overall cost estimate for overhead lines along the CAP Complete route approximately 43 percent more than that of the Proposed Action.

Since the overhead portion of the CAP Complete route would place high voltage transmission lines in close proximity to numerous existing residences, unlike the other alternatives already under evaluation that are located in more undeveloped settings, it is not considered environmentally reasonable. For all of the above reasons, the CAP Complete route was not carried forward for detailed analysis.

2.7.5 Luke Air Force Base Auxiliary Field #1 Bypass Route

2.7.5.1 Route Description

This route would bypass the LAFB Auxiliary Field #1 (**Figure 2.7-3**). The segment of the route on the west end would remain within the ACC-certificated route and would follow the Proposed Action route for about 15 miles from the Sun Valley Substation north to the Lone Mountain Road alignment, then east on the Lone Mountain Road alignment to the 235th Avenue alignment.

From the 235th Avenue alignment, there are three alignment options that are not within the ACC-certificated route.

LAFB Bypass Option A – (along CAP) - From 171st Avenue, the route would go east and then northeast along the CAP to the Morgan Substation.

LAFB Bypass Option B – (along Carefree Highway) - From the CAP, the route would run north on 171st Avenue to Carefree Highway, and then east and northeast to the Morgan Substation.

LAFB Bypass Option C – (along Cloud Road) - From the CAP, the route would run north on 171st Avenue to Cloud Road, and then east to the Morgan Substation.

2.7.5.2 Route Overview and Screening

Route Segments Common to All Options

The segment of the LAFB Auxiliary Field #1 route between 235th Avenue and US 60 is private land characterized by residences interspersed with vacant/undeveloped areas; approximately 56 residences are within 500 feet of the route. The route then nears/crosses US 60, a 69kV transmission line, and a railroad main line. Future land use includes low-density residential development in the Rancho Maria development north of the route, which has

preliminary plat approval. South of the route is the planned Walden Ranch, which currently has no plat approval. Mixed residential/commercial uses are proposed along US 60.The portion of this route between 235th Avenue and along US 60 between Lone Mountain Road and the CAP would occur within the Wickenburg Scenic Corridor (which is a designation defined by Maricopa County). It would also be close to existing communities along US 60 and, in particular, a number of small residential developments in the preliminary platting stage, including Rancho Caballeros Estates, Walden Ranch, Rancho Maria, and Grand Oasis. Broadstone Ranch, a large residential development in its conceptual phase, is partially crossed by the route just south of 235th Avenue. Acquisition of at least four residences would be required along Lone Mountain Road between 235th Avenue and US 60.

For a complete description of the CAP route, see **Section 2.7.4**. The portion of the route along the CAP between US 60 and 171st Avenue passes through the northern portion of a large conceptual residential subdivision called Asante North and near three smaller conceptual subdivisions called Vistas Montañas, Tierra Rico, and Sierra Norte. Existing low-density rural residential properties are also present south of the CAP, but are not part of a designated residential subdivision.

LAFB Bypass Option A (along CAP)

For a complete description of the CAP route, see **Section 2.7.4**. At several points along the CAP canal between 171st Avenue and the Navajo 500kV transmission line, existing residential developments are adjacent to the canal. There would need to be acquisition of at least four homes east of 171st Avenue along the north side of the CAP as the line avoids CAP retention/recharge ponds. The route passes through Vistancia (final plat) and Lake Pleasant Heights (preliminary platting stage), and would be in close proximity to over 20 existing residences. Some residences would be within 100 feet of the centerline of the transmission line route. In the area where the CAP canal is undergrounded through a tunnel, the terrain is mountainous and may require special construction techniques (such as extensive use of helicopters to deliver supplies, equipment, and personnel, and use of the helicopter for erection and stringing of lines.

Between the CAP and the Carefree Highway this route would be adjacent to the existing 500kV lines in the Navajo corridor. The area surrounding this segment is generally undeveloped. However, it is bordered on both sides by State Trust lands. Right-of-way acquisition costs for LAFB Bypass Option A are estimated to be $58 million. Construction costs are estimated to be $100 million for a total Project cost estimated at $158 million.

The final segment of the route between Carefree Highway and the Morgan Substation is characterized by vacant/undeveloped private land in close proximity to existing 500kV lines in the Navajo corridor and the existing Raceway Substation. This segment is also near the future site of the Peoria Airport and would traverse USBR land, which would require an additional federal right-of-way. Land use plans in this area call for low and medium-density residential, parks/recreation, and mixed uses.

LAFB Bypass Option B (along Carefree Highway)

Along 171st Avenue between the CAP and the Carefree Highway, this route would be adjacent to existing low-density residential development south of Dove Valley Road and the

western boundary of a conceptual residential subdivision named Marisol Ranch. This segment is bordered by State Trust lands.

The segment along the Carefree Highway between 171st Avenue and 165th Avenue is characterized by vacant/undeveloped land. Land use plans call for low-density residential uses, parks/preservation, and commercial development. The segment is bordered by State Trust lands and also borders the planned Saddleback Heights development, which does not have plat approval, but is planned for a master-planned community (6,052 acres). Saddleback Heights has a Specific Area Plan, Planned Community Development Zoning, and an executed development agreement between the developer and the City of Peoria.

Land along the Carefree Highway segment between 165th Avenue and the 500kV Navajo corridor is mostly vacant and undeveloped private land, interspersed with sections of State Trust lands. The route would bisect the planned residential developments of Saddleback Heights (no plat approval), Lake Pleasant Heights (preliminary platting stage), and a portion of Vistancia (final platting). Planned land uses include low-density residential use and parks/preservation to the north, low-density residential and parks/preservation within Vistancia, and parks/preservation. The general plan calls for a small area of commercial uses to the south. Within Lake Pleasant Heights, residential, golf course, and parks/preservation uses are planned. At the east end of the segment, low- and medium-density residential, parks/ preservation, mixed use, and parks (including the Maricopa County regional trail) are planned. This alignment does not comply with the City of Peoria's comprehensive land use plans (City of Peoria 2010). Right-of-way acquisition costs for LAFB Bypass Option B are estimated to be $50 million. Construction costs are estimated to be $94 million for a total Project cost estimated at $144 million.

The final segment of the route between Carefree Highway and the Morgan Substation is described under Option A – CAP above.

LAFB Bypass Option C (along Cloud Road)

Along 171st Avenue between the CAP and the Carefree Highway, this route would be adjacent to existing low-density residential development south of Dove Valley Road and the western boundary of a conceptual residential subdivision named Marisol Ranch. This segment is bordered by State Trust lands.

Along 171st Avenue between the Carefree Highway and Cloud Road, this segment is bordered on both sides by State Trust lands.

Between 171st Avenue and the Morgan Substation, lands adjacent to Cloud Road are mostly private lands that are generally vacant and undeveloped, interspersed with sections of State Trust Lands. Local land use plans call for low to medium density residential uses and natural area with the Saddleback Heights and Lake Pleasant Heights developments (not approved). Near the substation, the route crosses an existing 230kV line and the New Waddell Canal.

Right-of-way acquisition costs for LAFB Bypass Option C are estimated to be $50 million. Construction costs are estimated to be $96 million for a total Project cost estimated at $146 million.

Screening

The screening process found that LAFB Auxiliary Field #1 Bypass route does not meet the purpose and need of the Project as it would not access the northwest valley location with a 230kV line nor would it meet APS' objectives of co-locating the two lines for the Project. It is technically practical and feasible under past and current practice and technology, and much of the lands specific to this route are undeveloped and/or in the preliminary plat stage. As far as economic feasibility, the overhead transmission line is economically practical and feasible under past and current practice and technology, but ROW acquisition costs for this route would be more than double those for the Proposed Action, while construction costs would be somewhat less. Economic practicality varies per Option. Under LAFB Bypass Option A, the overall cost estimate would be approximately 24 percent more than that of the Proposed Action. Under LAFB Bypass Option B, costs would be 14 percent more than the Proposed Action. Under LAFB Bypass Option C, costs would be 13 percent more than the Proposed Action. The LAFB Auxiliary Field #1 Bypass route is not considered to be environmentally reasonable, since the route between 235th Avenue and along US 60 would be near existing communities and at least 4 residences would need to be acquired. Also, under LAFB Bypass Option A, the Project would place a high voltage transmission line in close proximity to existing residences along the CAP, unlike the other alternatives already under evaluation that are located in more undeveloped settings. For all of the above reasons, the LAFB Auxiliary Field #1 Bypass route was not carried forward for detailed analysis.

2.7.6 Vistancia Bypass Route

2.7.6.1 Route Description

The Vistancia Bypass route would bypass the Vistancia master-planned community (**Figure 2.7-4**). A segment on the west end of the transmission line route would remain within the Proposed Action route for about four miles between the Sun Valley Substation and the 267th Avenue alignment.

The route would then continue outside of the Proposed Action route along the CAP canal corridor to the 171st Avenue alignment. From the 171st Avenue alignment, there are three options as follows:

Vistancia Bypass Option A – (along Cloud Road) - from the CAP, north on 171st Avenue to Cloud Road, then east to the Morgan Substation.

Vistancia Bypass Option B – (along Carefree Highway) - from the CAP, north on 171st Avenue to Carefree Highway, then east and northeast to the Morgan Substation.

Vistancia Bypass Option C – (along ACC-certificated route) - from the CAP, north on 171st Avenue to the ACC-certificated route, then east and southeast to the Morgan Substation.

2.7.6.2 Route Overview and Screening

Route Segments Common to All Options

At several points along the portion of this route between 275th Avenue and US 60, existing residential developments are adjacent to the CAP. Acquisition of residential properties would

likely be required. The route intersects the Clear Zone and APZ of the LAFB Auxiliary Field #1.

The route common to all options would include a segment of the CAP between US 60 and 171st Avenue. For a complete description of the CAP Complete route, see **Section 2.7.4**. A description of the CAP between US 60 and 171st Avenue is in LAFB Auxiliary Field #1 Bypass route, Route Segments Common to All Options.

Vistancia Bypass Option A (along Cloud Road)

See LAFB Auxiliary Field #1 Bypass route, Option C for a description of the segment along 171st Avenue between the CAP and the Carefree Highway, and the segment along 171st Avenue between the Carefree Highway and Cloud Road.

See the Cloud Road route for a description of the segment between 171st Avenue and the Morgan Substation.

Right-of-way acquisition costs for Vistancia Bypass Option A are estimated to be $31 million. Construction costs are estimated to be $145 million for a total Project cost estimated at $176 million.

Vistancia Bypass Option B (along Carefree Highway)

See LAFB Auxiliary Field #1 Bypass route, Option B for a description of this option.

Right-of-way acquisition costs for the Vistancia Bypass Option B are estimated to be $26 million. Construction costs are estimated to be $145 million for a total Project cost estimated at $171 million.

Vistancia Bypass Option C (along ACC-Certificated Route)

See LAFB Auxiliary Field #1 Bypass route, Option C for a description of the segment along 171st Avenue between the CAP and the Carefree Highway, and the segment along 171st Avenue between the Carefree Highway and Cloud Road.

Between Cloud Road and the ACC-certificated route along 171st Avenue, adjacent State Trust Lands are vacant/undeveloped. Land use plans for private lands south of SR 74 call for low-density residential uses. The proposed Saddleback Heights development (not approved) will include mixed uses, parks, and open space.

This route would require an RMPA for plan conformance for both establishing a utility corridor and VRM Class designation changes.

Right-of-way acquisition costs for the Vistancia Bypass Option C are estimated to be $24 million. Construction costs are estimated to be $146 million for a total Project cost estimated at $170 million.

Screening

The screening process found that the Vistancia Bypass route does not meet the purpose and need of the Project as it would not access the northwest valley location with a 230kV line nor would it meet APS' objectives of co-locating the two lines for the Project. The overhead line is not technically feasible because the route would require construction of the power line within the LAFB APZ 1 and Clear Zone, contrary to airfield operational restrictions. The

underground line may be technically feasible for the segment crossing LAFB, under close coordination with the Base. As far as economic feasibility, the overhead transmission line is economically practical and feasible under past and current practice and technology, however both ROW acquisition and construction costs under this route would be greater than the Proposed Action; construction costs would be nearly 40 percent more. It is not considered to be economically practical; the overall cost estimate varies amongst the Options, but ranges from 34 percent to 39 percent more than that of the Proposed Action. Undergrounding of the line further increases the cost of the Vistancia Bypass route.

The screening process found the Vistancia Bypass route to be environmentally reasonable although existing information on biological or cultural resources is limited for the segment along 171st Avenue between the CAP and Carefree Highway. Under Options A and B, between Carefree Highway and Cloud Road the route would be similar to environmental conditions along the Proposed Action and Alternative 2 routes. The Carefree Highway portion of this route would be the same as Alternative 3. Under Option C, along 171st Avenue, between Cloud Road and SR 74, the route would be similar to environmental conditions along the Proposed Action and Alternative 2 routes. The ACC-certificated route portion of this route would be the same as the Proposed Action. For the above reasons other than environmental, the Vistancia Bypass route was not carried forward for detailed analysis.

2.7.7 Westwing/Navajo Corridor Route

2.7.7.1 Background Information

The Western Electricity Coordinating Council (WECC) defines a "Common Corridor" as a contiguous right-of-way or two parallel right-of-ways with structure centerline separation less than the longest span length of the two transmission circuits at the point of separation or 500 feet, whichever is greater, between the transmission circuits (WECC 2008). The Westwing/Navajo corridor meets the WECC's definition of a common corridor.

2.7.7.2 Route Description

The Westwing/Navajo Corridor route is an approximately 28-mile long segment that extends east from the Proposed Action route near the 267th Avenue alignment, continues east parallel to the Westwing transmission line corridor, then turns northeast to follow the Navajo South transmission line corridor to the Morgan Substation. This route would replace an approximately 34-mile long segment of the Proposed Action route that extends north from near the 275th Avenue alignment to the Lone Mountain Road alignment, west on the Lone Mountain Road alignment to the 235th Avenue alignment, north on the 235th Avenue alignment to the Joy Ranch Road alignment, east to SR 74, east on SR 74 to about 99th Avenue, and southeast to the Morgan Substation. The only segment of the route that would follow the Proposed Action route and remain within the ACC-certificated route would be the segment in the CAP route between the Sun Valley Substation and the 267th Avenue alignment on the west end of the route. See **Figure 2.7-5**.

Figures 2.7-6 through **2.7-9** depict crossings and other constraints.

2.7.7.3 Route Overview and Screening

As it relates to the 500kV circuit; having the proposed 500kV line in the same common corridor as the two Palo Verde to Westwing (PV-WW) 500kV lines and the Mead-Westwing 500kV line would not be consistent with Good Utility Practice. The term "Good Utility Practice" refers to the need for utilities to fulfill their mission to deliver safe and reliable electric power to their customers in compliance with reliability standards developed by NERC (NERC 2011), which are enforced by NERC and the WECC.

The proposed 500kV transmission line and the PV-WW lines provide a similar purpose. Both projects start at the PV Hub and terminate in the Navajo South system. These lines are useful as a back-up for the other; i.e. having the 500kV transmission line in-service would provide a back-up if the PV-WW lines are lost, and the PV-WW lines would provide a back-up if the 500kV transmission line is lost. Having the lines in the same common corridor would subject them to the same hazards and risks with the potential to lose all three of the 500kV lines.

In general, a utility will try to limit the number of line crossings as part of Good Utility Practice and sound electrical design. Crossings add complexity and difficulty in terms of reliability, design, construction, and costs.

The opportunity for a multiple line outage is greatly increased in the area of line crossings due to the potential for the circuit crossing over another to fall onto the circuit underneath, causing both circuits to fail, thus adversely affecting reliability. While there is no guidance as to the maximum numbers of crossings that would be allowed, utilities strive to have as few line crossings and particularly multiple line crossings as possible.

If the line were to be routed within the PV-WW common corridor there would be at a minimum two separate line crossings and potentially as many as four line crossings. The crossings would involve five 230kV lines, one 345kV line, and three 500kV lines. Crossings would potentially occur:

- Where the 500/230kV transmission line would exit the Sun Valley Substation and travel directly to the east, and remaining south of the PV-WW lines the line would have to cross both PV-WW lines.
- Approaching the Westwing lines, the line would be routed north, either to the east or to the west of the Westwing lines. If it is on the east side of the Westwing lines the line would be required to cross one 345kV line and five 230kV lines. If the line is to the west of the Westwing lines it would have to cross three 500kV lines.

The transmission line would need to cross the two PV-WW lines again, plus the Mead-Westwing line. With the transmission line in the PV-WW common corridor it would be creating a less reliable system due to the proximity of the lines and the multiple line crossings, the potential for the lines to interact and affect/damage each other, and the potential for all lines to be damaged by the same event (such as a wildfire). The loss of multiple lines would be an extreme contingency that would create challenges to serving the load in the Phoenix Valley and possibly cause some load to be lost. In sum, because of the nature of the facilities involved, it would not be Good Utility Practice to put the transmission facilities in this common corridor.

A further consideration is the rated capacity of the Project if it were to utilize the PV-WW common corridor. Per the WECC Bylaws (WECC 2009), WECC coordinates regional planning within the Western Interconnection, which is the geographic area containing the synchronously operated electric grid in the western part of North America, which includes parts of Montana, Nebraska, New Mexico, South Dakota, Texas, Wyoming, and Mexico and all of Arizona, California, Colorado, Idaho, Nevada, Oregon, Utah, Washington and the Canadian provinces of British Columbia and Alberta (WECC 2009). WECC planning standards include consideration for impacts that could occur to other utility's transmission lines. The planning standards must be met to be authorized to build within the WECC footprint. If a new transmission line is proposed within a common corridor and it is determined that the new transmission line could adversely impact the existing lines in the common corridor, the proposed line could be "de-rated", which means it would be required to be a lower voltage (K. Bolton, WECC, personal communication 2011). It is anticipated that the WECC would significantly de-rate the capacity of the transmission line due to its proximity to the other existing lines within that common corridor.

Placing the transmission line outside the common corridor would alleviate concerns about de-rating of the line as described above. Following WECC's definition of a common corridor, the longest span of the transmission line would be approximately 1,400 feet, which is the distance the transmission line would have to be separated from the existing transmission lines in order to be considered to be outside the common corridor. Routing the transmission line outside the PV-WW common corridor to the north side would potentially result in as many as four line crossings. Crossings would potentially occur at the following locations:

- Initially crossing the Mead-WW line to get on the north side of the common corridor;
- Crossing back to the south in order to get around the landfill, bringing it across the three 500kV lines and two 230kV lines; and
- Once the line is on the south side of the common corridor, the situation would be similar to that described above.

Multiple line crossings would not conform to sound electrical design. While the transmission line would be outside the common corridor, it would still be susceptible to an event (such as a wildfire) that could cause damage to all the lines in that vicinity. Taken together, this situation would not constitute Good Utility Practice.

Land or ROW acquisition is another concern for this route. Several "choke" points exist along the Westwing/Navajo route. The first such point is along the Westwing portion of the route between the Sun Valley Substation and the Westwing Substation in the vicinity of the Northwest Regional Landfill. The current ROW is fully utilized in the area between the existing transmission lines and the landfill. There is physically no room to fit an additional transmission line in this constrained area. Building the line through the landfill is not an option; therefore a route around the landfill would be necessary. Another consideration in this area is the proximity to the LAFB Auxiliary Field #1 and the associated APZs. The AFB does not allow above ground transmission lines within the APZ (see **Section 2.7.4** for a complete discussion of the APZ; BLM 2011a). The transmission line would need to be routed through a narrow passage between Deer Valley Road and the southernmost corner of

the APZ. Technical feasibility of placing the line in this location would depend on the actual width of the passage and the amount of that passage currently encumbered by any right-of-way for Deer Valley Drive.

Some areas where the Westwing/Navajo route would cross U.S. 60/Grand Avenue are of concern as there is a possibility of needing to acquire residential properties. Regarding the Navajo segment between the Westwing Substation and the Morgan Substation, there are existing residential properties next to the existing transmission lines. This may again represent the need for acquisition of approximately 20 existing homes and final platted parcels. The Westwing/Navajo route would provide a 500kV transmission line between the Sun Valley and Morgan Substations. However, this route would not supply 230kV service to the northwest valley locations because this route would be too far south and a separate 230kV line would need to be constructed to reach these locations in the northwest.

Construction of the transmission line within the common corridor along the Westwing/Navajo route would consolidate similar land uses and disturbances in one linear area. The area currently contains varying numbers of 230, 345, and 500kV transmission lines; the addition of the new line would repeat the form and line of the existing facilities in the landscape. Within the common corridor (as defined by the WECC) the lands have likely been disturbed to a certain degree by the existing development, and additional development would occur in a previously disturbed area.

Construction of the transmission line along the Westwing/Navajo route but outside of the common corridor would also repeat the form and line of the existing facilities, just slightly further away. Outside the common corridor it is less likely that the lands have been previously disturbed; however, the proximity of this area to the existing common corridor reduces its quality for biological resources as there is existing and past adjacent disturbance, plus routine maintenance activities in the existing corridor likely make the adjacent areas less desirable for biological resources.

Right-of-way acquisition costs for the Westwing/Navajo Corridor route are estimated to be $122 million, primarily due to expected extensive severance payments. Construction costs are estimated to be $78 million for a total Project cost are estimated at $200 million.

The screening process found that the Westwing/Navajo Corridor route does not meet the purpose and need of the Project as it would not access the northwest valley location with a 230kV line nor would it meet APS' objectives of co-locating two lines for the Project. Additionally, it is anticipated that the WECC would significantly de-rate the capacity of the transmission line due to its proximity to the other existing lines within that common corridor. Also, if constructed inside the existing WECC corridor, de-rating would mean the Project no longer provides the transmission capacity required by APS. The Westwing/Navajo Corridor route is not technically or practically feasible inside or outside the corridor; inside the corridor WECC would significantly de-rate the capacity of the line due to its proximity to the other existing lines within that common corridor, thus the Project would no longer provide 500kV transmission capability. Outside the corridor, multiple crossings would not be consistent with Good Utility Practice, making it feasible but not practical.

This route is not economically practical and feasible even though construction costs under the Westwing/Navajo Corridor route are estimated to be approximately 25 percent less than

the Proposed Action. ROW acquisition costs are estimated to be nearly five times more due to extensive severance payments, so the overall cost estimate for this route would be approximately 64 percent more than that of the Proposed Action. Also, the screening process did not find the Westwing/Navajo Corridor route, to be environmentally reasonable due to the potential need to acquire existing residences.

For the above reasons other than environmental, the Westwing/Navajo Corridor route was not carried forward for detailed analysis.

2.7.8 Westwing/Grand Avenue-Navajo 500/230kV Separation

2.7.8.1 Route Description

The Westwing/Grand Avenue-Navajo 500/230kV Separation route (**Figure 2.7-10**) would locate the 500/230kV line together along the Westwing transmission line common corridor from the Proposed Action route just west of the 267th Avenue alignment to US 60, for a distance of about 13 miles. At US 60, the 230kV line and the 500kV line would separate.

The 500kV line would continue along the Westwing transmission line corridor, and then turn northeast along the Navajo South transmission line corridor to the Morgan Substation for a distance of about 13 miles.

At Grand Avenue, the 230kV line would turn northwest to parallel US 60/Grand Avenue and an existing 69kV line to the CAP canal corridor. The 230kV line would then parallel the CAP canal to the 171st Avenue alignment.

From the 171st Avenue alignment there are three options.

230kV Separation Option A - Continue north on the 171st Avenue alignment to the Carefree Highway alignment, follow the Carefree Highway alignment east to the Navajo South transmission line corridor, then turn northeast and follow the transmission line corridor to the Morgan Substation. The total length of this optional segment would be about 13 miles.

230kV Separation Option B - Continue north on the 171st Avenue alignment to Cloud Road, then follow the Cloud Road alignment east to the Morgan Substation. The total length of this optional segment would be about 14 miles.

230kV Separation Option C - Continue north on the 171st Avenue alignment to the Proposed Action route at SR 74. The total length of this optional segment would be about 16 miles. This route option would require an RMPA for plan conformance for both establishing a utility corridor and VRM Class designation changes.

2.7.8.2 Route Overview and Screening

Descriptions for the Westwing/Navajo, CAP Complete, Carefree Highway, Cloud Road, and ACC-certificated route are described in the previous sections, with exception of the US 60 south segment. This segment (see **Figure 2.7-10**, Option C) follows US 60 from the point where it intersects the Westwing/Navajo common corridor to the point it intersects the CAP. This segment traverses primarily private lands, except for a small portion of State Trust lands near the intersection with the CAP.

The 230kV transmission line route along US 60 would be in proximity to several residential developments north and south of US 60, which are in various stages of planning.

This route would be on the northern boundary of the Maricopa County established McMicken Dam Scenic Corridor between the point where US 60 intersects the Westwing corridor, approximately one mile to the intersection of US 60 and Deer Valley Road. The scenic corridor guidelines state that new utility lines in this area should be underground (Maricopa County no date [n.d. a]). A description of undergrounding is provided below under that heading. US 60 in this area is also part of the Wickenburg Scenic Corridor, which currently has no restrictions on transmission lines within the corridor.

The 230kV transmission line would parallel an existing 69kV transmission line. Visually, the transmission line would repeat the form and line of the existing line, and would likely involve a different type of structures from the existing line in order to accommodate the higher voltage line. Separation of the 500/230kV transmission line would require construction along two different routes. The acquisition of at least two commercial and two residential properties would be required along US 60.

Right-of-way acquisition and construction costs for the Westwing/Grand Avenue-Navajo 500/230kV Separation route options would include land acquisition costs and potential severance payments for separate corridors, and costs for additional structures, equipment and construction for separated lines. Options A and B right-of-way costs are estimated to be $129 million and construction costs are estimated to be $156 million.

Option C right-of-way costs are estimated to be $128 million and construction costs are estimated to be $157 million. Total Project costs are estimated at $285 million for all options.

The screening process found that the Westwing/Grand Avenue-Navajo 500/230kV Separation route does not meet the purpose and need of the Project as the 230kV transmission line would be separated from the 500kV transmission line; APS' objectives requires co-location of the lines.

Additionally, no portions other than the US 60 portion would be technically practical and feasible; WECC would significantly de-rate the capacity of the Westwing portion, inside the corridor due to its proximity to the other existing lines within that common corridor, thus the Project would no longer provide 500kV transmission capability. The Westwing portion outside the corridor would require multiple crossings for the 500kV line as described for the Westwing/Navajo Corridor Route, above. Multiple crossings would not be consistent with Good Utility Practice, making this route feasible but not practical.

There would be no known technical issues with the US 60 portion of this route for the 230kV transmission line. This route is not economically practical and feasible since separation of the 230kV line from the 500kV line would involve project costs for separate infrastructure and rights-of-way, resulting in a 66 percent increase in construction costs over the Proposed Action. Acquisition of ROWs in separate corridors and severance payments would increase the cost of ROW acquisition 133 percent above the Proposed Action. The overall cost estimate for the Westwing/Grand Avenue-Navajo 500/230kV Separation route would be 124 percent more than the Proposed Action.

Lastly, the Westwing/Grand Avenue-Navajo 500/230kV Separation route is not environmentally reasonable because the acquisition of approximately 20 existing homes and final platted parcels would be required in the vicinity of US 60. For the above reasons, other than the technical practicality of the US 60 portion of the route, this route was not carried forward for detailed analysis.

2.7.9 CAP Canal Underwater 500/230kV Route

2.7.9.1 Route Description

The CAP Canal Underwater route calls for installation of the 500/230kV circuits by means of a power cable in or under the bed of the CAP canal. Installation could involve specific segments of the canal, or the entire length of the canal from the Sun Valley Substation to the Morgan Substation.

2.7.9.2 Route Overview and Screening

Submarine cable for electric transmission lines is a proven technology that is used in various parts of the U.S. where ocean beds, lakes or rivers are crossed. However, APS is not aware of any submerged transmission facilities that have been placed in canals such as the CAP anywhere in the world. The cost per mile for construction of an underwater transmission line is substantially more than a traditional overhead line.

This route would require the approval of the CAWCD. The CAWCD has indicated that placement of power cables in the CAP canal would have a negative impact on the District's canal maintenance program. Because the CAWCD has rejected the route, no cost estimates were provided for this alternative by APS.

The screening process found that this route does not meet the purpose and need of the Project as it would not access the northwest valley location with a 230kV line nor would it meet APS' objectives of co-locating the two lines for the Project. The CAP Underwater route is not technically practical or feasible as underwater construction in a canal is not a proven technique. Canal maintenance would be impacted as well. The economic practicality and feasibility of this route is not known, but the cost per mile for construction of an underwater transmission line is substantially more than a traditional overhead line. There would also be requirements for ongoing access to and maintenance of the canal. Since underwater canal construction is an unproven approach, it may or may not be environmentally reasonable; it may have impacts as yet unidentified.

For the above reasons and the rejection of this alternative by the CAWCD, the CAP underwater route was not carried forward for detailed analysis.

2.7.10 Underground a Portion or All of the Project

2.7.10.1 Technology Background Information

The source for the information provided in this section, including types of underground technology, past and present uses, and cost is the "Technology and Environmental Assessment Guide on Underground HV Power Transmission (Year 2000 update), which is

referenced in the Antelope-Pardee 500-kV Transmission Project EIR/EIS, Appendix 1, Alternatives Screening Report (USFS 2006).

There are four primary underground transmission technologies:

High Pressure Fluid-Filled (HPFF) Cable, which is also called a pipe-type or high pressure oil-filled system, has historically been the most commonly used underground transmission cable in the United States, accounting for approximately 80 percent of the existing underground transmission lines in this country. Since its development over 50 years ago, this system has proven to be very reliable.

In this design, the three high-voltage, individually insulated cables are contained in a coated and cathodically protected steel pipe (**Figure 2.7-11**). In addition to providing mechanical protection and preventing the ingress of moisture, the pipe is a pressure vessel for maintaining 200 pounds per square inch gage (psig) nominal operating pressure on dielectric fluid that surrounds the cables in the pipe.

The fluids may be petroleum based or synthetic, and function to ensure that there are no electrical discharges in the oil impregnated paper insulation surrounding the individual cables.

A pressurizing plant is required to maintain dielectric fluid pressure and accommodate pipe volume changes under all load conditions. A source of power must be available for each of the required pressurization plants separate from the primary cable system. This cable type requires the most intensive construction process due to the combination of its shorter splicing (connecting cable segments) interval with the associated underground splicing vaults, and the need for above ground pressurization plants. Trenches containing the pipe are typically backfilled with a special thermal backfill to aid in dissipating heat from the cables.

Underground splicing vaults consist of underground rooms approximately 10 feet wide by 10 feet deep by 35 feet long and located every 800 to 1,600 feet along the line (**Figure 2.7-12**). Ground disturbance area along the length of the line would be approximately 10 to 15 feet wide. This area remains an access way for monitoring of facility operations. A transition station, approximately 80 feet high and with a footprint of approximately two to three acres, would be required at each end of the underground segment to transfer the 500/230-kV transmission line from overhead to underground and vice versa.

For the HPFF cable option, additional space would be required at the transition station for the fluid pressurization equipment. In addition, a distribution overhead power line(s) would need to be constructed to provide power to the pressurization station(s).

Self-Contained Fluid-Filled (SCFF) cable, which is sometimes simply called self-contained cable, provides good long-term reliability and is higher rated than pipe-type cables, if directly buried. This type of underground line includes three independent cables. The cable for each of the three phases consists of a hollow conductor, which is filled with dielectric fluid in an aluminum sheath covered by a plastic jacket. The metallic sheath serves both as a hermetic moisture seal and as a pressure containment vessel. SCFF cable systems use low viscosity synthetic cable dielectric fluids that operate at a pressure of 75 psig. While dielectric fluid is present, it is in smaller quantities than HPFF cables.

This cable type can be placed in a duct bank or can be placed using direct burial. Elevation changes along the cable route can significantly affect the fluid pressure, therefore fluid reservoirs and stop joints are required along the length of the underground cable circuit (typically at each splice location) to segregate the cable into several hydraulic zones.

Cable splicing (joint) pits of dimensions similar to a cable vault are excavated along the trench alignment at splicing locations. The joint pits have a concrete base and a temporary all-weather cover. Once the splice is complete the joints are sealed in waterproof casing and the pit is backfilled. A concrete cap is placed a few feet below grade for the entire trench section as mechanical protection from dig-ins. Stop joints sectionalize the cable and limit fluid pressure as well as the amount of fluid that would be lost in the event of a cable breach. Fluid reservoirs that allow for expansion and contraction of the fluid are located every 800 to 1,600 feet along the alignment, frequently at stop joints.

Similar to the HPFF cables, the SCFF cable would be backfilled with a special thermal backfill, and would require a 10- to 15-foot wide ground disturbance that would remain for access along the cable and to the fluid reservoirs.

Similar to SCFF cables, Solid Dielectric Transmission Cable consists of three individual cables, each of which include cable insulation, usually made of cross-linked polyethylene, (XLPE), in a metallic shield or sheath, and plastic jacket (**Figure 2.7-13**). As described above, the metallic shield prevents exposure of the cable insulation to water. Although ethylene propylene rubber (EPR) insulation has been used for some transmission class solid dielectric cables, XLPE insulation has been used exclusively for solid dielectric cables with system voltages above 138kV. Unlike HPFF or SCFF, no dielectric fluid or pressurizing equipment is required, XLPE circuit repair is quicker and often simpler than for HPFF systems; and cable system design, operation, and maintenance are less complex than systems with pressurized dielectric fluid.

Similar to SCFF described above, this cable type can be placed in a duct bank or can be placed using direct burial. The trench construction for XLPE cables would be similar to SCFF installations, except XLPE cable joints are more complex, requiring the use of splicing vaults, as described for HPFF cables.

Compressed Gas Insulated Transmission Lines (CGTL) have primarily been used in applications such as short dips in overhead lines or relatively short substation connections to overhead lines. In this type of transmission line, epoxy spacer insulators support the high voltage conductors inside the enclosures that are filled with sulphur hexaflouride (SF6) or a mixture of SF6 and nitrogen gases.

CGTL systems have power transfer capabilities that are significantly higher than other types of underground transmission cables, have relatively simple system design, and relatively low magnetic field levels. The CGTL can be installed in concrete-covered trenches, directly buried, or installed in tunnels. The CGTL are typically manufactured in straight and rigid sections ranging in length from 40 to 70 feet with field welds required to connect the sections.

The capacitive characteristics of the underground cable insulating material and the close proximity of the cables to one another results in causing the cable system to introduce high capacitive reactive loads onto the electrical system. These capacitive reactive loads would

have to be offset with inductive compensation at above ground compensation stations located every 7 to 20 miles along the transmission line route. A further consideration is that the electrical system as a whole may or may not be capable of reliably accommodating these large reactive power loads, making the integration of long underground powerlines into the overall power grid questionable or infeasible.

HPFF and SCFF underground transmission systems are considered mature and well developed at lower voltages. HPFF underground transmission cable systems with system voltages ranging from 69kV up to 345kV have been in commercial operation for over 35 years. HPFF cable systems with rated system voltages up to and including 765kV are commercially available and have passed long-term qualification tests.

Application of the SCFF cable type within the United States has largely been limited to the 115/138kV range, with only a few miles of 220kV installed commercially. While this type of cable has been used extensively outside of the United States, it currently makes up less than five percent of the transmission cable in this country. This cable has been manufactured for system voltages from 69kV up to 500kV. The only installation of this cable type at 500kV within the United States is a short section of cable at the Grand Coulee Hydroelectric Plant in Washington, where approximately four miles of cable was used for each of the six generators for a total of 24 miles. The cable runs through galleries in the dam and then a tunnel to reach the switchyard. Long submarine cable circuits are one application where this type of cable has definite advantages over the other types of cables. This is due to the fact that there are overseas submarine cable factories that have the capability of manufacturing this type of cable in lengths exceeding five miles, thus avoiding the necessity of having field- or factory-installed joints. These systems typically use direct current (DC) technology due to the lengths involved. An example is the 138 kilometer (80-mile) 350kV DC submarine link between Denmark and Norway.

XLPE underground transmission system cable has been available for system voltages up to 138kV since the early 1970s; however, there was a lack of widespread acceptance in this country because of reliability problems with the first generation cable and accessories for some of the initial installations. As the newest technology, XLPE systems have begun to have installations with long enough service life to increase utility confidence in their reliability. Recent years have seen substantial improvement in XLPE systems and acceptance and adoption for higher transmission voltages. Currently, the number of 220kV solid dielectric cable installations in the United States is increasing with approximately 50 circuit miles in service.

Utility acceptance in the United States has grown relatively rapidly (last five years) for use at 220kV and 345kV. For example, a California utility proposed a project using over 12 miles of 220kV XLPE underground transmission cable in September 2002 and a New England utility is presently (as of 2006, the date of the source material) constructing a 345kV line which includes 2.1 miles of XLPE underground transmission cable with a second phase of the project proposed with a 5.5-mile XLPE alternative segment. Internationally, a number of XLPE systems up to 420kV have been installed including a 13.75-mile and 6.25-mile direct buried loop in Copenhagen, Denmark, which was completed in 1997. The first long-distance 500kV XLPE lines were installed in Tokyo, Japan, in 2000. This XLPE system is two circuits (with a third planned) and was installed in a cable tunnel and in ducts beneath bridge

decks for 25 miles. As only one 500kV XLPE system has been installed in the world, and was specially installed in a cable tunnel (and ducts), high voltage XLPE technology has scant operating history that can serve as a basis for demonstrating reliability for the APS Project. However, XLPE cable has been successfully installed and operated for long lengths at lower voltages and has been shown to be technically feasible for a 500kV installation since the fundamental technology is the same. Use of XLPE cable would require superior quality control during manufacturing, as a key reliability factor for the cables is the purity of the XLPE insulating material. In addition, during installation of the XLPE cable, special skills and proprietary equipment associated with the cable supplier may be required for cable splicing (joining of two segments in a splicing vault).

CGTL underground transmission system technology has primarily been used in applications where high power transfer is required over short distances, such as short dips in overhead lines or relatively short substation connections (get-aways) to overhead lines. Relatively short lengths (i.e., less than 1,000 feet) of 100 percent SF6 compressed-gas underground transmission lines have been installed in the United States, Japan, and European countries for several decades.

One 275kV CGTL system, installed in a tunnel with other utilities in Nagoya, Japan, is two miles long. The system voltages for these installations have been from 138kV up to 765kV. The first commercial application of the second generation CGTL technology was the construction of a "dip" in an existing 400kV overhead transmission line in Geneva, Switzerland, in 2000. Because it is not proven for more than two miles, CGTL technology would have significant technical feasibility issues for greater distances. Another particularly challenging issue for assembly of CGTL would be creating a dust-controlled environment to avoid particle pollution of the insulating gas. The lack of installation and operation information for buried CGTL transmission over any significant distance is as much a practicality issue as a feasibility issue.

As a result of the considerable construction activities associated with undergrounding transmission lines, the associated costs are substantially greater than the cost of installing overhead transmission lines. Increased cost estimates range from approximately 10 times more expensive (USFS 2006) to 12 to 17 times more expensive (National Grid 2009). Installation of certain types of technology may require special skills and proprietary equipment associated with a cable supplier, which contribute to the increased cost. APS estimates installation of an underground transmission line would be 10 to 30 times that of a similar overhead transmission line.

While undergrounding of lower voltage transmission lines is fairly common in the United States, there are limited instances where 500kV transmission lines have been undergrounded, in the United States and other areas of the world. The referenced 500kV transmission line in Washington is within the galleries of the Grand Coulee Dam, and in Japan the line is within a cable tunnel and ducts – neither are buried. While direct burial of 500kV transmission lines appears to be technologically feasible, no information available indicates it has been put into practice, and indicates that application of the technology is unproven.

Some undergrounding systems may require special skills or proprietary equipment, which would increase the installation, operation, and maintenance costs. Fluid-filled systems

require pressurization plants, which are additional infrastructure to construct, operate, and maintain, which would also increase Project costs.

Maintenance of underground transmission lines is more difficult than overhead lines because when a problem occurs underground it can be very difficult to identify the exact location of the problem. When the problem is located, the segment of cable on which the problem occurred must be removed and replaced. This process involves additional excavation and construction (USFS 2006). APS estimates a fault or failure of a 500kV or 230kV underground cable could be anticipated to take two to six weeks per segment of cable to conduct a repair. A repair to a segment of 500kV overhead transmission line by comparison can take from hours to several days. The economic ramifications are two-fold. Failures in underground transmission lines are fundamentally more difficult and time consuming to isolate and repair, which would be a more costly process. Second, because repairing underground transmission lines is more time consuming than overhead lines, there would be economic costs to consumers of the electricity lost during periods of outages.

While in operation, the land above the underground cables must remain free from secondary surface development, including overhead transmission lines, in order to accommodate operation and maintenance activities (USFS 2006). Additionally, infrastructure, such as vaults and pressurization plants, would have a long-term footprint for the Project.

2.7.10.2 Route Description

There are two general options for undergrounding the Sun Valley to Morgan 500/230kV transmission line; underground the entire line along any of the routes under consideration or underground portions of the transmission line in discrete areas for specific purposes (for example, undergrounding the line through the LAFB Auxiliary Field #1).

2.7.10.3 Route Overview and Screening

The following are major components of a typical underground design and represent only the generalized requirements necessary for an underground 500kV installation, and are not specific to any technology or application.

- An underground 500kV cable system would consist of up to three cables per phase (total of nine cables) in order to match the capacity of the overhead transmission line.
- Each set of three phase cables would be installed in three separate duct banks. Duct banks would require separation of 15 feet. There would be four conduits in each duct bank (one spare conduit).
- For the 500kV HPFF design APS would require the installation of two separate trenches separated by a minimum of 15 feet measured from center line of trench to center line of trench. The cable would be installed in one of the 10-inch steel pipes, and the other 10-inch steel pipe located in the same trench would be the return pipe to circulate the oil. For the required amperage it may be necessary to have multiple cables and return pipes. APS envisions two pumping plants and two forced cooling units.

- The 230kV underground installation with a 3,000 amp rating could be achieved with a XLPE installation. Depending on the size of cable, it may require two or more trenches separated by a minimum of 10 feet.
- Concrete encased duct bank packages would be covered with up to eight feet of thermal backfill.
- Permanent access (approximately 14 feet in width) would be graded along the path of the duct bank packages.
- Total construction disturbance width of the underground duct bank packages with the access road is estimated to be approximately 80 feet in width for the length of the route.
- Splicing of the cable would be required approximately every 800 to 1,600 feet. Splicing would be performed inside vault structures. Vault dimensions would be approximately 12 feet wide by 40 feet long by 9 feet deep, dependent upon the cable manufacturer design requirements.
- Vaults would be covered with up to eight feet of thermal backfill.

Underground to overhead transition stations would be required at each end of the underground transmission line (similar in appearance to a substation; **Figure 2.7-14**). Each transition station would be located on a two to three acre area and would require structures approximately 80 to 100 feet in height.

Use of underground technology within some of the routes on federal land administered by BLM would still require amendment of the Bradshaw-Harquahala RMP (BLM 2010b) to allow a utility ROW on public land. In addition, an RMPA might also be required to change current VRM Class designations if any associated aboveground facilities did not meet the current VRM Class designation objectives.

Surface disturbance, the presence of infrastructure, and sporadic activity along the route would have varying degrees of impact on natural resources and ecosystems. However, underground transmission line systems eliminate the potential for avian collision and/or electrocution.

Utilization of underground transmission lines would not involve the same visual intrusion of above ground transmission lines and poles in the landscape; however, structures 80-100 feet tall would be required at the transition stations. Underground technology also would be visible as ground disturbance along the route, access roads/routes, splicing vaults, and pressurization plants.

The use of fluid-filled and compressed gas underground technology creates environmental concerns about release of fluids or gasses into the environment. Petroleum-based fluids present environmental problems similar to those normally associated with oil spills (Shrieve n.d.). SF6 is a heavy gas that should not be vented to the atmosphere except through appropriate scrubbers in accordance with federal, state, and local regulations (Proline n.d.).

The screening process found that the option of undergrounding the transmission line meets the purpose and need of the Project since the use of underground technology could be used to

meet APS' Project objectives and allow the BLM to respond to APS' application for access across public lands.

Although the HPFF, SCFF, and XLPE underground transmission technologies are considered mature and reliable by some industry experts (USFS 2006), it is the view of APS that these technologies are not mature at the 500kV voltage. In addition, there are no known buried 500kV transmission lines, and none covering the distances proposed, therefore these technologies are not technically feasible and practical. CGTL may be feasible only for short distances, and thus may not be as practical as the other technology options. The option of undergrounding the transmission line is not economically practical and feasible for the entire Project as APS estimates the cost of undergrounding a transmission line ranges from 10 to 30 times that of overhead lines; specialized skills and proprietary technology are required; thus rendering undergrounding of the entire Project impractical. However, this option as applied to portions of the Project may be economically practical and feasible; while the cost increase of undergrounding the line even for a relatively short distance would be high, it may provide a practical option under certain circumstances.

This underground option is also not environmentally reasonable for all of the Project because undergrounding transmission lines involves ground disturbance along the entire route, which would be greater than ground disturbance associated with overhead lines. Depending on the route, this may or may not be an issue. The disturbance footprint of facilities includes pressurization plants at either end, vaults every 800 to 1,600 feet, access roads to these facilities, and electric distribution lines to pressurization plants. The use of fluid-filled and compressed gas for underground technology creates environmental concerns about release of fluids or gasses into the environment. If applied to portions of the Project, environmental concerns associated with undergrounding the line would exist even for a relatively short distance. APS does not believe that undergrounding a 500kV line for any distance is practical or meets the objectives of the company for reliability.

Although consistent with the purpose and need of the Project, the option of undergrounding the transmission line was not carried forward for detailed analysis for the reasons described above.

2.7.11 CAP to Grand Avenue

2.7.11.1 Route Description

The CAP to Grand Avenue route would replace an approximately 20-mile long segment of the Proposed Action route that extends north on the 235th Avenue alignment from US 60 to the Joy Ranch Road alignment, east to SR 74, east on SR74 to about 99th Avenue, and southeast to the Morgan Substation. The segment of the route that would follow the Proposed Action route and remain within the ACC-certificated route would extend east and north from the Sun Valley Substation to the Lone Mountain Road alignment, west on the Lone Mountain Road alignment to the 235th Avenue alignment, and north on the 235th Avenue alignment to US 60. See **Figure 2.7-5**.

2.7.11.2 Route Overview and Screening

The ACC-certificated route and the CAP Complete route are described above, and account for the description of the CAP to Grand Avenue route, with exception of the US 60 interior segment. This segment follows US 60 from the point it intersects the ACC-certificated route at 235th Avenue to the point it intersects the CAP. This segment traverses primarily private lands, except for a small portion of State Trust lands near the intersection with the certificated route. US 60 in this area is also part of the Wickenburg Scenic Corridor. The Maricopa Zoning Ordinance (Maricopa County n.d. b) does not provide specifications for utilities within the scenic corridor.

Siting of the 230kV transmission line along the US 60 segment would be in proximity to several residential developments north and south of US 60, which are in various stages of platting. The transmission line would parallel an existing 69kV transmission line. Visually, the transmission line would repeat the form and line of the existing line, and would involve a different type of structure from the existing line in order to accommodate the higher voltage, which may make it more visible or pronounced in the landscape. Private property acquisition in the vicinity of Wittmann may be required.

Right-of-way acquisition costs for the CAP to Grand Avenue route are estimated to be $63 million. Construction costs are estimated to be $106 million for a total Project cost estimated at $169 million.

The screening process found that the CAP to Grand Avenue route meets the purpose and need of the Project since it would provide 230kV service to the northwest valley location, and thus would meet APS' Project objectives, and would allow the BLM to respond to APS' application for access across public lands. The segment within the ACC-certificated route and the US 60 segment of this route are technically feasible and practical. See descriptions above for CAP and Underground alternatives in **Sections 2.7.4** and **2.7.10**. This route is not economically practical and feasible as the overall cost estimate for the CAP to Grand Avenue route using overhead transmission line would be 33 percent more than the Proposed Action. This route is environmentally reasonable.

Although consistent with the purpose and need of the Project, technically feasible and practical in part, and environmentally reasonable, the CAP to Grand Avenue route was not carried forward for detailed analysis for the economic and other reasons described above.

2.7.12 Wittmann/Circle City Bypass Route

The Wittmann/Circle City Bypass route was recommended during public review of the Draft EIS after its publication. This route was designed to:

- Minimize the amount of State Trust lands impacted by the ROW
- Not pass near the Thunder Ridge Airpark
- Not pass near residences in the communities of Wittmann and Circle City, or along Cloud Road
- Achieve a substantial reduction of turning structures required for the Project
- Avoid amendment of the Bradshaw-Harquahala RMP

2.7.12.1 Route Description

From the Sun Valley Substation location, the Wittmann/Circle City Bypass route would follow the Proposed Action/Preferred Alternative route north to Lone Mountain Road. At the intersection with Lone Mountain Road where the Proposed Action/Preferred Alternative would turn right, the Wittmann/Circle City Bypass route would continue north to one-half mile north of the Joy Ranch Road alignment, where it would turn east. At 243rd Avenue, the route would turn north. The route would turn southeast at the intersection with SR 74, following the south side of the highway until the point that it would intersect with the Alternative 3 alignment. The route would then follow the Alternative 3 alignment (south on 179th then east on the Carefree Highway alignment) to the Morgan Substation (**Figure 2.7.10**). The Wittmann/Circle City Bypass route would be approximately 41.6 miles long.

2.7.12.2 Route Overview and Screening

Because the Wittmann/Circle City Bypass route would be northwest of the Proposed Action/Preferred Alternative route, impacts to Thunder Ridge Airpark would be eliminated. By routing the ROW along the south side of SR 74 between 243rd and 179th Avenues, the route avoids the impacts to the State Trust lands that the Sub-alternative route alleviated; offering an alternative to the Sub-alternative route. However, more acres of State Trust lands would be impacted by this route due to its increased length compared with the Action Alternative routes.

From the Sun Valley Substation location to Lone Mountain Road, the Wittmann/Circle City Bypass route would be identical to the Proposed Action route. From the intersection of 179th Avenue and SR 74 the route would essentially be the Alternative 3 route. Because these portions of the Wittmann/Circle City Bypass route are contained in alternatives already analyzed in the Final EIS, there would be no environmental factors for elimination of these portions of the route.

Using aerial photography it was determined that near the intersection of 275th Avenue and one-half mile north of Joy Ranch Road there are approximately 22 structures within 1,000 feet of the centerline. One structure would be within the 200-foot ROW, but does not appear to be a residence. Seven of the structures within 1,000 feet of the centerline appear to be residences, the closest of which would be approximately 260 feet from the centerline. Impacts to visual resources would range from moderate to high, with high visual impacts occurring in the vicinity of existing residences and along SR 74 in particular. While the SR 74 Scenic Corridor guidelines (Maricopa County n.d. c) allow for a proposed 500/230kV overhead transmission line, it would have a major impact on the visual resources of SR 74.

The Roesner Ranch airstrip is approximately one mile long running roughly north and south, slightly off axis to the southwest. The Wittmann/Circle City Bypass route ROW would encroach upon the southern turn-around of the air strip. The ROW on the southern end of the airstrip would be perpendicular to the airstrip. Similar to the Thunder Ridge Airpark under the Proposed Action, impacts to the Roesner Ranch Airstrip would be anticipated to be major and adverse.

The total cost for the Wittmann/Circle City Bypass route would be $159.4 million. This route would involve increased private land acquisition over the Proposed Action route, particularly

due to following the Alternative 3 route across private property along the Carefree Highway alignment, resulting in a nearly 40 percent increase in ROW acquisition cost over the Proposed Action route. The fact that the Wittmann/Circle City Bypass route would be approximately eight percent longer than the Alternative 3 route, would include one more known turn than the Alternative 3 route, would be in proximity to the Hassayampa River, and would present challenges crossing US 60 in the proposed location, all of these factors would increase construction costs; construction costs are estimated to be 20 percent more than the Proposed Action route. Overall, this route would cost an estimated 26 percent more than the Proposed Action route.

The Wittmann/Circle City Bypass route would meet the purpose and need for the Project and it appears to be technically practical and feasible. However, the overall cost of the route is estimated to be 26 percent more than the Proposed Action route; given the alternatives analyzed in the Final EIS, this route would not be economically feasible. The route would shift the transmission line further way from the communities of Wittmann and Circle City, would be an alternative to the Sub-alternative route, and would alleviate impacts to the Thunder Ridge Airpark. However, the Wittmann/Circle City Bypass route would impact a number of residents southwest of Morristown and cause major impacts to the Roesner Ranch airstrip. The impacts would simply shift from one group to another, rendering this alternative substantially similar in effect to other alternatives considered or eliminated from detailed analysis, but costing more and outside of the ACC-certificated route. Therefore, the Wittmann/Circle City Bypass route was eliminated from detailed analysis.

2.7.13 Summary of Options and Route Screening Results

In assessing the results of application of the screening criteria to the technological options and other transmission line routes that were considered, only those characteristics that obviously distinguish a technological option or transmission line route from, or align it with other options or routes were discussed in the preceding descriptions. A summary of the screening results is provided in **Table 2.7-1**.

Table 2.7-1 Summary of Options and Route Screening Results for Eliminated Alternative

OPTIONS/ ROUTES	SCREENING CRITERIA			
	MEETS PURPOSE AND NEED AND/OR APS' OBJECTIVES	TECHNICALLY PRACTICAL AND FEASIBLE	ECONOMICALLY PRACTICAL AND FEASIBLE	ENVIRONMENTALLY REASONABLE AND/OR SIMILAR IN EFFECTS OR DESIGN
Cloud Road Route	Yes: Responds to the APS request for access across public land near the Sun Valley Substation and meets the purpose and need and APS' objectives for the Project and would be in conformance with the Bradshaw-Harquahala RMP.	Yes: Lands along the Cloud Road route are presently vacant and undeveloped. There are no known technical issues.	Yes: Overall cost estimate for along the Cloud Road route is approximately four percent less than that of the Proposed Action.	No: Route would essentially have the same effects as Alternative 3.
Hassayampa-Western SR 74 Route	Yes: Would be the same route as the Proposed Action for the requested ROW north of SR 74, would require an RMPA for plan conformance (utility corridor and VRM Class change), and would meet the purpose and need and APS' objectives for the Project.	Yes: Given constraints of possible construction in the river floodplain, the route is practical and feasible under current practice and technology.	Yes: Overall cost estimate for this route is approximately six percent more than that of the Proposed Action.	No: Unlike other alternatives and routes, this route would be sited within the Hassayampa River floodplain and would cut off and isolate small portions of one development in three different places.
Hassayampa-Joy Ranch Road Route	Yes: Would be the same route as the Proposed Action for the requested ROW north of SR 74, would require an RMPA for plan conformance (utility corridor and VRM Class change), and would meet the purpose and need and APS' objectives for the Project.	Yes: Given constraints of possible construction in the river floodplain, the route is practical and feasible under current practice and technology.	Yes: Overall cost estimate for this route is approximately two percent more than that of the Proposed Action.	No: Unlike other alternatives and routes, this route would be sited within the Hassayampa River floodplain and would cut off and isolate small portions of one development in three different places. The route would potentially impact operations at the Thunder Ridge Airpark.

Table 2.7-1 Summary of Options and Route Screening Results for Eliminated Alternative (Continued)

OPTIONS/ ROUTES	SCREENING CRITERIA			
	MEETS PURPOSE AND NEED AND/OR APS' OBJECTIVES	TECHNICALLY PRACTICAL AND FEASIBLE	ECONOMICALLY PRACTICAL AND FEASIBLE	ENVIRONMENTALLY REASONABLE AND/OR SIMILAR IN EFFECTS OR DESIGN
CAP Complete Route	No: Would not provide 230kV service to the northwest valley location, and thus would not meet APS' objectives for the Project.	Overhead Line – No: LAFB does not allow overhead transmission lines within the Clear Zone and APZs that would be crossed by the CAP Complete Route. Underground Line – Yes: For segment crossing LAFB, with close coordination with the Base.	Overhead Line – No: Would require acquisition of additional lands, rights-of-way, or easements to supplement federal lands containing the CAP; homes built in close proximity to the CAP would need to be acquired; numerous angle structures would be required; all these characteristics increase cost; the overall cost estimate for overhead lines under this route is approximately 43 percent more than that of the Proposed Action. Underground Line – No: APS estimates the cost of undergrounding a transmission line ranges from 10 to 30 times that of overhead lines.	Overhead Line – No: The Project would place high voltage transmission lines in close proximity to numerous existing residences, unlike the other alternatives and routes already under evaluation that are located in more undeveloped settings. Underground Line – See Underground a Portion or all of the Project, below.
LAFB Auxiliary Field #1 Bypass – Option A (along CAP)	No: Would not provide 230kV service to the northwest valley location, and thus would not meet APS' objectives for the Project.	Yes: An overhead transmission line is practical and feasible under past and current practice and technology, and much of the lands specific to this route are undeveloped and/or in the preliminary plat stage.	Yes: An overhead transmission line is economically practical and feasible under past and current practice and technology. ROW acquisition costs for this route would be more than double those for the Proposed Action, while construction costs would be less. The overall cost estimate for Option A would be approximately 24 percent more than that of the Proposed Action.	No: Between 235th Avenue and along US 60 the route would be near existing communities and at least 4 residences would need to be acquired. The Project would place a high voltage transmission line in close proximity to existing residences along the CAP, unlike the other alternatives and routes already under evaluation that are located in more undeveloped settings.

Table 2.7-1 Summary of Options and Route Screening Results for Eliminated Alternative (Continued)

OPTIONS/ ROUTES	SCREENING CRITERIA			
	MEETS PURPOSE AND NEED AND/OR APS' OBJECTIVES	TECHNICALLY PRACTICAL AND FEASIBLE	ECONOMICALLY PRACTICAL AND FEASIBLE	ENVIRONMENTALLY REASONABLE AND/OR SIMILAR IN EFFECTS OR DESIGN
LAFB Auxiliary Field #1 Bypass – Option B (along Carefree Highway)	No: Would not provide 230kV service to the northwest valley location, and thus would not meet APS' objectives for the Project.	Yes: Same as Option A.	Yes: An overhead transmission line is economically practical and feasible under past and current practice and technology. ROW acquisition costs for Option B would be more than double those for the Proposed Action, while construction costs would be less. Option B would cost 14 percent more than the Proposed Action.	No: Between 235th Avenue and along US 60 the route would be near existing communities and at least 4 residences would need to be acquired.
LAFB Auxiliary Field #1 Bypass – Option C (along Cloud Road)	No: Would not provide 230kV service to the northwest valley location, and thus would not meet APS' objectives for the Project.	Yes: Same as Option A.	Yes: An overhead transmission line is economically practical and feasible under past and current practice and technology. ROW acquisition costs for Option C would be more than double those for the Proposed Action, while construction costs would be less. Option C would cost 13 percent more than the Proposed Action.	No: Same as Option B.

Table 2.7-1 Summary of Options and Route Screening Results for Eliminated Alternative (Continued)

OPTIONS/ ROUTES	SCREENING CRITERIA			
	MEETS PURPOSE AND NEED AND/OR APS' OBJECTIVES	TECHNICALLY PRACTICAL AND FEASIBLE	ECONOMICALLY PRACTICAL AND FEASIBLE	ENVIRONMENTALLY REASONABLE AND/OR SIMILAR IN EFFECTS OR DESIGN
Vistancia Bypass Route – Option A (along Cloud Road)	No: Would not provide 230kV service to the northwest valley location, and thus would not meet APS' objectives for the Project.	Overhead Line - No: The route would require construction of the power line in the LAFB APZ 1 and Clear Zone, contrary to airfield operational restrictions. Underground Line – Yes: For segment crossing LAFB, with close coordination with the Base.	Overhead Line - No: An overhead transmission line is economically practical and feasible under past and current practice and technology. However, both ROW acquisition and construction costs under this route would be greater than the Proposed Action; construction costs would be nearly 40 percent more. The overall cost estimate for Option A would be approximately 39 percent more than that of the Proposed Action. Underground Line – No: Undergrounding of line would further increase the cost of this route.	No: Route would essentially have the same effects as those under Alternative 3.
Vistancia Bypass Route – Option B (along Carefree Highway)	No: Would not provide 230kV service to the northwest valley location, and thus would not meet APS' objectives for the Project.	Same as Option A	No: Same as Option A; the overall cost estimate for Option B would be approximately 35 percent more than that of the Proposed Action.	No: Route would essentially have the same effects as those under Alternative 3.

Table 2.7-1 Summary of Options and Route Screening Results for Eliminated Alternative (Continued)

OPTIONS/ ROUTES	SCREENING CRITERIA			
	MEETS PURPOSE AND NEED AND/OR APS' OBJECTIVES	TECHNICALLY PRACTICAL AND FEASIBLE	ECONOMICALLY PRACTICAL AND FEASIBLE	ENVIRONMENTALLY REASONABLE AND/OR SIMILAR IN EFFECTS OR DESIGN
Vistancia Bypass Route – Option C (along ACC-Certificated Route)	No: Would not provide 230kV service to the northwest valley location, and thus would not meet APS' objectives for the Project.	Same as Option A.	No: Same as Option A; the overall cost estimate for Option C would be approximately 34 percent more than that of the Proposed Action.	No: Route along 171st Avenue, between Cloud Road and SR 74, would essentially have the same effects and be the Proposed Action route and Alternative 2 routes. The certificated route portion of this route would be the same as the Proposed Action.
Westwing / Navajo Corridor Route	No: Would not provide 230kV service to the northwest valley location, and thus would not meet APS' objectives for the Project. Also, if constructed inside the existing corridor, de-rating would mean the Project no longer provides 500kV transmission capability.	Inside the Corridor – No: WECC would significantly de-rate the capacity of the line due to its proximity to the other existing lines within that common corridor, thus the Project would no longer provide 500kV transmission capability. Outside the Corridor – No: Multiple crossings would not be consistent with Good Utility Practice; the Project would be feasible, but not practical.	No: Construction costs under this route are estimated to be approximately 25 percent less than the Proposed Action; however, ROW acquisition costs are estimated to be nearly five times more due to extensive severance payments. The overall cost estimate for this route would be approximately 64 percent more than that of the Proposed Action.	No: Although this alternative would consolidate like uses within a common corridor, acquisition of existing residences would be required.

Table 2.7-1 Summary of Options and Route Screening Results for Eliminated Alternative (Continued)

OPTIONS/ ROUTES	SCREENING CRITERIA			
	MEETS PURPOSE AND NEED AND/OR APS' OBJECTIVES	TECHNICALLY PRACTICAL AND FEASIBLE	ECONOMICALLY PRACTICAL AND FEASIBLE	ENVIRONMENTALLY REASONABLE AND/OR SIMILAR IN EFFECTS OR DESIGN
Westwing/ Grand Avenue-Navajo 500/230kV Separation	No: The 230kV transmission line would be separated from the 500kV transmission line; the thus, not consistent with APS' objectives for the Project.	Westwing portion, inside the corridor – No: WECC would significantly de-rate the capacity of the line due to its proximity to the other existing lines within that common corridor, thus the Project would no longer provide 500kV transmission capability. Westwing portion, outside the corridor – No: Multiple crossings for the 500kV line would be required as described for the Westwing/Navajo Corridor Route, above. Multiple crossings would not be consistent with Good Utility Practice; the Project would be feasible but not practical. US 60 portion – Yes: There would be no known technical issues with this route for the 230kV transmission line.	No: Separation of the 230kV line from the 500kV line would involve Project costs for separate infrastructure and rights-of-way, resulting in a 66 percent increase in construction costs over the Proposed Action. Acquisition of ROWs in separate corridors and severance payments would increase the cost of ROW acquisition 133 percent above the Proposed Action. The overall cost estimate for this route would be 124 percent more than the Proposed Action.	No: Acquisition of approximately 20 existing homes and final platted parcels would be required in the vicinity of US 60. Additional impacts would also occur as two lines would need to be constructed.

Table 2.7-1 Summary of Options and Route Screening Results for Eliminated Alternative (Continued)

OPTIONS/ ROUTES	SCREENING CRITERIA			
	MEETS PURPOSE AND NEED AND/OR APS' OBJECTIVES	TECHNICALLY PRACTICAL AND FEASIBLE	ECONOMICALLY PRACTICAL AND FEASIBLE	ENVIRONMENTALLY REASONABLE AND/OR SIMILAR IN EFFECTS OR DESIGN
CAP Underwater Option	No: Would not provide 230kV service to the northwest valley location, and thus would not meet APS' objectives for the Project.	No: Underwater construction in a canal is not a proven technique and would impact canal maintenance.	Unknown: Cost estimates for underwater construction are not available. The cost of underwater construction, in addition to requirements for ongoing access and maintenance would be assumed to be substantially more than overhead construction.	No: Underwater canal construction is an unproven approach and may have impacts as yet unidentified. CAWCD has rejected this route.
CAP to Grand Avenue Route	Yes: Would provide 230kV service to the northwest valley location, and thus would meet APS' Project objectives, and would allow the BLM to respond to APS' application for access across public lands.	Portion within the - ACC-certificated route- Yes US 60 portion – Yes: There would be no known technical issues with this route for the transmission line. CAP portion – See descriptions above for the CAP Complete route and Underground options.	No: The overall cost estimate for this route using overhead transmission line would be 33 percent more than the Proposed Action. CAP portion - See descriptions above for the CAP Complete route and Underground options.	Yes: Known environmental advantages and disadvantages are indistinguishable from the Proposed Action route.

Table 2.7-1 Summary of Options and Route Screening Results for Eliminated Alternative (Continued)

OPTIONS/ ROUTES	SCREENING CRITERIA			
	MEETS PURPOSE AND NEED AND/OR APS' OBJECTIVES	TECHNICALLY PRACTICAL AND FEASIBLE	ECONOMICALLY PRACTICAL AND FEASIBLE	ENVIRONMENTALLY REASONABLE AND/OR SIMILAR IN EFFECTS OR DESIGN
Underground a Portion or All of the Project Option	Yes: The use of underground technology could be used to meet APS' Project objectives and allow the BLM to respond to APS' application for access across public lands.	HPFF, SCFF, XLPE - No: All three technologies are considered mature and reliable by industry experts, however APS does not believe that undergrounding a 500kV line for any distance is practical or meets the objectives of the company for reliability. Also, there are no known buried 500kV transmission lines, and none covering the distances proposed. CGTL - No: Feasible only for short distances, and thus may not be as practical as the other technology options.	All of the Project – No: APS estimates the cost of undergrounding a transmission line ranges from 10 to 30 times that of overhead lines; specialized skills and proprietary technology are required; thus rendering undergrounding of the entire Project impractical. Portions of the Project – Yes: While the cost increase of undergrounding the line even for a relatively short distance would be high, it may provide a practical option under certain circumstances.	All of the Project – No: Similar to pipeline construction, undergrounding transmission lines involves ground disturbance along the entire route, which would be greater than ground disturbance associated with overhead lines. Depending on the route, this may or may not be an issue. The disturbance footprint of facilities includes pressurization plants at either end, vaults every 800 to 1,600 feet, access roads to these facilities, and electric distribution lines to pressurization plants. The use of fluid-filled and compressed gas for underground technology creates environmental concerns about release of fluids or gasses into the environment. Portions of the Project – No: Environmental concerns associated with undergrounding the line would exist even for a relatively short distance.

Table 2.7-1 Summary of Options and Route Screening Results for Eliminated Alternative (Continued)

OPTIONS/ ROUTES	SCREENING CRITERIA			
	MEETS PURPOSE AND NEED AND/OR APS' OBJECTIVES	TECHNICALLY PRACTICAL AND FEASIBLE	ECONOMICALLY PRACTICAL AND FEASIBLE	ENVIRONMENTALLY REASONABLE AND/OR SIMILAR IN EFFECTS OR DESIGN
Wittmann/Circle City Bypass Route	Yes: Responds to the APS request for access across public land near the Sun Valley Substation and meets the purpose and need and APS' objectives for the Project and would be in conformance with the Bradshaw-Harquahala RMP.	Yes: Lands along the Wittmann/Circle City Bypass route are predominantly vacant and undeveloped. There are no known technical issues.	No: Construction costs under the Wittmann/Circle City Bypass route would be approximately 20 percent more than the Proposed Action route due to additional route length, proximity to the Hassayampa River, and crossing US 60. Land acquisition costs would be approximately 40 percent more than the Proposed Action route due to crossing additional private property. Overall costs would be approximately 26 percent more than the Proposed Action.	No: The unique portion of the route would eliminate impacts to Thunder Ridge Airpark, would avoid bisecting an area of State Trust land, and would be an alternative to the Sub-alternative route. However, • One structure would need to be acquired • Several structures including approximately seven residences would be within 1,000 feet of the centerline, likely on property that would adjoin the ROW. • There would be major impacts to the Roesner Ranch Airstrip, similar to impacts to Thunder Ridge Airpark under the Proposed Action. This alternative would simply shift the impacts from one group to another, rendering this alternative substantially similar in effect to other alternatives considered or eliminated from detailed analysis.

2.8 COMPARISON OF ALTERNATIVES

Table 2.8-1 compares and summarizes the Project components and environmental impacts of the Proposed Action and Action Alternatives.

This page intentionally left blank.

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Overall Project Disturbance							
Route Length (miles)		38.2	Same as P.A.	37.4	38.4	4.0	4.0
ROW (acres)		926	Same as P.A.	907	931	97	97
Temporary Access (miles)		10	Same as P.A.	8	9	0	<0.5
Permanent Access (miles along centerline)		40	Same as P.A.	39	40	4	4
Permanent Access (miles of spur roads)		1	Same as P.A.	2	2	0	0
Bradshaw-Harquahala RMP Amendments Required							
Utility Corridor		Yes – A 200-foot wide single-use utility corridor north and south of SR 74 corresponding to the requested ROW	Yes – A multiuse utility corridor on 2,362 acres north and 1,013 south of SR 74	Yes – A multiuse utility corridor on 1,013 acres south of SR 74	No	N/A	N/A
VRM Class Change		Yes – Change from VRM Class III to VRM Class IV on 2,362 acres north and 1,013 south of SR 74	Yes – Change from VRM Class III to VRM Class IV within the multiuse utility corridor north and south of SR 74	Yes – Change from VRM Class III to VRM Class IV within the multiuse utility corridor south of SR 74	No	N/A	N/A
Air Quality and Climate Change							
Maximum Pollutant Emissions from Construction (tons/month)	SO_2*	0.04	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.
	PM_{10}*	4.33	Same as P.A.	4.25	4.33	Same as P.A.	Same as P.A.
	$PM_{2.5}$*	1.08	Same as P.A.	1.07	1.08	Same as P.A.	Same as P.A.
	CO*	2.94	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.
	NOx*	7.94	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.
	VOC*	0.55	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.
GHG Emissions	Construction (total tons CO_2e)	823.9					
	Operation (tons/year)	16.4					
National Ambient Air Quality Standards (NAAQS) Compliance	SO_2*	No violations of NAAQS					
	PM_{10}* (Non-attainment area)						
	$PM_{2.5}$*						
	CO*						
	NOx*						
	O_3* (Non-attainment area)						

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Cultural Resources							
Number of National Register-eligible Sites Potentially Impacted	Historic	3	Same as P.A.	3	3	None	None
	Prehistoric	4		3	3		
	Multi-component	2		2	0		
Historic Properties within the Viewshed (Miles to line)	Santa Fe, Prescott & Phoenix Railway	0 *Negligible*	Same as P.A.	0 *Negligible*	0 *Negligible*	0 *Negligible*	0 *Negligible*
	Seymour III	4.3 *Negligible*		4.3 *Negligible*	4.3 *Negligible*	5.7 *Negligible*	4.3 *Negligible*
	Beardsley Canal	0 *Minor, Long-Term (LT)*		0 *Minor, LT*	0 *Minor, LT*	0 *Minor, LT*	0 *Minor, LT*
	Surly Site	3.2 *Negligible*	Same as P.A.	3.2 *Negligible*	3.1 *Negligible*	3.2 *Negligible*	3.2 *Negligible*
	Morristown Store	3.8 *Minor, LT*		3.8 *Minor, LT*	3.8 *Minor*	4.4 *Minor, LT*	3.8 *Minor, LT*
	Calderwood Butte Archaeological District	4.0 *Minor, LT*		4.0 *Minor, LT*	2.9 *Minor*	4.0 *Minor, LT*	4.0 *Minor, LT*
Geology and Minerals							
Number and type of active mining claims, mineral leases, and sand and gravel sites, and the number of metallic mineral districts leases in the disturbance footprint or ROW	Active Lode Mining Claims	3	12	None	None	None	None
	Metallic Mineral Districts	1	1	1			
	Active Sand and Gravel Sites	None	None	None			
	Active Oil and Gas, Sodium, and Geothermal Leases	None	None	None			
General		Construction could alter surface topography in areas of cut and fill; Access roads may increase accessibility to existing and future authorized mining claims, geothermal leases, and oil and gas leases *Negligible*					
Hazardous Materials and Wastes							
Potential for exposure of workers to hazardous materials, including hazardous wastes, during transportation and use of these materials		All materials and wastes would be handled and managed in compliance with state and federal regulations, and recycled or disposed of in existing, permitted offsite facilities. Waste management practices would ensure minimal impacts to workers from exposure to hazardous materials and wastes. *Minor, Short-Term (ST)*					
Potential for release of hazardous materials from potential leaks and spills causing contamination of surrounding soils and surface waters		There is potential for incidents involving releases of hazardous materials despite EPMs and BMPs being implemented and APS' adherence to the SWPPP during construction. Accidental spills that do occur outside of containment could contaminate the soil, and if surface runoff contacted these spills before they were cleaned up it would also become contaminated. *Minor, ST*					
Potential for generating or encountering soil contamination during construction		The likelihood that existing contamination would be encountered during construction is minimal. Contaminated soil exceeding regulatory limits for construction backfill would be transported to offsite, permitted disposal facilities. *Minor, ST*					

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Land Use and Range Resources							
Conflicts with Existing or Future Land Uses	State Trust Lands	24.7 acres crossed *Minor, LT*	Same as P.A.	25.8 acres crossed *Minor, LT*	26.6 acres crossed *Minor, LT*	Would leave 4.0 acres intact *Major, LT Beneficial*	Would bisect 4.0 acres *Minor, LT*
	Active Lode Mining Claims (miles)	1.5 *Moderate, LT*		1.0 *Moderate, LT*	None	N/A	N/A
	Commercial (miles)	0.4		0.8	0.6	0.0	0.0
	Light Industrial (miles)	0.5		0.5	0.0	0.0	0.0
	Recreation (miles)	7.2		3.1	3.4	0.0	0.0
	Recreation Development Potential (acres)	180		74	74	N/A	N/A
	Residential – Low Density (miles)	25.4		28.4	28.8	3.8	3.8
	Residential – Medium Density (miles)	2.1		2.1	2.7	0.0	0.0
	Residential Development Potential (acres)	660		732	756	N/A	N/A
	Overall Impacts	The portion of private and State Trust lands where the land use would be affected by the Proposed Action or any of the Action Alternative routes would be relatively small. *Minor, LT*					
Compliance with Land Management Plans and Zoning	Bradshaw-Harquahala RMP	Amendment Required (Single-use utility corridor and VRM class designation change)	Amendment Required (multiuse utility corridor and VRM class designation change)	Amendment Required (multiuse utility corridor and VRM class designation change)	In Compliance	N/A	N/A
	State	In Compliance	In Compliance	Amendment of ACC-certificated Route Required	Amendment of ACC-certificated Route Required	Amendment of ACC-certificated Route Required	In Compliance

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Compliance with Land Management Plans and Zoning Continued	Maricopa County Comprehensive Plan	• Would encourage appropriate buffers to mitigate conflicting land uses • Would create potential for conflicts between recreational use and the utility infrastructure • Would protect ridgelines, foothills, and other visually sensitive areas to the extent possible	Same as P.A.	• Would encourage appropriate buffers to mitigate conflicting land uses • Would reduce potential for conflicts between recreational use and the utility infrastructure • Conflicts between the transmission line and uses on private lands would arise • Impacts to open space on BLM-managed public lands would be minimal • Would protect ridgelines, foothills, and other visually sensitive areas to the extent possible	• Would eliminate potential for conflicts between recreational use and the utility infrastructure • Conflicts between the transmission line and uses on private lands would be greater under Alternative 3 than the Proposed Action or Alternatives 1 or 2 • Impacts to open space on BLM-managed public lands would be minimal	• Conflicts between the transmission line and uses on private lands would be greater under the Sub-alternative than the Proposed Action or Alternatives 1 or 2	Same as P.A.
	Maricopa County Regional Trail Plan or City of Peoria's Parks, Recreation, Open Space, and Trails (PROST) Plan	Would not conflict with the plans					
	City of Surprise General Plan	EIS process addresses the policies in the City of Surprise General and Town of Buckeye General Plans					
	City of Peoria General Plan	Would meet Policy 3.B.4 of the city's General Plan and also would be situated within a utility corridor defined on the city's General Land Use map	Same as P.A.	Would not meet Policy 3.B.4 of the city's General Plan	Would not meet Policy 3.B.4 of the city's General Plan	N/A	N/A
	Town of Buckeye General Plan	Would be within a BLM-designated utility corridor and would parallel other existing or approved transmission lines, thus keeping with compatible surrounding land uses					
Conflict with Authorized Uses	BLM Transportation Corridor	*Negligible*	Same as P.A.	*Negligible*	*Negligible*	N/A	N/A
	BLM Open Space (for recreational use)	Potential Conflict		Minimal Conflict			
Number of acres in each grazing allotment that would be affected	Acres Lost (ST)	129.6	Same as P.A.	119.2	121.9	9.2	9.2
	Acres Lost (LT)	123.9		121.1	118.5	10.7	10.7
	Overall Impacts	*Negligible* (all losses <1 percent of each allotment)					

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Public Health and Safety							
Projected noise levels above ambient at West Meyers St. near 235th Ave, 0.25 miles away (+dBA)	Ambient Noise Level = 45-60 dBA	+17-32 (helicopter; 77 dBA) +0-13 (heavy equipment; 55-58 dBA)					
Comparison of projected electromagnetic fields with ICNIRP recommendations (milliGauss or mG)	Recommended Exposure Limit = 2,000 mG	+8-20 mG *Minor, LT*					
Distance (miles) of Condition Class 2 fire regime crossed by the route	Condition Class 2 = Moderately altered from historic regime; risk of losing key ecosystem components	2.4	2.4	2.0	2.9	0.1	0.6
Paleontology							
Known Paleontological Resources		None known within 1 mile					
Proximity to formations with potential to contain paleontological resources		Potential for significant paleontological resources/ vertebrate fossils very low/unlikely; EPMs and BMPs would be implemented *Negligible – Minor, LT*					
Recreation and Special Designations							
Change in Recreation Access	Public Lands Along SR 74	Construction-related Delays *Major, ST*	Same as P.A.	Fewer Construction-related Delays *Minor, ST*	None	N/A	N/A
Change to ROS* setting	Roaded Natural	Construction Activities *Moderate, ST* Operations, Maintenance, Decommissioning Activities *Minor, LT*	Same as P.A.	Not Present	Not Present	N/A	N/A
	Rural	Construction Activities *Moderate, ST* Operations, Maintenance, Decommissioning Activities *Minor, LT*		Construction Activities *Negligible to Minor, ST* Operations, Maintenance, Decommissioning Activities *Minor, LT*			
Change to Castle Hot Springs SRMA	Access	Decrease in Access During Construction *Major, ST*	Same as P.A.	Decrease in access during construction in less heavily-used area *Minor, ST*	N/A	N/A	N/A
	Compliance with Management Goals	Operations, Maintenance, Decommissioning Activities *Major, LT (area closest to line)*	Same as P.A.	Operations, Maintenance, Decommissioning Activities *Major, LT (area closest to line)*	N/A		

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Change to Parks and Open Space	Lake Pleasant Regional Park	Visual and Noise Impacts During Construction *Negligible-minor, ST*	Same as P.A.	Same as P.A.	Less than P.A. *Negligible*	N/A	N/A
	Proposed Parks/Open Space Designation Area Lost	3 acres *Negligible*		3 acres *Negligible*	3 acres *Negligible*		
Other	Future Recreation Development/Parks Area Lost	20 acres *Negligible*	Same as P.A.	9 acres *Negligible*	10 acres *Negligible*	N/A	N/A
	Area Identified for Future Golf Course Development Lost	N/A		N/A	0.4 acres		
OHV* Recreation	Impacts to Routes North of SR 74	Temporary decrease in access during construction *Major, ST* Adverse impacts to the recreation experience of motorcycles intersecting the centerline access *Negligible to Minor, LT*	Same as P.A.	OHV recreation resources north of SR 74 would not be affected; impacts south of SR 74 would be similar in nature to those described for the Proposed Action *Negligible*	Not present	N/A	N/A
	Miles of Trail Used for Construction Access	1.4 miles Two-track *Moderate, ST*		0.3 miles Two-track *Negligible*			
Socioeconomics and Environmental Justice							
Effects Common to All Action Alternatives – Social Values	Employment	Overall Impact: *Minor, ST, Beneficial*					
	Construction-related Population and Housing	No effect on construction population-related housing in the Study Area expected					

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Socioeconomics - Market Value Effect	Construction Cost	$104 million	Same as P.A.	$101 million	$101 million	Approximately $350,000 more than the Proposed Action	Same as P.A.
	Economic Impacts of Construction	*Minor, ST, Beneficial*	Same as P.A.	*Minor, ST, Beneficial*	*Minor, ST, Beneficial*	*Minor, ST, Beneficial*	Same as P.A.
	Operations, Maintenance, and Decommissioning	*Negligible, LT*	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.
	Developed Property Values and Undeveloped Land Values	No residences within 200 feet of the ROW; therefore proximity and price effects do not apply; however, the value of developed properties adjoining the transmission line ROW may be affected. The value of approximately 101 acres of undeveloped land within 200 feet of the transmission line and outside the ROW within six planned developments could be reduced up to 34 percent	Same as P.A.	No residences within 200 feet of the ROW; therefore proximity and price effects do not apply; however, the value of developed properties adjoining transmission line ROW may be affected. The value of approximately 176 acres of undeveloped land within 200 feet of the transmission line and outside the ROW within six planned developments could be reduced up to 34 percent	No houses within 200 feet of the ROW; therefore proximity and price effects do not apply; however, the value of developed properties adjoining transmission line ROW may be affected. The value of approximately 229 acres of undeveloped land within 200 feet of the transmission line and outside the ROW within eight planned developments could be reduced up to 34 percent	Negatively affect four residences within 200 feet with a reduction in value that could range from 2.8 to 29 percent. A number of residences would be more than 200 feet from the transmission line, but located on property that appears that it would adjoin the ROW, and would have impacts to the property values. The value of 2.1 acres of private property planned for commercial development that is within 200 feet of the transmission line and outside the ROW could be reduced up to 34 percent.	Same as P.A.
	Property Taxes	Potential increase in tax revenue collected would be a 648 percent increase over existing property taxes but would only be approximately 0.40 percent of the Maricopa County property tax revenue. *Minor, LT, Beneficial*	Same as P.A.	Potential increase in tax revenue collected would be a 294 percent increase over existing property taxes but would only be approximately 0.40 percent of the Maricopa County property tax revenue. *Minor, LT, Beneficial*	Potential increase in tax revenue collected would be a 202 percent increase over existing property taxes but would only be approximately 0.40 percent of the Maricopa County property tax revenue. *Minor, LT, Beneficial*	A decrease in the assessed valuation of property located within 200 feet of the ROW could result in a decline in property tax revenue could decline if the property values, affecting the taxing entity and the beneficiaries of those tax revenues. *Negligible, Adverse*	Same as P.A.
	State Trust Land Value	554.6 acres of State Trust land valued at an estimated $16.6 million would be required	Same as P.A.	578.8 acres of State Trust land valued at an estimated to be $17.4 million would be required	615.2 acres of State Trust land valued at an estimated $18.4 million would be required	Same as P.A.	Same as P.A.

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Socioeconomics - Market Value Effect Continued	State Trust Land Revenue	Portions of seven allotments would be affected with permanent loss of four AUMs, with an annual loss of $110 in annual grazing revenue; however, this amount would be offset by the amount APS would pay in annual lease fees for State Trust lands crossed.	Same as P.A.	Portions of six allotments would be affected with permanent loss of three AUMs, with an annual loss of approximately $83 in annual grazing revenue; however, this amount would be offset by the amount APS would pay in annual lease fees for State Trust lands crossed.	Portions of six allotments would be affected with permanent loss of three AUMs, with an annual loss of approximately $83 in annual grazing revenue; however, this amount would be offset by the amount APS would pay in annual lease fees for State Trust lands crossed.	One grazing allotment would be affected with permanent loss of less than one AUM, with an annual loss of grazing revenue that would be insignificant; losses would be offset by the amount APS would pay in annual lease fees for State Trust lands crossed.	Same as P.A.
	Recreation	Decreased OHV trail access in the short term, and reduced recreational use due to changes in the recreation environment, resulting in economic effects of an unknown magnitude.	Same as P.A.	The quality of the recreation experience on BLM-managed public land and access to trails from the Boulders Staging Area would remain unchanged. Likewise, there would be no impact on recreation spending, so the economic impacts generated by that spending would also remain unchanged.	The SRMA containing areas heavily used for OHV recreation would not be crossed by the Alternative 3 route. Fewer BLM lands would be affected under Alternative 3, so there would be no impact to some types of motorized and non-motorized recreation use.	State Trust lands are not managed for recreation uses; therefore, the Sub-alternative would not result in any impacts to recreation.	Same as P.A.
Socioeconomics - Nonmarket Values	Recreation Values	No potential beneficial aspects; potential adverse aspects through changes in quality of the recreation experience.	Same as P.A.	Alternative 2 involves less BLM-managed public land and the land that is affected is less heavily used than that under the Proposed Action. Under this alternative, the quality of the routes could change, but the OHV use levels of the affected lands are much lower than the OHV area north of SR 74.	The transmission line would not cross any of the areas heavily used for recreation. The line would be so far removed from SR 74 that there would be little change in recreational access and few changes in recreational values under this alternative. Long-term adverse effects of an undetermined magnitude would occur to 54 acres planned for open space as a part of a private future development.	No Impacts	Same as P.A.

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Socioeconomics - Nonmarket Values Continued	Natural Amenities and Quality of Life	Construction would require the removal of some habitat for wildlife and special status species. Communities closest to the Project might feel that their current rural quality of life would be adversely affected with the presence of the transmission line and permanent loss of wildlife habitat. The changes in the natural amenities could permanently lessen the quality of life experience for some residents.	Same as P.A.	Similar in nature to the Proposed Action; however, there would be no Category II Sonoran desert tortoise habitat impacted under Alternative 2, only Category III habitat. Keeping this habitat safe could be viewed by some residents as a positive outcome.	Same as Alternative 2	Similar to those for the Proposed Action, but of a potentially higher intensity for property owners. A decline in property values could have an adverse effect on the quality of life for these property owners within 200 feet of the transmission line. *Minor to Moderate, LT*	Same as P.A.
	Health and Safety Concerns	While evidence is not sufficient to establish a definitive cause and effect relationship between EMF and human health effects, the potential health risks of exposure to EMFs remains a concern and affects interest in properties near transmission lines.	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.	Same as P.A.
Environmental Justice		Proportions of the route affecting private developed/occupied property within the EJ community versus outside the EJ community, and proximity of the ROW to private developed/occupied property do not indicate a disproportionate effect.					
Soils Resources							
Acres of Temporary Soil Disturbance (to be reclaimed)		230	Same as P.A.	224	229	Same as Proposed Action	
Acres of Permanent Soil Disturbance		108		104	108	Same as Proposed Action	
Acres of Prime Farmland		62		62	62	1 unit	1 unit
Erosion Potential Rating (majority of soils)		Low to Moderate		Low to Moderate	Low to Moderate	Low to Moderate	Low to Moderate
Reclamation Suitability Rating (majority of soils)		Poor		Poor	Poor	Poor to Fair	Poor

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Transportation and Traffic							
Changes in Traffic Volume	Trips Generated on SR 74 and US 60	21,712 *Minor, ST*					
	Maximum Construction Vehicle Events at Intersections	20-32 *Moderate, ST*					
Miles of Access Road to be Constructed or Improved	Temporary (miles)	9.5 *Moderate, ST*	Same as P.A.	8.5 *Moderate, ST*	9.0 *Moderate, ST*	None	None
	Permanent (miles)	38	Same as P.A.	37	38	4	4
Number of Intersections at SR 74 or US 60 Requiring Upgrades		8 SR 74 and US 60	Same as P.A.	9 SR 74 and US 60	1 US 60 only	N/A	N/A
Project Elements Occurring in Standard Arrival/Departure Flight Paths		Line would be parallel to single landing strip at private air facility *Major, LT*					
Vegetation Resources							
Potential Disturbance in Each Vegetation Community	Creosote White Bursage Desert Scrub	Occurs West of US 60 *Minor, LT*					
	Sonoran Palo Verde Mixed Cacti Desert Scrub	Occurs East of US 60 *Minor, LT*					
	Riparian	Avoided *Negligible*					
Disturbance of Special Status Species	Salvage Restricted Area (SRA)-restricted Species	Individuals would be avoided if possible; many would be lost *Moderate, LT*					
	Sensitive Species	Hohokam agave individuals would be avoided *Negligible*					
Disturbance of Suitable Habitat for Special Status Species	SRA-restricted Species	Suitable habitat would be disturbed *Moderate, LT*					
	Sensitive Species	Suitable habitat for Hohokam agave (river terraces) may be disturbed, although disturbance of riparian habitats is unlikely *Moderate, LT (if individuals are present in suitable habitat is disturbed)*					
Proximity to Noxious or Invasive Weeds	General	Present within roadways, disturbed areas, and in ditches and drainages *Minor, ST*					
	Fire-prone species	Cheatgrass, red brome, and Bermuda grass are present in many areas *Moderate, LT*					

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Visual Resources							
Portion of the route common to all Action Alternatives on BLM-managed public land	Contrast	Weak to moderate					
	Meets VRM Class Objectives?	Yes, where applicable**					
	Overall Long-term Impact	Minor					
Portion of the route common to all Action Alternatives on all other lands	Contrast	Weak to moderate					
	Overall Long-term Impact	*Minor*					
Portion of route on BLM-managed public lands - Linear KOP	Contrast	None to Strong and Dominating	Same as P.A.	Moderate to Strong and Dominating	None to Moderate	N/A	N/A
	Meets current VRM Class Objectives?	Yes, in approximately 50 percent of VRM Class III north of SR 74 and 74 percent of VRM Class III south of SR 74 No, in approximately 50 percent of VRM Class III north of SR 74 and 26 percent of VRM Class III south of SR 74	Same as P.A.	Yes, in approximately 64 percent of VRM Class III south of SR 74 No, in approximately 36 percent of VRM Class III south of SR 74	N/A	N/A	N/A
	Would meet VRM Class Objectives with the Proposed RMPA?	Yes	Same as P.A.	Yes	N/A	N/A	N/A
	Overall Long-term Impact	*Major*	Same as P.A.	*Major*	*Minor*	N/A	N/A
Castle Hot Springs SRMA and Hieroglyphic Mountains RMZ	Contrast	Minimal to Strong and Dominating	Same as P.A.	Negligible to Moderate	None to Moderate	N/A	N/A
	Meets VRM Class Objectives?	Yes, in approximately 50 percent of VRM Class III north of SR 74 and 74 percent of VRM Class III south of SR 74 No, in approximately 50 percent of VRM Class III north of SR 74 and 26 percent of VRM Class III south of SR 74		Yes, in approximately 64 percent of VRM Class III south of SR 74 No, in approximately 36 percent of VRM Class III south of SR 74	Yes, no portion of the transmission line would cross or dominate the views within the SRMA	N/A	N/A
	Would meet VRM Class Objectives with the Proposed RMPA?	Yes	Same as P.A.	Yes	N/A	N/A	N/A
	Overall Long-term Impact	*Minor to moderate*	Same as P.A.	*Negligible to moderate*	*Minor*	N/A	N/A

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Visual Resources Inventory	Impact to existing VRI	In the area where the transmission line would dominate the view, it would be a very discordant element; however, it would not affect the Scenic Quality rating assigned to the SQRU and therefore there would be no change to the current VRI.	Same as P.A.	In the area where the transmission line would dominate the view, it would be a very discordant element. The amount of acreage where the transmission line would dominate the view would be less than under the Proposed Action and would not affect the Scenic Quality rating assigned to the SQRU; therefore there would be no change to the current VRI.	N/A	N/A	N/A
Portion of Route on All Other Lands	Contrast	Weak to Moderate	Same as P.A.	None to Strong	See Portions of Route Unique to Alternative 3 (below)	Weak to Strong	Weak to Moderate
	Overall Long-term Impact	*Minor*	Same as P.A.	*Moderate*		*Moderate*	*Minor*
Portion of Route Unique to Alternative 3	Contrast	N/A	N/A	N/A	Weak	N/A	N/A
	Meets VRM Class Objectives?	N/A	N/A	N/A	N/A	N/A	N/A
	Overall Long-term Impact	N/A	N/A	N/A	Negligible	N/A	N/A
Lake Pleasant Regional Park	Contrast	Weak to moderate	Same as P.A.	Weak	Weak	N/A	N/A
	Meets VRM Class Objectives?	N/A	Same as P.A.	N/A	N/A	N/A	N/A
	Overall Long-term Impact	*Negligible to minor*	Same as P.A.	*Negligible to minor*	*Negligible to minor*	N/A	N/A
Impact to Portion of SR 74 within the Linear KOP	Overall Long-term Impact	*Moderate*	Same as P.A.	*Major*	*Minor to moderate*	N/A	N/A
Complies with Town of Buckeye and City of Peoria General Plans?		Yes	Same as P.A.	No – City of Peoria	No – City of Peoria	N/A	N/A
Water Resources							
Change in Volume, Timing, and/or Extent of Surface Water Flow		Small quantities and temporary alteration of existing uses of surface water for construction Limited size of construction corridor would not measurably increase local runoff levels *Negligible*					
Number of Drainages Crossed	By the Transmission Line	552	Same as P.A.	566	544	73	70
	By Access Roads	55		49	50	0	0
Acres of Waters of the U.S. Potentially Disturbed		4.51		5.91	5.86	0.66	0.39
100-year Floodplain Crossed (total feet)		7,360		7,615	9,150	0	0
Number of Structures Placed within the 100-year Floodplain		2-5		2-5	3-6	0	0
Measurable Effect on Groundwater Levels as a Result of Construction Water Uses		No New Groundwater Withdrawals *Negligible*					
Potential for Hydrocarbon Spills or Releases to Occur Over Shallow Groundwater		No Known Areas of Shallow Groundwater *Negligible*					

Table 2.8-1 Comparison Summary of Components and Impacts from Proposed Action and Action Alternatives (Continued)

(Footnotes at end of table.)

IMPACT INDICATOR		PROPOSED ACTION (P.A.)	ALTERNATIVE 1 PROPOSED ACTION WITH ADDITIONAL CORRIDOR	ALTERNATIVE 2 ROW SOUTH OF SR 74	ALTERNATIVE 3 CAREFREE HIGHWAY	SUB-ALTERNATIVE	
						STATE TRUST LAND ROUTE VARIATION	PRIMARY SEGMENT COMMON TO ALL ACTION ALTERNATIVES
Wildlife Resources							
Suitable Habitat Disturbance for Wildlife and Migratory Birds	Desert Scrub	Permanent removal of habitat *Minor, LT*					
	Riparian Habitat	Riparian habitats may be disturbed temporarily by noise *Minor, ST*	Same as P.A. *Minor, ST*	Same as P.A. *Minor, ST*	Not Present	Not Present	Same as P.A. *Minor, ST*
	Washes	Fragmentation would occur *Moderate, LT*					
	General – Migratory Birds	Transmission line would fragment habitats by posing a flight barrier and reducing habitat security *Moderate, LT*					
Suitable habitat disturbance for special status species	Willow Flycatcher	Habitat may be disturbed temporarily by noise *Minor, ST*	Same as P.A. *Minor, ST*	Same as P.A. *Minor, ST*	Not Present	Not Present	Not Present
	Desert Tortoise (Category II)	Some habitat would be removed *Moderate, LT*	Same as P.A. *Moderate, LT*	Not Present	Not Present	Not Present	Not Present
	Desert Tortoise (Category III)	Some habitat would be removed *Minor, LT*	Same as P.A. *Minor, LT*	Same as P.A. *Minor, LT*	Same as P.A. *Minor, LT*	Not Present	Not Present

*Definitions:
CO – Carbon Monoxide
NO_x – Nitrogen Oxide
0_3 - Ozone
OHV – Off Highway Vehicle
PM_{10} – Particulate matter equal to or less than 10 microns in diameter
$PM_{2.5}$ - Particulate matter equal to or less than 2.5 microns in diameter
ROS – Recreation Opportunity Spectrum
VOC – Volatile Organic Compound
**Compliance with VRM objectives only applicable to BLM-managed public lands.

This page intentionally left blank.

2.9 MONITORING AND MITIGATION

In addition to the Project design features, the EPMs, and BMPs proposed by APS, which are already included as part of the Proposed Action and any Action Alternative, additional monitoring and mitigation measures are necessary. These additional measures are in response to potential environmental impacts identified in Chapter 4 of this EIS. These measures are taken verbatim from the applicable resource sections in Chapter 4 and combined all together in this section as they would be included and apply to the Agency Preferred Alternative.

2.9.1 Air Quality

Control of Construction Related Fugitive Particulate Emissions

Maricopa County Air Pollution Control Rule 310 requires any earthmoving project that disturbs greater than 0.1 of an acre to obtain a dust control permit from the Maricopa County Air Quality Department (MCAQD) and to have a Dust Control Plan detailing dust control measures for the project and contingency measures. Additionally, for any site requiring a dust control permit, all water truck and water-pull drivers must have successfully completed the Maricopa County Basic Dust Control Training Class within the last three years.

For project sites greater than one-tenth of an acre, additional requirements apply as follows: For projects disturbing greater than one acre, the soil texture of the site must be identified, either by a soil assessment report or by Appendix F (Soil Designations) of Maricopa County Air Pollution Control Rules, and the site superintendant is required to have completed the Basic Dust Control Training Class within the last three years (County Rule 310 Sec. 309). For project sites of two acres or larger (or sites where 100 cubic yards/day of bulk material is hauled on/off), a trackout control device is required at all exits. For project sites of five acres or greater, an on-site Dust Control Coordinator is required and must have successfully completed the Maricopa County Comprehensive Dust Control Training Class within the last three years. Additionally, for sites 5 acres or larger, a project information sign must be posted in accordance with Rule 310 Section 308 requirements. The sign must include the MCAQD complaint number allowing the public to report dust related complaints.

Maricopa County Rule 310 limits fugitive dust visible emissions to no more than 20 percent opacity and requires extensive monitoring of earthmoving activities to ensure compliance with this limit and all applicable requirements. Additionally, Maricopa County Rule 310.01 specifies requirements for open areas and vacant lots. Such areas would possibly be a source of particulate emissions during both the construction phase and post-construction operational phase. Section 302.5 of the rule specifies that the owner of open land areas or vacant lots must not allow any particulate matter visible emissions beyond the property line and also requires implementation of control measures, such as establishment of vegetative ground cover, application of palliatives, or other control measures approved by the County to minimize windblown dust emission. The rule also requires periodic evaluation and measurements of soil stability and surface conditions to ensure the effectiveness of control measures.

A variety of fugitive dust control measures are available to minimize fugitive dust emissions which include:

- Frequent watering to maintain visible moisture and/or form soil crust (stabilization)
- Treatment of actively disturbed areas with dust palliatives
- Trackout control devices such as grizzly bars, wheel washers, gravel pads located at all entrances and exits
- Utilize street sweepers to remove any visible soil/mud/dirt carried onto paved access roads
- Limiting vehicle speeds on access roads to less than 15 mph
- Covering haul truck cargo beds with tarps and maintain 3 inches of freeboard
- Cessation of construction on high-wind event days, and/or during periods of adverse meteorological conditions which could cause or contribute to NAAQS violations
- Revegetation to stabilize soil
- Minimization of disturbed land areas to the extent practicable with project design considerations
- Maintain a visible crust and sufficient moisture on any storage piles
- During the post-construction operational phase apply dust suppression measures such as watering (to form crust), application of dust palliatives, or gravel on vacant lots and disturbed areas in accordance with Maricopa County Rule 310.01

Minimization of Emissions from Mobile Sources and Construction Equipment

Emissions from mobile and construction equipment are due primarily to combustion of diesel fuel in engines. Ultra-low sulfur diesel fuel, limited to 15 parts per million (ppm) sulfur is now in widespread use in Arizona and is virtually the only type of diesel fuel available for use in both on-road and non-road construction vehicles in the United States. Use of ultra-low sulfur diesel fuel drastically reduces SO_2 emissions and would serve to mitigate the associated secondary fine particulate emissions (of which SO_2 is a precursor), thereby lessening overall particulate impacts. Use of ultra-low sulfur diesel also results in lower NOx emissions. Additional mitigation measures for mobile sources and construction equipment include the following:

- Construction related trips of workers and equipment would be minimized
- Idling of heavy equipment would be minimized
- Manufacturer recommendations for engine maintenance and operation would be followed to optimize emission performance
- Newer equipment meeting the most stringent of applicable Federal or State standards would be utilized as much as practicable
- Diesel engines, motors and equipment would be located as far as practicable from residential areas and other sensitive areas (schools, daycare centers, and hospitals)

2.9.2 Cultural Resources

Avoidance/protection: APS would implement actions to ensure that historic properties that are avoided by Project design or redesign are not impacted during construction, operation, or maintenance activities. Such actions are subject to agency approval and may include, as appropriate, temporarily placing barriers or marking areas to be avoided during construction; construction monitoring by a professional archaeologist meeting the Secretary of the Interior standards (36 CFR Part 61) and qualification standards established by the Office of Personnel Management; and/or placing locked gates to restrict public access to transmission line access roads that may increase the potential for indirect impacts. BLM and ASLD would also work with APS to develop a long-term monitoring program for avoided properties at risk, involving regular monitoring and documentation by staff assisted by Arizona Site Steward Program volunteers.

Under the Proposed Action, Alternative 1, or Alternative 2, spanning the historic properties near the Agua Fria River would not be possible; therefore a supplemental Class III cultural resource survey was conducted (Rogge and Kirvan 2013), located within the ACC corridor, so that options for avoiding impacts by shifting the alignment to the east could be considered. The recently inventoried potential alignment shift (Rogge and Kirvan 2013) would avoid disturbance of all the National Register eligible sites between the river and the Morgan Substation. Four sites are present along the potential alignment shift, all eligible for the National Register. The alignment shift could span the one newly recorded small site (AZ T:3:358(ASM)), the Beardsley Canal (AZ T:3:55(ASM)), as well as the edges of two larger sites (AZ T:3:350(ASM) and AZ T:3:351(ASM)).

Mitigation through a data recovery program: Scientific data recovery may be implemented to mitigate impacts to historic properties that cannot be avoided. Procedures for scientific investigations, reporting, and long-term preservation of data and collections would be specified in a Historic Properties Treatment Plan implemented in accordance with the terms of a Section 106 Memorandum of Agreement (MOA) executed to address any identified adverse effect.

Mitigation of visual impacts: The impact analysis indicates negligible to minor impacts to the setting of historic properties within five miles of the Action Alternatives. Impacts could be reduced by selecting transmission line structures or facility designs and shades that would lessen visual contrast.

2.9.3 Geology and Minerals

Additional mitigation measures are not required.

2.9.4 Hazardous Materials and Hazardous and Solid Waste

If the Sub-alternative were selected as the preferred alternative, site-specific inquiries into the presence, if any, of pre-existing contamination from a Leaking Underground Storage Tank (LUST) site and a corral in the vicinity of the Sub-alternative alignment should be conducted in advance of locating structures for the power line.

2.9.5 Land Use and Range Resources

There is no mitigation proposed for land use and range resources.

2.9.6 Public Health and Safety

A number of mitigation actions related to public health and safety would be undertaken to reduce potential impacts from the Project during periods of construction and operations, maintenance, and decommissioning activities as described in the following sections. EPMs and BMPs established (**Appendix 2A**) would also be followed for the Project.

General

Following construction and after the line were to be placed into service, APS would respond to complaints of line-generated radio interference (RI) or television interference (TI) by investigating the complaints and implementing appropriate mitigation measures. The transmission line would be patrolled on a regular basis so that damaged insulators or other line materials that could cause interference are repaired or replaced.

As required by the ACC, through the conditions of a CEC, APS shall make every reasonable effort to identify and correct, on a case-specific basis, all complaints of interference with radio or television signals from operation of the transmission line and related facilities addressed in the CEC. APS shall maintain written records for a period of five years of all complaints of radio or television interference attributable to operation, together with the corrective action taken in response to each complaint. All complaints shall be recorded to include notations on the corrective action taken. Complaints not leading to a specific action or for which there was no resolution shall be noted and explained.

The transmission line configuration, hardware and conductor would limit the audible noise, RI, and TI due to corona. Tension would be maintained on all insulator assemblies to assure positive contact between insulators, thereby avoiding sparking. Caution would be exercised during construction to avoid scratching or nicking the conductor surface, which may provide points for corona to occur.

Noise

During construction, traditional large construction and ground moving equipment would be utilized, as outlined in **Table 2.4-3**, which would create noise during use. Typical hours of construction would be 5:00 am to 4:00 pm in the summer, and 6:00 am to 5:00 pm in the winter. Noise-generating construction activities, such as the use of heavy equipment or helicopters, within 0.5-mile of residential areas, would be restricted to the hours of 7:00 am and 7:00 pm; thus avoiding generation of noise during the periods (7:00 pm to 7:00 am) when the Community Noise Equivalent Level (CNEL) measurements include a sound penalty for time periods when a quiet environment is expected.

During operation and maintenance of the Project, similar equipment to that described for construction may be used, which would generate noise. Generally, maintenance activities would be confined to typical workday hours, thus avoiding generation of noise during the periods (7:00 pm to 7:00 am) when the CNEL measurements include a sound penalty for time periods when a quiet environment is expected. Occasionally there may be emergency

maintenance required, which may occur in the evening or nighttime hours, but that would take place very infrequently.

Fire

Contractor safety requirements provided in the appendix of the POD would typically be employed during construction. APS employees receive annual health and safety training, which includes fire prevention and response. These requirements, together with information described in the Health and Safety Plan would cover fire protection efforts associated with this Project. Employees would be prohibited from smoking outside of company vehicles during dry summer months.

Fiber optic/static neutral cables would be installed at the top of the structures supporting the transmission lines, to serve as static wires. These static wires (sometimes referred to as shield wires) are grounded and installed at the very top of the structures to protect lower conductors from lightning.

Vegetation management would be undertaken by APS in accordance with their TVMP (see **Appendix 2B**), as well as their IVM, which would include removal of all tall–growing vegetation within the wire zone, and preservation of low-growing herbaceous and woody plant communities that do not interfere with overhead transmission lines, or pose a fire hazard or hamper access.

APS would comply with industry standard codes governing the design and operation of high-voltage electric utility systems. Equipment would be designed such that if, for some reason, an energized phase conductor were to fall to the ground and create a line-ground fault, high-speed relay equipment would sense that condition and activate circuit breakers to quickly de-energize the line. This would reduce the risk of fire from the high voltage transmission lines to a low level.

2.9.7 Paleontology

Awareness during subsurface excavations in the Project Area is recommended, but monitoring should not be required. Any fossils so discovered should be professionally recovered without impeding development. Any fossils recovered during mitigation should be deposited in a permanent scientific institution (e.g., Arizona Museum of Natural History (AZMNH)) for the benefit of current and future generations.

2.9.8 Recreation and Special Designations

The following mitigation measures would apply to BLM-managed public lands only:

- The BLM would not approve the use of any single-track routes for construction access. The BLM would work with APS to develop a Construction Access Plan that would strictly limit construction access and operation of construction equipment to specific routes.
- The BLM would designate the permanent centerline access route as an Administrative Access Route only; prohibition of recreational use of the centerline access (except for single-track trails crossing of the centerline access) and speed limits would be enforced by BLM. Appropriate signs would be installed.

- The BLM would require that all four-wheel OHV roads/trails accessed from SR 74, intersecting the ROW (for example, at Christian Church Camp [Church] Road), be gated along the ROW with associated fencing to a natural barrier, to prevent unauthorized four-wheel OHV use along the centerline access.
- APS' ROW authorization would require monitoring the centerline access route for unauthorized recreational use. APS would monitor the condition of the centerline access and all gated ROW access points in conjunction with other Project monitoring, and provide reports of the conditions to BLM. During the course of routine field work in this area, BLM resource and law enforcement staff would monitor conditions within the ROW for unauthorized access and use. Should gates/fencing be breached or determined to be ineffective, APS would work with the BLM to undertake additional reasonable and practicable steps to prohibit access and mitigate for adverse impacts resulting from unauthorized access.
- APS would fund additional long-term monitoring of the ROW (three to five years) by the BLM or other cooperating entities for unauthorized recreation and associated impacts.
- APS would work with the BLM to collect necessary data (such as cultural resource surveys) to facilitate transportation planning, including future OHV recreation planning and management, on specific trails in the area north of SR 74.
- As a result, after mitigation there would be no residual effects to single-track OHV users.

2.9.9 Socioeconomics and Environmental Justice

There is no mitigation proposed for socioeconomic resources.

Several mitigations are proposed to address EJ concerns and eliminate potential residual effects. They include:

- At least one public meeting on the Draft EIS was held at a time and location easily accessible to the identified EJ community; the meeting was well publicized using media that are prominent in the EJ community.
- The transmission line route through the EJ community would use public (state or federal) land to the extent possible to minimize direct impacts to the community.

2.9.10 Soils

Soil Stabilization

In order to minimize the potential for erosion, temporarily disturbed surfaces would be restored at or as near to the original contour of the land surface as possible. Water diversions would be constructed along the ROW, as needed, to control surface water and minimize soil erosion. Temporary construction access roads, not required for future maintenance access, would be restored after construction of the Project is complete. Areas of soil compaction, including temporary access roads, would be scarified as needed. Seeding would be used where appropriate to reestablish soil stability. APS would be required to meet the

stabilization requirements and conditions of their Arizona Pollution Discharge Elimination System (AZPDES) permit.

Revegetation

Appropriate site-specific seed mixes for revegetation would be used where conditions vary. Salvaged native plants would be used for revegetation, if appropriate, along with seeding using BLM-recommended and approved seed mixes. Preferably, seed would be planted during months identified as most preferable for revegetation success following construction. Seed would be planted as directed by appropriate land managing agency.

Mitigation Practices

Mitigation practices that would be employed as a part of this Project to ensure that the soil resources are protected and/or impacts minimized include the following:

1. Vegetation would be cleared and the construction ROW would be graded only to the extent necessary. Vegetation within the ROW would be trampled or cut at or near the ground level. Except for the area to be excavated, the vegetative root system and subsurface soils would be left intact to the greatest extent practicable. This would help stabilize the soils within the ROW during construction. ROW boundaries would be clearly staked or flagged and no disturbance would be allowed beyond the limits.
2. Design access roads to fit the terrain by avoiding unstable slopes and highly erodible conditions, to the extent practicable, to protect soils and prevent excessive erosion and sedimentation. These protective measures include, but are not limited to, mulch, tracking, matting, or slope length shortening. When soils are wet, construction, operation, and maintenance activities would be restricted so as to properly support construction or maintenance equipment (i.e., when heavy equipment creates ruts in excess of four inches deep over a distance of 100 feet or more in wet or saturated soils). Where the soil is deemed too wet, one or more of the following measures would apply:
    - Re-route all construction or maintenance activities around the wet areas so long as the route does not cross into sensitive resource areas.
    - If wet areas cannot be avoided, implement BMPs for use in these areas during construction and improvement of access roads, and their subsequent reclamation. This includes use of wide-track or balloon-tire vehicles and equipment, or other weight dispersing systems approved by the appropriate resource agencies. It also may include use of geotextile cushions, pre-fabricated equipment pads, and other materials to minimize damage to the substrate where determined necessary by resource specialists. In addition and if feasible, APS could move construction activities into other portions of the Project until saturated areas dry out.

2.9.11 Transportation and Traffic

To minimize potential effects of the proximity of the transmission line to the Thunder Ridge Airpark, the transmission lines and structures adjacent to the single airstrip would be marked on a strictly voluntary basis, as the FAA does not have jurisdiction or regulatory authority over this facility.

2.9.12 Vegetation Resources, including Noxious and Invasive Weeds and Special Status Plants

Vegetation Communities

Areas of temporary disturbance, identified in **Table 2.4-4**, would be reclaimed according to BLM stipulations in the ROW grant and the final reclamation plan to meet the RMP reclamation goal to, "Maintain, restore or enhance the diversity, distribution, and viability of populations of native plants, and maintain, restore, or enhance overall ecosystem health." (BLM 2010a).

The following additional measures provide general guidelines as to what measures may be used to decrease vegetation resource impacts:

- In construction areas where recontouring is not required, vegetation would be left in place wherever possible, to avoid excessive root damage and allow for resprouting.
- In construction areas (e.g., structure sites, spur roads from existing access roads) where recontouring is required, surface restoration would occur in accordance with the land management agency permitting requirements. The method of restoration would typically consist of returning disturbed areas to their natural contour (to the extent practical), reseeding or revegetating with native plants (if required), installing cross drains for erosion control, placing water bars in the road, and filling ditches. Seed must be tested and certified to contain no noxious weeds in the mix by the State of Arizona Department of Agricultural (ADA). Seed viability also must be tested at a certified laboratory approved by the authorized officer.
- All construction and maintenance activities would be conducted in a manner that would minimize disturbance to vegetation. In addition, all existing roads would be left in a condition equal to or better than their condition prior to the construction of the transmission line, as defined by the land management agency.
- Species protected by the Arizona Native Plant Law would be relocated and transplanted in accordance with the Law. A Vegetation Management Plan, approved by the BLM, would be included in the final POD. As dictated by the Arizona Native Plant Law, actions would include: 1) removal and stockpiling for replanting on site or 2) removal and transplanting out of surface disturbance areas. All personnel working on site would complete a mandatory Environmental Awareness Program, which includes pertinent information on the identification of Arizona Native Plant Law-protected plants.
- In designated areas, structures would be placed or rerouted so as to avoid sensitive features such as, but not limited to, riparian areas, or to allow conductors to clearly span the features, within limits of standard tower design.

Special Status BLM, USFWS Listed Species, and Arizona Native Plant Law

Pre-construction surveys would be performed in the ROW corridor and within all areas of potential new surface disturbance (i.e. access roads, laydown areas, etc.). Special status plants would be identified and marked. Designated surveys for Hohokam agave (*Agave murpheyi*) would be conducted in the layout/project planning phase and then again immediately prior (within a few days) to construction.

Special status plants would be protected to the extent that APS would conduct all activities in compliance with the Arizona Native Plant Law, which would include minimizing the destruction of native plants and in some cases relocating/transplanting individuals on or off-site. A Vegetation Management Plan would be prepared, included in the final POD, and approved by the BLM prior to initiating construction. APS would also work within the Arizona Native Plant Law in restoration and reseeding of construction-disturbed areas.

Invasive and Noxious Plants

BLM policy is to prevent the spread of invasive and noxious plants. Mitigation measures would be used at specific locations where resource sensitivity is high, such as where invasive and noxious weed infestations are existing within or near work areas. Several levels of prevention would be implemented such as minimizing disturbance to existing vegetation (leaving plants in place when possible) and reseeding disturbed areas with native plants and weed-free seed as certified by the ADA. All personnel working on site would complete a mandatory Environmental Awareness Program, which includes pertinent information on the identification of invasive and noxious plant species.

APS would treat any invasive species encountered during the course of herbicide vegetation maintenance projects within the ROW where it is reasonable, prudent, and effective. All appropriate regulations required by the landowner or land-management agency would be implemented and adhered to for any herbicide treatment activities.

2.9.13 Visual Resources

Micrositing

Within the linear KOP, the transmission line would be designed to minimize visual impacts from SR 74. Monopole structures would be used as they are less visually disturbing in foreground/middle ground situations (see **Section 4.14.4.2**). APS worked with the BLM to microsite a sampling of individual structures to understand how visual impacts from the portion of the Project located on BLM-managed public lands would be minimized. Structures were first proposed to be located within the ACC-certificated route as far north as possible from SR 74. Individual poles would be microsited, reducing visual contrast by taking greater advantage of the terrain – to provide either screening or backdropping of the transmission structures. Minor shifts would be made in the route alignment and potential structure locations within the proposed ROW. Along the approximately 6-mile segment north of SR 74 and within the proposed ROW, the alignment would be shifted from 2 to 195 feet (when comparing centerline to centerline). The structures would be shifted away from ridgelines and points of higher elevation to minimize the amount of the structures that would be visible from SR 74. In certain locations, the lower elevation would reduce sky-lining and would provide additional back-dropping or screening opportunities depending on the angle of view.

At locations where the transmission line would cross SR 74, individual structures either side of the highway would be shifted to maximize the distance between the structures and the highway. Simulations comparing previous pole locations with microsited locations would be used to determine effectiveness of micrositing efforts and make adjustments where possible. As a result, micrositing would result in a reduction in impacts to views of travelers on SR 74 and may reduce major impacts to some specific viewpoints within the linear KOP to less than major levels; however, it would not change the overall impact analysis or reduce the estimated area of visual dominance on BLM-administered public lands.

Structure Type

Simulations of the proposed transmission line were prepared using both monopoles and lattice structures as viewed from selected KOPs from SR 74 within the linear KOP where the transmission line would be located on BLM-managed public lands north of SR 74. Because of the relative proximity of the transmission line to SR 74, particularly where the transmission line would cross SR 74, it was determined that the lattice structures were more visually disruptive than the monopole structures. Therefore, to minimize visual impacts along the linear KOP, the BLM would require the use of monopoles on BLM-managed public lands.

The southern portion of the Castle Hot Springs Special Recreation Management Area (SRMA) and the Hieroglyphic Mountains Recreation Management Zone (RMZ) are most greatly impacted by the number of structures visible to the west of the linear KOP, where the landscape flattens out, distant views are common; and the landscape becomes less scenic and complex, and therefore has less capacity to absorb the transmission line (**Figures 4.14-6**, **4.14-21**, and **4.14-25**). In general, the remainder of the route beginning where the route diverges from SR 74 could be constructed using lattice structures south of the highway on private and State Trust lands. Because the viewers in the southern portion of the SRMA and RMZ would be superior to the transmission line, the transmission line would be against a backdrop of lands rather than skylined, and the views would be distant, the use of lattice structures would minimize visual impacts within the SRMA and RMZ, as well as any other distant views from the south, because the viewer would be looking through the lattice structure. However, monopoles would be used when the transmission line would be in the foreground/middle ground of sensitive viewers, such as existing residences and communities. Where the transmission line would be in proximity to another existing line, the same type of support structure (monopole, lattice, or H-frame) would be used as is used in the existing transmission line, to the extent possible, in order to maintain architectural consistency.

Where the transmission line would cross lands other than BLM-administered public lands, the above are recommendations to minimize visual impacts from the transmission line; the final decision regarding design and infrastructure type would be between the underlying land manager and APS.

Color

The color of the structures or lattice towers affects how well the structure blends in the environment. Photographs of boards treated with the BLM's standard environmental colors were taken from KOPs representing typical topography and vegetation within the Project Area. The photographs were then analyzed to identify which standard environmental color

would minimize visual impacts. While no one color works best in all situations and lighting conditions, the shadow gray and shale green colors blended best under front lit conditions and had low levels of contrast in back lit situations. A complete analysis of the color selection process is available in the Project Record. Surface treatment options for monopole structures are very limited and do not achieve much color variation. The colors available would be shades of gray ranging to almost black; no surface treatments available would resemble shale green. Among the surface treatments available for the monopole structures, the BLM would require a treatment that would be non-reflective and most closely resemble shadow gray.

2.9.14 Water Resources

No additional mitigation required.

2.9.15 Wildlife Resources, including Special Status Wildlife and Migratory Birds

Pre-construction surveys would be implemented during the migratory bird nesting season to locate raptor and other migratory bird nests. Surveys would be conducted in the layout/Project planning phase so that sensitive areas (such areas with a high density of tortoises) can be identified and avoided if possible; and then again immediately prior (within a few days) to construction. The survey area would be determined by the timing of the survey (inside or outside the migratory season) and the buffer requirements. Survey areas for raptors would be determined by buffer requirements in Guidelines for Raptor Conservation in the Western United States (USFWS 2008a). If an active nest is found, a timing or spatial buffer would be implemented following BLM and USFWS guidelines. Each buffer would be implemented on a case-by-case basis, considering, for example, the duration of construction activities in the area and topographical barriers (if any) between the nest and construction activities. The decision maker regarding buffers would be the BLM Field Manager, with counsel from the BLM Wildlife Biologist.

All ground-clearing/disturbance activities that could affect special status species or habitat would be monitored. A qualified biologist would be retained to conduct pre-construction activities to minimize or prevent impacts to Sonoran desert tortoises and active migratory bird nests. Monitors would be present where active migratory bird nests were located during pre-construction surveys to assure buffer distances are maintained.

All personnel working on site would complete a mandatory Environmental Awareness Program, which includes pertinent information on biological resource identification of special status species or species of concern. APS's environmental contractor, approved by the BLM, would provide this training. All training would be conducted by experienced and qualified biologists approved by the BLM. The training, at a minimum, would cover identification of tortoises, how to move them according to AGFD guidelines, the protocols for waiting for clearances prior to construction, and when a monitor needs to be present. All personnel working on site would be briefed on the criminal penalties of take under the Migratory Bird Treaty Act, as well as the protocols for waiting for clearances prior to construction and the need to comply with timing stipulations and/or buffers around active migratory bird nests.

Holes or pits created by construction would be covered when not in use and would be checked for animals prior to use, in order to minimize trapping or burying of wildlife.

Raptor electrocutions would be minimized by constructing the transmission line according to raptor-safe design standards, which meet or exceed recommendations from the Avian Power Line Interaction Committee (APLIC 2006). Avian collisions with the power line would be minimized by following recommendations for bird diverters in APLIC (2012), at specific locations such as the Aqua Fria River crossing, and in coordination/consultation with appropriate agency specialists.

Gates would be installed on permanent ROW access roads, as required by the land owner or land managing agency, or if APS finds it to be warranted, to restrict unauthorized vehicular access to the ROW. This would prevent unnecessary traffic along access roads that would disrupt wildlife behavior or cause direct impacts (collisions) to wildlife.

Mitigation specific to Sonoran Desert Tortoise

BLM objectives regarding mitigation for desert tortoises on construction projects are to 1) avoid, minimize, or eliminate loss or degradation of habitat and 2) avoid or minimize take of tortoises. On BLM-managed public lands, the following mitigation measures would be implemented along with compensation, following the Final Report on Compensation for the Desert Tortoise (DTCT 1991), for any desert tortoises or desert tortoise habitat that is disturbed on BLM-managed public lands, as clarified in BLM Instructional Memorandum No. AZ-2012-031.

The first focus of the desert tortoise mitigation policy is on avoiding and minimizing impacts to tortoises and their habitat. If an action with on-site mitigation measures would result in residual impacts, then compensation would be required. Category II habitats would be compensated for at a rate ranging from 2:1 to 5:1. Category III habitats would be compensated for at a rate of 1:1. Acquiring habitat is the primary means of compensation for impacts to tortoise habitat; however, compensation funds can also be used for other tortoise conservation efforts. Purchasing private lands with tortoise habitat would bring these lands into federal protection, making the habitat more secure. Further, reclamation of temporarily disturbed areas would also be conducted and would assist with restoring impacted habitat.

Compensation for habitat loss or take on BLM-managed public lands would involve either the direct purchase of privately-owned desert tortoise habitat for transfer to conservation management, or the direct payment of funds to an appropriate land management agency/entity for purchase of tortoise habitat or other tortoise management actions (DTCT 1991). However, acquiring tortoise habitat is the primary means of compensating for residual impacts (BLM IM AZ-2012-031).

To minimize the potential for desert tortoise mortality, prior to and during ground-clearing construction activities in desert tortoise habitat on BLM-managed public lands, a desert tortoise monitor would survey the ROW. The monitor would meet qualifications for GS-0486 series Wildlife Biologist according to the U.S. Office of Personnel Management (opm.gov) and have the necessary experience and expertise required by the BLM. The survey area would include the ROW plus at least a 50-foot buffer either side of the ROW. Construction monitors would be present in areas where tortoises or fresh tortoise sign was observed during the pre-construction surveys. Any potential tortoise shelter sites in harm's

way would be cleared for tortoises and then rendered unusable (i.e., filled in or blocked with rocks or other native materials). If tortoises are encountered during the pre-construction phase or during construction, APS would follow BLM's Strategy for *Desert Tortoise Habitat Management on Public Lands in Arizona* and any appropriate guidance issued by AGFD and USFWS. Preconstruction and construction crews would look out for and avoid tortoises. If tortoises must be moved to avoid harming them, they would be moved according to AGFD, "Guidelines for Handling Sonoran Desert Tortoise" (2007).

As part of the Environmental Awareness Program, desert tortoise training would be provided to all construction personnel who would be present before and during the ground-clearing activities and any fencing of work areas within desert tortoise habitat. Training would cover identification of tortoises, how to move them according to AGFD guidelines, the protocols for waiting for clearances prior to construction, and when/if a monitor needs to be present. Desert tortoise training would also include general procedures on how to reduce tortoise mortality, such as checking stationary vehicles for tortoises, and recommendations on how to avoid disturbing tortoises that are detected. BLM would have in place any applicable and relevant enforcement procedures for these guidelines, similar to other construction projects on BLM land.

To minimize the potential for vehicle collisions with desert tortoises, vehicle speeds would not exceed 15 mph on all dirt access roads in desert tortoise habitat. Speed limit signs would be installed on all centerline access roads in desert tortoise habitat, and caution signs indicating the potential presence of Sonoran desert tortoises would be posted at the beginning of any such access road in desert tortoise habitat.

2.10 AGENCY PREFERRED ALTERNATIVE

The BLM has identified the Proposed Action route crossing public lands managed by the BLM as the Agency Preferred Alternative route for the proposed transmission line, including BMPs and mitigation measures, with modifications, as necessary. Modifications could consist of minor route deviations for micrositing of structures or segments of the line at the time of route engineering to minimize impacts to visual and other sensitive resources, as indicated in the mitigation measures; however, all potential modifications would still allow for the transmission line route to remain within the ACC-certificated route.

Under the Agency Preferred Alternative, the BLM would approve a 200-foot wide ROW within the existing designated utility corridor northeast of the Sun Valley Substation. In addition, the BLM would amend the Bradshaw-Harquahala RMP to:

- Designate a single-use 200-foot wide utility corridor on public lands managed by the BLM north of SR 74,
- Designate a multiuse utility corridor on 1,013 acres of public lands managed by the BLM south of SR 74 to address potential future BLM management considerations, and
- Change the existing VRM Class designations of 2,362 acres north of SR 74 and 1,013 acres south of SR 74 from VRM Class III to VRM Class IV to allow for the newly established utility corridors (**Figure 2.10-1**).

Upon amendment of the Bradshaw-Harquahala RMP, the BLM would approve a 200-foot wide ROW following the Proposed Action route within the newly designated corridors.

The Agency Preferred Alternative would reasonably accomplish the purpose and need for the federal action, while fulfilling the BLM's statutory mission and responsibilities, giving consideration to environmental, economic, and technical factors. This action is responsive to public input for avoiding environmental and economic impacts to lands in the Project vicinity.