

- To minimize the attractiveness of the evaporation ponds to birds, the ponds would be designed to minimize the creation of vegetated or barren mud shorelines, shallow wading habitat, and vegetation in deeper water.
- Water chemistry of the evaporation ponds, including concentrations of potentially toxic constituents (arsenic and selenium), would be monitored. If concentrations of any constituents approach levels known to be chronically toxic to wildlife, the sampling frequency would be increased to at least quarterly. At least weekly observations of bird use of the evaporation ponds would be recorded. The area around the evaporation ponds would be monitored for wildlife mortalities, and the location, date, species, and probably cause of death would be recorded for each carcass found.
- If the concentrations of any constituents of the evaporation ponds reach levels known to be toxic, and the number of birds using the evaporation ponds for extended periods is high or substantial wildlife mortalities are recorded, then Caithness would implement measures to reduce pond toxicity (such as removing toxic sediments or concentrated brine) or reduce or exclude wildlife (such as construction additional fences or using distractive devices).
- Plugs of soil would be left approximately every 0.25 mile during trenching of the gas pipeline, allowing small mammals and reptiles that fall into the trench a chance to escape.

### 3.14 THREATENED, ENDANGERED, PROPOSED, AND OTHER SPECIAL STATUS SPECIES

This section describes the affected environment and environmental consequences relating to threatened and endangered species. This section also addresses species that are proposed for

threatened or endangered status, as well as other special status species.

#### 3.14.1 Affected Environment

The following sections describe the current threatened, endangered, and special status species. This information provides a baseline for assessment of impacts and environmental consequences.

***Threatened and Endangered Species***—Impacts on threatened and endangered species proposed and listed under the Endangered Species Act (ESA) of 1973, as amended, that could occur within the vicinity of the Project are addressed here. Listed species with the potential to occur in the region of influence include southwestern willow flycatcher, bald eagle, Yuma clapper rail, and Arizona cliffrose.

***Other Special Status Species***—There are additional species that are considered BLM sensitive species and/or species of special concern in Arizona and one species, the mountain plover, which is proposed to be listed as threatened by the U.S. Fish and Wildlife Service (USFWS).

<i>Federal Consultation</i>
Impacts on species listed under the ESA are addressed through consultations by Federal agencies with the U.S. Fish and Wildlife Service (USFWS), as specified in Section 7 of the ESA. Consultations begin informally when a Federal agency requests a list of species listed under the ESA. If a listed species exists in the Project area, a biological assessment (BA) is prepared. The initial determination of effect is made by the lead agency (50 CFR Part 420). If the BA determines that the Proposed Action may adversely affect a listed species or its habitat, then the Federal agency must enter formal consultation with the USFWS. USFWS would then prepare a biological opinion (BO) that determines whether or not the Project will adversely affect listed species or critical habitat. The process of formal consultation with the USFWS ensures that Federal actions conserve listed species and their critical habitat. The BO is based on information provided in the BA, but the BO may concur with or dispute the determination of impact.

A meeting including representatives of USFWS, BLM, and Western was held in Phoenix on August 31, 2000, to initiate informal consultation and preparation of a Biological Assessment (BA) for the Big Sandy Energy Project, and a follow-up meeting was held on March 22, 2001. A BA is currently being drafted, and will be submitted to USFWS soon after publication of this Draft EIS. After submission of the BA, this process is expected to move into formal consultation because of the potential for adverse impacts on endangered species. The USFWS would then prepare a Biological Opinion (BO) that determines whether or not the Project would adversely affect listed species or critical habitat. The results of the BO are expected to be available before issuance of the Final EIS and incorporated therein.

Because the mountain plover is proposed to be Federally listed, it is afforded some protection under the ESA. Some species considered by BLM to be sensitive are those that were once listed as “candidate” species under the ESA. In some cases (e.g., Sonoran desert tortoise), the BLM may require pre-construction surveys for sensitive species on BLM lands before issuing permits. The Arizona Game and Fish Department (AGFD) maintains a list of species of special concern in Arizona. Arizona Revised Statutes (ARS) Section 17-231 gives authority to the Arizona Game and Fish Commission (AGFC) to establish policies and programs for management, preservation, and harvest of wildlife. In addition, ARS Section 17-231 allows AGFC to adopt rules and orders for the protection of wildlife.

### 3.14.1.1 Region of Influence

#### *Southwestern Willow Flycatcher*

The region of influence for the analysis of impacts to the southwestern willow flycatcher is the suitable and potential habitat for the flycatcher found in riparian areas associated with perennial or intermittent water along the

Big Sandy River. Suitable and potential habitat is found in corridor segment R5.

#### *About the Southwestern Willow Flycatcher*

The southwestern willow flycatcher is a small bird that breeds in the southwestern United States (California, Nevada, Arizona, New Mexico, Colorado, Utah, and Texas) in the spring and early summer and spends the remaining two-thirds of the year in the semi-tropical areas of Central and South America. It is a grayish, olive green bird about 5.75 inches tall with few distinguishing characteristics. It hunts for insects in “riparian” habitat, which generally is composed of dense shrub and tree vegetation along rivers, streams, and other wetland areas. The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to nearly 8,000 feet in Arizona and southwestern Colorado. Declining southwestern willow flycatcher numbers have been attributed to the loss, modification, and fragmentation of riparian breeding habitat; the loss of wintering habitat in Central and South America; and brood parasitism by the brown-headed cowbird. Habitat loss and degradation are caused by a variety of factors, including urban, recreational, and agricultural development; water diversion and groundwater pumping; channelization; dams; and livestock grazing. Fire is an increasing threat to flycatcher habitat, especially in dense saltcedar vegetation and where water diversion and/or groundwater pumping has dried the riparian vegetation. Flycatchers depend on vigorous, dense plant growth along flowing streams. This plant growth provides critical forage and cover for wildlife and is valued by people for recreational purposes. Plants and trees in these areas depend on high groundwater tables, periodic flooding, and wide floodplains. These perennial waters are limited in the arid Southwest. The dramatic decline of flycatchers throughout their range is a reminder of the fragile condition of our riparian ecosystems.

#### *Bald Eagle*

The region of influence for analysis of impacts to the bald eagle includes the Big Sandy River from I-40 to Alamo Lake, approximately 25 miles south of Wikieup, and the proposed activities within Section 5. Suitable habitat for the bald eagle is present in riparian areas

associated with perennial water along the Big Sandy River and Alamo Lake.

### *Yuma Clapper Rail*

The region of influence for the Yuma clapper rail includes emergent wetlands along the Big Sandy River south of Wikieup.

### *Arizona Cliffrose*

The region of influence for the Arizona cliffrose includes the area that would be impacted by construction from Interstate 40 south to a point on US 93 approximately 2.5 miles south of the US 93/Big Sandy River crossing.

### *Other Special Status Species*

The region of influence for special status species would include the area that would be impacted by construction, operation, and maintenance of the Proposed Action. This area includes the proposed power plant site, substation, evaporation ponds, access road, either the proposed or alternative natural gas pipeline route, the agricultural development area, and the proposed OPGW route and microwave tower sites.

The region of influence for special status fisheries includes the entire length of the Big Sandy River. This river originates at the confluence of Knight Creek and Trout Creek and extends downstream 37.8 miles to Alamo Reservoir. The region of influence includes waters within the proposed Project area that could be directly impacted, as well as potentially affected areas downstream from the Project area. The upstream portion of the river was included for additional information.

#### **3.14.1.2 Existing Conditions**

### *Southwestern Willow Flycatcher*

Southwestern willow flycatcher territories and nest sites usually are located near open water, cienegas, marshy seeps, or saturated soils

(Sogge et al. 1997). These flycatchers normally select nest sites in thickets of shrubs and trees between four and seven meters in height, with dense foliage between ground level and four meters (USFWS 1995a). Occupied habitats always have dense vegetation in the patch interior, and dense patches often are interspersed with small clearings, open water, or areas of sparse shrubs.

Suitable and potential habitat for the southwestern willow flycatcher was identified in corridor segment R5 along perennial reaches of the Big Sandy River. Surveys for the flycatcher were conducted within a 2-mile stretch of the Big Sandy River, centered on the US 93 Bridge crossing the river. Surveys were completed in May, June, and July of 2000 using the USFWS survey protocol. Survey areas are located in Sections 1, 2, 11, and 12, T15N, R13W (Greystone 2000b). Seventy-seven southwestern willow flycatchers were detected during five separate surveys. Fifteen confirmed pairs occur within the survey areas (Figure 3.14-1) based upon hearing calls and observing the flycatchers and an estimated 22 to 28 territories. This may be one of the densest populations in Arizona.

### *Bald Eagle*

In Arizona, bald eagles were reported in the 1800s and early 1900s to nest along rivers in the White Mountains and along the Salt and Verde rivers. Millsap (1981) reported bald eagles wintering on Alamo Lake, but intensive nest searches did not locate any nests in the Bill Williams drainage basin. Currently, bald eagles are known to nest along the Salt and Verde rivers and their tributaries upstream of the Salt and Verde confluence; along the Bill Williams River and its tributaries; on the Agua Fria River near Lake Pleasant; and on the Gila River near San Carlos Lake (Hunt et al. 1992).

Since Millsap (1981), four nest territories have been reported on the Bill Williams River or its tributaries (Hunt et al. 1992). The two nest territories on the Bill Williams River are located at Alamo Reservoir and approximately 2 miles

downstream from the Alamo Dam. A third territory is located on the Big Sandy River, at the approximate high-water limit for the Alamo Reservoir. This territory is approximately 20 miles downstream from the US 93 bridge crossing the Big Sandy River. The fourth territory in this vicinity is on Burro Creek, approximately 28 miles upstream from its confluence with the Big Sandy River. This territory is approximately 23 miles southeast of the proposed power plant site, across the Aquarius Mountains. According to results of the 2001 mid-winter bald eagle surveys conducted by AGFD, the nest territories on the Big Sandy River and Burro Creek are currently unoccupied. The Big Sandy River nest territory is no longer on the list of breeding areas to be surveyed. However, the other two nest territories are active. There is a pair of breeding adults on Ive's Wash, downstream of Alamo Dam, and another breeding pair immediately north of Alamo Reservoir (Driscoll, personal communication, 2001).

Approximately 200 to 250 bald eagles winter in Arizona, primarily in the Flagstaff and Colorado River regions (AGFD 1996; Phillips et al. 1964). Wintering bald eagles began concentrating in the Glen and Grand Canyon portions of the Colorado River during the 1980s, after the completion of Glen Canyon Dam in 1963 enabled the non-native rainbow trout to colonize the main stem of the Colorado River (Brown et al. 1989). In most years there is an influx of bald eagles, most of which are immature, into the Lower Colorado River Valley in January or February. Some of these birds may be from the Arizona breeding population (Rosenberg et al. 1991). It is possible that migratory eagles could pass through the Big Sandy Valley. Bald eagles winter on the Big Sandy River and at Alamo Reservoir (Peck, personal communication, 2001).

Bald eagles are opportunistic feeders. Fish make up the majority of the diet for many bald eagles, and waterbirds also can be an important food source. Eagles also consume mammals, shellfish, and carrion (Hunt et al. 1992). Bald

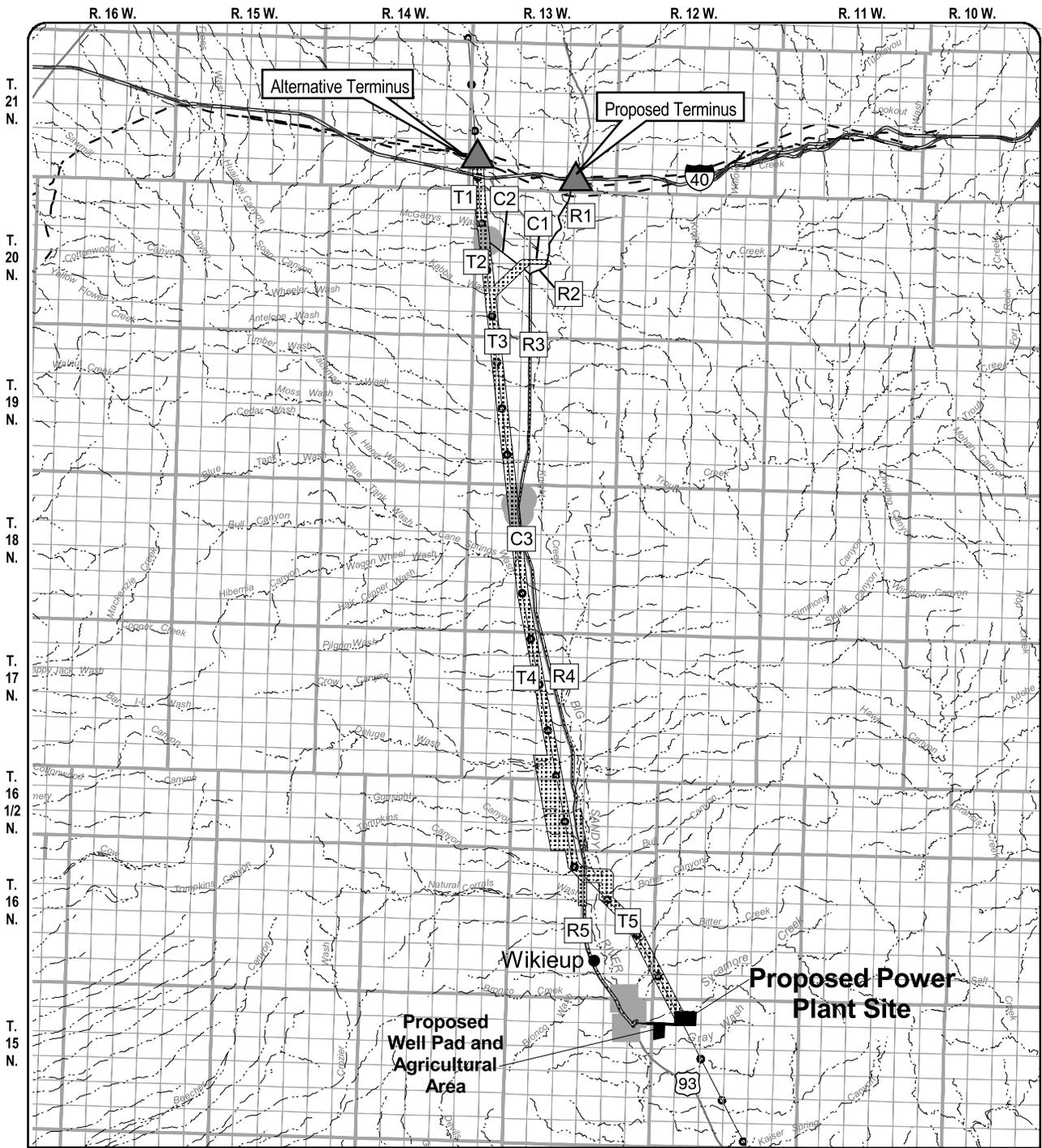
eagles forage from perches near water and will also steal prey from osprey, gulls, and other eagles.

Along the Salt and Verde river drainages in Arizona, fish are the most common prey item, followed by mammals (cottontail, jackrabbit, squirrel, and woodrat), waterfowl, and reptiles (Sonora mud turtles, spiny softshell turtles, and snakes). Eagles also have been observed foraging on frogs and crayfish (Grubb 1995). Potential prey items available in the Big Sandy River include common carp, green sunfish, black bullhead, yellow bullhead, and Sonora mud turtle (refer to Section 3.13.1.2). Other fish species in this area are too small to provide a significant food resource for eagles. Although the reach of the Big Sandy River at the US-93 bridge (in corridor segment R5) is perennial, the normal channel is relatively small, and this reach is unlikely to support many fish that are large enough to be potential prey items for eagles. Small mammals, waterfowl, and other reptiles also are available in the vicinity, but these species normally account for a very small proportion of an eagle's diet.

### *Yuma Clapper Rail*

The Yuma clapper rail is a subspecies of clapper rail that breeds in freshwater marshes in the Salton Sea area of California, along the lower Colorado River, in the Colorado River Delta of Sonora and Baja California del Norte, on the Salt and Gila rivers upstream to the confluence with the Verde River, and at Picacho Reservoir (AGFD 1996; Todd 1986). The breeding range of the Yuma clapper rail is geographically isolated from those of all other subspecies of clapper rail. It is thought that the Yuma clapper rail was restricted to the Yuma area prior to 1940 but has since expanded its range. This range expansion is the result of river impoundments creating marsh habitat in places where it did not previously exist (Ohmart and Smith 1973; Rosenberg et al. 1991).

The Yuma clapper rail is dependent upon freshwater marshes that support dense woody or



**Legend**

- |  |                      |  |                |
|--|----------------------|--|----------------|
| <b>Resource Components</b>   |                      | <b>General Reference</b>                       |                |
| ● Known Locations of Arizona Necklace                                | — Existing Pipelines | — Mead-Liberty/Mead-Phoenix Transmission Lines | — Stream/River |
| ■ Known Locations of Vocalizing Male Southwestern Willow Flycatchers | — Interstate         | — U.S. Route                                   |                |
| <b>Project Components</b>  |                      |  |                |
| ▨ 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  |                      |  |                |

**Federally Listed and Sensitive Species**

**Big Sandy Energy Project EIS**



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



Figure 3.14-1

x:\big sandy\projects\biology.apr

herbaceous vegetation exceeding 16 inches in height (Todd 1986). Vegetation typical of clapper rail habitat includes patches of emergent plant species such as cattail and giant bulrush. Pond openings and flowing channels are also important, as are emergent soils. Water depth at preferred sites is 12 inches or less. The interface between water and soil is important, and rails use areas where the slope of the soil-to-water contact is relatively gentle.

Within the region of influence, emergent wetlands occur along perennial stretches of the Big Sandy River from corridor segment R5 downstream to Alamo Lake. Springs also could support emergent wetland vegetation; however, springs do not support large enough patches of emergent vegetation to provide habitat for the clapper rail. The emergent wetland near the proposed power plant site has some cattail and bulrush, but the area is too small to support clapper rails.

Yuma clapper rails on the Colorado River feed very heavily on introduced crayfish (Lower Colorado River Multi-Species Conservation Program 2001; New Mexico Game and Fish Department 2001). No crayfish are present in the perennial reach of the Big Sandy River near Wikieup. The lack of suitable prey species also makes this region unlikely to support a population of Yuma clapper rails.

### ***Arizona Cliffrose***

Arizona cliffrose was placed on the Federal endangered species list in 1984 and is known from four sites in Arizona. The species was first described by Kearney in 1943 and was originally known as *Cowania subintegra*. The type locality for this Arizona endemic is in the Burro Creek drainage approximately 12 miles southeast of the proposed power plant site, where there are three populations. This plant grows only on Tertiary limestone lakebed deposits and is restricted to the nutrient-poor calcareous soils found in these areas (USFWS 1995b).

Populations of Arizona cliffrose also have been found near Bylas, on the San Carlos Apache Reservation in Graham County, near Cottonwood in Yavapai County, and near Horseshoe Lake in Maricopa and Yavapai counties. There are no known populations of this species within the region of influence; however, there are two small Tertiary limestone lakebed deposits in the vicinity of the proposed power plant site along corridor segment T5, and it is possible that other small exposures may exist.

Possible threats to the Arizona cliffrose would include urbanization, mining, habitat decline due to overuse or browsing of plants by livestock and burros, road construction, off-road vehicle use, pesticide application, and inundation (USFWS 1995b).

### ***Mountain Plover***

The USFWS has proposed to list the mountain plover as threatened under the ESA. Mountain plovers breed in high-elevation shortgrass prairie in the Great Plains region. They do not breed in the region of influence, but they may winter there.

### ***Other Special Status Species***

#### **Bats**

The following sensitive bat species have been listed in the Greystone wildlife report (2000b) as potentially occurring within the region of influence: big free-tailed bat, California leaf-nosed bat, cave myotis, fringed myotis, greater western mastiff bat, occult little brown bat, small-footed myotis, long-eared myotis, long-legged myotis, Townsend's big-eared bat, Allen's big-eared bat, western yellow bat, Mexican long-tongued bat, and spotted bat. Mist-netting surveys for bats were conducted in the wetlands in the vicinity of the proposed power plant site. California leaf-nosed bats, Yuma myotis, and pallid bats were captured during these surveys (Greystone 2000b).

A study conducted between 1959 and 1964 in Mohave County included extensive surveys of bat roost locations and mist netting of bats over water sources (Cockrum et al. 1996). Most of the field work for this study was conducted in the southern and southwestern parts of the county, with relatively little effort in the Big Sandy Valley. Based on the results of this study, at least ten species of bats were present in the region of influence of the Big Sandy Energy Project. These species are California leaf-nosed bat, Yuma myotis, cave myotis, occult little brown bat, fringed myotis, California myotis, western pipistrelle, Townsend's big-eared bat, Brazilian free-tailed bat, and western mastiff bat.

A more recent survey of bats in this vicinity was conducted in 1997 and 1998 (Brown and Berry 1999). The primary focus of this study was in abandoned mines and water sources in the Hualapai Mountains, but some of the locations were within the region of influence of the Big Sandy Energy Project. Bats were identified by a combination of techniques, including mist netting or hand netting at roost sites, mist netting at water sources, and recording and analysis of echo-location signals. Of the 19 species of bats observed in the Hualapai Mountains, at least 10 species were confirmed to be present in or near the region of influence. Species netted or recorded at the Big Sandy bridge on US 93 (corridor segment R5) were California myotis, cave myotis, Yuma myotis, western pipistrelle, pallid bat, spotted bat, western mastiff bat, pocketed free-tailed bat, Brazilian free-tailed bat, Townsend's big-eared bat and California leaf-nosed bats were detected at the Warm Springs mine in Kaiser Canyon, about 8 miles southeast of the Big Sandy Bridge.

General information on bat species distribution and habitat requirements was obtained from Hoffmeister (1986). Big free-tailed bats are sparsely distributed in a variety of habitats in Arizona, and they appear to require rocky cliffs with fissures for roosting. No suitable habitat for the big free-tailed bat would be affected by the Proposed Action or the alternative pipeline corridors. The cave myotis is relatively common

and widespread in Arizona. They typically roost in caves and mines, but they also may use bridges. Roost sites are generally close to water. The cave myotis could use the bridge over the Big Sandy River or other bridges over ephemeral channels on US 93 for roost sites, but there are no caves or mines that would be affected by the Proposed Action or alternative pipeline corridors.

The fringed myotis may be found from chaparral to pine forest habitats, and their preferred habitat appears to be oak woodland. Suitable habitat for these bats might be present in the conifer woodlands in corridor segments R1, T1, T2, T3, C1, and C2. The small-footed myotis typically forages over oaks, chaparral, junipers, and riparian areas. Suitable habitat for this bat is present in the northern parts of the region of influence or along the Big Sandy River (corridor segments R1, R5, T1, T2, T3, C1, and C2). Townsend's big-eared bats are widely distributed in a variety of habitats in Arizona, and they could forage in the region of influence. These bats normally require caves or mine tunnels for day roosts, and these features are not available in areas that would be impacted by the Proposed Action or alternative pipeline corridors. Allen's big-eared bats are found in ponderosa pines and piñon-juniper woodland, and suitable habitat is present in the northern end of the region of influence in corridor segments R1, T1, T2, T3, C1, and C2. Greater western mastiff bats have a disjunct distribution, and typically roost in crevices in cliffs. The Proposed Action or alternative pipeline corridors would not impact any suitable cliff habitat. Spotted bats are very sparsely distributed in a variety of habitats, but their appearance in the region of influence would be a rare event.

The occult little brown bat is generally found in ponderosa pine or pine-oak woodland, and the region of influence is outside its normal geographic range. The long-legged myotis is normally found in ponderosa pine or other coniferous forests, and it is unlikely to be present in the region of influence. The long-eared myotis is also a bat of ponderosa pine or

spruce fir forests, and the region of influence is outside its normal geographic range. The western yellow bat is typically found roosting in palm fronds, and the region of influence is outside its normal geographic range. The Mexican long-tongued bat is a nectar-feeding bat found in desert scrub in the southeastern corner of Arizona. The region of influence is outside its normal geographic range.

## Birds

The region surrounding the Project area is home to many raptor species that are considered sensitive. These sensitive raptors that have at least some potential to occur in the region of influence include the golden eagle, sharp-shinned hawk, Cooper's hawk, Swainson's hawk, ferruginous hawk, common black hawk, zone-tailed hawk, merlin, peregrine falcon, western burrowing owl, and loggerhead shrike. All species listed here are considered sensitive species by the BLM. AGFD considers all raptors listed here except the burrowing owl and loggerhead shrike to be species of special concern. The loggerhead shrike is included in discussions of sensitive raptor species because of its raptorial behavior. The sharp-shinned hawk, Cooper's hawk, Swainson's hawk, and zone-tailed hawk could use trees found in riparian or xeroriparian areas for nesting (corridor segments T2, T3, T4, T5, R3, R4, R5, and C3). The golden eagle, merlin, and peregrine falcon use cliffs, and burrowing owls may use mammal burrows for nesting or they may dig their own burrows in sandy soil. The loggerhead shrike could nest in trees or shrubs found throughout the region of influence. The common black hawk nests in well-developed riparian corridors with wide stretches of perennial water that support fish. The ferruginous hawk could nest in grasslands and open juniper woodlands, (corridor segments T1, T2, T3, R1, R2, R3, and C3).

Millsap (1981) conducted a detailed study of raptors (not including owls) in an area of northeast Arizona that included the Big Sandy Valley. In this study, the most common raptors

nesting in the Wikieup vicinity included turkey vulture, red-tailed hawk, Cooper's hawk, American kestrel, and prairie falcon. Common black hawks were observed nesting on Burro Creek, northern goshawks were nesting in the Hualapai Mountains, and golden eagles and zone-tailed hawks also nested in mountainous areas (Millsap 1981). Common wintering raptors included Cooper's hawk, red-tailed hawk, northern harrier, and American kestrel. Several other species of raptors, including ferruginous hawk, rough-legged hawk, Harris's hawk, Swainson's hawk, sharp-shinned hawk, merlin, and peregrine falcon, were noted as rare or irregular visitors to this area.

Other sensitive species of birds that could be found in the Project area include white-faced ibis, yellow-billed cuckoo, and western bluebird. The white-faced ibis and western bluebird could be found during migration along the Big Sandy River; however, these species are not expected to breed in the region of influence.

The western bluebird breeds in ponderosa pine forests, and the white-faced ibis does not breed in Arizona. No adverse impacts are anticipated for the mountain plover, western bluebird, or white-faced ibis.

The western yellow-billed cuckoo currently is being reviewed by the USFWS to determine whether it should be proposed for listing under the ESA. A yellow-billed cuckoo was observed 1 mile northeast of Wikieup, in the floodplain of the Big Sandy River, in 1979 (Hall 1980). Yellow-billed cuckoos are generally restricted to tall cottonwood and willow riparian woodland for nesting (Ehrlich et al. 1992, Corman and Magill 2000), but the predominant riparian species found along the Big Sandy River is tamarisk. Populations of western yellow-billed cuckoo are known to have been depressed by impacts associated with tamarisk invasion (DeLoach 1996). The yellow-billed cuckoo could use riparian areas along the Big Sandy River for temporary foraging during migration, but this site does not provide suitable breeding

habitat for this species. No adverse effects related to this Project are anticipated.

### Reptiles

Six species of reptiles may be present on the Project site that are classified by BLM as sensitive species and by AGFD as species of special concern, including the desert night lizard, Arizona skink, chuckwalla, desert rosy boa, desert tortoise, and banded Gila monster. All six species are found in the BLM Hualapai-Aquarius planning area (Jones 1981). Chuckwallas generally require rock outcrops, cliffs, or other extensive rocky areas to provide cover and nest sites. Creosote bush is often present in their habitat (Stebbins 1985).

Although the desert night lizard is a diurnal forager, it is seldom seen due to its secretive habits and use of dead vegetation and rocks for cover. It does not require permanent water. Its diet is made up of arthropods that may be found in dry upland areas (corridor segments C3, T4, T5, R4, and R5).

The banded Gila monster uses areas that contain loose sandy soil required for burrowing although they are known to find refuge in existing burrows of other animals. It is frequently found on irrigated lands or rocky areas. The areas with permanent or semi-permanent water may act to concentrate populations in arroyos or stream banks (Stebbins 1985).

The Arizona skink is known from both streamside habitat and juniper woodland. There are known populations in the Hualapai and Harcuvar mountains, and this lizard may be present in the region of influence.

The desert rosy boa generally requires rocky desert substrate and is known to forage in the vicinity of water. These snakes are mostly nocturnal and seldom seen.

The Sonoran desert tortoise generally uses rock shelters, but may also excavate burrows. They also are known to use stream banks for burrows

and forage. These animals are active during the day and may be highly visible during warm months. All areas that would be disturbed by this Project are identified as Category III habitat for desert tortoise. Category III areas include habitat that is not essential to the maintenance of viable populations. They may have a low- to medium-density tortoise population that is not contiguous with a higher density population, and the tortoise population may be stable or decreasing in a Category III habitat.

### Amphibians

Two species of amphibians, the Arizona toad and lowland leopard frog, are classified as sensitive species and species of special concern. Both species use stream habitat for foraging and reproduction. The Arizona toad was observed in the Project area during the wildlife surveys (Greystone 2000b). The lowland leopard frog is dependent on a permanent water source for survival and reproduction. Lowland leopard frogs are found in perennial reaches at and below the proposed pipeline crossing site in the Big Sandy River (Greystone 2000a; Smith, personal communication, 2001).

### Fish

Five species of fish are considered sensitive by BLM. These species include the longfin dace, desert sucker, Sonora sucker, speckled dace, and roundtail chub. A complete list of fish species observed in the Big Sandy River and its tributaries are listed in Tables 3.13-2 (Greystone 2000a) and 3.13-3 (AGFD 1993; BLM 1994; Fresques et al. 1997; Kepner 1979). Additional details on these earlier studies are provided in Greystone 2000a.

Greystone (2000a) documented increases in the abundance and diversity of exotic species and the loss of native species by comparing the results of its 2000 survey with the results of the 1979 and 1996 surveys by others. Two native species, Sonora sucker and roundtail chub, were recorded in 1979 but were not found in 1996 (Fresques et al. 1997) or 2000 (Greystone

2000a) at these same sites (roundtail chubs were found at a separate location by BLM in 1994). Native fish species accounted for 57.8 percent of the total fish counted in 1979, but only 8 percent in 2000. The longfin dace was the most abundant fish species in most sites sampled in 1979, but it was not most abundant at any of the revisited sites in 2000. Mosquitofish were not present in 1979; by 1996 they were common but not the most abundant; and in 2000, mosquitofish was the dominant species at all but one monitoring site.

## Plants

Several species of sensitive plants are reported to occur in Mohave County. Thorn milkwort is in the Polygalaceae family. This species is an Arizona state-listed species. It occurs at an elevation of 2,500 to 5,000 feet. This shrubby species grows up to 3 feet high, tending to form hummocks. It is intricately branched with small, yellow flowers appearing in June. There are no known occurrences of thorn milkwort in the region of influence.

Arizona necklace is a legume that is found only in western Arizona. This species is an Arizona state-listed species. It occurs southeast of Yucca (Mohave County), in the foothills of the Hualapai Mountains. This species is shrubby, up to 11.5 feet high, with leaflets usually less than 0.4 inch. Lilac-colored flowers appear in March. It is known to occur along the Big Sandy River at elevations between 2,000 and 4,000 feet on dry, rocky hillsides and on banks of arroyos. Groups of these plants were located on both alternative pipeline corridors near the north end of the region of influence in corridor segments T1, T2, R3, C2, and C3 (Figure 3.14-1). It is possible that there are isolated populations of Arizona necklace along corridor segment T3.

Linear-leaf sand spurge is a perennial species in the Euphorbiaceae family. This species is an Arizona state-listed species. This species has linear leaves, and highly branching stems from a stout, woody root. It flowers in April and October. It has been documented near Yucca

and Topock (Mohave County), western Pima County, and southern Yuma County at elevations from 500 to 2,000 feet. An individual plant was found and tagged during the design of the Big Sandy Bridge replacement in corridor segment R5 (ADOT 2000).

Sand cholla is an Arizona state-listed cactus. This species grows in a clump from a bristle-covered tuber, favoring higher elevation dry-lake borders and sandy flats. It is located in the northern Mojave Desert from eastern California to southern Utah from 4,400 to 5,000 feet. It grows up to 10 inches in height and is narrowly club-shaped to cylindrical. The flowers are pink to purple and appear April to June. The yellow-green flattened but slender stems are about 1 inch in diameter, and the smooth red fruit is fleshy and barbed, up to 1 inch long. This species does not occur in the elevation range of the region of influence and would not be included in pre-construction surveys.

Aquarius milk-vetch is a legume species found in Apache, Mohave, Gila, and Yavapai counties. This plant occurs in limestone lakebed deposits. It flowers in March and April and produces pods with long soft hairs. This plant species is listed by the BLM as a special status plant species.

Crownless milkweed vine is in the Asclepiadaceae family. It is a BLM-sensitive species that occurs in sandy loamy uplands with creosote bush, rayless goldenhead, and big galleta in Mohave and Sonoran Desertscrub at about 500 to 2,000 feet. The milkweed vine is generally inconspicuous, climbing relatively low-growing shrubs for support. The glabrous slender twining stems have narrowly linear leaves. The flowers are small and yellowish and appear in clusters of three to five from April to June. There are confirmed occurrences near Wikieup, Dolan Springs, Yucca, and Hardyville.

Parish's phacelia is in the Hydrophyllaceae family. It occurs in clay or alkaline soils, in limestone lakebed deposits, at elevations of 2,600 to 3,900 feet. It is an annual that stands 2 to 7 inches tall with elliptic basal leaves.

Flowers are lavender with a yellow base and are bell shaped. This species is listed by the BLM as a special status plant species.

Three hearts is also in the Hydrophyllaceae family. Three hearts is a BLM-sensitive species that occurs on sandy or gravelly desert slopes, generally in the shelter of shrubs. It is a perennial species with stems branching from a woody taproot. The leaves are entire and mostly basal. White and purple flowers appear in short racemes in April. Known occurrences are in northwestern Mohave County at approximately 2,000 feet.

Another BLM-sensitive species is shrubby senna, a legume that grows in sandy or gravelly washes. It is a shrubby plant about 3 feet high that has branches ending in a thorn and armed with weak spines. Shrubby senna has two to four leaflets, but is leafless most of the year. Yellow flowers in loose terminal panicles appear from February to October. It occurs in Yucca and Mohave counties at approximately 2,000 feet.

The following five species are categorized as BLM-sensitive, but are not likely to occur within the region of influence.

Antelopebrush is a shrub in the Rosaceae family. It occurs in Apache to Coconino County on open slopes and mesas and coniferous forests from 2,300 to 9,000 feet. This species is an intricately branched shrub with small three-toothed leaves. The solitary yellow flowers have five petals and appear from April to June. Antelopebrush is a very important browse plant for wildlife and cattle. This species occurs in northern Arizona and is not found in Mohave County; therefore, it is not likely to occur in the region of influence.

California flannelbrush is in the Sterculiaceae family. Known occurrences are in Yavapai and Gila counties. It occurs in oak pine woodlands, rocky ridges, and usually on north slopes in canyons 1,300 to 6,500 feet high. This species is a large evergreen shrub or small tree with thick leaves that usually are palmately lobed. Solitary showy flowers with bright yellow (sometimes

orange) sepals appear in May. This species is not known to occur in Mohave County; therefore, it is not likely to occur in the region of influence.

Aravaipa woodfern is a woodland fern that occurs along streams and seepage areas at 200 to 1,800 feet. Its blade is widest at or near the base. The fern is found near the Santa Maria River (southwestern Yavapai County), Aravaipa Canyon (Graham and Pinal counties), and Santa Catalina Mountains (Pima County). This species is on the lower end of the elevation range of the region of influence and is not expected to be encountered.

Striped horsebrush is a shrub in the composite family. This species occurs in piñon-juniper woodlands on rocky slopes at 4,600 to 6,900 feet. It is commonly less than 3 feet high. The stems have spines, derived from the main leaves and pale yellow flowers. The stems become glabrous in stripes below the spines, contributing to its common name. Striped horsebrush occurs in elevations higher than those in the region of influence; therefore, it is not expected to be encountered.

Nevin's birdsbeak is in the Schrophulariaceae family. It occurs in Mohave County scattered among pines, in the Hualapai Mountains at approximately 6,500 feet. Pink or lavender flowers appear along the branches in September. Nevin's birdbeak occurs in elevations higher than those in the region of influence; therefore, it is not expected to be encountered.

### 3.14.2 Environmental Consequences

#### 3.14.2.1 Identification of Issues

The following issues were identified as the basis for assessment of impacts.

- Potential adverse impacts on the southwestern willow flycatcher, bald eagle, Yuma clapper rail, and Arizona cliffrose. These potential impacts include direct and indirect effects on these species as a result of construction, operation, and maintenance of

the proposed Project. Potential impacts include direct mortality of individuals; loss of habitat due to clearing of vegetation; clearing in limestone lakebed deposits; and loss of aquatic, riparian, or marsh habitats by lowering water levels due to groundwater pumping for the proposed Project.

- Potential direct and indirect adverse impacts on sensitive species as a result of construction, operation, and maintenance of the proposed Project.
- Impacts on threatened, endangered, or sensitive species due to noise produced by construction and operation of the proposed Project.

### 3.14.2.2 Significance Criteria

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

- loss of population or habitat of other sensitive species that would cause the species to become listed as endangered or threatened
- loss of one active nest for sensitive raptors
- removal or alteration of hibernacula or maternity colonies for bats
- substantial adverse impacts on populations or habitats of sensitive reptiles or amphibians
- any unmitigated loss of aquatic habitat greater than 0.5 acre or any long-term adverse effects on native fish
- destruction of a substantial population of a sensitive plant species
- any impact on a portion of a limestone lakebed deposit containing sensitive species

The significance of the impacts of the Project on threatened and endangered species or their habitats is being deferred in this Draft EIS until completion of the BA.

In the BA, three choices are possible for a listed species or area of critical habitat. A determination of “No Effect” means that there are absolutely no effects of the Project, either positive or negative. Any possibility of effect, no matter how small or unlikely, must be given a determination of “may affect, but not likely to adversely affect.” This determination means that all effects of the Project are beneficial, insignificant, or discountable. Beneficial effects have contemporaneous positive effects without any adverse side effects to the species or habitat. Insignificant effects relate to the size of the impact and should never reach the scale where “take” of the species would occur. Discountable effects are those that are extremely unlikely to occur. The third possible determination is that of “may affect, is likely to adversely affect,” which means that there is at least one adverse effect. A combination of beneficial and adverse effects is still “likely to adversely affect,” even if the net effect is neutral or positive.

If the determination in the BA is that the Project “may affect, likely to adversely affect” threatened and endangered species, the Final EIS will determine that the effects of the Proposed Action will be significant.

### 3.14.2.3 Impact Assessment Methods

#### *Southwestern Willow Flycatcher*

The proposed gas pipeline corridor crosses the Big Sandy River only once, and the crossing occurs in a reach of perennial water. Impacts on the flycatcher were determined by evaluating the Project area for suitable habitat. Once suitable habitat was identified, surveys were conducted in the areas that were within approximately 1 mile north and south of the US 93 Big Sandy River bridge (habitat is along perennial reaches or river with riparian vegetation) to determine whether or not southwestern willow flycatchers

were present. Impacts associated with the proposed Project were evaluated to determine effects on the southwestern willow flycatcher in the area of the pipeline crossing. Downstream more than 1 mile from the US 93 Big Sandy River bridge crossing, where surveys were not conducted for the southwestern willow flycatcher, potential impacts of construction, operation, and maintenance of the proposed Project were analyzed.

### ***Bald Eagle***

For the bald eagle, the known distribution of eagles in the region of influence was reviewed, and the proposed power plant site was evaluated for potential nesting habitat and potential foraging or roosting sites during nesting or winter seasons. The impact assessment is based on anticipated effects of the Proposed Action and alternatives on potential habitat areas and on how these habitat impacts might affect bald eagles and their use of this area.

### ***Yuma Clapper Rail***

Impacts were assessed by determining what types of impacts could adversely affect the Yuma clapper rail. It was then assessed whether or not these impacts could occur during construction or operation of the proposed Project.

### ***Arizona Cliffrose***

For the Arizona cliffrose, known population locations were reviewed, and the proposed power plant site was evaluated for areas with the suitable environmental conditions necessary for the establishment, growth, and reproduction of the plant. The impact assessment is based on the anticipated effects of the Proposed Action on Arizona cliffrose populations.

### ***Other Special Status Species***

For other sensitive species, the occurrence of each species in the Project area was reviewed. Any impacts anticipated during construction at

the proposed plant site, or along the proposed or alternative gas pipeline corridors were assessed relative to the presence of other sensitive species.

#### **3.14.2.4 Actions Incorporated Into the Proposed Action to Reduce or Prevent Impacts**

The Proposed Action includes the following measures to reduce or prevent potentially adverse impacts on threatened or endangered species:

- Erosion sedimentation and control measures, implemented to reduce erosion, and prevent siltation in the waterways, including specific methods at the Big Sandy River Crossing to limit the disturbance.
- A groundwater monitoring plan would be implemented to allow the predicted change to groundwater levels to be measured, impacts to be anticipated, and flows in the shallow groundwater and the Big Sandy River augmented as described in Section 3.4.2.4.
- A stormwater pollution prevention plan has been prepared which would divert surface water around areas of potential contamination and retain all contaminated water on site.
- Reclamation plans have been developed to reduce the affect to vegetation on private, state, and BLM-managed public lands.
- Pre-construction biological studies would be conducted to identify the presence of Sonoran desert tortoise and breeding raptors.
- Pre-construction surveys would be conducted to identify suitable habitat for sensitive plant species. In habitat that could not be avoided, surveys would be conducted to identify any populations of individual sensitive plant species.

- A spill prevention control and countermeasure plan would establish a plan for response to a spill of petroleum products on site.
- Construction activities are anticipated to occur 10 –hours per day, 5 –days per week to reduce the potential impacts from construction noise during the night.
- A biological monitor would be on site during all ground disturbing activities to mitigate impacts on desert tortoise (refer to Appendix C).
- The following measures would be implemented in areas designated as Category III desert tortoise habitat to reduce or minimize impact:
- Surface-disturbing activities would be minimized along the proposed pipeline corridor.
- Access to roads not needed after construction would be restricted, and the roads would be scarified. Access roads scheduled for upgrading in desert tortoise habitat would not be widened, if possible, nor would berms be disturbed during grading. New permanent access roads would not be created in desert tortoise habitat except where the right-of-way is not adjacent to an existing right-of-way or road.
- Stockpile areas in desert tortoise habitat would be placed either in less valuable habitat, or minimized in size.
- Where feasible, following completion of construction activities, the landscape would be restored to pre-construction conditions using techniques such as recontouring, topsoil replacement, and re-seeding. Seed mixtures would only include native species that have the greatest potential for establishment and wildlife use (refer to Appendix B).

### 3.14.2.5 Where feasible, Impact Assessment

#### *Proposed Action*

#### Southwestern Willow Flycatcher

#### *Proposed Power Plant Site and Access Road*

**Direct Impacts** – Proposed construction, operation, and maintenance of the power plant, substation, and evaporation ponds in Section 5, T15N, R12W would have no direct impact on the Southwestern willow flycatcher. No willow flycatcher habitat is present in the area where these facilities would be installed.

**Indirect Impacts** – Because the Proposed Action contains measures to augment shallow groundwater and surface water flow in the Big Sandy River, groundwater withdrawal for Project operations is not predicted to result in a lowering of the shallow groundwater table or reduced flow in the Big Sandy River, either of which would lead to the diminishment of flycatcher habitat. As discussed in Section 3.4, it is anticipated that there will be no change in the upper groundwater aquifer or surface water flow in the Big Sandy River in the vicinity of the Project or downstream.

Construction would bring many workers close to existing and potential flycatcher habitat. This would create the potential for disturbance to flycatchers due to increased camping, hiking, biking, off-road vehicles, fires, wood-gathering, and other recreational uses.

#### *Agricultural Development*

**Direct Impacts** – The proposed agricultural development is located in an area of Sonoran desertscrub with no riparian vegetation and no suitable habitat for willow flycatchers. Development of these lands for agriculture would have no direct impact on the Southwestern willow flycatcher or its habitat.

**Indirect Impacts** – The potential indirect impacts on southwestern willow flycatchers

related to the agricultural development are the withdrawal and consumption of groundwater and increased brown-headed cowbird populations. Potential effects of groundwater withdrawal on flycatcher habitat are discussed above.

Agricultural fields provide enhanced foraging habitat for brown-headed cowbirds compared with the foraging currently available in the Sonoran desertscrub of this area. Additional foraging opportunities within 2 miles of the Big Sandy River riparian area could allow for an increase in the cowbird population, which could adversely affect the southwestern willow flycatchers through increased rates of parasitism.

### *Communication Facilities*

The OPGW option would not cross any riparian area, so no direct impacts on the southwestern willow flycatcher or flycatcher habitat would occur.

Microwave dishes would be installed on existing microwave towers with the primary and redundant communication systems. No flycatcher habitat is present near existing microwave towers, thus no direct impacts would occur.

### *Proposed Natural Gas Pipeline*

**Direct Impacts** – Depending upon which construction technique for the natural gas pipeline is implemented, the Project could result in temporary direct impacts on the Southwestern willow flycatcher and its habitat. If the pipeline is constructed by trenching, laying pipe, and backfilling at the crossing of the Big Sandy River, it would be necessary to remove riparian vegetation. Removal of riparian vegetation would result in a temporary loss of occupied, suitable, or potential flycatcher habitat. The total area of impact within the riparian zone is estimated to be 66,000 sq. ft. (1.38 acres), assuming a 50-foot wide construction zone. Of this area, only about 37,500 sq. ft. (0.86 acre) is suitable habitat for flycatchers.

It is also possible that the trenching method could result in direct loss of a flycatcher nest, although the Greystone surveys found no flycatcher territories within 200 feet of the existing bridge. However, trenching would not occur during the breeding season. The proposed zone for construction, within 400 feet upstream from the bridge, has been subjected to other disturbances in the past. Close to the bridge there is an area that has had some grading and vegetation removal. Cattle grazing throughout the riparian area is an on-going disturbance. The area close to the bridge is currently occupied by species tolerant of disturbance, including saltcedar, screwbean mesquite, arrowweed, and Bermuda grass. More Fremont cottonwoods and Goodding willows are present farther from the bridge.

Other possible impacts related to the trenching method for pipeline construction could include erosion, sedimentation, and spills. These impacts would not affect the flycatcher population upstream from the construction site. Because most occupied flycatcher habitat is in areas extending away from the river, erosion is not expected to be a problem, unless severe flooding removes the vegetation in occupied habitat. Additional sediment loads in the river are unlikely to have any direct effect on the flycatchers. Fluid spills from construction equipment could adversely affect downstream habitat by contamination that could affect the insect prey populations.

Caithness has developed an erosion and sedimentation control plan that would be implemented as a part of the Proposed Action. Best management practices and procedures in this plan would include use of erosion control fabric, diversion ditches, ditch stabilization, sediment barriers, sediment filtering devices, erosion control berms, riprap, and revegetation. Likewise, a hazardous material management and spill prevention and countermeasure plan would be implemented during construction to ensure the safe handling, storage, and disposal of hazardous materials, as well as procedures to follow in case of a release.

As an optional construction technique, the natural gas pipeline could be installed under the Big Sandy River and riparian zone by directional drilling. Staging and drilling areas would be located outside the riparian zone on each side of the river, although there still would be some potential for erosion, sedimentation, or spills to impact the riparian zone. To avoid any disturbance to the flycatchers, the Proposed Action would conduct this operation during the period from September to April when southwestern willow flycatchers are absent from this region. With the implementation of erosion, sedimentation, and spill control measures, the directionally drilled pipeline option would have no direct impact on southwestern willow flycatchers or suitable habitat.

***Indirect Impacts*** – Disturbance of riparian vegetation along the Big Sandy River could increase the chance of brood parasitism of southwestern willow flycatcher by brown-headed cowbirds. These cowbirds typically parasitize nests found at the edge of flycatcher habitat. Removal of riparian vegetation along the proposed gas pipeline route would increase the amount of edge habitat in the riparian area and increase the risk of parasitism until the vegetation has returned to preconstruction conditions.

### Bald Eagle

Construction of the power plant, substation, and evaporation ponds in Section 5, T15N, R12W would not impact any aquatic resources or riparian areas that might provide foraging area for the bald eagle. This area has no large trees that could provide nest sites, perches, or overnight roosting sites for bald eagles. Likewise, construction of the access road from US 93 would have no impact on aquatic resources or riparian areas, and it would not affect any large trees. Bald eagles show little aversion to loud noise in their habitat. In long-term monitoring of bald eagle related to construction of a secondary sewage treatment plant for Seattle, Washington, eagle responses to construction truck traffic within 1,000 feet of an

active nest were recorded (Strong et al. 1992). In more than 6,000 observations, the eagles completely ignored the truck traffic over 90 percent of the time, and they never took flight or showed any other type of avoidance response. In a study of human disturbances in Arizona, eagles at nest sites on the Salt and Verde rivers showed approximately 3 percent avoidance responses to vehicles, aircraft, and other noises (Grubb and King 1991). Avoidance responses increased with decreasing distance to the source of the disturbance. Noise produced by construction and operation of the facility would have no impacts on the bald eagle.

The proposed gas pipeline corridor would cross the Big Sandy River at the US 93 bridge in corridor segment R5. If the pipeline is constructed by trenching, laying pipe, and backfilling at this crossing, there would be impacts on the wetland and riparian area (refer to Section 3.12). Assuming a 50-foot-wide construction zone in riparian areas, riparian vegetation would be removed within an area of 1.38 acres. However, due to the small area of disturbance in the river channel, there would be little, if any, impact on the populations of prey species. If the pipeline is installed by directional drilling, there would be no impact on the riparian habitat. There would be no long-term impacts on potential eagle foraging habitat on the Big Sandy River. The proposed gas pipeline corridor would not affect any other potential eagle foraging areas, and it would not impact any trees large enough to be potential nest or roost sites.

The OPGW option and/or microwave dish installations would not impact any potential foraging areas, and would not impact any trees large enough to be potential nest or roost sites.

A literature search pertaining to evaporation (brine) ponds at power generation facilities and the potential for wildlife impacts was completed using Cambridge Scientific Abstracts, an internet search tool that provides access to more than 70 databases covering the scientific and technical research literature.

Most recently, Tanner et al. (1999) published a study of the algae, invertebrates, and chemistry of two large, hypersaline, industrial wastewater ponds near Phoenix, Arizona (Tanner et al. 1999). Negative impacts associated with waterbird use of selenium-contaminated evaporation ponds are generally reported for birds that feed and reside at these evaporation ponds for the duration of the breeding season (Adams et al. 1998; Lemly 1997; Robinson and Oring 1996). The presence of a vegetated or barren mud shoreline, shallow wading habitat, and vegetation in deeper water are key factors that attract wildlife, particularly waterbirds, to reside through the breeding season at evaporation ponds (Byron et al. 1999). The absence of attractive habitat for breeding waterbirds and other wildlife, including bats, can minimize exposure and preclude impacts, even when water and dietary selenium concentrations exceed chronic threshold concentrations (Byron et al., 1999). If chronic toxicity levels of any constituent are reached in the evaporation ponds for this Project, habitat is present, and bald eagle prey have access to the ponds, impacts on bald eagle may occur.

Evaporation ponds used to dispose of waste cooling water could attract waterfowl. Bald eagles could be attracted to the evaporation ponds by these waterfowl, a potential prey item of the eagle. Numbers of waterfowl are not expected to be large enough to support a wintering population of bald eagles, although transient eagles could capture some waterfowl from the ponds, if present. If compounds are concentrated to toxic levels in the evaporation ponds and likewise in waterfowl using the ponds, there would be a risk of bald eagles consuming the contaminated waterfowl. Because of the transient nature of the waterfowl and eagles, the toxicity risk to eagles would be small.

Because the evaporation ponds would be adjacent to the existing transmission lines, bald eagles moving in pursuit of waterfowl are at risk for collisions with transmission lines. These collisions may result in mortality or injury of

bald eagles. Because the Proposed Action contains measures to augment shallow groundwater and surface water in the Big Sandy River, groundwater pumping for the Project is predicted to cause no adverse impacts on the bald eagle.

#### Yuma Clapper Rail

Because the Proposed Action contains measures to augment shallow groundwater and surface water in the Big Sandy River, groundwater pumping for the Project is not predicted to result in a lowering of the shallow groundwater table or reduced flow in the Big Sandy River. Thus, there would likely be no adverse impacts on the Yuma clapper rail.

Sufficient emergent wetland vegetation to constitute Yuma clapper rail habitat is not present in wetlands along the proposed gas pipeline corridor. Construction of the pipeline and installation of OPGW or microwave dishes with the Proposed Action would have no impact on the Yuma clapper rail.

Because no habitat for the Yuma clapper rail is found at the proposed power plant site, noise from construction and operation of the facility would not impact populations of this bird.

#### Arizona Cliffrose

Known populations of Arizona cliffrose are situated far enough from the proposed power plant site to prevent any impacts on this endangered shrub. The Proposed Action would not affect any known population of Arizona cliffrose but it is possible that small exposures may exist. However, pre-construction surveys for Arizona cliffrose habitat (Tertiary limestone lakebed deposits) would be completed as part of the Proposed Action within the region of influence. If habitat could not be avoided, surveys would be conducted during its flowering period from April to June. . Arizona cliffrose habitat or any identified individuals would be avoided and no impacts would occur on this species.

The installation of the OPGW option would locate the pulling and tensioning stations to avoid individuals and populations of the Arizona cliffrose. Therefore, there would be no impacts on the Arizona cliffrose from this installation. Microwave dishes would be installed on existing towers and would have no impact on the Arizona cliffrose.

### Mountain Plover

Some suitable habitat for wintering mountain plovers is present in the semi-desert grasslands near the northern end of the proposed gas pipeline corridor in corridor segments R1, C1, and T3. There would be minimal impacts on habitat for this species because disturbed areas within the proposed pipeline corridor would be re-seeded with native vegetation.

Suitable habitat also is present along the route for the northern portion of the OPGW installation option. Since disturbed areas would be reseeded with native vegetation, there would be minimal impacts on habitats for the mountain plover. Microwave dish installations would not impact mountain plover habitat.

### Other Special Status Species

#### *Bats*

Several sensitive species of bats are known to forage over the wetland adjacent to the proposed power plant site and over the Big Sandy River riparian area and in xeroriparian and upland habitat. Bats also are known to use the bridges and culverts on US 93 for day and night roosting. Construction of the proposed power plant, substation, agricultural development, and OPGW option is not expected to impact any known roosting sites or maternity colonies. Construction of the proposed power plant, associated facilities, agricultural activities, and pipeline would permanently remove approximately 319 acres of predominantly Sonoran desertscrub foraging habitat. In addition, 250 acres of similar habitat would be disturbed but revegetated. Limited xeroriparian

foraging habitats exist on the proposed power plant site.

The evaporation ponds and night lighting at the proposed power plant site may beneficially attract a large number of insects that could provide an additional foraging resource for bats. Water quality of the ponds would have the potential to affect bats if they drink contaminated water. There is some potential for the bioaccumulation of contaminants to adversely affect bats through consumption of insects, although this is unlikely. Pipeline construction along the proposed gas pipeline corridor and the OPGW option would be a temporary disturbance for bats roosting under bridges and culverts. Agricultural chemicals, including pesticides, are proposed for use on the proposed agricultural fields, and could result in a direct, adverse impact on bats that would consume contaminated insects. There is no evidence that microwave dish installation would have any adverse impacts on bat activities. These impacts would not be significant because they do not directly affect hibernacula or maternity colonies.

#### *Birds*

Construction at the proposed power plant site is not expected to have a significant impact on sensitive species of birds. Raptor nest sites, including large trees and cliffs, do not occur at the proposed power plant site so impacts on nesting raptors are not expected. A few scattered saguaros exist at the proposed power plant site. Some of these saguaros could support nests of large raptors, and cavities in the saguaros could provide nest sites for American kestrels, western screech-owls, and elf owls. Nesting habitat for other sensitive bird species also is absent from the proposed power plant site. As noted in Section 3.11, groundwater pumping associated with the Proposed Action is not expected to have any impact on riparian vegetation.

Construction of the OPGW option, microwave dish installations, or the proposed gas pipeline is not expected to impact birds identified as

sensitive species. Tensioning and pulling sites for the OPGW installation would be surveyed for nests and any discovered nests would be avoided during the OPGW installation. A few of the larger cottonwood trees in the riparian zone of the Big Sandy River could support nests for raptors. Although the pipeline crossing of the Big Sandy River could require the removal of large riparian trees with a diameter at breast height (DBH) of greater than 12 inches, this impact would not be significant as long as the trees did not contain an active raptor nest. Impacts on most nesting raptors are not expected; however, there is some chance that ferruginous hawks, loggerhead shrikes, or burrowing owls could be found along the proposed gas pipeline corridor. Pre-construction surveys for breeding raptors would be conducted. Shrikes may nest along the proposed gas pipeline corridor. Impacts on these species would be considered significant if active nests were lost.

Ground-disturbing activities would be scheduled outside of the breeding season of the yellow-billed cuckoo, which is mid-June through mid-August. Other sensitive species of birds are not expected to be impacted during construction of the proposed pipeline.

Reptiles Construction of the power plant and associated facilities under the Proposed Action would result in the loss of chuckwalla habitat and possibly the loss of individual chuckwalla. Because of the extent of chuckwalla habitat and individuals of this species in the region of influence, these impacts would not be considered significant.

Habitat for the desert night lizard may be subject to adverse impacts as a result of vegetation removal and soil disturbance associated with the Proposed Action. Ground disturbance would total approximately 5 acres for the OPGW installation, approximately 406 acres in the proposed pipeline corridor and 108 acres for the proposed power plant site and associated facilities. Ground disturbance would total approximately 107 acres for the agricultural

fields. Because of the extent of desert night lizard habitat and individuals of this species in the region of influence, these impacts would not be considered significant.

Some habitat for the banded Gila monster may be adversely impacted by the Proposed Action as a result of vegetation removal and soil disturbance. These animals may be subject to incidental take by construction or maintenance vehicle traffic. Because of the extent of Gila monster habitat and individuals of this species in the region of influence, these impacts would not be considered significant.

Habitat for the Arizona skink is limited in the region of influence to the riparian zone on the Big Sandy River and the juniper woodland near the north end of the pipeline corridor. Because the Proposed Action contains measures to augment shallow groundwater and surface water in the Big Sandy River, groundwater pumping for the Project is not predicted to affect riparian vegetation. However, there would be a small, temporary disturbance to the riparian vegetation in the Big Sandy River if the pipeline is constructed there by trenching. There also would be some small impacts on juniper woodland habitat from construction of the pipeline in these areas. OPGW pulling and tensioning sites likely would be sited around juniper woodland habitat. Because extensive juniper woodland habitat is present in the Hualapai Mountains, these impacts would not be significant.

The desert rosy boa is nocturnal and there is little chance of incidental death by construction and maintenance vehicle traffic. However, soil disturbance and vegetation removal may result in some habitat degradation. Because of the extent of desert rosy boa habitat and individuals of this species in the region of influence, these impacts would not be considered significant.

Habitat for the Sonoran desert tortoise would be adversely impacted through vegetation removal and soil disturbance associated with the Proposed Action. Ground disturbance would total about 621 acres under the Proposed Action

(229 acres of permanent disturbance and 393 acres of temporary disturbance) and an additional 5 acres of temporary disturbance for the OPGW option, if selected. Microwave dish installation would not affect any desert tortoise habitat. Desert tortoises are diurnally active and may be subject to incidental take by construction and maintenance vehicle traffic, especially during the summer months. Pre-construction surveys and other measures would be implemented as part of the Proposed Action to avoid or relocate identified individuals. This would avoid any significant impacts.

### *Amphibians*

The OPGW option and microwave dish installations would not impact amphibian habitat. Depending upon which construction technique for the gas pipeline is implemented, the Proposed Action could result in impacts on the Arizona toad and the lowland leopard frog and their habitat. If the pipeline is constructed by trenching, laying pipe, and backfilling at the crossing of the Big Sandy River, then wetland habitat for these amphibians could be temporarily impacted. Impacts would not be significant because of the small area of habitat that would be impacted and the relatively low density of amphibians. If the natural gas pipeline is installed under the Big Sandy River and riparian zone by directional drilling, the pipeline is not likely to impact the Arizona toad or lowland leopard frog or their habitats. Because the Proposed Action contains measures to augment shallow groundwater and surface water flow in the Big Sandy River, no impact is expected on wetlands, and thus there is expected to be no adverse impacts on lowland leopard frogs, Arizona toads, or their habitat on the Big Sandy River.

### *Fish*

The OPGW option and microwave dish installations would not impact fish habitat. Depending upon which construction technique for the gas pipeline is implemented, the Proposed Action could result in impacts on fish

and their habitat. If the pipeline is constructed by trenching, laying pipe, and backfilling at the crossing of the Big Sandy River, then wetland habitat for these fish could be temporarily impacted. Impacts would not be significant because of the small area of habitat that would be impacted and the relatively low density of fish. If the natural gas pipeline is installed under the Big Sandy River and riparian zone by directional drilling, the pipeline is not likely to impact fish. Because the Proposed Action contains measures to augment shallow groundwater and surface water flow in the Big Sandy River, groundwater pumping would likely cause no adverse impacts on fish or their habitat on the Big Sandy River.

If the pipeline is installed under the Big Sandy River riparian zone by directional drilling, there would be no impacts on these aquatic habitats from this activity.

### *Plants*

Thorn milkwort, linear-leaf sand spurge, and three hearts were not observed in the Project area during a survey for special status species (Greystone 2000c); however, these species could occur in the region of influence. Significant impacts are not expected for these species because detailed field surveys would be conducted in all suitable habitat prior to construction or OPGW installation. If habitat cannot be avoided, field surveys would be conducted during the appropriate flowering period to identify any individuals or populations of this species. Arizona necklace was not observed along the proposed gas pipeline corridor (Greystone 2000c). However, it was observed during a site reconnaissance by EPG, Inc. on the proposed pipeline corridor in segment C3 and along corridor segments T1, T2, C2, and R3. Because of the limited distribution of this species within the region of influence, these populations are substantial, and the destruction of them would be considered significant. Detailed field surveys would be conducted to identify suitable habitat. If habitat cannot be avoided, field surveys would be

conducted during the appropriate flowering period to identify any individuals or populations of this species. Loss of these populations would be significant. Aquarius milk-vetch and Parish's phacelia could occur in lakebed deposits in the Big Sandy Valley; however, there are no known occurrences of these plants in the region of influence. It is possible that small exposures of Tertiary limestone lakebed deposits may exist, but no significant impact on these species is expected if they are not found on the ancient lakebed deposits. Detailed field surveys would be conducted to identify suitable habitat. If habitat cannot be avoided, field surveys would be conducted during the appropriate flowering period to identify any individuals or populations of this species. California flannelbrush, Aravaipa woodfern, and sand cholla are not likely to occur in the region of influence. Therefore, significant impacts are not expected for these species under the Proposed Action.

### ***Alternative R Gas Pipeline Corridor***

#### Southwestern Willow Flycatcher

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

#### Bald Eagle

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

#### Yuma Clapper Rail

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

#### Arizona Cliffrose

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

#### Mountain Plover

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

#### Other Special Status Species

##### *Bats*

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

##### *Birds*

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

##### *Reptiles*

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

##### *Amphibians*

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

##### *Fish*

Potential impacts of this alternative would be the same as those discussed for the Proposed Action.

##### *Plants*

With the exception of the Arizona necklace, potential impacts of this alternative would be the same as those discussed for the Proposed Action.

Arizona necklace was observed at the northern end of the Alternative R gas pipeline corridor in segments C3 and R3. Because of the limited distribution of this species within the region of

influence, these populations are substantial, and the destruction of them would be considered significant. Detailed field surveys would be conducted to identify suitable habitat. If habitat cannot be avoided, field surveys would be conducted during the appropriate flowering period to identify any individuals or populations of this species. Loss of these populations would be significant.

### ***Alternative T Gas Pipeline Corridor***

#### Southwestern Willow Flycatcher

Potential impacts of this alternative would be the same as those discussed for the Proposed Action except that the Alternative T gas pipeline corridor would not cross the perennial reach of the Big Sandy River where it supports riparian vegetation.

#### Bald Eagle

Potential impacts of this alternative would be the same as those discussed for the Proposed Action except that the Alternative T gas pipeline corridor would not cross the perennial reach of the Big Sandy River where it supports riparian vegetation.

#### Yuma Clapper Rail

Potential impacts of this alternative would be the same as those discussed for the Proposed Action, except that this would be that the Alternative T gas pipeline corridor would not cross the perennial reach of the Big Sandy River where it supports riparian vegetation.

#### Arizona Cliffrose

Construction of the gas pipeline in the Alternative T gas pipeline corridor would not impact any known populations of Arizona cliffrose. Potential habitat would be impacted in corridor segment T5, where Tertiary limestone lakebed deposits have been found.

#### Mountain Plover

The potential impacts of this alternative would be the same as those discussed for the Proposed Action.

#### Other Special Status Species

##### *Bats*

Potential impacts of this alternative would be the same as those discussed for the Proposed Action except that the Alternative T gas pipeline corridor would not be located close to existing bridges or culverts that could be used by bats.

##### *Birds*

Potential impacts of this alternative would be the same as those discussed for the Proposed Action except that the Alternative T gas pipeline corridor would present a slightly higher potential for raptor nests because it would follow the transmission line rights-of-way. .

##### *Reptiles*

Potential impacts of this alternative would be the same as those discussed for the Proposed Action except where the Alternative T gas pipeline corridor crosses the Big Sandy River at a point that is dry except during storm flow events. The sandy banks may be used by Sonoran desert tortoises, and these habitats may be affected by construction. These impacts would be comparable to those under the Proposed Action.

##### *Amphibians*

Potential impacts of this alternative would be the same as those discussed for the Proposed Action, except there would be no direct impact on the perennial flow of the Big Sandy River.

##### *Fish*

Potential impacts of this alternative would be the same as those discussed for the Proposed

Action, except there would be no direct impact on the perennial flow of the Big Sandy River.

### *Plants*

With the exception of the Arizona necklace, potential impacts of this alternative would be the same as those discussed for the Proposed Action.

Arizona necklace was observed near the northern end of the Alternative T gas pipeline corridor in segments C3, T1, and T2. It is possible that there are isolated populations along corridor segment T3. Because of the limited distribution of this species within the region of influence, these populations are substantial, and the destruction of them would be considered significant. Detailed field surveys would be conducted to identify suitable habitat. If habitat cannot be avoided, field surveys would be conducted during the appropriate flowering period to identify any individuals or populations of this species. Loss of these populations would be significant.

### *Crossover Segment C2*

Along this corridor segment, there is potential habitat for some sensitive bat species such as the fringed myotis, small-footed myotis, and Allen's big-eared bat. Populations of Arizona necklace also are found within corridor segment C2. However, the pipeline would be routed within an existing road, so it is not likely that adverse impacts would occur to these species.

### *Communication Facilities*

The presence of any special status species at any locations that would be affected by the installation of the OPGW (pulling and tensioning sites) or installation of the microwave towers would be identified through pre-construction field surveys. Potential impacts could be avoided by altering the location of the facilities as needed.

### *No-Action Alternative*

#### Southwestern Willow Flycatcher

Under the No-Action Alternative, the Project would not be constructed, and there would be no impacts on the willow flycatcher.

#### Bald Eagle

No impacts, adverse or otherwise, are expected on this endangered raptor under the No-Action Alternative.

#### Yuma Clapper Rail

The No-Action Alternative would have no effect on the Yuma clapper rail.

#### Arizona Cliffrose

No impacts, adverse or otherwise, are expected on this endangered plant under the No-Action Alternative.'

#### Mountain Plover

The No-Action Alternative would have no effect on the Mountain Plover.

#### Other Special Status Species

Bat, bird, reptile, amphibian, and fish populations and their use of this area would be expected to continue at their current levels. Plants would not be impacted by the No-Action Alternative. The groundwater production and monitoring wells, and associated access roads completed on private land and used to test the lower aquifer, would remain.

#### **3.14.2.6 Mitigation and Residual Impacts**

If adopted, the following measures would be implemented to avoid or reduce impacts on the southwestern willow flycatcher:

- To reduce or avoid cowbird parasitism on southwestern willow flycatcher, agricultural

activities in Section 7 would be restricted to those that could occur without increasing cowbird foraging habitat.

- To reduce potential impacts on southwestern willow flycatcher habitat, camping, hiking, biking, off-road vehicles, fires, wood-gathering, and other recreational uses by Project construction workers would be excluded within the areas of known or potential habitat controlled by Caithness.
- To avoid impacting southwestern willow flycatchers by attracting people or livestock, the use of surveyors' flagging in flycatcher habitat would be as inconspicuous as practical, and the flagging would be removed when Project construction is completed.
- Should the agencies with regulatory responsibilities applicable to the Project, in consultation with agencies with appropriate expertise, determine that on the basis of the available evidence the Project poses a substantial threat to the southwestern willow flycatcher or its habitat, modifications to the Project up to and including the cessation of groundwater pumping may be required in accordance with the agencies' applicable authority.

If adopted, the following additional measures would be implemented to avoid or reduce impacts on the southwestern willow flycatcher if the natural gas pipeline is constructed across the Big Sandy River by trenching:

- In cooperation with USFWS and AGFD, monitoring of the southwestern willow flycatcher population would be conducted until the riparian vegetation is restored. Data would be collected on specific habitat requirements, nest site selection, reproductive success, and cowbird parasitism. Special permits from USFWS would be required for this monitoring. If excessive rates of parasitism are documented, cowbird control measures

(traps) would be implemented at the restoration area in the Big Sandy riparian area. Excessive parasitism and trapping protocols would be defined by USFWS and/or AGFD.

- To accomplish restoration of riparian vegetation that supports southwestern willow flycatcher, temporary fencing to exclude livestock would be installed around the restoration area at and adjacent to Wetland #1 to ensure success of the revegetation efforts. This fencing would be removed after the trees and shrubs have become well established and would be less susceptible to damage by livestock.
- To restore southwestern willow flycatcher habitat in the riparian areas of the Big Sandy River, areas to be disturbed would be replanted with woody native species at a density of 3 to 1 of the individuals removed to accelerate restoration. Species would include Goodding willow, Fremont cottonwood, screwbean mesquite, and arrowweed.

If adopted, the following measures would be implemented to avoid or reduce impacts on the bald eagle :

- Mitigation measures presented in Section 3.13.2.6 for mortality of birds colliding with the transmission line would be implemented.
- To prevent impacts from exposure to toxic contaminants in evaporation ponds, the mitigation measure in Section 3.13.2.6 regarding exposure to wildlife to contaminants in the evaporation ponds would be implemented.

If adopted, the following measures would be implemented to minimize adverse impacts not considered to be significant on other sensitive species:

- To prevent impacts on the bats from exposure to toxic contaminants in

evaporation ponds, the mitigation measure in Section 3.13.2.6 regarding exposure to wildlife to contaminants in the evaporation ponds would be implemented.

- To prevent abandonment of nests, construction would be prohibited within 0.25 mile of any nesting raptor during the period the nest is active. Within the riparian habitat, large trees that could provide suitable nesting sites for raptors would be avoided.
- To reduce the adverse impacts of the Project on the banded Gila monster, desert night lizard, rosy boa, chuckwalla, and Arizona skink and to help avoid incidental deaths of these animals by construction vehicles and maintenance traffic, any of these species identified during the surveys to relocate desert tortoise would be relocated as well.
- All rosy boa or chuckwalla found within construction areas could be moved a minimum of 500 feet (not more than 1 mile from their original location) and placed in a shady location. Rosy boa or chuckwalla that wander onto construction areas during construction periods also could be removed to a safe location, if necessary, and would be moved solely for the purpose of preventing death or injury.
- To the extent practical, to avoid harming individual sensitive plants, pipeline alignments would be re-routed within the selected corridor to avoid sensitive plant species. If sensitive plants cannot be avoided, seeds would be collected to aid in revegetation to the extent practical and added to the seed mix in areas where the individuals are found.

If adopted, the following measure would be implemented to enhance the existing environment:

- To enhance bat roosting habitat in the Project vicinity, box culverts that would be

installed at the Sycamore Creek crossing would include domed and roughened roofs, or shallow roof crevices.

### 3.15 CULTURAL RESOURCES

The cultural environment includes those aspects of the physical environment that relate to human culture and society, along with the social institutions that form and maintain communities and link them to their surroundings. The BLM (Manual 8100, *Cultural Resource Management*) uses the term *cultural resources* to include *cultural properties* and *traditional lifeway values* defined as follows:

- *cultural property*: a definite location of past activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and may include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups. Cultural properties are concrete, material places and things that are located, classified, ranked, and managed through the system of identifying, protecting, and utilizing for public benefit.
- *traditional lifeway value*: a social and/or cultural group's traditional patterns of religious belief, cultural practice, or social interaction. Traditional lifeway values sometimes imbue cultural resources with significance. They can be identified through consultation and considered through public participation during planning and environmental review.

Section 101(b)(4) of NEPA established a Federal policy of conserving the historic and cultural, as well as the natural, aspects of our national heritage. Regulations implementing NEPA stipulate that Federal agencies consider the consequences of their undertakings on historic and cultural resources (40 CFR Part

1502.16[g]). Numerous other laws, regulations, and executive orders define other requirements for protecting cultural resources, but the primary requirements are those of Section 106 of the National Historic Preservation Act (NHPA). NHPA mandates that as Federal undertakings are planned and implemented, the responsible Federal agencies give due consideration to historic properties, which are defined as districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places (National Register). Federal undertakings include projects, activities, or programs funded in whole or in part by a Federal agency, or requiring a Federal permit, license, or approval. Regulations for *Protection of Historic Properties* (36 CFR Part 800) implement the NHPA by defining a process for demonstrating such consideration through consultation with State Historic Preservation Officers (SHPOs), the Federal Advisory Council on Historic Preservation (ACHP), and other interested organizations and individuals.

Cultural resources are addressed in this Draft EIS in compliance with both NEPA and NHPA. The cultural resource component of the affected environment is described first, and then the potential impacts of the Proposed Action and alternatives are discussed.

### **3.15.1 Affected Environment**

#### **3.15.1.1 Region of Influence**

The region of influence, or analysis area, for assessing impacts on cultural resources was considered to be the “area of potential effects,” as defined by regulations for *Protection of Historic Properties*. These regulations define the area of potential effects as “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties” (36 CFR Part 800.16(d)).

The area of potential direct effects was considered to be the area of the Project parcels or rights-of-way where ground-disturbing

activities could occur. These include the plant site, well field and agricultural development parcel, new access road, four other groundwater monitoring wells, two existing roads used to access those wells, the pipeline that would supply natural gas to the plant, and communications systems (microwave and possibly OPGW).

Potential indirect effects include visual and noise intrusions that could diminish the historic values of certain types of cultural resources. The area of potential indirect effects is defined as extending up to 3 miles from the Project facilities. This zone encompasses about 317.5 square miles.

The Big Sandy River Basin was defined as the region of influence for considering potential cumulative impacts. This Basin encompasses about 2,732 square miles of east central Mohave County.

### **3.15.1.2 Existing Conditions**

#### ***Cultural History***

Human societies have lived in Arizona at least since the end of the Pleistocene epoch some 12,000 years ago. The early occupants, labeled Paleo-Indians, experienced a regional climate that was cooler and wetter than today, and large Pleistocene mammals, such as mammoths, mastodons, and camels, lived in the area. Archaeological evidence of the Paleo-Indian occupation of west-central Arizona is meager, and limited primarily to isolated finds of distinctive spear points used by early Paleo-Indian hunters. The large Pleistocene megafauna became extinct due to overhunting or inability to adapt to the warming and drying climate. Human societies that occupied this subsequent Archaic era came to rely on many species of smaller game and a wide variety of native plants for food. These Archaic-era hunters and foragers occupied the region for thousands of years. Populations remained small throughout this long period and, to date, little evidence of Archaic era