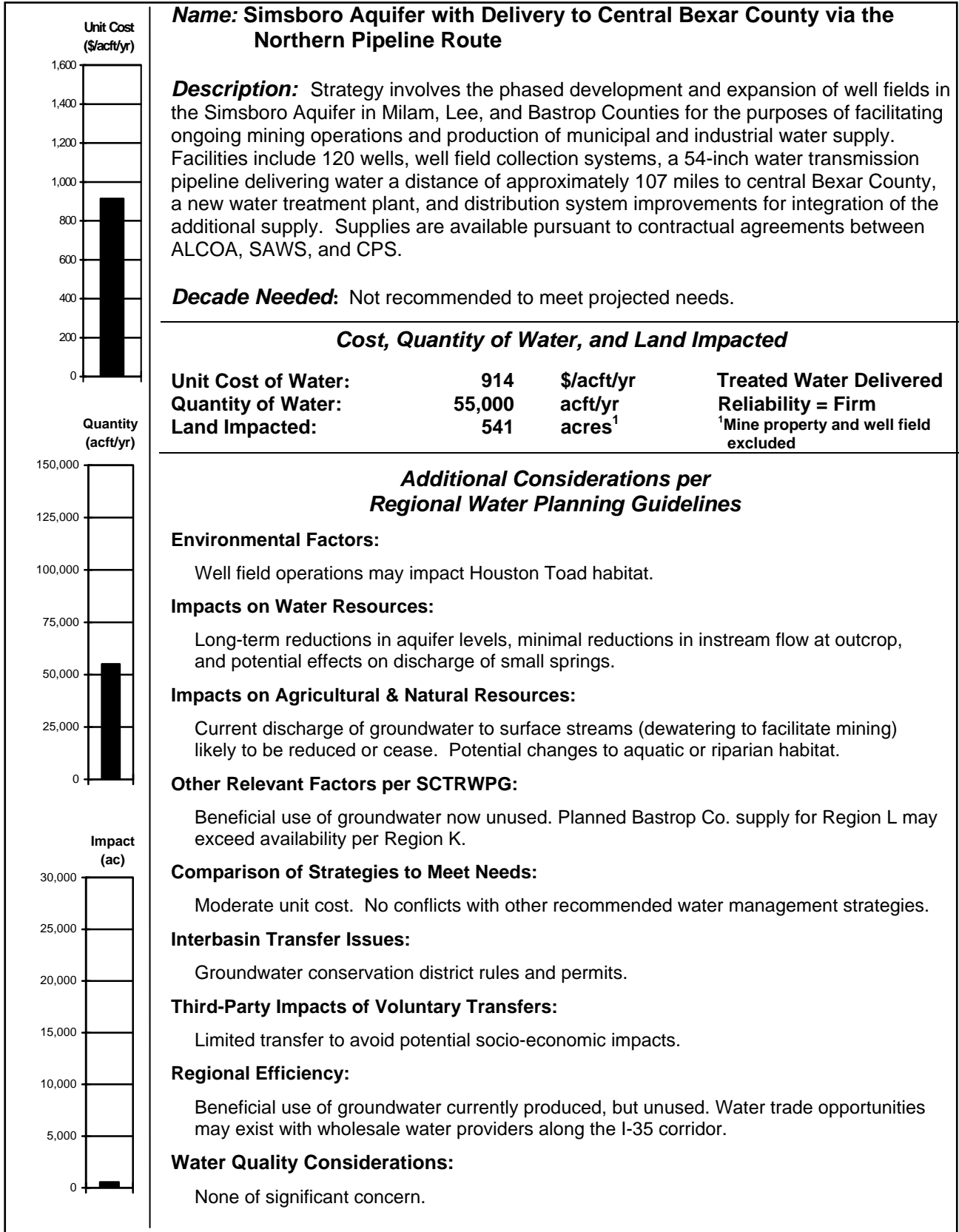
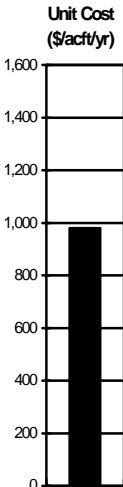
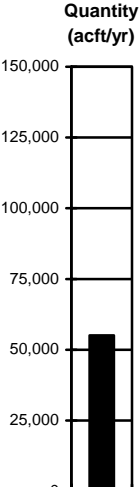
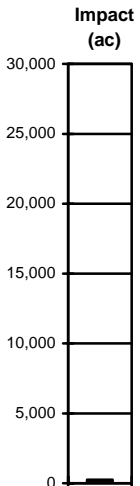


2006 South Central Texas Regional Water Plan Water Management Strategy Summary Sheet



2006 South Central Texas Regional Water Plan Water Management Strategy Summary Sheet

	<p>Name: Simsboro Aquifer with Delivery to South Bexar County via the Southern Pipeline Route</p> <p>Description: Strategy involves the phased development and expansion of well fields in the Simsboro Aquifer in Milam, Lee, and Bastrop Counties for the purposes of facilitating ongoing mining operations and production of municipal and industrial water supply. Facilities include 120 wells, well field collection systems, a 54-inch water transmission pipeline delivering water a distance of approximately 143 miles to south Bexar County, expansion of the existing Twin Oaks Water Treatment Plant, and distribution system improvements for integration of the additional supply. Supplies are available pursuant to contractual agreements between ALCOA, SAWS, and CPS.</p> <p>Decade Needed: Not recommended to meet projected needs.</p>												
	<p>Cost, Quantity of Water, and Land Impacted</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Unit Cost of Water:</td> <td style="width: 20%; text-align: center;">980</td> <td style="width: 20%; text-align: center;">\$/acft/yr</td> <td style="width: 30%;">Treated Water Delivered</td> </tr> <tr> <td>Quantity of Water:</td> <td style="text-align: center;">55,000</td> <td style="text-align: center;">acft/yr</td> <td>Reliability = Firm</td> </tr> <tr> <td>Land Impacted:</td> <td style="text-align: center;">248</td> <td style="text-align: center;">acres¹</td> <td>¹Mine property, well field, and shared right-of-way w/ SAWS Regional Carrizo Project excluded.</td> </tr> </table>	Unit Cost of Water:	980	\$/acft/yr	Treated Water Delivered	Quantity of Water:	55,000	acft/yr	Reliability = Firm	Land Impacted:	248	acres¹	¹ Mine property, well field, and shared right-of-way w/ SAWS Regional Carrizo Project excluded.
Unit Cost of Water:	980	\$/acft/yr	Treated Water Delivered										
Quantity of Water:	55,000	acft/yr	Reliability = Firm										
Land Impacted:	248	acres¹	¹ Mine property, well field, and shared right-of-way w/ SAWS Regional Carrizo Project excluded.										
	<p style="text-align: center;">Additional Considerations per Regional Water Planning Guidelines</p> <p>Environmental Factors: Well field operations may impact Houston Toad habitat.</p> <p>Impacts on Water Resources: Long-term reductions in aquifer levels, minimal reductions in instream flow at outcrop, and potential effects on discharge of small springs.</p> <p>Impacts on Agricultural & Natural Resources: Current discharge of groundwater to surface streams (dewatering to facilitate mining) likely to be reduced or cease. Potential changes to aquatic or riparian habitat.</p> <p>Other Relevant Factors per SCTRWPG: Beneficial use of groundwater now unused. Planned Bastrop Co. supply for Region L may exceed availability per Region K.</p> <p>Comparison of Strategies to Meet Needs: Moderate unit cost. No conflicts with other recommended water management strategies.</p> <p>Interbasin Transfer Issues: Groundwater conservation district rules and permits.</p> <p>Third-Party Impacts of Voluntary Transfers: Limited transfer to avoid potential socio-economic impacts.</p> <p>Regional Efficiency: Beneficial use of groundwater currently produced, but unused. Shared right-of-way with SAWS Regional Carrizo Project.</p> <p>Water Quality Considerations: None of significant concern.</p>												

4C.13 Simsboro Aquifer

4C.13.1 Description of Water Management Strategy

The Simsboro Aquifer in Central Texas is part of the Carrizo-Wilcox Aquifer System and is capable of producing large quantities of freshwater. The aquifer has primarily been used for domestic, livestock, and public supplies, except in southwestern Milam County where lignite mining in the overlying Calvert Bluff Formation requires the aquifer to be depressurized. Since 1988, the depressurization operations have pumped about 30,000 acft/yr from the Simsboro Aquifer and have discharged much of the water to East Yegua Creek. Over the next few decades, the mining operators are planning to advance the lignite mines southwestward into western Lee and northern Bastrop Counties. A well field intended for depressurization purposes in these expanded mining operations, as well as additional water being pumped from wells in the vicinity of the present mining operations, results in a line of production wells that extends from south of U.S. Hwy 79 near Rockdale to north of U.S. Hwy 290 near Elgin, a distance of about 30 miles (see Figure 4C.13-1).

The placement and operation of wells for supplies to be used in this water management strategy for the South Central Texas Water Planning Region would be coordinated with mining operators so that the wells would effectively depressurize the aquifer and provide water for municipal and industrial purposes. The water quality of the Simsboro Aquifer is suitable for use as a public water supply, except for elevated concentrations of iron and manganese.

Even though mining operations may require some of the supply wells to be abandoned and replaced at another location from time-to-time, for

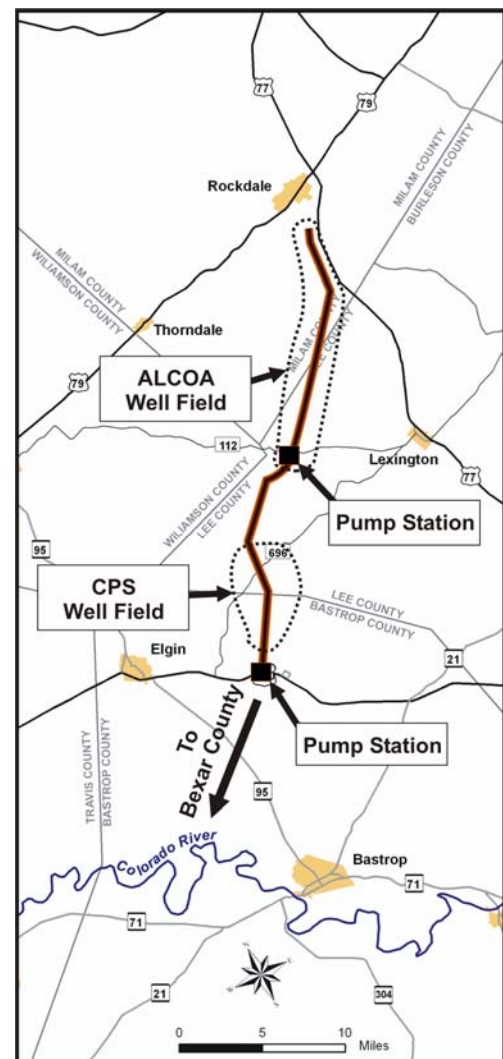


Figure 4C.13-1. ALCOA and CPS Well Fields and Water Collection System

planning purposes, only one well field development scenario is planned. With a proposed transfer of 55,000 acft/yr to the South Central Texas Water Planning Region and average well yields from the Simsboro Aquifer of about 300 gpm in the proposed well field, 120 wells would be required, including a contingency of 10 percent for wells being out-of-service. In general, the supply wells would be spaced about 1,000 feet apart, parallel the outcrop of the Simsboro, and located downdip of the outcrop.

There are two pipeline delivery options for the water supply to Bexar County. The northern pipeline option delivers water to central Bexar County via a 107-mile, 54-inch pipeline. The southern pipeline option delivers water to the existing Twin Oaks water treatment and distribution facility in southern Bexar County via a 143-mile, 54-inch pipeline. Both options use the same well field and transmission design to a location south of the Colorado River in Bastrop County. At this location, the northern pipeline option would take a direct route to Bexar County and pass near Lockhart and Seguin. The southern pipeline option turns south toward northern Gonzales County and utilizes a right-of-way to southern Bexar County that was selected for another water management strategy (identified as Regional Carrizo for Bexar County Supply). Figures 4C.13-2 and 4C.13-3 show the approximate locations of the pipeline routes, water treatment plant (50 MGD), and delivery points. The water is assumed to be delivered at a uniform rate and treated for iron and manganese removal at the terminus.

4C.13.2 Available Yield

Evaluations of this water management strategy are based on two groundwater availability studies.^{1,2} These studies indicate that, in the project area, about 2,500 acft/yr of groundwater can be developed per mile along the outcrop of the Simsboro Aquifer. Considering a 30-mile section of the Carrizo-Wilcox Aquifer from U.S. Hwy 79 near Rockdale to U.S. Hwy 290 near Elgin, about 75,000 acft/yr could be developed. After making an allowance for local groundwater use, 55,000 acft/yr could be developed and transported to the South Central Texas Water Planning Region. Based on model simulations with the TWDB's Central Carrizo-Wilcox Groundwater

¹ HDR Engineering, Inc., "Assessment of Groundwater Availability on CPS Property in Bastrop and Lee Counties, Texas," prepared for San Antonio Water System, San Antonio, Texas, July 1999.

² Dutton, Alan R. and Others, "Groundwater Availability Model for the Central Part of the Carrizo-Wilcox Aquifer in Texas," prepared for Texas Water Development Board, February 2003.

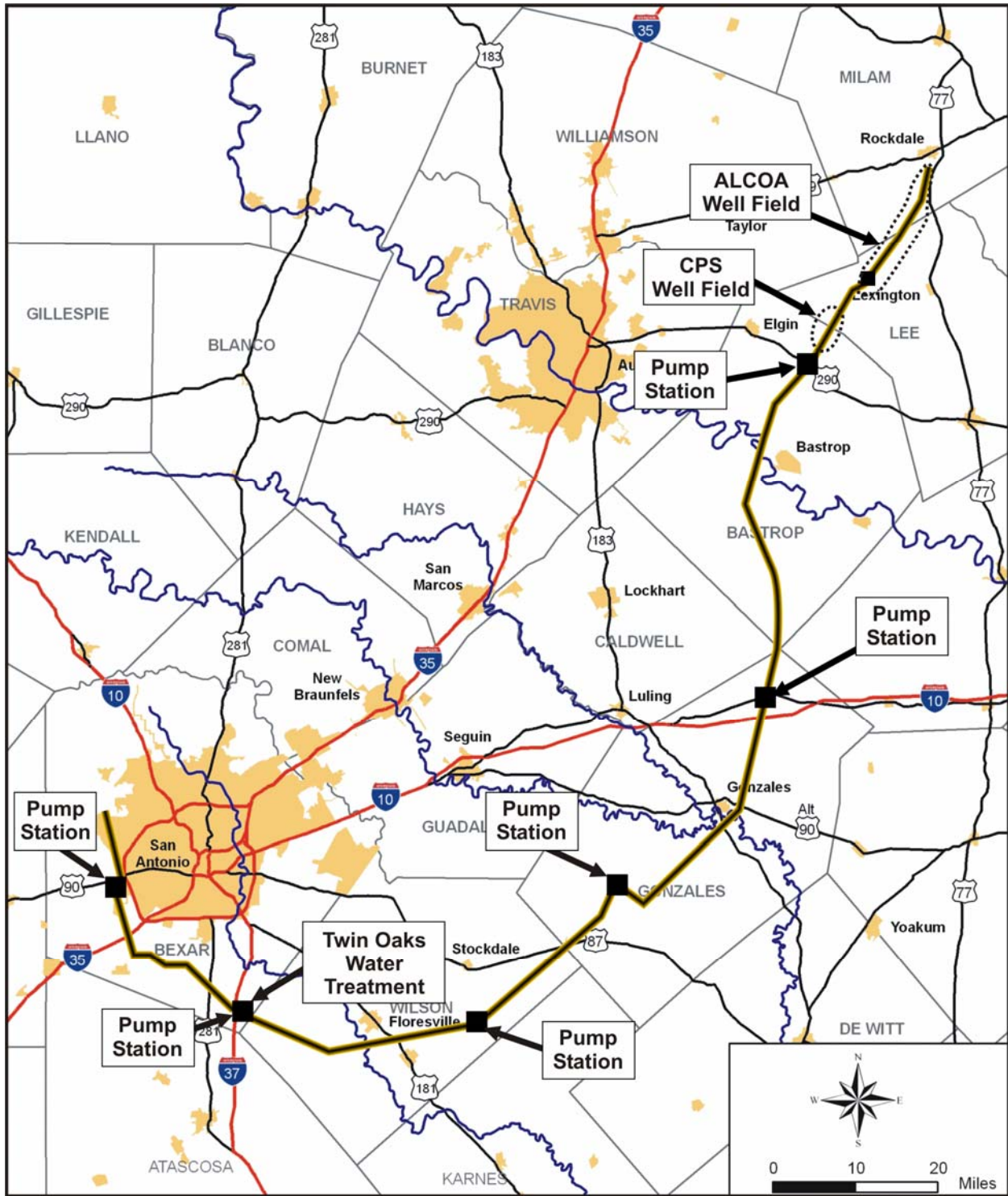


Figure 4C.13-3. Location of Water Delivery Route and Facilities for Simsboro Aquifer Groundwater to Southern Bexar County via the Southern Pipeline Option

Availability Model (GAM) using groundwater availability estimates adopted by the Brazos G Regional Water Planning Group, water level drawdowns in the well field could range from 100 feet to about 200 feet.

4C.13.3 Environmental Issues

The Simsboro Aquifer water management strategy involves the construction of a 30-mile well field in Milam, Lee, and Bastrop Counties. The northern well field has existed for many years, and the central and southern part of the well field will be implemented in the near future to support lignite mining, and is presumed to be needed for that purpose regardless of whether the water is transferred to the South Central Texas Water Planning Region. From the U.S. 290 pump station at the southern end of the well field, northern option requires a 107-mile pipeline, and the southern option requires a 143-mile pipeline. Intermediate pump stations and water treatment facilities at the terminus are required for both options.

The majority of the well field and the extensions of the transmission pipeline for both options lie in and along several borders of the Blackland Prairies and Post Oak Savannah vegetational areas.³ The project area would lie in the Texas Blackland Prairies and East Central Texas ecoregions.⁴ The pipeline routes cross the Texan biotic province and a small portion of the Tamaulipan biotic province.⁵

The dominant vegetation of the Blackland Prairies is mesquite, post oak, bluestems, switchgrass and blackjack supported by clay soils mixed with sandy loams. The Post Oak Savannah vegetational area is characterized by gently rolling to hilly terrain with an understory that is typically tall grass and an overstory that is primarily post oak (*Quercus stellata*) and blackjack oak (*Q. marilandica*). On-site surveys will be necessary to determine fauna composition since the pipeline corridor is a mosaic of the Post Oak Savannah and the Blackland Prairie ecoregions and could potentially include a wide variety of species. The pipeline routes cross the San Marcos River and Geronimo Creek, both listed by Texas Parks and Wildlife as Ecologically Significant River and Stream Segments.

³ Omernik, James M., "Ecoregions of the conterminous United States," *Annals of the Association of American Geographers*, 77(1) pp. 118-135.

⁴ Gould, F.W., "The Grasses of Texas," Texas A&M University Press, College Station, Texas, 1975.

⁵ Blair, W.F., "The biotic Provinces of Texas," *Texas Journal of Science* 2(1): pp. 93-117, 1950.

Table 4C.13-1 lists rare and protected species that may have habitat in the project area. The Texas Biological and Conservation Data System maintained by TPWD Wildlife Diversity Branch maps several species and essential habitat in the vicinity of the well field and transmission pipelines. Houston Toad (*Bufo houstonensis*) habitat is mapped in Lee and Bastrop Counties along with several sightings of the species itself, and a portion of this habitat is less than a mile from the proposed project area. The well field and resulting water table drawdown could potentially impact *Bufo houstonensis* in this area since the endangered Houston Toad uses the temporary pools provided by the saturated sands of the Carrizo Aquifer as their breeding habitat. Two threatened species, Cagles Map Turtle (*Gratemys caglei*), and the Bald Eagle (*Haliaeetus leucocephalus*), were reported very near the transmission pipeline route. The Bald Eagle prefers habitat near large bodies of water with nearby resting sites, and the map turtle is found in the waters of the Guadalupe River Basin. In addition to these species, pipelines would pass in the vicinity of several mapped rare species: Guadalupe Bass (*Micropterus treculi*), Mountain Plover (*Charadrius montanus*), Parks jointweed (*Polygonella parksii*), Sandhill woollywhite (*Hymenopappus carrizoanus*), Elmendorf's Onion (*Allium elmendorffii*), Texas tauschia (*Tauschia texana*), Texas Garter Snake (*Thamnophis sirtalis annectens*) and Bracted Twistflower (*Streptanthus bracteatus*).

Several protected species that were not specifically mapped along the proposed well field or pipeline route, but may have essential habitat in the project area include the Timber/Canebrake Rattlesnake, Texas Tortoise, and the Spot-tailed Earless Lizard. The Timber Rattlesnake and Spot-tailed Earless Lizard can be found in woodlands consisting of oak and other hardwoods; the Texas Tortoise prefers open brush with grass understory and usually occupies shallow depressions at the base of a bush or cactus. The endangered Navasota ladies' tresses (*Spiranthes parksii*), grows at the margins of post oak woodlands within sandy loams and may be affected by construction.

Protected bird species, which may have habitat within the study area, are the Golden-cheeked Warbler (*Dendroica chrysoparia*), Black-capped Vireo (*Vireo atricapillus*), and Zone-tailed Hawk (*Buteo albonotatus*). The Golden-cheeked Warbler inhabits mature oak-Ashe juniper woods for nesting. It requires strips of Ashe juniper bark for nest material. The Black-capped Vireo nests in dense underbrush in semi-open woodlands having distinct upper and lower

Table 4C.13-1.
Important Species* Having Habitat or Known to Occur
in Counties Potentially Affected by Option
Simsboro Aquifer – Bastrop, Lee, and Milam Counties

Common Name	Scientific Name	Impact Value	Multiplier Based on Status	Adjusted Impact	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
						USFWS ¹	TPWD ¹	
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	0	3	0	Open country; cliffs	DL	E	Nesting/Migrant
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	0	2	0	Open country; cliffs	DL	T	Nesting/Migrant
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	2	2	Large bodies of water with nearby resting sites	LT-PDL	T	Nesting/Migrant
Big Red Sage	<i>Salvia penstemonoides</i>	1	1	1	Endemic; Creekbeds and seepage slopes of limestone canyons			Resident
Black Bear	<i>Ursus americanus</i>	0	2	0	Mountains, broken country, woods, brushlands, forests	T/SA; NL	T	Resident
Black-capped Vireo	<i>Vireo atricapillus</i>	1	3	3	Semi-open broad-leaved shrublands	LE	E	Nesting/Migrant
Black-spotted Newt	<i>Notophthalmus meridionalis</i>	1	2	3	Wet or temporally wet arroyos, canals, ditches, shallow depressions; aestivates underground during dry periods		T	Resident
Blue Sucker	<i>Cycleptus elongatus</i>	0	2	0	Channels and flowing pools with exposed bedrock		T	Resident
Bracted Twistflower	<i>Streptanthus bracteatus</i>	1	1	1	Endemic; Shallow clay soils over limestone; rocky slopes			Resident
Braken Bat Cave Meshweaver	<i>Cicurina venii</i>	0	3	0	Small eyeless spider, in Karst features in western Bexar County.	LE		Resident
Cagle's Map Turtle	<i>Graptemys caglei</i>	1	2	2	Waters of the Guadalupe River Basin	C1	T	Resident

Table 4C.13-1 (Continued)

Cave Myotis Bat	<i>Myotis velifer</i>	0	1	0	Colonial & cave dwelling; hibernates in limestone caves of Edwards Plateau			Resident
Cokendolpher Cave Harvestman	<i>Texella cokendolpheri</i>	0	3	0	Small eyeless harvestman, karst features in north-central Bexar county.	LE		Resident
Comal Blind Salamander	<i>Eurycea tridentifera</i>	0	2	0	Endemic; Semi-troglobitic; Springs and waters of caves		T	Resident
Correll's False Dragon-Head	<i>Physostegia correllii</i>	0	1	0	Wet soils			Resident
Edwards Plateau Spring Salamander	<i>Eurycea sp. 7</i>	0	1	0	Troglobitic; Edwards Plateau			Resident
Elliot's Short-tailed Shrew	<i>Blarina hylophaga hylophaga</i>	0	1	0	Sandy areas in live oak mottes.			Resident
Elmendorf's Onion	<i>Allium elmendorffii</i>	1	1	1	Endemic; deep sands derived from Queen City and similar Eocene formations			Resident
Golden-Cheeked Warbler	<i>Dendroica chrysoparia</i>	1	3	3	Woodlands with oaks and old juniper	LE	E	Nesting/Migrant
Government Canyon Bat Cave Meshweaver	<i>Cicurina vespera</i>	0	3	0	Small, eyeless spider, karst features in northwestern Bexar County.	LE		Resident
Government Canyon Bat Cave Spider	<i>Neoleptoneta microps</i>	0	3	0	Small, eyeless or essentially eyeless spider; karst features in N and NW Bexar Co.	LE		Resident
Ground Beetle #1	<i>Rhadine exilis</i>	0	3	0	Eyeless beetle, karst features in northern Bexar County.	LE		Resident

Table 4C.13-1 (Continued)

Ground Beetle #2	<i>Rhadine infernalis</i>	0	3	0	Small eyeless ground beetle; karst features in northern and western Bexar County.	LE		Resident
Guadalupe Bass	<i>Micropterus treculi</i>	1	1	1	Streams of eastern Edwards Plateau			Resident
Guadalupe Darter	<i>Percina sciera apristis</i>	0	1	0	Raceways of medium streams and rivers.			
Helotes Mold Beetle	<i>Bastrisodes venyivi</i>	0	3	0	Small, essentially eyeless mold beetle; karst features in N and NW Bexar Co.	LE		Resident
Henslow's Sparrow	<i>Ammodramus henslowii</i>	0	1	0	Weedy fields or cut over areas; bare ground for running and walking			Nesting/Migrant
Houston Toad	<i>Bufo houstonensis</i>	2	3	6	Loamy, friable soils, temporary rain pools, flooded fields, ponds surrounded by forest or grass; reintroduced to Colorado Co.	LE	E	Resident
Indigo Snake	<i>Drymarchon corais erebennus</i>	1	2	2	Grass prairies and sand hills; usually thornbush woodland and mesquite savannah of coastal plain		T	Resident
Interior Least Tern	<i>Sterna antillarum athalassos</i>	0	3	0	Inland river sandbars for nesting and shallow waters for foraging	LE	E	Nesting/Migrant
Jaguarundi	<i>Felis yagouaroudi</i>	1	3	3	South Texas thick brushlands, favors areas near water	LE	E	Resident
Keeled Earless Lizard	<i>Holbrookia propinqua</i>	1	1	1	Coastal dunes, Barrier islands and sandy areas			Resident
Manfreda Giant-Skipper	<i>Stallingsia maculosus</i>	0	1	0	Larvae feed inside leaf shelter and pupae found in cocoon made of leaves fastened by silk			Resident
Madla's Cave Spider	<i>Cicurina madla</i>	0	3	0	Small, eyeless or essentially eyeless spider; karst features in N and NW Bexar Co.	LE		Resident
Mimic Cavesnail	<i>Phreatodrobia imitata</i>	0	1	0	Subaquatic; wells in Edwards Aquifer			Resident
Mountain Plover	<i>Charadrius montanus</i>	1	1	1	Shortgrass plains and fields, sandy deserts, plowed fields			Nesting/Migrant
Navasota Ladies'-Tresses	<i>Spiranthes parksii</i>	1	3	3	Margins of post oak woodlands within sandy loams	LE	E	Resident

Table 4C.13-1 (Continued)

Ocelot	<i>Felis pardalis</i>	1	3	3	Dense chaparral thickets; mesquite-thorn scrub and live oak mottes; avoids open areas	LE	E	Resident
Palmetto Pill Snail	<i>Euchemotrema leai cheatumi</i>	0	1	0	Terrestrial snail from Palmetto State Park.			Resident
Parks' Jointweed	<i>Polygonella parksii</i>	1	1	1	South Texas Plains; subherbaceous annual in deep loose sands, spring-summer			Resident
Plains Spotted Skunk	<i>Spilogale putorius interrupta</i>	0	1	0	Catholic; Wooded, brushy areas and tallgrass prairies			Resident
Red Wolf	<i>Canis rufus</i>	1	3	3	Extirpated	LE	E	
Robber Baron Cave Spider	<i>Cicurina baronia</i>	0	3	0	Small, eyeless or essentially eyeless spider; karst features in N and NW Bexar Co.	LE		Resident
Sandhill Woollywhite	<i>Hymenopappus carrizoanus</i>	1	1	1	Endemic; Open areas in deep sands derived from Carrizo and similar Eocene formations			Resident
Sharpnose Shiner	<i>Notropis oxyrhynchus</i>	0	1	0	Endemic to Brazos River drainage.	C1		Resident
Smalleye Shiner	<i>Notropis buccula</i>	0	1	0	Endemic to upper Brazos River system	C1		Resident
Spikerush	<i>Eleocharis austrotexana</i>	0	1	0	Plant			Resident
Spot-tailed Earless Lizard	<i>Holbrookia lacerata</i>	1	1	1	Oak-juniper woodlands and mesquite-prickly pear			Resident
Texas Tauschia	<i>Tauschia texana</i>	1	1	1	Plant.			Resident
Texas Garter Snake	<i>Thamnophis sirtalis annectens</i>	1	1	1	Varied, especially wet areas; bottomlands and pastures			Resident
Texas Horned Lizard	<i>Phrynosoma cornutum</i>	1	2	2	Varied, sparsely vegetated uplands		T	Resident
Texas Salamander	<i>Eurycea neotenes</i>	0	1	0	Endemic, from springs, seeps and caves.			Resident
Texas Tortoise	<i>Gopherus berlandieri</i>	1	2	2	Open brush with grass understory; open grass and bare ground avoided; occupies shallow depressions at base of bush or cactus, underground burrows, under objects; active March-Nov		T	Resident
Timber/Canebrake Rattlesnake	<i>Crotalus horridus</i>	1	2	2	Bottomland hardwoods		T	Resident
Toothless Blindcat	<i>Trogloglanis pattersoni</i>	1	1	1				Resident
Whooping Crane	<i>Grus americana</i>	0	3	0		LE	E	Migrant

Table 4C.13-1 (Continued)

White-faced Ibis	<i>Plegadis chihi</i>	0	2	0			T	
Widemouth Blindcat	<i>Satan eurystomus</i>	1	1	1				Resident
Wood Stork	<i>Buteo americana</i>	1	2	2			T	Nesting/Migrant
Zone-tailed Hawk	<i>Buteo albonotatus</i>	1	2	2			T	Nesting/Migrant
¹ Texas Parks and Wildlife Department (TPWD), Unpublished 2005, March 2005, Data and Map Files of the Wildlife Science Research and Diversity Division maintained by TPWD, Austin, Texas.								
* LE/LT=Federally Listed Endangered/Threatened E/SA, T/SA=Federally Listed Endangered/Threatened by Similarity of Appearance C1=Federal Candidate for Listing DL, PDL=Federally Delisted/Proposed for Delisting NL=not Federally Listed E, T=State Listed Endangered/Threatened PE, PT=Federally Proposed Endangered/ Threatened Blank = Rare, but no regulatory listing status								

stories, while the Zone-tailed Hawk inhabits arid, open country including deciduous or pine-oak woodlands.

Two fish species that could be affected by the delivery pipeline are the Toothless Blindcat (*Trogloganis pattersoni*) and Widemouth Blindcat (*Satan eurystomus*), which live in caves found in the Edwards Aquifer at the end of the northern pipeline route.

Existing regulations would require that habitat studies and surveys for protected species be conducted at the proposed well field sites, construction activity sites, and along any pipeline routes. Monitoring saturated sands of the Carrizo Aquifer for effects by pumping groundwater may be required to protect the Houston Toad habitat. When potential protected species habitat or other significant resources cannot be avoided, additional studies would be required to evaluate habitat use, permit requirements, and other mitigative measures. Eligibility for inclusion in the National Register for Historic Places would be considered for migration of cultural resources that could not be avoided. Wetland impacts, primarily pipeline stream crossings, can be minimized by right-of-way selection and appropriate construction methods, including erosion controls and revegetation procedures. Compensation for net losses of wetlands would be required where impacts are unavoidable.

Based on the review of available records housed at the Texas Archeological Research Laboratory in Austin, 113 cultural resource sites appear to occur within the project area that extends from south of U.S. Hwy 79 near Rockdale to north of U.S. Hwy 290 near Elgin. Table 4C.13-2 lists the archeological sites within a one-mile corridor of this segment of the project area. The northern pipeline option would impact fifty-seven cultural resource sites. The southern pipeline option would impact 126 sites. Table 4C.13-3 and Table 4C.13-4 list the archeological sites within the northern and southern project areas, respectively. Considering that the owner or controller of the project will likely be a political subdivision of the State of Texas (i.e. river authority, municipality, county, etc.), they will be required to coordinate with the Texas Historical Commission regarding if the project will affect waters of the United States or wetlands, the project sponsor will also be required to coordinate with the U.S. Army Corps of Engineers regarding impacts to cultural resources.

**Table 4C.13-2.
Archeological Sites within One-Mile Corridor
of the Project Area between U.S. Hwy 79 and U.S. Hwy 290**

41BP332	41LE147	41LE243	41LE298	41MM251	41MM33
41BP335	41LE150	41LE244	41LE300	41MM276	41MM330
41BP603	41LE151	41LE246	41LE303	41MM278	41MM331
41BP617	41LE152	41LE247	41LE304	41MM279	41MM333
41BP630	41LE153	41LE248	41LE305	41MM281	41MM334
41BP631	41LE154	41LE249	41LE306	41MM282	41MM335
41BP632	41LE155	41LE250	41LE54	41MM283	41MM58
41LE108	41LE156	41LE251	41LE55	41MM284	41MM60
41LE109	41LE157	41LE253	41LE56	41MM285	41MM69
41LE112	41LE159	41LE270	41LE57	41MM286	
41LE113	41LE160	41LE274	41LE58	41MM288	
41LE116	41LE161	41LE275	41LE59	41MM305	
41LE121	41LE162	41LE276	41LE60	41MM307	
41LE122	41LE163	41LE277	41MM108	41MM308	
41LE123	41LE164	41LE278	41MM109	41MM309	
41LE133	41LE165	41LE279	41MM145	41MM310	
41LE134	41LE167	41LE286	41MM146	41MM311	
41LE135	41LE194	41LE287	41MM148	41MM312	
41LE137	41LE202	41LE288	41MM149	41MM313	
41LE138	41LE209	41LE289	41MM150	41MM314	
41LE141	41LE227	41LE290	41MM152	41MM315	
41LE142	41LE232	41LE292	41MM153	41MM317	
41LE143	41LE236	41LE293	41MM154	41MM319	
41LE144	41LE239	41LE294	41MM162	41MM322	
41LE145	41LE240	41LE295	41MM216	41MM326	
41LE146	41LE241	41LE296	41MM217	41MM329	

**Table 4C.13-3.
Archeological Sites within One-Mile Corridor
of the Northern Pipeline Option**

41BP235	41BP365	41BX1320	41GU79
41BP237	41BP366	41BX178	41GU85
41BP238	41BP367	41BX64	41LE111
41BP239	41BP383	41BX772	41LE119
41BP247	41BP384	41BX782	41LE120
41BP248	41BP388	41BX783	41LE149
41BP249	41BP400	41BX784	41LE195
41BP250	41BP474	41CW25	41LE203
41BP260	41BP514	41CW44	41LE254
41BP305	41BP620	41CW9	41MM257
41BP330	41BP68	41CW94	41MM323
41BP331	41BP89	41GU35	41MM325
41BP333	41BX1146	41GU62	
41BP338	41BX1317	41GU77	
41BP343	41BX1318	41GU78	

**Table 4C.13-4.
Archeological Sites within One-Mile Corridor
of the Southern Pipeline Option**

41BP119	41BP168	41BP246	41BX1099	41BX534	41GZ146
41BP120	41BP169	41BP302	41BX1100	41BX535	41GZ209
41BP121	41BP170	41BP334	41BX1101	41BX541	41GZ24
41BP125	41BP171	41BP336	41BX1104	41BX663	41GZ87
41BP126	41BP172	41BP337	41BX1109	41BX664	41GZ88
41BP130	41BP192	41BP38	41BX1110	41BX665	41GZ89
41BP131	41BP218	41BP432	41BX1111	41BX666	41GZ91
41BP133	41BP219	41BP433	41BX1112	41BX793	41LE192
41BP139	41BP221	41BP527	41BX1113	41BX835	41LE228
41BP141	41BP224	41BP54	41BX1116	41BX842	41LE263
41BP144	41BP225	41BP55	41BX1117	41BX848	41MM140
41BP145	41BP227	41BP948	41BX1118	41BX849	41MM257
41BP149	41BP228	41BP97	41BX1538	41BX850	41MM280
41BP150	41BP230	41BX1055	41BX345	41BX864	41MM287
41BP152	41BP233	41BX1056	41BX439	41BX868	41MM316
41BP153	41BP236	41BX1057	41BX465	41BX870	41WN94
41BP154	41BP240	41BX1058	41BX521	41BX871	41WN95
41BP155	41BP242	41BX1059	41BX527	41BX980	41WN96
41BP156	41BP243	41BX1072	41BX528	41BX989	41WN97
41BP164	41BP244	41BX1073	41BX529	41BX995	41WN98
41BP167	41BP245	41BX1098	41BX532	41GZ129	41WN99

4C.13.4 Engineering and Costing

Groundwater would be developed by constructing conventional, vertical wells, a collector pipeline, pump stations, and terminal storage along a line from south of U.S. Hwy 79 near Rockdale to north of U.S. Hwy 290 near Elgin. From the terminal storage, the water would be pumped through a pipeline to either central Bexar County (northern pipeline option) or to southern Bexar County (southern pipeline option). Common to the two options is the Well Field and Collection System of wells, pipelines, and pump stations and a Transmission System of storage, pipelines, and pump stations to a point south of the Colorado River in Bastrop County. The wells would be constructed to public water supply standards. The major facilities required for these options are:

- Well Field, and Collection and Conveyance System (to U.S. Hwy 290):
 - Wells
 - Pipelines
 - Pump Station

- Transmission System (from U.S. Hwy 290 to Bexar County):
 - Storage
 - Pipeline
 - Pump Station
- Water Treatment Plant
 - Iron and Manganese removal
- Integration to distribution system

The approximate locations of the well fields, pipeline routes, and water treatment plants for the northern and southern options are shown in Figure 4C.13.2 and 4C.13.3, respectively.

Estimates were prepared for capital costs, annual debt service, operation and maintenance, water purchases, power, land, and environmental mitigation. These costs are summarized in Tables 4C.13-2 and 4C.13-3. The annual costs, including debt service for a 30-year loan at 6 percent interest and operation and maintenance costs, including power, are estimated to be \$50,245,000 and \$53,927,000 for the northern pipeline and southern pipeline options, respectively (Tables 4C.13-5 and 4C.13-6). Depending upon transmission route and terminal treatment location, this water management strategy produces water at estimated costs of \$914/acft/yr or \$980/acft/yr. The cost estimates include potential fees levied by well field land owners and underground water conservation districts.

Table 4C.13-5.
Cost Estimate for Simsboro Aquifer
Bastrop, Lee, and Milam Counties with Delivery to
Central Bexar County via the Northern Pipeline Route
(Second Quarter 2002 Prices)

<i>Item</i>	<i>Total Project Costs</i>
Capital Costs	
Wells (120 wells)	\$42,480,000
Well Field Pipelines and Booster Station	\$25,399,000
Transmission Pipeline, Pump Stations and Ground Storage (54", 107-miles)	\$224,986,000
Water Treatment Plant (50 MGD, Level 2)	\$20,900,000
Distribution System Improvements	\$65,023,000
Total Capital Cost	\$378,788,000
Engineering, Legal and Contingency	\$79,691,000
Environmental & Archaeology Studies and Mitigation	\$3,508,000
Land Acquisition & Surveying (541 acres, mine property and well fields excluded)	\$5,015,000
Groundwater Purchase	\$5,640,000
ALCOA Construction Program Management Fee	\$5,070,000
Interest During Construction (2 years, 6% int, 4% ret)	\$32,609,000
Total Project Cost	\$510,321,000
Annual Costs	
Debt Service (6% interest, 30 years)	\$32,350,000
Operations and Maintenance	\$7,010,000
Pumping Energy	\$7,303,000
ALCOA Project Management Fees	\$300,000
Purchase of Groundwater	\$2,000,000
Groundwater District Fees (\$0.05/1,000 gal)	\$897,000
Mitigation Reserves	\$385,000
Total Annual Cost	\$50,245,000
Available Project Yield (acft/yr)	55,000
Annual Cost of Water (\$/acft)	\$914
Annual Cost of Water (\$/1,000 gal)	\$2.80
Notes:	
1. Facilities sized for uniform delivery of 55,000 acft/yr	
2. Distribution system improvements are regional planning estimates.	

Table 4C.13-6.
Cost Estimate for Simsboro Aquifer
Bastrop, Lee, and Milam Counties with Delivery to
Southern Bexar County via the Southern Pipeline Route
(Second Quarter 2002 Prices)

<i>Item</i>	<i>Total Project Costs</i>
Capital Costs	
Wells (120 wells)	\$42,480,000
Well Field Pipelines and Booster Station	\$25,399,000
Transmission Pipeline, Pump Stations and Ground Storage (54", 143-miles)	\$251,597,000
Water Treatment Plant (50 MGD, Level 2)	\$20,900,000
Distribution System Improvements	\$65,023,000
Total Capital Cost	\$340,376,000
Engineering, Legal and Contingency	\$87,901,000
Environmental & Archaeology Studies and Mitigation	\$2,032,000
Land Acquisition & Surveying (248 acres, mine property, well field, and shared right-of-way w/ Regional Carrizo for Bexar County Project excluded)	\$2,258,000
Groundwater Purchase	\$5,640,000
ALCOA Construction Program Management Fee	\$5,070,000
Interest During Construction (2 years, 6% int, 4% ret)	\$35,056,000
Total Project Cost	\$478,333,000
Annual Costs	
Debt Service (6% interest, 30 years)	\$34,750,000
Operations and Maintenance	\$7,343,000
Pumping Energy	\$8,252,000
ALCOA Project Management Fees	\$300,000
Purchase of Groundwater	\$2,000,000
Groundwater District Fees (\$0.05/1,000 gal)	\$897,000
Mitigation Reserves	\$385,000
Total Annual Cost	\$53,927,000
Available Project Yield (acft/yr)	55,000
Annual Cost of Water (\$/acft)	\$980
Annual Cost of Water (\$/1000 gal)	\$3.01
Notes:	
1. Facilities sized for uniform delivery of 55,000 acft/yr	
2. Distribution system improvements are regional planning estimates.	
3. Environmental and archaeology studies and mitigation and land acquisition and surveying costs based on shared right-of-way with Regional Carrizo for Bexar County water management strategy.	

4C.13.5 Implementation Issues

Major issues of the development of groundwater from the Simsboro Aquifer in Bastrop, Lee, and Milam Counties for the South Central Texas Water Planning Region include:

- Possibly additional hydrogeology, and environmental data and analyses of the effects of pumping the aquifer at 55,000 acft/yr for an extended period of time.
- Impact on:
 - Endangered species
 - Water levels in the aquifer
 - Baseflow in streams, and
 - Wetlands
- Regulations of groundwater conservation districts (Lost Pines and Post Oak Savannah).
- Potential groundwater quality degradation from leakage of groundwater through the mine.
- Resistance to movement of water from one river basin to another and from one planning region to another.
- It will be necessary to obtain the following permits or approvals:
 - TCEQ approval for public water wells
 - Lost Pines and Post Oak Savannah Groundwater Districts' well and production permits
 - USCE Sections 10 and 404 dredge and fill permits for pipelines
 - GLO sand and gravel removal permits
 - GLO easement of use of state-owned land
 - TPWD sand, gravel, and marl permit
- Permitting, at a minimum, will require these studies:
 - Habitat mitigation plan
 - Environmental studies
 - Cultural resource studies and mitigation