The Western Gulf Coastal Plains are characterized as a rather flat narrow section of land, typically 50 to 90 miles wide, paralleling the Gulf of Mexico. Historically, the vegetation was generally grasslands with irregular forests and savannah habitats farther inland. Today, croplands are common and urban and industrial environments have expanded in recent years with the growing oil and gas production. The Southern Subhumid Gulf Coastal Prairies are characterized by low flat plains with low gradient streams and rivers. Historically, this ecoregion was covered by tallgrass prairie and scattered oak mottes. These tall grass prairies are now restricted to scattered relic populations. The Southern Subhumid Gulf Coastal Prairies are typically drier than the Northern Humid Gulf Coastal Prairies to the north (Griffith et al. 2007).

The Southern Texas Plains lie east of the Rio Grande River and west of the Gulf Coastal Plains in south Texas. This region is described as rolling to moderately dissected plains with grassland and savanna vegetation that vary during wet and dry cycles. Also known as the Tamaulipan Thornscrub or the "South Texas Brush Country" as it is called locally, this ecoregion contains a high and distinct diversity of plant and animal life (Griffith et al. 2007).

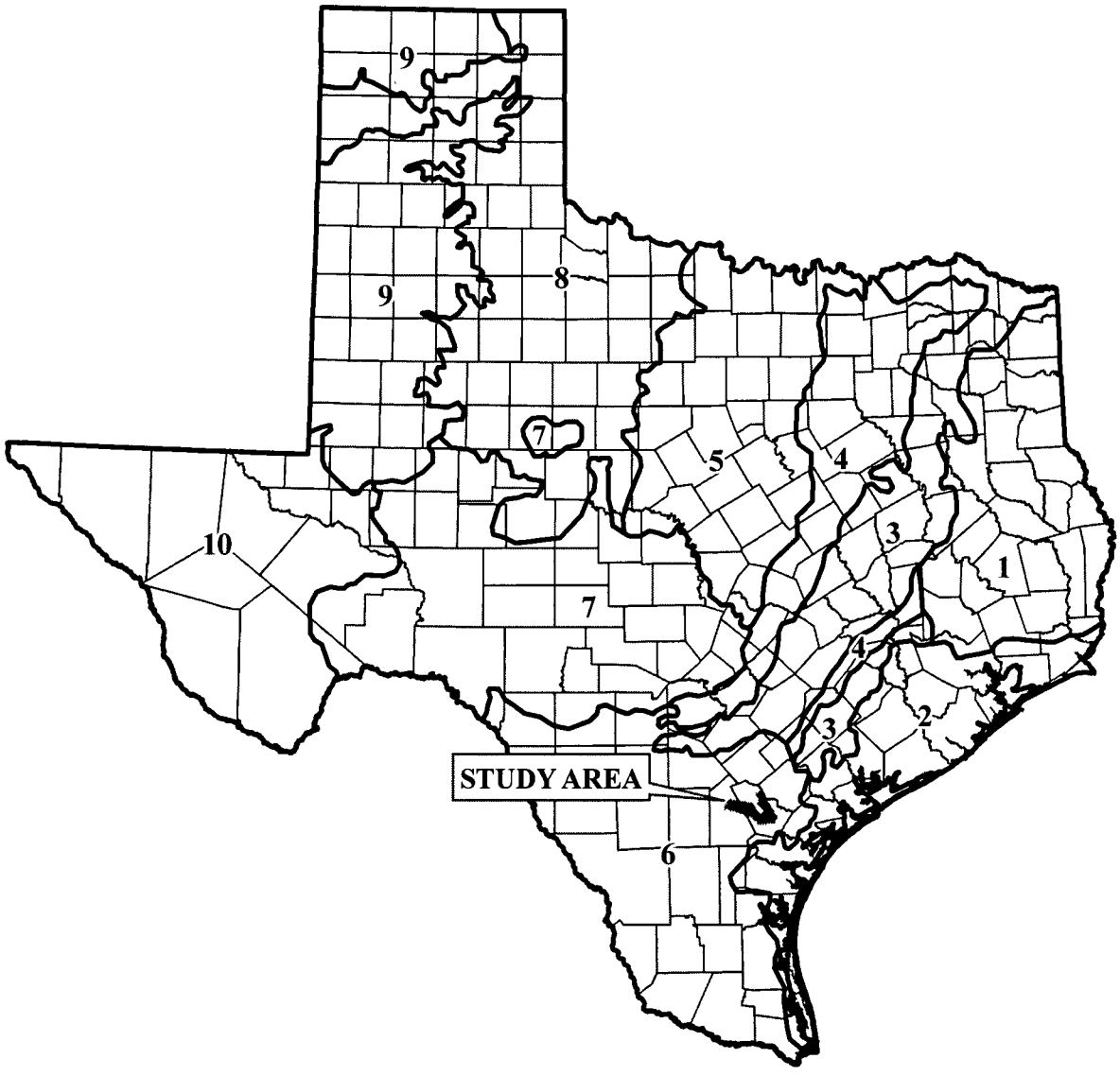
The Texas-Tamaulipan Thornscrub Level IV Ecoregion encompasses a large portion of South Texas and the Southern Texas Plains, stretching into northern Mexico and contains a variety of soil and vegetation types. The majority of the area is described as gently rolling or irregular plains, intersected by streams and arroyos, with low growing vegetation. The land usage in this region is predominantly rangeland, with supplemental income from game hunting (Griffith et al. 2007).

Vegetation Types

The study area is mapped within the South Texas Plains vegetational area of Texas (Gould et al. 1960) (see Figure 2-4). Vegetational types within the study area include Cropland, Post Oak Woods/Forests/with Grassland Mosaic, Mesquite/Blackbrush Shrub, Mesquite-Live Oak-Bluewood Parks (Frye et al. 1984).

Within the South Texas Plains, consistent grazing pressure and the reduction of wildfires provided the opportunity for invasive woody species including honey mesquite (*Prosopis glandulosa*), huisache *(Acacia smallii)*, blackbrush (*Acacia rigidula*), granjeno (*Cretis pallida*), yaupon, and eastern red cedar to expand their range and density.

Cropland areas are scattered throughout the study area, but primarily occur within the western and southern portions of the study area and incorporate the commercial production hay, wheat, pecans, rice, soybeans, grain sorghum, cotton, and corn.



0 50 100 150 200 250

Miles

Source Gould, F W , Hoffman, G O , and Rechenthin, C A 1960, modified

Legend

Vegetational Areas Boundary

1 Pineywoods
2 Gulf Prairies and Marshes
3 Post Oak Savannah
4 Blackland Prairies
5 Cross Timbers and Prairies
6 South Texas Plains
7 Edwards Plateau
8 Rolling Plains
9 High Plains
10 Trans-Pecos

County Boundary

THREE RIVERS - BORGLUM - TULETA
TRANSMISSION LINE PROJECT

Figure 2-4

Location of the Study Area
In Relation to the
Vegetational Areas of Texas

AEP TEXAS

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The Post Oak Woods/Forests/with Grassland Mosaic vegetation type makes up a majority of the study area. This vegetational subdivision generally occurs on sandy soils and is comprised of post oak, black-jack oak (*Quercus marilandica*), eastern red cedar, mesquite, black hickory (*Carya texana*), live oak (*Quercus virginianna*), sandjack oak (*Quercus incana)*, cedar elm (*Ulmus crassifolia*), hackberry (*Celtis* spp.), yaupon, poison oak (*Toxicondendron radicans*), American beautyberry (*Callicarpa americana*), hawthorn (*Crataegus* spp.), supplejack (*Berchemia scandens)*, trumpet creeker (*Campsis radicans*), dewberry (*Rubus trivialis*), coral-berry (*Symphoricarpos orbiculatus*), little bluestem (*Schizachyrium scoparium*), silver bluestem (*Bothriochloa saccharoides*), sand lovegrass (*Eragrostis trichodes*), beaked panicum (*Panicum anceps*), three-awn (*Aristida* spp.), sprangle-grass (*Chasmanthium latifolium*), and tickclover (*Desmodium paniculatum)* (McMahan et al. 1984).

Mesquite/Blackbrush Shrub vegetation is primarily located in the southwestern portion of the study area within Bee County. This vegetational subdivision typically occurs on shallow, gravelly or loamy soils and is comprised of mesquite, blackbrush, lotebush (*Ziziphus obtusifolia*), Texas sage (*Leucophyllum frutescens*), guajillo (*Acacia berlandieri*), desert olive (*Foresteria angustifolia*), allthorn (*Koeberlinia spinosa*), whitebrush (*Aloysia gratissima*), bluewood (*Condalia hookeri*), granjeno, guayacan (*Guaiacum angustifolium*), leatherstem (*Jatropha dioica*), prickly pear (*Opuntia* spp.*)*, tasajillo (*Opuntia leptocaulis)*, kidneywood (*Esenhardtia texana*), and yucca (*Yucca* spp.) (McMahan et al. 1984).

Mesquite-Live Oak-Bluewood Parks vegetation type is primarily located in the south-central portion of the study area. Typical vegetation in this region includes *Acacia* spp., whitebrush, granjeno, lotebush, wolfberry (*Lycium berlandieri*), blackbrush, desert yaupon (*Schaefferia cuneifolia*), prickly pear, chittamwood (*Sideroxylan lanuginosum*), tasajillo, agarita (*Mahonia trifoliolata*), and Texas persimmon (*Diospyros texana*) (McMahan et al. 1984).

Introduced grasses occurring throughout the study area may include king ranch bluestem (*Bothriochloa ischaemum*), johnsongrass (*Sorghum halepense*), bufflegrass (*Cenchrus ciliaris*), bermudagrass (*Cynodon dactylon*), and rescuegrass (*Bromus unioloides*) (Hatch and Pluhar 1993).

Wetlands

Mapped wetlands information was incorporated for the study area from the USFWS NWI database (USFWS 2016a). NWI maps are based on topography and interpretation of infrared satellite data and color aerial photographs and are classified under the Cowardin System (Cowardin et al. 1979). NWI wetland types identified within the study area include freshwater palustrine emergent (PEM), palustrine (PFO), palustrine scrub shrub (PSS), ponds (PUB), and lacustrine, and riverine. PEM wetlands consist of rooted herbaceous hydrophytes

located generally in depressional areas, pond margins, freshwater marshes, or shallow water areas. PFO wetlands are comprised of hydrophytic trees that constitute 30 percent or greater of the areal vegetation coverage and exist typically in bottomland riparian woodlands near creeks and rivers. PSS wetlands are comprised of hydrophytic trees that constitute less than 30 percent and the scrub-shrub layer constitutes 30 percent or greater of the areal vegetation cover. Mapped PUB ponds and lacustrine wetlands are typically associated with shallow freshwater stock ponds and other man-made impoundments. Riverine areas are associated with the Nueces River and perennial creeks (USFWS 2016a). Typically, fluctuations in water levels are experienced throughout the year because of high evaporation rates and heavy rainfall events are required to fill the ponds completely.

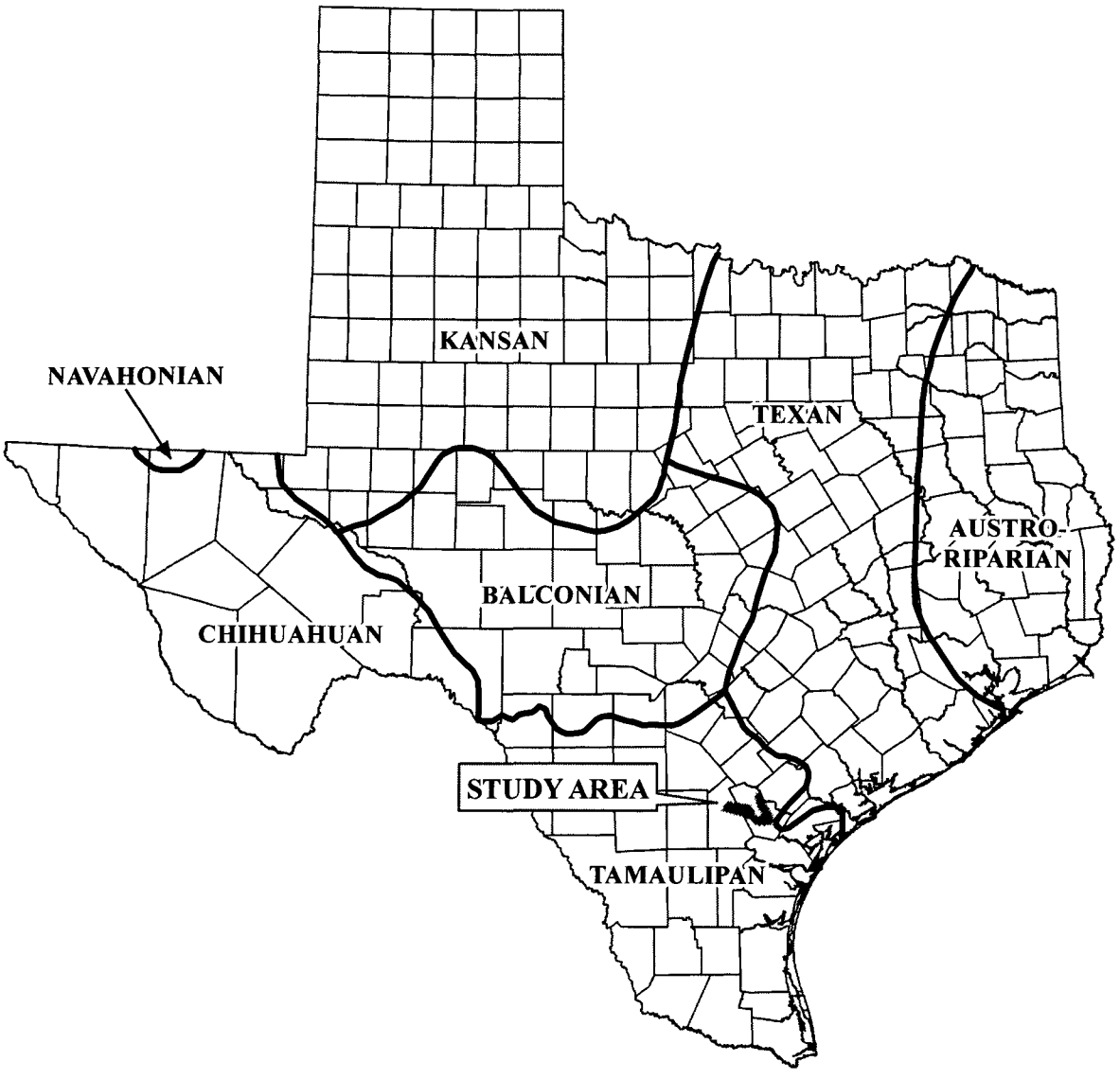
Perennial and intermittent streams and creeks exist in the study area, and may be prone to flash flooding after heavy rain storms. Perennial aquatic environments may support species of smartweeds and docks (*Polygonaceae*), pennyworts (*Hydrocotyle* spp.), widgeon-grass (*Ruppia* spp.), pondweed (*Potamogetonacae*), and duckweeds (*Lemna* spp.). PEM wetlands may be located along the edges of ponds and streams during wetter periods and may be comprised of such species as rushes (*Juncus* spp.), spikerushes (*Eleocharis* spp.), sedges (*Carex* spp.), and flatsedges (*Cyperus* spp.). Typical woody plant species in these wetland or riparian areas include American elm (*Ulmus americana*), sycamore (*Platanus* spp.), pecan (*Carya illinoinensis*), eastern cottonwood (*Populus deltoides*), black willow (*Salix nigra*), and rattlebush (*Sesbania* spp.) (Chadde 2012a and 2012b). Bottomland/riparian areas were mapped by POWER personnel through aerial photography and topographic map interpretation.

Ponds located in the study area exhibit variability in terms of their age, drainage, use by livestock, past fish stocking and fertilization history. These aquatic habitats are often exposed to full sunlight and do not typically experience the variations in flow as do streams and rivers after heavy rainfall events. Typically, fluctuations in water level are experienced during the summer months because of high evaporation rates and repeated heavy rainfall is required to fill the ponds completely. Periods of extended drought in the region may reduce these seasonal water level fluctuations or dry the pond completely. Bottom materials in these ponds are typically universally silt-sized particles, either naturally occurring or added as a liner to prevent leakage.

Wildlife and Fisheries

Wildlife

The study area is located within the Tamaulipan Biotic Province (see Figure 2-5) as described by Blair (1950). At the time of publication, species diversity within the Tamaulipan Biotic Province was noted to include 19 different anurans (frogs and toads), five urodeles (salamanders and newts), 36 snake species, 19 lizards, two land turtles, and 61 species of mammals (Blair 1950). Bird species occurring within the study area include resident and summer/winter migratory species.



N

0 50 100 150 200 250

Miles

Source Blair, 1950, modified

Legend

Biotic Province Boundary

County Boundary

THREE RIVERS - BORGLUM - TULETA
TRANSMISSION LINE PROJECT

Figure 2-5

Location of the Study Area
In Relation to the
Biotic Provinces of Texas

AEP TEXAS

POWER ENGINEERS

Amphibians

Amphibian species (frogs, toads and salamanders and newts) that may occur within the study area are listed in Table 2-14. Frogs and toads may occur in all vegetation types and salamanders and newts are typically restricted to moist hydric habitats (Tipton et al. 2012; Dixon 2013).

TABLE 2-14 AMPHIBIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Frogs/Toads	
American bullfrog	*Lithobates catesbeianus*
Blanchard's cricket frog	*Acris blanchardi*
Cope's gray treefrog	*Hyla chrysoscelis*
Couch's spadefoot	*Scaphiopus couchi*
Eastern green toad	*Anaxyrus debilis debilis*
Green treefrog	*Hyla cinerea*
Gulf Coast toad	*Incilius nebulifer*
Hurter's spadefoot	*Scaphiopus hurterii*
Mexican treefrog	*Smilisca baudinii*
Red-spotted toad	*Anaxyrus punctatus*
Rio Grande leopard frog	*Lithobates berlandieri*
Sheep frog	*Hypopachus variolosus*
Southern leopard frog	*Lithobates sphenocephala utricularius*
Spotted chorus frog	*Pseudacris clarkii*
Strecker's chorus frog	*Pseudacris streckeri*
Texas toad	*Anaxyrus speciosus*
Western narrowmouth toad	*Gastrophryne olivacea*
Woodhouse's toad	*Anaxyrus woodhousii*
Salamander/Newt	
Black-spotted newt	*Notophthalmus meridionalis*
Central newt	*Notophthalmus viridecens louisianensis*
Eastern tiger salamander	*Ambystoma tigrinum*
Smallmouth salamander	*Ambystoma texamum*

Sources: Dixon 2013.

Reptiles

Reptiles (turtles, lizards and snakes) that may typically occur in the study area are listed in Table 2-15. These include those species that are more commonly observed near water (i.e., aquatic turtles) and those that are more common in terrestrial habitats (Dixon 2013).

TABLE 2-15 REPTILIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Turtles	
Common snapping turtle	*Chelydra serpentina*
Guadalupe spiney soft-shelled turtle	*Apalone spinifera guadalupensis*
Mississippi mud turtle	*Kinosternon subrubrum hippocrepis*

TABLE 2-15 REPTILIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Ornate box turtle	*Terrapene ornata ornata*
Red-eared slider	*Trachemys scripta elegans*
Stinkpot	*Sternotherus odoratus*
Texas river cooter	*Pseudemys texana*
Texas tortoise	*Gopherus berlandieri*
Three-toed box turtle	*Terrapene carolina triunguis*
Yellow mud turtle	*Kinosternon flavescens*
Crocodilian	
American alligator	*Alligator mississippiensis*
Lizards	
Blue spiny lizard	*Sceloporus cyanogenys*
Five-lined skink	*Plestiodon fasciatus*
Great plains skink	*Plestidon obsoletus*
Green anole	*Anolis carolinensis*
Little brown skink	*Scincella lateralis*
Long-lined skink	*Plestiodon tetragrammus tetragammus*
Mediterranean gecko	*Hemidactylus turcicus*
Mesquite lizard	*Sceloporus grammicus microlepidotus*
Northern keeled earless lizard	*Holbrookia propinqua propinqua*
Short-lined skink	*Plestiodon tetragrammus brevilineatus*
Six-lined race runner	*Aspidoscelis sexlineatus*
Southern prairie skink	*Plestiodon septentrionalis obtusirostris*
Southern prairie lizard	*Sceloporus consobrinus*
Southern spot-tailed earless lizard	*Holbrookia lacerata subcaudalis*
Texas greater earless lizard	*Cophosaurus texanus texanus*
Texas horned lizard	*Phrynosoma cornutum*
Texas rose-bellied lizard	*Sceloporus variabilis marmoratus*
Texas spiny lizard	*Sceloporus olivaceus*
Texas spotted whiptail	*Aspidoscelis gularis gularis*
Western slender glass lizard	*Ophisaurus attenuatus attenuatus*
Snakes	
Blotched watersnake	*Nerodia erythrogaster*
Broad-banded copperhead	*Agkistrodon contortrix laticinctus*
Bullsnake	*Pituophis catenifer sayi*
Canebrake rattlesnake	*Crotalus horridus*
Checkered gartersnake	*Thamnophis marcianus*
Desert kingsnake	*Lampropeltis splendida*
Diamond-backed watersnake	*Nerodia rhombifer*
Dusky hog-nosed snake	*Heterodon gloydi*
Eastern gartersnake	*Thamnophis sirtalis*
Eastern hog-nosed snake	*Heterodon platirhinos*
Eastern yellow-bellied racer	*Coluber constrictor flaviventris*
Flatheaded snake	*Tantilla gracilis*
Gulf Coast ribbonsnake	*Thamnophis proximus orarius*
Mexican hog-nosed snake	*Heterodon kenerlyi*
Mexican milksnake	*Lampropeltis triangulum annulata*
Plains black-headed snake	*Tantilla nigriceps*

TABLE 2-15 REPTILIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Plains threadsnake	*Rena dulcis dulcis*
Rough earthsnake	*Virginia striatula*
Rough greensnake	*Opheodrys aestivus*
Schott's whipsnake	*Coluber schotti schotti*
Southern groundsnake	*Sonora semiannulata taylori*
Southwestern ratsnake	*Pantherophis guttata meahllmorum*
Speckled kingsnake	*Lampropeltis holbrooki*
Tamaulipan hook-nosed snake	*Ficimia streckeri*
Texas brownsnake	*Storeria dekayi texana*
Texas coralsnake	*Micrurus tener tener*
Texas glossy snake	*Arizona elegans arenicola*
Texas indigo snake	*Drymarchon melanurus erebennus*
Texas lined snake	*Tropidoclonion lineatum texanum*
Texas long-nosed snake	*Rhinocheilus lecontei*
Texas nightsnake	*Hypsiglena jani texana*
Texas patch-nosed snake	*Salvadora grahamiae lineate*
Texas ratsnake	*Pantherophis obsoletus*
Western coachwhip	*Coluber flagellum testaceus*
Western cottonmouth	*Agkistrodon piscivorus leucostoma*
Western diamond-backed rattlesnake	*Crotalus atrox*
Western massasauga	*Sistrurus catenatus tergeminus*

Source: Dixon 2013.

Birds

Numerous avian species are present within the study area. They include year-round residents and summer, and/or winter migrants as shown in Table 2-16. Additional transient bird species may migrate within or through the study area in the spring and fall and/or use the area to nest (spring/summer) or to overwinter. The likelihood for occurrence of each species will depend upon suitable habitat and the season. Migratory bird species may be protected under the MBTA.

TABLE 2-16 AVIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
ACCIPITRIFORMES: Accipitridae				
Broad-winged hawk	*Buteo platypterus*		X	
Cooper's hawk	*Accipiter cooperii*			X
Harris's hawk	*Parabuteo unicinctus*	X		
Mississippi kite	*Ictinia mississippiensis*		X	
Northern harrier	*Circus cyaneus*			X
Red-tailed hawk	*Buteo jamaicensis*	X		X
Sharp-shinned hawk	*Accipiter striatus*			X
Swainson's hawk	*Buteo swainsoni*		X	

TABLE 2-16 AVIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
White-tailed hawk	*Geranoaetus albicaudatus*	X		
White-tailed kite	*Elanus leucurus*	X		
ACCIPITRIFORMES: Cathartidae				
Black vulture	*Coragyps atratus*	X		
Turkey vulture	*Cathartes aura*	X		
ACCIPITRIFORMES: Pandionidae				
Osprey	*Pandion haliaetus*			X
ANSERIFORMES: Anatidae				
American wigeon	*Anas americana*			X
Black-bellied whistling-duck	*Dendrocygna autumnalis*	X		
Blue-winged teal	*Anas discors*			X
Bufflehead	*Bucephala albeola*			X
Canvasback	*Aythya valisineria*			X
Gadwall	*Anas strepera*			X
Greater white-fronted goose	*Anser albifrons*			X
Green-winged teal	*Anas crecca*			X
Lesser scaup	*Aythya affinis*			X
Mallard	*Anas platyrhynchos*	X		
Northern pintail	*Anas acuta*			X
Northern shoveler	*Anas clypeata*			X
Redhead	*Aythya americana*			X
Ring-necked duck	*Aythya collaris*			X
Ruddy duck	*Oxyura jamaicensis*			X
Snow goose	*Chen caerulescens*			X
Wood duck	*Aix sponsa*	X		X
APODIFORMES: Apodidae				
Chimney swift	*Chaetura pelagica*		X	
APODIFORMES: Trochilidae				
Berylline hummingbird	*Amazilia beryllina*	X		
Buff-bellied hummingbird	*Amazilia yucatanensis*		X	
Ruby-throated hummingbird	*Archilochus colubris*		X	
CAPRIMULGIFORMES: Caprimulgidae				
Chuck-will's-widow	*Antrostomus carolinensis*		X	
Common nighthawk	*Chordeiles minor*		X	
Common pauraque	*Nyctidromus albicollis*	X		
Common poorwill	*Phalaenoptilus nuttallii*	X		
CHARADRIIFORMES: Charadriidae				
Killdeer	*Charadrius vociferus*	X		

TABLE 2-16 AVIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Piping plover	*Charadrius melodus*			X
Semipalmated plover	*Charadrius semipalmatus*		X	
CHARADRIIFORMES: Laridae				
Black tern	*Chlidonias niger*		X	
Gull-billed tern	*Gelochelidon nilotica*	X		
Laughing gull	*Leucophaeus atricilla*	X		
Least tern	*Sternula antillarum*	X		
Ring-billed gull	*Larus delawarensis*			X
CHARADRIIFORMES: Recurvirostridae				
American avocet	*Recurvirostra americana*			X
Black-necked stilt	*Himantopus mexicanus*	X		
CHARADRIIFORMES: Scolopacidae				
Greater yellowlegs	*Tringa melanoleuca*		X	
Least sandpiper	*Calidris minutilla*			X
Long-billed curlew	*Numenius americanus*			X
Long-billed dowitcher	*Limnodromus scolopaceus*			X
Short-billed dowitcher	*Limnodromus griseus*			X
Stilt sandpiper	*Calidris himantopus*		X	
Western sandpiper	*Calidris mauri*			X
Whimbrel	*Numenius phaeopus*	X		
Willet	*Tringa semipalmata*	X		
Wilson's phalarope	*Phalaropus tricolor*		X	
CICONIIFORMES: Ciconiidae				
Wood stork	*Mycteria americana*		X	
COLUMBIFORMES: Columbidae				
Common ground-dove	*Columbina passerina*	X		
Eurasian collared-dove	*Streptopelia decaocto*	X		
Inca dove	*Columbina inca*	X		
Mourning dove	*Zenaida macroura*	X		
Rock pigeon	*Columba livia*	X		
White-tipped dove	*Leptotila verreauxi*	X		
White-winged dove	*Zenaida asiatica*	X		
CORACIIFORMES: Alcedinidae				
Belted kingfisher	*Megaceryle alcyon*			X
Green kingfisher	*Chloroceryle americana*	X		
Ringed kingfisher	*Megaceryle torquata*	X		
CUCULIFORMES: Cuculidae				
Greater roadrunner	*Geococcyx californianus*	X		

TABLE 2-16 AVIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Groove-billed ani	*Crotophaga sulcirostris*		X	
Yellow-billed cuckoo	*Coccyzus americanus*		X	
FALCONIFORMES: Falconidae				
American kestrel	*Falco sparverius*			X
Crested caracara	*Caracara cheriway*	X		
GALLIFORMES: Cracidae				
Plain chachalaca	*Ortalis vetula*	X		
GALLIFORMES: Odontophoridae				
Northern bobwhite	*Colinus virginianus*	X		
Scaled quail	*Callipepla squamata*	X		
GALLIFORMES: Phasianidae				
Wild turkey	*Meleagris gallopavo*	X		
GRUIFORMES: Gruidae				
Sandhill crane	*Grus canadensis*			X
GRUIFORMES: Rallidae				
American coot	*Fulica americana*			X
Clapper rail	*Rallus crepitans*	X		
Common gallinule	*Gallinula galeata*	X		
Sora	*Porzana carolina*		X	X
Virginia rail	*Rallus limicola*		X	
PASSERIFORMES: Alaudidae				
Horned lark	*Eremophila alpestris*		X	
PASSERIFORMES: Bombycillidae				
Cedar waxwing	*Bombycilla cedrorum*			X
PASSERIFORMES: Cardinalidae				
Blue grosbeak	*Passerina caerulea*		X	
Dickcissel	*Spiza americana*		X	
Indigo bunting	*Passerina cyanea*		X	
Northern cardinal	*Cardinalis cardinalis*	X		
Painted bunting	*Passerina ciris*		X	
Pyrrhuloxia	*Cardinalis sinuatus*	X		
Rose-breasted grosbeak	*Pheucticus ludovicianus*		X	
Summer tanager	*Piranga rubra*		X	
PASSERIFORMES: Corvidae				
Blue jay	*Cyanocitta cristata*	X		
Chihuahuan raven	*Corvus cryptoleucus*			X
Green jay	*Cyanocorax yncas*	X		
PASSERIFORMES: Emberizidae				

TABLE 2-16 AVIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Black-throated sparrow	*Amphispiza bilineata*	X		
Cassin's sparrow	*Peucaea cassinii*		X	
Chipping sparrow	*Spizella passerina*			X
Clay-colored sparrow	*Spizella pallida*			X
Grasshopper sparrow	*Ammodramus savannarum*	X		
Lark bunting	*Calamospiza melanocorys*			X
Lark sparrow	*Chondestes grammacus*	X		
Lincoln's sparrow	*Melospiza lincolnii*			X
Olive sparrow	*Arremonops rufivirgatus*		X	
Savannah sparrow	*Passerculus sandwichensis*			X
Spotted towhee	*Pipilo maculatus*			X
Vesper sparrow	*Pooecetes gramineus*			X
White-crowned sparrow	*Zonotrichia leucophrys*			X
PASSERIFORMES: Fringillidae				
House finch	*Haemorhous mexicanus*	X		
PASSERIFORMES: Hirundinidae				
Bank swallow	*Riparia riparia*		X	
Barn swallow	*Hirundo rustica*		X	
Cave swallow	*Petrochelidon fulva*		X	
Cliff swallow	*Petrochelidon pyrrhonota*		X	
Northern rough-winged swallow	*Stelgidopteryx serripennis*		X	
Purple martin	*Progne subis*		X	
Tree swallow	*Tachycineta bicolor*			X
PASSERIFORMES: Icteridae				
Baltimore oriole	*Icterus galbula*		X	
Brewer's blackbird	*Euphagus cyanocephalus*			X
Bronzed cowbird	*Molothrus aeneus*	X		
Brown-headed cowbird	*Molothrus ater*	X		X
Eastern meadowlark	*Sturnella magna*	X		
Great-tailed grackle	*Quiscalus mexicanus*	X		
Orchard oriole	*Icterus spurius*		X	
Red-winged blackbird	*Agelaius phoeniceus*	X		X
Western meadowlark	*Sturnella neglecta*			X
PASSERIFORMES: Laniidae				
Loggerhead shrike	*Lanius ludovicianus*			X
PASSERIFORMES: Mimidae				
Gray catbird	*Dumetella carolinensis*			X
Long-billed thrasher	*Toxostoma longirostre*	X		

TABLE 2-16 AVIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Northern mockingbird	*Mimus polyglottos*	X		
PASSERIFORMES: Motacillidae				
American pipit	*Anthus rubescens*			X
PASSERIFORMES: Paridae				
Black-crested titmouse	*Baeolophus atricristatus*	X		
Carolina chickadee	*Poecile carolinensis*	X		
PASSERIFORMES: Parulidae				
American redstart	*Setophaga ruticilla*		X	
Black-and-white warbler	*Mniotilta varia*		X	
Black-throated Green warbler	*Setophaga virens*			X
Chestnut-sided warbler	*Setophaga pensylvanica*		X	
Common yellowthroat	*Geothlypis trichas*		X	X
Hooded warbler	*Setophaga citrina*		X	
Louisiana waterthrush	*Parkesia motacilla*		X	
Magnolia warbler	*Setophaga magnolia*		X	
Mourning warbler	*Geothlypis philadelphia*		X	
Nashville warbler	*Oreothlypis ruficapilla*		X	
Northern parula	*Setophaga americana*		X	
Northern waterthrush	*Parkesia noveboracensis*		X	
Orange-crowned warbler	*Oreothlypis celata*			X
Ovenbird	*Seiurus aurocapilla*		X	
Tennessee warbler	*Oreothlypis peregrina*		X	
Wilson's warbler	*Cardellina pusilla*		X	
Yellow warbler	*Setophaga petechia*		X	
Yellow-breasted what	*Icteria virens*		X	
Yellow-rumped warbler	*Setophaga coronata*			X
Yellow-throated warbler	*Setophaga dominica*		X	
PASSERIFORMES: Passeridae				
House sparrow	*Passer domesticus*	X		
PASSERIFORMES: Polioptilidae				
Blue-gray gnatcatcher	*Polioptila caerulea*			X
PASSERIFORMES: Regulidae				
Ruby-crowned kinglet	*Regulus calendula*			X
PASSERIFORMES: Remizidae				
Verdin	*Auriparus flaviceps*	X		
PASSERIFORMES: Sturnidae				
European starling	*Sturnus vulgaris*	X		
PASSERIFORMES: Troglodytidae				

TABLE 2-16 AVIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Cactus wren	*Campylorhynchus brunneicapillus*	X		
Carolina wren	*Thryothorus ludovicianus*	X		
House wren	*Troglodytes aedon*			X
Marsh wren	*Cistothorus palustris*			X
Sedge wren	*Cistothorus platensis*			X
PASSERIFORMES: Turdidae				
American robin	*Turdus migratorius*			X
Eastern bluebird	*Sialia sialis*	X		
Swainson's thrush	*Catharus ustulatus*		X	
Wood thrush	*Hylocichla mustelina*		X	
PASSERIFORMES: Tyrannidae				
Acadian flycatcher	*Empidonax virescens*		X	
Alder flycatcher	*Empidonax alnorum*		X	
Ash-throated flycatcher	*Myiarchus cinerascens*		X	
Brown-crested flycatcher	*Myiarchus tyrannulus*		X	
Couch's kingbird	*Tyrannus couchii*		X	
Eastern kingbird	*Tyrannus tyrannus*		X	
Eastern phoebe	*Sayornis phoebe*			X
Eastern wood-pewee	*Contopus virens*		X	
Great crested flycatcher	*Myiarchus crinitus*		X	
Great kiskadee	*Pitangus sulphuratus*	X		
Least klycatcher	*Empidonax minimus*		X	
Olive-sided flycatcher	*Contopus cooperi*		X	
Say's phoebe	*Sayornis saya*			X
Scissor-tailed flycatcher	*Tyrannus forficatus*		X	
Vermilion flycatcher	*Pyrocephalus rubinus*		X	X
Western kingbird	*Tyrannus verticalis*		X	
Willow flycatcher	*Empidonax traillii*		X	
Yellow-bellied flycatcher	*Empidonax flaviventris*		X	
PASSERIFORMES: Vireonidae				
Red-eyed vireo	*Vireo olivaceus*		X	
White-eyed vireo	*Vireo griseus*		X	
PELECANIFORMES: Ardeidae				
American bittern	*Botaurus lentiginosus*			X
Black-crowned night-heron	*Nycticorax nycticorax*			X
Cattle egret	*Bubulcus ibis*	X		
Great blue heron	*Ardea herodias*	X		
Great egret	*Ardea alba*	X		

TABLE 2-16 AVIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*	RESIDENT	SUMMER	WINTER
Green heron	*Butorides virescens*		X	
Least bittern	*Ixobrychus exilis*		X	
Little blue heron	*Egretta caerulea*		X	
Reddish egret	*Egretta rufescens*	X		
Snowy egret	*Egretta thula*	X		
Tricolored heron	*Egretta tricolor*	X		
Yellow-crowned night-heron	*Nyctanassa violacea*		X	
PELECANIFORMES: Threskiornithidae				
Roseate spoonbill	*Platalea ajaja*	X	X	
White ibis	*Eudocimus albus*		X	
White-faced ibis	*Plegadis chihi*	X	X	
PICIFORMES: Picidae				
Golden-fronted woodpecker	*Melanerpes aurifrons*	X		
Ladder-backed woodpecker	*Picoides scalaris*	X		
PODICIPEDIFORMES: Podicipedidae				
Eared grebe	*Podiceps nigricollis*			X
Least grebe	*Tachybaptus dominicus*	X		
Pied-billed grebe	*Podilymbus podiceps*			X
STRIGIFORMES: Strigidae				
Eastern screech-owl	*Megascops asio*	X		
Great horned owl	*Bubo virginianus*	X		
STRIGIFORMES: Tytonidae				
Barn owl	*Tyto alba*	X		
SULIFORMES: Anhingidae				
Anhinga	*Anhinga anhinga*		X	
SULIFORMES: Phalacrocoracidae				
Double-crested cormorant	*Phalacrocorax auritus*	X		

Source: Arvin 2007; Lockwood and Freeman 2014.

Mammals

Mammals that might potentially occur in the study area are listed in Table 2-17 (Schmidly and Bradley 2016). The occurrence of each species within the study area is dependent upon available suitable habitat.

TABLE 2-17 MAMMALIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	*SCIENTIFIC NAME*
American badger	*Taxidea taxus*
American beaver	*Castor canadensis*
American perimyotis	*Perimyotis subflavus*

TABLE 2-17 MAMMALIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Attwater's pocket gopher	*Geomys attwateri*
Big free-tailed bat	*Nyctinmops macrotis*
Black rat	*Rattus rattus*
Black-tailed jackrabbit	*Lepus californicus*
Bobcat	*Lynx rufus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Cave myotis bat	*Myotis velifer*
Collared peccary	*Pecari tajacu*
Common gray fox	*Urocyon cinereoargenteus*
Coyote	*Canis latrans*
Crawford's desert shrew	*Notiosorex crawfordi*
Eastern cottontail	*Sylvilagus floridanus*
Eastern fox squirrel	*Sciurus niger*
Eastern mole	*Scalopus aquaticus*
Eastern red bat	*Lasiurus borealis*
Eastern spotted skunk	*Spilogale putorius*
Evening bat	*Nycticeius humeralis*
Feral pig	*Sus scrofa*
Fulvous harvest mouse	*Reithrodontomys fulvescens*
Gulf Coast kangaroo rat	*Dipodomys compactus*
Hispid cotton rat	*Sigmodon hispidus*
Hispid pocket mouse	*Chaetodipus hispidus*
Hoary bat	*Aeorestes cinereus*
Hog-nosed skunk	*Conepatus leuconotus*
Least shrew	*Cryptotis parva*
Long-tailed weasel	*Mustela frenata*
Merriam's pocket mouse	*Perognathus merriami*
Mountain lion	*Puma concolor*
Nine-banded armadillo	*Dasyppus novemcinctus*
North American deermouse	*Peromyscus maniculatus*
North American porcupine	*Erethizon dorsatum*
Northern grasshopper mouse	*Onychomys leucogaster*
Northern pygmy mouse	*Baiomys taylori*
Northern raccoon	*Procyon lotor*
Northern yellow bat	*Lasiurus intermedius*
Norway rat	*Rattus norvegicus*
Nutria	*Myocastor coypus*
Ringtail	*Bassariscus astutus*
Rio Grande ground squirrel	*Ictidomys parvidens*
Silver-haired bat	*Lasionycteris noctivagans*
Southern plains woodrat	*Neotoma micropus*
Spotted ground squirrel	*Xerospermophilus spilosoma*
Striped skunk	*Mephitis mephitis*
Swamp Rabbit	*Sylvilagus aquaticus*
Texas pocket gopher	*Geomys personatus*
Thirteen-lined ground squirrel	*Ictidomys tridecemlineatus*
Virginia opossum	*Didelphis virginiana*

TABLE 2-17 MAMMALIAN SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
White-footed deermouse	*Peromyscus leucopus*
White-tailed deer	*Odocoileus virginianus*

Source: Schmidly and Bradley 2016.

Fisheries

The divisions of the biotic provinces were separated on the basis of terrestrial vertebrate distributions; however, the distribution of freshwater fishes generally corresponds with the terrestrial province boundaries (Hubbs 1957). Areas showing the greatest deviation from this general rule include northeast Texas and the coastal zone. Aquatic habitats within the study area are associated with the San Antonio River, perennial creeks, lakes, and the Coleto Creek Reservoir, along with smaller lakes, streams and ponds.

The intermittent flowing tributary streams support aquatic species primarily adapted to ephemeral pool habitats. Because the streams consist of small headwater drainages, persistent flow is unlikely to be sufficient to support any substantial stream fishery assemblage. Aquatic species in this habitat type are typically adapted to rapid dispersal and life cycle completion within pool habitats that typically have fine-grained substrates. In stream reaches dominated by scoured, sandy-clay bottoms, accumulations of woody debris of leaf pack, provide the most important feeding and refuge areas for invertebrates and forage fish. The softer muddy bottoms generally harbor substantial populations of burrowing invertebrates (e.g., larval diptera and oligochaetes) which can be an important food source to higher aquatic trophic levels.

The perennial streams and larger lakes provide consistent aquatic habitat for all trophic levels with fish the most prominent. The relatively stable water levels of the reservoirs and the constant pools and flow of the streams facilitate stable population growth. Species with flowing water or pooled area habitat requirements will utilize perennial streams and those adapted for deeper waters will utilize the smaller lakes and pond environments. The larger populations of fish also attract fish eating bird species. Table 2-18 indicates the fish species potentially occurring within the study area (Thomas et al. 2007).

TABLE 2-18 FISH SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Alligator gar	*Atractoteus spatula*
Amazon molly	*Poecilia formosa*
American eel	*Anguilla rostrata*
Black bullhead	*Ameiurus melas*
Black crappie	*Poximus nigromaculatus*
Blackstripe topminnow	*Fundulus notatus*
Blacktail shiner	*Cyprinella venusta*

TABLE 2-18 FISH SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Blue catfish	*Ictalurus furcatus*
Blue sucker	*Cycleptus elongatus*
Blue tilapia	*Oreochromis aurea*
Bluegill	*Lepomis macrochirus*
Bullhead minnow	*Pimephales vigilax*
Burrhead chub	*Macrhybopsis macronis*
Channel catfish	*Ictalurus punctatus*
Common carp	*Cyprinus carpio*
Dusky darter	*Percina sciera*
Fathead minnow	*Pimephales promelas*
Flathead catfish	*Pylodictis olivaris*
Freckled madtom	*Noturus nocturnus*
Freshwater drum	*Aplodinotus grunniens*
Ghost shiner	*Notropis buchanani*
Gizzard shad	*Dorosoma cepedianum*
Golden shiner	*Notemigonus crysoleucas*
Goldfish	*Carassius auratus*
Grass carp	*Ctenopharyngodon idella*
Gray redhorse	*Moxostoma congestum*
Green sunfish	*Lepomis cyanellus*
Guadalupe bass	*Micropterus treculii*
Inland silverside	*Menidia beryllina*
Largemouth bass	*Micropterus salmoides*
Longear sunfish	*Lepomis megalotis*
Longnose gar	*Lepisosteus oseus*
Mexican tetra	*Astyanax mexicanus*
Mimic shiner	*Notropis volucellus*
Mountain mullet	*Agonostomus monticola*
Orangespotted sunfish	*Lepomis humilis*
Pugnose minnow	*Opsopoedus emiliae*
Rainwater killifish	*Lucania parva*
Red shiner	*Cyprinella lutrensis*
Redbreast sunfish	*Lepomis auritus*
Redear sunfish	*Lepomis microlophus*
Redspotted sunfish	*Lepomis miniatus*
Ribbon shiner	*Lythrurus femeus*
River carpsucker	*Cariodes carpio*
Sailfin molly	*Poecilia latipinna*
Sheepshead minnow	*Cyprinodon variegatus*
Slough darter	*Etheostoma gracile*
Smallmouth buffalo	*Ictiobus bubalus*
Spotted gar	*Lepisosteus oculatus*
Striped bass	*Morone saxatilis*
Tadpole madtom	*Noturus gyrinus*
Texas shiner	*Notropis amabilis*
Threadfin shad	*Dorosoma petenense*
Warmouth	*Lepomis gulosus*

TABLE 2-18 FISH SPECIES POTENTIALLY OCCURRING WITHIN THE STUDY AREA

COMMON NAME	SCIENTIFIC NAME
Weed shiner	*Notropis texanus*
Western mosquitofish	*Gambusia affinis*
White bass	*Morone chrysops*
White crappie	*Poximus annularis*
Yellow bullhead	*Ameiurus natalis*

Source: Thomas et al. 2007.

Threatened and Endangered Species

For this routing study, emphasis was placed on obtaining documented occurrences of special status species and/or their designated critical habitat within the study area. The documented occurrences of species of concern and/or other unique vegetative communities within the study area were also reviewed. Special status species include those listed by the USFWS (2016b) as threatened, endangered, or candidate; and those species listed by TPWD (2016e) as threatened or endangered. Species of concern include those listed as rare by TPWD. POWER requested a GIS data layer of historical known occurrences for listed species and/or sensitive vegetative communities from the TXNDD (2016). For the purpose of this study, the TXNDD information is not used as a substitute for a presence/absence survey, but as an indication of previous occurrences within suitable habitat for the species.

The USFWS regulates activities affecting plants and animals designated as endangered or threatened under the ESA (16 U.S.C. § 1531 et seq.). A USFWS IPaC report request was submitted and received on August 15, 2016 (Consultation Code: 02ETTXX0-2016-SLI-1037). This USFWS report identifies potentially occurring federal listed threatened, endangered, and candidate species and habitats within the study area (USFWS 2016b). By definition, an endangered species is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as likely to become endangered within the near foreseeable future throughout all or a significant portion of its range. Candidate species are those that have sufficient information on their biological vulnerability and threat(s) to support listing as threatened or endangered and might be proposed for listing in the near foreseeable future. The ESA also provides for the conservation of "designated critical habitat". These areas include sites with food and water, breeding areas, cover or shelter sites, and sufficient habitat to provide for normal population growth and behavior for the species. Review of USFWS data indicates there is no "designated critical habitat" within the study area (USFWS 2016c).

The TPWD also regulates state-listed plants and animals designated as threatened or endangered (Chapters 67 and 68 of the Texas Parks and Wildlife Code [TPWC] and Sections 65.171 - 65.176 of Title 31 of the TAC; and Chapter 88 of the TPWC and Sections 69.01 - 69.9 of the TAC). Under Texas law, endangered animal species are those deemed to be "threatened with statewide extinction" and endangered plant species are those "in danger of

extinction throughout all or a significant portion of its range." Threatened animal and plant species are those deemed to be likely to become endangered within the foreseeable future. The USFWS and TPWD maintain listings by county for all special status species pursuant to federal and state law (USFWS 2016b; TPWD 2016e). A review of each threatened and endangered species listed within the study area, as well as species of concern, is provided in the following sections.

Threatened and Endangered Plant Species

There are no known federal or state plant species listed as threatened or endangered within the study area counties (USFWS 2016b; TPWD 2016e).

Plant Species of Concern and Sensitive Vegetation Communities

While not regulated, TPWD (2016e) and TXNDD (2016) data may also list rare plant species and sensitive vegetation communities. TPWD generally recommends consideration for these species and avoidance of the listed vegetation communities when routing linear utility corridors. However, these data do not preclude the potential for each species to exist within the study area. Only a species specific survey could delineate potential suitable habitat and determine the presence or absence of a special status species. For a discussion of TPWD listed rare species, please refer to the TPWD letter in Appendix A.

There are 13 plant species listed as species of concern within the study area counties, as summarized in Table 2-19. Review of TXNDD (2016) data indicates the occurrence of Drummond's rushpea (*Caesalpinia drummondii*), South Texas rushpea (*Caesalpinia phyllanthoides*), and Elmendorf's Onion (*Allium elmendorfii*) within the study area. Review of TXNDD (2016) data also indicates the occurrence of the little bluestem-indiangrass series (*Schizachyrium scoparium - Sorghastrum nutans*) near the Chase Field Industrial – Airport.

TABLE 2-19 PLANT SPECIES OF CONCERN LISTED FOR BEE AND LIVE OAK COUNTIES, TEXAS

SPECIES		COUNTY LISTED	
Common Name	***Scientific Names***	**Bee**	**Live Oak**
Amelia's abronia	*Abronia ameliae*	-	X
Arrowleaf milkvine	*Matelea sagittifolia*	-	X
Coastal gay-feather	*Liatris bracteata*	-	X
Drummond's rushpea	*Caesalpinia drummondii*	X	-
Elmendorf's onion	*Allium elmendorfii*	X	-
Low spurge	*Euphorbia peplidion*	X	X
Net-leaf bundleflower	*Desmanthus reticulatus*	-	X
Plains gumweed	*Grindelia oolepis*	X	-
South Texas gilia	*Gilia ludens*	-	X
South Texas rushpea	*Caesalpinia phyllanthoides*	-	X
Texas almond	*Prunus minutiflora*	-	X

TABLE 2-19 PLANT SPECIES OF CONCERN LISTED FOR BEE AND LIVE OAK COUNTIES, TEXAS

SPECIES		COUNTY LISTED	
Common Name	*Scientific Names*	Bee	Live Oak
Texas peachbush	*Prunus texana*	-	X
Wright's trichocoronis	*Trichocoronis wrightii var. wrightii*	-	X

Source: TPWD 2016e.

Threatened and Endangered Animal Species

Threatened and endangered species lists from the USFWS and TPWD were reviewed for Bee and Live Oak counties (TPWD 2016e; USFWS 2016b). There are 19 animal species (two amphibians, eight birds, four mammals, one mollusks, and four reptiles) that are federally and/or state listed, have candidate status, or have been federally delisted within the study area counties (Table 2-20). The USFWS (2016b) IPaC report for the Project area lists only seven (four birds, one mollusk, and two mammals) species as having endangered, threatened or candidates status within the study area counties. Federal status species listed in the TPWD Annotated County Lists of Rare Species have been included in Table 2-20 for consistency. A brief description of each species life history, habitat requirements, and documented occurrences within the study area are summarized below for each species. Only USFWS listed threatened or endangered species are afforded federal protection under the ESA.

TABLE 2-20 LISTED THREATENED AND ENDANGERED ANIMAL SPECIES WITHIN BEE AND LIVE OAK COUNTIES, TEXAS

SPECIES		COUNTY LISTED		LEGAL STATUS	
Common name	*Scientific Names*	Bee	Live Oak	USFWS[1]	TPWD[2]
Amphibians					
Black-spotted newt	*Notophthalmus meridionalis*	X	X	-	T
Sheep frog	*Hypopachus variolosus*	X	X	-	T
Birds					
Interior least tern	*Sterna antillarum athalassos*	-	X	E[1]	E
Peregrine falcon (2 sub-species)	*Falco peregrinus*	X	X	DL	T
Piping plover	*Charadrius melodus*	X	X	T[1]	T
Red knot	*Calidris canutus rufa*	X	-	T[1]	-
White-faced ibis	*Plegadis chihi*	X	X	-	T
White-tailed hawk	*Buteo albicaudatus*	X	X	-	T
Whooping crane	*Grus americana*	X	X	E[1]	E
Wood stork	*Mycteria americana*	X	X		T
Mammals					
Jaguarundi	*Puma yagouaroundi*	-	X	E[1]	E
Ocelot	*Leopardus pardalis*	X	X	E[1]	E
Red wolf	*Canis rufus*	X	X	EXT	EXT
White-nosed coati	*Nasua narica*	X	-	-	T

TABLE 2-20 LISTED THREATENED AND ENDANGERED ANIMAL SPECIES WITHIN BEE AND LIVE OAK COUNTIES, TEXAS

SPECIES		COUNTY LISTED		LEGAL STATUS	
Common name	*Scientific Names*	Bee	Live Oak	USFWS[1]	TPWD[2]
Mollusks					
Golden orb	*Quadrula aurea*	-	X	C[1]	T
Reptiles					
Reticulate collared lizard	*Crotaphytus reticulatus*	-	X	-	T
Texas horned lizard	*Phrynosoma cornutum*	X	X	-	T
Texas indigo snake	*Drymarchon melanurus erebennus*	X	X	-	T
Texas tortoise	*Gopherus berlandieri*	X	X	-	T

Status abbreviations: E - Endangered, T - Threatened, DL - Federally Delisted, C - Federal Candidate, and EXT – Extirpated.
Sources: [1]USFWS 2016b; [2]TPWD 2016e.

USFWS Listed Species

BIRDS

Interior least tern

The interior least tern (*Sterna antillarum athalassos*) is a subspecies of least tern that nests inland along sand and gravel bars within braided streams and rivers, including the Missouri, Mississippi, Colorado (Texas), Arkansas, Rio Grande, and Red Rivers. The species is migratory and winters along the Central American coast and northern coast of South America from Venezuela to Northeastern Brazil (TPWD 2016e). It is also known to nest on man-made structures (inland beaches, wastewater treatment plants, gravel quarries, etc.). Breeding begins as early as April and is completed by late August (TPWD 2014, 2016e). The USFWS recognizes any nesting least tern that is 50 miles or greater from a coastline as being an interior least tern subspecies. USFWS (2016b) conditionally lists this species for wind energy projects within the study area counties because of the potential to occur during migration. This species is not expected to occur within the study area, except as an uncommon to rare non-breeding migrant (Lockwood and Freeman 2014).

Piping plover

Piping plovers (*Charadrius melodus)* overwinter along the Gulf and Atlantic coastlines. During winter, these birds will inhabit beaches, mudflats, and sandflats along the Gulf of Mexico and spoil islands on the Gulf Intercoastal Waterway. Critical habitat for wintering piping plovers has been designated along the Gulf Coast and the study area is not located within this area. The piping plover is an uncommon to locally common winter resident along the Texas coastline and rarely seen inland during migration. They occupy sandy beaches and lakeshores, bayside mudflats, and salt flats. Loss and alteration of nesting and wintering habitat are the primary cause of the decline in plover populations (Lockwood and Freeman 2014; TPWD 2016e). USFWS (2016b) conditionally lists this species for wind energy projects within the study area counties because of the potential to occur during

migration. This species is not expected to occur within the study area, except as a rare non-breeding migrant (Lockwood and Freeman 2014).

Red knot

The red knot (*Calidris canutus rufa*) is a migratory bird which nests in the drier arctic tundra areas and overwinters along shorelines along the Gulf of Mexico coastline and into Central and South America. A spring migratory stopover is located in Delaware Bay where the species gorges on horseshoe crab eggs. USFWS (2016b) conditionally lists this species for wind energy projects within the study area counties because of the potential to occur during migration. This species is not anticipated to occur within the study area, except as a rare non-breeding migrant (Lockwood and Freeman 2014).

Whooping crane

The study area is located on the western edge of the primary central migratory corridor for the whooping crane (*Grus americana*). The primary migration path includes a 220-mile wide corridor that begins at their nesting site at Wood Buffalo National Park in Canada and continues south to their wintering grounds at the Aransas National Wildlife Refuge along the Texas coast. The migratory pathway contains 95 percent of all confirmed whooping crane stopover sightings, during migration, through spring 2007 (USFWS 2009). Whooping cranes overwinter in Texas from November through March. During migration, they typically fly at altitudes greater than 1,000 feet but will roost and feed in areas away from human disturbance during nightly stopovers. Stopover areas may include large rivers, lakes and associated wetlands, playa lakes, pastureland, and cropland (USFWS 2009). This species may occur in the study area as a rare non-breeding winter migrant, if suitable habitat is available (Arvin 2007).

MAMMALS

Jaguarundi

The Gulf Coast jaguarundi (*Puma yagouaroundi*) is a feline slightly larger than a domestic cat and has a solid rusty-brown or charcoal gray coat. The jaguarundi hunts primarily during the day with peak activity occurring at midday, preying on birds, rabbits, and small rodents and typically inhabits thick mixed South Texas thornshrub brush. Riparian habitats along rivers or creeks are sometimes used (Campbell 2003). The jaguarundi is historically thought to have occurred throughout South Texas. TXNDD (2016) data indicates one Class II (Reliable Observation/Observer) element of occurrence of a jaguarundi in the far western portion of the study area from 1988/1989; however, the last confirmed documented occurrence of a jaguarundi in Texas is from a salvaged road kill two miles south of Brownsville, Texas in 1986. This species is presumed to be extirpated from Texas and is not anticipated to occur within the study area (Schmidly and Bradley 2016).

Ocelot

The ocelot (*Leopardus pardalis*) is a feline that has cream-colored fur with reddish-brown spots outlined in black, with two stripes extending from the corners of their eyes over the back of their head. The ocelot typically avoids open areas and prefers dense, thorny, low brush such as spiny hackberry, lotebush, and blackbrush; and in dense chaparral thickets, mesquite-thorn scrub, and live oak mottes habitats. The ocelot was once distributed throughout South Texas, the southern Edwards Plateau, and along the Coastal Plain, but its current range is restricted to the Rio Grande Plains and lower Rio Grande Valley (Campbell 2003). Only two known populations consisting of approximately 50 total individuals are currently documented within Texas. One population inhabits the Laguna Atascosa National Wildlife Refuge in Cameron County and the other is located on private property within Willacy County. Additional individuals are also occasionally found in surrounding counties including Kennedy and Hidalgo counties (Schmidly and Bradley 2016). No occurrences have been recorded within the study area (TXNDD 2016), and this species is not anticipated to occur within the study area.

Candidate Species

Golden orb

The golden orb (*Quadrula aurea*) is an orange colored freshwater mussel that inhabits lentic and lotic sandy, gravely, and muddy aquatic areas along the Guadalupe, San Antonio, Lower San Marcos, and Nueces River basins (Howells et al. 1996). TXNDD (2016) data indicates the presence of the golden orb at several locations along the Nueces River approximately two to five miles south of the study area. This species may occur within the study area, where suitable aquatic habitats exist.

TPWD Listed Species

AMPHIBIANS

Black-spotted newt

The black-spotted newt (*Notophthalmus meridionalis*) inhabits wet or seasonally wet areas, such as arroyos, canals, ditches, or even shallow depressions. They feed on leeches, insects, worms, mollusks, crustaceans, smaller amphibians, and their own eggs. During dry periods, the black-spotted newt aestivates in the ground (Tipton et al. 2012). No documented occurrences have been recorded within the study area (TXNDD 2016); however, this species may occur within the study area where suitable aquatic habitat is available (TPWD 2016e).

Sheep frog

The sheep frog (*Hypopachus variolosus*) inhabits moist sites in arid areas, predominantly grassland and savanna habitats, and feeds on ants and termites. The sheep frog hides most of the year and is never far from breeding habitat such as ponds, ditches, or temporary rain pools. They may emerge at night or with heavy rains in late summer. The frog is typically found underneath partially buried objects or subterranean mammal burrows and remains in these burrows for most of the year (Tipton et al. 2012). No documented occurrences have been

recorded within the study area (TXNDD 2016); however, this species may occur within the study area where suitable habitat is available (TPWD 2016e).

BIRDS

Peregrine falcon

The peregrine falcon (*Falco peregrinus*) TPWD listing includes two subspecies: the American peregrine falcon (*F.p. anatum*) and arctic peregrine falcon (*F.p. tundrius*) due to similarities in appearance. The American peregrine falcon inhabits nests in tall cliff eyries and occupies many kinds of habitats during migration, including urban. Stopover habitat during migration typically includes lake shores, coastlines, and barrier islands and the falcon is also a resident breeder in west Texas (TPWD 2016e). This species may occur within the study area as a locally uncommon to rare non-breeding winter resident or migrant, if suitable habitat is available (Lockwood and Freeman 2014).

White-faced ibis

The white-faced ibis (*Plegadis chihi*) prefers freshwater marshes, swamps, ponds, river, sloughs, and irrigated rice fields, but will also use brackish and saltwater habitats. This species is a colonial nester and forages on insects, newts, leeches, earthworms, snails, crayfish, frogs, and fish. This species breeds and winters along the Gulf Coast of Texas (TPWD 2016e). This species may occur within the study area as a common to uncommon resident on coastal prairies or as a migrant, if suitable habitat is available (Lockwood and Freeman 2014).

White-tailed hawk

The white-tailed hawk (*Buteo albicaudatus*) inhabits prairies, cordgrass flats, and scrub-live oak habitats near the coast. Farther inland, the white-tailed hawk prefers prairies, mesquite and oak savannas, and mixed savanna-chaparral habitats (TPWD 2016e). This species may occur within the study area as a common to uncommon resident in coastal prairies and south Texas brush, if suitable habitat is available (Lockwood and Freeman 2014).

Wood stork

The wood stork (*Mycteria americana*) inhabits prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including saltwater areas. This species usually roosts communally in tall snags, sometimes in association with other wading birds and formerly nested in Texas (TPWD 2016e). This species may occur within the study area as an uncommon to common post-breeding migrant, if suitable habitat is available (Lockwood and Freeman 2014).

MAMMALS

Red wolf

The red wolf (*Canis rufus*) historically occurred throughout the eastern half of the state in forests, brushlands, and prairies (Schmidly and Bradley 2016). Changes in land-use and over hybridization with the coyote (*Canis latrans*) are thought to have extirpated the red wolf from Texas. This species is not anticipated to occur within the study area (TPWD 2016e).

White-nosed coati

The white-nosed coati (*Nasua narica*) inhabits woodlands, riparian corridors, and canyons. This very sociable, omnivorous species forages on the ground and in trees during twilight, and is a member of the Procyonidae (raccoon) family (Schmidly and Bradley 2016). Historically this species occurred throughout South Texas from the Gulf of Mexico to Big Bend. Current distribution is thought to only occur in isolated populations near Big Bend and Padre Island (Schmidly and Bradley 2016). This species is not anticipated to occur within the study area.

REPTILES

Reticulate collared lizard

The reticulate collared lizard (*Crotaphytus reticulatus*) inhabits scattered flat rocks below escarpments or isolated rock outcrops among scattered clumps of prickly pear and mesquite. The general habitat associated with this species includes open brush-grasslands and thorn-scrub vegetation on well-drained rolling terrain with shallow gravel, caliche, or sandy soils. The lizard has a patchy distribution with a range restricted to southern Texas and northern Mexico (TPWD 2016e). The study area counties lie just east of the known populations of this species, therefore, it is not anticipated to occur within the study area (Dixon 2013).

Texas horned lizard

The Texas horned lizard (*Phrynosoma cornutum*) inhabits a variety of habitats including open desert, grasslands and shrublands in arid and semiarid habitats that contain bunch grasses, cacti and yucca on soils varying from pure sands and sandy loams to coarse gravels, conglomerates, and desert pavements (Henke and Fair 1998). Their primary prey item is the harvester ant *(Pogonomyrmex* spp.) and they will aestivate beneath the soil during winter periods. This species may occur within the study area where suitable habitat is available (TPWD 2016e).

Texas indigo snake

The Texas indigo snake (*Drymarchon melanurus erebennus*) inhabits thornbush-chaparral woodlands of South Texas, south of the Guadalupe River and Balcones Escarpment. This is one of the largest snakes in Texas and requires moist microhabitats for shelter (burrows). They feed on vertebrate prey including rodents, frogs, snakes,

and birds (Dixon and Werler 2005). This species may occur within the study area where suitable habitat is available (TPWD 2016e).

Texas tortoise

The Texas tortoise (*Gopherus berlandieri*) has a shell with yellowish-orange, "horned" scutes (plates) and is a long-lived, charismatic species that prefers open brush habitats with a grass understory and avoids areas only having open grass and bare ground. The Texas tortoise is active during March to November and when inactive, it occupies shallow depressions at the base of a bush or cactus, underground burrows, or under objects. The Texas tortoise feeds on fruits of prickly pear and other mostly succulent plants. This species may occur within the study area if suitable habitat is available (TPWD 2016e).

STATE LISTED ANIMAL SPECIES OF CONCERN

While not regulated, TPWD also maintains a list of non-listed animal species of concern within each county (TPWD 2016e). TPWD generally recommends consideration for these species when routing linear utility corridors. Table 2-21 summarizes these species for each county within the study area and a brief description of habitat requirements is provided below.

TABLE 2-21 STATE LISTED ANIMAL SPECIES OF CONCERN WITHIN BEE AND LIVE OAK COUNTIES, TEXAS

SPECIES		COUNTY LISTED	
Common name	Scientific name	Bee	Live Oak
Birds			
Audubon's oriole	*Icterus graduacauda audubonii*	-	X
Henslow's sparrow	*Ammodramus henslowii*	X	-
Mountain plover	*Charadrius montanus*	X	X
Sprague's pipit	*Anthus spragueii*	X	X
Western burrowing owl	*Athene cunicularia hypugaea*	X	X
Fishes			
American eel	*Anguilla rostrata*	X	-
Reptiles			
Spot-tailed earless lizard	*Holbrookia lacerata*	X	X
Mammals			
Plains spotted skunk	*Spilogale putorius interrupta*	X	X

Source: TPWD 2016e.

BIRDS

Audubon's oriole

Audubon's oriole (*Icterus graduacauda audubonii*) inhabits a variety of habitats including scrub thorn, riparian, and live oak forest habitats. This species typically nests in dense trees and thickets, often along water courses and

nests are particularly vulnerable to brood parasitism from brown-headed cowbirds (*Molothrus ater*). The oriole typically forages on insects, spiders and small fruits (TPWD 2016e). There have been no recorded observations within the study area (TXNDD 2016), but this species may occur as an uncommon to rare resident where suitable habitat is present (Lockwood and Freeman 2014).

Henslow's sparrow

Wintering Henslow's sparrow (*Ammodramus henslowii*) individuals may be found in weedy fields or mowed areas where bunchgrasses, vines, and brambles occur. They also require some bare ground for running and walking. The Henslow's sparrow generally forages for insects on the ground (TPWD 2016e). This species may occur within the study area as a rare non-breeding migrant or winter resident where suitable habitat is available (Lockwood and Freeman 2014).

Mountain plover

The mountain plover, unlike many other plovers, is not typically found near water. Non-breeding habitat includes shrub steppe, shortgrass prairie, and bare ground landscapes, including plowed fields. This species nests on the ground in shallow depressions in high plains or shortgrass prairie habitats. The mountain plover is insectivorous and primarily forages on crickets, beetles and ants. On two separate occasions the mountain plover was ruled a proposed candidate for being listed as a federal threatened or endangered species. On both occasions the USFWS determined the species was not threatened or endangered throughout all and a significant portion of the species range (TPWD 2016e). This species may occur within the study area as a rare to local non-breeding winter resident or migrant, where suitable habitat is present (Lockwood and Freeman 2014).

Sprague's pipit

Sprague's pipit (*Anthus spragueii*) is a small grassland bird that avoids edge habitats and is strongly associated with native prairies. In Texas, Sprague's pipit inhabits native upland prairie and coastal grasslands during migration and winter (USFWS 2011; TPWD 2016e). This species may occur within the study area as uncommon to local non-breeding winter resident or migrant, where suitable habitat is present (Lockwood and Freeman 2014).

Western burrowing owl

The western burrowing owl (*Athene cunicularia hypugaea*) inhabits open grasslands, such as prairie, plains, and savanna, and sometimes in open areas, including vacant lots near human habitation or airports. This species nests and roosts in abandoned mammal burrows. They are known to utilize burrows of the black-tailed prairie dog (*Cynomys ludovicianus*), fox (*Urocyon, Vulpes* spp.), skunk (*Mephitis, Spilogale, Conepatus* spp.), coyote, and armadillo (*Dasypus novemcinctus*) burrows. They are listed as endangered in Canada, listed as threatened in Mexico, and considered by USFWS to be a Bird of Conservation Concern. They are opportunistic feeders and

primarily forage on arthropods, small mammals, amphibians, and reptiles (Lockwood and Freeman 2014; TPWD 2016e). This species may occur within the study area as a non-breeding winter resident or migrant, where suitable habitat is present.

FISHES

American eel

American eel (*Anguilla rostrata*) has an olive-green to greenish yellow, snake-like body with a long dorsal fin and a light gray to white underbelly. This species occurs in aquatic habitats having ocean access in coastal waterways below reservoirs to the Gulf of Mexico. In Texas, dams have impeded access to upstream spawning areas and this species has been eliminated from most of central and western Texas (Thomas et al. 2007; TPWD 2016e). This species may occur within rivers and creeks within the study area, if suitable habitat exists.

REPTILES

Spot-tailed earless lizard

The spot-tailed earless lizard (*Holbrookia lacerata*) is found in a variety of habitats, utilizing flat and open prairies or meadows, sand dunes, chaparral-shrubland, mixed woodland areas, and graded roads in Texas, as well as the desert habitats of northern Mexico. The spot-tailed earless lizard tends to burrow in soil, fallen logs, and other ground debris, and avoid obstructions, such as waterways, buildings, and pavement. The spot-tailed earless lizard eats small invertebrates and lays its eggs underground (Dixon 2013; TPWD 2016e). TXNDD (2016) data identifies the occurrence of this species near the city of Three Rivers, Texas and just north of the study area along State Highway 72. This species may occur within the study area where suitable habitat is present.

MAMMALS

Plains spotted skunk

The plains spotted skunk (*Spilogale putorius interrupta*) is a universal species that prefers wooded, brushy areas and tallgrass prairie, but can also inhabit open fields, croplands, fence rows, farmyards, and forest edges (TPWD 2016e). TXNDD (2016) data identifies the occurrence of this species near the city of Beeville, Texas. This species may occur within the study area where suitable habitat is present.

3.0 ALTERNATIVE ROUTE DEVELOPMENT

After defining the study area, the results of data collection and reconnaissance surveys were used to develop an environmental and land use composite constraints map to perform the resource analysis. The POWER planning team was comprised of technical experts within the respective resource fields of land use, aesthetics, ecology, and cultural resources. The composite constraints map was used by the POWER planning team to identify areas of opportunity and constraints for facilitating the development of geographically diverse preliminary alternative links. Preliminary alternative links were developed to connect the project endpoints. The proposed links were reviewed by POWER and AEP Texas for engineering and constructability. AEP Texas hosted two public open house meetings on May 22nd and 23rd, 2017 to receive public input and comments on the preliminary alternative links. Modifications to the preliminary alternative links were based on public input, local, state, and federal agency comment, stake-holder meetings, and data refinement. Following the modifications, a set of geographically diverse primary alternative routes were identified. The evaluation and comparison between the primary alternative routes is presented in Section 4.0. The following sections describe the alternative route development process.

3.1 RESOURCE ANALYSIS

The composite constraints map was used as a foundation for the resource analysis. Criteria were developed for each resource to establish constraint parameters which facilitated the identification of preliminary alternative links. The following definitions were considered during development of the preliminary alternative links:

- **Resource Value**: A measure of rarity, intrinsic worth, singularity, or diversity of a resource within a particular area.
- **Protective Status**: A measure of the formal concern as expressed by legal protection or special status designation.
- **Present and Known Future Uses**: A measure of the level of potential conflict with land management and land use policies.
- **Hazards**: A measure of the degree to which construction and operation of the transmission line could be affected by a known resource hazard.

Using this framework, overlays of individual resources were mapped to provide a visual representation of constraint areas and potential routing opportunity areas that were identified. Identified constraints were avoided to the extent practicable to minimize potential impacts or conflicts.

3.2 OPPORTUNITIES AND CONSTRAINTS EVALUATION

3.2.1 Existing Linear Corridors

Based on routing criteria in the Texas Utilities Code Section 37.056(c) and 16 TAC § 25.101(b)(3)(B)(i-iii), paralleling or utilizing existing compatible linear routing features are considered potential areas of opportunity when selecting route alternatives for new transmission lines. In general, locating a transmission line adjacent to existing linear routing features typically minimizes environmental impacts due to existing adjacent disturbances, improved access, and decreased habitat fragmentation. Linear routing features identified within the study area include existing electrical transmission lines, roadways, abandoned railways, pipelines, fence lines, and apparent property boundaries.

Transmission Line ROWs

One option for the TRB Segment that AEP Texas is proposing is to rebuild a portion of the existing AEP Texas Three Rivers to Beeville 69-kV transmission line as a single-circuit 138-kV transmission line. The intent of this option is to maximize use of the existing 69-kV transmission line ROW for the TRB Segment of the project. Links C, H, L, U6, P, T, Y, J1, K1, W6, R1, A2, F2, M2, P2, D3, and L3 are proposed to be rebuilt completely or partially within the existing 69-kV ROW. Development in the City of Beeville limits the opportunity to utilize the Three Rivers to Beeville 69-kV transmission line all the way to the existing Beeville Substation. Other links were developed to provide options to connect to the Borglum Substation and to provide geographic diversity.

One option for the BT Segment is to rebuild portions of the existing AEP Texas Beeville to Normanna to Pettus 69-kV transmission line as a double-circuit line that will accommodate the existing 69-kV circuit and the new 138-kV circuit that will continue to the Tuleta Substation. The intent of this option is to maximize use of the existing 69-kV transmission line ROW for the BT Segment of the project. Based on this, AEP Texas is proposing to double circuit both the existing line and the new line on the same structures in the existing ROW. Links E7, T4, X5, I5, N5, and P5 are proposed to be double circuited with the existing 69-kV line in existing ROW completely or partially. If the existing 69-kV line cannon be taken out of service for reliability reasons and cannot be reconstructed in the existing ROW, the double-circuit 69/138-kV line can be constructed adjacent to the existing 69-kV line, and links were developed where possible to parallel the existing 69-kV transmission line. Links F7, Z5, W5, U5, A6, and Y5 are proposed to parallel the existing 69-kV line for the BT Segment. Existing constraints in some areas prohibited double circuiting both lines within the existing 69-kV ROW. As a result, links were developed to minimize impacts to these constraint areas while also maximizing the use of the existing ROW and also providing geographic diversity.

POWER and AEP Texas evaluated paralleling and rebuilding other existing transmission lines identified within the study area, which include one 345-kV transmission line and seven 69-kV transmission lines. Several opportunities for paralleling or rebuilding some of these transmission lines were identified. In some instances, constraints located adjacent to these transmission lines, their location, or the orientation of these lines precluded paralleling or reconstructing them.

Distribution Line Underbuild

No existing distribution lines were identified within the study area that were considered viable for potential overbuild or paralleling opportunities by this proposed 138-kV transmission line for any significant distance. Where overbuild opportunities may exist, it would require determination of outage impact during reconstruction, cost allocation, operation and maintenance agreements, and would likely involve other electric utilities.

Roadway ROWs

POWER evaluated paralleling multiple roadways within the study area, including one IH, two US Hwys, two SHs, and nine FM roads (a complete list of roadways is provided in Section 2.2.2.6). POWER also evaluated paralleling the numerous county and local roads (paved and unpaved) within the study area. Numerous opportunities for paralleling roadways were identified, although habitable structures are frequently located near these features.

Railway ROWs

POWER considered paralleling an abandoned railway that was identified within the study area. The railway primarily parallels US Hwy 181 and is located in the central portion of the study area.

Pipeline ROWs

Several opportunities for paralleling pipeline ROWs were identified within the study area; however, AEP Texas did not consider petroleum product pipelines to be a compatible routing feature for this project and the paralleling opportunities were avoided as much as reasonable, given the number of pipelines in the study area. Pipelines with a known diameter of 8 to 36 inches are shown on Figures 3-3a and b and 5-1a and b.

Fence Lines

Fence lines provided several paralleling opportunities within the study area. Fence lines were identified utilizing aerial photography (TOP 2016) and were often found along apparent property boundaries.

Apparent Property Boundaries

Apparent property boundaries were identified utilizing county appraisal district property boundary information obtained for Bee and Live Oak counties. Apparent property boundaries within the study area provided several paralleling opportunities between the project endpoints where no other existing linear features were present.

3.3 ALTERNATIVE ROUTE IDENTIFICATION

The objective of this Routing Study/EA was to develop alternative routes that provide geographic diversity and comply with the routing criteria in PURA Section 37.056(c)(4)(A)-(D) and 16 TAC § 25.101(b)(3)(B), including the Commission's policy of prudent avoidance. The comments from regulatory agencies, local officials, public meetings, and other interested stakeholders were also considered during the alternative route development process. Modifications and additions of preliminary alternative links were made while considering existing resources and public input. Feasible and geographically diverse alternative routes were selected for analysis and were compared using the 41 evaluation criteria (see Table 2-1) to determine potential impacts to land use and environmental resources. This EA documents the routing process conducted to develop and select alternative routes and for POWER to recommend routes that best address the routing requirements in PURA and PUC Substantive Rules from an environmental and land use perspective. This recommendation, along with additional engineering and cost considerations, will factor into the selection of one alternative route for each segment that AEP Texas believes best addresses the routing requirements under PURA and PUC Substantive Rules that will be addressed in the CCN application.

POWER utilized a comprehensive routing and evaluation methodology to develop and evaluate alternative transmission line routing links. The POWER planning team identified feasible and geographically diverse locations for preliminary alternative links to connect the project endpoints that were then reviewed by AEP Texas for constructability. The preliminary alternative links were presented at the public open house meetings on May 22nd and 23rd, 2017. Modifications to the proposed preliminary alternative links were completed after input was considered from the public open house meetings, additional agency input, meetings with stakeholders, refined data collection, and/or identified potential engineering constraints. The resulting alternative routing links were combined to form numerous forward progressing alternative routes while also providing geographic diversity of the routes. An evaluation and comparative potential impact assessment for each alternative route was completed as provided in Section 4.0.

The following sections provide a detailed description of the methodologies and assumptions used to complete the alternative route development process.

3.3.1 Preliminary Alternative Links Development

Preliminary alternative links were identified by the POWER planning team by using the composite constraints map while also considering the value of the existing resources. Preliminary alternative links were developed based upon maximizing the use of opportunity areas while avoiding areas of higher environmental constraint or conflicting land uses. Existing aerial photography was used in conjunction with the composite constraints superimposed to identify optimal locations for preliminary alternative link centerlines. POWER utilized the following to identify the preliminary alternative links:

- Input received from correspondence with local officials, regulatory agencies, and others.
- Results from reconnaissance surveys of the study area.
- Review of aerial photography.
- Findings of the various data collection activities.
- Environmental and land use constraints data.
- Apparent property boundaries and fence lines.
- Existing compatible linear opportunity areas.
- Locations of existing developments.

The preliminary alternative links were developed in accordance with the Texas Utilities Code, Title II, Section 37.056 (c)(4)(A)-(D), 16 TAC § 25.101, including the PUC's policy of prudent avoidance, and were consistent with AEP Texas' transmission line routing principals. It was POWER's intent to develop an adequate number of environmentally acceptable and geographically diverse preliminary alternative links while considering such factors as community values, parks and recreation areas, historical and aesthetic values, environmental integrity, route length parallel to existing compatible corridors or parallel to apparent property boundaries, and prudent avoidance. POWER and AEP Texas developed 166 preliminary alternative links that were presented at the public open house meetings (see Figure 3-1 and Appendix B).

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Figure 3-1 Project Vicinity

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3.3.2 Public Involvement Program

AEP Texas hosted two public open house meetings within the community to solicit comments, concerns, and input from residents, landowners, and other interested parties. The meetings were held on May 22nd, 2017 at the Three Rivers Elementary School, in Three Rivers, Texas; and on May 23rd, 2017 at the Beeville Community Center, in Beeville, Texas.

Landowners along each of the preliminary alternative links were invited to attend. These meetings were intended to solicit comments from landowners and other interested parties concerning the proposed project. In addition to gathering public input, the purpose of the meetings was to:

- Promote a better understanding of the proposed project, including the purpose and need for the project, the benefits and potential impacts of the new transmission line, and the PUC regulatory approval process.
- Inform and educate the public about the routing procedure, schedule, and POWER and AEP Texas (link development and routes) selection process.
- Ensure that the decision-making process adequately identifies and considers the values and concerns of the landowners and other interested parties in the community.

A public open house meeting notice was submitted to landowners who own property located within 300 feet of the preliminary alternative link centerlines. Notices were mailed to 685 landowners for the Three Rivers and Beeville meetings in May 2017. Each landowner also received a map of the study area depicting the preliminary alternative links with their notice letter and a question and answer sheet. An example of the notice letter and a copy of the attachments are provided in Appendix B.

Rather than a formal presentation in a speaker-audience format, the meetings were held in an open house format. Numerous information stations were set up around the meeting room. Each station was devoted to a particular aspect of the link development and routes selection process and was manned by representatives of AEP Texas, Coates Field Services, Inc. (AEP Texas' property research consultant), CDS Muery (AEP Texas' survey and property mapping consultant), and/or POWER. One set of large display maps (1-inch equals 1,200 feet), illustrations, photographs, and text explaining each particular topic were presented at the stations. A GIS station was also available to provide additional detail on the proposed preliminary alternative links, and property ownership boundaries using recent aerial photography of the project area. Staff at the GIS station was available to answer questions such as the distance from the proposed alternative link centerline to the nearest corner of a habitable structure. Attendees were encouraged to visit each station in a particular order so the entire process and general project development sequence could be explained clearly. The open house using the numerous

information station format is advantageous because it facilitates one-on-one discussions and encourages personalized attendee interactions. More importantly, the one-on-one discussions with representatives of AEP Texas, Coates Field Services, Inc., CDS Muery, or POWER encourage more interaction from attendees who might be hesitant to participate in a speaker-audience format.

At the first station, each individual in attendance was asked to sign their name on a sign-in sheet and they received a questionnaire that solicited comments on the proposed project and an evaluation of the information presented at the public meetings. An example copy of the questionnaire is located in Appendix B.

Additional stations provided information regarding the PUC regulatory process, the purpose and need for the project, the project's structure type, agencies that were contacted, and the link development criteria. In addition, general overview maps showing the study area and all preliminary alternative links, constraint maps, and detailed aerial-photography based maps were available for discussion and comment.

Individuals were asked to complete the questionnaire after visiting the information stations and speaking with AEP Texas, Coats Field Services, Inc., CDS Muery, and/or POWER personnel. Completed questionnaires were submitted to AEP Texas either at the meetings or later by mail; however, not all respondents answered every question.

Three Rivers Open House

A total of 41 individuals attended the Three Rivers public open house meeting according to the sign-in sheet, with 38 submitting questionnaire responses at the meeting. Results from the questionnaires were reviewed and analyzed, and of the 35 attendees that answered the question, 31 (89%) agreed that the need for the Project was adequately explained; while four (11%) said it was not. Of those attendees that responded to the question regarding the presentation format and if the information provided helpful, 89% were pleased with the open house format of the meeting and 84% felt that the information provided was helpful to their understanding of the project.

Respondents were then presented with a list of 15 factors that are taken into consideration for a routing study (see a complete list of the criteria on the questionnaire in Appendix B). They were asked to rank each of these criteria, with **1** being the least important factor and **5** being the most important factor. Of those attendees that ranked the criteria, the five criteria that were ranked by the respondents as being the most important are listed in descending order:

- Maximize distance from residences — Most Important: 29 (76%)
- Maximize length along existing transmission lines — Most Important: 21 (55%)

- Minimize loss of trees — Most Important: 21 (55%)
- Maximize distance from public facilities — Most Important: 19 (50%)
- Minimize impacts to archeological and historic sites — Most Important: 18 (47%)

Respondents were asked if there are other factors that should be considered, and if they had any comments regarding the listed factors. Responses included:

- Suggested using the existing line ROW
- Concerns about property values
- Concerns about old oak trees
- Concerns about distance from residences
- Suggested placing the line underground
- Concerns about disrupting wildlife management programs

Respondents were then asked if there are other features in the study area that are important, and to please describe them, their locations, and to mark them on the map. Written responses included:

- A 15,000 foot deep salt water well
- Concerns about property values
- Concerns about maintenance for the new line
- Archaeological site on property
- Concerns about the value of oak trees
- Concerns about erosion along Sulphur Creek
- Concerns about rare habitat

When asked if respondents had concerns with any particular link, respondents listed multiple links. Link Q was listed the most, with nine respondents each specifying concern with the link, followed by Links N, O, P, and V with five respondents each. Twelve other links were also specified as having a particular concern.

When asked which of four situations applied to them, responses were as follows:

- 21 indicated that a potential link is near their home.
- 26 indicated that a potential link crosses their land.
- One indicated that a potential link is near their business.

- No one answered "Other."

The questionnaire then provided a space for respondents to include any additional remarks and comments. Comments and responses included:

- Suggested moving line closer to pipeline ROW
- Suggested using existing line ROW
- Suggested moving line to the edge of the property line
- Concerns about disrupting wildlife management programs
- Concerns about cost if existing line is not used

Beeville Open House

A total of 109 individuals attended the Beeville public open house meeting according to the sign-in sheet, with 80 submitting questionnaire responses at the meeting. Results from the questionnaires were reviewed and analyzed, and of the 70 attendees that answered the question, 57 (71%) agreed that the need for the Project was adequately explained; while 13 (16%) said it was not. Of those attendees that responded to the question regarding the presentation format and if the information provided helpful, 83% were pleased with the open house format of the meeting and 79% felt that the information provided was helpful to their understanding of the project.

Respondents were then presented with a list of 15 factors that are taken into consideration for a routing study (see a complete list of the criteria on the questionnaire in Appendix B). They were asked to rank each of these criteria, with **1** being the least important factor and **5** being the most important factor. The five criteria that were ranked by the respondents as being the most important are listed in descending order:

- Maximize distance from residences — Most Important: 53 (66%)
- Minimize loss of trees — Most Important: 49 (61%)
- Maximize length along property boundary lines — Most Important: 45 (56%)
- Minimize length through grassland or pasture — Most Important: 43 (54%)
- Minimize impacts to archaeological and historic sites — Most Important: 43 (54%)

Respondents were asked if there are other factors that should be considered, and if they had any comments regarding the listed factors. Responses included:

- Concerns about minimizing impacts to livestock and wildlife operations
- Suggested using existing line ROW
- Concerns about property values
- Concerns about visual impact
- Concerns about EMF for grandchildren and cattle
- Concerns about crossing property
- Concerns about distance to residence
- Concerns about trees
- Concerns about future land development
- Suggested following major highways

Respondents were then asked if there are other features in the study area that are important, and to please describe them, their locations, and to mark them on the map. Written responses included:

- Suggested using existing line ROW
- Concerns about small burial area from the early 1800s on property
- Concerns about wildlife, horses and cattle
- Concerns for planned subdivision and irrigation systems
- Concerns about old oak trees
- Concerns about run off
- Concerns about 1,800 foot long private grass runway

When asked if respondents had concerns with any particular link, respondents listed multiple links. Link L2 was listed the most, with six respondents each specifying concern with the link, followed by Links G5 and J2 with five respondents each. Fifty-eight other links were also specified as having a particular concern.

When asked which of four situations applied to them, responses were as follows:

- 40 indicated that a potential link is near their home.
- 48 indicated that a potential link crosses their land.
- 11 indicated that a potential link is near their business.
- Four answered "Other."

The questionnaire then provided a space for respondents to include any additional remarks and comments. Comments and responses included:

- Concerns about line crossing property
- Concerns about how line will affect health, noise, and electronics
- Suggested using the existing line ROW
- Concerns about plans to build a solar farm
- Concerns about 1,800 foot long private grass runway
- Concerns about trees
- Concerns about property values

Mailed Comments

A total of six questionnaires commenting on the proposed project were received by AEP Texas after the public meetings. Results from the questionnaires were reviewed and analyzed, and of those who answered the question, three (50%) of the respondents agreed that the need for the project was adequately explained; while two (33%) said it was not. Of those that responded to the question regarding the presentation format and if the information provided helpful, 33% were pleased with the open house format of the meetings and 17% felt that the information provided was helpful to their understanding of the project.

Respondents were then presented with a list of 15 factors that are taken into consideration for a routing study. They were asked to rank these criteria, with **1** being the factor least important and **5** being the most important factor. The five criteria that were ranked by the respondents as being the most important are listed in descending order:

- Maximize distance from residences — Most Important: 5 (83%)
- Maximize distance from public facilities — Most Important: 5 (83%)
- Minimize length through wetlands/floodplains — Most Important: 5 (83%)
- Minimize crossing and paralleling of streams/rivers — Most Important: 5 (83%)
- Minimize loss of trees — Most Important: 5 (83%)
- Minimize length through grassland or pasture — Most Important: 5 (83%)

Respondents were asked if there are other factors that should be considered, and if they had any comments regarding the listed factors. Responses included:

- Recommended paralleling property lines
- Concerns about crossing main gate entrance

Respondents were then asked if there are other features in the study area that are important, and to please describe them, their locations and to mark them on the map. Written responses included:

- Recommended using existing easements

When asked if respondents had concerns with any particular link, respondents listed multiple links. Links I1, C1, and E1 were listed the most, with two respondents each specifying concern with these links, followed by Links A6, N5, and U4 with one respondent each.

When asked which of four situations applied to them, responses were as follows:

- 4 indicated that a potential link is near their home.
- 2 indicated that a potential link crosses their land.
- 0 (zero) indicated that a potential link is near their business.
- 0 (zero) answered "Other."

The questionnaire then provided a space for respondents to include any additional remarks and/or comments. Comments and responses included:

- Concerns about Links I1 and C1
- Concerns about a water well
- Concerns about structures near residential areas
- Recommended using existing easements

3.3.3 Correspondence with Agencies/Officials

As described previously is Section 2.1.5, POWER contacted federal, state, and local regulatory agencies, elected officials, and organizations regarding the study area for the proposed project. As of the date of this document, written replies to the letters sent in relation to the study area were received from the following agencies: FAA, NRCS, USACE, USFWS, TCEQ, TGLO, THC, TPWD, TWDB, and TxDOT. All agency comments, concerns, and information received were taken into consideration by POWER and AEP Texas in the preparation of this EA. Additionally, the information received from the agencies will be taken into consideration by AEP Texas before

and during construction of the project. The following is a summary of the comments provided by federal, state, and local officials that have responded as of this writing and the response to those comments where appropriate. Copies of correspondence with the various state and federal regulatory agencies, and local and county officials and departments are included in Appendix A.

- The FAA responded with a letter dated June 24, 2016, stating that AEP Texas will need to determine if formal notice is required to the FAA under 14 CFR Part 77. AEP Texas will coordinate with the FAA as necessary once a route is approved for construction.
- The NRCS responded with a letter dated June 28, 2016, stating that although they did identify important farmland within the study area, they do not consider power lines to be a conversion of farmland because the area can still be used after construction. However, the installation of the substation site will require that the site be evaluated as required by the Farmland Protection Policy Act and a Farmland Conversion Impact Ratting (AD-1006) must be completed.
- The USACE responded with an email dated July 5, 2016, stating that they had assigned a contact person and Corp of Engineers file number SWG-2016-00496.
- The USACE Galveston District responded with a letter dated July 8, 2016, stating that they had determined that the study area contains waters of the US including the Nueces River and several creeks. Upon PUCT approval of a route, additional coordination with the USACE for a Section 404 Permit may be required if the approved route includes utility facilities (i.e., substations, foundations, and access roads) to be constructed within potential jurisdictional areas.
- The USFWS Texas Coastal Ecological Services Field Office responded with a letter dated August 15, 2016, assigned Consultation Number 02ETTXX0-2016-SLI-1037. The USFWS provided a list of the federally listed threatened, endangered and proposed to be listed species for the counties within the study area. The USFWS also provided the definitions of the affected determinations and referenced the MBTA and Bald and Golden Eagle Protection Act. They also stated that no critical habitats were identified within the study area.
- The TCEQ responded with a letter dated June 23, 2016, stating that 'General Conformity' does not apply because the study area counties are in attainment of the National Ambient Air Quality Standards. TCEQ recommended that the EA address actions that will be taken to prevent surface and groundwater contamination. The construction and demolition waste must be sent to an appropriately authorized disposal facility.
- The TGLO responded with a letter dated June 20, 2016, stating that the GLO does not appear to have any environmental or land use constraints associated with the project. The GLO also requested contact when a

final route has been determined in order to determine if the project crosses any Permanent School Fund land or streambeds that would require an easement.

- The THC responded with a letter dated June 27, 2016, stating that the proposed project would cross an area containing several previously recorded archeological sites. They also stated that much of the study area has never been surveyed and recommended that the final proposed route be surveyed by a professional archeologist.
- The TPWD responded with a letter dated July 29, 2016, providing a list of species that could be impacted by proposed project activities if suitable habitat is present. The TPWD provided a list of regulations pertaining to the project and a number of recommendations for the project to comply with these regulations.
- The TWDB responded with an email dated July 22, 2017, stating that there are two new active projects within the study area. Both projects are in the early stages; therefore, the TWDB is not aware of any conflicts with the proposed transmission line project.
- TxDOT's Aviation Division responded with a letter dated June 16, 2016, stating the FAA notification requirements. TxDOT also stated that there are three public use airports in or near the study area, Beeville Municipal, Chase Field, and George West Airport. They also stated that there are no public use heliports in or near the study area.
- County of Live Oak responded with a letter dated July 8, 2016, stating that their concern was for a new bridge planned on FM 1358 at the crossing of Sulphur Creek.
- Live Oak County Farm Bureau responded with a letter dated July1, 2016, suggesting that the proposed line stay within the same ROW as the existing line that runs between Three Rivers and Beeville substations.
- Texas Land Trust Council responded with an email dated June 29, 2016, stating that their records indicated that a conservation easement was located in each of the two study area counties. However, these two conservation easements are not located within the study area boundaries.

3.3.4 Modifications to Preliminary Alternative Links

Following the open house meetings, POWER and AEP Texas personnel performed a review and analysis of the input, comments, and information received at the open house meetings and also of information provided during individual meetings and discussions with landowners and interested stake-holders. The purpose of the review and analysis was to evaluate areas of concern and to consider revisions to the preliminary alternative links.

In response to public comments, several links were modified and some were added to reduce potential impacts to habitable structures and other constraints to the greatest extent practicable, increase geographic diversity, and

address other concerns from the comments provided. It was also decided that the existing 69-kV line could not be taken out of service for reliability reasons and could not be reconstructed within the existing ROW. Those links that were proposed to be double circuited with the existing 69-kV line in the existing ROW were deleted. The project team made final revisions to the preliminary alternative links before identifying the primary alternative routes to be evaluated by POWER in this EA. The preliminary alternative links are presented in Figure 3-1, following the link modifications; the primary alternative links are reflected in Figure 3-2.

Generally, the changes and additions that were made to the preliminary alternative links after the open house meetings were made for the following reasons:

- To further reduce the number of habitable structures directly affected by the centerline of the proposed links.
- To improve the paralleling of apparent property lines or other physical features.
- To improve the paralleling of compatible ROW.
- To reduce potential land use impacts to ranching and farming operations.
- To increase the number of geographically diverse routing options.

Figure 3-2 Project Vicinity

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3.3.5 Primary Alternative Routes

It was POWER and AEP Texas' intent to identify alternative routing links, that when combined, would form an adequate number of reasonable and geographically diverse primary alternative routes (alternative routes) that reflect all of the previously discussed routing considerations.

Following the modifications to the 167 preliminary alternative links, and identification of the new alternative links, 159 primary alternative links resulted. Numerous possible alternative routes using these 159 primary alternative links exist. POWER and AEP Texas identified primary alternative routes using each of the 159 primary alternative routing links in at least one route. Ultimately, 21 primary alternative routes were selected for the Three Rivers to Borglum (TRB) Segment and 11 primary alternative routes were selected for the Borglum to Tuleta (BT) Segment. Of course, many more alternative routes for each segment of the project might be formed by utilizing the links in different combinations. However, together, the selected sets of primary alternative routes utilize each alternative link at least once while also providing geographic diversity across the study area.

The primary alternative routes, their link compositions, and approximate lengths are presented in Table 3-1 for the TRB Segment, Table 3-2 for the BT Segment, and are depicted in Figures 3-3a and 3-3b in the map pockets (see Figures 5-1a and 5-1b also in the map pockets for aerial-based maps). Potential impacts for each of the 41 evaluation criteria (see Table 2-1) were tabulated for each of the primary alternative routes (see Section 4.0).

TABLE 3-1 LINK COMPOSITION AND APPROXIMATE LENGTH OF THE TRB SEGMENT PRIMARY ALTERNATIVE ROUTES

Primary Alternative Route Number	Link Composition	Length (Miles)
1	J-T6-N-V-E1-M1-V1-Y1-J2-E3-L3-I3-Q3-V3-O6	34.0
2	J-T6-N-V-E1-M1-O1-U1-Y1-J2-E3-F3-J3-I3-Q3-V3-O6	34.7
3	J-T6-N-V-C1-D1-L1-R1-A2-K2-E3-F3-H3-G3-Q3-V3-O6-	34.4
4	A-C-H-Q6-R6-T6-N-V-C1-D1-F1-J1-K1-P1-X1-A2-F2-I2-N2-Q2-D3-L3-I3-Q3-V3-O6	33.3
5	J-T6-N-B6-R-T-Y-J1-K1-R1-Z1-B2-G2-N2-U2-V2-W2-H3-J3-I3-Q3-V3-O6	32.5
6	J-T6-O-R-T-Y-J1-K1-R1-Z1-B2-E2-R2-T2-B3-K3-R3-T3-U3-P6-V3-O6	34.5
7	A-C-H-Q6-S6-U6-P-T-Y-J1-K1-R1-A2-F2-M2-O2-U2-V2-W2-G3-Q3-V3-O6	29.4
8	A-C-H-L-U6-P-T-Y-J1-K1-R1-A2-F2-M2-P2-D3-L3-I3-Q3-V3-O6-	28.3
9	A-B-H-K-M-P-T-Z-I1-M1-O1-S1-W1-J2-E3-F3-H3-G3-Q3-V3-O6	33.9
10	A-B-H-K-Q-U-Y-J1-K1-R1-A2-F2-I2-N2-U2-X2-L3-I3-Q3-V3-O6	35.6
11	A-C-H-K-Q-S-X-A1-G1-K1-R1-A2-F2-M2-P2-D3-L3-I3-Q3-V3-O6	34.3
12	A-C-H-K-Q-S-X-A1-H1-Q1-B2-E2-H2-L2-A3-B3-Z2-C3-M3-P3-R3-T3-U3-H6-E6-N6-O6	39.4
13	A-C-H-K-Q-S-X-A1-H1-N1-C2-R2-S2-W2-G3-Q3-V3-O6	34.2
14	A-B-H-K-Q-S-W-A1-H1-N1-C2-H2-L2-Y2-C3-M3-O3-S3-T3-W3-J6-M6-E6-F6-Y3	40.7
15	A-B-H-K-Q-S-W-A1-H1-N1-D2-L2-Y2-C3-N3-A4-B4-J6-K6-I6-Y3	46.7
16	J-T6-N-V-E1-M1-O1-S1-T1-X1-Z1-B2-E2-H2-L2-A3-B3-K3-R3-T3-W3-J6-K6-I6-Y3	38.4
17	A-C-H-L-U6-P-T-Y-J1-K1-R1-Z1-B2-E2-H2-L2-A3-B3-K3-R3-T3-U3-P6-V3-O6	33.2
18	A-C-H-L-U6-P-T-Y-J1-K1-R1-A2-F2-M2-P2-D3-F3-J3-I3-Q3-V3-O6	29.0
19	A-C-H-L-U6-P-T-Y-J1-K1-R1-A2-F2-M2-P2-D3-F3-H3-G3-Q3-V3-O6	28.9
20	A-C-H-L-U6-P-T-Y-J1-K1-R1-A2-F2-I2-N2-U2-V2-W2-G3-Q3-V3-O6	29.9
21	A-C-H-L-U6-P-T-Y-J1-K1-R1-Z1-B2-E2-R2-S2-W2-G3-Q3-V3-O6	30.7

TABLE 3-2 LINK COMPOSITION AND APPROXIMATE LENGTH OF THE BT SEGMENT PRIMARY ALTERNATIVE ROUTES

Primary Alternative Route Number	Link Composition	Length (Miles)
1	X3-E4-G4-J4-L4-N4-C7-D7-Z5-U5-A6-Y5-R5	21.7
2	X3-G6-Z3-C4-D4-K4-P4-U4-A5-E5-K5-L5-O5-Q5-R5	37.5
3	X3-E4-F4-B7-I4-J4-L4-N4-R4-A5-E5-H5-L5-M5-A6-Y5-R5	23.8
4	Y3-I6-L6-Z3-C4-Z6-B7-I4-J4-L4-N4-C7-O4-S4-B5-E5-K5-L5-M5-A6-Y5-R5	28.8
5	X3-E4-G4-J4-L4-N4-C7-O4-S4-Y4-U5-A6-Y5-R5	22.9
6	X3-E4-F4-B7-I4-J4-L4-N4-C7-O4-C6-Z5-U5-A6-Y5-R5	23.4
7	X3-G6-Z3-C4-Z6-B7-I4-J4-L4-Q4-U4-A5-E5-H5-L5-O5-Y5-R5	27.8
8	X3-E4-G4-J4-M4-P4-U4-A5-E5-K5-L5-M5-A6-Y5-R5	25.0
9	X3-E4-F4-B7-H4-K4-P4-U4-A5-E5-K5-L5-M5-A6-Y5-R5	26.0
10	X3-G6-Z3-C4-Z6-B7-I4-J4-L4-N4-C7-D7-Z5-U5-A6-Y5-R5	25.4
11	Y3-I6-L6-Z3-C4-D4-K4-M4-L4-N4-C7-D7-Z5-U5-A6-Y5-R5	37.1

3.3.6 Combining the Primary Alternative Routes

The ultimate goal of the proposed project is to connect the three project endpoints, the existing Three Rivers Substation, the proposed Borglum Substation, and the existing Tuleta Substation. This will require combing one of the TRB Alternative Routes with one of the BT Alternative Routes, when the route is approved for the complete transmission project.

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4.0 POTENTIAL IMPACTS OF THE PRIMARY ALTERNATIVE ROUTES

Potential impacts of the project that could occur from, and are unique to, the construction and operation of either specific segment of the project are discussed separately in this section of the EA. Potential impacts that could occur throughout the entire study area and are general in nature are not discussed separately by specific segment.

Evaluation of the potential impacts of the primary alternative routes (alternative routes) identified in Section 3.0 was conducted by tabulating the data for each of the 40 evaluation criteria in Table 2-1 for each alternative routing link and each primary alternative route for both segments of the project. The data tabulations for land use and environmental criteria for the TRB Segment are presented in Table 4-1 and the BT Segment data are presented in Table 4-2.

The potential impacts of each alternative route were compared with respect to community values, park and recreational areas, cultural resources, aesthetics, and environmental integrity. This section provides a summary and discussion of the comparison of the alternative routes for each segment of the project. Additionally, through the identification of key evaluation criteria and a consensus process, POWER further compared the potential impacts or benefits of each route and provided a recommendation to AEP Texas for the alternative route for each segment that best addresses the requirements under PURA and applicable PUC Substantive Rules (see Section 5.0) related to ecology, land use and cultural resources.

4.1 Impacts on Community Values

Adverse effects upon community values are defined as aspects of the proposed project that would significantly and negatively alter the use, enjoyment, or intrinsic value attached to an important area or resource by a community. This definition assumes that community concerns are applicable to this specific project's location and characteristics, and do not include objections to electric transmission lines in general.

Potential impacts to community resources can be classified into direct and indirect effects. Direct effects are those that would occur if the location and construction of a transmission line and substation result in the removal or loss of public access to a valued resource. Indirect effects are those that would result from a loss in the enjoyment or use of a resource due to the characteristics (primarily aesthetic) of the proposed transmission line, structures, or ROW.

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TABLE 4-1 ENVIRONMENTAL AND LAND USE DATA FOR ROUTE EVALUATION

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TABLE 4-1 ENVIRONMENTAL AND LAND USE DATA FOR ROUTE EVALUATION

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TABLE 4-2 ENVIRONMENTAL AND LAND USE DATA FOR ROUTE EVALUATION

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4.2 Impacts on Land Use

The magnitude of potential impacts to land use resulting from the construction of a transmission line is determined by the amount of land (land use type) temporarily or permanently displaced by the actual ROW and by the compatibility of the facility with adjacent land uses. During construction, temporary impacts to land uses within the ROW might occur due to the movement of workers, equipment, and materials through the area. Construction noise and dust, as well as temporary disruptions of traffic flow, might also temporarily affect local residents and businesses in the area immediately adjacent the ROW. Coordination between AEP Texas, its contractors, and landowners regarding ROW access and construction scheduling should minimize these disruptions.

The evaluation criteria used to compare potential land use impacts include overall alternative route length, route length parallel to existing linear features (including apparent property boundaries), route proximity to habitable structures, route proximity to park and recreational areas, and route length across various land use types. An analysis of the existing land use within and adjacent to the proposed ROW is required to evaluate the potential impacts.

Alternative Route Length

The length of an alternative route can be an indicator of the relative magnitude of land use impacts. Generally, all other things being equal, the shorter the route, the less land is crossed, which usually results in the least amount of potential impacts. The differences in route lengths reflect the direct or indirect pathway of each alternative route between the project endpoints. The length of the alternative routes may also reflect the effort to parallel existing transmission lines, other existing linear features and apparent property boundaries, and the geographic diversity of the alternative routes.

Compatible ROW

PUC Substantive Rule 16 TAC § 25.101(b)(3)(B) requires that an applicant for a CCN and ultimately the PUC consider whether new transmission line routes are within existing compatible ROWs and/or are parallel to existing compatible ROWs, apparent property lines, or other natural or cultural features. Criteria were used to evaluate the use of existing transmission line ROW, length parallel and adjacent to existing transmission line ROW, length of route parallel to other existing linear ROWs, and length of ROW paralleling apparent property lines. It should also be noted that if a link parallels more than one existing linear corridor it was only tabulated once (e.g., a link that parallels both an apparent property line and a roadway, will only be tabulated as paralleling the roadway).

Typically, a more representative account for the consideration of whether new transmission line routes are parallel to existing compatible ROWs, apparent property lines, or other natural or cultural features is demonstrated with the percentage of each total route length parallel to any of these features. These percentages can be calculated for each alternative route by adding up the total length parallel to existing transmission lines, other existing ROW, and apparent property lines and then dividing the result by the total length of the alternative route.

Three Rivers to Borglum Segment

For the TRB Segment of the project, Alternative Route TRB-8 is the shortest alternative route (approximately 28.32 miles), while Alternative Route TRB-15 is the longest alternative route (approximately 46.70 miles). The approximate lengths for each of the TRB Alternative Routes are presented in Table 4-1.

Most of the alternative routes (19 of the 21) of the TRB Segment utilize portions of an existing 69-kV ROW in which the existing 69-kV line would be rebuilt as a 138-kV transmission line. The total alternative route lengths utilizing existing transmission line ROW vary from approximately zero (0) mile for Alternative Routes TRB-2 and TRB-16, to approximately 22.10 miles for Alternative RouteTRB-8, 80 percent of its length. The lengths utilizing existing transmission line ROW for each of the TRB Alternative Routes is presented in Table 4-1.

All of the alternative routes parallel some length of existing transmission line ROW. The total alternative route lengths parallel and adjacent to existing transmission line ROW vary from approximately 0.17 mile each for Alternative Routes TRB-1, TRB-8, TRB-10, and TRB-11, to approximately 10.89 miles for Alternative Route TRB-16. The lengths parallel and adjacent to existing transmission line ROW for each of the TRB Alternative Routes is presented in Table 4-1.

The alternative routes with lengths paralleling other existing linear features, including roadways and railways range from approximately 1.43 mile for Alternative Route TRB-6, to approximately 10.65 miles for Alternative Route TRB-12. The lengths paralleling other existing linear features for each of the TRB Alternative Routes are presented in Table 4-1.

All of the alternative routes parallel apparent property boundaries to the extent feasible in the absence of other existing linear features. The length of alternative routes that parallel apparent property boundaries ranges from approximately 0.72 mile each for Alternative Routes TRB-8, TRB-18 and TRB-19, to approximately 15.63 miles for Alternative Route TRB-15. The lengths paralleling apparent property boundaries for each of the TRB Alternative Routes are presented in Table 4-1.

All of the TRB Alternative Routes utilize and parallel existing linear features for some portion of their lengths. The percentage of the TRB Alternative Routes utilizing and paralleling existing linear features ranges from 48 percent for Alternative Route TRB-1, to 90 percent for Alternative Route TRB-18.

Borglum to Tuleta Segment

For the BT Segment of the project, Alternative Route BT-1 is the shortest alternative route (approximately 21.66 miles), while Alternative Route BT-2 is the longest alternative route (approximately 37.52 miles). The approximate lengths for each of the BT Alternative Routes are presented in Table 4-2.

None of the BT Alternative Routes utilize any existing transmission line ROW.

All of the alternative routes parallel some length of existing transmission line ROW. The total alternative route lengths parallel and adjacent to existing transmission line ROW vary from approximately 2.16 miles for Alternative Route BT-2, to approximately 12.74 miles for Alternative Route BT-10. The lengths parallel and adjacent to existing transmission line ROW for each of the BT Alternative Routes is presented in Table 4-2.

The alternative routes with lengths paralleling other existing linear features, including roadways and railways range from approximately 1.36 mile for Alternative Route BT-1, to approximately 6.16 miles for Alternative Route BT-4. The lengths paralleling other existing linear features for each of the BT Alternative Routes are presented in Table 4-2.

All of the alternative routes parallel apparent property boundaries to the extent feasible in the absence of other existing linear features. The length of alternative routes that parallel apparent property boundaries ranges from approximately 4.56 miles for Alternative Route BT-10, to approximately 20.50 miles for Alternative Route BT-2. The lengths paralleling apparent property boundaries for each of the BT Alternative Routes are presented in Table 4-2.

All of the BT Alternative Routes utilize and parallel existing linear features for some portion of their lengths. The percentage of the BT Alternative Routes utilizing and paralleling existing linear features ranges from 64 percent for Alternative Route BT-3, to 81 percent each for Alternative Routes BT-5.

4.2.1 Impacts on Developed and Residential Areas

Typically, one of the most important measures of potential land use impacts is the number of habitable structures located in the vicinity of each alternative route. Based on direction provided by the PUC, habitable structure

identification is included in the CCN filing. POWER determined the number of habitable structures located within 300 feet of the centerline of each alternative route and the distance from the centerline through the use of GIS software, interpretation of aerial photography, and verification during reconnaissance surveys. All known habitable structure within 300 feet of the centerline of the routes are shown on Figures 3-3a, 3-3b, 5-1a, and 5-1b (map pockets).

Three Rivers to Borglum Segment

All of the alternative routes for this segment of the project have habitable structures located within 300 feet of their centerlines. Alternative Route TRB-17 has the least number of habitable structures located within 300 feet of its centerline at 10. Alternative Route TRB-5 has the most habitable structures located within 300 feet of its centerline at 46. Tables 5-3 through 5-23 present detailed information on habitable structures for the TRB Alternative Routes. The number of habitable structures located within 300 feet of the centerline of each of the TRB Alternative Routes is presented in Table 4-1.

Borglum to Tuleta Segment

All of the alternative routes for this segment of the project have habitable structures located within 300 feet of their centerlines. Alternative Route BT-11 has the least number of habitable structures located within 300 feet of its centerline at six. By comparison, Alternative Routes BT-5 and BT-6 have the most habitable structures located within 300 feet of their centerlines at 44 each. Tables 5-24 through 5-34 present detailed information on habitable structures for the BT Alternative Routes. The number of habitable structures located within 300 feet of the centerline of each of the BT Alternative Routes is presented in Table 4-2.

Land Use Categories

An analysis of compatibility with adjacent land use types was completed for each alternative route. Land use categories identified within the study area include cropland, pastureland/rangeland, and oil and gas facilities.

4.2.2 Impacts on Agriculture

Impacts to agricultural land uses can generally be ranked by degree of potential impact, with the least potential impact occurring in areas where cultivation is not the primary use (pastureland/rangeland), followed by cultivated croplands, which have the highest degree of potential impact. Most existing agricultural land uses may be resumed within the ROW following construction.

Three Rivers to Borglum Segment

All of the TRB Alternative Routes cross some length of cropland; however, due to the relatively small area affected (location of the structures), and the short duration of construction activities at any one location, such impacts should be both minor and temporary. TRB Alternative Route lengths crossing cropland areas range from 0.41 mile each for Alternative Routes TRB-1, TRB-4, and TRB-8, to approximately 6.61 miles for Alternative Route TRB-15. The lengths of each of the TRB Alternative Routes crossing croplands are presented in Table 4-1.

All of the TRB Alternative Routes cross some length of pastureland/rangeland; however, because the ROW for this project will not be fenced or otherwise separated from adjacent lands, there will be no significant long-term displacement of farming or grazing activities. TRB Alternative Route lengths crossing pastureland areas range from approximately 17.11 miles for Alternative Route TRB-13, to approximately 25.43 miles for Alternative Route TRB-17. The lengths of each of the TRB Alternative Routes crossing pasturelands are presented in Table 4-1.

None of the TRB Alternative Routes cross lands with known mobile irrigation systems (rolling or pivot); see Table 4-1.

Borglum to Tuleta Segment

All of the BT Alternative Routes cross some length of cropland; however, due to the relatively small area affected (location of the structures), and the short duration of construction activities at any one location, such impacts should be both minor and temporary. BT Alternative Route lengths crossing cropland areas range from approximately 0.52 mile each for Alternative Routes BT-8 and BT-9, to approximately 2.60 miles for Alternative Route BT-11. The lengths of each of the BT Alternative Routes crossing croplands are presented in Table 4-2.

All of the BT Alternative Routes cross some length of pastureland/rangeland; however, because the ROW for this project will not be fenced or otherwise separated from adjacent lands, there will be no significant long-term displacement of farming or grazing activities. BT Alternative Route lengths crossing pastureland areas range from approximately 9.71 miles for Alternative Route BT-7, to approximately 21.35 miles for Alternative Route BT-11. The lengths of each of the BT Alternative Routes crossing pasturelands are presented in Table 4-2.

None of the BT Alternative Routes cross lands with known mobile irrigation systems (rolling or pivot); see Table 4-2.

4.2.3 Impacts on Lands with Conservation Easements

As discussed in Section 2.4.2, there are no properties within the study area with a known conservation easement. The proposed project would have no significant impact on lands with conservation easements. Further, AEP Texas will coordinate with landowners during transmission line construction and operation for continued operation of ongoing or existing land management activities.

4.2.4 Impacts on Oil and Gas Facilities

Oil and gas wells, associated treatment facilities, and pipelines were identified within the study area. During the route development process, AEP Texas and POWER applied a set-back distance of 200 feet from the alternative route centerlines to identified well heads using 2016 RRC data layers, aerial photo interpretation, and GIS software generated measurements. In some instances the set-back distance was reduced due to the need to traverse a particular area to connect the project endpoints while also considering other existing constraints in the area. Pipelines that are crossed by the PUC approved alternative route will be indicated on engineering drawings and flagged prior to construction. AEP Texas will notify and coordinate with pipeline companies as necessary during transmission line construction and operation.

Three Rivers to Borglum Segment

The number of known pipelines crossed by the TRB Alternative Routes ranges from 18 pipeline crossings each for Alternative Routes TRB-5 and TRB-6, to 28 pipeline crossings for Alternative Route TRB-10. The number of pipeline crossings for each of the TRB Alternative Routes is presented in Table 4-1.

Borglum to Tuleta Segment

The number of known pipelines crossed by the BT Alternative Routes ranges from 23 pipeline crossings each for Alternative Routes BT-3, BT-8, and BT-9, to 29 pipeline crossings for Alternative Routes BT-4 and 11. The number of pipeline crossings for each of the BT Alternative Routes is presented in Table 4-2.

4.2.5 Impacts on Transportation, Aviation and Utility Features

Transportation Features

Potential impacts to transportation could include temporary disruption of traffic or conflicts with future proposed roadways and/or utility improvements. Traffic disruptions would include those associated with the movement of equipment and materials to the ROW, and slightly increased traffic flow and/or periodic congestion during the construction phase of the proposed project. In the rural portions of the study area, these impacts are typically considered minor, temporary, and short-term. In the urban portions of the study area, the temporary impacts to traffic flow can be significant during construction; however, none of the alternative routes are located in areas that

are considered as urban. AEP Texas will coordinate with the agencies in control of the affected roadways to address these traffic flow impacts. As mentioned in Section 2.4.5, there are several roadway projects within the study area.

Aviation Facilities

According to FAA regulations, Title 14 CFR Part 77, the construction of a transmission line requires FAA notification if tower structure heights exceed the height of an imaginary surface extending outward and upward at a slope of 100:1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of a public or military airport having at least one runway longer than 3,200 feet. The FAA also requires notification if tower structure heights exceed a 50:1 slope for a horizontal distance of 10,000 feet from the nearest runway of a public or military airport where no runway is longer than 3,200 feet in length, and if tower structure heights exceed a 25:1 slope for a horizontal distance of 5,000 feet for heliports.

One public FAA registered airport with at least one runway longer than 3,200 feet is located within 20,000 feet of all of the alternative routes, the Beeville Municipal County Airport. Chase Field Industrial Airport is also a public FAA registered airport with at least one runway longer than 3,200 feet and is located within 20,000 feet of 14 of the alternative routes. There are no FAA registered airports where no runway longer than 3,200 feet located within 10,000 feet of any of the alternative routes; and there are no heliports within 5,000 feet of any of the alternative routes.

Following PUC approval of a route for the proposed transmission line, AEP Texas will make a final determination of the need for FAA notification, based on specific route location and structure design of the approved route. The result of this notification, and any subsequent coordination with the FAA, could include changes in the line design and/or potential requirements to mark the conductors and/or light the structures. There are two known private airstrips located within 10,000 feet of the alternative routing links, Terminal D Ranch and The Flats. Tables 4-1 and 4-2 present detailed airport, airstrip, and heliport information for each of the TRB and BT Alternative Routes.

The distance for each airport/airstrip from the nearest route was measured using GIS software and aerial photography interpretation (see Table 4-3). All known airport/airstrip locations are shown on Figures 3-3a, 3-3b, 5-1a, and 5-1b (map pockets).

TABLE 4-3 AIRSTRIP RUNWAY LOCATIONS

FIGURE 5-1 MAP ID	AIRSTRIP	ALTERNATIVE ROUTES	DISTANCE FROM NEAREST ROUTING LINK (FEET)*	ESTIMATED RUNWAY LENGTH (FEET)[1]*	EXCEEDS THE SLOPE[1,2]
501	Terminal D Ranch (Private)	TRB-5, TRB-6, TRB-7, TRB-8, TRB-9, TRB-10, TRB-11, TRB-12, TRB-13, TRB-14, TRB-15, TRB-17, TRB-18, TRB-19, TRB-20, TRB-21	3,658	2,650	NA
502	Beeville Municipal Airport (FAA Public)	TRB-1, TRB-2, TRB-3, TRB-4, TRB-5, TRB-6, TRB-7, TRB-8, TRB-9, TRB-10, TRB-11, TRB-12, TRB-13, TRB-14, TRB-15, TRB-16, TRB-17, TRB-18, TRB-19, TRB-20, TRB-21, BT-1, BT-2, BT-3, BT-4, BT-5, BT-6, BT-7, BT-8, BT-9, BT-10, BT-11	4,346	4,553	Yes
503	Chase Field Industrial (FAA Public)	TRB-14, TRB-15, TRB-16, BT-1, BT-2, BT-3, BT-4, BT-5, BT-6, BT-7, BT-8, BT-9, BT-10, BT-11	3,119	8,000	Yes
504	The Flats (Private)	BT-1, BT-2, BT-3, BT-4, BT-5, BT-6, BT-7, BT-8, BT-9, BT-10, BT-11	2,178	1,800	NA

[1]FAA 2016b; *POWER aerial photo and USGS interpretation
[2]POWER used aerial photo and USGS interpretation considering elevation information obtained from USGS topographic maps and a typical transmission structure height of 100 feet.

In addition to the previously discussed airport facilities and runways, an FAA regulated VHF Omnidirectional Range / Tactical Aid to Navigation (VORTAC) facility was identified outside the study area but within approximately 2 miles of the alternative routes. The Three Rivers VORTAC ground based air navigation aid is a radio navigation system that broadcasts a navigational signal and transmits continuously in the VHF and UHF frequency range (FAA 1986). After review of the potential impacts to the VORTAC facility, AEP Texas and POWER considered structure location and ground elevation to avoid potential impacts to operation of the VORTAC facility. No adverse impacts are anticipated to the VORTAC from any of the primary alternative routes. Once a route is approved by the Commission, AEP Texas will coordinate with the FAA if required.

Utility Features

Utility features, including existing electrical transmission lines, distribution lines, and pipelines are crossed by most of the alternative routes. Potential impacts to oil and gas facilities were discussed previously in Section 4.2.4. Water wells and water tanks are scattered throughout the study area and were mapped and avoided to the extent practicable. If these utility features are crossed by or are in close vicinity to the alternative route centerline approved by the PUC, AEP Texas will coordinate with the appropriate entities to obtain necessary permits or permission as required.

Three Rivers to Borglum Segment

Each of the TRB Alternative Routes crosses an Interstate, US or State highway. The number of Interstate, US, and State highways crossed by the TRB Alternative Routes ranges from two highway crossings each for 18 of the alternative routes, to four highway crossings each for Alternative Routes TRB-14, TRB-15, and TBR-16. The number of FM roads crossed by the TRB Alternative Routes ranges from two road crossings for Alternative Route TRB-13, to five road crossings each for Alternative Routes TRB-3 and TRB-14. As mentioned above, AEP Texas would be required to obtain road-crossing permits from TxDOT for any crossing of state-maintained roadways. The number of Interstate, US, State highways, and FM road crossings for each of the TRB Alternative Routes are presented in Table 4-1.

Each of the TRB Alternative Routes crosses existing electric transmission lines. The number of existing electric transmission lines crossed by the TRB Alternative Routes ranges from three transmission lines crossings each for 16 of the TRB Alternative Routes, to six transmission line crossings for Alternative Route TRB-15. The number of transmission line crossings for each of the TRB Alternative Routes is presented in Table 4-1.

Borglum to Tuleta Segment

Each of the BT Alternative Routes have three US or State highway crossings. The number of FM roads crossed by the BT Alternative Routes ranges from one road crossing each for seven of the alternative routes, to two road crossings for Alternative Routes BT-2, BT-4, BT-8, and BT-9. As mentioned above, AEP Texas would be required to obtain road-crossing permits from TxDOT for any crossing of state-maintained roadways. The number of US, State highways, and FM road crossings for each of the BT Alternative Routes are presented in Table 4-2.

Several existing electric transmission lines were identified within the study area, and each of the BT Alternative Routes crosses several existing transmission lines. The number of transmission line crossings ranges from six crossings for Alternative Route BT-2, to ten crossings each for Alternative Routes BT-4 and BT-10. As mentioned above, AEP Texas will notify and coordinate with the appropriate entity to obtain necessary written

agreements or permits for the crossings as required. The number of transmission line crossings for each of the BT Alternative Routes is presented in Table 4-2.

4.2.6 Impacts on Electronic Communication Facilities

The distance of each electronic communication facility from the closest link was measured using GIS software and aerial photograph interpretation (see Table 4-4).

TABLE 4-4 ELECTRONIC COMMUNICATION FACILITIES

FIGURE 5-1 MAP ID	TOWER TYPE	NEAREST LINK	DISTANCE FROM NEAREST LINK (FEET)*
600	AM radio tower	E4	2,304
601	Other electronic installation	R	1,276
602	Other electronic installation	E3	872
603	Other electronic installation	W2	1,712
604	Other electronic installation	Q3	166
605	Other electronic installation	Q3	183
606	Unidentified electronic installation	A6	1,564

*POWER aerial photo and USGS interpretation; FCC 2016.

All known radio and communication facility locations are shown on Figures 3-3a, 3-3b, 5-1a, and 5-1b (map pockets).

Three Rivers to Borglum Segment

None of the TRB Alternative Routes would have a significant impact on electronic communication facilities or operations in the study area. One commercial AM radio tower was located within 10,000 feet of each of the TRB Alternative Route centerlines. Five FM radio transmitters and other electronic communication facilities are located within 2,000 feet of the TRB Alternative Route centerlines. The number of FM radio transmitters and other electronic communication facilities located within 2,000 feet of the TRB Alternative Routes ranges from zero (0) each for Alternative Routes TRB-12, TRB-14, TRB-15, TRB-16, and TRB-17, to four for Alternative Routes TRB-5. The number of radio and communication facilities located within 2,000 feet of the TRB Alternative Routes is presented in Table 4-1.

Borglum to Tuleta Segment

None of the BT Alternative Routes would have a significant impact on electronic communication facilities or operations in the study area. One commercial AM radio tower was located within 10,000 feet of each of the BT Alternative Route centerlines. One FM radio transmitter was located within 2,000 feet of nine of the BT Alternative Route centerlines. The number of FM radio transmitters and other electronic communication facilities located within 2,000 feet of the BT Alternative Routes ranges from zero (0) each for Alternative Routes BT-2 and

BT-7, to one each for the remaining nine alternative routes. The number of radio and communication facilities located within 2,000 feet of the BT Alternative Routes is presented in Table 4-2.

4.2.7 Impacts on Parks and Recreation Areas

Potential impacts to parks or recreation areas include the disruption or preemption of recreation activities. As previously mentioned in Section 2.4.7, no parks and recreational areas were identified within the study area.

No adverse impacts are anticipated for any of the fishing or hunting areas from any of the alternative routes.

Three Rivers to Borglum Segment

None of the TRB Alternative Routes cross any parks or recreational areas. There are also no parks or recreation areas located within 1,000 feet of the TRB Alternative Routes. The number of parks or recreation areas crossed and located within 1,000 feet of the TRB Alternative Routes is presented in Table 4-1.

Borglum to Tuleta Segment

None of the BT Alternative Routes cross any parks or recreational areas. There are also no parks or recreation areas located within 1,000 feet of the BT Alternative Routes. The number of parks or recreation areas crossed and located within 1,000 feet of the BT Alternative Routes is presented in Table 4-2.

4.3 Impacts on Socioeconomics

Construction and operation of the proposed transmission line is not anticipated to result in a significant change in the population or employment rate within the study area. For this project, some short-term employment would be generated. AEP Texas normally uses contract labor supervised by AEP Texas employees during the clearing and construction phases of transmission line projects. Construction workers for the project would likely commute to the work site on a daily or weekly basis instead of permanently relocating to the area. The temporary workforce increase would likely result in an increase in local retail sales due to purchases of lodging, food, fuel, and other merchandise for the duration of construction activities. No additional staff would be required for line operations and maintenance. AEP Texas is also required to pay sales tax on purchases and is subject to paying local property tax on land or improvements as applicable.

4.4 Impacts on Cultural Resources

Methods for identifying, evaluating, and mitigating impacts to cultural resources have been established for federal projects or permitting actions, primarily for purposes of compliance with the National Historic Preservation Act (NHPA). Similar methods are often used when considering cultural resources affected by state-regulated

undertakings. In either case, this process generally involves identification of significant (i.e., national or state-designated) cultural resources within a project area, determining the potential impacts of the project on those resources, and implementing measures to avoid, minimize, or mitigate those impacts.

Impacts associated with the construction, operation, and maintenance of transmission lines can affect cultural resources either directly or indirectly. Construction activities associated with any proposed project can adversely impact cultural resources if those activities alter the integrity of key characteristics that contribute to a property's significance as defined by the standards of the NRHP or the Antiquities Code of Texas. These characteristics might include location, design, setting, materials, workmanship, feeling, or association for architectural and engineering resources or archeological information potential for archeological resources.

4.4.1 Direct Impacts

Typically, direct impacts could be caused by the actual construction of the line or through increased vehicular and pedestrian traffic during the construction phase. Absent best management practices, proper mitigation, and avoidance measures, historic buildings, structures, landscapes, and districts are among the types of resources that could be adversely impacted by the construction of a transmission line. Additionally, an increase in vehicular and/or pedestrian traffic might damage surficial or shallowly buried sites. Direct impacts might also include isolation of a historic resource from or alteration of its surrounding environment.

4.4.2 Indirect Impacts

Indirect impacts include those affects caused by the project that are farther removed in distance or that occur later in time but are reasonably foreseeable. These indirect impacts might include introduction of visual or audible elements that are out of character with the resource or its setting. Indirect impacts might also occur as a result of alterations in the pattern of land use, changes in population density, accelerated growth rates, or increased pedestrian or vehicular traffic. Absent best management practices, proper mitigation, and avoidance measures, historic buildings, structures, landscapes, and districts are among the types of resources that could be adversely impacted by the indirect impact of a transmission line.

4.4.3 Mitigation

The preferred form of mitigation for direct and indirect impacts to cultural resources is avoidance through project modifications. Additional mitigation measures for direct impacts might include implementing a program for data recovery excavations if an archeological site cannot be avoided. Indirect impacts on historical properties and landscapes can be lessened through careful design and landscaping considerations, such as using vegetation screens or berms if practicable. Additionally, relocation might be possible for some historic structures.

4.4.4 Summary of Cultural Resource Impacts

The distance of each recorded site located within 1,000 feet from the nearest routing link and alternative route was measured using GIS software and aerial photography interpretation (see Table 4-5). A review of the THSA and TASA (THC 2017b and 2017c) records, described in Section 2.6, indicated that no NHLs, NRHP-listed properties, or SALs have been recorded within 1,000 feet of the alternative routes. Of the 55 previously recorded archeological sites in the study area, one site is crossed by alternative routes, and six are recorded within 1,000 feet of the alternative routes.

Three Rivers to Borglum Segment

All seven archeological sites recorded within 1,000 feet of the alternative route centerlines are located along the TRB Segments. All seven of the archeological sites are prehistoric. Sites 41LK103, 41LK107, 41LK109, 41LK222, and 41LK225 are lithic scatters, and 41LK108 and 41LK336 are campsites. Site 41LK336 is crossed by Alternative Routes TRB-10, TRB-11, TRB-12, TRB-13, TRB-14, TRB-15. A list of the archeological sites and the distances from the TRB routes are shown in Table 4-5. None of the archeological sites have been formally assessed for listing on the NRHP. No adverse impacts are anticipated for any of the previously recorded cultural resources from any of the alternative routes. It is anticipated that potential impacts to these sites will be mitigated through careful selection of routing alternatives and/or engineering design and construction measures that will protect the sites.

All of the TRB Alternative Routes cross HPAs for prehistoric cultural resources. Alternative Routes TRB-07, TRB-20, and TRB-19 cross the least amount of HPA, with 8.67, 9.27, and 10.19 miles of HPA, respectively. Alternative Routes TRB-12, TRB-14, and TRB-15 cross the most HPA, with 15.81, 17.27, and 17.53 miles of HPA crossed, respectively. Table 4-1 shows the amount of HPA crossed by each TRB alternative route.

TABLE 4-5 ARCHEOLOGICAL SITES RECORDED WITHIN 1,000 FEET OF THE ALTERNATIVE ROUTES

SITE TRINOMIAL	DESCRIPTION	DISTANCE IN FEET FROM CENTERLINE	ALTERNATIVE ROUTE(S)	COMMENTS
41LK103	Prehistoric lithic scatter	856	TRB-01, TRB-02, TRB-03, TRB-04, TRB-05, TRB-16	
41LK107	Prehistoric lithic scatter	900	TRB-01, TRB-02, TRB-03, TRB-04, TRB-05, TRB-16	
41LK108	Prehistoric campsite	724	TRB-01, TRB-02, TRB-03, TRB-04, TRB-05, TRB-16	
41LK109	Prehistoric lithic scatter	867	TRB-01, TRB-02, TRB-03, TRB-04, TRB-05, TRB-16	
41LK222	Prehistoric lithic scatter	486	TRB-01, TRB-02, TRB-03, TRB-05, TRB-06, TRB-16	Destroyed
41LK225	Prehistoric lithic scatter	102	TRB-01, TRB-02, TRB-03, TRB-04, TRB-05, TRB-06, TRB-16	Destroyed

TABLE 4-5 ARCHEOLOGICAL SITES RECORDED WITHIN 1,000 FEET OF THE ALTERNATIVE ROUTES

SITE TRINOMIAL	DESCRIPTION	DISTANCE IN FEET FROM CENTERLINE	ALTERNATIVE ROUTE(S)	COMMENTS
41LK336	**Prehistoric campsite**	**0**	**TRB-10, TRB-11, TRB-12, TRB-13, TRB-14, TRB-15**	

Note: Bold entries are crossed by the proposed ROW.
Source: TASA 2017b.

Borglum to Tuleta Segment

No cultural resources are crossed by or located within 1,000 feet of the BT Alternative Routes.

All of the BT Alternative Routes cross HPAs for prehistoric cultural resources. Alternative Routes BT-1, BT-6 and BT-5 cross the least amount of HPA, with 11.59, 11.75, and 12.05 miles of HPA, respectively. Alternative Routes BT-9, BT-11, and BT-2 cross the most HPA, with 15.93, 18.49, and 23.08 miles of HPA crossed, respectively. Table 4-2 shows the amount of HPA crossed by each BT alternative route.

4.5 Impacts on Aesthetic Values

Aesthetic impacts, or impacts to visual resources, exist when the ROW, lines and/or structures of a transmission line system create an intrusion into, or substantially alter the character of the existing view. The significance of the impact is directly related to the quality of the view, in the case of natural scenic areas, or to the importance of the existing setting in the use and/or enjoyment of an area, in the case of valued community resources and recreational areas.

Construction of the proposed transmission project could have both temporary and permanent aesthetic impacts. Temporary impacts would include views of the actual assembly and erection of the tower structures. If wooded areas are cleared, the brush and wood debris could have an additional negative temporary impact on the local visual environment. Permanent impacts from the project would involve the views of the cleared ROW, tower structures, and lines from public viewpoints including roadways, recreational areas and scenic overlooks. Since no designated landscapes protected from most forms of development or legislation exist within the study area, potential visibility impacts were evaluated by estimating the length of each alternative route that would fall within the foreground visual zones (one-half mile with unobstructed views) of major highways, FM roads, and parks or recreational areas. The alternative route lengths within the foreground visual zone of Interstate, US, and State highways, FM roads, and parks or recreational areas were tabulated and are discussed below.

Three Rivers to Borglum Segment

All of the TRB Alternative Routes have some portion of the routes located within the foreground visual zone of Interstate, US, and State highways. Alternative Route TRB-15 has the longest length of ROW within the foreground visual zone of Interstate, US, and State highways, with approximately 10.79 miles, while Alternative Route TRB-6 has the least, with approximately 3.90 miles.

All of the TRB Alternative Routes have some portion of the routes located within the foreground visual zone of FM roads. Alternative Route TRB-11 has the longest length of ROW within the foreground visual zone of FM roads, with approximately 19.14 miles, while Alternative Route TRB-16 has the least, with approximately 6.87 miles.

Although there are no parks or recreational areas within 1,000 feet of any of the TRB Alternative Routes, some of the TRB Routes are within the foreground visual zone of one park, the 10 Acre Park located in the City of Beeville. Fifteen of the TRB Alternative Routes have approximately 0.84 mile of ROW within the foreground visual zone of parks or recreational areas, while the remaining six TRB Alternative Routes have zero (0) mile each. A summary of the lengths for each of the TRB Alternative Routes within the foreground visual zone of Interstate, US, and State highways, FM roads, and parks or recreational areas is presented in Table 4-1.

Borglum to Tuleta Segment

All of the BT Alternative Routes have some portion of the routes located within the foreground visual zone of Interstate, US, and State highways. Alternative Route BT-7 has the longest length of ROW within the foreground visual zone of Interstate, US, and State highways, with approximately 5.85 miles, while Alternative Routes BT-8 and BT-9 have the least, with approximately 3.26 miles each.

All of the BT Alternative Routes have some portion of the routes located within the foreground visual zone of FM roads. Alternative Route BT-4 has the longest length of ROW within the foreground visual zone of FM roads, with approximately 6.87 miles, while Alternative Route BT-11 has the least, with approximately 2.11 miles.

None of the BT Alternative Routes have any of their ROW length located within the foreground visual zone of parks or recreational areas. A summary of the lengths for each of the BT Alternative Routes within the foreground visual zone of Interstate, US, and State highways, FM roads, and parks or recreational areas is presented in Table 4-2.

Overall, the character of the rural landscape within the study area includes gently rolling pasturelands with trees bordering the fence lines or along streams. The residential and commercial developments within the study area have already impacted the aesthetic quality within the region from public viewpoints. The construction of any of the alternative routes is not anticipated to significantly impact the aesthetic quality of the landscape.

4.6 Impacts on Environmental Integrity

4.6.1 Impacts on Physiography and Geology

Construction of the proposed transmission line is not anticipated to have any significant adverse effects on the physiographic or geologic features and resources of the area. Erection of the structures will require the excavation and/or minor disturbance of small quantities of near-surface materials, but should have no measurable impacts on the geologic resources or features along any of the alternative routes. No geologic hazards or hazardous waste sites were identified within the study area and no geologic hazards are anticipated to be created by the proposed project.

4.6.2 Impacts on Soils

Activities associated with the construction, operation, and maintenance of electrical transmission lines typically do not adversely impact soils when appropriate mitigation measures are implemented during the construction phase. Potential impacts to soils include erosion, compaction, and conversion of prime farmland soils.

The highest risk for soil erosion and compaction is primarily associated with the clearing and construction phases of the project. In accordance with AEP Texas standard construction specifications, ROW clearing of woody vegetation including trees, brush, and undergrowth would be conducted within the primary ROW area (100 feet wide). Areas with vegetation removed would have the highest potential for soil erosion and the movement of heavy equipment down the cleared ROW creates the greatest potential for soil compaction. Prior to construction, AEP Texas would develop a SWPPP to minimize potential impacts associated with soil erosion, compaction, and off ROW sedimentation. Implementation of this plan would incorporate temporary and permanent BMPs to minimize soil erosion on the ROW during significant rainfall events. The SWPPP would also establish the criteria for mitigating soil compaction and re-vegetation to ensure adequate soil stabilization during the construction and post construction phases. The native herbaceous layer of vegetation would be maintained, to the extent practical, during construction and most denuded areas with a low erosion potential would be allowed to re-vegetate with native herbaceous species. Areas with a high erosion potential, including steep slopes and areas with shallow topsoil, might require seeding and/or implementation of permanent BMPs (i.e., soil berms or interceptor slopes) to stabilize disturbed areas and minimize soil erosion potential during the post construction phase. The ROW will be

inspected during and post construction to ensure that potential high erosion areas are identified and appropriate BMPs are implemented and maintained.

Prime farmlands, as defined by the NRCS, are soils that are best suited for producing food, feed, forage, or fiber crops. The USDA recognizes the importance and vulnerability of prime farmlands throughout the nation and encourages the wise use and conservation of these soils where possible. The project will likely cross prime farmland soils. However, the USDA-NRCS does not consider the limited area of direct impact associated with the structure to be a significant conversion of these soils, and the majority of the ROW would be available for agricultural use once construction of the transmission line is completed.

Potential impacts to soils, primarily erosion and compaction, would be minimized with the development and implementation of a SWPPP. The magnitude of potential soil impacts are considered equivalent for all of the alternative routes. No conversions of prime or state important soils are anticipated related to project activities for any of the alternative routes.

4.6.3 Impacts on Water Resources

Impacts on Surface Water

Multiple surface waters within the study area would be crossed by all of the alternative routes. The Nueces River lies within the study area, although none of the alternative routes crosses the river. Named ephemeral and perennial streams/creeks within the study area include La Para Creek, Olds Slough, Levena Hollow, Gambie Gully, Sulphur Creek, Salt Branch, Rock Quarry Branch, Aransas Creek, Poesta Creek, Elm Creek, Friday Hollow, Dry Creek, Little Dry Creek, Spring Creek, Talpacate Creek, Medio Creek, Parker Hollow Creek, Live Oak Hollow, and Boggy Creek. Many additional unnamed small lakes, ponds, quarries, creeks, and tributaries were also identified within the study area. No major reservoirs were identified within the study area. AEP Texas proposes to span all surface waters crossed by any of the alternative routes, if practical. Structure locations would be outside of the ordinary high water lines for any surface waters. Hand-cutting of woody vegetation within the ordinary high water lines would be implemented and limited to the removal of woody vegetation as necessary to meet conductor to ground clearances. The shorter understory and herbaceous layers of vegetation would remain, where allowable, and BMPs would be implemented in accordance with the SWPPP to reduce the potential for sedimentation outside of the ROW. Since all surface waters will be spanned and a SWPPP plan will be implemented during construction, no significant impacts to these surface waters are anticipated for any of the alternative routes. The number of streams crossed by each of the alternative routes, lengths of each alternative route crossing open water, and lengths paralleling streams/rivers are provided in Tables 4-1 and 4-2.

None of the surface waters crossed by any of the alternative routes exceed the typical span lengths of a 138-kV transmission line. Structure locations would be outside of the ordinary high water lines for any surface waters. Hand-cutting of woody vegetation within the ordinary high water lines may be implemented and limited to the removal of woody vegetation exceeding 10 feet in height. The shorter understory and herbaceous layers of vegetation may remain, where allowable, and BMPs would be implemented in accordance with the SWPPP to reduce the potential for sedimentation outside of the ROW.

Three Rivers to Borglum Segment

The number of stream crossings for the alternative routes range from 23 for Alternative Route TRB-7, to 39 each for Alternative Routes TRB-2, TRB-4, TRB-11, and TRB-16. However, these stream crossings are calculated from the National Hydrography Dataset (NHD) and the hydrology of some of these streams may have been altered or affected by construction of drainage ditches/canals, levees, impoundments, residential areas, etc. Each of the alternative routes parallel streams within 100 feet, the length of each alternative route parallel (within 100 feet) to streams ranges from approximately 0.30 mile for Alternative Route TRB-13, to approximately 1.26 miles each for Alternative Routes TRB-8 and TRB-18. None of the 21 TRB Alternative Routes crosses any rivers or known open waters (lakes, ponds, and stock tanks). AEP Texas proposes to span all surface waters crossed by any of the alternative routes.

Borglum to Tuleta Segment

The number of stream crossings for the alternative routes range from 18 for Alternative Route BT-1, to 42 for Alternative Route BT-2. However, these stream crossings are calculated from the NHD and the hydrology of some of these streams may have been altered or affected by construction of drainage ditches/canals, levees, impoundments, residential areas, etc. None of the 11 BT Alternative Routes crosses any rivers. Each of the BT Alternative Routes parallel streams within 100 feet, the length of each alternative route parallel (within 100 feet) to streams ranges from approximately 0.19 mile for Alternative Route BT-3, to approximately 0.86 mile for Alternative Route BT-2.

The length of each alternative route crossing open waters (lakes, ponds, and stock tanks) ranges from approximately zero (0) mile each for Alternative Routes BT-1, BT-3, BT-5, BT-6, BT-8, and BT-9, to approximately 0.08 mile each for Alternative Routes BT-2, BT-4, BT-7, BT-10, and BT-11. AEP Texas proposes to span all surface waters crossed by any of the alternative routes.

Impacts on Ground Water

The construction, operation, and maintenance of the proposed transmission line is not anticipated to adversely affect groundwater resources within the study area. During construction activities, another potential impact for both surface water and groundwater resources is related to fuel and/or other chemical spills. As a component of the SWPPP, standard operating procedures and spill response specifications relating to petroleum product storage, refueling, and maintenance activities of equipment are provided to avoid and minimize potential contamination to water resources. Any accidental spills would be promptly responded to in accordance with state and federal regulations. AEP Texas will take all necessary and available precautions to avoid and minimize the occurrence of such spills.

Impacts on Floodplains

If a structure is proposed to be located within the floodplain, engineering and design methods should alleviate the potential of construction activities to adversely impact flood channels and proper monopole structure placement would minimize any flow impedance during a major flood event. No construction activities are anticipated that would significantly impede the flow of water within watersheds. The construction of any of the alternative routes is not likely to significantly impact the overall function of a floodplain, or adversely affect adjacent or downstream properties. AEP Texas will coordinate with the county floodplain administrators as necessary.

Three Rivers to Borglum Segment

The length of ROW across 100-year floodplain ranges from approximately 0.53 mile each for Alternative Routes TRB-7, TRB-8, TRB-18, TRB-19, and TRB-20, to approximately 4.79 miles for Alternative Route TRB-15. The lengths of each alternative route across 100-year FEMA floodplains are provided in Table 4-1.

Borglum to Tuleta Segment

The length of ROW across 100-year floodplain ranges from approximately 1.78 miles for Alternative Route BT-3, to approximately 7.56 miles for Alternative Route BT-11. The lengths of each alternative route across 100-year FEMA floodplains are provided in Table 4-2.

4.6.4 Impacts on Ecological Resources

Impacts on Vegetation Types

Potential impacts to vegetation would result from clearing the ROW of woody vegetation and/or mowing/clearing of herbaceous vegetation. These activities facilitate ROW access for structure construction, line stringing, and future maintenance activities of the proposed transmission line. Impacts to vegetation would be limited to a 100-foot wide ROW. Woody vegetation removal within the ROW would be required within upland

woodlands/brushlands, bottomland/riparian and shrub/forested wetland areas. ROW clearing activities would be completed while minimizing the impacts to existing groundcover vegetation when practical. Mowing and/or shredding of herbaceous vegetation might be required within grasslands/pasturelands. Future ROW maintenance activities might include periodic mowing and/or herbicide applications to maintain an herbaceous vegetation layer within the ROW.

Clearing trees and shrubs from woodland areas typically generates a degree of habitat fragmentation. The magnitude of habitat fragmentation is typically minimized by paralleling an existing linear feature such as a transmission line, roadway, railway, or pipeline. During the route development process, consideration was given to avoid wooded areas and/or to maximize the length of the routes parallel to existing linear features. Clearing would occur only where necessary to provide access, work space and future maintenance access to the ROW. The lengths of each alternative route crossing upland woodlands/brushlands and bottomland/riparian woodlands are provided in Tables 4-1 and 4-2.

Three Rivers to Borglum Segment

All of the alternative routes cross some length of upland woodlands/brushlands. Alternative route lengths crossing upland woodlands/brushlands ranges from approximately 9.98 miles for Alternative TRB-19, to approximately 19.47 miles for Alternative Route TRB-15.

All of the alternative routes cross some length of bottomland/riparian woodlands. Alternative route lengths crossing bottomland/riparian woodlands range from approximately 0.15 mile for Alternative Route TRB-7, to approximately 1.07 miles for Alternative Route TRB-2. These areas are primarily associated with vegetation near stream/creek crossings or other perennial surface waters.

Borglum to Tuleta Segment

All of the alternative routes cross some length of upland woodlands/brushlands. Alternative route lengths crossing upland woodlands/brushlands ranges from approximately 8.87 miles for Alternative Route BT-1, to approximately 25.52 miles for Alternative Routes BT-2.

All of the alternative routes cross some length of bottomland/riparian woodlands. Alternative route lengths crossing bottomland/riparian woodlands range from approximately 0.27 mile each for Alternative Routes BT-5 and BT-6, to approximately 1.07 miles for Alternative Route BT-2. These areas are primarily associated with vegetation near stream/creek crossings or other perennial surface waters.

Impacts on Wetlands

Removal of vegetation in wetlands increases the potential for erosion and sedimentation, which can be detrimental to downstream plant communities and aquatic life. Wetland areas also provide habitat to a number of species and are often used as migration corridors for wildlife. Removal of woody vegetation within wetlands crossed is proposed using hand-clearing methods to avoid disturbance of the soil profile and to preserve the herbaceous vegetation layer. The temporary and/or permanent placement of fill material within jurisdictional waterways and wetlands requires a permit from the USACE under Section 404 of the CWA or under Section 10 of the Rivers and Harbors Act. A delineation of the wetlands crossed by the PUC approved route will be completed to determine USACE permit requirements. Additionally, mitigation measures can be implemented during construction activities to further avoid and minimize potential impacts to wetlands. Due to the semi-arid nature of the region, NWI mapped wetland areas are typically restricted to the floodplains of larger creeks, ponds, and the Nueces River. Other NWI wetlands are typically located within smaller depressions and/or associated with man-made ponds; in most instances could be spanned with impacts limited to clearing woody vegetation to achieve clearance requirements. AEP Texas proposes to implement BMPs as a component of their SWPPP to prevent off ROW sedimentation and degradation of the wetland areas. With the use of these avoidance and minimization measures, none of the alternative routes are anticipated to have a significant impact on jurisdictional wetlands.

Activities associated with the construction of electrical transmission facilities within jurisdictional wetlands are regulated by the USACE under the CWA. If necessary, AEP Texas will coordinate with the USACE prior to clearing and construction to ensure compliance with Section 404 of the CWA and Section 10 of the Rivers and Harbors Act in order to avoid, minimize, or mitigate unavoidable impacts to waters of the US, including associated wetlands. The lengths of each alternative route crossing NWI mapped wetlands are provided in Tables 4-1 and 4-2.

Three Rivers to Borglum Segment

Four of the 21 TRB Alternative Routes have some length of ROW crossing NWI mapped wetlands. Alternative Routes TRB-1, TRB-2, TRB-3, and TRB-9 each cross approximately 0.06 mile of NWI mapped wetlands. The remaining 17 TRB Alternative Route ROWs crosses 0.00 (zero) mile each of NWI mapped wetlands.

Borglum to Tuleta Segment

The lengths of each BT Alternative Route crossing NWI mapped wetlands range from 0.00 (zero) mile each for Alternative Routes BT-1, BT-3, BT-5, and BT-6, to approximately 0.08 mile each for Alternative Routes BT-2 and BT-7.

Impacts on Wildlife and Fisheries

The primary impacts of construction activities on terrestrial wildlife species are typically associated with temporary disturbances from construction activities, and with the removal of vegetation (habitat modification/fragmentation). Increased noise and equipment movement during construction might temporarily displace mobile wildlife species from the immediate workspace area. These impacts are considered short-term and normal wildlife movements would be expected to resume after construction is completed. Potential long-term impacts include those resulting from habitat modifications and/or fragmentation. All the alternative routes cross areas of upland and riparian woodlands which can represent the highest degree of habitat fragmentation by converting the area within the ROW to an herbaceous habitat. During the routing process, POWER attempted to minimize potential woodland habitat fragmentation by paralleling existing linear features and avoiding paralleling streams to the extent feasible.

Construction activities might also impact small, immobile, or fossorial (living underground) animal species through incidental takes or from the alteration of local habitats. Incidental impacts of these species might occur due to equipment or vehicular movement on the ROW by direct impact or due to the compaction of the soil if the species is fossorial. Potential impacts of this type are not typically considered significant and are not likely to have an adverse effect on any species population dynamics.

If ROW clearing occurs during bird nesting seasons, potential impacts could occur within the ROW area related to potential takes of bird eggs and/or nestlings. Increases in noise and equipment activity levels during construction could also potentially disturb breeding or other activities of species nesting in areas immediately adjacent to the ROW. AEP Texas proposes to complete all ROW clearing and construction activities compliant with the MBTA to avoid or minimize these potential impacts to the extent practical.

Transmission lines can also present additional hazards to birds due to electrocutions and/or collisions. Measures can be implemented to minimize this risk with transmission line engineering designs. The electrocution risk to birds should not be significant since the engineering design distance between conductors, conductor to structure, or conductor to ground wire for the proposed transmission line is greater than the wingspan of any bird typically occurring within the area (i.e., greater than eight feet). The risk for avian collisions with the shield wire could also be minimized by installing bird flight diverters or other marking devices on the line within high bird use areas.

Potential impacts to aquatic ecosystems would include effects resulting from erosion, siltation, and sedimentation. Vegetation clearing of the ROW might result in increased suspended solids entering surface waters traversed by the transmission line. Increases in suspended solids might adversely affect aquatic organisms that require

relatively clear water for foraging and/or reproduction. Physical aquatic habitat loss or alteration could result wherever riparian vegetation is removed and at temporary crossings required for access roads. Increased levels of siltation or sedimentation might also potentially impact downstream areas primarily affecting filter feeding benthic and other aquatic invertebrates. Implementation of a SWPPP and BMPs will minimize these potential impacts. No significant adverse impacts are anticipated to any aquatic habitats crossed or located adjacent to the ROW for any of the alternative routes.

Construction of the proposed transmission line is not anticipated to have significant impacts to wildlife and fisheries within the study area. Direct impacts would be associated with the loss of woodland habitat which is reflected in the vegetation analysis discussed above. Habitat fragmentation was minimized for all the alternative routes within woodland areas by paralleling existing linear features to the extent feasible. While highly mobile animals might temporarily be displaced from habitats near the ROW during the construction phase, normal movement patterns should return after project construction is complete. Implementation of a SWPPP utilizing BMPs will minimize potential impacts to aquatic habitats.

Impacts to Threatened and Endangered Species

In order to determine potential impacts to threatened or endangered species, a review using available information was completed. Known occurrence data (TXNDD 2016) for the study area and project scoping comments from TPWD and USFWS (see Appendix A) were reviewed. Current USFWS and TPWD county listings for federal and state listed threatened and endangered species and USFWS designated critical habitat locations were included in the review. The TXNDD data provides an historical record of the species and other rare resources that could potentially occur in the study area. The absence of species within the TXNDD database is not a substitute for a species-specific field survey that might be necessary after a field survey for potential suitable habitat is conducted for the PUC approved route. The TXNDD data provides an indication that suitable habitat for the species may be present within these alternative route lengths. After the PUC approves a route, AEP Texas will conduct any necessary surveys to identify potential suitable habitats for listed species and evaluate the need for additional surveys and/or coordination with USFWS and TPWD.

Threatened and Endangered Plant Species

Federally listed plant species within the study area are only afforded federal protection from take if they are located on federal lands, federal funding, or actions are associated with the project. Listed plant species are protected from commercial trade and from collection and malicious harm when located on federal lands. No federally-listed threatened or endangered plant species are listed for the counties within the study area.

State listed threatened and endangered plant species are afforded protection under Chapter 88 within Title 5 of the Texas Parks and Wildlife Code. Within this regulation, a "take" means to collect, pick, cut, dig up, or remove. This restricts the "take" of a listed species from public lands. It also prohibits the collection for sale, possession for commercial sale, transport for commercial sale, or sale of all or part of an endangered, threatened, or protected plant from private land unless permitted through the TPWD. No state-listed threatened or endangered plant species are listed for the study area counties. Therefore, construction of the proposed transmission line is not anticipated to have any significant adverse effects on any state or federally-listed threatened or endangered plant species.

Sensitive Vegetation Communities

There are 13 plant species listed as species of concern within the study area counties, as summarized in Table 2-19. Review of TXNDD (2016) data indicates the occurrence of Drummond's rushpea (*Caesalpinia drummondii*), South Texas rushpea (*Caesalpinia phyllanthoides*), and Elmendorf's Onion (*Allium elmendorfii*) within the study area. Review of TXNDD (2016) data also indicates the occurrence of the little bluestem-indiangrass series (*Schizachyrium scoparium - Sorghastrum nutans*) near the Chase Field Industrial Airport. Construction of the proposed transmission line is not anticipated to have any significant adverse effects on sensitive vegetation communities the area. Any occurrences of sensitive vegetation communities will be noted if observed during any field surveys that are conducted after a route is approved by the PUC.

Threatened and Endangered Animal Species

Of the federally listed threatened and endangered species briefly described in Section 2.0, the species which are dependent on dense thornscrub or mixed thornscrub habitats, the jaguarundi and ocelot, would have the highest risk of potential impacts due to habitat degradation and/or fragmentation. Minimization of this impact could be achieved by spanning streams and riparian areas which leaves movement corridors for these and other wildlife species requiring woody cover. Only two known breeding populations of ocelot are known in south Texas and neither is located within the study area and the last confirmed documented occurrence of a jaguarundi in Texas was from a salvaged road kill in 1986. If necessary, a field survey for potential suitable habitat for all listed species will be completed after PUC approval of an alternative route. Additional consultation with the USFWS and TPWD might be required if suitable habitat for any federal or state listed species is observed during the field survey of the PUC approved route.

State-listed species such as the black-spotted newt, sheep frog, white-faced ibis, white-tailed hawk, wood stork white-nosed coati, golden orb, reticulate collared lizard, Texas indigo snake, Texas horned lizard, and Texas tortoise may occur within the study area if suitable habitats are present. Some of these species habitats may be spanned or avoided entirely. If present, species may be susceptible to minor temporary disturbance during

construction efforts, but the proposed transmission line project is not anticipated to result in significant adverse impacts to these species. The construction of a transmission line does not include activities associated with collecting, hooking, hunting, netting, shooting, or snaring by any means or device, and does not include an attempt to conduct such activities. Therefore, "take" of state-listed species as defined in Section 1.01(5) of the Texas Parks and Wildlife Code is not anticipated by this project. Potential impacts to listed species include direct takes of individuals and potential degradation of optimal habitat to sub-optimal in most instances. AEP Texas proposes to span all surface waters and implement BMPs within their SWPPP plan to minimize potential impacts to aquatic species.

The study area is located on the western edge of the primary central migratory corridor within Texas for the whooping crane. This species may occur in the study area only as a rare non-breeding migrant (Arvin 2007). Additional listed migratory avian species such as the interior least tern, peregrine falcon, piping plover, and red knot are not expected to occur except as possible non-breeding migrants that pass through the study area and potentially occupy habitats temporarily or seasonally. These seasonal habitats may be spanned or avoided entirely; the proposed transmission line project is not anticipated to have any adverse impacts to these species. If any potential suitable habitat is identified or individuals are observed during the field survey of the approved route, AEP Texas will further coordinate with the USFWS to determine avoidance or mitigation strategies.

Bald eagles are not listed by TPWD (TPWD 2016e) or USFWS (2016b) however, nesting eagles have extended their range in recent years and may winter or migrate through the study area (Lockwood and Freeman 2014). Bald eagles and their nests are protected under the MBTA and BGEPA. Nests are protected if they have been used within the previous five nesting seasons. If, in the course of further biological surveys and/or construction activities, any bald eagle roost or nest trees are identified within the vicinity of the project, AEP Texas will refer to the National Bald Eagle Management Guidelines to avoid and minimize harm and disturbance of bald eagles as recommended by USFWS.

The absence of TXNDD data for a species does not preclude the need for additional evaluations for potential suitable habitat or the need for any species specific surveys for any listed species for the PUC approved alternative route. Pedestrian surveys have not been completed for any of the alternative routes; therefore, suitable habitat for these species has not been determined to be located within the ROW of any of the alternative routes. If necessary, a field survey will be completed on the PUC approved route to determine if suitable habitat is present prior to construction. Additional consultation with USFWS and TPWD might be required if suitable habitat is observed during a field survey of the PUC approved route.

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5.0 ROUTE EVALUATION

The purpose of this Routing Study was to delineate and evaluate alternative routes for AEP Texas' proposed transmission line in Bee and Live Oak counties between AEP Texas' existing Three Rivers Substation and the proposed Borglum Substation and the existing Tuleta Substation. POWER completed an environmental analysis of 21 primary alternative routes for the TRB Segment and 11 primary alternative routes for the BT Segment, the results of which are shown in Tables 4-1 and Tables 4-2 (Section 4.0). The environmental evaluation was a comparison of the alternative routes from a strictly environmental, land use, and cultural resource viewpoint based upon the measurement of 40 environmental criteria (Tables 2-1, 4-1, and 4-2) and the consensus process of POWER's group of evaluators. POWER used this information to evaluate and rank the alternative routes and to select an alternative route for each segment of the project (TRB and BT) for recommendation that provides the best balance between land use, aesthetic, ecological, and cultural resource factors. AEP Texas considers POWER's recommendations in addition to engineering and constructability constraints, cost estimates, and comments from agencies and the public; and then identifies one alternative route from each segment of the project that when combined together, is the alternative route that AEP Texas believes best addresses the requirements of applicable portions of PURA and PUC Substantive Rules.

5.1 POWER'S ENVIRONMENTAL EVALUATION

POWER used a consensus process to evaluate the potential environmental, land use, and cultural resource impacts of the alternative routes. POWER professionals with expertise in different environmental disciplines (land use, ecology, and cultural resources), as well as POWER's Project Manager, evaluated all of the alternative routes based on the environmental conditions present along each route. This evaluation was based on the evaluation criteria; comments received from the public, local, state, and federal agencies; and field reconnaissance of the study area. Each POWER technical expert independently analyzed the routes and the environmental data presented in Table 4-1 and then independently ranked the routes with respect to potential impacts within their respective discipline. The evaluators then met as a group and discussed their independent results. The group as a whole determined the relationship and relative sensitivity among the major land use, ecological, and cultural resource factors. The group then ranked the alternative routes based strictly upon the environmental, land use, and cultural data considered.

5.1.1 Three Rivers to Borglum Segment

The evaluators agreed that all of the TRB Alternative Routes were viable and acceptable from an overall land use, ecology, and cultural resource perspective. The evaluators each ranked the alternative routes from 1st to 21st (with 1st having the least potential impact and 21st the greatest potential impact) from the perspective of their own technical discipline. The results of this ranking are summarized in Table 5-1.

TABLE 5-1 POWER'S ENVIRONMENTAL RANKING OF THE THREE RIVERS TO BORGLUM ALTERNATIVE ROUTES

	RANKING				
Alternative Route	Land Use Specialist	Ecology Specialist	Cultural Resources Specialist	Project Manager	Consensus
TRB-1	20th	16th	13th	20th	
TRB-2	19th	17th	12th	21st	
TRB-3	14th	12th	8th	14th	
TRB-4	13th	14th	11th	13th	
TRB-5	10th	8th	9th	12th	
TRB-6	9th	10th	14th	8th	
TRB-7	4th	4th	1st	4th	4th
TRB-8	1st	2nd	5th	1st	1st
TRB-9	12th	9th	10th	9th	
TRB-10	11th	13th	17th	10th	
TRB-11	8th	11th	18th	11th	
TRB-12	16th	19th	19th	15th	
TRB-13	21st	15th	16th	19th	
TRB-14	18th	20th	20th	17th	
TRB-15	17th	21st	21st	18th	
TRB-16	15th	18th	15th	16th	
TRB-17	6th	7th	7th	6th	
TRB-18	3rd	3rd	6th	3rd	3rd
TRB-19	2nd	1st	3rd	2nd	2nd
TRB-20	5th	5th	2nd	5th	5th
TRB-21	7th	6th	4th	7th	

The land use evaluation of the TRB Alternative Routes placed the greatest importance on the length utilizing existing transmission line ROW, length paralleling existing compatible ROW, number of habitable structures located within 300 feet of the proposed ROW centerline, and overall length of the route. Comparing the 21 TRB Alternative Routes from a land use perspective, TRB-8 was selected as having the least-potential land use impact.

The ecological ranking of the TRB Alternative Routes was based primarily on the total length of ROW through upland woodlands/brushlands, bottomland/riparian woodlands, and overall length of the route and the proportion of the route using or parallel to existing ROW to attempt minimize habitat fragmentation. Consideration was also given to the number of stream crossings, potential impacts to NWI mapped wetlands, length of route parallel to streams, length across 100-year floodplains, and proximity to potential threatened or endangered species habitats. The ecologist ranked TRB-19 as having the least-potential ecological impact.

The cultural resources ranking of the TRB Alternative Routes were based primarily on potential impacts to sites crossed by the alternative routes, followed by the amount of HPA crossed by the TRB Alternative Routes. The proximity, quality of and quantity of sites within 1,000 feet of the alternative routes was also considered. Alternative Route TRB-7 was identified as having the least-potential impact on cultural resources.

The POWER project manager ranked the TRB Alternative Routes considering all of the evaluation criteria and the flow of the alternative routes across the study area. For the TRB Segment, the length of ROW utilizing existing transmission line ROW for rebuilding the existing 69-kV line was given the greatest importance for this specific project while the proximity to habitable structures and the overall length of the alternative route were considered key factors. The length of ROW paralleling existing compatible ROWs; paralleling other existing ROWs; and apparent property lines; as well as the length of ROW across upland woodlands/brushlands were also relied on for ranking purposes. Potential impact avoidance and minimization measures typically employed during the construction of transmission lines were also taken into account. For example, natural features identified along the ROW such as streams and open water can be spanned to minimize potential impacts. TRB-8 was selected by the POWER project manager as the best-balanced route considering all the evaluation criteria reviewed.

Following the ranking by discipline, the group of POWER evaluators discussed the relative importance and sensitivity of the various criteria as they applied to all of the TRB Alternative Routes. Based on group discussion of the relative value and importance of each set of criteria (land use, ecology, and cultural resources) for this specific project, it was the consensus of the group that the length utilizing existing transmission line ROW; length paralleling existing compatible ROW; the number of habitable structures located within 300 feet of the proposed ROW centerline; overall length of the route; and route lengths crossing upland woodlands/brushlands were the primary factors in their decision for selecting the recommended TRB Alternative Route and ranking the next four alternative routes in order of preference. Secondary factors included route lengths across bottomland/riparian woodlands and HPAs for archeological resources.

For the TRB Segment, the group selected TRB-8 as the alternative route that best balances land use, ecology, cultural resources, and certain PUC routing criteria. The next four TRB Alternative Routes determined to have the least potential cumulative impacts in order of preference were TRB-19, TRB-18, TRB-7, and TRB-20. The ranking of the TRB Alternative Routes is presented in Table 5-1. All of the TRB Alternative Routes are considered viable acceptable routes that provide geographic diversity.

In summary, POWER's decision to recommend TRB-8 as the route that best balances the PUC routing criteria related to land use, ecology, and cultural resource for the TRB Segment, was based primarily on the following evaluation criteria.

Alternative Route TRB-8:

- is the shortest route, at 28.32 miles;
- has the longest length using existing transmission line ROW, at 22.10 miles;
- is tied with two other routes as having the shortest length across cropland, at 0.41 mile;

- has the fourth shortest length of ROW within the foreground visual zone of IH, US, and state highways, at 4.85 miles;
- has the fourth shortest length across upland woodlands/brushlands; at 10.95 miles;
- is tied with one other route as having the fifth shortest length across bottomland/riparian woodlands; at 0.38 mile;
- is tied with four other routes as having the shortest length of ROW across 100-year floodplains, at 0.53 mile; and
- has the fifth shortest length of ROW across areas of high archaeological site potential, at 11.0 miles.

Alternative Route TRB-8:

- crosses no parks/recreational areas;
- has no parks/recreational areas within 1,000 feet of the ROW centerline;
- crosses no land irrigated by traveling systems (rolling or pivot type);
- has no cemeteries within 1,000 feet of the ROW centerline;
- has no FAA registered airports with no runway more than 3,200 feet in length within 10,000 feet of the ROW centerline;
- has no heliports within 5,000 feet of its ROW centerline;
- crosses no NWI mapped wetlands;
- crosses no known/occupied habitat of federally endangered or threatened species;
- crosses no open water;
- crosses no rivers;
- crosses no archeological sites and is not located within 1,000 feet of any additional recorded archeological sites; and
- crosses no NRHP sites and is not located within 1,000 feet of any additional NRHP sites.

Therefore, based upon its evaluation of this project and its experience and expertise in the field of transmission line routing, POWER recommends TRB-8 from an overall land use and environmental perspective and the remaining routes as alternatives. Considering all pertinent factors, it is POWER's opinion that this alternative route best addresses the applicable criteria in PURA § 37.056(c)(4) and the PUC Substantive Rules.

5.1.2 Borglum to Tuleta Segment

The evaluators agreed that all of the BT Alternative Routes were viable and acceptable from an overall land use, ecology, and cultural resource perspective. The evaluators each ranked the alternative routes from 1st to 11th (with

1st having the least potential impact and 11th the greatest potential impact) from the perspective of their own technical discipline. The results of this ranking are summarized in Table 5-2.

TABLE 5-2 POWER'S ENVIRONMENTAL RANKING OF THE BORGLUM TO TULETA ALTERNATIVE ROUTES

	RANKING				
Alternative Route	Land Use Specialist	Ecology Specialist	Cultural Resources Specialist	Project Manager	Consensus
BT-1	1st	1st	1st	1st	1st
BT-2	11th	11th	11th	11th	
BT-3	7th	5th	4th	5th	5th
BT-4	5th	9th	8th	7th	
BT-5	4th	2nd	3rd	3rd	3rd
BT-6	3rd	3rd	2nd	4th	4th
BT-7	6th	8th	6th	8th	
BT-8	8th	6th	7th	9th	
BT-9	9th	7th	9th	10th	
BT-10	2nd	4th	5th	2nd	2nd
BT-11	10th	10th	10th	6th	

The land use evaluation of the BT Alternative Routes placed the greatest importance on the length paralleling existing compatible ROW, paralleling other existing ROWs, and overall length of the route. Comparing the 11 BT Alternative Routes from a land use perspective, BT-1 was selected as having the least-potential land use impact.

The ecological ranking of the BT Alternative Routes was based primarily on the total length of ROW through upland woodlands/brushlands, bottomland/riparian woodlands, and overall length of the route and the proportion of the route using or parallel to existing ROW to attempt minimize habitat fragmentation. Consideration was also given to the number of stream crossings, potential impacts to NWI mapped wetlands, length across open water (lakes/ponds), length of route parallel to streams, length across 100-year floodplains, and proximity to potential threatened or endangered species habitats. The ecologist ranked BT-1 as having the least-potential ecological impact.

The cultural resources ranking of the BT Alternative Routes was based on the length of HPA crossed by the alternative routes. No archeological sites or NRHP-listed properties are recorded within 1,000 feet of the alternative routes. Alternative Route BT-1 was identified as having the least-potential impact on cultural resources.

The POWER project manager ranked the BT Alternative Routes, considering all of the evaluation criteria and the flow of the alternative routes across the study area. For the BT Segment, the length paralleling existing compatible ROW was given the greatest importance for this specific project while the proximity to habitable

structures and the overall length of the alternative route were considered key factors. The length of ROW paralleling other existing ROWs and apparent property lines; as well as the length of ROW across upland woodlands/brushlands were also relied on for ranking purposes. Potential impact avoidance and minimization measures typically employed during the construction of transmission lines were also taken into account. For example, natural features identified along the ROW such as streams and open water can be spanned to minimize potential impacts. BT-1 was selected by the POWER project manager as the best-balanced route considering all the evaluation criteria reviewed.

Following the ranking by discipline, the group of POWER evaluators discussed the relative importance and sensitivity of the various criteria as they applied to all of the BT Alternative Routes. Based on group discussion of the relative value and importance of each set of criteria (land use, ecology, and cultural resources) for this specific project, it was the consensus of the group that the length paralleling existing compatible ROW; overall length of the route; the number of habitable structures located within 300 feet of the proposed ROW centerline; and route lengths crossing upland woodlands/brushlands were the primary factors in their decision for selecting the recommended BT Alternative Route and ranking the next four alternative routes in order of preference. Secondary factors included route lengths across bottomland/riparian woodlands and HPAs for archeological resources.

For the BT Segment, the group selected BT-1 as the alternative route that best balances land use, ecology, cultural resources, and certain PUC routing criteria. The next four BT Alternative Routes determined to have the least potential cumulative impacts, in order of preference, were BT-10, BT-5, BT-6, and BT-3. The ranking of the BT Alternative Routes is presented in Table 5-2. All of the BT Alternative Routes are considered viable acceptable routes that provide geographic diversity.

In summary, POWER's decision to recommend BT-1 as the route that best balances the PUC routing criteria related to land use, ecology, and cultural resource for the BT Segment, was based primarily on the following evaluation criteria.

Alternative Route BT-1:

- is the shortest route, at 21.66 miles;
- has the fifth fewest habitable structures within 300 feet of the proposed ROW centerline, with 34;
- has the third longest length paralleling existing transmission line ROW, at 10.27 miles;
- is tied with three other routes as having the second shortest length across cropland, at 0.86 mile;
- has the second shortest length of ROW within the foreground visual zone of FM roads, at 2.28 miles;
- has the shortest length across upland woodlands/brushlands; at 8.87 miles;
- has the second shortest length across bottomland/riparian woodlands; at 0.32 mile;

- has the fewest number of stream crossings, with 18;
- has the third shortest length of parallel to streams or rivers, at 0.26 mile; and
- has the shortest length of ROW across areas of high archaeological site potential, at 11.59 miles.

Alternative Route BT-1:

- crosses no parks/recreational areas;
- has no parks/recreational areas within 1,000 feet of the ROW centerline;
- crosses no land irrigated by traveling systems (rolling or pivot type);
- has no cemeteries within 1,000 feet of the ROW centerline;
- has no FAA registered airports with no runway more than 3,200 feet in length within 10,000 feet of the ROW centerline;
- has no heliports within 5,000 feet of its ROW centerline;
- has no length of ROW within the foreground visual zone of parks/recreational areas;
- crosses no NWI mapped wetlands;
- crosses no known/occupied habitat of federally endangered or threatened species;
- crosses no open water;
- crosses no rivers;
- crosses no archeological sites and is not located within 1,000 feet of any additional recorded archeological sites; and
- crosses no NRHP sites and is not located within 1,000 feet of any additional NRHP sites.

Therefore, based upon its evaluation of this project and its experience and expertise in the field of transmission line routing, POWER recommends BT-1 from an overall land use and environmental perspective and the remaining routes as alternatives. Considering all pertinent factors related to land use, environmental and cultural resources, it is POWER's opinion that this alternative route best addresses the applicable criteria in PURA § 37.056(c)(4) and the PUC Substantive Rules.

Tables 5-3 through 5-34 present detailed information on habitable structures and other land use features in the vicinity of the TRB and BT Alternative Routes. The items in Tables 5-3 through 5-34 and the TRB and BT Alternative Routes are illustrated on Figures 5-1a and 5-1b (map pockets).

Table 5-3 Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Three Rivers - Borglum Route 1

Link Combinations: J-T6-N-V-E1-M1-V1-Y1-J2-E3-L3-I3-Q3-V3-O6

Map Number	Structure or Feature	Approximate Distance from Route Centerline[1] (feet)	Nearest Alternative Route Link[2]
2	Single-Family Residence	198	J
3	Single-Family Residence	210	J
4	Single-Family Residence	307	J
5	Single-Family Residence	182	J
8	Single-Family Residence	75	T6
9	Single-Family Residence	267	N
19	Single-Family Residence	230	V1
20	Single-Family Residence	255	V1
21	Single-Family Residence	250	Y1
22	Single-Family Residence	273	J2
23	Single-Family Residence	241	J2
24	Single-Family Residence	210	J2
39	Single-Family Residence	297	E3
48	Single-Family Residence	195	I3
49	Single-Family Residence	242	I3
50	Single-Family Residence	217	I3
51	Single-Family Residence	241	Q3
52	Single-Family Residence	228	Q3
53	Commercial	205	Q3
54	Commercial	208	Q3
55	Single-Family Residence	202	Q3
56	Single-Family Residence	289	Q3
57	Commercial	197	Q3
58	Single-Family Residence	197	Q3
59	Single-Family Residence	200	Q3
60	Single-Family Residence	199	Q3
61	Single-Family Residence	199	Q3
62	Single-Family Residence	202	Q3
63	Single-Family Residence	202	Q3
64	Single-Family Residence	210	Q3
65	Single-Family Residence	213	Q3
66	Single-Family Residence	210	Q3
67	Single-Family Residence	213	Q3
68	Single-Family Residence	215	Q3
69	Single-Family Residence	216	Q3
70	Single-Family Residence	222	Q3

Table 5-3 Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Three Rivers - Borglum Route 1

Link Combinations: J-T6-N-V-E1-M1-V1-Y1-J2-E3-L3-I3-Q3-V3-O6

Map Number	Structure or Feature	Approximate Distance from Route Centerline[1] (feet)	Nearest Alternative Route Link[2]
71	Single-Family Residence	235	Q3
72	Single-Family Residence	287	Q3
73	Multi-Family Residence	293	Q3
74	Commercial	80	Q3
90	Single-Family Residence	308	V3
91	Single-Family Residence	251	V3
502	Beeville Municipal Airport	6,328	Q3
600	AM Radio Tower	3,460	O6
602	Other Electronic Installation	872	E3
604	Other Electronic Installation	166	Q3
605	Other Electronic Installation	183	Q3
--	41LK103	--	N
--	41LK107	--	N
--	41LK108	--	N
--	41LK109	--	N
--	41LK222	--	J
--	41LK225	--	T6

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 311' have been identified.

[2] Distances to sensitive cultural resource sites are not provided for protection of the sites.

Table 5-4 Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Three Rivers - Borglum Route 2

Link Combinations: J-T6-N-V-E1-M1-O1-U1-Y1-J2-E3-F3-J3-I3-Q3-V3-O6

Map Number	Structure or Feature	Approximate Distance from Route Centerline[1] (feet)	Nearest Alternative Route Link[2]
2	Single-Family Residence	198	J
3	Single-Family Residence	210	J
4	Single-Family Residence	307	J
5	Single-Family Residence	182	J
8	Single-Family Residence	75	T6
9	Single-Family Residence	267	N
21	Single-Family Residence	250	Y1
22	Single-Family Residence	273	J2
23	Single-Family Residence	241	J2
24	Single-Family Residence	210	J2
39	Single-Family Residence	297	E3
43	Single-Family Residence	251	J3
44	Single-Family Residence	152	J3
45	Single-Family Residence	221	J3
46	Single-Family Residence	206	J3
47	Single-Family Residence	29	J3
48	Single-Family Residence	195	I3
49	Single-Family Residence	242	I3
50	Single-Family Residence	217	I3
51	Single-Family Residence	241	Q3
52	Single-Family Residence	228	Q3
53	Commercial	205	Q3
54	Commercial	208	Q3
55	Single-Family Residence	202	Q3
56	Single-Family Residence	289	Q3
57	Commercial	197	Q3
58	Single-Family Residence	197	Q3
59	Single-Family Residence	200	Q3
60	Single-Family Residence	199	Q3
61	Single-Family Residence	199	Q3
62	Single-Family Residence	202	Q3
63	Single-Family Residence	202	Q3
64	Single-Family Residence	210	Q3
65	Single-Family Residence	213	Q3
66	Single-Family Residence	210	Q3
67	Single-Family Residence	213	Q3

Table 5-4 Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Three Rivers - Borglum Route 2

Link Combinations: J-T6-N-V-E1-M1-O1-U1-Y1-J2-E3-F3-J3-I3-Q3-V3-O6

Map Number	Structure or Feature	Approximate Distance from Route Centerline[1] (feet)	Nearest Alternative Route Link[2]
68	Single-Family Residence	215	Q3
69	Single-Family Residence	216	Q3
70	Single-Family Residence	222	Q3
71	Single-Family Residence	235	Q3
72	Single-Family Residence	287	Q3
73	Multi-Family Residence	293	Q3
74	Commercial	80	Q3
90	Single-Family Residence	308	V3
91	Single-Family Residence	251	V3
502	Beeville Municipal Airport	6,328	Q3
600	AM Radio Tower	3,460	O6
602	Other Electronic Installation	872	E3
604	Other Electronic Installation	166	Q3
605	Other Electronic Installation	183	Q3
--	41LK103	--	N
--	41LK107	--	N
--	41LK108	--	N
--	41LK109	--	N
--	41LK222	--	J
--	41LK225	--	T6

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 311' have been identified.

[2] Distances to sensitive cultural resource sites are not provided for protection of the sites.

Table 5-5 Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Three Rivers - Borglum Route 3

Link Combinations: J-T6-N-V-C1-D1-L1-R1-A2-K2-E3-F3-H3-G3-Q3-V3-O6

Map Number	Structure or Feature	Approximate Distance from Route Centerline[1] (feet)	Nearest Alternative Route Link[2]
2	Single-Family Residence	198	J
3	Single-Family Residence	210	J
4	Single-Family Residence	307	J
5	Single-Family Residence	182	J
8	Single-Family Residence	75	T6
9	Single-Family Residence	267	N
39	Single-Family Residence	297	E3
51	Single-Family Residence	241	Q3
52	Single-Family Residence	228	Q3
53	Commercial	205	Q3
54	Commercial	208	Q3
55	Single-Family Residence	202	Q3
56	Single-Family Residence	289	Q3
57	Commercial	197	Q3
58	Single-Family Residence	197	Q3
59	Single-Family Residence	200	Q3
60	Single-Family Residence	199	Q3
61	Single-Family Residence	199	Q3
62	Single-Family Residence	202	Q3
63	Single-Family Residence	202	Q3
64	Single-Family Residence	210	Q3
65	Single-Family Residence	213	Q3
66	Single-Family Residence	210	Q3
67	Single-Family Residence	213	Q3
68	Single-Family Residence	215	Q3
69	Single-Family Residence	216	Q3
70	Single-Family Residence	222	Q3
71	Single-Family Residence	235	Q3
72	Single-Family Residence	287	Q3
73	Multi-Family Residence	293	Q3
74	Commercial	80	Q3
90	Single-Family Residence	308	V3
91	Single-Family Residence	251	V3
502	Beeville Municipal Airport	4,346	G3
600	AM Radio Tower	3,460	O6
602	Other Electronic Installation	872	E3

Table 5-5 Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Three Rivers - Borglum Route 3

Link Combinations: J-T6-N-V-C1-D1-L1-R1-A2-K2-E3-F3-H3-G3-Q3-V3-O6

Map Number	Structure or Feature	Approximate Distance from Route Centerline[1] (feet)	Nearest Alternative Route Link[2]
604	Other Electronic Installation	166	Q3
605	Other Electronic Installation	183	Q3
--	41LK103	--	N
--	41LK107	--	N
--	41LK108	--	N
--	41LK109	--	N
--	41LK222	--	J
--	41LK225	--	T6

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 311' have been identified.

[2] Distances to sensitive cultural resource sites are not provided for protection of the sites.

Table 5-6 Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Three Rivers - Borglum Route 4

Link Combinations: A-C-H-Q6-R6-T6-N-V-C1-D1-F1-J1-K1-P1-X1-A2-F2-I2-N2-Q2-D3-L3-I3-Q3-V3-O6

Map Number	Structure or Feature	Approximate Distance from Route Centerline[1] (feet)	Nearest Alternative Route Link[2]
1	Single-Family Residence	133	C
8	Single-Family Residence	75	T6
9	Single-Family Residence	267	N
18	Single-Family Residence	108	P1
32	Single-Family Residence	74	Q2
48	Single-Family Residence	195	I3
49	Single-Family Residence	242	I3
50	Single-Family Residence	217	I3
51	Single-Family Residence	241	Q3
52	Single-Family Residence	228	Q3
53	Commercial	205	Q3
54	Commercial	208	Q3
55	Single-Family Residence	202	Q3
56	Single-Family Residence	289	Q3
57	Commercial	197	Q3
58	Single-Family Residence	197	Q3
59	Single-Family Residence	200	Q3
60	Single-Family Residence	199	Q3
61	Single-Family Residence	199	Q3
62	Single-Family Residence	202	Q3
63	Single-Family Residence	202	Q3
64	Single-Family Residence	210	Q3
65	Single-Family Residence	213	Q3
66	Single-Family Residence	210	Q3
67	Single-Family Residence	213	Q3
68	Single-Family Residence	215	Q3
69	Single-Family Residence	216	Q3
70	Single-Family Residence	222	Q3
71	Single-Family Residence	235	Q3
72	Single-Family Residence	287	Q3
73	Multi-Family Residence	293	Q3
74	Commercial	80	Q3
90	Single-Family Residence	308	V3
91	Single-Family Residence	251	V3
502	Beeville Municipal Airport	6,328	Q3
600	AM Radio Tower	3,460	O6

Table 5-6 Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Three Rivers - Borglum Route 4

Link Combinations: A-C-H-Q6-R6-T6-N-V-C1-D1-F1-J1-K1-P1-X1-A2-F2-I2-N2-Q2-D3-L3-I3-Q3-V3-O6

Map Number	Structure or Feature	Approximate Distance from Route Centerline[1] (feet)	Nearest Alternative Route Link[2]
604	Other Electronic Installation	166 .	Q3
605	Other Electronic Installation	183	Q3
--	41LK103	--	N
--	41LK107	--	N
--	41LK108	--	N
--	41LK109	--	N
--	41LK225	--	T6

[1] Due to the potential horizontal inaccuracies of the aerial photography and data utilized, all habitable structures within 311' have been identified.

[2] Distances to sensitive cultural resource sites are not provided for protection of the sites.