

Legend

- Resource Components**
- Important Streams
 - Springs
 - ⊕ Gaging Station

- General Reference**
- Existing Pipelines
 - Mead-Liberty/Mead-Phoenix Transmission Lines
 - Stream/River
 - U.S. Route

- Project Components**
- ▨ Pipeline Corridor Segments
 - ▨ Proposed Pipeline Corridor - R1, C1, T3, C3, T4, R5
 - ▨ Alternative R Corridor - R1, R2, R3, C3, R4, R5
 - ▨ Alternative T Corridor - T1, T2, T3, C3, T4, T5
 - ▨ Proposed Plant Facilities

0 5

Scale in Miles

Universal Transverse Mercator Projection
1927 North American Datum
Zone 12

**Surface Water Resources Map
of the Big Sandy Basin
Big Sandy Energy Project EIS**



Figure 3.5-2

**TABLE 3.5-1
BIG SANDY RIVER
GAGING STATION SOUTH OF WIKIEUP (09424450)
WATER CHEMISTRY DATA**

Analyte	Federal Drinking Water Standard	Unit of Measure	Recorded Flow Rate (cfs)			
			Low	Medium	High	Extreme
			(<20)	(30-50)	(100-260)	(>1000)
As	50	µg/L	5-11	11-14	6-12	5
Ba	2,000	µg/L	40-300	40-400	20-200	100
Cd	5	µg/L	0-2	N/A	N/A	N/A
Cr	100	µg/L	20	N/A	20	40
Cu	1,300*	µg/L	0-7	3-7	3-9	5
Pb	15	µg/L	0-10	11-96	2-9	N/A
Hg	2	µg/L	0.1-0.5	N/A	0.1	0.1
NO₃	10	mg/L	0.71-4.8	N/A	2.3	9.7
Se	50	µg/L	0-1	1	1-6	1
SO₄	250*	mg/L	120-170	140-160	30-120	18
TDS	500*	mg/L	538-732	540-653	169-448	103
F	4	mg/L	1.3-1.5	1.1-1.4	0.4-0.9	0.5

*Indicates a Secondary Drinking Water standard.

and McGarrys Wash. Perennial riparian areas have been identified along certain reaches in the upper portions of Sycamore Creek and Boner Canyon.

Proposed Gas Pipeline Corridor

Surface water resources along the proposed gas pipeline corridor include the Big Sandy River, ephemeral Knight Creek, and numerous ephemeral tributaries that generally trend east to west or west to east and discharge to the Big Sandy River system. Notable tributaries crossed include Bronco Wash, Cane Springs Wash, Wheeler Wash, and McGarrys Wash.

Alternative R Gas Pipeline Corridor

Surface water resources along the Alternative R gas pipeline corridor include the Big Sandy River, ephemeral Knight Creek, and numerous ephemeral tributaries that generally trend east to west or west to east and discharge to the Big Sandy River system. Notable tributaries crossed include Bronco Wash, Cane Springs Wash, Wheeler Wash, and McGarrys Wash.

Alternative T Gas Pipeline Corridor

Surface water resources along the Alternative T gas pipeline corridor include the Big Sandy River, ephemeral Knight Creek, and numerous ephemeral tributaries that generally trend east to west or west to east and discharge to the Big Sandy River system. Notable tributaries crossed Sycamore Creek, Bitter Creek, Boner Canyon, Cane Springs Wash, Wheeler Wash, and McGarrys Wash. Perennial riparian areas have been identified along certain reaches in the upper portions of Sycamore Creek and Boner Canyon.

Crossover Corridor Segment C2

No surface water resources were identified along crossover corridor segment C2.

3.5.2 Environmental Consequences

The following sections outline the environmental issues related to surface water resources, significance criteria, and the methodology and conclusions of the impact

assessment. Also described are mitigation measures that could be implemented to minimize impacts on surface water resources.

3.5.2.1 Identification of Issues

The following is a list of issues that were identified as relating to surface water; these issues form the basis for the assessment of potential impacts:

- potential impacts on surface water quality of the Big Sandy River, Alamo Reservoir, and Bill Williams River
- potential impacts on other surface water uses in the watershed
- potential impacts on surface water quality from wastewater discharges, stormwater discharges, secondary water uses, or crossings of the proposed or alternative gas pipeline corridors
- potential impacts of long-term groundwater withdrawal on surface water rights associated with springs and seeps
- potential direct and indirect impacts of long-term groundwater withdrawal on surface water resources
- potential impacts on the quantity of instream flow in the Big Sandy River and downstream surface water resources, including Alamo Reservoir and the Bill Williams River
- potential impacts on existing water rights on the Big Sandy River

3.5.2.2 Significance Criteria

Listed below are the significance criteria that have been established for the identified surface water issues. Impacts would be considered significant if the following were to occur:

- any reduction of flows in the Big Sandy River and/or downstream watercourses due to long-term groundwater withdrawal
- degradation of surface water quality in exceedance of state-established standards for designated uses of the Big Sandy River, Alamo Reservoir, or Bill Williams River, excluding background levels
- any uncompensated impact on existing surface water rights to springs and seeps, the Big Sandy River, and/or other watercourses

3.5.2.3 Impact Assessment Methods

In order to assess potential impacts on surface water resources within the region of influence, the first task involved reviewing the proposed agricultural water uses and locations as well as the proposed wastewater and stormwater discharge plans with respect to their potential impacts on surface water quantity and quality. Information collected and reviewed included the anticipated characteristics of wastewater discharge from generation areas. Also reviewed were actions included in the Proposed Action that would minimize impacts on surface waters, such as erosion and sedimentation control measures and Big Sandy River flow augmentation.

Where possible and appropriate, approximate impacts on surface water quality/quantity and surface water rights were estimated. Estimated impacts on surface water flows were based in part on results of groundwater modeling. Potential impacts on surface water quality/quantity were assessed by characterizing and quantifying discharge, and assessing how it may affect downstream surface water bodies.

The results of groundwater modeling were reviewed to assess whether surface water flows in the Big Sandy River and downstream watercourses could be impacted.

If applicable, potential mitigation measures not already included in the Proposed Action were identified to prevent potential impacts on surface water quality, quantity, or rights.

3.5.2.4 Actions Incorporated Into the Proposed Action to Reduce or Prevent Impacts

The Proposed Action includes the following measures to reduce or prevent potential adverse environmental impacts on surface water:

- A groundwater and surface water monitoring plan would be implemented. The principal objective of groundwater monitoring would be to assess the extent to which observed water level drawdowns correlate with model-predicted drawdowns, and to use this information to determine the amount of water to be added, and the timing of this water augmentation. The groundwater and surface water monitoring plan is summarized in Sections 3.4.2.4.
- Two options have been included in the Proposed Action that would augment flows in the Big Sandy River to avoid reduction due to long-term groundwater withdrawal. These options are described in Section 3.4.2.4.
- The potential reduction or elimination of flow at Cofer Hot Spring would be mitigated by using existing shallow wells located near the spring to supply water for grazing. One of the wells would be pumped to a stock tank or water trough to provide water for the spring's grazing allotment. In addition, Caithness has agreed in concept with the landowner to provide a well to access water from the lower aquifer to replace any water for other uses lost from reduction in spring flow.
- The Stormwater Pollution Prevention Plan would be implemented and revised as

needed (refer to Section 2.2.8.4 and Appendix A).

- Best management practices would be followed during construction in order to limit the temporary impacts of increased erosion, sedimentation, and/or turbidity in surface waters. These include measures such as silt fences, hay bales, water bars, and sediment barriers. More detail is provided in Section 2.2.8.2.

3.5.2.5 Impact Assessment

Proposed Action

The assessment of potential impacts on surface water resources is described below in terms of the significance criteria outlined in Section 3.5.2.2.

Surface Water Flows

The Project would not likely have a significant impact on surface water flows in the Big Sandy River, either in the vicinity of the Project area or downstream in Granite Gorge or below (refer to Section 3.4.2.5).

Groundwater modeling results suggest that, with the exception of Cofer Hot Spring, there would be no impact on springs, seeps, or riparian areas in the Aquarius Mountains because they are hydraulically disconnected from the lower (volcanic) aquifer (refer to Section 3.4). Replacement of the lost Cofer Hot Spring water that had been used for grazing and other uses has been included in the Proposed Action (refer to Section 2.2.8.6). With this replacement, there would be no significant impacts.

Agricultural activities should not have any direct impact on surface water flows. However, the proposed quantity of groundwater to be produced for the Proposed Action includes irrigation water demands. Thus, agricultural activities could have an indirect impact on surface water flows in the Big Sandy River

downstream of Granite Gorge due to long-term groundwater production for purposes including irrigation.

Neither the installation of the OPGW, construction of the gas pipeline in any location within the proposed corridor, nor the construction of the proposed access road would be likely to cause any significant impacts on surface water flows because these activities would be designed to not alter flows.

All stormwater within the proposed power plant site and substation boundaries would be captured and diverted to the evaporation ponds in accordance with the Stormwater Management Plan. This would remove 46 acres from the drainage basin of Grey Wash, which would not adversely affect surface water flows.

Surface Water Quality

The proposed power plant is designed to be a zero discharge facility. Practices would be implemented as follows: (1) onsite stormwater generation would be collected and routed to lined evaporation ponds (Caithness 2000a); (2) offsite stormwater discharges would be routed around the facility and returned to natural drainages using standard erosion control structures including a retention basin (Caithness 2000a); (3) a Stormwater Pollution Prevention Plan (SWPPP) has been developed to prevent onsite stormwater pollution and/or discharge from the proposed power plant site (Caithness 2000b and Appendix A.); (4) process wastes would be discharged to the evaporation ponds; (5) the evaporation ponds would be double-lined with leak detection; and (6) erosion and sedimentation control measures would be implemented. These practices should prevent all but incidental discharges. Thus, there would be no significant degradation of surface water quality in the Big Sandy River or downstream watercourses.

As part of the Proposed Action, Caithness has agreed to monitor groundwater levels and to

augment surface flows to prevent any impacts on the upper aquifer as a result of the Proposed Action (refer to Section 3.4). A potential source of water for augmentation is groundwater from the lower aquifer, which would be piped from the groundwater production wellfield and added into the Big Sandy River between the US 93 bridge over the Big Sandy River and the marsh. Analytical results from two lower aquifer groundwater samples collected from the production wellfield show arsenic at concentrations of 80 and 141 g/L, which exceed the Big Sandy River arsenic surface water quality standard of 50 g/L. In addition, the temperature of the lower aquifer water was measured at 96 °F.

Caithness has proposed as part of the Proposed Action to discharge to the Big Sandy River only water that meets all applicable surface water quality standards. In addition, a National Pollutant Discharge Elimination System (NPDES) permit would be required to add water from the lower aquifer to the river. Surface water quality standards could be met by either treating the groundwater stream to surface water quality standards, or by using the treated water from the power plant water treatment system as the source of augmentation water. Other options may be available; therefore, there would be no significant impact on surface water quality.

There is a potential for erosion of the surrounding dike and sides of the evaporation ponds both from wind-generated wave action and from bank erosion of the wash that flows between the ponds. An impact on surface water quality could occur if erosion eventually caused one of the evaporation ponds to breach. However, wave action erosion should not occur because the evaporation ponds will be double-lined and covered with a 9-inch-thick layer or riprap; and the surrounding dike will be covered with a 6-inch layer of gravel or crushed rock to provide erosion protection.

As part of the Proposed Action, agricultural activities would be conducted on an

approximately 107-acre site located in the northwest quarter of Section 7, T15N, R12W (Caithness 2000c). It is unlikely that agricultural activities would have a significant impact on surface water quality of the Big Sandy River basin or downstream watercourses. This is because the quantities and application rates of chemicals and water are typical for the desert southwest region of the United States and proposed crops. Also, the Proposed Action includes operating the agricultural area in a fashion that minimizes the potential for runoff of irrigation water, applied chemicals, and fine-grained soils to surface waters. There is a potential for offsite stormwater runoff to enter and flow over the agricultural area. Stormwater discharge from the agricultural area could carry irrigation water, low concentrations of residual applied chemicals, and silts and clays from the topsoil. Neither the construction of the gas pipeline in any location within the proposed corridor nor the construction of the proposed access road would be likely to cause any significant, long-term impact on surface water quality. The primary communication system would involve installing microwave dishes on existing towers and would have no impact on surface water quality. Construction of the pipeline or OPGW across washes and at crossings of the Big Sandy River may cause a minor, temporary impact on surface water quality, including some increase in sedimentation and turbidity. The Big Sandy River is perennial in this area, so it is likely that the river would be flowing during construction. However, these activities would be short-lived, and with the implementation of the best management practices included in the Proposed Action, impacts would not be considered significant. Caithness has included several erosion and sedimentation control measures in the Proposed Action (refer to Sections 2.2.8.2 and 2.2.8.4).

Domestic water supplies would not be impacted because they rely on groundwater instead of surface water.

Surface Water Rights

The surface water rights that potentially could be impacted are those pertaining to Cofer Hot Spring and the Big Sandy River downstream of Granite Gorge. Because there would be no reduction in flows in the Big Sandy River, no downstream surface water rights would be impacted (refer to Section 3.4.2.5).

It has been demonstrated through aquifer testing and numerical groundwater modeling that discharge from Cofer Hot Spring would be reduced, and possibly cease, as a result of groundwater withdrawal from the volcanic aquifer (refer to Section 3.4.2.3). Cofer Hot Spring is located on privately owned land. Discharges from the spring are used on site and do not flow off site. Caithness has agreed in concept with the landowner to provide compensation for impacts on the spring. This agreement is described in Section 2.2.8.6.

The assessment of springs and seeps conducted for the groundwater modeling suggests that no other known springs or seeps are hydraulically connected to the volcanic aquifer. Thus, it is not anticipated that any springs or seeps besides Cofer Hot Spring would be impacted. Refer to Section 3.4 for a further discussion of this topic. Because loss of flow at Cofer Hot Spring would be compensated, and because no other springs or seeps would be affected, impacts on surface water rights would not be considered significant.

Construction of the gas pipeline, along the proposed corridor or the access road, and installation of the OPGW and microwave dishes would not consume any water; therefore, these activities will not impact surface water rights. Agricultural irrigation would not impact surface water rights either since the estimated water demand for irrigation is included in the proposed groundwater consumption rate for the Proposed Action.

Alternative R Gas Pipeline Corridor

The impacts of Alternative R would be the same as the Proposed Action.

Alternative T Gas Pipeline Corridor

Construction of the gas pipeline along the Alternative T gas pipeline corridor would result in crossing the Big Sandy River approximately 3 to 4 miles north of Wikieup. The Big Sandy River is ephemeral in this area, so it is likely that the river would be dry during pipeline installation. Thus, there would be little potential for surface water quality impacts to occur during construction. Some increase in sedimentation and turbidity could occur when the river later flows across the trenched area in response to a substantial precipitation event. This potential impact would be temporary, and it is likely that the river water would naturally have elevated turbidity due to entrainment of fines that collect on the surface of the channel during periods of no flow. Implementation of the best management practices contained in the Proposed Action would reduce the potential for impacts on surface water quality. Therefore, the impacts of this alternative would be less than significant.

No-Action Alternative

Under the No-Action Alternative, the Project would not be constructed and there would be no change to, or disturbance of, existing surface water resources within the Big Sandy Valley.

3.5.2.6 Mitigation and Residual Impacts

If adopted, the mitigation measure described in Section 3.4.2.5 regarding conversion of existing surface water irrigation rights to instream flow rights, would avoid significant impacts on surface water flow. With implementation of this measure, no residual significant impacts are expected.

If adopted, the following measure would be implemented to minimize adverse impacts not considered to be significant:

- The small wash between the evaporation ponds and evaporation pond dike would be designed and constructed to prevent substantial erosion and ensure the integrity of the pond.

3.6 FLOODPLAINS

This section describes the affected environment and environmental consequences relative to floodplains. This section complies with 10 CFR 1022, Floodplain/Wetlands Environmental Review Requirements. The Final EIS will contain a Statement of Findings explaining why the Proposed Action would be located in a floodplain and a list of alternatives considered, and describe steps that would be taken to minimize harm to or within any floodplain.

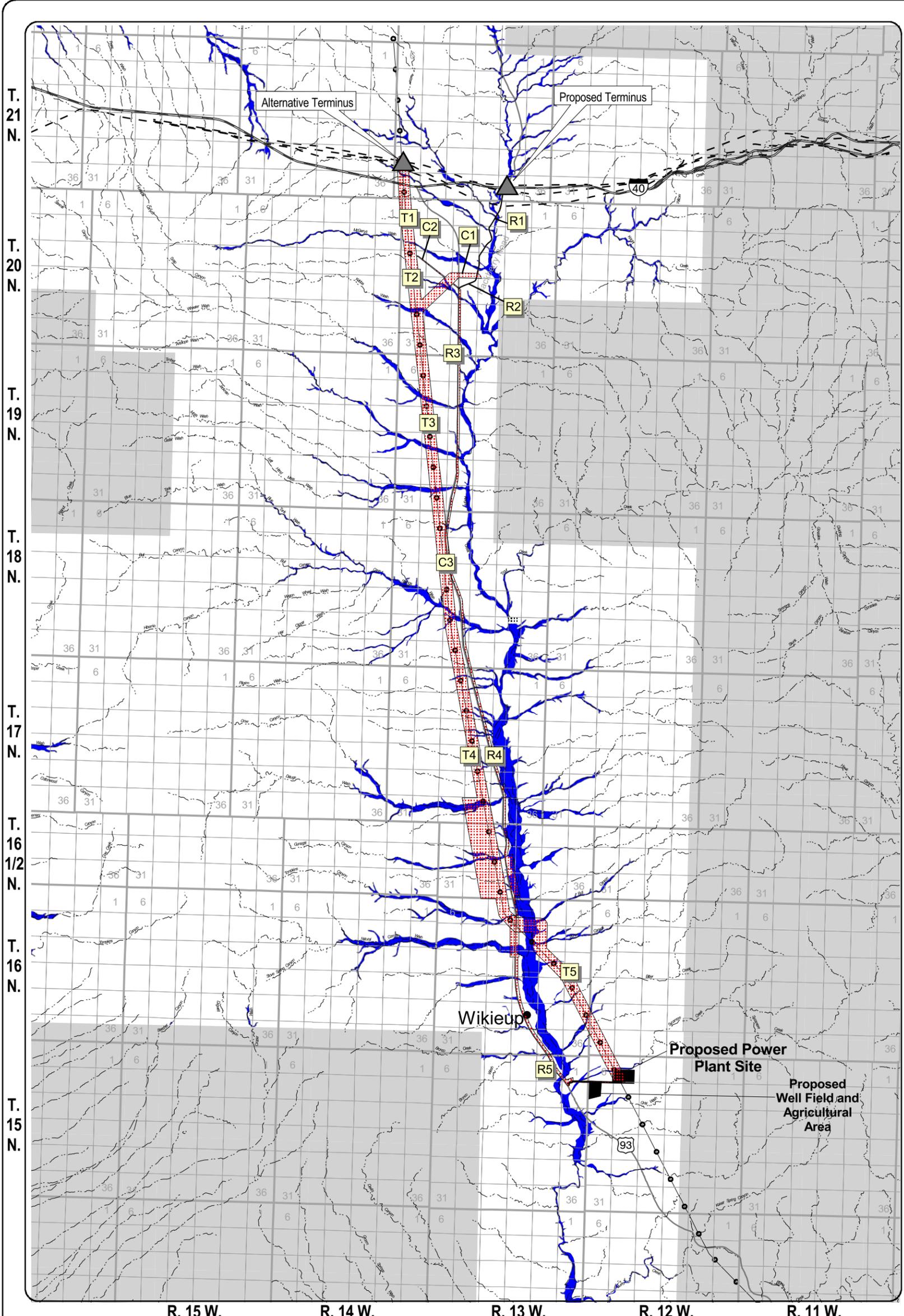
3.6.1 Affected Environment

The following sections describe the current floodplain conditions. The description of current conditions represents the baseline for the assessment of impacts and environmental consequences.

Areas of potential flooding (100-year and 500-year floodplains) as determined by the Federal Emergency Management Agency (FEMA) have been identified in the vicinity of the proposed Project and are presented on Figure 3.6-1.

The proposed power plant site, which is located mainly in the southwest quarter of Section 5, T15N, R12W, is situated in Zone C, which is defined by FEMA to include all areas of minimal flooding.

The proposed gas pipeline corridor crosses the Big Sandy River, minor tributaries, and several washes.



Legend

Resource Components

- Zone A - Areas of 100 year flood; base flood elevations and flood hazard factors not determined.
- Zone D - Areas of undetermined, but possible, flood hazards.
- Zone X - Areas of minimal flooding.
- Area Not Included

General Reference

- Existing Pipelines
- Mead-Liberty/Mead-Phoenix Transmission Lines
- Stream/River
- Interstate
- U.S. Route

Project Components

- Pipeline Corridor Segments
- Proposed Pipeline Corridor - R1,C1,T3,C3,T4,R5
- Alternative R Corridor - R1,R2,R3,C3,R4,R5
- Alternative T Corridor - T1,T2,T3,C3,T4,T5
- Proposed Plant Facilities

**Floodplain Map
of the Big Sandy Basin
Big Sandy Energy Project EIS**



Scale in Miles

Universal Transverse Mercator Projection
1927 North American Datum
Zone 12



Figure 3.6-1

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The floodplains that would be crossed by the proposed pipeline corridor are classified as Zone A, which are areas of the 100-year flood; base flood elevations and flood hazard factors have not been determined. One tributary crossing in corridor segment R5 is classified as Zone A0, which is an area of 100-year shallow flooding where depths are between 1 and 3 feet; the average depth of inundation in this case is 2 feet, but no flood hazard factors have been determined. A list of the floodplains crossed by the proposed and alternative gas pipeline corridors is presented in Table 3.6-1.

3.6.1.1 Region of Influence

The region of influence for assessing impacts on floodplains and washes includes all facilities related to the Project. The Project parcels, well sites, access roads, pipeline corridors, and potential areas for the OPGW installation were evaluated to determine the level of possible floodplain disturbance.

3.6.1.2 Existing Conditions

Proposed Power Plant Site

The proposed power plant site is located in the southeastern portion of the Big Sandy groundwater basin, which occupies an area of approximately 800 square miles. The primary drainage and surface water resource in the basin is the Big Sandy River.

The proposed power plant site and substation are located between Sycamore Creek and Gray Wash, which are both westerly flowing tributaries to the Big Sandy River. The site is crossed by several southerly and southwesterly flowing ephemeral drainages that are tributaries to Gray Wash.

Proposed Route	Alternative R	Alternative T
Big Sandy River	Big Sandy River	Big Sandy River
Sycamore Creek	Sycamore Creek	Sycamore Creek
Bronco Creek	Bronco Creek	Bitter Creek
Tributary #1 (AO)	Tributary #1 (AO)	Tompkins Canyon Creek
Natural Corrals Wash	Natural Corrals Wash	Gunsight Canyon Creek
Tompkins Canyon Creek	Tompkins Canyon Creek	Deluge Wash
Gunsight Canyon Creek	Gunsight Canyon Creek	Cane Springs Wash
Deluge Wash	Deluge Wash	Moss Wash
Cane Springs Wash	Cane Springs Wash	Antelope Wash
Moss Wash	Moss Wash	Wheeler Wash
Antelope Wash	Antelope Wash	Kabba Wash
Wheeler Wash	Wheeler Wash	McGarrys Wash
Kabba Wash	Kabba Wash	10 Minor Tributaries
Bottleneck Wash	Bottleneck Wash	
McGarrys Wash	McGarrys Wash	
14 Minor Tributaries	29 Minor Tributaries	

Note: All floodplains crossed by the proposed and alternative gas pipeline corridors are classified as Zone A except Tributary #1, which is classified as Zone A0.

The proposed power plant site and substation are located in an area of minimal flooding, outside of the 100-year and 500-year floodplain zones that extend from the Big Sandy River. The proposed gas pipeline corridor crosses the river west of the proposed power plant site and various extensions of the floodplain as the corridor runs north toward the intersection with the existing pipeline.

Proposed Gas Pipeline Corridor

Most of the segments that make up the proposed gas pipeline corridor intersect a floodplain. Only corridor segment C3, which also is included in the Alternative R and T gas pipeline corridors, is completely encompassed by Zone C and avoids any such crossings.

Corridor segment R5 crosses the Big Sandy River just west of the proposed power plant site along US 93. The crossing of Zone A0 is also located in corridor segment R5. All other crossings along the proposed gas pipeline corridor involve Zone A floodplains.

Alternative R Gas Pipeline Corridor

The Alternative R gas pipeline corridor crosses the same washes and creeks as the Proposed Action, but intersects many more minor tributaries. Corridor segment R4 is the main contributor to the additional crossings and overlaps approximately 8,000 feet of Zone A floodplain of the Big Sandy River in T16N, R13W. The remaining segments of this alternative have similar qualities to the Proposed Action. Corridor segment R2 is solely in Zone C, but the rest cross at least one floodplain in Zone A.

Alternative T Gas Pipeline Corridor

The Alternative T gas pipeline corridor has the fewest floodplain crossings of all the corridors presented. However, corridor segment T5 would cross approximately 0.5 mile of the Big Sandy floodplain. Zone A is the only floodplain that would be affected, as corridor segment R5 is

excluded from this alternative. All the segments in the Alternative T gas pipeline corridor have similar intersections.

Crossover Segment C2

Crossover segment C2, which is not part of any of the corridors, does not intersect any flood zones.

3.6.2 Environmental Consequences

The construction of new facilities within floodplains or washes potentially could have an adverse impact on 100-year peak flow events. The extent of disturbance for this Project is examined in the following sections.

3.6.2.1 Identification of Issues

The issues identified are the potential adverse impacts on natural and floodplain values, as well as the potential adverse impacts on downstream lives and property.

3.6.2.2 Significance Criteria

The effects of the Proposed Action and alternatives would be considered significant if the following would occur:

- encroachment on a floodplain or alteration of a wash, watershed, or river or wash flow that would cause a rise in river or wash flow stage or increase in floodplain area downstream, such that the alteration would cause destruction of lives or property
- construction within or surrounding washes that would cause a substantial reduction in flood-carrying capacity

3.6.2.3 Impact Assessment Methods

Potential impacts on washes and floodplains were assessed based on intersections that would occur where the proposed Project would cross an existing wash or floodplain boundary. Factors including the number and location of

intersections and the nature and size of facilities that intersect these features were evaluated.

The washes and floodplains were identified by plotting the proposed power plant site and the proposed and alternative gas pipeline corridors on FEMA Flood Insurance Rate Map (FIRM) panels. The proposed power plant site was found to be outside of any flood zone, but the access road and the proposed and alternative gas pipeline corridors cross several 100-year floodplains. Floodplain crossings associated with the proposed and alternative gas pipeline corridors were counted based on hypothetical assumed pipeline alignments along the centerlines of the corridors; these crossings are presented in Table 3.6-1. Any crossings not included in Table 3.6-1 that may occur due to selection of a final alignment would be evaluated as necessary during pre-construction surveys.

3.6.2.4 Actions Incorporated Into the Proposed Action to Reduce or Prevent Impacts

The Proposed Action includes the following measures to reduce or prevent potential adverse impacts on floodplains :

- The proposed county road that would connect the proposed power plant site to US 93 would include a box culvert at the Sycamore Creek crossing designed to handle a 100-year, 24-hour flood event.
- The Proposed Action includes numerous erosion and sedimentation control measures that would help to reduce downstream floodplain impacts. Section 2.2.8.2 includes a discussion of these measures.

3.6.2.5 Impact Assessment

Proposed Action

Since the proposed power plant site is located outside of the 100- and 500-year floodplain zones, no adverse impacts are expected in this area. All stormwater within the proposed power

plant site and substation boundaries would be captured and diverted to the evaporation ponds in accordance with the Stormwater Management Plan. Stormwater in the washes upstream of the power plant, substation, and evaporation ponds would be collected and diverted in drainage channels around the facilities back into the same washes through appropriate erosion control and energy dissipation structures. Therefore, floodplains in Gray Wash and Sycamore Creek would not be adversely affected.

There are numerous crossings of floodplains by the proposed gas pipeline corridor. These areas would be disturbed only temporarily during construction because the pipeline would be placed underground. The pipeline would be buried at a depth of approximately 4 to 5 feet, which would eliminate the possibility of permanent floodplain disturbance. After the pipeline is in place, the excavated trench would be regraded to the approximate pre-construction contour. In effect, the original floodplain features and characteristics would remain unchanged. A Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (COE) would be required for the section of pipeline trenched through the Big Sandy River in corridor segment R5. Downstream effects would be minimal because this disturbance along the pipeline corridor would be temporary and because of the erosion/sedimentation control measures included in the Proposed Action.

The option to directionally drill the natural gas pipeline approximately 20 to 30 feet below the Big Sandy River instead of trenching and burying is included in the Proposed Action. The directional drilling option would minimize or eliminate impacts on floodplains and associated riparian areas during construction. In addition, this method could avoid the requirement of a permit from the COE pursuant to Section 404 of the Clean Water Act.

In corridor segment T4, where this corridor expands in the vicinity of the Carrow-Stephens Ranches Area of Critical Environmental Concern (ACEC) and near the Hackberry

Road/US 93 intersection, floodplain crossings other than those listed in Table 3.6-1 would be encountered. Following pre-construction surveys, the final alignment would be located anywhere within the corridor. However, as mentioned before, all crossings would involve only temporary impacts.

The proposed county road would cross the Sycamore Creek floodplain. Because the box culvert under the road would be sized to handle the 100-year, 24-hour flood event, it would not cause a substantial reduction in flood-carrying capacity. Sycamore Creek would continue to flow through the box culvert and its downstream effects should remain the same.

The proposed agricultural activities and well sites would not affect any floodplains.

Any floodplains that occur along the route of the OPGW installation option would be easily avoided.

The microwave dishes would be installed on existing towers and would have no impact on floodplains.

Because there would be no alteration of flood-carrying capacity from the crossing of Sycamore Creek, and no permanent encroachment or alteration of a wash or river, and the resulting downstream effects would be negligible, the potential adverse impact on floodplains would not be significant.

Alternative R Gas Pipeline Corridor

The Alternative R gas pipeline corridor is similar to the Proposed Action. It crosses the same washes and streams, but intersects more tributaries. Corridor segment R4 potentially could affect the Big Sandy floodplain, but the impact would not be significant since there would not be substantial encroachment or alteration of flows or flood-carrying capacity.

As with the Proposed Action, there would be no alteration of the flood-carrying capacity of

Sycamore Creek, and all crossings occurring along this alternative corridor would involve only temporary impacts. Thus, the potential for adverse impacts on floodplains would not be significant.

Alternative T Gas Pipeline Corridor

The Alternative T gas pipeline corridor would have similar impacts as the Proposed Action. This alternative would likely have fewer floodplains to cross; however, it would cross approximately 0.5 mile of the Big Sandy floodplain.

As with the Proposed Action, there would be no alteration of the flood-carrying capacity of Sycamore Creek, and all crossings occurring along this alternative corridor would involve only temporary impacts. Thus, the potential for adverse impacts on floodplains would not be significant.

Crossover Corridor Segment C2

Crossover segment C2 would have no adverse impacts on floodplains because it does not cross any flood zone.

No-Action Alternative

The Proposed Action would not be constructed under the No-Action Alternative. There would be no impacts on floodplains.

3.6.2.6 Mitigation and Residual Impacts

No significant impacts would result from the implementation of the Proposed Action with the actions incorporated to reduce or prevent impacts and there would be no residual significant impacts.

If adopted, the following measure would be implemented to minimize adverse impacts not considered to be significant:

- Should substantial channel erosion occur in Sycamore Creek as a result of the

installation of the box culvert that causes an impediment to wildlife movement, corrective actions, such as the placement of additional riprap or other means of restoring the channel grade sufficient to allow wildlife movement, would be taken.

3.7 LAND USE AND ACCESS

This section identifies and describes the jurisdiction and existing and planned land uses in the vicinity of the Proposed Action, as well as environmental consequences as they apply to land use and access.

Information was compiled from agency maps and planning documents, aerial photography, and previously conducted resource studies. Field investigations were conducted in August 2000 and April 2001 to verify existing land use conditions.

Land jurisdiction represents the administrative control maintained by the responsible Federal, state, Indian nation, or local agencies within the Project area. The jurisdiction does not necessarily dictate ownership. Jurisdictional boundaries were obtained from BLM and Arizona State Land Department (ASLD) maps and digital data. The main jurisdictions within the Project area include BLM, ASLD, Hualapai Tribe, and Mohave County. Private lands in the Project area are under the jurisdiction of Mohave County. Land jurisdiction and ownership for the power plant site, pipeline corridors, and surrounding areas are presented in Section 2.0 on Figure 2-12.

Existing land uses (regardless of jurisdiction or planned use) were determined from aerial photography and subsequent field visits. Planned land uses were assessed from appropriate planning documents; the plans applicable for land management in the area include the Kingman Area Resource Management Plan (BLM 1995) and Mohave County General Plan (1995) and Zoning Ordinance (2000). The approximate locations of residences and existing

land uses are shown on Figure 3.7-1; planned land uses are shown on Figure 3.7-2.

In May 2001, the BLM Kingman Field Office completed the Cane Springs Land Exchange. This exchange brought additional lands in the region under the management responsibility of BLM. Twenty-eight sections of land in T18N and T19N; R13W and R14W just west of US 93 (Figure 3.7-3) were involved in this exchange. The Alternative T gas pipeline corridor crosses portions of two of these sections. Due to the timing of this land exchange agreement, and the limited effect this change in management responsibility has on the proposed Project, this Draft EIS was completed without further assessment of the lands involved in this exchange.

3.7.1 Affected Environment

The following sections describe the current land use and access conditions; this represents the baseline for assessment impacts.

3.7.1.1 Region of Influence

The region of influence for assessing construction, operation, and maintenance impacts on land uses includes all areas within 5 miles of the proposed power plant site, substation, access road, well pads, and agricultural area (all of these Project lands previously part of Banegas Ranch), and 1 mile on each side of the centerline of each alternative pipeline corridor. The Mead-Liberty 345-kV transmission line right-of-way, north of the alternative pipeline terminus, is also included for the potential installation of the redundant communication OPGW. In addition, lands owned by the Hualapai Tribe that are within the Big Sandy Valley have been included as a potentially sensitive land jurisdiction.

3.7.1.2 Existing Conditions

The Big Sandy Valley is surrounded by the Aquarius Mountains to the east, and McCracken and Hualapai Mountains to the west. The Big

Sandy River and US 93 are oriented approximately north-south through the valley. Land uses throughout the valley include ranching, residential uses, and some commercial uses. The developed uses tend to be clustered along US 93 and near the community of Wikieup, which is located toward the south end of the valley. Lands 5 miles or less from the proposed power plant site are privately owned or managed by the BLM. Lands 1 mile from the proposed pipeline corridor are privately owned, Hualapai lands, public lands managed by the BLM, or state lands managed by ASLD (refer to Figure 2-12).

The general area surrounding the proposed power plant site, substation, agricultural uses, water wells, and associated facilities is located approximately 3.5 miles southeast of Wikieup in Sections 5 and 7, T15N, R12W. The terrain varies from flat areas, to rolling hills, to fairly mountainous and rocky terrain east of the proposed power plant site. There are small washes dissecting the area, as well as two large ephemeral streams, Sycamore Creek and Gray Wash. The proposed power plant site is located near one small spring and wetland area (refer to Section 3.12) with primarily native vegetation (refer to Section 3.11). Vegetation across the general area consists of native upland Sonoran Desert species of grasses, desert shrubs, and some cacti. The area is primarily open rangeland that is undeveloped and/or grazed by cattle and/or wild burros. There is a grazing allotment for use of public lands.

The general area shows evidence of some vehicle traffic; however, the disturbance appears predominantly limited to small areas (e.g., near well sites). There is one large bladed strip along the northern boundary of Section 7, which crosses through Sycamore Creek. This is the route of the proposed county road and currently is used for access from US 93 to the east.

The developed uses in the vicinity are limited to the Mead-Phoenix Project 500-kV transmission line, Phelps Dodge water pipeline, scattered water wells, a clay mining operation, two

existing dirt roads [one through Sections 5 and 6 (T15N, R12W) and one through Section 7], and one residence that has several trailers associated with it. The residence is located approximately 0.5 mile southwest of the proposed power plant site, directly east of the proposed wells and agricultural area. The general area includes privately owned and BLM-managed lands. Plans for Mohave County and BLM-managed public lands do not indicate any proposed additional development near the proposed power plant site.

Communication Facilities

Land uses at Hayden Peak in the Hualapai Mountains include existing access roads and radio/microwave towers.

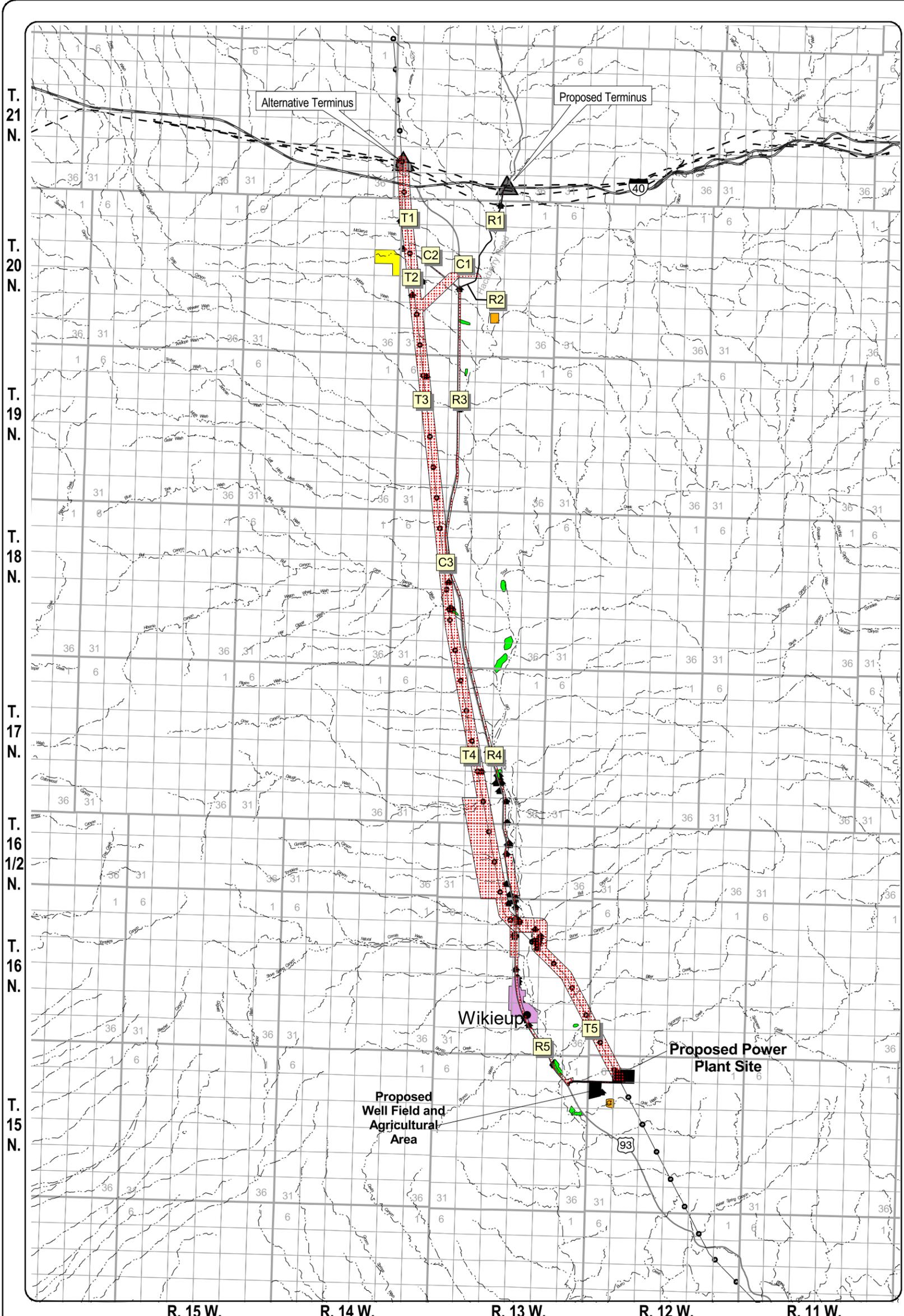
Land uses surrounding the Mead-Liberty 345-kV transmission line, where the OPGW option would be installed, are described under the pipeline corridor segments following the transmission lines. Lands north of the alternative pipeline terminus (Section 29, T21N, R14W) are privately-owned lands that typically include large-acreage remote ranches with a single residence and other structures associated with ranch uses (e.g., corrals, barns).

There are about three residences located near or adjacent to the Mead-Phoenix Project 500-kV or Mead-Liberty 345-kV rights-of-way. In addition to the privately owned lands, there are undeveloped lands managed by ASLD.

Natural Gas Pipeline Corridor

As described in Section 2.0, the corridor for the proposed natural gas pipeline would include corridor segments R1, C1, T3, C3, T4, and R5. The land uses associated with each corridor segment are described below, beginning closest to the plant site.

Corridor segment R5 follows the alignment of the proposed access road west to US 93, turns north and follows along the east side of the US 93 to the intersection of the highway and the Mead-Phoenix Project 500-kV transmission line.



Legend

- Resource Components**
- Agriculture
 - Industrial
 - Mining Area (Sand, Gravel, Zeolite)
 - Mixed Use - Residential, Commercial, Agriculture
 - Residential
 - ◆ Residential or Commercial Sites
- Note: Inventory performed in corridor segments only.

- Project Components**
- Pipeline Corridor Segments
 - Proposed Pipeline Corridor - R1,C1,T3,C3,T4,R5
 - Alternative R Corridor - R1,R2,R3,C3,R4,R5
 - Alternative T Corridor - T1,T2,T3,C3,T4,T5
 - Proposed Plant Facilities
- General Reference**
- Existing Pipelines
 - Mead-Liberty/Mead-Phoenix Transmission Lines
 - Stream/River
 - Interstate
 - U.S. Route

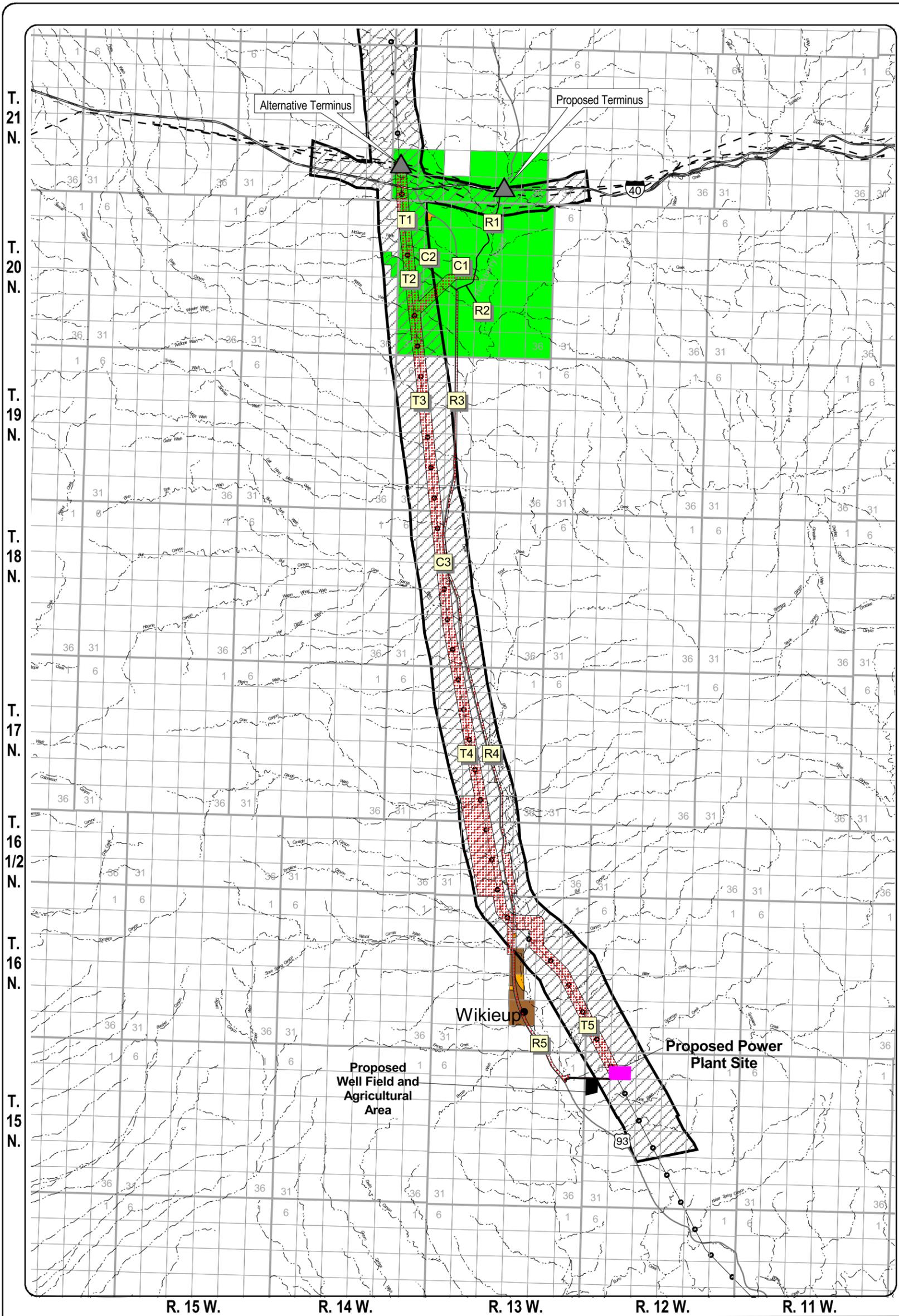
Existing Land Use in the Big Sandy Basin

Big Sandy Energy Project EIS



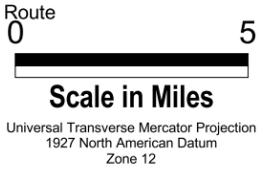
Figure 3.7-1

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Legend

- | | |
|---|---|
| <p>Resource Components</p> <ul style="list-style-type: none"> BLM Utility Corridor Surbaban Development Area General Commercial Industrial <p>Project Components</p> <ul style="list-style-type: none"> Pipeline Corridor Segments Proposed Pipeline Corridor - R1,C1,T3,C3,T4,R5 Alternative R Corridor - R1,R2,R3,C3,R4,R5 Alternative T Corridor - T1,T2,T3,C3,T4,T5 Proposed Plant Facilities | <p>General Reference</p> <ul style="list-style-type: none"> Existing Pipelines Mead-Liberty/Mead-Phoenix Transmission Lines Stream/River Interstate U.S. Route |
|---|---|

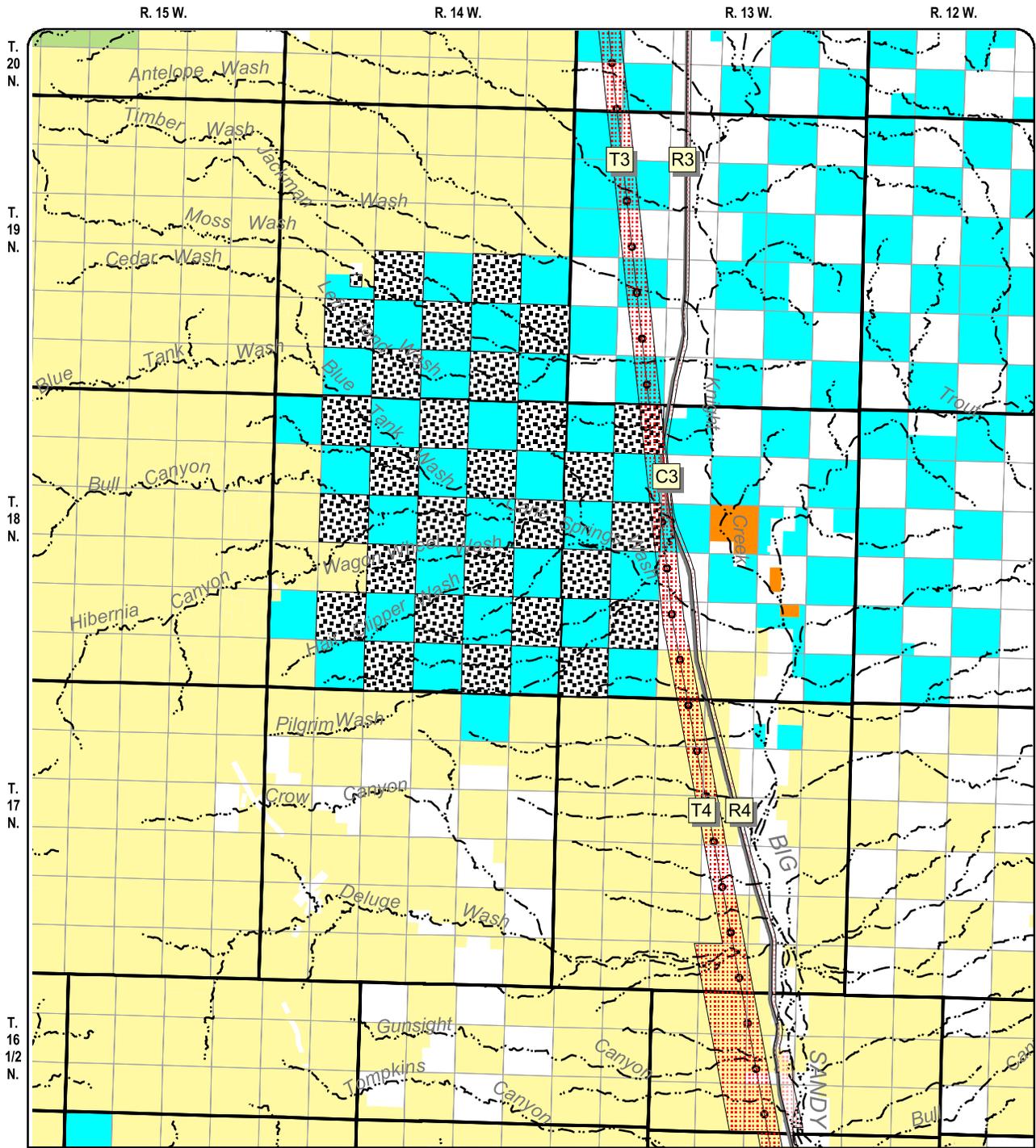


Planned Land Use in the Big Sandy Basin Big Sandy Energy Project EIS



Figure 3.7-2

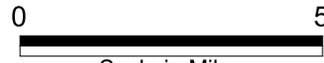
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Legend

- Cane Springs Land Exchange - From Private to BLM Managed Lands
- Private
- State
- BLM
- Hualapai Reservation
- Parks
- Project Components**
- Pipeline Corridor Segments
- Proposed Pipeline Corridor - R1,C1,T3,C3,T4,R5
- Alternative R Corridor - R1,R2,R3,C3,R4,R5
- Alternative T Corridor - T1,T2,T3,C3,T4,T5
- General Reference**
- Existing Pipelines
- Mead-Liberty/Mead-Phoenix Transmission Lines
- Stream/River
- U.S. Route

**Cane Springs Land Exchange
Big Sandy Energy Project EIS**



Scale in Miles
Universal Transverse Mercator Projection
1927 North American Datum
Zone 12



Figure 3.7-3

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This corridor segment crosses the Big Sandy River and travels through the community of Wikieup. Between the plant site and US 93, a large portion of the county road alignment within this corridor has been partially disturbed; much of the vegetation has been removed and vehicle travel along the proposed access road is apparent. The corridor crosses through Sycamore Creek, where vehicle disturbance is also apparent. Near US 93, there is an existing road (Cholla Canyon Ranch Road) which is the current access point from the highway into the general plant site area. North of Cholla Canyon Ranch Road, US 93 crosses over the Big Sandy River via a bridge.

The Big Sandy River area is relatively undeveloped with the exception of the highway crossing. ADOT plans to widen the highway through this area, which will include a second bridge to the west of the existing bridge. North of the Big Sandy bridge, there are four residences located in or near the corridor segment; however, the areas along US 93 remain relatively undisturbed south of the developed community of Wikieup. Through about two miles of Wikieup the land in the corridor tends to be partially to completely disturbed by development and ranching activities; there are up to 15 residences and up to 6 businesses, including a gas station and nursery/garden, located in or near the pipeline corridor. ADOT's proposed highway improvements would not expand the highway or its right-of-way east of US 93 through this area; rather there will be a by-pass road constructed to the west of Wikieup. About 0.25 mile north of Wikieup, there is a historical marker for the Big Sandy Valley located along the east side of the highway (Section 15, T16N, R13W). This corridor segment terminates where the Mead-Liberty 345-kV and Mead-Phoenix Project 500-kV transmission lines cross over US 93. Lands within corridor segment R5 are primarily privately owned, though some small land areas are managed by the BLM (i.e., at section corners along the proposed access road alignment).

Corridor segment T4 parallels each of the Mead-Liberty 345-kV and Mead-Phoenix Project 500-kV transmission lines through a BLM-designated 1-mile-wide utility corridor. As described in Section 2.0, this corridor segment includes a broader area to the west of the transmission lines, for a distance of about 4 miles, to provide an opportunity to avoid the Carrow-Stephens ACEC and existing topographic features. There is only one residence within this corridor, which is along US 93, just north of the Mead-Phoenix Project 500-kV line (on the west side); three additional residences are located on the east side of the highway, immediately north of the transmission lines (located in corridor segment T5). Despite these residences located along US 93, a majority of this corridor is undeveloped rangeland that is used for grazing. In addition, there is a primitive access road that generally follows topographic contours near the transmission line. This road was used for construction of the transmission line and is currently used for maintenance activities. The road is not maintained, but does provide limited access into the area. This corridor segment crosses privately owned lands and lands managed by the BLM and ASLD.

Similar to corridor segment T4, the land within corridor segment C3 includes relatively undeveloped areas used for grazing. This corridor includes US 93 along the east side, providing the opportunity for the pipeline to parallel the transmission lines or the highway. Roads in the corridor, including US 93, the transmission line access road, and several other small dirt roads, are the primary sources of disturbance. The unmaintained transmission line road generally follows the natural contours of the land. There are no residences located in this corridor segment. This corridor segment crosses privately owned lands and lands managed by ASLD.

Corridor segment T3 includes relatively undeveloped rangeland, though some residential development is present toward the north end of the segment. There are two residences, as well as a communication tower, located in Section

30, T20N, R14W, just west of the transmission lines. These are the only developed uses, beyond the transmission lines and the transmission line access road, that are located in this corridor segment. Similar to the transmission line access road in other corridor segments, the road generally follows topographic contours. Corridor segment T3 includes privately owned lands and lands managed by ASLD.

Corridor segment C1 crosses undeveloped rangeland that is used for grazing. This corridor does not follow an existing linear feature and disturbance is limited to the existing nearby access provided by the transmission line access road, Old US 93, US 93, and Hackberry Road. The corridor crosses both Old US 93 and US 93. Old US 93 provides access to Windmill Ranch residences (40-acre parcel residential area) and Sierra Vista Estates (residential subdivision in Section 13, T20N, R14W). US 93 is a two lane highway maintained by ADOT. Roads are the only developed uses; no residences are located within this corridor segment. Corridor segment C1 primarily crosses lands managed by ASLD, though some section corners of privately-owned land are also present in the corridor (see Figure 2-12).

Corridor segment R1 parallels Hackberry Road, a dirt road maintained by Mohave County. The corridor crosses through relatively undeveloped rangeland that is used for grazing. Disturbance is limited to the existing roadway, side access roads, an abandoned mining area (Section 3, T20N, R13W), one residence, gas pipeline crossing areas and associated facilities, and the I-40 corridor. The single residence is located along the east side of Hackberry Road in Section 3, T20N, R13W. The corridor crosses two existing natural gas pipelines, one just south of the residence, the other crossing about 0.5 mile north of the residence. Just north of the second pipeline crossing, Hackberry Road crosses under I-40, at an existing highway underpass. This corridor segment terminates at a third natural gas pipeline immediately north of I-40. This pipeline corridor segment includes privately owned lands and lands managed by ASLD.

Alternative Gas Pipeline Corridors

The two alternative natural gas pipeline corridors follow road alignments completely (Alternative R) or along the transmission lines completely (Alternative T). The land uses associated with each corridor segment that have not been described under the proposed natural gas pipeline corridor are described below. Although none of the alternatives include corridor segment C2, a description of the existing land uses along this crossover segment is also included.

Alternative R Gas Pipeline Corridor

As described in Section 2.0, Alternative R gas pipeline corridor includes corridor segments R1, R2, R3, C3, R4, and R5. Corridor segments R1, C3, and R5 are described under the Proposed Action. The land uses associated with corridor segments R2, R3, and R4 are described below, beginning closest to the plant site.

Corridor segment R4 parallels US 93 and the Big Sandy River. The corridor includes areas east of, and adjacent to, the US 93 right-of-way. The land is relatively undeveloped and is primarily used for grazing, though there are some scattered residences associated with some of these ranch uses. The southern part of the corridor also crosses through the Carrow-Stephens Ranches ACEC (refer to Section 3.10). There are about eight residences located within the corridor along the east side of US 93; additional residences are present outside the width of the corridor to the east and along the west side of US 93. This corridor segment crosses privately owned lands and lands managed by the BLM.

The land uses present in the R3 corridor segment are very similar to those described for corridor segment R4. There are about four residences located within the corridor; additional residences are present outside the corridor and along the west side of US 93. This corridor segment crosses only privately owned lands.

Corridor segment R2 follows along Hackberry Road, which is an unpaved public road maintained by Mohave County. The land in the area is undeveloped; there are no developed uses except one residence that is located outside the corridor. Lands within this corridor are privately owned and managed by ASLD.

Alternative T Gas Pipeline Corridor

As described in Section 2.0, the Alternative T gas pipeline corridor includes corridor segments T1, T2, T3, C3, T4, and T5. Corridor segments T3, C3, and T4 are described under the Proposed Action. The land uses associated with corridor segments T1, T2, and T5 are described below, beginning closest to the plant site.

Corridor segment T5 generally follows the Mead-Phoenix Project 500-kV and Mead-Liberty 345-kV transmission lines from the plant site to its intersection with US 93, except for the area where the corridor crosses the Big Sandy River. This corridor segment also crosses the buried Phelps Dodge water pipeline near the Big Sandy River. The lands through this corridor are mostly undeveloped and used for grazing, though some development is present near the Big Sandy River and where the corridor approaches US 93. Additionally, there is an unmaintained primitive access road that follows the transmission lines. There are about 10 residences located in this corridor (six along the river, four along US 93). Additionally, there are several non-residential structures located in the corridor along the boundary of Sections 10 and 11 (T16N, R13W). This corridor includes lands managed by the BLM and privately owned lands.

Corridor segment T2 is primarily undeveloped rangeland. There are some scattered residences located near the area, though they are completely outside the corridor. The corridor segment is intersected at its north end by Old US 93, a well-maintained dirt road. Additionally, the primitive transmission line road is located in and provides access to areas within this corridor.

This corridor segment crosses privately owned lands and lands managed by ASLD.

Land uses in corridor segment T1 are similar to those described for corridor segment T2; there are no residences located in this corridor segment. Corridor segment T1, however, includes the crossing of I-40 near its north end. The transmission lines cross over I-40; there is not an existing crossing under I-40 in this corridor segment. The corridor also intersects with three natural gas pipelines north of I-40. At the north end of the corridor, there is a large facility operated by El Paso Natural Gas located in Section 29, T21N, R14W, adjacent to the middle pipeline crossing. This corridor segment includes privately owned lands and lands managed by ASLD.

Crossover Segment C2

Corridor segment C2 follows Old US 93. This corridor is narrow, including only the road right-of-way. The land use near the road is generally grazing; there are a few scattered residences (on minimum 40-acre parcels). There are no developed uses, aside from the road itself, located within the corridor. This corridor segment crosses privately owned lands and public lands managed by the BLM.

Management Plans and Policies

Bureau of Land Management

The Kingman Area Resource Management Plan (RMP) guides management of BLM lands in the vicinity of the Project (1995). The Project would be located primarily in the General Management Area, meaning the lands are not subject to unusual demands requiring special management and typically are managed for multiple uses. Land use management prescriptions described in the RMP that are relevant to the proposed Project are for land use authorizations, or rights-of-way, utility corridors, and access issues. Portions of corridor segments R4 and T4 cross the Carrow-Stephens Ranches ACEC (refer to Section 3.10).