State Revolving Fund Program
Texas Water Development Board

DRAFT
Environmental Information Document

for

THE CITY OF WIMBERLEY

PROPOSED WASTEWATER COLLECTION AND TREATMENT SYSTEM PROJECT

WIMBERLEY, HAYS COUNTY, TEXAS

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I DESCRIPTION OF THE PROBLEM

The City of Wimberley proposes to construct a wastewater collection system and new wastewater treatment facility to serve central Wimberley. The project is composed of the expansion and relocation of an existing 25,000 gallons per day (GPD) treatment plant, the rehabilitation and expansion of an existing lift station, the construction of three (3) new lift stations, the installation of approximately 9,000 linear feet of force main pipelines, and the installation of approximately 13,000 linear feet of gravity sewer pipelines. The new plant will be 75,000 GPD in capacity. Treated effluent from the new treatment plant would be disposed of through the use of a spray irrigation system in Blue Hole Regional Park recreational fields west of the proposed plant site, and through a discharge outfall in Deer Creek during periods of heavy rainfall when irrigation is not possible.

I.A Purpose and Need for the Proposed Project

The purpose of the proposed project is to decrease the reliance on private septic systems, which in many cases are deteriorating. These deteriorating systems are potentially impacting the water quality of Cypress Creek, which winds through the central business district of Wimberley. Secondary benefits from the project include a source of irrigation water for current and future Blue Hole Regional Park amenities and potentially commercial areas in downtown Wimberley, as well as the reduction of wastewater pumping and trucking operations for businesses and public facilities located within the Wimberley area.

I.A.1 Capacity of Existing Facilities

The majority of Wimberley wastewater treatment needs are served by private septic systems. Only a small percentage of the septic systems within the service area of the proposed wastewater collection and treatment project comply with the requirements outlined in the City of Wimberley's On Site Sewage Facilities (OSSF) Regulations and the Texas Commission on Environmental Quality (TCEQ) regulations governing OSSF

installation. The non-compliance of the systems is primarily due to the small lot size on which they are located, and not meeting the required buffer distance from surface waters.

The City of Wimberley currently owns and funds the operation of a small 25,000 GPD wastewater package plant permitted at 15,000 GPD. The facility services the Deer Creek of Wimberley Nursing Home and Rehabilitation Center and Blue Hole Regional Park. While the existing treatment plant has a capacity of 25,000 GPD, the plant typically operates at 10,000 GPD.

I.A.2 Current Treatment Requirements and Treatment Processes Now in Use

The existing treatment facility is an extended aeration activated sludge package plant, which discharges effluent through a system of perforated subsurface pipes in a 2.2-acre subsurface irrigation disposal field. The treatment plant routinely produces effluent to a quality better than that outlined in the Texas Land Application Permit (TLAP).

I.A.3 Existing and Anticipated Violations of Federal and State Standards

The existing package treatment facility was upgraded in 2009 to replace an older IMHOFF tank, which routinely failed to meet Biochemical Oxygen Demand (BOD) effluent limits. Because of these violations, the TCEQ issued an Agreed Order, which has since been addressed by the rehabilitation of the existing treatment plant facility as described in Section I.A.2.

As mentioned above, many of the septic systems utilized by residences and businesses in the service area are aging and undersized. As Wimberley gains popularity as a Hill Country destination, the increase in tourism is expected to exacerbate the problems associated with these deteriorating systems.

I.B Map of the Current Facilities Planning Area

The planning area is a portion of the City of Wimberley roughly bounded by Cypress Creek to the west, the Blanco River to the south, Blue Hole Regional Park to the north

and Farm to Market Road (FM) 3237 to the east (note this is also called RM 3237 on some maps). In Appendix A, Figure A-1 shows the planned service area of the proposed project, Figure A-2 shows the general location of the proposed facility and wastewater pipelines within the service area, Figure A-3 shows the proposed project on a U.S. Geologic Survey (USGS) topographic map (Driftwood and Wimberley, Texas Quadrangles), and Figure A-4 shows the proposed project on a 2012 aerial photograph.

II ENVIRONMENTAL SETTING

II.A Existing Environment

The location of the proposed project, consisting of the treatment plant and wastewater conveyance infrastructure, is located in west-central Hays County within the corporate limits of the City of Wimberley. The proposed treatment facility would be located in an undeveloped area in the northeast corner of the Blue Hole Regional Park property. Wastewater collection pipelines would primarily follow existing road rights of way and service Wimberley businesses and residences in the defined service area. Appendix B contains representative photographs of the proposed area.

II.A.1 Geological Elements

This section describes the topography, geology, soils, groundwater, and prime farmland that exist in the project area.

Topography

The topography of the project area (from the USGS, Wimberley and Driftwood, Texas quadrangle maps) is shown on Figure A-3. The proposed treatment plant site is located in the Deer Creek drainage, which is a tributary to the Blanco River. The elevation of the area on which the treatment plant will be located is between 924 and 904 feet above mean sea level. The proposed wastewater lines would be located in the gently sloping valleys of Cypress Creek and Deer Creek. The collection pipelines would generally follow the contours of the existing road rights of ways they parallel. Elevations in the collection system area range from 900' MSL in the northeast where the pipeline would tie into the proposed treatment facility and 820' MSL in the south at the proposed Ranch Road 12 Lift Station.

Geology

The proposed project is located in the Edwards Plateau Physiographic Province. The topography is undulating to hilly. The underlying material is erosion-resistant limestone and limestone interbedded with clay and marl. The proposed project is located in the

upper member of the Glen Rose Limestone formation. This formation is a lower cretaceous formation typified with marine deposits. Figure A-5 in Appendix A shows the geological formations underlying the proposed project area as depicted by the Bureau of Economic Geology's Geological Atlas of Texas – Llano and San Antonio Sheets.

Soils

The proposed project lies in the Brackett-Comfort-Real (BCR) and Lewisville-Gruene-Krum (LGK) soil associations as shown on the Soil Survey of Comal and Hays Counties, Texas (Batte, 1984). The BCR association consists of shallow, undulating to steep soils over limestone or strongly cemented chalk; on the uplands of the Edwards Plateau. The LGK association consists of deep, shallow, and very shallow, nearly level to gently sloping soils over loamy, clayey, and gravelly sediments; on stream terraces and valley fills of the Blackland Prairie and Edwards Plateau.

Soil map units in the project area consist of the Brackett-Rock outcrop-Comfort complex undulating unit (BtD map unit symbol), Gruene clay, 1 to 5 percent slopes unit (GrC map unit symbol), Sunev clay loam, 1 to 3 percent slopes unit (SuB), and Lewisville silty clay, 1 to 3 percent slopes (LeB map unit symbol). The depth to high water tables for all of these units is greater than six (6) feet. None of the soil types in the proposed project area are nationally listed hydric soils. Appendix C contains detailed information on the soil units and a map showing their location within the proposed project area.

Groundwater

The extent of the proposed project is located in the Trinity Aquifer and the Contributing Zone of the Southern Edwards Aquifer. Two water wells recorded by the TWDB are located in the project area as described in Section 1.B, and one is located immediately adjacent to FM 3237, across from Blue Hole Regional Park. The location and ownership details of these wells are shown in Figure 6 in Appendix A. The source of information used to develop this figure was the TWDB Water Information Integration and Dissemination System.

Further, there are several springs in the vicinity of the project area. It is not known if areas impacted by project components are hydrologically connected to the source flows of any springs.

Aquifers are discussed further in Section II.A.2.

Prime Farmland

The Sunev clay loam and Lewisville silty clay soil units are both representative of prime farmland (Web Soil Survey, 2014). With the exception of the construction of two lift stations in the Lewisville unit near the Blanco River, impacts to prime farmland soil would be temporary during pipeline installation.

II.A.2 Hydrologic Elements

Surface Water

Preliminary Jurisdictional Determinations (PJD) were performed by APAI on October 26, 2009 and January 8, 2014 to determine the existence and extents of waters of the U.S. in the proposed project area. The Blanco River and Cypress Creek are the predominant hydrological features in the project vicinity. Deer Creek, which is a tributary to the Blanco River, is the predominant hydrological feature that will be encountered by the proposed project. The majority of the project is located outside of the 100-year floodplains of Deer Creek, Cypress Creek, and the Blanco River.

Deer Creek, the predominant hydrological feature observed within the limits of the PJD, should be considered an ephemeral stream based on its lack of groundwater influence, limited drainage area, and dependence on rainfall for flow. In the general vicinity of the project area, Deer Creek flows in a southwesterly direction towards its confluence with the Blanco River. During the on-site investigation, Deer Creek displayed an ordinary high water mark (OHWM) of approximately 5.5 feet.

The proposed wastewater treatment plant facility would be located between two ephemeral tributaries to Deer Creek. The northern tributary (Tributary 1) to Deer Creek is approximately three (3) feet in width at OHWM and originates near FM 3237 and follows a westerly course for approximately 540 linear feet to its confluence with Deer Creek. The southern tributary (Tributary 2), like the northern tributary, receives focused runoff from FM 3237. Approximately 200 feet from a culvert under FM 3237, the southern tributary becomes a defined channel and follows a westerly course for approximately 495 linear feet to its confluence with Deer Creek. The southern tributary is approximately 2.5 feet in width at OHWM.

No other hydrological features were observed within the limits of the PJD. However, it should be noted that the construction of two of the new, proposed lift stations would be located within the 100-year floodplains of Cypress Creek and the Blanco River. The Cypress Creek Park lift station would be located adjacent to Cypress Creek in the 100-year floodplain. The construction of a lift station near the intersection of RR 12 and Malone Drive would be located in the Blanco River 100-year floodplain. The existing Deer Creek lift station that services the existing wastewater package plant and would be upgraded as part of the proposed wastewater collection and treatment project, is located in the 100-year floodplain of Deer Creek. Floodplains are discussed further in Section II.A.3. Hydrological features within the vicinity of the proposed project area are listed in Table II-1 below. Figure A-7 in Appendix A shows the location of the various hydrologic features identified in the proposed project area.

Table II-1: Hydrological Features Observed in the General Project Area

Waters of the U.S. and Site Numbers	Class	OHWM (Feet)	Linear Feet	Area in PJD Limits (Acres)
Deer Creek	Ephemeral	5.5	1,810	0.23
Tributary to Deer Creek (T1)	Ephemeral	3.0	538	0.04
Tributary to Deer Creek (T2)	Ephemeral	2.5	187	0.01
Total			**2,535**	**0.28**

Groundwater and Aquifers

Aquifers are the predominant source of groundwater in Hays County. The project area is located in the Trinity Aquifer and in the contributing zone of the Southern Edwards Aquifer (Balcones Fault Zone). Both of these aquifers are considered major aquifers in Texas. No minor aquifers are located beneath Hays County.

The Trinity Aquifer is comprised of early Cretaceous age formations of the Trinity Group where they occur in a band extending through the central part of Texas in all or parts of 55 counties. The aquifer extends from the Red River to the Hill County of Central Texas. The Edwards Aquifer is comprised predominantly of limestone formed during the early Cretaceous and covers parts of 11 counties in Central Texas.

The Edwards Aquifer is considered a sensitive aquifer due to its highly permeable nature and rapid response to changes and stresses placed on the system, as well as the fact that it underlies some of the most environmentally sensitive areas of the state. Many municipalities in Central Texas rely on groundwater from these aquifers for their freshwater source. For example, San Antonio relies solely on the Edwards Aquifer for its fresh water source. Therefore, the Edwards aquifer and the Trinity aquifer are important water supply sources to Central Texas. The Trinity Aquifer is a major drinking water source for residents of Wimberley. Figure A-8 identifies the Trinity and Edwards Aquifers in and surrounding the proposed project area.

Some of the creeks and rivers in the project area vicinity are spring fed. The most notable spring is Jacob's Well located on Cypress Creek approximately 3.5 miles northwest of the project area. This spring provides a stable water source for Cypress Creek and is considered an area recreational feature.

Water Quality and Availability

Major streams and creeks in the area are spring fed and are supplemented by overland storm runoff during significant rain events. As a result, these major streams and creeks retain relatively permanent flows. Surface water quality in the area is generally good

except for bacteria levels in Cypress Creek, and discharges to major streams and creeks are highly regulated. According to the TCEQ, there are no treated wastewater effluent discharge locations to rivers or creeks within the proposed project area.

Water Rights, Interbasin Transfers, and Related Issues

According to the Texas Commission on Environmental Quality, water rights in the project area vicinity include one water right claim on Cypress Creek upstream of the project area extents, and one claim on the Blanco River downstream of the extents of the project area.

The proposed project would not utilize water obtained directly from an interbasin transfer. Further, no new water rights authorizations would be obtained as a result of the proposed project.

Surface Water Use

Surface water resources in Hays County are generally used for residential and agricultural uses, and to a lesser extent municipal use. The spring fed streams and rivers in the area are used for recreational purposes such as swimming, fishing, canoeing, kayaking, and others.

II.A.3 Floodplains and Wetlands

Floodplains

The majority of the proposed project is located outside of 100-year floodplains. A small portion of the proposed wastewater line and the existing Deer Creek lift station would be located in the Deer Creek 100-year floodplain. Portions of the western wastewater collection lines are located either in or immediately adjacent to the 100-year floodplain of Cypress Creek and the Blanco River. The gravity line following Rio Bonito Road and the lift station it connects to near the intersection of Malone Drive and RR 12 are in the Blanco River 100-year floodplain. Additionally, two segments of the Blue Heron Run gravity main, the western portion of the Blue Hole Road force main segment, and the lift station in Cypress Creek Park near the intersection of Old Kyle Road and RR 12 are in

the 100-year floodplain of Cypress Creek. The remaining portions of the project are located outside of 100-year floodplains. Figure A-9 in Appendix A shows the floodplain locations relative to the proposed project area.

Wetlands

During on-site investigations for waters of the U.S., no wetlands were identified within the proposed project area. Wetlands within the general vicinity of the project area would be limited to fringe wetlands surrounding hydrological features such as streams, springs, and impoundments where the bank slopes would allow the establishment of hydrophytic vegetation. Other temporary seasonal wetlands could be located in areas with poor drainage that receive storm water flow and/or are spring fed.

II.A.4 Coastal Zones

There are no coastal zones or coastal management zones located within or near the service area.

II.A.5 Climatic Events

The regional climate is characterized as humid, subtropical, continental climate with hot and humid summers and mild and dry winters. According to the National Climatic Data Center's (NCDC) 1981-2010 climate norms for Dripping Springs, Texas, the region has a mean annual temperature of 66.7º Fahrenheit (F). The warmest months of the year are from May through September, while the coolest are from November through March. Mean daily highs and lows in winter of 39.7º F and 61.0º F, respectively. Mean daily temperatures in summer are 70.7º F and 92.4º F, respectively (NCDC, 2014).

The NCDC reports the region receives an average of 35.74 inches of precipitation a year, with autumn generally being the wettest season and winter the driest season (NCDC, 2014). The majority of the precipitation occurs in the spring and summer months when large thunderstorms develop in the region. Occasional dissipating hurricanes can also contribute substantial amounts of precipitation. The winter months are the driest with precipitation usually occurring as drizzle and light rain, and very

rarely as snow. Winds in the area are predominantly from out of the south/southeast. The wind rose for Austin, Texas is included as Figure II-1.

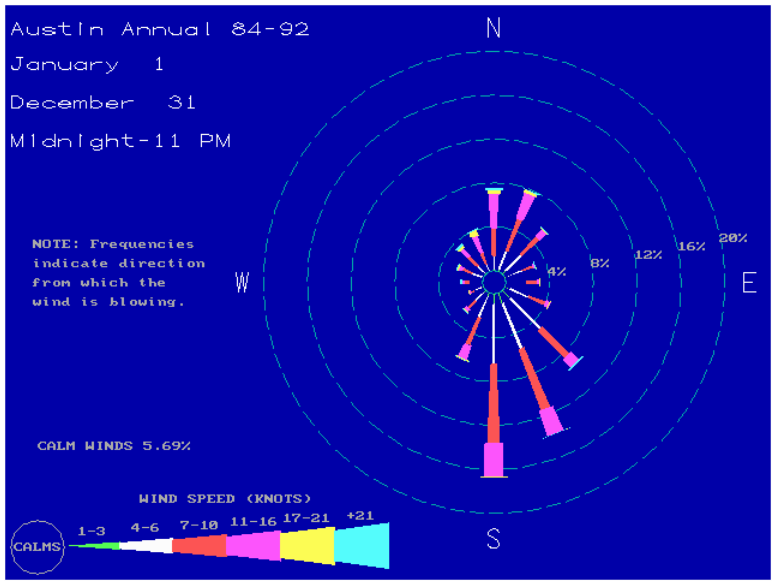

Figure II-1: Wind Rose for Austin, Texas

The TCEQ maintains a network of continuous air monitoring stations (CAMS) throughout the state, with two locations in Hays County. The Dripping Springs CAMS (CAMS 13), located approximately 18 miles north of the project area, is a monitoring station with ozone and meteorological coverage. The San Marcos CAMS (CAMS 60), located approximately 18 miles southeast of the project area and also records ozone and meteorological data. Hays County is a National Ambient Air Quality Standards (NAAQS) attainment area for total suspended particulates, carbon monoxide, sulphur dioxide, nitrogen dioxide, lead, and ozone.

II.A.6 Biological Elements

Hays County is split between the Texan Biotic Province and the Balconian Biotic Province. The project area lies in the Edwards Plateau Land Resource Area within the Balconian Biotic Province. The soils in this area are best suited for rangeland, and with good management can provide high yields of quality livestock forage.

Major Plant Communities

Historically, the major plant communities within the proposed project area most likely consisted of live oak savannahs (Blair, 1950). This vegetative community would typically be comprised mostly of grasses with little bluestem being dominant, followed by other mid-height grasses. Woody vegetation would exist in upland and riparian communities. Typical woody vegetation would include live oak, other oaks, elm, and hackberry. Over time, many areas of Central Texas have been converted from their native vegetation community to pastureland for livestock. As these areas were converted to pastureland, vegetation such as Ashe juniper, eastern red cedar, and/or mesquite began to invade. The project area contains areas dominated by Ashe juniper and eastern red cedar; therefore, it can be assumed that the project area was once used as pastureland for livestock grazing.

Table II-2 below lists plants observed by representatives of the Lady Bird Johnson Wildflower Center while preparing the Blue Hole Regional Park Master Plan. The list includes several species that were not observed within Blue Hole Regional Park as part of the most recent field investigation, however, these species were observed in other parts of the project area. Also included are the vegetation's Region 6 Indicator Status. Table II-3 explains the U.S. Environmental Protection Agency's Region 6 Wetland Indicator Status categories.

Table II-2: Vegetation Observed within the Blue Hole Regional Park

Common Name	Common Name	Region 6 Indicator Status
Grasses		
Aristida oligantha	Oldfield threeawn	NA
Bouteloua curtipendula	Sideoats grama	NA
Bouteloua hirsuta	Hairy grama	NA
Bouteloua rigidiseta	Texas grama	NA
Bromus catharticus	Rescue grass	NA
Bromus japonicus	Japanese brome	FACU
Chasmanthium latifolium	Inland sea oats	FACU
Cynodon dactylon	Bermudagrass	FACU
Dichanthelium sp.	Rosettegrass	FACU
Elymus virginicus var. virginicus	Virginia wild-rye	FAC
Lolium perenne	Rye grass	FACU
Muhlenbergia lindheimeri	Lindheimer muhly	FACW
Muhlenbergia reverchonii	Seep muhly	FAC

Table II-2 Continued		
Nassella leucotricha	Wintergrass	NA
Oplismenus hirtellus	Basketgrass	FACU
Panicum sp.	Panicgrass	NA
Paspalum setaceum	Thin paspalum	FAC
Schizachyrium scoparium	Little bluestem	FACU
Sorghum halepense	Johnsongrass	FACU
Tridens flavus	Purple top	UPL
Herbaceous		
Galium aparine	Catchweed bedstraw	FACU
Abutilon fruticosum	Indian mallow	NA
Allium canadense	Wild onion	FACU
Ambrosia psilostachya	Western ragweed	FACU
Anemone berlandieri (A. heterophylla)	Windflower	NA
Asclepias oenotheroides	Hierba de zizotes	FACU
Aster drummondii	Texas aster	NA
Chamaesyce sp.	Spurge	NA
Cirsium texanum	Texas thistle	NA
Cnidoscolus texanus	Texas bull-nettle	NA
Commelina erecta	Dayflower	FACU
Convolvulus equitans	Bindweed	FACU
Croton monanthogynus	Prairie-tea	NA
Desmanthus virgatus	Wand bundleflower	FACU
Dichondra sp.	Ponyfoot	NA
Eupatorium serotinum	White boneset	FAC
Euphorbia marginata	Snow-on-the-mountain	FACU
Heliotropium tenellum	White heliotrope	NA
Liatris mucronata	Gayfeather	NA
Lupinus texensis	Bluebonnet	NA
Malvaviscus arboreus	Turk's cap	NA
Matelea reticulata	Milkvine	UPL
Medicago sp.	Medic	FAC
Monarda citriodora	Horsemint	NA
Oxalis dillenii	Yellow woodsorrel	FACU
Plantago helleri	Cedar plantain	NA
Plantago rhodosperma	Red-seeded plantain	FACU
Ruellia nudiflora	Wild petunia	NA
Salvia farinacea	Mealy blue sage	NA
Salvia lyrata	Lyre-leaf sage	FAC
Solanum eleagnifolioum	Silver leaf nightshade	NA
Solanum rostratum	Buffalo bur	NA
Solidago sp.	Goldenrod	NA
Verbena halei	Texas vervain	NA
Verbesina virginica	Frostweed	FACU
Vernonia lindheimeri	Woolly ironweed	NA
Dasylirion texanum	Texas sotol	NA
Phoradendron tomentosum	Hairy mistletoe	NA
Woody, Shrub		
Cornus drummondii	Roughleaf dogwood	FAC
Croton fruticulosus	Bush croton	NA
Eupatorium (Ageratum) havanense	Shrubby boneset	NA
Ilex vomitoria	Yaupon holly	FAC
Mahonia (Berberis) trifoliolata	Agarita	NA

Table II-2 Continued		
Opuntia engelmannii var. lindheimeri	Texas prickly-pear	NA
Opuntia macrorhiza	Plains prickly pear	NA
Rhus lanceolata	Flame-leaf sumac	NA
Rubus trivialis	Southern dewberry	FACU
Sophora affinis	Eve's necklace	NA
Toxicodendron radicans	Poison ivy	FACU
Woody, Tree		
Carya illinoinensis	Pecan	FAC
Celtis laevigata	Sugar hackberry	FAC
Cercis canadensis var. texensis	Texas redbud	UPL
Diospyros texana	Texas persimmon	NA
Juniperus ashei	Ashe juniper	NA
Juniperus virginiana	Eastern Red Cedar	UPL
Ligustrum sinense	Chinese ligustrum	UPL
Morus rubra	Red mulberry	FACU
Platanus occidentalis	Sycamore	FAC
Prosopis glandulosa	Honey mesquite	FACU
Quercus buckleyi	Texas oak	NA
Quercus fusiformis	Plateau live oak	NA
Quercus sinuata var. breviloba	White shin oak	NA
Quercus virginiana	Live Oak	FACU
Taxodium distichum	Bald cypress	OBL
Ulmus americana	American elm	FAC
Ulmus crassifolia	Cedar elm	FAC
Woody, Vine		
Ampelopsis arborea	Peppervine	FAC
Cocculus carolinus	Carolina snailseed	FACU
Parthenocissus quinquefolia	Virginia creeper	FACU
Smilax bona-nox	Saw greenbriar	FACU
Vitis mustangensis	Mustang grape	NA
Yucca rupicola	Twisted-leaf yucca	NA

Table II-3: Explanation of Plant Indicator Status Categories for Region 6

Indicator status rating (abbreviation)	Designation	Qualitative Description (Lichvar et al. 2012)
Obligate (OBL)	Hydrophyte	Almost always occur in wetlands
Facultative Wetland (FACW)	Hydrophyte	Usually occur in wetlands, but may occur in non-wetlands
Facultative (FAC)	Hydrophyte	Occur in wetlands and non-wetlands
Facultative Upland (FACU)	Nonhydrophyte	Usually occur in non-wetlands, but may occur in wetlands
Upland (UPL)	Nonhydrophyte	Almost never occur in wetlands

Major Animal Communities

Some common mammals in the Balconian Biotic Province include the nine-banded armadillo (*Dasypus novimcinctus*), fox squirrel (*Sciurus niger*), white-footed mouse (*Peromyscus leucopus*), black rat (*Rattus rattus*), house mouse (*Mus musculus*), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginiana*).

Bird species observed in the Balconian Biotic Province are numerous and include species migrating through the area. Common species include mourning dove (*Zenaida macroura*), yellow-billed cuckoo (*Coccyzus americanus*), chimney swift (*Chaetura pelagica*), black-chinned hummingbird (*Archilochus alexandri*), red-bellied woodpecker (*Melanerpes carolinus*), purple martin *(Progne subis*), cliff swallow (*Hirundo pyrrhonota*), blue jay (*Cyanocitta cristata*), Carolina chickadee (*Parus carolinensis*), tufted titmouse (*Parus bicolor*), Carolina wren (*Thryothorus ludovicianus*), Bewick's wren (*Thryomanes bewickii*), northern mockingbird (*Mimus polyglottos*), white-eyed vireo (*Vireo griseus*), black-and-white warbler (*Mniotilta varia*), northern cardinal (*Cardinalis cardinalis*), rufous-crowned sparrow (*Aimophila ruficeps*), lark sparrow (*Chodestes grammacus*), great-tailed grackle (*Quiscalus mexicanus*), and house sparrow (*Passer domesticus*) (Brazos, 2010).

Species of Special Concern

The United States Fish and Wildlife Service (USFWS) lists 14 protected species as occurring or potentially occurring within Hays County. Further, the Texas Parks and Wildlife Department (TPWD) lists an additional 35 species of special concern as occurring or potentially occurring in Hays County. Table II-4 details the federal and state listed endangered, threatened, or rare species in Hays County.

Table II-4: Hays County List of Rare, Threatened, Endangered Species

Last Revision 10/0216/2012 (L= Listed, E= Endangered, C= Candidate, T= Threatened, DL= Delisted)

AMPHIBIANS	Federal Status	State Status
Austin blind Salamander *Eurycea waterlooensis*	C	
Barton Springs salamander *Eurycea sosorum*	LE	
Blanco blind salamander *Eurycea robusta*	--	T
Troglobitic; water-filled subterranean caverns; may inhabit deep levels of the Balcones aquifer to the north and east of the Blanco River.		
Blanco River springs salamander *Eurycea pterophila*	--	Rare
Subaquatic; springs and caves in the Blanco River drainage.		
San Marcos salamander *Eurycea nana*	LT	T
Headwaters of the San Marcos River downstream to ca. ½ mile past IH-35; water over gravelly substrate characterized by dense mats of algae (Lyng bya) and aquatic moss (Leptodictym riparium), and water temperatures of 21-22 O C; diet includes amphipods, midge larve, and aquatic snails.		
Texas blind salamander *Eurycea rathbuni*	LE	E
Troglobitic; water-filled subterranean caverns along a six mile stretch of the San Marcos Spring Fault, in the vicinity of San Marcos; eats small invertebrates.		
ARACHNIDS	Federal Status	State Status
Bandit Cave spider *Cicurina bandida*	--	Rare
Very small, subterrestrial, subterranean obligate.		

Table II-4 Continued		
BIRDS	Federal Status	State Status
American Peregrine Falcon *Falco peregrinus anatum*	DL	T
Year-round resident and local breeder in west Texas, nests in tall cliffs; migrant across state from northern breeding areas in US and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.		
Arctic Peregrine Falcon *Falco peregrinus tundrius*	DL	--
Migrant throughout state from far northern breeding range, winters along coast and farther south; occupies a range of habitats during migration, including urban, concentrations along coast and barrier islands; stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.		
Bald Eagle *Haliaeetus leucocephalus*	DL	T
Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.		
Black-capped Vireo *Vireo atricapilla*	LE	E
Oak-juniper woodlands with distinctive patchy two-layered aspect; shrub and tree layer with open grassy spaces; requires foliage reaching to ground level for nesting cover; return to same territory, or one nearby, anually; deciduous broad-leaf shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaf shrubs, and required structure; nesting season March-late summer.		
Golden-cheeked Warbler *Dendroica chrysoparia*	LE	E
Juniper-oak woodlands; depend on Ashe juniper (cedar) for long fine bark strips available from mature trees for nest construction; nests are placed in various trees other than Ashe juniper; a few mature junipers or nearby cedar brakes can provide nest material; forage for insects in broad-leaf trees and shrubs; nest late March-early summer.		
Mountain Plover *Charadrius montanus*	--	Rare
Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous.		
Peregrine Falcon *Falco peregrinus*	DL	T
Both subspecies migrate across the state from northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F.p. anatum) is also a resident breeder in west Texas; the two subspecies' listing status differ, F.p. tundrius is no longer listed in Texas; because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level.		
Sprague's Pipit *Anthus spragueii*	C	
Only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges.		
Western Burrowing Owl *Athene cunicularia hypugaea*	--	Rare
Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows.		
Whooping Crane *Grus americana*	LE	E
Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.		
Zone-tailed Hawk *Buteo albonotatus*	--	T
Arid open country, open deciduous or pine-oak woodland, mesa or mountain county, often near watercourses, and wooded canyons and tree-lined rivers along middle-slopes of desert mountains; nests in habitats and sites ranging from small trees in lower desert, giant cottonwoods in riparian areas, to mature conifers in high mountain regions.		
CRUSTACEANS	Federal Status	State Status
A cave obligate crustacean *Monodella texana*	--	Rare
Subaquatic, subterranean obligate; underground freshwater aquifers.		
Balcones Cave amphipod *Stygobromus balconis*	--	Rare
Subaquatic, subterranean obligate amphipod.		

Table II-4 Continued		
Ezell's cave amphipod *Stygobromus flagellatus*	--	Rare
Known only from artesian wells.		
Peck's cave amphipod *Stygobromus (=Stygonectes) pecki*	LE	
Texas cave shrimp *Palaemonetes antrorum*	--	Rare
Subterranean sluggish streams and pools.		
Texas troglobitic water slater *Lirceolus smithii*	--	Rare
Subaquatic, subterranean obligate, aquifer.		
FISH	Federal Status	State Status
Fountain darter *Etheostoma fonticola*	LE	E
Known only in the San Marcos and Comal rivers; springs and spring-fed streams in dense beds of bottom growing aquatic plants, which is normally mucky; feeds mostly diurnal; spawns year-round peaking in August and late winter to early spring.		
Guadalupe bass *Micropterus treculii*	--	Rare
Endemic to perennial streams of the Edward's Plateau region; introduced in Nueces River system.		
Guadalupe darter *Percina sciera apristis*	--	Rare
Guadalupe River basin; most common over gravel or gravel and sand raceways of large streams.		
Ironcolor shiner *Notropis chalybaeus*	--	Rare
Big Cypress Bayou and Sabine River basins; spawns April-September, eggs sink to bottom of pool; pools and slow runs of low gradient small acidic streams with sandy substrate and clear well vegetated water; feeds mainly on small insects, ingested plant material not digested.		
San Marcos gambusia *Gambusia georgei*	LE	E
Extinct; endemic; formerly known from upper San Marcos River; restricted to shallow, quiet, mud-bottomed shoreline areas without dense vegetation in thermally constant main channel.		
INSECTS	Federal Status	State Status
Mayfly *Procloeon distinctum*		Rare
Mayflies distinguished by aquatic larval stage; adult stage generally found in shoreline vegetation.		
Comal Springs dryopid beetle *Stygoparnus comalensis*	LE	--
Dryopids cling to objects in a stream; dryopids are found crawling on stream bottoms or along shores; adults leave the stream and fly at night; dryopid larvae are vermiform and live in soil or decaying wood.		
Comal Springs riffle beetle *Heterelmis comalensis*	LE	--
Comal and San Marcos Springs.		
Edwards Aquifer diving beetle *Haideoporus texanus*	--	Rare
Habitat poorly known; known from an artesian well in Hays County.		
Flint's net-spinning caddisfly *Cheumatopsyche flinti*	--	Rare
Very poorly known species with habitat description limited to 'a spring'.		
Leonora's dancer damselfly *Argia leonorae*	--	Rare
South central and western Texas; small streams and seepages.		
Rawson's metalmark *Calephelis rawsoni*	--	Rare
Moist areas in shaded limestone outcrops in central Texas, desert scrub or oak woodland in foothills, or along rivers elsewhere; larval hosts are Eupatorium havanense, E. greggii.		
San Marcos saddle-case caddisfly *Protoptila arca*	--	Rare
Known from an artesian well in Hays County; locally very abundant; swift, well-oxygenated warm water about 1-2 m deep; larvae and pupal cases abundant on rocks.		
Texas austrotinodes caddisfly *Austrotinodes texensis*	--	Rare
Endemic to the karst springs and spring runs of the Edwards Plateau; flow in type locality swift but may drop significantly during periods of drought; substrate coarse and ranges from cobble and gravel to limestone bedrock; many limestone outcroppings also found along the streams.		
MAMMALS	Federal Status	State Status
Cave myotis bat *Myotis velifer*	--	Rare
Colonial and cave-dwelling; also roosts in rock crevices, old buildings, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; insectivore.		

Table II-4 Continued		
Plains spotted skunk *Spilogale putorius interrupta*	--	Rare
Fields, cropland, fence rows, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.		
Red wolf *Canis rufus*	LE	E
Extirpated; formerly known throughout eastern half of Texas in brushy and forested areas.		
MOLLUSKS	Federal Status	State Status
Creeper (squawfoot) *Strophitus undulatus*	--	Rare
Small to large streams, prefers gravel or gravel and mud in flowing water; Colorado, Guadalupe, San Antonio, Neches (historic), and Trinity (historic) River basins.		
False spike mussel *Quincuncina mitchelli*	--	Rare
Cobble and mud substrates, Rio Grande, Brazos, Colorado, and Guadalupe (historic) river basins.		
Golden orb *Quadrula aurea*	--	Rare
Sand, gravel, and mud; mostly intolerant of impoundments; Guadalupe, San Antonio, and Nueces River basins.		
Texas fatmucket *Lampsilis bracteata*	--	Rare
Streams and rivers on sand, mud, and gravel substrates; intolerant of impoundment; broken bedrock and course gravel or sand in moderately flowing water; Colorado and Guadalupe River basins.		
Texas pimpleback *Quadrula petrina*	--	Rare
Mud, gravel and sand substrates, generally areas with low flow; Colorado and Guadalupe river basins.		
REPTILES	Federal Status	State Status
Cagle's map turtle *Graptemys caglei*	--	T
Endemic; Guadalupe River System; short stretches of shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nest on gently sloping sand banks within ca. 30 feet of water's edge.		
Spot-tailed earless lizard *Holbrookia lacerata*	--	Rare
Central and southern Texas and adjacent Mexico; moderately open prairie-brushland; flat areas free of vegetation and obstructions, including disturbed areas; eats small invertebrates; eggs laid underground.		
Texas garter snake *Thamnophis sirtalis annectens*	--	Rare
Wet, moist microhabitats, are conducive to the species occurrence, but is not necessarily restricted to them; hibernates underground or in or under surface cover; breeds March-August.		
Texas horned lizard *Phrynosoma cornutum*	--	T
Open arid and semi-arid regions with sparse vegetation, like grass, cactus, scattered brush, scrubby trees; sandy to rocky soils; burrows in soil, enters rodent burrows, hides under rock when inactive; breeds March-September.		
PLANTS	Federal Status	State Status
Bracted twistflower *Streptanthus bracteatus*	--	Rare
Texas endemic, shallow, well-drained gravelly clays and clay loams over limestone in oak juniper woodlands and associated openings, steep to moderate slopes and canyon bottoms; known soils include Tarrant, Brackett, or Speck over Edwards, Glen Rose, and Walnut geologic formations, populations fluctuate widely from year to year, depending on winter rainfall; flowering mid-April-late May, fruit matures and foliage withers by early summer.		
Hill Country wild-mercury *Argythamnia aphoroides*	--	Rare
Texas endemic; mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; flowering April-May with fruit persisting until midsummer.		
Texas wild-rice *Zizania texana*	LE	E
Texas endemic; spring-fed river, in clear, cool, swift water mostly less than 1 m deep, with coarse sandy soils rather than finer clays; flowering year-round, peaking March-June.		

Table II-4 Continued		
Warnock's coral-root *Hexalectris warnockii*	--	Rare
In leaf litter and humus in oak-juniper woodlands on shaded slopes and intermittent canyon rocky creekbeds; in Trans Pecos oak-pinyon-juniper woodlands in higher mesic canyons (to 6550 ft), primarily on igneous substrates; in Terrell County under Quercus fusiformis mottes on spring-fed perennial streams terraces, draining an otherwise xeric limestone landscape; the Taylor County Callahan Divide, the Dallas County White Rock Escarpment, and the Edwards Plateau oak-juniper woodlands on limestone slopes; in Llano Uplift igneous substrates of Gillespie County; flowering June-September; individual plants do not usually bloom in successive years.		

A survey for potential habitat for the species of concern as well as their preferred and designated critical habitat as listed by the USFWS and the TPWD for Hays County was conducted on January 8, 2014 by Alan Plummer Associates, Inc. for the proposed project area. During the on-site investigation, the project area was visually assessed for the occurrence of listed species as well as suitable habitat for the same species. None of the federal or state listed species were observed during the on-site investigation.

Observations of the Golden-cheeked Warbler (*Dendroica chrysoparia*) and Black-capped Vireo (*Vireo atricapilla*) have been documented by the USFWS in areas immediately surrounding the proposed project area. The potential impact to these species and their habitat was previously assessed as part of the Blue Hole Regional Park improvements project in 2010. The project included clearing and grading for recreational fields and other park amenities. Coordination with the USFWS resulted in the agency determining that there was not suitable habitat of the Golden-cheeked Warbler and other species of concern located in the limits of Blue Hole Regional Park that would be impacted by park improvements. A letter (Zerrenner, 2010) stating their finding of no impact is included in Appendix D.

Many of the other federally listed species are highly adapted to specific cave and aquatic habitats that are not located in the vicinity of the project area or area of influence; therefore, would not be impacted by the proposed project. The remaining listed bird species migrate through Hays County and are not permanent residents, thus making their presence on the proposed project site unlikely. Lastly, the federal listed red wolf is believed extirpated from Hays County and consequently not likely to occur within the project vicinity.

With regard to state listed threatened, endangered, or rare species, none were observed during the on-site investigation. Similar to the federal listed species, many of the state listed species are highly adapted to unique environments such as caves, springs, and other aquatic environments unique to Central Texas. These species include fish, amphibians, arachnids, crustaceans, fish, insects, reptiles, and plants.

As for the species that may occur in the area, the American and Arctic Peregrine Falcons (*Falco peregrinus anatum* and *Falco peregrinus tundrius*) typically migrate through northeast Texas and breed along the coast; therefore, the likelihood of these species occurring within the project area would be extremely rare. The Western Burrowing Owl (*Athene cunicularia hypugaea*) and Mountain Plover (*Charadrius montanus)*, prefer similar habitat of open fields or grasslands. These habitat features were not observed in the project area. However, habitat for the Zone-tailed Hawk (*Buteo albonotatus*) may occur along the Blanco River and Cypress Creek. The likelihood of this species occurring in the project area would be extremely rare.

The TPWD also lists seven species of aquatic mollusks as rare. The listed species and their preferred habitat were not observed in the proposed project area. These mollusks prefer riverine systems that were outside of the proposed project's area of influence.

Habitat for the Leonora's Dancer Damselfly (*Argia leonorae*), Rawson's Metalmark (*Calephelis rawsoni*), the Plains Spotted Skunk (*Spilogale putorius interrupta*), Texas Garter Snake (*Thamnophis sirtalis annectens*), Hill Country Wild-mercury (*Argythamnia aphoroides*), and Warnock's Coral-root (*Hexalectris warnockii*) may exist in the project area. Leonora's Dancer Damselfly prefers small streams and seepages, which occur along Cypress Creek. Rawson's Metalmark prefers moist shaded areas in limestone outcrops and oak woodlands, which are ubiquitous in the vicinity of the project. The Plains Spotted Skunk prefers wooded brushy areas and tallgrass prairies which were observed in the vicinity of the proposed project. The Texas Garter Snake prefers wet or moist microhabitats, which could occur along Cypress Creek. Hill Country Wild-mercury is found in bluestem/grama grasslands associated with plateau live oak woodlands and oak-juniper woodlands, both of which occur within the project area. Lastly, Warnock's

Coral-root prefers leaf litter and humus in oak-juniper woodlands on shaded limestone slopes and intermittent, rocky creekbeds, which do occur within the proposed project area. During the on-site investigation, none of the species were observed.

During the process of obtaining grant funding for improving Blue Hole Regional Park, a Habitat Assessment and Sensitive Species Survey was performed under the advisement of the TPWD (PBS&J, 2010). The survey performed by PBS&J looked for suitable habitat on the park property that could be utilized by federal and state listed species of concern that may occur in Hays County. The survey report, dated October 2010, discusses the habitat requirements of the species, the types of habitat found on the park property, and the potential of any of the species occurring on the park property. The findings of the survey report were that the park improvement project was unlikely to adversely affect the species evaluated in the report. A copy of the survey report is included in Appendix D of this document.

II.A.7 Cultural Resources

AR Consultants, an archaeological consulting firm, conducted a cultural resources review of the proposed project. A copy of the 2010 cultural resources report and a 2014 addendum to the report is included in Appendix E. No cultural or historical resources were identified during the survey.

II.A.8 Economic Conditions

The U.S. Census Bureau estimates the 2012 population of Hays County to be 168,990 people (U.S. Census Bureau). The population of Hays County is approximately 49.9 percent male and 50.1 percent female. According to the 2012 estimates, racial distributions are 91.4 percent White; 3.9 percent Black; 1.2 percent American Indian, or Alaskan Native; 1.6 percent Asian or Pacific Islander. Estimates from 2012 showed 36.3 percent of the population claiming Hispanic or Latino origin.

According to 2012 Census Bureau estimates, the average age in Hays County was 30.4. Age distributions were as follows:

AGE	PERCENT
Under 5 years	6.7
5 to 9 years	7.1
10 to 14 years	6.7
15 to 19 years	9.5
20 to 24 years	12.5
25 to 34 years	13.5
35 to 44 years	12.8
45 to 54 years	12.5
55 to 59 years	5.5
60 to 64 years	4.6
65 to 74 years	5.2
75 to 84 years	2.6
85 years and over	0.8

There do not appear to be any significant social conditions that would be affected by the project. The following table shows the percent and number of people employed in certain industry types in Hays County as estimated for 2012.

INDUSTRY	NUMBER	PERCENT
Agriculture, forestry, fishing and hunting, and mining	746	1.0%
Construction	6,83	9.1%
Manufacturing	5,134	6.8%
Wholesale trade	1,447	1.9%
Retail trade	10,380	13.8%
Transportation and warehousing, and utilities	3,144	4.2%
Information	1,538	2.0%
Finance, insurance, real estate, and rental and leasing	4,953	6.6%
Professional, scientific, management, administrative, and waste management services	7,386	9.8%
Educational, health and social services	17,815	23.6%
Arts, entertainment, recreation, accommodation and food services	7,321	9.7%
Other services (except public administration)	3,796	5.0%
Public administration	4,898	6.5%

Additionally, 2012 estimates show that Hays County had a labor force of approximately 81,674 with a 7.5 percent unemployment rate (in persons 16 years of age and older).

The estimated mean annual family income was $91,644, and 88 percent of families had incomes in excess of $25,000 while 3.1 percent had incomes below $10,000.

II.A.9 Land Use

The proposed project area includes both developed and undeveloped areas of Wimberley. A majority of the wastewater lines will be constructed in street rights of way, fronting businesses and homes. The location of the three new lift stations would also be in developed areas. The existing Deer Creek Lift Station, which would be upgraded as part of the proposed project, and the location of the new treatment plant are both in undeveloped areas of Blue Hole Regional Park.

Blue Hole Regional Park is owned by the City of Wimberley. Past uses for this property are presumably for livestock purposes. Adjacent land uses include a nursing home/rehabilitation center campus, and a commercial center

II.A.10 Site Assessment

On January 8, 2014 Alan Plummer Associates, Inc. conducted a site assessment for signs of hazardous material contamination. No signs of unusual soil discoloration, vegetation anomalies, or atypical odors were identified in the project area. Due to the nature of land use being primarily residential and commercial without heavy industry, hazardous material contamination would not be expected.

There were no signs of waste disposal in the project area. Banks Information Service was contracted in October 2009 to perform an Environmental FirstSearch™ Report to investigate the possibility of contamination on sites within and adjacent to the proposed project area. The investigation did not reveal any conditions that would raise concern of contamination. Items revealed in the investigation included a list of several underground storage tanks and leaking underground storage tanks that had been removed and remediated in the same zip code as the project area. The exact locations of the leaking underground storage tanks were not provided, but the description of the use of the tanks and the associated businesses indicate they were not in the vicinity of

the project area. A copy of the FirstSearch™ report will be provided to the public or to any of the consulting agencies in electronic format upon request.

A segment of the abandoned Shell Texas New Mexico crude oil pipeline runs across the Blue Hole Regional Park property and would be crossed by one of the wastewater lines. Figure 10 in Appendix A shows the location of the abandoned pipeline.

II.A.11 Other Programs and Projects

There are no other programs or projects associated with the proposed project.

II.B Future Environment without a Project

Many of the environmental factors discussed in Section I.A would not be significantly changed from their current state if the proposed project is not implemented (i.e., geological elements, hydrological elements, floodplains and wetlands, climatic events, biological elements, and cultural resources).

However, water quality in Cypress Creek and the Blanco River could change from the current state without the proposed project. If the proposed project is not implemented, bacteria levels in Cypress Creek could remain high in some areas and potentially increase due to the continued reliance on septic systems for wastewater disposal.

The water quality parameters proposed for the new treatment plant effluent are considered protective of the environment by the TCEQ. In consideration of this and due to the fact that the frequency and volume associated with a discharge is anticipated to be minimal, the discharging of wastewater effluent is not expected to negatively impact the quality of surface waters.

III ALTERNATIVES TO THE PROPOSED ACTION

III.A Alternative Solutions to the Water Supply Problems

The *City of Wimberley Wastewater Collection and Treatment System Feasibility Study* (Feasibility Study) authored by Alan Plummer Associates, Inc. outlines the collection and treatment options available to the City of Wimberley. The addendum to the Feasibility Study describes the final recommendation approved by council. (A link to the report is provided in the Reference Section of this document). In summary, the report and addendum provide an explanation of the preferred alternative as well as a discussion on the various treatment options, collection system layouts and treatment plant locations. Also included in these documents is a description of the various options available for wastewater effluent disposal.

III.A.1 Alternative Wastewater Development and Management Techniques

Potentially feasible wastewater system alternatives to the proposed project include:

- Preferred Alternative: Expansion / relocation of existing package plant within Blue Hole Park
- Expansion of the existing wastewater treatment plant at its current location
- Construction of a new wastewater treatment plant outside Blue Hole Park
- Pumping wastewater to an existing plant owned and operated by Aqua Texas, Incorporated
- No action alternative.

Construction of a New Wastewater Treatment Plant and Collection System

Within the *Addendum to the City of Wimberley Wastewater Collection and Treatment System Feasibility Study*, the preferred option would involve the installation of a wastewater collection system and the expansion and relocation of the existing treatment plant to a new location within Blue Hole Park. Implementation of this option would provide wastewater service to many of the local businesses, restaurants, and residential areas that currently rely on septic systems in central Wimberley, as well as provide

sufficient capacity for anticipated increases in water use due to the availability of central wastewater collection.

This alternative includes the installation of a wastewater collection system that would convey wastewater from existing commercial and residential areas in the central Wimberley area and the construction of a new wastewater treatment plant in the northeast corner of Blue Hole Regional Park. The total plant capacity would be 75,000 GPD, and would include the capacity of the existing plant (25,000 GPD) which would be relocated to the new site. Treated wastewater effluent would be disposed of using land application and by discharging into Deer Creek during periods of heavy rainfall when irrigation is not possible.

The alternative locations considered for the treatment plant facility included expanding the plant at its current location, constructing a new plant outside of Blue Hole Regional Park and constructing a new plant within the park closer to the park boundary (preferred alternative). The selected location of the proposed treatment facility was decided based on maintaining the vision of the Blue Hole Regional Park Master Plan, and in consideration of grade and buffer zone requirements. The primary factor in locating the proposed facility was finding a location that would not interfere with the function and enjoyment of Blue Hole Park. The proposed location is in the extreme northeast corner of the Blue Hole Park property. The facility site would be set back from the property boundary by an approximate 260-foot buffer.

This preferred alternative would meet the immediate and foreseeable wastewater treatment needs of the central Wimberley area, and provide sustainable and upgradable infrastructure. Further, the location of the proposed new plant conforms to Wimberley's approved Blue Hole Regional Park Master Plan and the use of treated effluent for irrigation would reduce the demand on groundwater within the park. The use of highly treated wastewater for non-potable needs beyond the park boundaries, such as in commercial areas downtown or along Winter's Mill Parkway, could be implemented by extending reclaimed water lines or 'purple pipe' from the new plant. Installing these lines in the same trench as the proposed wastewater lines offers advantages both from

a cost perspective and from an environmental standpoint in that impacts during construction are minimized. The decision to move forward with the reclaimed water portion of the proposed project will be dependent upon a variety of factors including impacts to construction costs and schedule.

Expansion of the Existing Wastewater Treatment Plant

This alternative would involve the expansion of the existing wastewater treatment plant at its current location to a treatment capacity of 75,000 GPD. Currently, the plant is a 25,000 GPD package treatment plant that discharges through a system of perforated subsurface pipes into a disposal field. Texas Land Application Permit (TLAP) limits for the plant are 35 mg/L of BOD, based on a grab sample. The plant receives approximately 10,000 GPD of wastewater from the Deer Creek of Wimberley Nursing Home and Rehabilitation Center and Blue Hole Regional Park. The effluent quality of the plant far exceeds that outlined in the TLAP, with typical BOD concentrations of 10 mg/L.

The facility is located in an area that was previously cleared with an existing effluent disposal irrigation field adjacent to the site. The expansion of the plant and expansion of the irrigation field would involve less land clearing, grading and filling activities than other alternatives. This alternative would be less expensive than the construction of a new facility.

Although it would be less expensive to expand existing infrastructure, relocating the plant to the northeast corner of the park was specifically identified in the Blue Hole Regional Park Master Plan and is considered preferable from an aesthetic and recreational standpoint.

Pumping Wastewater to a Treatment Facility Owned and Operated by Aqua Texas

This alternative would include the construction of the wastewater collection system proposed for the other alternatives, but would not involve the construction of a new treatment plant within the proposed service area. Wastewater would be pumped from

the proposed lift station at Cypress Creek Park underneath Cypress Creek to an existing lift station operated by Aqua Texas, Inc. located behind the Brookshire Brothers grocery store near downtown. This alternative eliminates the costs associated with expanding or replacing the treatment plant at the Blue Hole Regional Park. However, the customers served by this alternative would be required to pay wastewater rates established in the agreement between Aqua Texas and the City of Wimberley. Under this alternative, the City of Wimberley would not have long term rate control of wastewater treatment. The City would also not have any control over the quality of wastewater produced at the plant or the method(s) by which it is disposed of.

No Action

The 'no action' alternative is equivalent to continued use of septic systems to serve the wastewater needs of central Wimberley. As outlined in detail in the Feasibility Study, this method of wastewater disposal is not sustainable both from an economic and environmental standpoint. Continued use of septic systems in areas which are not conducive to their use could impact the quality of ground and surface water and further affect the operation of businesses in the area.

Summary

Based on the above discussion, the preferred option to expand and relocate the existing wastewater treatment plant within Blue Hole Regional Park and construct a new wastewater collection system is in line with Wimberley's future vision, adheres to the Blue Hole Regional Park Master Plan, and acknowledges the sensitive environmental nature of the area compared to the other alternatives.

Under the preferred option, operational control of the collection and treatment system remains with the City of Wimberley, as does the wastewater rates charged to customers. This alternative and the Aqua Texas alternative had virtually the same costs when compared on a net present value basis.

III.A.2 Flow and Waste Reduction Measures

Flow and waste reduction measures were not evaluated as part of this project.

III.A.3 Alternative Alignments, Capacities, and Construction Staging

Alternative Location

Several alternative alignments and facility locations were analyzed. Alternative pipeline alignments included alignments to deliver wastewater to alternative facility locations. The facility location alternatives included the expansion of the existing wastewater treatment plant facility, using the preferred facility location on the northeast corner of the Blue Hole Regional Park, and acquiring land outside of the park for the facility.

Alternative Capacities

The capacity of the proposed project is based on the maximum projected needs of prospective customers of wastewater treatment in the service area. Therefore, alternative higher treatment capacities in the future were considered in the planning and design of the proposed project.

Alternative Construction Staging

Construction staging areas would occur in the most environmentally neutral and practicable locations available on the site.

III.A.4 Alternative Methods of Sludge or Other Project Waste Disposal

Transporting sludge and waste offsite for disposal was the only option considered for all of the alternatives. This was considered to be the most cost effective and environmentally sound solution given the limited land area and environmentally sensitive nature of the surrounding area.

III.B Reasons for Rejecting or Accepting Alternatives

Reasons for accepting or rejecting alternatives include environmental and operational factors, project costs, and immediacy for a solution. Based on these criteria, the preferred alternative is the most feasible.

Reasons for Accepting Preferred Alternative

While the option to expand and relocate the existing plant to a total capacity of 75,000 GPD is initially more expensive than expanding the existing package plant in its current location, it is the preferred option and therefore recommended alternative. The reason for this is primarily due to the fact that the new plant would be located in the area designated in the Blue Hole Regional Park Master Plan and allow park development to continue as planned, out of the way of park amenities yet easily accessible from county roads. Moving the plant further from recreational facilities within the park also minimizes aesthetic impacts.

Although the preferred alternative would have a greater environmental impact in terms of clearing vegetation than would expanding the plant in place, this alternative is expected to have a positive environmental impact through the use of effluent for the irrigation of native plant species in Blue Hole Regional Park. Further, the proposed location of the treatment facility was sited to minimally impact vegetation in Blue Hole Regional Park. Wastewater lines would be located in existing transportation and utility rights of way to the greatest extent possible to limit land clearing and land use impacts.

Reasons for Rejecting Other Alternatives

Environmental factors considered included impacts by filling surface waters, and impacts to potential threatened and endangered species habitat. Like the preferred alternative, the expansion alternative would have a positive environmental impact through the use of effluent for the irrigation of native plant areas and areas slated as restored natural areas within the Blue Hole Regional Park master plan.

The Aqua Texas alternative was rejected because, under this option, the quality of treated effluent would not be within the City of Wimberley's control. Furthermore, the City would have less control over the rates charged to wastewater customers.

The "no action" alternative is not preferable due to the continued reliance on private septic systems and the potential for water quality impacts from those systems.

III.C Floodplain Policy (Floodplain and/or Wetland Management Notice)

The majority of the proposed project is located outside of 100-year floodplains. A small portion of the proposed wastewater pipeline within Blue Hole Regional Park and the existing Deer Creek lift station would be located in the Deer Creek 100-year floodplain. Portions of the western wastewater lines are located either in or immediately adjacent to the 100-year floodplain of Cypress Creek and the Blanco River. The wastewater line following Rio Bonito Road and the lift station it connects to near the intersection of Malone Drive and RR 12 is in the Blanco River 100-year floodplain. Additionally, two segments of the Blue Heron Run gravity main, the western portion of the Blue Hole Road force main segment, and the lift station in Cypress Creek Park near the intersection of Old Kyle Road and RR 12 are in the 100-year floodplain of Cypress Creek. The remaining portions of the project are located outside of 100-year floodplains. A copy of the wetland and floodplain management notice will be included in Appendix F of the final document.

III.C.1 Direct Impacts

Direct impacts would be temporary for pipeline installation and permanent with installation of the proposed Deer Creek effluent discharge outfall structure. Following the installation of the pipelines, disturbed areas would be graded to their pre-construction contours; thereby, resulting in only temporary impacts occurring during the installation of the pipelines. There would be no change in valley storage following the installation of the pipelines or the lift station. Permanent impacts to Deer Creek resulting from the construction of the proposed effluent discharge outfall would be

considered minor. The proposed outfall would occupy a small area and maintain pre-construction contours to the extent practical.

III.C.2 Indirect Impacts

Indirect impacts would be temporary and limited to the duration of the installation of the proposed pipelines. During the pipeline installation, upstream and downstream flows along stream channel could be altered if storm events occurred during the installation. All installations would be conducted during low flow conditions. Traffic patterns during pipeline installation may be impacted. A traffic control plan would be developed to ameliorate these impacts.

III.C.3 Mitigation

Installation of the pipelines would follow appropriate state and federal guidelines, and would receive appropriate state and federal permits needed for compliance. To comply with Section 404 of the Clean Water Act, the proposed project (pipeline installation) should be authorized by Nationwide Permit 12 for Utility Line Activities. Following the construction of the pipelines, contours located within the proposed pipeline alignments would be returned to their pre-project elevations. Stream crossings by the pipelines should be considered self-mitigating as the area impacted would be minimal. The proposed effluent discharge outfall should also be authorized by Nationwide Permit 12 for Utility Line Activities. The outfall would likely not require mitigation due to its minimal impact to Deer Creek.

A formal Floodplain and Wetland Management Notice will be sent to the USACE, FEMA, Hays County Director of Transportation Services, TCEQ, TWDB, and USFWS. A copy of the notice will be included in Appendix F of the final EID document.

IV PROJECT DESCRIPTION

IV.A Project Description

This section provides a description of the proposed project. The proposed project consists of the relocation and expansion of an extended aeration activated sludge package plant to a rated capacity of 75,000 GPD. To transport wastewater to the proposed facility, approximately 13,000 linear feet of gravity sewer pipeline and 9,000 linear feet of force main pipeline would be installed in the central Wimberley service area as illustrated in the figures located in Appendix A. Three lift stations would also be constructed and one existing lift station (Deer Creek Lift Station) would be upgraded.

IV.A.1 Treatment Processes Proposed

Extended aeration activated sludge biological treatment as well as clarification, filtration, disinfection, and phosphorous removal are proposed processes for the new wastewater treatment plant.

IV.A.2 Anticipated Water Quality Parameters and Other Operational Requirements

The proposed effluent would meet Federal and State Type I reclaimed water standards and permit limits for surface irrigation discharges.

IV.A.3 List of Project Elements and Funding Sources

- Approximately 13,000 linear feet of gravity sewer pipeline
- Approximately 9,000 linear feet of force main pipeline
- Construction of three new lift stations and rehabilitation of one existing lift station
- Relocation and expansion of an existing package plant to a rated capacity of 75,000 GPD using the processes described above
- Construction of a treated effluent discharge outfall structure at Deer Creek
- Construction of a treated effluent holding tank adjacent to the package plant
- Construction of a spray irrigation system within Blue Hole Regional Park

Funding for the proposed project would come from a Texas Water Development Board Tier III Clean Water State Revolving Fund (CWSRF) loan.

The wastewater collection and delivery system would consist of 8-inch diameter gravity mains, 4- and 6-inch diameter force mains, and four lift stations (three new and one rehabilitated lift stations).

The wastewater collection system serving downtown Wimberley would consist of gravity sewer lines serving the businesses and residences in and around Wimberley Square and the northern extent of Oak Street. Wastewater from the downtown area would be transported by gravity to the lift station at Cypress Creek Park on Old Kyle Road.

South of downtown Wimberley, gravity lines along Hinson Street, south Oak Street, and Blue Heron Run would collect wastewater and transport the wastewater to a lift station on Blue Heron Run. From this lift station, wastewater would be pumped through force mains to RR 12 where the force main would transition to a gravity main and flow to the Cypress Creek Park lift station.

Wastewater in the southeastern service area would be collected by gravity lines following eastern RR 12, FM 3237 (aka RM 3237), and Rio Bonito Road and be transported by gravity to a lift station at the intersection of Malone Drive and RR 12. From the RR 12 lift station, the wastewater would be pumped in force mains to just past the intersection of Blue Heron Run and RR 12 were the force main transitions to a gravity line and continues to the Cypress Creek Park lift station.

Due to topographic constraints, individual grinder pumps would convey wastewater from residences along the western portion of Blue Hole Lane to the Deer Creek Lift Station via a force main on Blue Hole Regional Park

The Cypress Creek Park lift station would serve to pump collected wastewater via force main along Old Kyle Road to the Deer Creek lift station. From the Deer Creek lift station the wastewater would be transported via force main to the proposed treatment facility along the existing force main alignment and a new force main segment to the proposed

treatment facility. In total, there would be approximately 13,000 linear feet of gravity sewer and 9,000 linear feet of force main installed for the proposed project.

The treatment plant and effluent disposal system would have a treatment capacity of 75,000 GPD. An extended aeration activated sludge package plant with clarification, filtration, disinfection and phosphorous removal processes would adequately treat the flow for use in spray irrigation and discharges into Deer Creek.

Project element locations and designs were selected based on minimization of environmental and infrastructural impacts. Primarily, the pipeline alignments parallel existing transportation and utility line rights of way to the greatest extent possible. The location of one of the new lift stations is in an area already used for public restrooms, and the location of the other two proposed new lift stations is in private easements in close proximity to disturbed areas (i.e. roadways). Additionally, minimizing the need to remove trees or clear other vegetation was an important criteria when selecting the proposed treatment plant location.

Projected Project Costs

The project costs are listed on the following table and are taken from the *Addendum To the Wastewater Collection and Treatment System Feasibility Study*.

Table IV-1: Opinion of Probable Costs

Element	Cost
Collection System	$2,259,000
Treatment Plant Cost	$750,000
Irrigation Cost	$38,000
Storage Cost	$300,000
Discharge Cost	$20,000
Land Acquisition Cost	$44,000
Subtotal Construction Cost	**$3,411,000**
Contingency (20%)	$682,200
Planning and Design (15%)	$511,650
Legal, Financial, Permitting	$175,000
Debt Reserve	$238,993
TWDB Loan Origination Fee	$92,849
Total Construction Cost	**$5,111,692**

IV.A.4 Existing Treatment Facilities

The existing treatment facility would be taken offline and transported to the proposed facility site to be expanded to a treatment capacity of 75,000 GPD. The existing irrigation fields would continue to receive effluent discharge from the newly expanded treatment facility via surface irrigation. Private septic systems would be replaced by central wastewater collection within the proposed service area.

IV.A.5 Special Project Elements

There would be no special project elements involved with the proposed project.

IV.A.6 Land Required

The total land required for the proposed wastewater lines, lift stations, treatment facility, and irrigation areas is approximately 22 acres. The pipelines would have a combined length of approximately 4.2 miles with a 15-foot wide construction work area totaling an approximately 7.6-acre footprint. Wastewater lines would be located in existing transportation and utility easements, properties owned by the City of Wimberley and in some cases, easements on private property.

Easement acquisition would be necessary for the Blue Heron Run and RR 12 at Malone Drive lift stations, part of the Hinson Street wastewater line and Rio Bonito wastewater line.

The treatment facility would occupy just under a 1–acre footprint. This footprint includes the proposed effluent storage tank. The existing subsurface septic fields and other open areas within the park designated for irrigation total approximately 13 acres. The treatment plant and irrigation fields are located in the limits of the Blue Hole Regional Park which is owned by the City of Wimberley.

IV.A.7 Method(s) of Sludge or Other Project Waste Disposal and Disposal Site(s)

Sludge and waste would be transported offsite for disposal. Given the limited availability of land and sensitive environment surrounding the facility, this is the most cost effective and practicable disposal method.

IV.B Proposed Linework

Proposed linework would consist of approximately 13,000 feet of gravity sewer main and 9,000 feet of force main. Wastewater would be conveyed to the treatment plant through these force mains via four lift stations. The proposed construction cost of the collection system including pipelines and lift stations would be approximately $2,259,000.

IV.C Map(s) of All Proposed Project Elements

Figure A-1 in Appendix A shows the project area in relation to the service area of the proposed wastewater treatment plant. Figure A-2 shows the location of the proposed project, Figures A-3 shows the proposed project on a USGS topographic map, and Figure A-4 shows the project on a 2012 aerial photograph. Additional related figures are included in Appendix A.

IV.D Total Estimated Project Cost and Financing Sources

The proposed project is anticipated to be funded by a loan under the Clean Water State Revolving Fund Tier III. The total estimated loan amount is $5,111,692.

V ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT

V.A Primary Impacts

This section provides a discussion of primary impacts from construction and operation of the proposed facilities. The discussion is divided into short- and long-term impacts.

V.A.1 Short Term Impacts

V.A.1.a Alterations to Land Forms, Streams, and Natural Drainage Patterns

During open trench construction of the pipelines, there would be a temporary alteration to land forms, streams, and natural drainage patterns. After backfill and grading, the land forms, streams, and natural drainage patterns should be almost identical to the current condition. As discussed elsewhere, all crossings of waters of the United States would be returned to their pre-construction contours.

V.A.1.b Effects of Siltation and Sedimentation on Area Watercourses

A Storm Water Pollution Prevention Plan (SWPPP) would be developed for the wastewater collection and treatment plant construction phases of the project to minimize siltation and sedimentation runoff into creeks, tributaries, and drainages. Typical measures in a SWPPP include silt fencing and upslope diversionary flow trenches. The SWPPP would be to the regulatory standards of a construction project located in the Edwards Aquifer Contributing Zone. Due in part to these measures, no significant siltation or sedimentation is expected to occur.

V.A.1.c Effects of Dredging, Tunneling, and Trenching on Area Watercourses and Mitigative Measures

There are no anticipated permanent impacts to area watercourses that would be caused by dredging, tunneling, and trenching. Following installation of the pipelines, contours would be graded to their original contours. The United States Army Corps of Engineers (USACE) has jurisdiction over discharge of dredged or fill material into waters of the United States. The USACE was provided a copy of this document as well as a copy of a preliminary jurisdictional determination report. It is assumed that the proposed project

would be authorized under Nationwide Permit 12 for Utility Line Activities and outfalls. Nationwide permits are general permits under Section 404 of the Clean Water Act.

Fill used within jurisdictional waters would consist of earthen backfill using material excavated from the pipeline trench. The trenches would be kept to the minimum necessary for construction. A minimum of four (4) feet of cover would be used on the pipe. The existing topsoil in the vicinity of the crossing would be stockpiled and reapplied during the final grading process to ensure vegetative growth from the existing seed bank.

V.A.1.d Precautions to Avoid Injury to Cover Vegetation

Injury to cover vegetation would be minimized to the extent practicable by confining construction activities to the treatment facility footprint, and the pipeline temporary construction easement areas. Areas disturbed by pipeline installation and permeable soil in the treatment facility footprint would be reseeded to restore vegetative cover similar to the displaced vegetation after completion of final grading. The proposed vegetation seeding mixes as recommended in the Blue Hole Regional Park Master Plan are shown in Table V-1 below.

Table V-1: Vegetation List for Planting in Areas Disturbed by Construction

Common Name	Scientific Name	Seeding Rate (lbs/acre)
Lowland Switchgrass	*Panicum virgatum*	4
Indiangrass	*Sorghastrum nutans*	6
Little Bluestem	*Schizachyrium scoparium*	8
Prairie or Canada Wildrye	*Elymus canadensis*	10
Sidoats Grama	*Bouteloua curtipendula*	6
Buffalograss	*Buchloe dactyloides*	6
Cutleaf Daisy	*Engelmannia pinnatifida*	12
Maximilian Sunflower	*Helianthus maximiliani*	4
Scarlet Sage	*Salvia coccinea*	8
Illinois Bundleflower	*Desmanthus illinoensis*	19

V.A.1.e Precautions Taken to Protect the Area's Environment from Herbicides, Defoliants, and Cutting or Burning

No herbicides or defoliants would be used in clearing of vegetation or in future facility maintenance. Cutting and burning may be an option for the disposal of vegetation. Any burning of vegetation would adhere to local, state, federal rules and regulations. The contractor would be required to adhere to all county burn notices. The contractor would be required to minimize removal of trees of significant size.

V.A.1.f Final Disposal Method for Soil and Vegetative Spoil

Excavation is anticipated for the installation of pipelines and for the below-grade structures associated with the lift stations (i.e. wet wells). Excavated material would be used in backfilling of pipeline trenches. Any excavation for the treatment facility construction would be reapplied to disturbed areas of the site and seeded according to section V.A.1.d. Excess excavated material would be properly disposed of either on- or off-site in compliance with applicable local, state, and federal laws. Disturbed areas would be restored to their existing grades. Vegetative spoil would be disposed of in accordance with appropriate local, state, and federal rules and regulations.

V.A.1.g Acquired Land

The proposed project would be located on land previously acquired by the City of Wimberley for the Blue Hole Regional Park, in existing county and municipal utility and transportation rights of way and in private easements.

V.A.1.h Permit or Mitigative Measures Required by the United States Army Corps of Engineers

The proposed project is anticipated to fall under the criteria of Nationwide Permit 12 for Utility Line Activities. A Preliminary Jurisdictional Determination report was authored and submitted to the USACE for concurrence. Further consultation regarding permitting issues and mitigation measures will be ongoing prior to issuance of the Final EID. It is anticipated that mitigation for aquatic resources would not be required based on the minimal impacts to waters of the U.S.

V.A.1.i Dust Control Measures During Construction

Construction measures to assist in dust control would include driving construction vehicles at low speeds and watering disturbed, soil exposed roadways and work areas.

V.A.1.j Precautions for Protection from Noise

Noise effects would be minimal and for short duration during project construction. Some wildlife may leave the general area, but is expected to return after construction is complete. During project construction, noise would be intermittent. Major noise generation would be anticipated from the operation of heavy equipment. Construction would occur during daylight hours when disruption to receptors would likely be minimal. Noise originating from the project site would be attenuated by distance. Pipeline installation closer to residential and business receptors would only occur for a short period of time. Additionally, consideration may be given during the design phase to incorporate private service connection installation into the project. In many cases, connecting private residences / businesses to wastewater collection lines is the responsibility of the property owner. However, due to the complexity of the septic system orientation on some properties and to facilitate ease of making these connections, it may be advantageous to integrate this into the overall project. If, upon further analysis, this approach is selected, construction on private property would be more substantial but would still be for only a short duration as each connection is made.

Pipeline and lift station construction in Wimberley would occur during the day, and noise levels are not anticipated to exceed levels generated by typical road maintenance and construction. The construction specifications would require the contractor to be familiar with, observe, and comply with federal, state, and local laws, ordinances, and regulations that apply to the conduct of work including the Occupational Safety and Health Administration regulations with respect to noise. Therefore, noise levels, which would be unacceptable from a health and safety standpoint, should not occur.

V.A.1.k Areas to be Affected by Blasting

No blasting activities are anticipated during project construction.

V.A.1.l Measures to Minimize Vehicular and Pedestrian Traffic Disruption and to Protect the Public from Construction Hazards

There are no anticipated disruptions in road traffic or pedestrian traffic that would result from the proposed project beyond that of typical road maintenance and construction. Most crossings of transportation rights of way are perpendicular to the road and would be directionally drilled in order to avoid disruption of traffic. Vehicular traffic to and from the proposed project site may increase during the construction phase, but would subside after project completion. The additional construction traffic is not anticipated to adversely affect the flow of traffic.

V.A.1.m Effects of Night Work on Area Environment

It is anticipated that construction would only take place during daylight hours.

V.A.2 Long Term Impacts

V.A.2.a Beneficial Land Uses Eliminated by the Project

The proposed project would not eliminate any beneficial land uses. The pipeline alignment would be located along existing transportation and utility rights of way to the greatest extent possible. The treatment facility site is located within an area specified in the Blue Hole Regional Park Master Plan for a wastewater treatment plant. The project would augment vegetation established in areas of Blue Hole Regional Park where the spray irrigation system is located.

V.A.2.b Interference with Scenic Views

There is no anticipated impact to scenic views that would be incurred by the proposed project. However, a viewshed analysis has not been performed.

V.A.2.c Potential Odor Effects

The designs of the treatment facility and lift stations will include odor abatement measures. There are no odor issues anticipated beyond the immediate vicinity of the treatment facility. There are currently no human receptors that would be impacted by

odors from the facility in the immediate vicinity of the proposed project, and the plant location would conform to the minimum 150-foot buffer requirement from the property boundary of Blue Hole Regional Park.

V.A.2.d Effects on Water Supply

The proposed project is expected to have positive effects on water supply by decreasing the reliance on private septic system treatment of wastewater and the water quality impacts that may be attributed to these systems. Effluent discharges to Deer Creek are expected to be infrequent and would meet or exceed TCEQ water quality standards for discharges to receiving water bodies. The project will also reduce the demand on groundwater to irrigate areas within Blue Hole Regional Park.

V.A.2.e Effects of Interbasin Transfer

The proposed project would not involve interbasin water transfers.

V.A.2.f Effects on Historical, Cultural, and Archaeological Resources

AR Consultants, Inc., an archaeological consulting company, reviewed the available records in the Texas Historical Commission's Texas Archaeological Sites Atlas and conducted a site investigation to determine the potential for archaeological sites in the project area. AR Consultants concluded that the likelihood of finding cultural or historical resources is remote.

V.A.2.g Potential Effect on Protected Species and/or Their Habitat

There are no federal or state protected species whose critical habitat would be affected by the proposed project. Although several endangered and threatened species have the potential to occur within or migrate across the subject property, no adverse impacts to these species is anticipated by the proposed activities. Habitat for the Black Capped Vireo and the Golden Cheeked Warbler are known to exist in the area. However, the USFWS concluded there was not suitable habitat of the Golden-cheeked Warbler and other species of concern located in the limits of Blue Hole Regional Park that would be

impacted by park improvements project. A letter stating their finding of no impact is included in Appendix D.

V.A.2.h Effect on Recreational Areas or Natural Preserves

The proposed project is not anticipated to have any long-term effects on recreational or natural areas. The location of the treatment plant would be in the northeast corner of Blue Hole Regional Park as designated in the Blue Hole Regional Park Master Plan, in order to minimize potential aesthetic impacts and not interfere with planned uses for the park. Recreational areas such as hike/bike trails may be temporarily affected during construction of the wastewater lines within the park but no long term impacts from wastewater line construction are anticipated.

Construction of the proposed lift station in Cypress Creek Park would have temporary impacts to this recreational area during construction. Design of the lift station will include elements to minimize the long-term aesthetic impact of this project component by implementing below-grade construction (i.e. submersible pumps) and odor control. The lift station is expected to be located adjacent to the current public restrooms. The septic tank that currently serves these restrooms would be removed.

V.A.2.i Potential Noise Levels

During project construction, noise would be intermittent. Major noise generation would be anticipated from the operation of heavy equipment. Construction would occur during daylight hours when disruption to receptors would likely be minimal. Noise originating from the project site would be attenuated by distance. The operation of lift stations and the treatment facility is not anticipated to generate unacceptable noise levels.

V.A.2.j Potential Impacts on Different Socioeconomic Groups

Under the Environmental Protection Agency's (EPA's) methodology[1] for calculation of a Potential Environmental Justice Index, demographics are analyzed in one and fifty square mile study areas around each Environmental Justice point location. The one square mile area corresponds to a 0.56 mile radius, and the fifty square mile are corresponds to a 4 mile radius. The Potential Environmental Justice Index is the product of a Population Factor and an Economic Status Score. The Population Factor is based on population density (Table V-2). The Economic Status Score (Table V-3) is based on the percentage of households in the study area with incomes of less than $20,000 per year.

Table V-2: Population Factor

Population per Square Mile, X	Population Factor
0	0
0 < X ≤ 200	1
200 < X ≤ 1,000	2
1,000 < X ≤ 5,000	3
5,000 < X	4

Table V-3: Economic Status Score

Percentage of Households With Income Less than $20,000 per Year	Economic Status Score
0 < X ≤ 23.6 (Texas Average)	1
23.6 < X ≤ 31.4	2
31.4 < X ≤ 39.2	3
39.2 < X ≤ 47.2	4
47.2 < X ≤ 100	5

The Potential Environmental Justice Indices for the proposed project is presented in Table V-4. The proposed project has a Potential Environmental Justice Index of 1 out of a possible 20 for a 1-square mile area, and 1 out of 20 for a 50-square mile area,

[1] *Computer Assisted Environmental Justice Index Methodology*, Office of Planning and Analysis, U.S. EPA Region VI, July 1994.

indicating that low-income populations would not endure a disproportionate share of environmental impacts from the proposed project.

Table V-4: Potential Environmental Justice Indices

Study Area (sq. mi.)	Population Density (cap/sq. mi.)	Population Factor	Percentage of Households With Income Less Than $20,000 per Year	Economic Status Score	Potential Environmental Justice Index (Out of 20)
1	94	1	17%	1	1
50	137	1	17%	1	1

V.A.2.k Control of Access to the Facilities

Access would be controlled by the construction contractor. The contractor would be required to develop a plan, approved by the design engineer that would specify the exact precautions to be taken to control access to the facilities during construction. Construction traffic to the site would be restricted to daylight hours, and public entrance would not be allowed.

Following construction, the City of Wimberley would be responsible for facility access and security. A facility access and security plan for the facility would be established in accordance with state and federal law.

V.A.2.l Potential Insect Nuisances and Methods of Control

It is not anticipated that the proposed project would cause an insect nuisance. Therefore, no insect control measures are planned.

V.A.2.m Potential Effects on Floodplains and Flood Levels

See discussion in Section III.C.1.

V.A.2.n Effect on Air Quality

Construction activities associated with the proposed project would not have a long-term effect on air quality. Implementation of the project would not have a long-term effect on air quality.

V.A.2.o Expected Energy Consumption during Operation and Chemicals Used in Treatment

Rough estimates for electrical and chemical uses are as follows:

- Annual average power usage is expected to be approximately 130,000 kilowatts.
- Chlorine for disinfection and aluminum sulfate for phosphorous removal would be used and stored at the treatment plant facility.

V.A.2.p Abandoned Facilities

The existing package treatment plant would be taken offline and transported to the proposed facility location in the northeast corner of Blue Hole Regional Park. The relocated package plant would be expanded to a rated treatment capacity of 75,000 GPD.

V.A.2.q Effects on Coastal Zones

There are no coastal zones or coastal management zones located within or near the service area.

V.B Secondary Impacts

Secondary impacts are indirect or induced changes caused by the proposed project. Potential secondary impacts such as impacts of future development on land use, air quality, water quality and availability, public services, economics, land use planning, and environmentally sensitive areas are discussed below.

V.B.1 Impacts of Future Development on Land Use

The proposed project is not anticipated to impact population growth in the project area. The project is in response to deteriorating infrastructure.

V.B.2 Effects on Air Quality

The proposed project should have little if any impact on air quality. Construction of the proposed project may increase particulate levels in the vicinity, but these problems would be temporary and short-lived. Dust emissions can be controlled by appropriate methods during construction.

V.B.3 Effects on Water Quality and Availability

The proposed project is expected to provide beneficial impacts to water quality and availability. The proposed project would decrease the reliance on private septic systems, which in many cases are deteriorating, and potentially impacting the water quality of Cypress Creek. Additionally, treated effluent from the proposed wastewater treatment facility would provide a source of irrigation water for Blue Hole Regional Park amenities, and potentially for commercial users, thereby reducing the reliance on groundwater for non-potable water needs. Effluent discharges to Deer Creek would occur infrequently and would meet or exceed TCEQ water quality standards for discharges to Deer Creek and the Blanco River.

V.B.4 Effects on Public Services

Public service in the service area would be improved by providing a central wastewater collection system.

V.B.5 Economic Impacts

The funding options available to the City of Wimberley to finance the construction of the wastewater collection and treatment system include connection fees, taxes, assessments, user fees, or any combination thereof. The funding mechanism has not yet been finalized, however, estimates for the potential cost on a per Living Unit Equivalent (LUE) basis were developed. These costs range from $2,500 to $10,000 per LUE for one-time connection fees, $80 to $125 per LUE per month for user fees and anywhere from $40 to $140 annually in taxes or $600 to $2,000 annually in

assessments. An increase in one funding mechanism would reduce the revenue required of another, as illustrated by the ranges in values.

V.B.6 Conformance or Conflict with Land Use Planning

The proposed project conforms to current land use planning in the service area.

V.B.7 Impacts of Development on Environmentally Sensitive Areas

The proposed project is not anticipated to induce population or commercial growth in floodplains, wetlands, or other environmentally sensitive areas.

VI ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROJECT BE IMPLEMENTED

Environmental impacts were discussed in detail in Section V, and adverse impacts that cannot be avoided are reviewed below. Adverse impacts are anticipated to be minor, and through best management practices, impacts are anticipated to be abated in a short time after implementation.

VI.A Primary Adverse Impacts

During construction, there would be unavoidable short-term adverse impacts such as a minor increase in air pollution (primarily dust), disruption of the natural soil, emigration of wildlife, temporary loss of habitat within the construction area, and increased noise. There would also be temporary impacts from pipeline installation to creeks identified in the proposed project area. The construction of the proposed effluent discharge outfall in Deer Creek would permanently impact the creek. However, the outfall structure design would minimize permanent impacts by limiting the size of the structure and having the structure follow existing contours of the creek as much as possible. Construction practices are available which, if employed, can minimize many of these impacts. These requirements would be included in the specifications and Storm Water Pollution Prevention Plan for the project, and the contractor's activities would be monitored to ensure compliance. These impacts, to the extent they do occur, are temporary. When construction is completed, the impacts would abate within a short period of time.

Treated wastewater effluent discharges to Deer Creek are expected to be infrequent and would meet or exceed water quality standards established by the TCEQ for discharges to receiving water bodies.

VI.B Secondary Adverse Impacts

Secondary impacts are indirect or induced changes caused by the proposed project (See discussion in Section V.B). There are no anticipated secondary adverse impacts associated with the proposed project.

VII RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

No tradeoffs between short-term environmental gains at the expense of long-term environmental gains or vice versa have been identified. Overall the proposed project considers both short and long term impacts and is designed to provide the most environmentally beneficial design in the short and long terms.

VIII IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES TO THE PROPOSED PROJECT

No irreversible or irretrievable commitments of resources have been identified.

IX PUBLIC PARTICIPATION AND COORDINATION

IX.A Discussion

A summary of public participation and coordination is included in the following narratives. Coordination will include a published notice in the Wimberley View newspaper, 30-day comment period, and a public hearing to discuss the proposed projects and its alternatives.

IX.B Public Hearing

Pursuant to Clean Water State Revolving Funds Tier III guidance, a public hearing for the proposed project will be held. The time and location of the public hearing will be published in the Wimberley View.

IX.B.1 Advertisement

The public will be notified of the public hearing through advertisements placed in the Wimberley View. The advertisement will contain the Notice of Public Hearing and Availability of Environmental Information Document (EID).

A written notice of the hearing will be sent to the appropriate local and state agencies, councils of government, and all parties that express an interest in the project. A distribution list is included as part of the Public Hearing Record in section IX.C.1.

IX.B.2 Hearing Notice

The Notice of Public Hearing and Availability of Environmental Information Document, presented as part of the Public Hearing Record, is included in the following section (IX.B.3).

IX.B.3 Public Availability of EID

The Notice of Public Hearing and Availability of Environmental Information Document (EID) will be published in the Wimberley View and delivered to the appropriate local,

county, state, and federal agencies. A copy of the notice will be included in the Final EID.

IX.B.4 Hearing Format

The public hearing will included the following elements:

- Call to order;
- Statement of the purpose of the public hearing (including the following statement: "One of the purposes of this hearing is to discuss the potential impacts of the project and alternatives to it.");
- The considerations to be taken into account under law and regulations; a brief description of the proposed project; its costs and alternatives, including the estimated monthly bill to a typical residential household as above, any connection fee and an estimate of the private (service line) costs;
- A question and answer period;
- A list of witnesses; and
- Testimony.

IX.B.5 Hearing Record

In the Final EID report, the public hearing record (Appendix G) will include a copy of the hearing notice, letters of notification and list of all recipients, a statement that the hearing was held in conformance with the public hearing notice, a list of witnesses including the complete text of their statements and any written testimony (if applicable), and a verbatim transcript of the hearing.

IX.C Coordination of Review

This section describes activities to coordinate review of the Draft Environmental Information Document.

IX.C.1 Circulation of EID

Copies of the Draft Environmental Information Document (Draft EID) will be delivered by certified mail to the applicable offices of each agency below.

- U.S. Army Corps of Engineers, Fort Worth District Regulatory Branch
- U.S. Fish and Wildlife Service
- Texas Historical Commission, State Historic Preservation Officer
- Federal Emergency Management Agency, Region VI Federal Center
- Texas Commission on Environmental Quality, Chief Engineer
- Texas Parks and Wildlife Department, Wildlife Habitat Assessment Program, Wildlife Division
- Natural Resources Conservation Service, Assistant State Conservationist, Water Resources
- U.S. Forest Service, Regional Environmental Coordinator
- U.S. National Park Service, Wild and Scenic River Coordinator
- Capital Area Council of Governments

The following agencies will receive the Notice of Public Hearing and Availability of the Environmental Information Document also by certified mail.

- Bureau of Reclamation, Texas Representative
- Department of Housing, Environmental Officer
- U.S. Geological Survey, Director, Central Region
- Bureau of Land Management
- Hays Trinity Groundwater Conservation District
- Hays County Resource Protection, Transportation, and Planning Department
- Edwards Aquifer Authority

IX.C.2 Notice of the Public Hearing and Availability

The notice of public hearing and availability of the draft EID will be published in the Wimberley View. The same notice will be included in correspondence with the reviewing State and Federal agencies. Copies of the draft EID will be made available at the Wimberley City Hall, the Wimberley Library, and the Wimberley Community Center during the review period.

IX.C.3 Documentation

Copies of transmittal letters, the comments of the reviewing agencies and the public, and responses to them if necessary, will be included in Appendix H of the Final EID report.

X REFERENCES

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Texas Water Code, Subtitle B, Chapter 11, Section 11.085.

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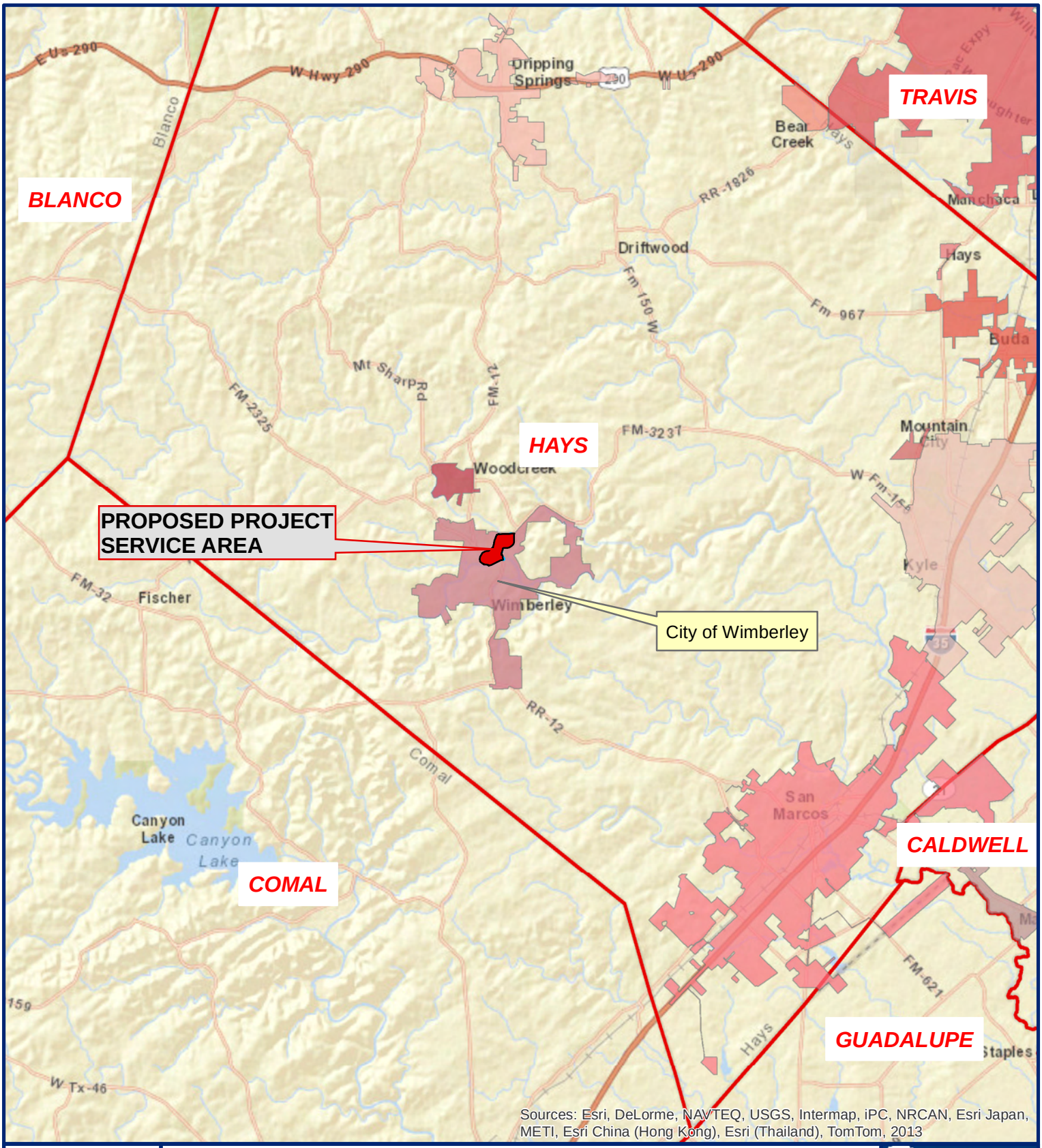
APPENDIX A

FIGURES



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

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DATE: 4/1/2014

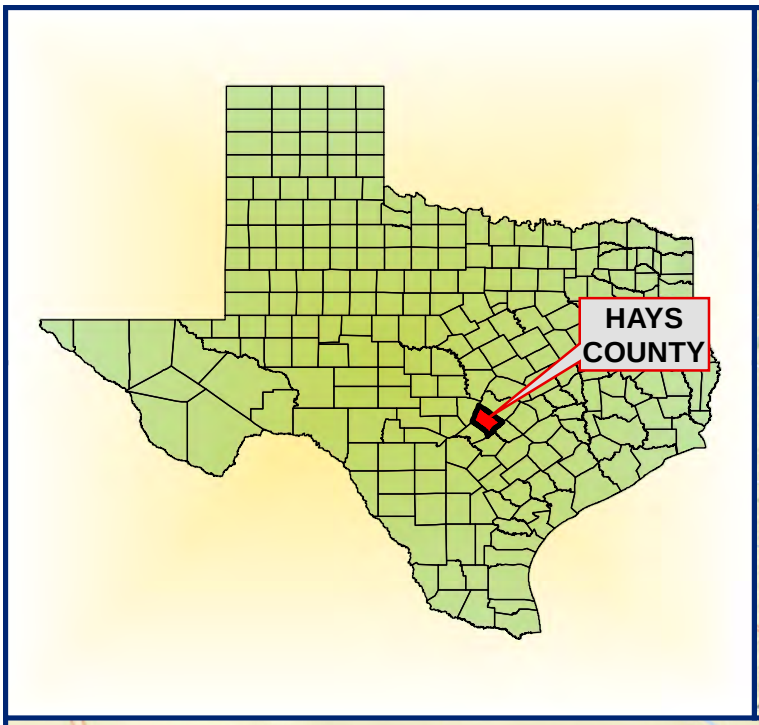
FIGURE A-1
SERVICE AREA
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

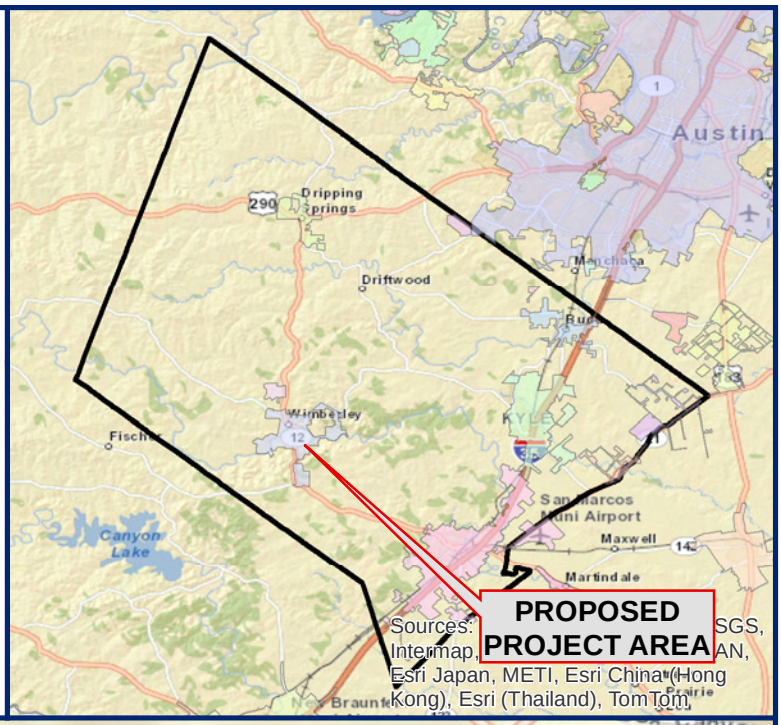
ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS
1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

20,000 10,000 0 Feet

SOURCE:
TEXAS NATURAL RESOURCES INFORMATION SYSTEMS
CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01





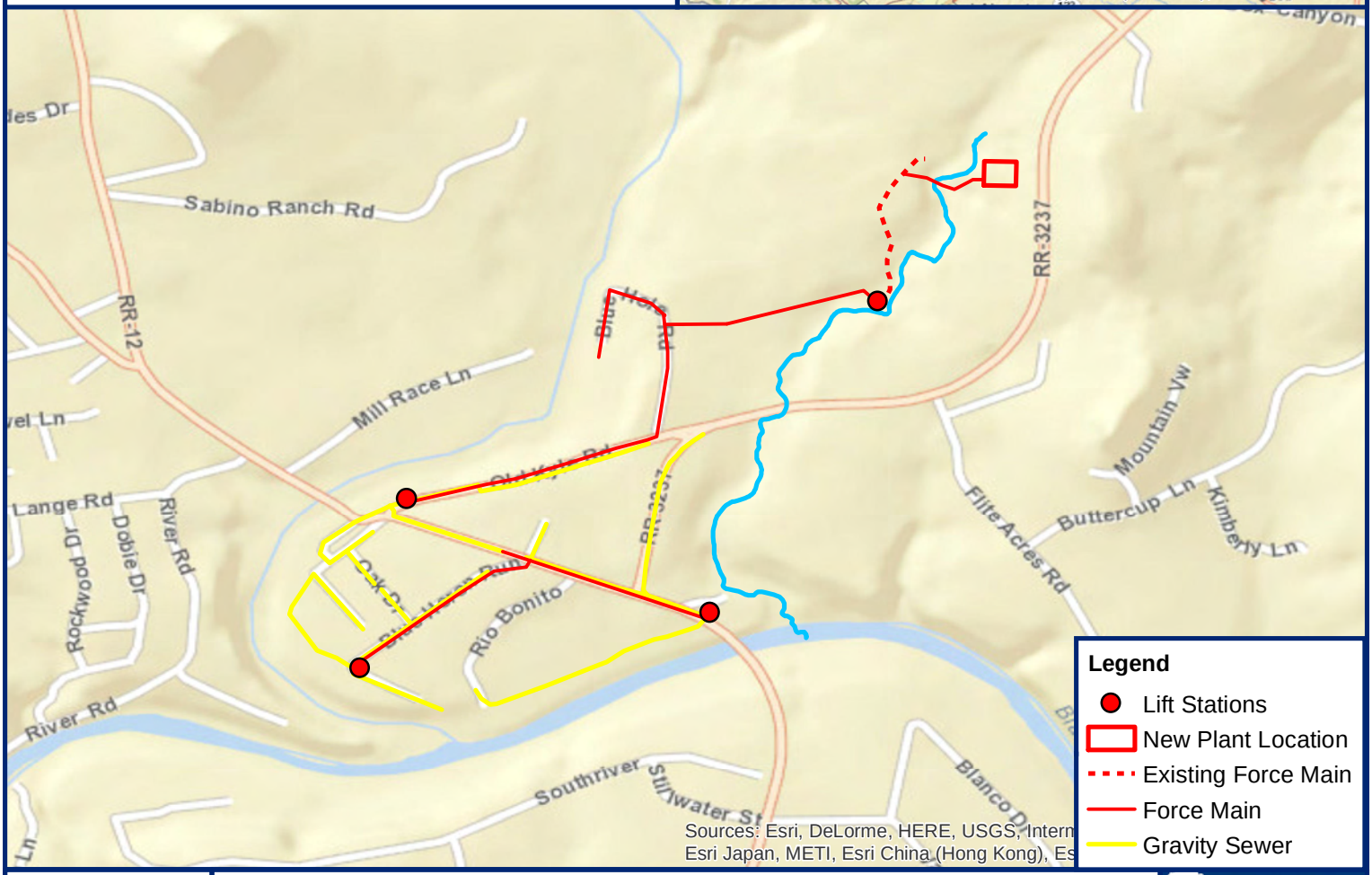


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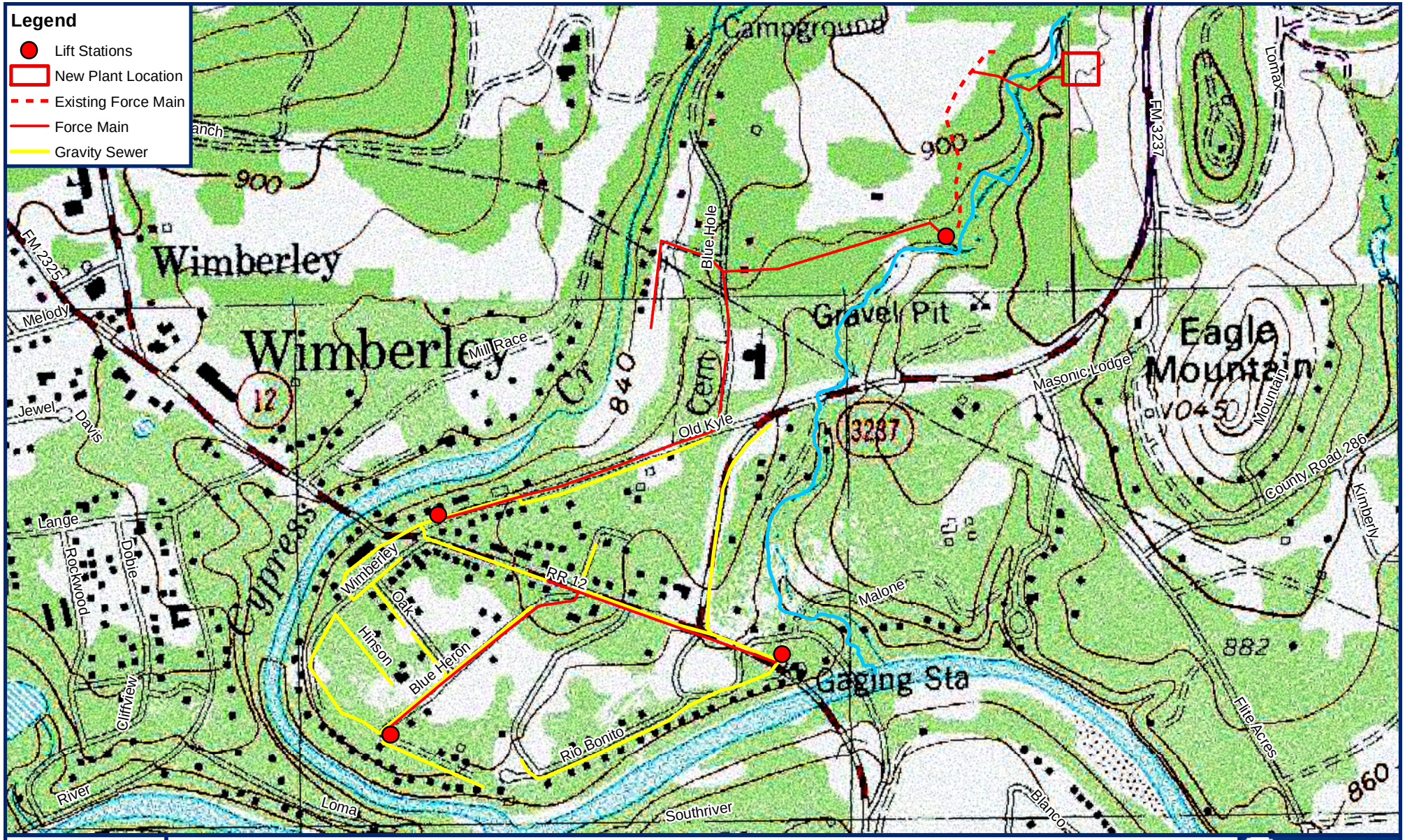
FIGURE A-2
GENERAL LOCATION MAP
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS
1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

2,000 1,000 0 Feet

SOURCE:
TEXAS NATURAL RESOURCES INFORMATION SYSTEMS
CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01



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DATE: 4/3/2014

FIGURE A-3
U.S.G.S. TOPOGRAPHIC MAP (DRIFTWOOD AND WIMBERLEY, TX QUADRANGLES)
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

ALAN PLUMMER ASSOCIATES, INC.
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1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

FIGURE 3 OF 11

800 400 0 Feet

SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01

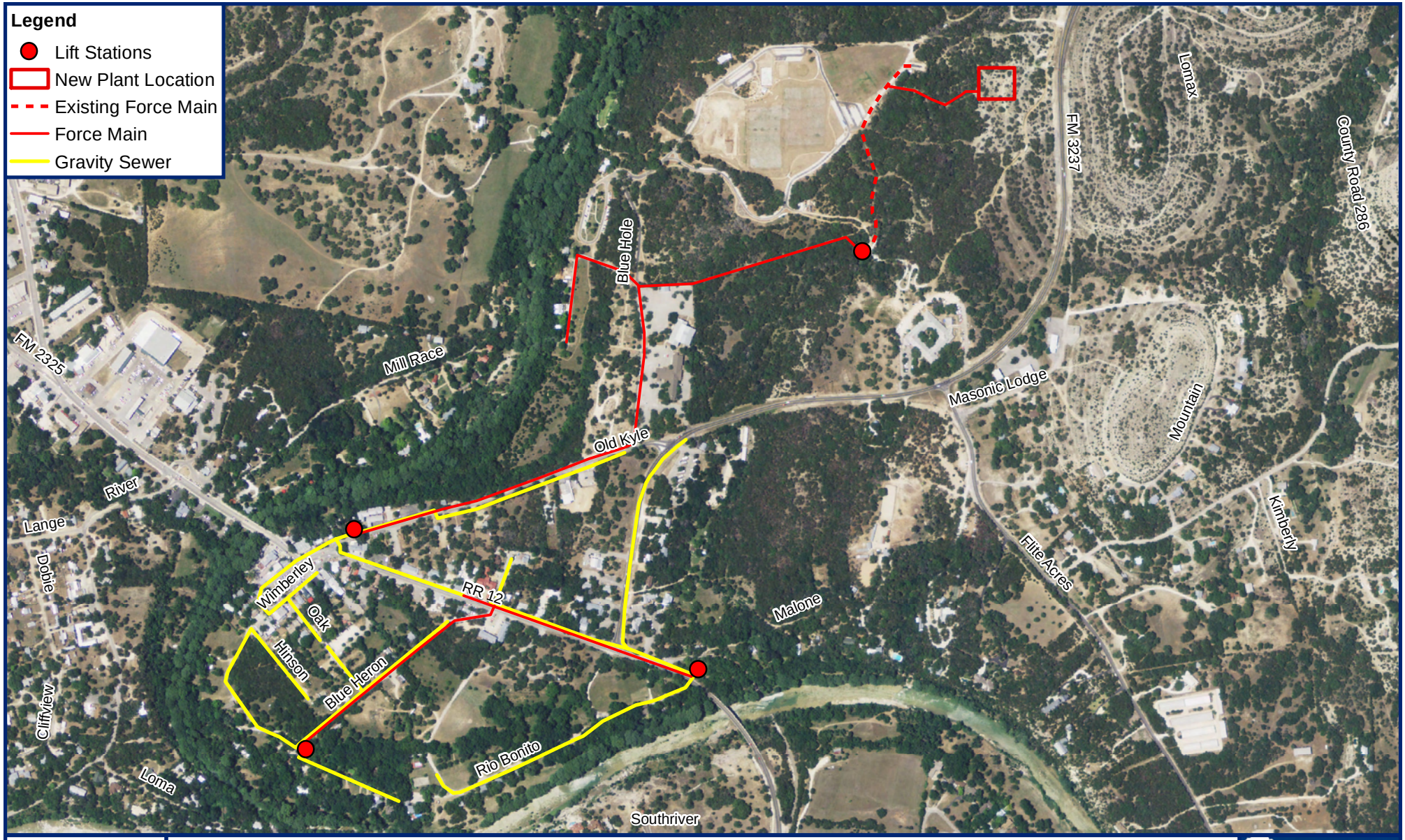

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FIGURE A-4
2012 AERIAL PHOTOGRAPH
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

ALAN PLUMMER ASSOCIATES, INC.
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1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

DATE: 4/3/2014

FIGURE 4 OF 11

800 400 0 Feet

SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01

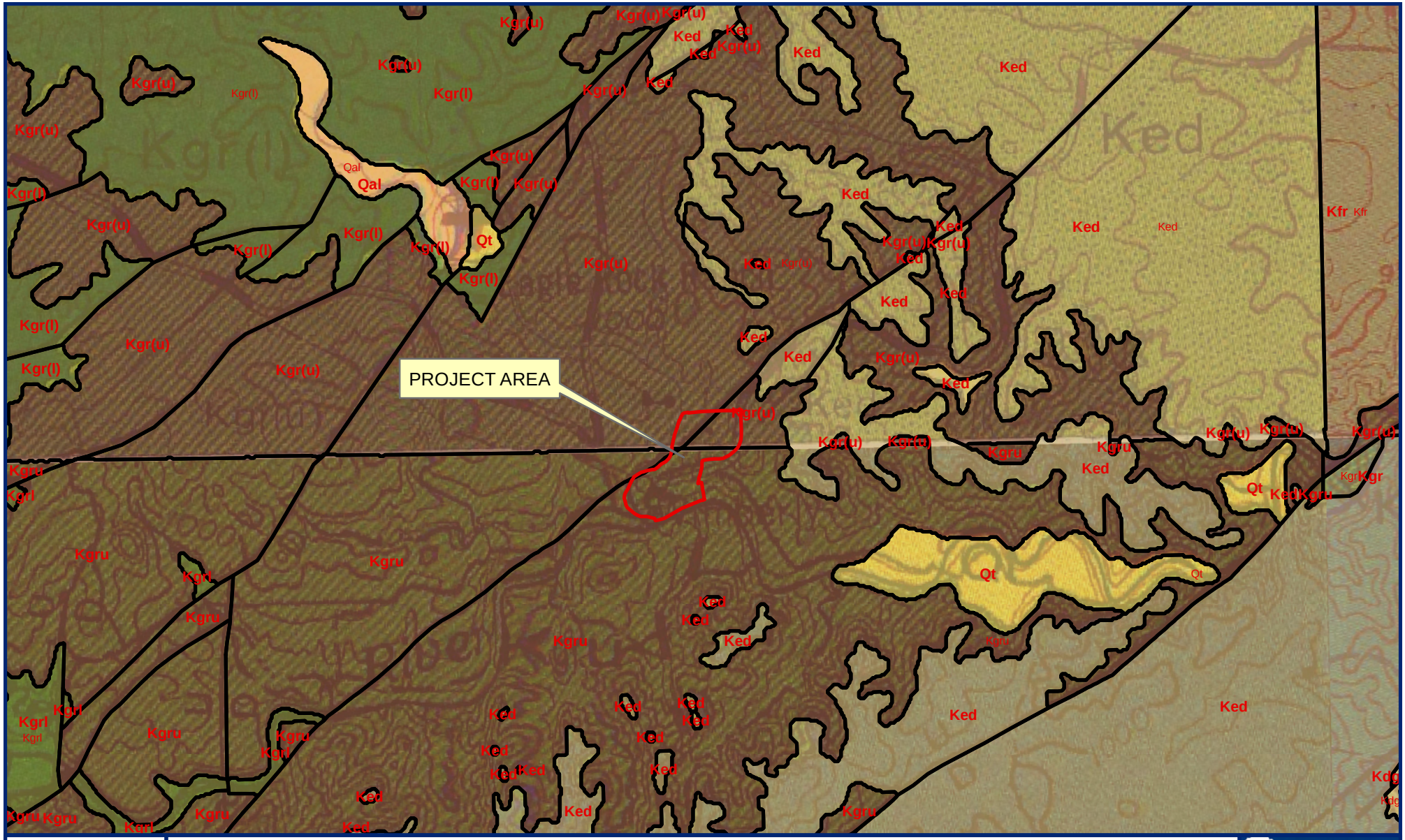

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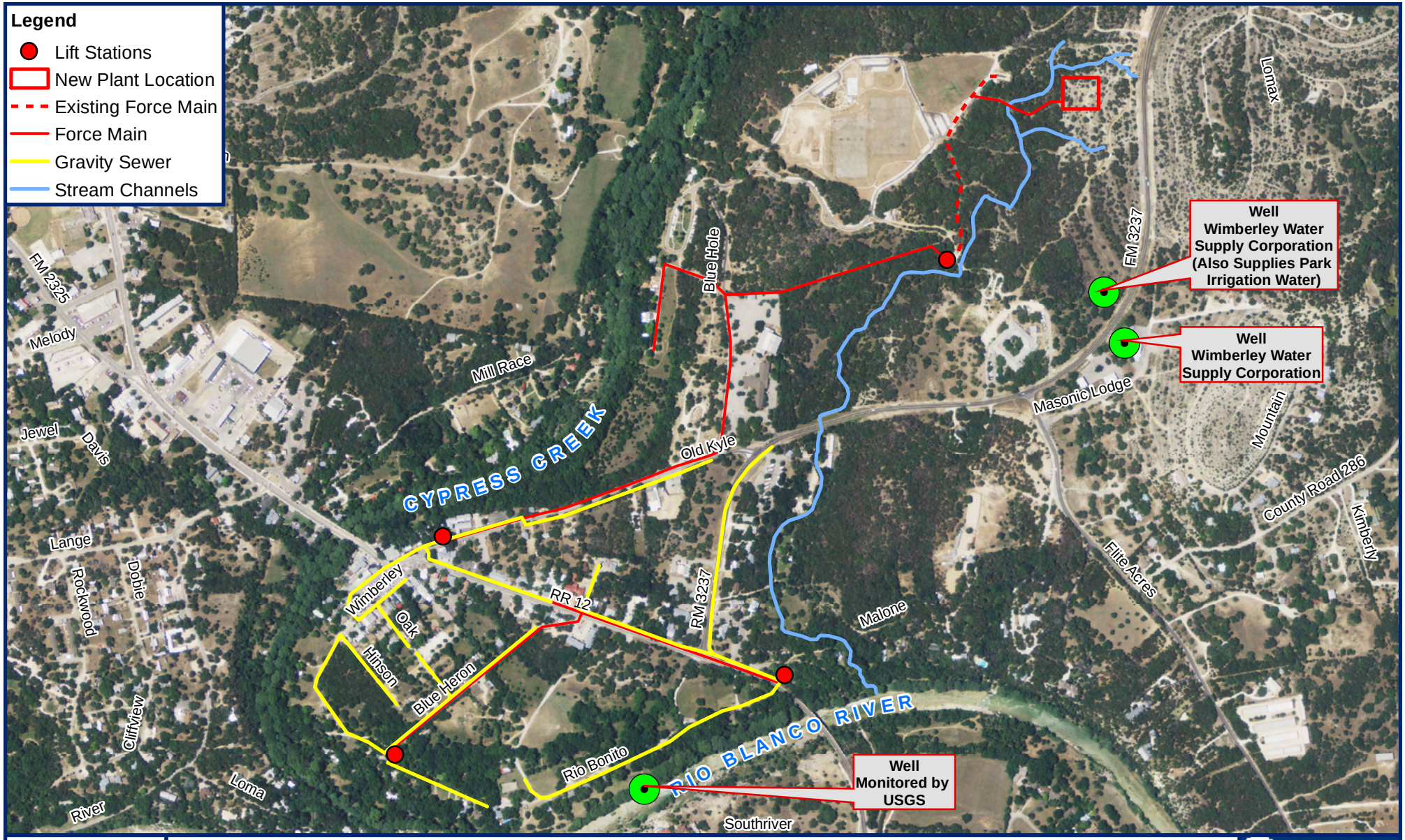
FIGURE A-5
GEOLOGICAL FORMATIONS
GEOLOGICAL ATLAS OF TEXAS LLANO AND SAN ANTONIO SHEETS
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS
1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

6,000 3,000 0 Feet

SOURCE:
TEXAS NATURAL RESOURCE INFORMATION SYSTEM DIGITIZED FROM THE GEOLOGICAL ATLAS OF TEXAS PUBLISHED BY THE TEXAS BUREAU OF ECONOMIC GEOLOGY

PROJECT NUMBER:
1732-002-01



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DATE: 4/3/2014

FIGURE A-6
TEXAS WATER DEVELOPMENT BOARD GROUNDWATER DATABASE RECORDED WELLS
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

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ENVIRONMENTAL ENGINEERS AND SCIENTISTS
1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

800 400 0 Feet

SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01

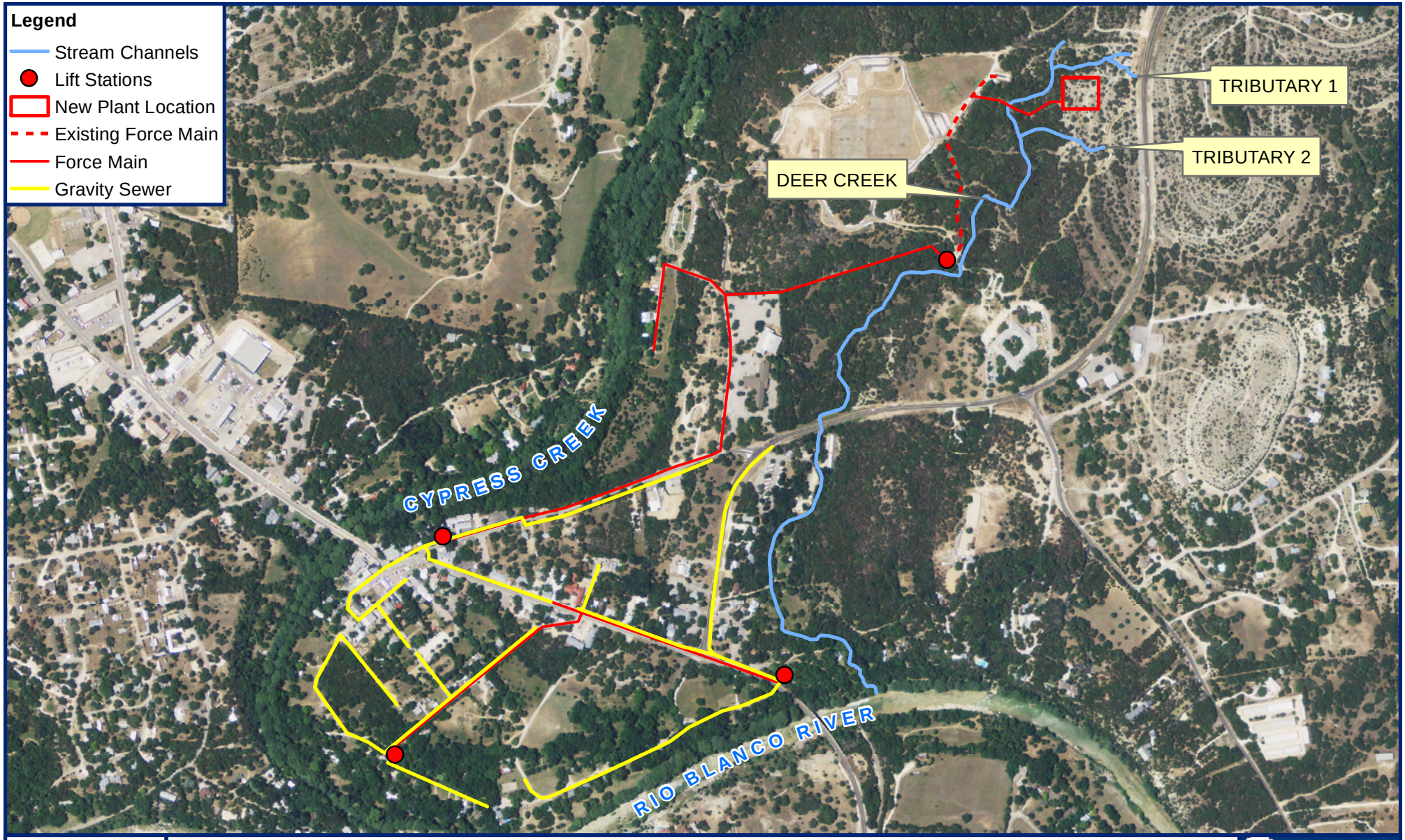

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FIGURE A-7
PRELIMINARY JURISDICTIONAL DETERMINATION OF WATERS OF THE U.S.
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

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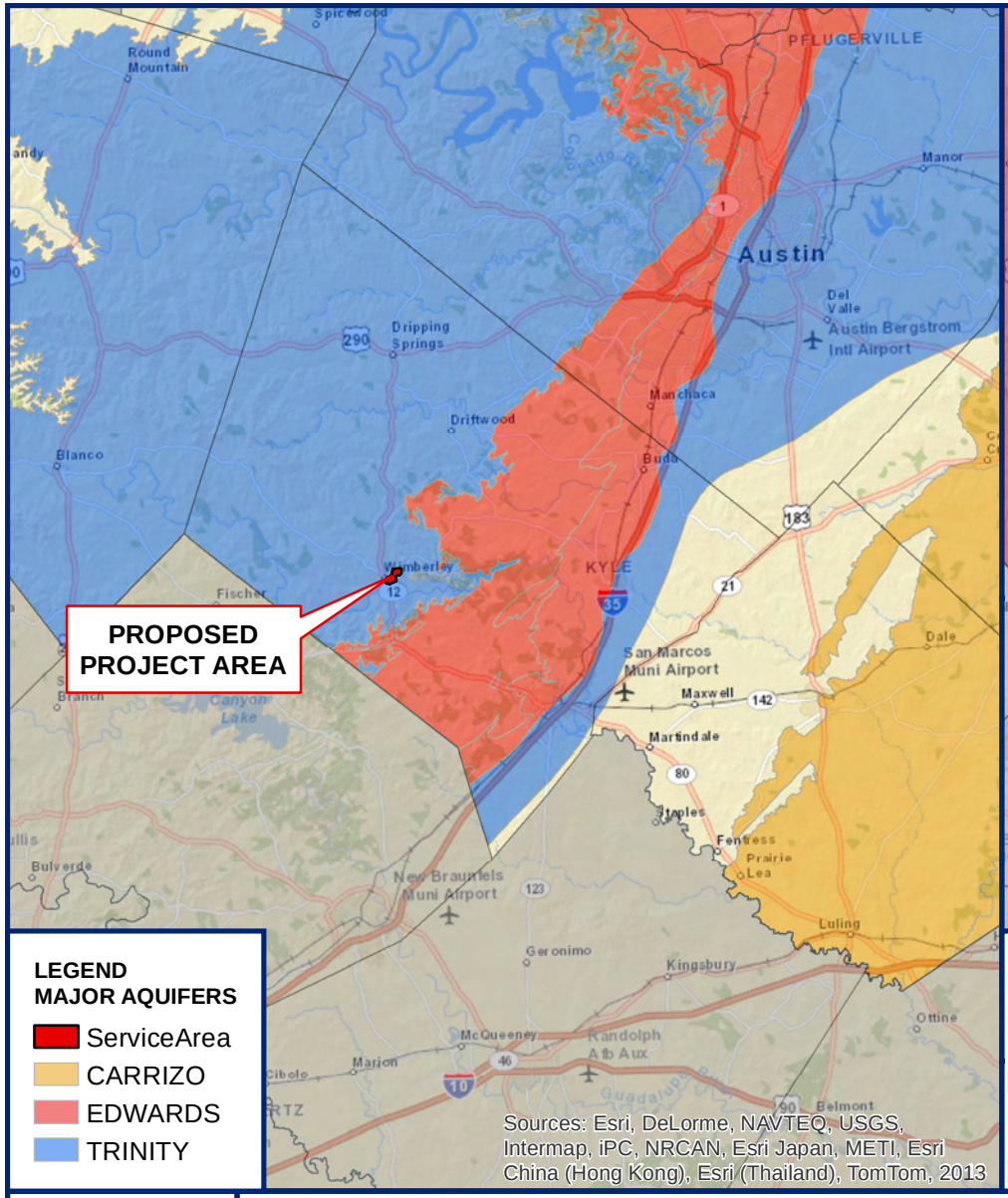
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

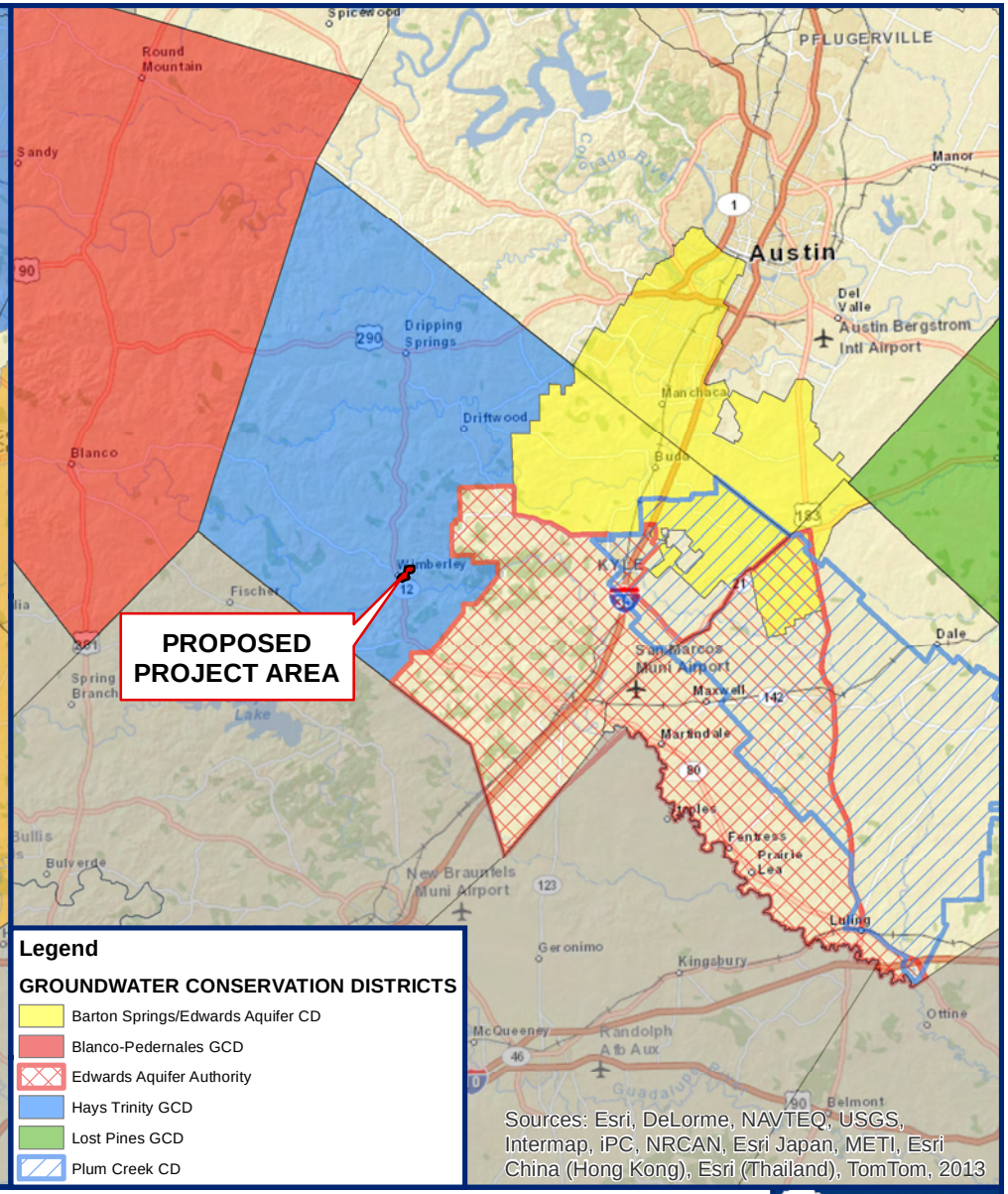
FIGURE 7 OF 11

800 400 0 Feet

SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01





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DATE: 4/1/2014

FIGURE A-8
AREA AQUIFERS AND GROUNDWATER DISTRICTS
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

ALAN PLUMMER ASSOCIATES, INC.
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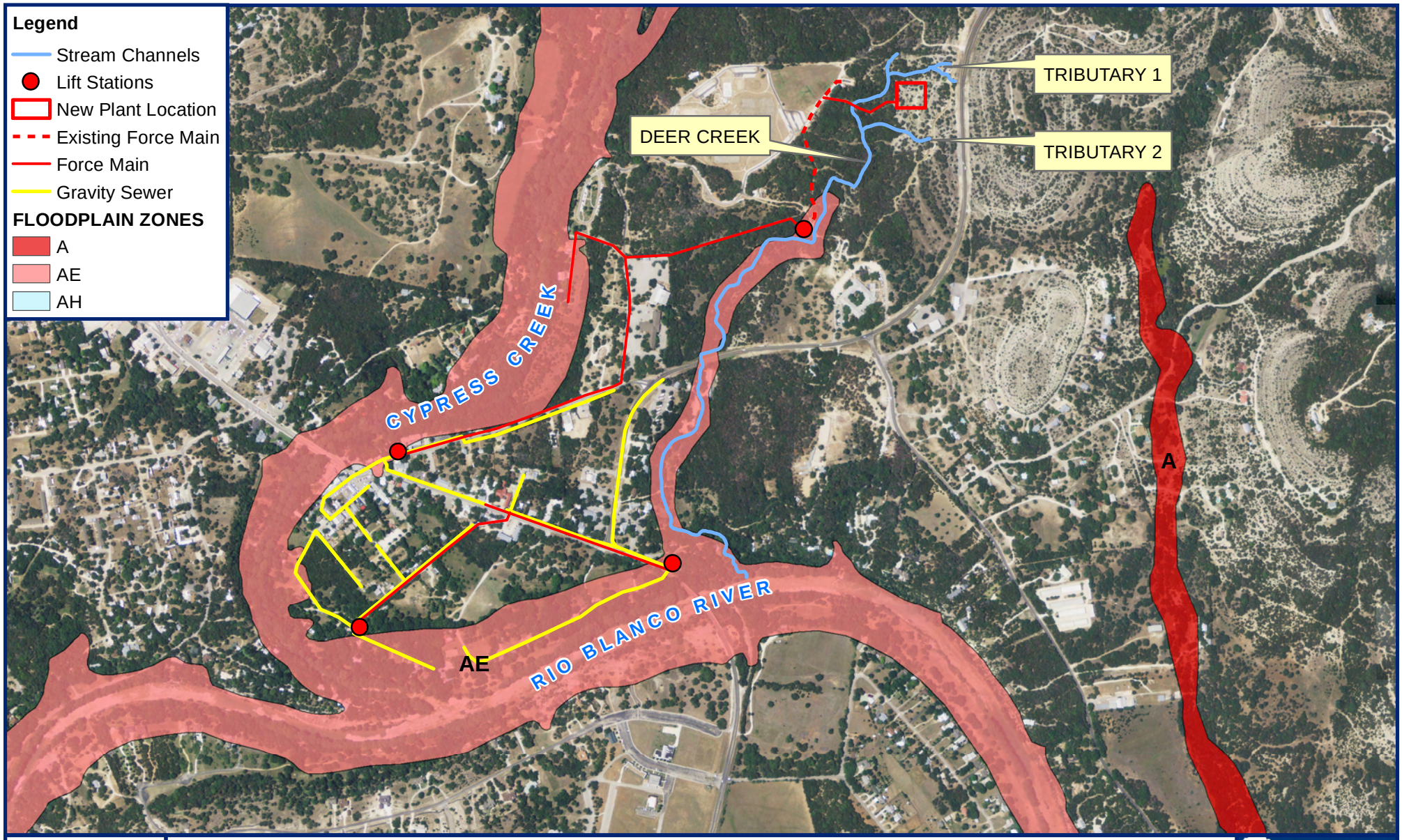
1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

FIGURE 8 OF 11

20 10 0 Miles

*SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01



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DATE: 4/2/2014

FIGURE A-9
FEDERAL EMERGENCY MANAGEMENT AGENCY'S
FLOOD INSURANCE RATE MAP
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

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SUITE 300
FORT WORTH, TEXAS 76107
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FAX: (817) 870-2536

FIGURE 9 OF 11

1,000 500 0 Feet

SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01

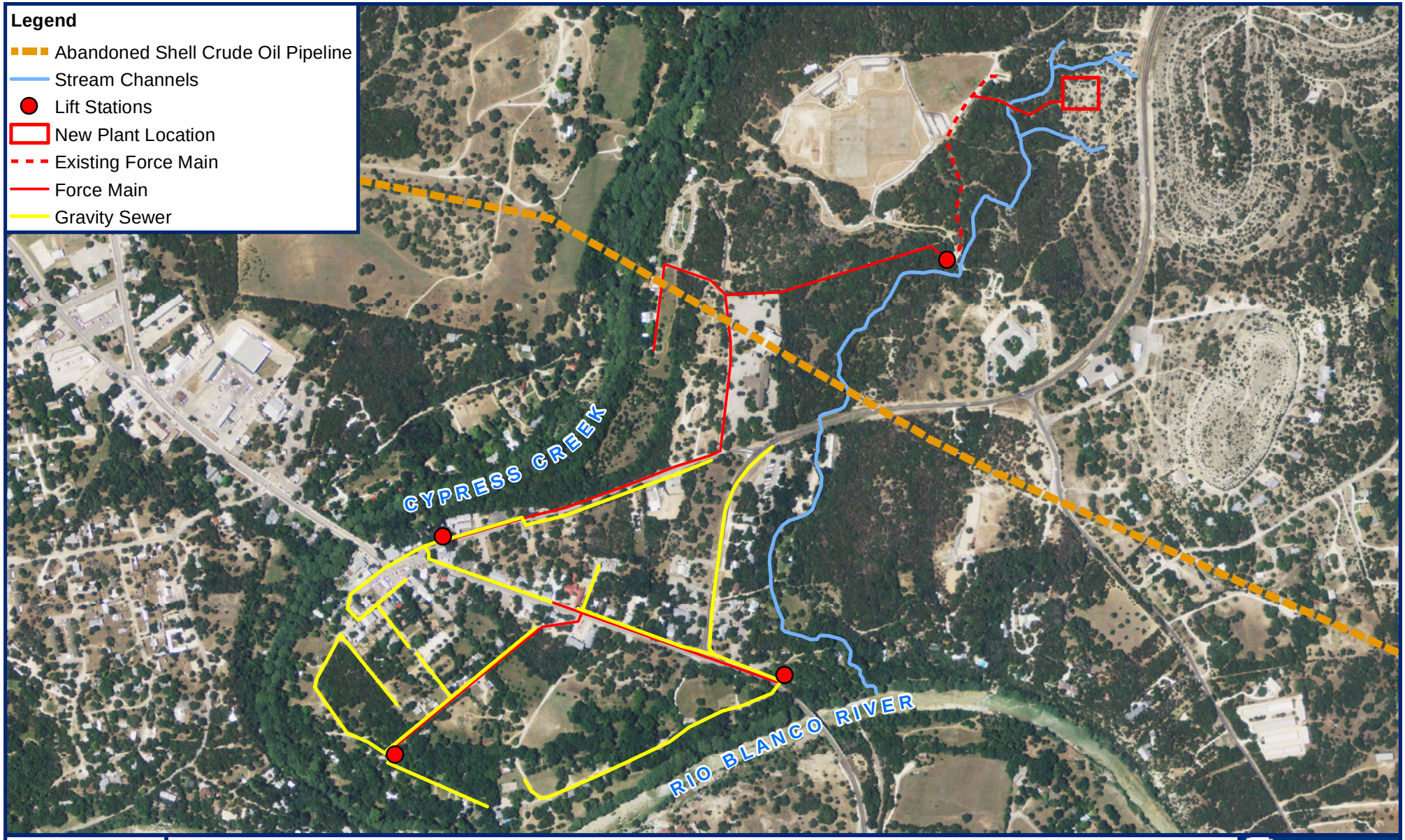

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FIGURE A-10
ABANDONED SHELL TEXAS TO NEW MEXICO CRUDE OIL PIPELINE
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

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ENVIRONMENTAL ENGINEERS AND SCIENTISTS
1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

800 400 0 Feet

SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01

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DATE: 4/2/2014

FIGURE A-11
PROJECT ALTERNATIVES
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS
1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

FIGURE 11 OF 11

1,300 650 0 Feet

SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01

APPENDIX B

SITE PHOTOGRAPHS

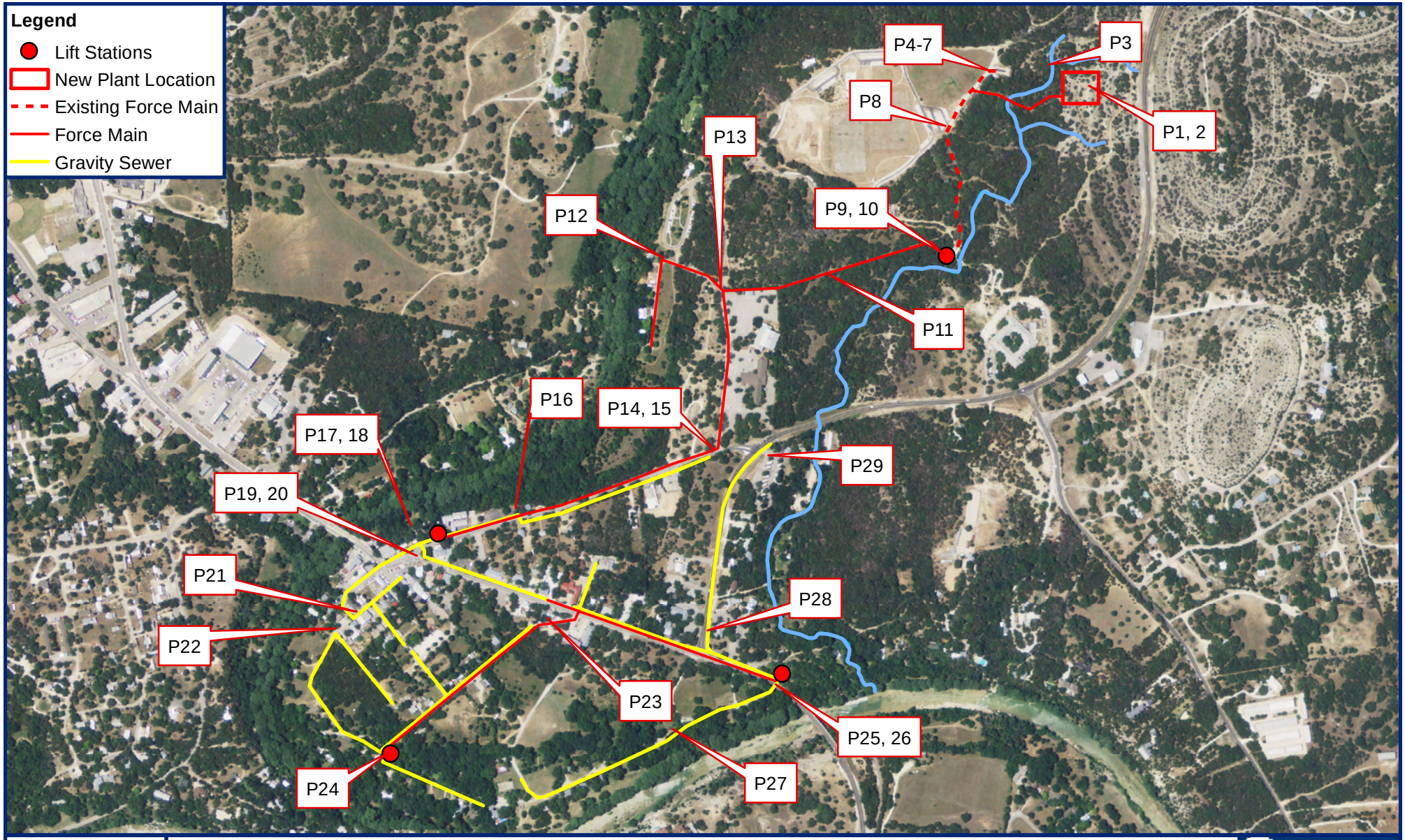

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FIGURE B-1
REPRESENTATIVE PHOTOGRAPH LOCATIONS
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS
1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

FIGURE 1 OF 1

750 375 0 Feet

SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01

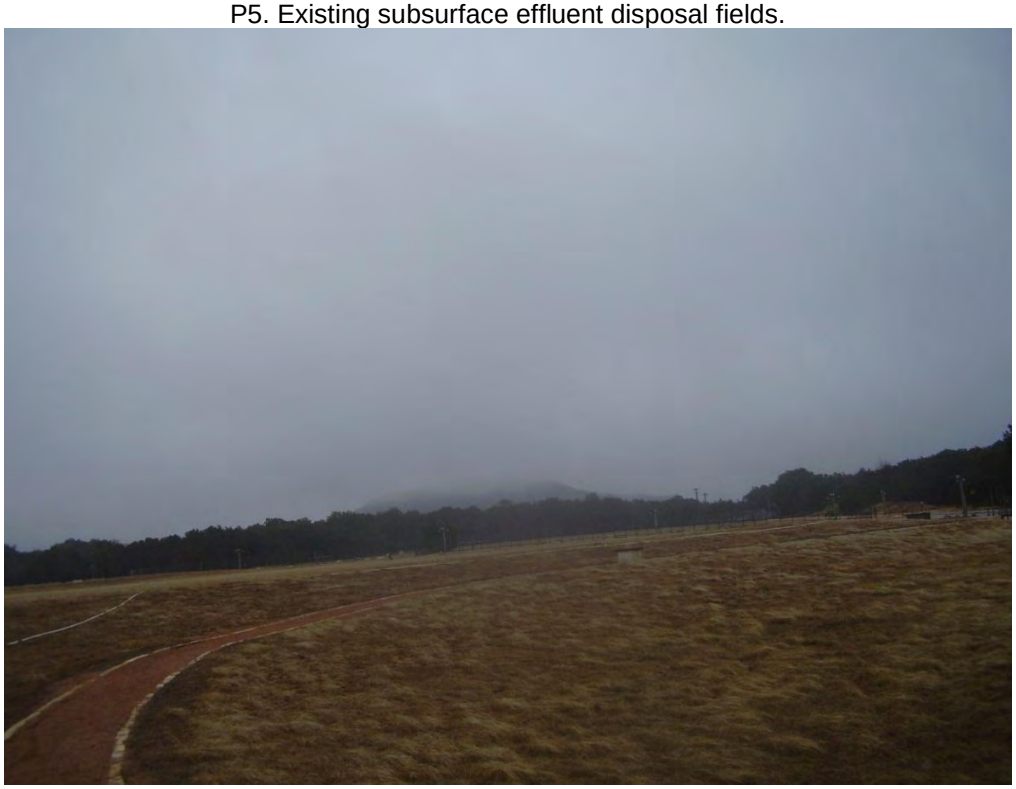
P1. Proposed treatment facility site looking south and southeast from northern extent of site.

P2. Proposed treatment facility site looking south and southwest from northern extent of site.

P3. Approximate location in Deer Creek of proposed effluent discharge outfall, looking downstream south.

P4. Existing package treatment facility that will be relocated to the proposed facility site and expanded to a treatment capacity of 75,000 GPD.

P5. Existing subsurface effluent disposal fields.



P6. Open areas in Blue Hole Regional Park – proposed location of spray irrigation.

P7. Force Main alignment along Blue Hole Regional Park road northeast of existing package treatment facility.

P8. Existing wastewater pipeline alignment that would be utilized for a proposed force main, looking south from Blue Hole Regional Park road.

P9. Existing pipeline alignment from Deer Creek lift station to Blue Hole Regional Park road, looking north.

P10. Existing Deer Creek lift station that will be upgraded.

P11: Proposed force main alignment following an electric line right of way between commercial property and Deer Creek lift station.

P12. Proposed Blue Hole Road force main alignment on west side of cemetery property looking south.

P13. Proposed Blue Hole Road force main alignment on the north side of cemetery property looking west.

P14. Proposed Blue Hole Road force main alignment looking north along cemetery and commercial properties.

P15. Old Kyle Road looking west from intersection with Blue Hole Road.

P16. Old Kyle Road looking west from between downtown Wimberley and Blue Hole Road intersection.

P17. Old Kyle Road looking east from park.

P18. Existing public restrooms at Cypress Creek Park. Proposed site of new lift station.

P19. Proposed gravity line alignment location along RR 12, looking southeast from intersection with Old Kyle Road.

P20. North Wimberley Square, looking west along proposed gravity line alignment.

P21. South Wimberley Square, looking east along proposed gravity line alignment.

P22. Hinson Road west of downtown Wimberley, looking south along proposed gravity line alignment.

P23. Blue Heron Run, looking southeast along proposed gravity line alignment.

P24. Lift Station location at western extent of Hinson Street and Blue Heron Run.

P25. RR12 looking northwest from intersection with Malone and Rio Bonito Roads. Gravity lines and force mains would parallel the road right of way.

P26. Lift station location at intersection of Malone Drive and RR 12. The lift station would collect gravity flows from RR 12, FM 3237, and Rio Bonito Road, and pump the wastewater northwest through a force main along RR 12.

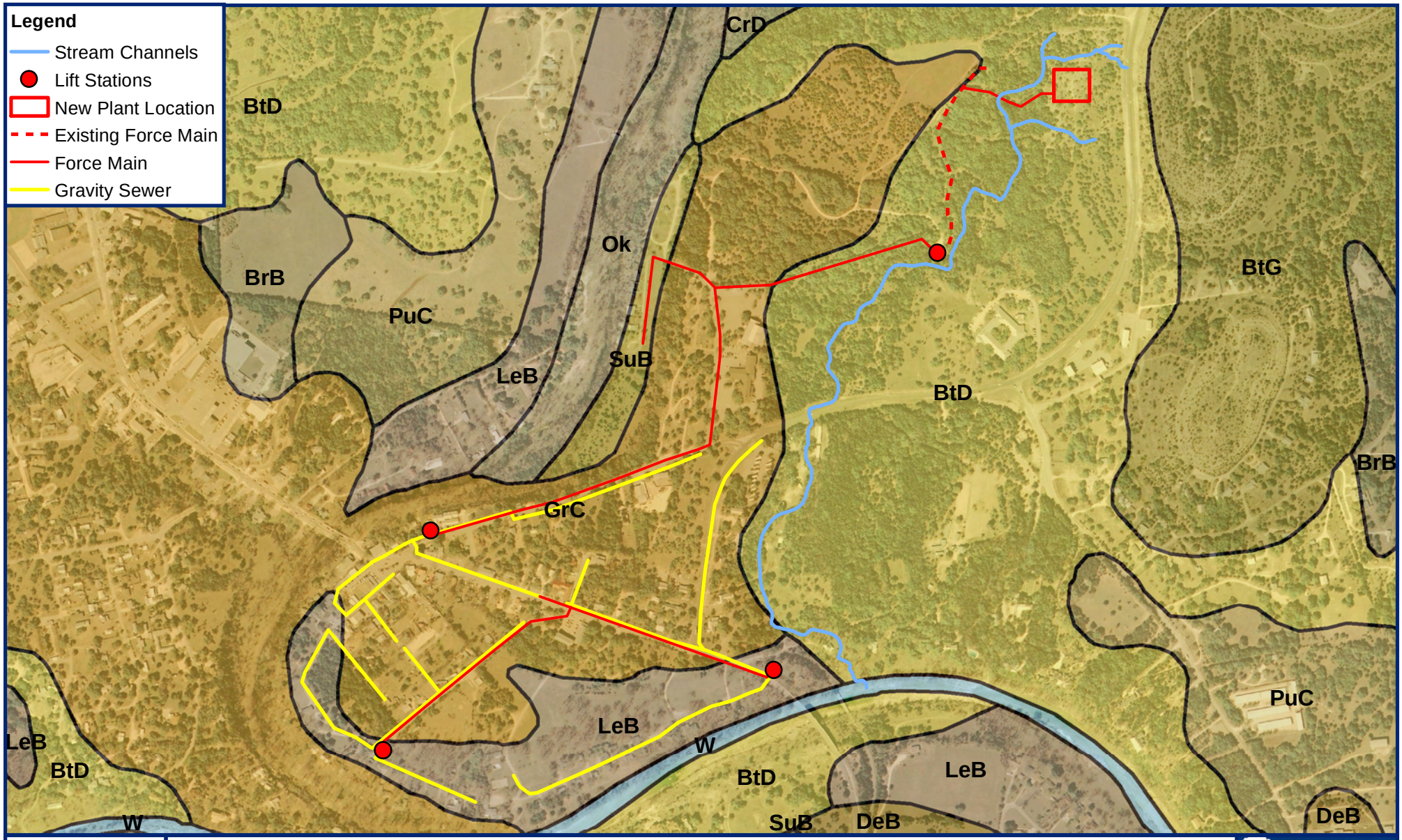
P27. Rio Bonito Road looking northeast along rental cabins and proposed gravity line alignment.

P28. FM 3237, looking north along the proposed gravity line alignment.

P29. FM 3237, looking northeast along the proposed gravity line alignment, near intersection with Old Kyle Road.

APPENDIX C

DESCRIPTIONS OF PROJECT AREA SOIL UNITS



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DATE: 4/2/2014

FIGURE C-1
MAPPED SOIL TYPES IDENTIFIED IN THE PROJECT AREA
CITY OF WIMBERLEY WASTEWATER COLLECTION AND TREATMENT SYSTEM

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS
1320 S. UNIVERSITY DRIVE
SUITE 300
FORT WORTH, TEXAS 76107
PHONE: (817) 806-1700
FAX: (817) 870-2536

FIGURE 1 OF 1

800 400 0 Feet

SOURCE: CAPCOG GEOSPATIAL CLEARINGHOUSE

PROJECT NUMBER:
1732-002-01

BRACKETT SERIES

The Brackett series consists of very shallow to shallow soils over bedrock. These well drained and moderately permeable soils formed in residuum over chalky limestone bedrock mainly of the Glenrose formation of Cretaceous Age. These soils are on gently sloping to very steep uplands. Slopes range from 1 to 60 percent.

TAXONOMIC CLASS: Loamy, carbonatic, thermic, shallow Typic Haplustepts

TYPICAL PEDON: Brackett gravelly clay loam--rangeland. (Colors are for dry soil unless otherwise stated.)

A--0 to 6 inches; grayish brown (10YR 5/2) gravelly clay loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky and granular structure; hard, friable; common fine roots; few masses and nodules of calcium carbonate; about 15 percent, by volume, weakly cemented limestone pebbles 2mm to 1 inch across; violently effervescent; moderately alkaline; clear smooth boundary. (3 to 12 inches thick)

Bw--6 to 14 inches; light gray (10YR 7/2) gravelly clay loam, light brownish gray (10YR 6/2) moist; moderate fine subangular blocky and granular structure; hard, friable; common fine roots; few masses and nodules of calcium carbonate; about 20 percent, by volume, weakly cemented limestone pebbles 2mm to 1 inch across; violently effervescent; moderately alkaline; clear wavy boundary. (3 to 16 inches thick)

Cr--14 to 60 inches; weakly cemented, fractured and weathered limestone bedrock with vertical fractures that roots can enter, 4 to 10 inches apart, interbedded with thin strata of pale yellow and very pale brown weathered chalk bedrock; moderately alkaline.

TYPE LOCATION: Hays County, Texas. From the intersection of Ranch Road 32 and Ranch Road 12 about 10 miles west of San Marcos, 6 miles west on Ranch Road 32 and 1,000 feet north of the road, in rangeland.

RANGE IN CHARACTERISTICS: The solum thickness over limestone bedrock ranges from 6 to 20 inches. Rock fragments above the paralithic contact average 0 to 35 percent by volume. Calcium carbonate equivalent ranges from 40 to about 85 percent in the fine-earth fraction and increases with depth. Reaction is slightly alkaline or moderately alkaline throughout. Carbonate clay content is 2 to 10 percent and silicate clay is 18 to 30 percent in the control section.

The A horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 2 to 4. Texture is loam, clay loam, gravelly loam or gravelly clay loam. Where value is 5 the organic carbon content is less than 2.5 percent.

The Bw horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 2 to 4. Yellowish and brownish mottles occur in the soil and within porous limestone fragments in some pedons. Texture is loam, clay loam, gravelly loam or gravelly clay loam. Secondary forms of calcium

carbonate on fragments and within the soil ranges from few to common nodules, concretions, or masses.

In some pedons a Cr/Bk horizon is present that has the same colors as the Bk horizon in the fine earth fraction. The limestone bedrock in the Cr are mostly white or yellow but mottles or individual fragments may be, brownish or grayish in some pedons. The Cr is extremely weakly to moderately cemented chalk with weathered rinds of soft bedrock that slakes in water. The fine-earth fraction is loam or clay loam. Secondary forms of calcium carbonate on fragments and within the soil ranges from common to many nodules, concretions, or masses of calcium carbonate.

The Cr layer is extremely weakly to moderately cemented chalky limestone that is more than 6 inches thick with vertical fractures more than 4 inches apart horizontally. Most fractures are filled with secondary calcium carbonate.

COMPETING SERIES: These are no competing series in the same family. Similar soils include Doss and Whitewright. Doss soils have a typic ustic moisture regime and a mollic epipedon. Whitewright soils formed over the Austin Chalk.

GEOGRAPHIC SETTING: Brackett soils occur on undulating to hilly uplands. Slopes are mostly 1 to 20 percent but range from 1 to 60 percent. The soil formed in interbedded marl and limestone of the Lower Cretaceous age like the southern portion of the Glen Rose formation and Commanche Peak formations with some acreage on the Walnut and Keys Valley marl. The limestone in these areas weathers to a benched or stair stepped topography consisting of risers and treads. The Brackett soils are mainly on the treads. The mean annual precipitation ranges from about 26 to 32 inches, and mean annual air temperature ranges from 64 to 69 degrees F. Frost free days range from 210 to 270 days and elevation ranges from 600 to 2450 feet. Thorntwaite annual P.E. indices range from 32 to 52.

GEOGRAPHICALLY ASSOCIATED SOILS: These are Cranfill, Denton, the Doss, Eckrant, Karnes, Maloterre, Real, Topsey, and Tarrant series. Denton soils occur at lower elevations, and do not have a paralithic contact within 20 inches of the surface. Doss soils are drier in the control section and have a mollic epipedon. Eckrant, Maloterre, and Tarrant soils occur at higher elevations, and are are clayey-skeletal. Real soils occur on similar surfaces and are loamy-skeletal. Cranfill, Karnes, and Topsey soils are deep and are very deep and are below or on slightly lower positions.

DRAINAGE AND PERMEABILITY: Well drained. Runoff is very low on 1 to 3 percent slopes, low on 3 to 5 percent slopes, medium on 5 to 20 percent slopes and high on 20 to 60 percent slopes. Permeability is moderate.

USE AND VEGETATION: Mainly used for livestock grazing and wildlife habitat. Original vegetation was rolling prairies dominated by little bluestem, indiangrass, and grama species. Woody vegetation includes juniper, sumac, liveoak, Vasey Oak, and Texas oak. Most of these plants can still be observed on these soils. In many places extended periods of overgrazing

allows plants such as Texas grama, red grama, hairy tridens, and juniper to replace plants more desired by livestock.

DISTRIBUTION AND EXTENT: Eastern Edwards Plateau and Grand Prairie Land Resource areas of southwest and central and north-central Texas. The series is extensive.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Kinney County, Texas (Reconnaissance Soil Survey of Southwest Texas); 1911.

REMARKS: Classification was changed 11/89 from Typic Ustochrepts to Udic Ustochrepts. On 10/2001 the type location was moved to Hays County, and the depth was changed from very deep to shallow and the sugroup changed back to Typic which was the original series concept.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipdeon - 0 to 7 inches after mixing (A and Bw)

Cambic horizon - 6 to 14 inches (Bk)

Paralithic contact - at 14 inches (top of Cr)

Ecological Sites: 1 to 20 percent slopes, Adobe PE 31-44 (081BY320TX), Adobe PE 44+(081CY355TX); and 20 to 60 percent slopes, Steep Adobe PE 31-44 (081BY348TX), Steep Adobe PE 44+ (081CY362TX).

ADDITIONAL DATA:

TAXONOMIC VERSION: Soil Taxonomy, Second Edition, 1999.

COMFORT SERIES

The Comfort series consists of well drained, slowly permeable soils that formed in clayey residuum over dolomitic limestone rocks of the Lower Cretaceous period. These soils are on nearly level to sloping upland plateaus and ridges. Slopes range from 0 to 8 percent.

TAXONOMIC CLASS: Clayey-skeletal, mixed, superactive, thermic Lithic Argiustolls

TYPICAL PEDON: Comfort stony clay--rangeland. (Colors are for dry soil unless otherwise stated.)

A--0 to 5 inches; dark grayish brown (10YR 4/2) stony clay, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure parting to moderate fine subangular blocky; very hard, very firm; many fine roots; few very fine tubular pores; 15 percent by volume angular limestone pebbles, 40 percent by volume cobbles and stones partially on the surface and in the soil; slightly alkaline; clear wavy boundary. (3 to 10 inches thick)

Bt--5 to 17 inches; dark reddish gray (5YR 4/2) stony clay, dark reddish brown (5YR 3/2) moist; moderate medium subangular and angular blocky structure parting to moderate fine angular blocky; very hard, very firm; few fine and medium roots; patchy clay films; 40 percent by volume cobble and stone size angular limestone fragments, many roots matted at soil rock interfaces; slightly alkaline; abrupt wavy boundary. (7 to 14 inches thick)

R--17 to 20 inches; indurated crystalline dolomitic limestone with irregular veins filled with soil.

TYPE LOCATION: Kendall County, Texas; from the intersection of Ranch Road 474 and U.S. Highway 87 in Boerne, northwest on U.S. 87 to Interstate Highway 10 west access road, then northwest 1 mile to Cibolo Creek Road, then west approximately 3 miles to entrance to a subdivision, then south on a paved road, 1.3 miles, then west 0.3 mile on top of a ridge in rangeland.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 9 to 20 inches and corresponds to the depth to bedrock. Soil reaction ranges from neutral through moderately alkaline. Coarse fragments of stone, cobble, and pebble size range from 35 to 70 percent on the surface and in the soil. Cobbles and stones are crystalline dolomitic limestone and pebbles are dominantly chert.

The A horizon has hue of 5YR, 7.5YR or 10YR with chroma of 3 or 4 and value of 2. Texture of the fine earth fraction is clay or clay loam.

The Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, chroma of 3 or 4 and value of 2 to 6. Texture of the fine earth fraction is clay, with clay. Clay content ranges from 55 to 75 percent.

COMPETING SERIES: Ridgelite is the only series in the same family. Similar series in other families are Bexar, Eckrant, Hensley, Rumple, Speck, Spicewood, Tarpley, and Tarrant series.

Ridgelite soils have lower soil temperatures and moisture. Bexar, Rumple, and Spicewood soils have sola more than 20 inches thick. Eckrant and Tarrant soils do not have Bt horizons. Hensley soils lack mollic epipedons. Speck and Tarpley soils have less than 35 percent coarse fragments.

GEOGRAPHIC SETTING: Comfort soils are on nearly level to sloping upland plateaus and low ridges. Slopes are plane to convex and gradients range from 0 to 8 percent, but are mostly less than 5 percent. The soils formed in clayey residuum over crystalline dolomitic limestone of Lower Cretaceous age. The climate is dry subhumid with a mean annual precipitation of 23 to 36 inches and average annual air temperature of 65 to 69 degrees F. The Thornthwaite annual P-E index ranges from 42 to 50. Frost free days range from 210 to 260. Elevation ranges from 1000 to 2300 feet.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Eckrant, Speck, Spicewood, Tarpley, and Tarrant series and Brackett and Real series. Eckrant, Speck, Spicewood, Tarpley, and Tarrant soils are on similar surfaces. Brackett and Real soils do not have Bt horizons and are on slopes below plateaus. In addition, Brackett soils do not have mollic epipedons.

DRAINAGE AND PERMEABILITY: Well drained. Runoff is low on 0 to 1 percent slopes, medium on 1 to 5 percent slopes and high on 5 to 8 percent slopes; Permeability is medium.

USE AND VEGETATION: Mostly used for rangeland and rural homesites. Native vegetation consists mostly of Texas wintergrass, threeawns, sideoats grama, little bluestem, and indiangrass. Woody vegetation consists of Texas oak, shin oak, liveoak, Texas persimmon and pricklypear.

DISTRIBUTION AND EXTENT: Central Texas; mainly in the southeastern part of the Edwards Plateau. The soils of this series are moderately extensive, about 100,000 acres.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Kendall County, Texas; 1979.

REMARKS: Comfort series was formerly included in the Tarrant series. Diagnostic horizons and features recognized in this pedon are:

Mollic epipedon - 0 to 17 inches (A and Bt horizon) Lithic Contact - 17 inches (R horizon) Argillic horizon - 5 to 17 inches (Bt horizon)

ADDITIONAL DATA: none

TAXONOMIC VERSION: Keys to Soil Taxonomy, Ninth Edition 2003.

GRUENE SERIES

The Gruene series consists of shallow, well drained, moderately slowly permeable soils that formed in clayey sediments over gravel. These soils are on gently sloping uplands. Slopes range from 1 to 5 percent.

TAXONOMIC CLASS: Clayey, mixed, active, thermic, shallow Petrocalcic Paleustolls

TYPICAL PEDON: Gruene clay--rangeland on low ridge. (Colors are for dry soil unless otherwise stated.)

A1--0 to 13 inches; very dark grayish brown (10YR 3/2) clay, very dark brown (10YR 2/2) moist; strong coarse blocky structure breaking to moderate fine blocky; very hard, very firm; common fine roots; few chert pebbles and few limestone and chert cobbles on the surface and within horizon; very gravelly clay layer about 2 inches thick in the lower part; noncalcareous; mildly alkaline; clear wavy boundary. (7 to 16 inches thick)

Ccam--13 to 22 inches; strongly cemented, massive caliche containing embedded rounded siliceous and limestone pebbles; abrupt wavy boundary. (2 to 24 inches thick)

IIC--22 to 80 inches; stratified very pale brown (10YR 7/4) very gravelly loam, becoming sandier with depth; some strata have rounded rock fragments up to 6 inches across.

TYPE LOCATION: Hays County, Texas; 4.9 miles north on Interstate Highway 35 from the intersection of Interstate Highway 35 and State Highway 80 in San Marcos; 550 feet east of access road at exit No. 210 in pasture.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 7 to 16 inches and corresponds to depth of the petrocalcic horizon. The A horizon is brown, dark brown, very dark gray, or very dark grayish brown in hues of 7.5YR and 10YR with values of 3 and 4 and chromas
of 1 and 2. It is clay or clay loam and contains 0 to 15 percent by volume of siliceous and limestone pebbles. Structure is blocky or subangular blocky. Reaction ranges from neutral through mildly alkaline, but is noncalcareous. The A horizon in some pedons has a thin strata that is very gravelly and calcareous in the lower part.

The Ccam horizon is massive strongly cemented or indurated caliche containing about 30 to 70 percent by volume of chert and limestone. The IIC horizon is stratified very gravelly loams and sands. In some pedons there are strata of weakly cemented nongravelly caliche.

COMPETING SERIES: These include the Slaughter series in the same family and the Kavett, Mereta, Patrick, Queeny, Quihi, and Stephen series. Slaughter, Mereta, and Kavett soils are drier for longer periods. In addition, Slaughter soils have a Bt horizon and Mereta and Kavett soils are calcareous. Queeny soils are calcareous and contain less than 35 percent in the control section. Patrick and Stephen soils lack petrocalcic horizons and are calcareous. Quihi soils have

more than 35 percent coarse fragments in the control section, have a Bt horizon, and have a solum more than 20 inches thick.

GEOGRAPHIC SETTING: These soils are on gently sloping ancient stream terraces. Slopes are convex and are mostly 1 to 5 percent but range up to 8 percent. The soils formed over thick beds of gravel deposited by streams of Pleistocene Age. The climate is warm and subhumid; mean annual precipitation ranges from about 30 to 34 inches; mean annual temperature from about 65 degrees to 70 degrees F and the Thornthwaite P-E indices from 42 to 50.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Patrick series and the Branyon, Krum, Lewisville, and Sunev series. They all lack Petrocalcic horizons and occur at slightly lower elevations. In addition, Branyon, Krum, Lewisville and Sunev soils have sola more than 20 inches thick.

DRAINAGE AND PERMEABILITY: Well drained, medium run-off, permeability of the A horizon is moderately slow and of the Petrocalcic horizon very slow.

USE AND VEGETATION: Mainly used for rangeland and as a source of gravel. Local areas are cultivated and used for small grains and hay. Present grasses include Texas wintergrass, buffalograss, Wright's threeawn, pinhole bluestem, fall witchgrass, and silver bluestem. Woody plants include honey mesquite, hackberry, Texas persimmon, and live oak.

DISTRIBUTION AND EXTENT: South Central Texas. These soils are moderately extensive.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Hays County, Texas; 1981.

REMARKS: The Gruene series was formerly included in the Queeny series.

LEWISVILLE SERIES

The Lewisville series consists of very deep, well drained, moderately permeable soils that formed in ancient loamy and calcareous sediments. These upland soils have slopes of 0 to 10 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Udic Calciustolls

TYPICAL PEDON: Lewisville silty clay--pasture. (Colors are for dry soil unless otherwise stated.)

Ap--0 to 6 inches; dark grayish brown (10YR 4/2) silty clay; very dark grayish brown (10YR 3/2) moist; moderate very fine subangular blocky and granular structure; hard, friable; contains a few strongly cemented calcium carbonate concretions; calcareous; moderately alkaline; abrupt smooth boundary. (0 to 7 inches thick)

A--6 to 16 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, firm; few root channels; common strongly cemented calcium carbonate concretions about 2 to 5 mm in diameter; calcareous; moderately alkaline; gradual smooth boundary. (7 to 15 inches thick)

Bk1--16 to 34 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; very hard, firm; common strongly cemented calcium carbonate concretions 2 to 5 mm in diameter; a few threads of soft calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary. (13 to 30 inches thick)

Bk2--34 to 62 inches; pale brown (10YR 6/3) silty clay; brown (10YR 5/3) moist; weak subangular blocky structure; hard, firm; common soft masses of segregated calcium carbonate, few small, strongly cemented calcium carbonate concretions; calcareous; moderately alkaline.

TYPE LOCATION: Collin County, Texas; from the intersection of Farm Road 546 and Texas Highway 75 in McKinney, 5 miles southeast on Farm Road 546, 1.2 miles south on county road, 60 feet east in pasture.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 60 to about 80 inches. It is clay loam, silty clay loam, or silty clay with silicate clay content ranging from 24 to 35 percent. Calcium carbonate equivalent in the 10- to 40-inch control section ranges from about 20 to 40 percent.

The A horizon has color in hue of 7.5YR and 10YR, value of 3 to 5, and chroma of 2 and 3. Thickness is 10 to 20 inches.

The Bk1 horizon is grayish, brownish, or yellowish in hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma of 2 to 4. Some pedons in hue of 10YR and 7.5YR have chroma of 6. Soft bodies, concretions, films, and threads of calcium carbonate comprise about 3 to 8 percent by volume.

The Bk2 horizon has colors similar to the Bk1 horizon except they have values about 1 or 2 units higher. Some pedons have hue of 5YR and chroma of 6. Secondary forms of calcium carbonate comprise 5 to about 15 percent by volume.

Some pedons are underlain at depths of 3 to 15 feet by sediments containing 15 to 50 percent gravel.

COMPETING SERIES: There are no other series in this family. Similar series are the Altoga, Austin, Nuvalde, Quanah, Venus, and Volente series. Nuvalde and Quanah soils are dry in the moisture control section for longer periods. Altoga and Austin soils have more than 40 percent calcium carbonate equivalent in the control section. In addition, Altoga soils lack mollic epipedons. Venus soils have fine-loamy control sections. Volente soils have more than 35 percent silicate clay content in the control section.

GEOGRAPHIC SETTING: Nearly level to rolling landscapes having plane to convex surfaces. Slopes range from 0 to 10 percent, but they are mostly 2 to 6 percent. The soil formed in ancient loamy and limy alluvium assumed to have originated in areas underlain by limestone. The climate is moist subhumid with an annual mean precipitation of about 28 to 38 inches and the Thornthwaite P-E index of 44 to 66. At the type location the mean annual temperature is 66 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These include the competing Altoga, Venus, and Volente series and Eddy, Krum, and Stephen series. Altoga, Eddy, and Stephen soils occur on erosional surfaces at higher elevations. Eddy and Stephen soils are less than 20 inches thick and are underlain by chalk or weakly cemented limestone. In addition, Eddy soils contain more than 35 percent by volume of coarse fragments. Krum, Venus, and Volente soils occur at lower elevations as stream terraces or lower portions of narrow valleys. In addition, Krum soils have clayey control sections and vertic features of cracking widely and deeply when dry.

DRAINAGE AND PERMEABILITY: Well drained; runoff is slow to medium; permeability is moderate.

USE AND VEGETATION: Mostly cultivated, mainly to small grains. Originally vegetation was mid and tall grasses and a few widely separated elm, hackberry, and mesquite trees.

DISTRIBUTION AND EXTENT: Mainly in Texas, along major streams in the Blackland Prairies and the Grand Prairie; possibly in Oklahoma. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Temple, Texas

SERIES ESTABLISHED: Denton County, Texas; 1918.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Mollic epipedon - 0 to 16 inches, the Ap and A horizons. Calcic horizon - 16 to 62 inches, the Bk horizons.

APPENDIX D

PRIOR THREATENED AND ENDANGERED SPECIES COORDINATION

UNITED STATES FISH AND WILDLIFE SERVICE

BLUE HOLE REGIONAL PARK THREATENED AND ENDANGERED SPECIES FINDINGS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
10711 Burnet Road, Suite 200
Austin, Texas 78758
512 490-0057
FAX 490-0974

DEC 03 2010

Mr. Don Ferguson
City Administrator
City of Wimberley
P.O. Box 2027,
Wimberley, Texas 78676

Consultation Number 21450-2010-I-0149

Dear Mr. Ferguson:

This responds to the City of Wimberley's May 30, 2010, letter and the attached information regarding development of the Blue Hole Regional Park (Park), Wimberley, Hays County, Texas (proposed project). The City of Wimberley submitted the letter and supporting documentation to the U.S. Fish and Wildlife Service (Service) requesting concurrence that future improvement projects on the approximately 126-acre site, as described within the 2007 *Blue Hole Regional Park: A Master Planning Vision* (Park Master Plan), may affect, but will not likely adversely affect the golden-cheeked warbler (*Dendroica chrysoparia*), a species listed pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act). Critical habitat has not been designated for the golden-cheeked warbler, therefore none will be affected. Suitable habitat for the black-capped vireo (*Vireo atricapilla*), and other species listed pursuant to the Act, does not occur within the action area. Therefore, no adverse effects to these species are anticipated.

The Service previously reviewed two individual improvement projects within the Park property that had been submitted by the City of Wimberley and the Texas Department of Transportation (TxDOT) in 2009 and 2010. However, to preclude review of future individual projects within the Park, the Service requested to review the Park property in its entirety. The March 3, 2010, submittal from the Guadalupe Blanco River Authority (GBRA) included the Park Master Plan as Appendix F in the *Draft Environmental Information Document for Village of Wimberley Wastewater Collection and Treatment System*, dated March, 2010.

Section 7 of the Act requires that all Federal agencies consult with the Service to ensure that the actions authorized, funded, or carried out by such agencies do not jeopardize the continued existence of any threatened or endangered species or adversely modify or destroy critical habitat of such species. It is our understanding that the Federal Highway Administration (FHWA) and the Environmental Protection Agency have provided funding for improvement projects within the Park.

The limits of the proposed project are within an approximately 126-acre site along Cypress Creek in western Hays County, Texas (Page 108, Park Master Plan). Currently, the proposed project site is a mix of riparian areas along drainages, woodlands, grassland, and existing use

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areas such as roadways, trails, and a wastewater treatment plant (Pages 17-36, Park Master Plan). The City of Wimberley is proposing the construction of various park improvements including bank stabilization, construction of a pavilion, amphitheatre, basketball court, soccer fields, tennis courts, restrooms, and additional trails. The City of Wimberley and GBRA are also proposing to replace the existing wastewater treatment plant. At full development, the total impervious cover within the Park will be less than seven percent of the 126-acre site.

According to the Park Master Plan, prepared by the Lady Bird Johnson Wildflower Center, woodlands within the site are dominated by Ashe juniper (*Juniperus ashei*) and lack sufficient levels of deciduous trees to qualify as habitat for the golden-cheeked warbler. Additionally, the *Programmatic Categorical Exclusion for Proposed Improvements on Blue Hole Loop from Ranch to Market Road 12 to Blue Hole Park*, dated January, 2010, prepared for the FHWA and TxDOT states that no habitat for golden-cheeked warbler occurs within the right-of-way of a 2.73-mile hike and bike trail that terminates within the Park due to lack of appropriate species and canopy closure. This document also notes that surveys along the Winter's Mill Trail area in 2006 and 2007 failed to detect golden-cheeked warblers.

Due to the lack of suitable habitat within the Park, we concur that the project as proposed may affect, but will not likely adversely affect the golden-cheeked warbler pursuant to section 7 of the Act. Therefore, no further action pursuant to the Act is necessary at this time. However, modifications to the proposed project or the addition of new information that suggests listed species or critical habitat may be affected by your proposed project should be submitted to our office for further consideration.

If you have any questions or comments, please contact Charlotte Kucera at 512-490-0057, extension 224.

Sincerely,

Adam Zerrenner
Field Supervisor

cc: Miguel Flores, Environmental Protection Agency, Dallas, Texas
Clarence Rumancik, Federal Highway Administration, Austin, Texas

TEXAS PARKS AND WILDLIFE DEPARTMENT

BLUE HOLE REGIONAL PARK HABITAT ASSESSMENT AND SENSITIVE SPECIES SURVEY

Habitat Assessment and
Sensitive Species Survey
Blue Hole Regional Park
Hays County, Texas

Document No. 100178
PBS&J Job No. 100010045

HABITAT ASSESSMENT AND SENSITIVE SPECIES SURVEY BLUE HOLE REGIONAL PARK HAYS COUNTY, TEXAS

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October 2010

Printed on recycled paper

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Acronyms and Abbreviations

BMP	best management practice
FEMA	Federal Emergency Management Agency
TPWD	Texas Parks and Wildlife Department
TXNDD	Texas Natural Diversity Database
NWI	National Wetland Inventory
SOC	species of concern
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

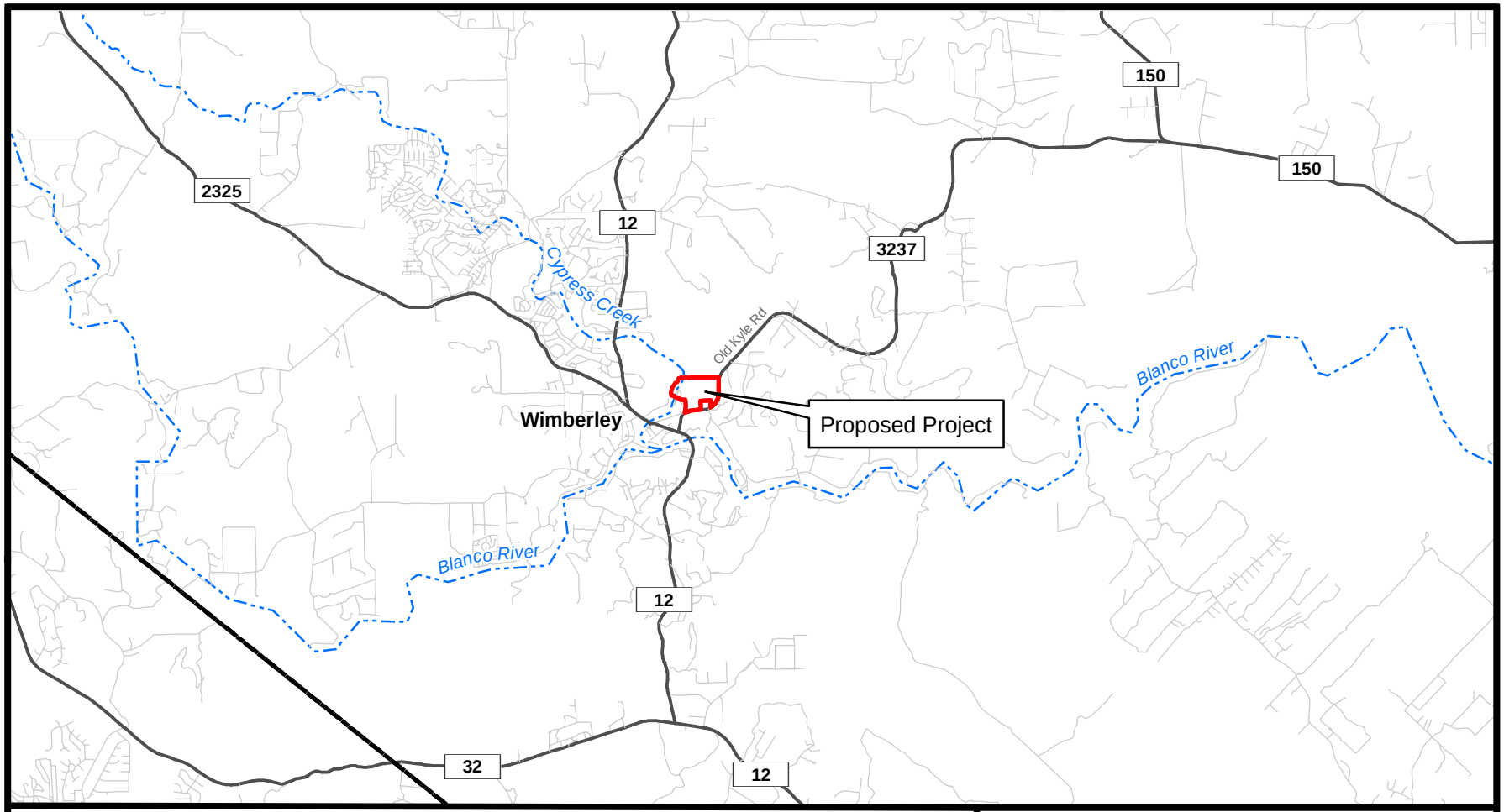
1.0 INTRODUCTION

The Village of Wimberley proposed to conduct improvements to Blue Hole Regional Park. Wimberley is located on Ranch Road 12, 14 miles from Dripping Springs and San Marcos (Figure 1). Blue Hole Regional Park occurs immediately east of the downtown square on Blue Hole Lane, off Old Kyle Road near the junction of Farm to Market Road 3237 (see Figure 1).

In 2005, Blue Hole Regional Park was purchased by the Village of Wimberley to save it from encroaching development. Goals of the proposed Blue Hole Regional Park improvement project (project) are to protect, restore, and develop the park as a recreational, educational and, ecological resource for present and future generations (Lady Bird Johnson Wildflower Center, 2007). The 126 acres will be sensitively developed for the enjoyment of residents, visitors, and future generations. Plans include new recreational facilities needed by the growing community and ecological restoration of native landscapes.

An environmental addendum was implemented by Texas Parks and Wildlife Department (TPWD), which required a habitat assessment and survey for specific species prior to the onset of project activities (Appendix A). TPWD requested the following species be assessed: Blanco River springs salamander (*Eurycea pterophila*), Western burrowing owl (*Athene cunicularia hypugaea*), zone-tailed hawk (*Buteo albonotatus*), golden-cheeked warbler (*Dendroica chrysoparia*), Texas fatmucket (*Lampsilis bracteata*), golden orb (*Quadrula aurea*), false spike mussel (*Quadrala mitchelli*), Texas pimpleback (*Quadrula petrina*), creeper (squawfoot) (*Strophitus undulates*), pistolgrip (*Tritogonia verrucosa*), plains spotted skunk (*Spilogale putorius interrupta*), Cagle's map turtle (*Graptemys caglei*), spot-tailed earless lizard (*Holbrookia lacerate*), Texas horned lizard (*Phrynosoma cornutum*), Texas garter snake (*Thamnophis sirtalis annectens*), Hill County wild-mercury (*Argythamnia aphoroides*), Warnock's coral root (*Hexalectris warnockii*), and canyon mock-orange (*Philadelphus ernestii*).

Design Workshop contracted PBS&J to conduct surveys for 17 of the 18 species. The golden-cheeked warbler will be assessed by Cliff Ladd of Loomis Consulting. This report presents the results of the habitat assessment and species survey conducted for the proposed project. The purpose of the assessment was to identify habitat and species of concern so they would be protected during park development.



0 1 2 4 Miles

PBSJ
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Figure 1
General Project Location
Blue Hole Regional Park Habitat Assessment
City of Wimberley, Hays County

Job No.: 100010045	Scale: 1" = 2 miles
Prepared by: CW	Date: 9/18/2010

File: N:/Clients/U_Z/Wimberley_City/Blue_Hole/100010045/geo/figs/Project_Location_Map.mxd

2.0 METHODS

2.1 HABITAT ASSESSMENTS

Vegetation communities were delineated within the project area using National Wetland Inventory (NWI) maps (U.S. Fish and Wildlife Service [USFWS], 1992), Federal Emergency Management Agency (FEMA) floodplain maps (FEMA, 1985), data obtained from the Blue Hole Regional Park Master Plan prepared by the Lady Bird Johnson Wildflower Center (Lady Bird Johnson Wildflower Center, 2007), aerial interpretation of recent infrared and true color aerial imagery, and field surveys. PBS&J ecologists characterized vegetation communities and potential habitat impacts for the study area.

2.2 STATE-LISTED THREATENED AND SPECIES OF CONCERN

Prior to conducting field surveys, PBS&J ecologists reviewed the TPWD's Natural Diversity Database (TXNDD) (TPWD, 2010a) to identify previously recorded occurrences of endangered, threatened and species of concern within Hays County. USFWS's threatened and endangered species county list was also reviewed (USFWS, 2010). Additionally, staff ecologists reviewed the soil surveys for Hays County, Texas (NRCS, 2006) and 7.5-minute U.S. Geological Survey (USGS) topographic maps for the Driftwood and Wimberley quads (USGS, 1998). The project area was assessed for potentially suitable habitat for 17 of 18 species listed species in TPWD's Environmental Addendum (see Appendix A) on May 5, May 20, May 24, and July 21, 2010.

PBS&J botanists conducted presence/absence surveys in appropriate habitat during the blooming period for each plant species listed in Appendix A (April–June for the canyon mock-orange [*Philadelphus ernestii*] and Hill Country wild mercury [*Argythamnia aphoroides*], and June–August for Warnock's coral root [*Hexalectris warnockii*]). A list of plant species found within the area was recorded and is included in Appendix B. PBS&J aquatic and wildlife biologists assessed appropriate habitats and sampled areas, as appropriate, for the potential presence of animal species listed in Appendix A.

3.0 EXISTING ENVIRONMENT

3.1 HABITAT ASSESSMENT

Vegetation communities and habitat types observed include Riparian, Juniper/Live Oak Woodland, Stream Channel, Grassland/Savanna, Disturbed Woodland, and Disturbed Areas. A brief description of each community is provided below.

3.1.1 Riparian

Riparian community refers to linear bands of trees, shrubs or other vegetation paralleling flowing water bodies such as creeks, streams or rivers. Riparian areas adjacent to Cypress Creek are shaded by bald cypress (*Taxodium distichum*), with scattered individuals of American sycamore (*Plantanus occidentalis*) and cedar elm (*Ulmus crassifolia*). Woody vegetation in the northern stretch of bank was limited primarily to a single line of cypress trees, but to the west and south of the access road there was more woody vegetation and higher diversity (Lady Bird Johnson Wildflower Center, 2007). The sparse understory was dominated by roughleaf dogwood (*Cornus drummondii*) and possumhaw (*Ilex deciduas*), with scattered patches of yaupon holly (*Ilex vomitoria*) and mustang grape (*Vitis mustangensis*). Woody exotic species included Japanese ligustrum (*Ligustrum japonicum*), Chinese ligustrum (*Ligustrum sinense*), English ivy (*Hedera helix*), and Japanese honeysuckle (*Lonicera japonica*) (Lady Bird Johnson Wildflower Center, 2007). Golden groundsel (*Packera obovata*) was widespread and abundant. Lyre-leafed sage (*Salvia lyrata*), which is typically found in the eastern quarter of Texas, and is considered to be rare in neighboring Travis County, was also abundant, perhaps the result of introduction. Additional herbaceous species included little bluestem (*Schizachyrium scoparium*), inland sea oats (*Chasmanthium latifolium*), rosettegrasses (*Dichanthelium acuminatum*), sedges, Japanese brome (*Bromus japonicas*), frogfruit (*Phyla* sp.), Mexican hat (*Ratibida columnaris*), catchweed bedstraw (*Galium aparine*), and scattered patches of maidenhair fern (*Adiantum pedatum*) (Lady Bird Johnson Wildflower Center, 2007).

3.1.2 Juniper/Live Oak Woodland

The majority of upland areas supported dense woodland heavily dominated by mature specimens of Ashe juniper (*Juniperus ashei*) with plateau live oak (*Quercus fusiformis*) as a lesser co-dominant. The largest and best developed specimens were on the deeper soils, mapped as Gruene clays, and the more westerly portions of the areas mapped as Brackett-Rock Outcrop (Lady Bird Johnson Wildflower Center, 2007). The canopy contained a few specimens of Texas oak (*Quercus buckleyi*) and Durand's oak (*Quercus sinuata var. sinuate*), but species diversity of trees was generally very low. Cedar elm and sugar hackberry (*Celtis laevigata*) were present, but were most noticeable in the thin strip of woodlands west of the cemetery. Other than live oak and juniper, the most common understory components were Texas persimmon (*Diospyros texana*), agarita (*Mahonia trifoliolata*), and twisted-leaf yucca (*Yucca rupicola*). Lindheimer silktassel (*Garrya ovata* subsp. *Lindheimeri*) was fairly common in some areas. Texas barberry (*Berberis* sp.), widely distributed on the property and fairly common in these woodlands, is an

interesting component, being restricted in range to portions of the Edwards Plateau (Lady Bird Johnson Wildflower Center, 2007). Although relatively rare over most of the Hill Country, it is locally common in portions of Hays and Blanco Counties. Additional woody species included bush croton (*Croton fruticulosus*), saw greenbriar (*Smilax bona-nox*), elbowbush (*Forestiera angustifolia*), red buckeye (*Aesculus pavia*), and flame-leaf sumac (*Rhus copallina*). The most common herbaceous component in closed woodlands was cedar sedge (*Carex planostachys*). Also present was golden groundsel and scattered grasses.

3.1.3 Stream Channel

As previously mentioned, the project area includes Cypress Creek and Deer Creek. Cypress Creek is a 44 km freshwater spring-fed tributary of the Blanco River within the Guadalupe River Basin. The flow is perennial in the lower 22 km, below Jacob‘s Well, and intermittent above (Dedden, 2008). The Cypress Creek watershed has significant local water use, with total combined water use in Wimberley and Woodcreek of 1,166 ac-ft during 2000 (TWDB, 2006). The Blanco River and Cypress Creek have been nominated by the Texas Parks and Wildlife Department as Ecologically Significant River and Stream Segments. The Texas Commission on Environmental Quality classifies Cypress Creek in terms such as high water-quality, exceptional aquatic life, and high aesthetic value (TCEQ, 2007). The northwestern portion of the property and areas adjacent to and west of the current entry road drain to Cypress Creek. The creek channel immediately downstream from the swimming hole was braided with flow divided into several smaller channels where riffle and run areas were observed.

Deer Creek is an intermittent drainage, which flows to the southwest from the northeastern portion of park boundary. The majority of Deer Creek, and portions of its minor tributaries, were bound by steep bluffs and occasional limestone rimrock features. Several of the minor tributaries contained small limestone step-down or waterfall areas having vertical drops of up to 7 feet in height (Lady Bird Johnson Wildflower Center, 2007). A segment in the southern portion of Deer Creek became narrowly incised to a depth of over 5 feet with evidence of a rapidly eroding stream system. Close to the southern boundary of the property, Deer Creek developed a wider floodplain that included a section where the drainage became indistinct with braiding of channels, damming by flotsam, and overland flow (Lady Bird Johnson Wildflower Center, 2007).

3.1.4 Grassland/Savanna

This vegetation community was observed where juniper/live oak woodland transitioned into a savanna, where the junipers and live oaks were generally smaller and more sparsely dispersed. Woody species were similar to those of the juniper/oak woodlands, but agarita, Texas prickly pear (*Opuntia lindheimeri*), and Texas sotol (*Dasylirion texanum*) were more frequent. Although hardly pristine, these areas contained the greatest diversity of herbaceous species, especially the large clearing to the west of the rehabilitation center. Savanna grass species included little bluestem, silver bluestem (*Bothriochloa saccharoides*), hairy grama (*Bouteloua hirsute*), sideoats grama (*Bouteloua curtipendula*), plains lovegrass (*Eragrostis*

intermedia), purpletop (*Tridens flavus*), Texas wintergrass (*Nassella leucotricha*), oldfield threeawn (*Aristida oligantha*), purple threeawn (*Aristida purpurea*), and Drummonds dropseed (*Sporobolus composites*). Common and widespread herbaceous species included four-nerve daisy (*Tetraneuris scaposa*), zexmenia (*Wedelia texana*), and wild onion (*Allium canadense*).

3.1.5 Disturbed Woodland

An area of disturbed woodland was observed southwest of the drainfields. This area appeared to have been cleared of all woody vegetation and is now dominated by low, bushy, shrubby regrowth of Ashe juniper. This area appears to have been previously leveled, and the junipers were appeared to be uniform in size and were distributed in clumps and bands of varying density (Lady Bird Johnson Wildflower Center, 2007).

3.1.6 Disturbed Areas

For the purposes of this report, disturbed areas include parking areas, trails, and maintained areas where exotic species are dominant. An on-site wastewater line, lift station, treatment plant, and drainfields serving the Deer Creek Rehabilitation Center are included in this classification. Additionally, an open area between the Cypress Creek swimming hole (Blue Hole) and the bluffs bordering the juniper/live oak woodland is included in this classification as it is dominated by exotic St. Augustine grass.

3.2 STATE-LISTED THREATENED AND SPECIES OF CONCERN

State law prohibits any take (incidental or otherwise) of state-listed species. Laws and regulations pertaining to state-listed endangered or threatened animals are contained in Chapters 67 and 68 of the Texas Parks and Wildlife (TPW) Code; laws pertaining to endangered and threatened plants are contained in Chapters 88 of the TPW Code.

As per TPWD's Environmental Addendum, sixteen species were assessed on May 5, May 20, May 24, and July 21, 2010. Six species are listed as state threatened and include zone-tailed hawk (*Buteo albonotatus*), Texas fatmucket (*Lampsilis bracteata*), golden orb (*Quadrula aurea*), false spike mussel (*Quadrula mitchelli*), Texas pimpleback (*Quadrula petrina*), and Texas horned lizard (*Phrynosoma cornutum*). The remaining eleven species are considered by TPWD as species of concern and include Blanco River springs salamander (*Eurycea pterophila*), Western burrowing owl (*Athene cunicularia hypugaea*), creeper (squawfoot) (*Strophitus undulates*), pistolgrip (*Tritogonia verrucosa*), plains spotted skunk (*Spilogale putorius interrupta*), Cagle's map turtle (*Graptemys caglei*), spot-tailed earless lizard (*Holbrookia lacerate*), Texas garter snake (*Thamnophis sirtalis annectens*), Hill County wild-mercury (*Argythamnia aphoroides*), Warnock's coral root (*Hexalectris warnockii*), and canyon mock-orange (*Philadelphus ernestii*). Table 1 contains a list of these species, status, a brief life history or habitat association, and potential for occurrence within the project area.

Table 1: State-Listed Threatened or Species of Concern with Potential to Occur
Within the Blue Hole Regional Park, Hays County, Texas[1]

Species[2]	Life History or Habitat Association	Federal/State Status[3]	Habitat On-site?	Potential to Occur
AMPHIBIANS				
Blanco River Springs salamander (*Eurycea pterophila*)	Subaquatic; springs and caves within the Blanco River drainage.	NL/SOC	Yes	High. TXNDD records an occurrence in Cypress Creek Springs, approximately 0.5 mile southwest of the project area (TPWD, 2010a).
BIRDS				
Western burrowing owl (*Athene cunicularia hypugaea*)	Found in open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows.	NL/SOC	Yes	Low. No TXNDD recorded occurrences for Hays County and no sign of this species was observed during the field surveys. Minimal grassland/savanna present within the park.
Zone-tailed hawk (*Buteo albonotatus*)	Arid open country, including open deciduous or pine-oak woodland, mesa or mountain country, often near watercourses, wooded canyons, tree-lined rivers along middle-slopes of desert mountains; nests in various habitats and sites, ranging from small trees in lower desert, giant cottonwoods in riparian areas, to mature conifers in high mountain regions.	NL/ST	Yes	Low. No recorded TXNDD sightings for Hays County and not observed during the field surveys. According to Lockwood and Freeman (2004) no occurrences have been recorded by for Hays County; however, sightings have been recorded in neighboring Kendall and Blanco counties. Suitable habitat is present within the park and this species may occur.
MOLLUSKS				
Texas fatmucket (*Lampsilis bracteata*)	Streams and rivers on sand, mud, and gravel substrates; intolerant of impoundment; broken bedrock and course gravel or sand in moderately flowing water; Colorado and Guadalupe River basins.	NL/ST	Yes	Low. Deer Creek is an ephemeral drainage and does not provide habitat for this species. No mussels were observed during the aquatic survey within the portion of Cypress Creek that occurs within the study area. This species may be present downstream of the project area; however, it is unlikely to occur within the study area.
Golden orb (*Quadrula aurea*)	Sand and gravel in some locations and mud at others; intolerant of impoundment in most instances; endemic to the Guadalupe, San Antonio, and Nueces	NL/ST	Yes	Low. Deer Creek is an ephemeral drainage and does not provide habitat for this species. No mussels were observed during

Species[2]	Life History or Habitat Association	Federal/State Status[3]	Habitat On-site?	Potential to Occur
	River basins. Only seven extant populations of this mussel have been noted from the upper and central Guadalupe River, central San Antonio River, lower San Marcos River, and Lake Corpus Christi.			the aquatic survey within the portion of Cypress Creek that occurs within the study area. This species may be present downstream of the project area; however, it is unlikely to occur within the study area.
False spike mussel (*Quadrula mitchelli*)	Substrates of cobble and mud, with water lilies present; Rio Grande, Brazos, Colorado, and Guadalupe (historic) river basins.	NL/ST	Yes	Low. Deer Creek is an ephemeral drainage and does not provide habitat for this species. No mussels were observed during the aquatic survey within the portion of Cypress Creek that occurs within the study area. This species may be present downstream of the project area; however, it is unlikely to occur within the study area.
Texas pimpleback (*Quadrula petrina*)	Mud, gravel and sand substrates, generally in areas with slow flow rates; endemic to the Colorado and Guadalupe drainages.	NL/ST	Yes	Low. Deer Creek is an ephemeral drainage and does not provide habitat for this species. No mussels were observed during the aquatic survey within the portion of Cypress Creek that occurs within the study area. This species may be present downstream of the project area; however, it is unlikely to occur within the study area.
Creeper (squawfoot) (*Strophitus undulates*)	Small to large streams, prefers gravel or gravel and mud in flowing water; Colorado, Guadalupe, San Antonio, Neches (historic), and Trinity (historic) River basins.	NL/SOC	Yes	Low. Deer Creek is an ephemeral drainage and does not provide habitat for this species. No mussels were observed during the aquatic survey within the portion of Cypress Creek that occurs within the study area. This species may be present downstream of the project area; however, it is unlikely to occur within the study area.
Pistolgrip (*Tritogonia verrucosa*)	Stable substrate, rock, hard mud, silt, and soft bottoms, often buried deeply; east and central Texas, Red through San Antonio River basins.	NL/SOC	Yes	Low. Deer Creek is an ephemeral drainage and does not provide habitat for this species. No mussels were observed during the aquatic survey within the portion of Cypress Creek that occurs within the study area. This species may be present downstream of the project area; however, it is unlikely to occur within the study area.

Species[2]	Life History or Habitat Association	Federal/State Status[3]	Habitat On-site?	Potential to Occur
MAMMALS				
Plains spotted skunk (*Spilogale putorius interrupta*)	Species is catholic and can be found in open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.	NL/SOC	Yes	High. No recorded TXNDD sightings within Hays County and species was not observed during the field surveys; however, suitable habitat is present and this species may occur. In addition, Schmidly (2004) records the occurrence of *Spilogale putorius* within Hays County.
REPTILES				
Cagle's map turtle (*Graptemys caglei*)	Endemic to the Guadalupe River system; short stretches of shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nest on gently sloping sand banks within 30 feet of water's edge.	NL/SOC	Yes	High. TXNDD records the closest sighting approximately 1.35 miles southeast of the project area within the Blanco River (TPWD, 2010a). Species was not observed during the field surveys; however, suitable habitat is present within and adjacent to Cypress Creek.
Spot-tailed earless lizard (*Holbrookia lacerate*)	Central and southern Texas and adjacent Mexico; areas that are sparsely vegetated with some bare ground; a variety of soil types, though never on pure sand; upland savannas, plowed fields in places that originally were grasslands, thinly vegetated mesquite shrublands, semi-xeric mesquite and prickly pear brushlands, and coastal prairie.	NL/SOC	Yes	High. No recorded TXNDD for Hays County and species was not observed during field surveys; however, suitable habitat is present within the project area and this species may occur. In addition, Dixon (2000) records sightings of the subspecies *Holbrookia lacerate lacerate* (plateau earless lizard) from Hays County.
Texas horned lizard (*Phrynosoma cornutum*)	Open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March–September.	NL/ST	Yes	High. No recorded TXNDD sightings within Hays County and species was not observed during the field surveys; however, minimally suitable habitat is present within the park and this species may occur. Dixon (2000) records this species presence in Hays County.
Texas garter snake (*Thamnophis sirtalis annectens*)	Wet or moist microhabitats are conducive to the species occurrence, but is not necessarily restricted to them; hibernates underground or in/under surface cover; breeds March–August.	NL/SOC	Yes	High. Although species was not observed during field surveys, TXNDD records a sighting approximately 15 miles east of the project area (TPWD, 2010a).
PLANTS				

Species[2]	Life History or Habitat Association	Federal/State Status[3]	Habitat On-site?	Potential to Occur
Hill County wild-mercury (*Argythamnia aphoroides*)	Texas endemic; mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; flowering April-May with fruit persisting until midsummer.	NL/SOC	Yes	Unlikely. Species was not observed during field surveys conducted in 2010 or surveys conducted by the Lady Bird Johnson Wildflower Center in 2007; however suitable habitat is present within the project area. TXNDD records the closest sighting approximately 6.35 miles southeast of the project area (TPWD, 2010a).
Warnock's coral root (*Hexalectris warnockii*)	Leaf litter and humus in oak-juniper woodlands on shaded slopes and intermittent, rocky creekbeds in canyons; in the Trans Pecos in oak-pinyon-juniper woodlands in higher mesic canyons (to 2000 m [6550 ft]), primarily on igneous substrates; in Terrell County under *Quercus fusiformis* mottes on terraces of spring-fed perennial streams, draining an otherwise rather xeric limestone landscape; on the Callahan Divide (Taylor County), the White Rock Escarpment (Dallas County), and the Edwards Plateau in oak-juniper woodlands on limestone slopes; in Gillespie County on igneous substrates of the Llano Uplift; flowering June-September; individual plants do not usually bloom in successive years.	NL/SOC	Yes	Unlikely. Species was not observed during field surveys conducted in 2010 or surveys conducted by the Lady Bird Johnson Wildflower Center in 2007; however suitable habitat is present within the project area. TXNDD records the closest sighting approximately 0.66 miles south/southwest of the project area (TPWD, 2010a).
Canyon mock-orange (*Philadelphus ernestii*)	Texas endemic; usually found growing from honeycomb pits on outcrops of Cretaceous limestone exposed as rimrock along mesic canyons, usually in the shade of mixed evergreen-deciduous canyon woodland; flowering April-June, fruit dehiscing September-October.	NL/SOC	Yes	Unlikely. Species was not observed during field surveys conducted in 2010 or surveys conducted by the Lady Bird Johnson Wildflower Center in 2007; however suitable habitat is present within the project area. TXNDD records the closest sighting approximately 8.3 miles northwest of the project area (TPWD, 2010a).

[1] According to TPWD 2009 Environmental Addendum for the WIMBERLEY Blue Hole Regional Park II, Project Number 50-000419 (Appendix A).

[2] Nomenclature follows FWS (2010) and TPWD (2010b).

[3] According to FWS (2010) and TPWD (2010b).

NL = no federal listing; ST – state threatened; SOC = state species of concern

4.0 RESULTS

4.1 VEGETATIVE COMMUNITIES AND HABITAT

As previously mentioned, vegetation communities and habitat types observed include Riparian, Juniper/Live Oak Woodland, Stream Channel, Grassland/Savanna, Disturbed Woodland and Disturbed Areas. The amount (acres) of each type is listed below in Table 2, and is illustrated on Figure 2.

Table 2: Vegetation Communities and Habitats within Blue Hole Regional Park, Hays County, Texas

Vegetation Community	Area within Park Boundary (acres)
Riparian	6.9
Juniper/Live Oak Woodland	72.5
Stream Channel	1.7
Grassland/Savanna	21.6
Disturbed Woodland	13.4
Disturbed Areas	5.6
Total	**121.7**

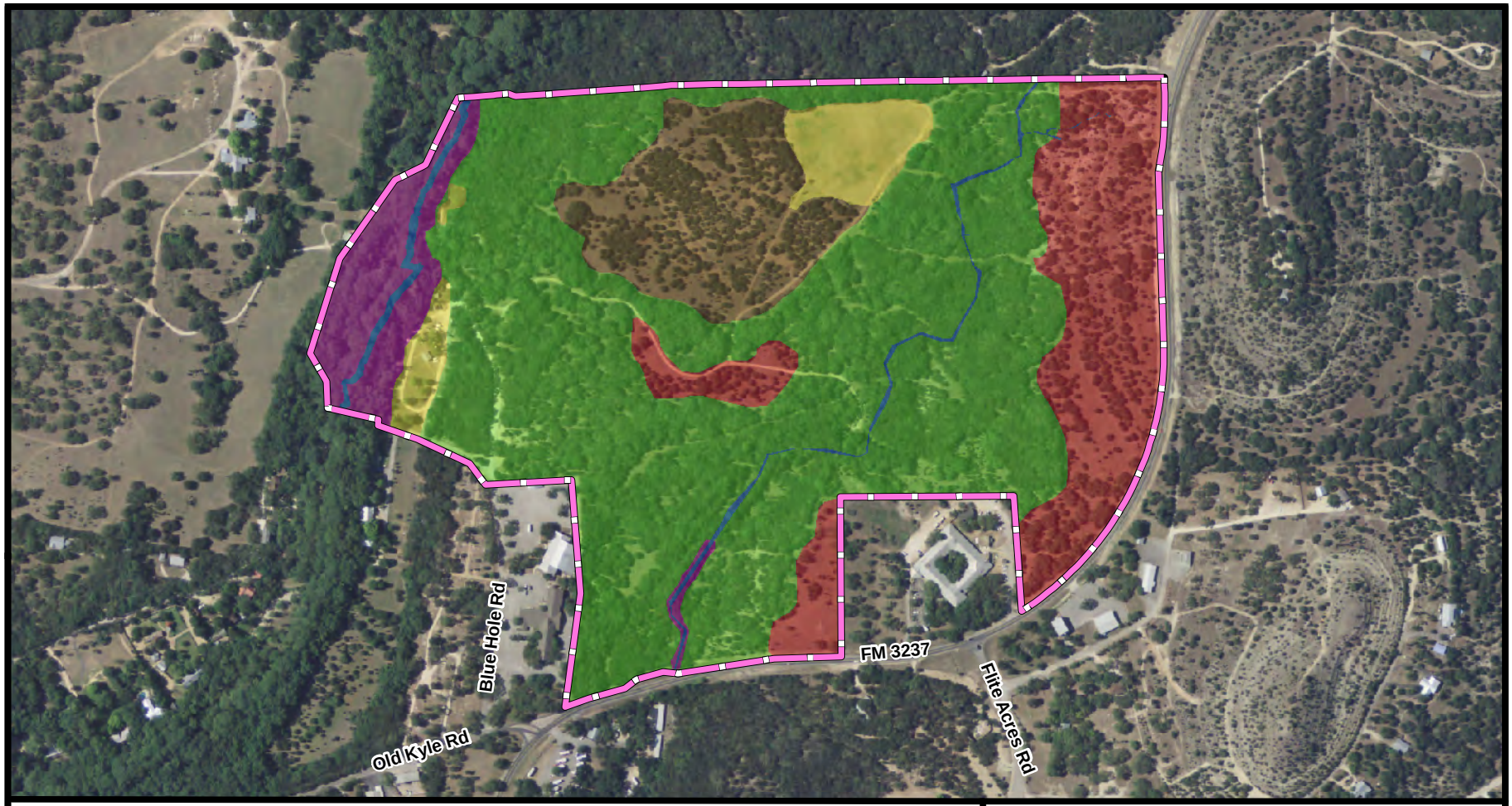
4.2 STATE-LISTED THREATENED AND SPECIES OF CONCERN

None of the species listed in Table 1 were observed during the field surveys. Figure 3 displays TXNDD records of occurrence for some of the species listed in Appendix A.

Habitat for Hill country wild-mercury, Warnock's coral root, and canyon mock-orange is present within the study area; however, these species are given an "unlikely" potential for occurrence because extensive surveys were conducted in 2007 by Lady Bird Johnson Wildflower Center and by PBS&J in 2010 with no findings. TXNDD records an occurrence of Hill country wild-mercury approximately 6.35 miles southeast of the project area, an occurrence of Warnock's coral root approximately 0.66 mile south-southwest of the project area, and an occurrence of canyon mock-orange approximately 8.3 miles northwest of the project area (TPWD, 2010a; see Figure 3). The proposed park improvement project may affect, but is unlikely to adversely affect, these species.

Species having a low potential to occur within the project area include Western burrowing owl, zone-tailed hawk, Texas fatmucket, golden orb, false spike mussel, Texas pimpleback, creeper, and pistolgrip.

Western burrowing owl is uncommon to common summer resident and uncommon to rare winter resident in the western half of the state, east to Wilbarger County (Lockwood and Freeman, 2004). This species is found in open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant



- Project Boundary (121.8 acres)
- Disturbed (5.6 acres)
- Disturbed Woodland (13.4 acres)
- Grassland/Savanah (21.6 acres)
- Juniper/Live Oak/Woodland (72.5 acres)
- Riparian (6.9 acres)
- Stream Channel (1.7 acres)

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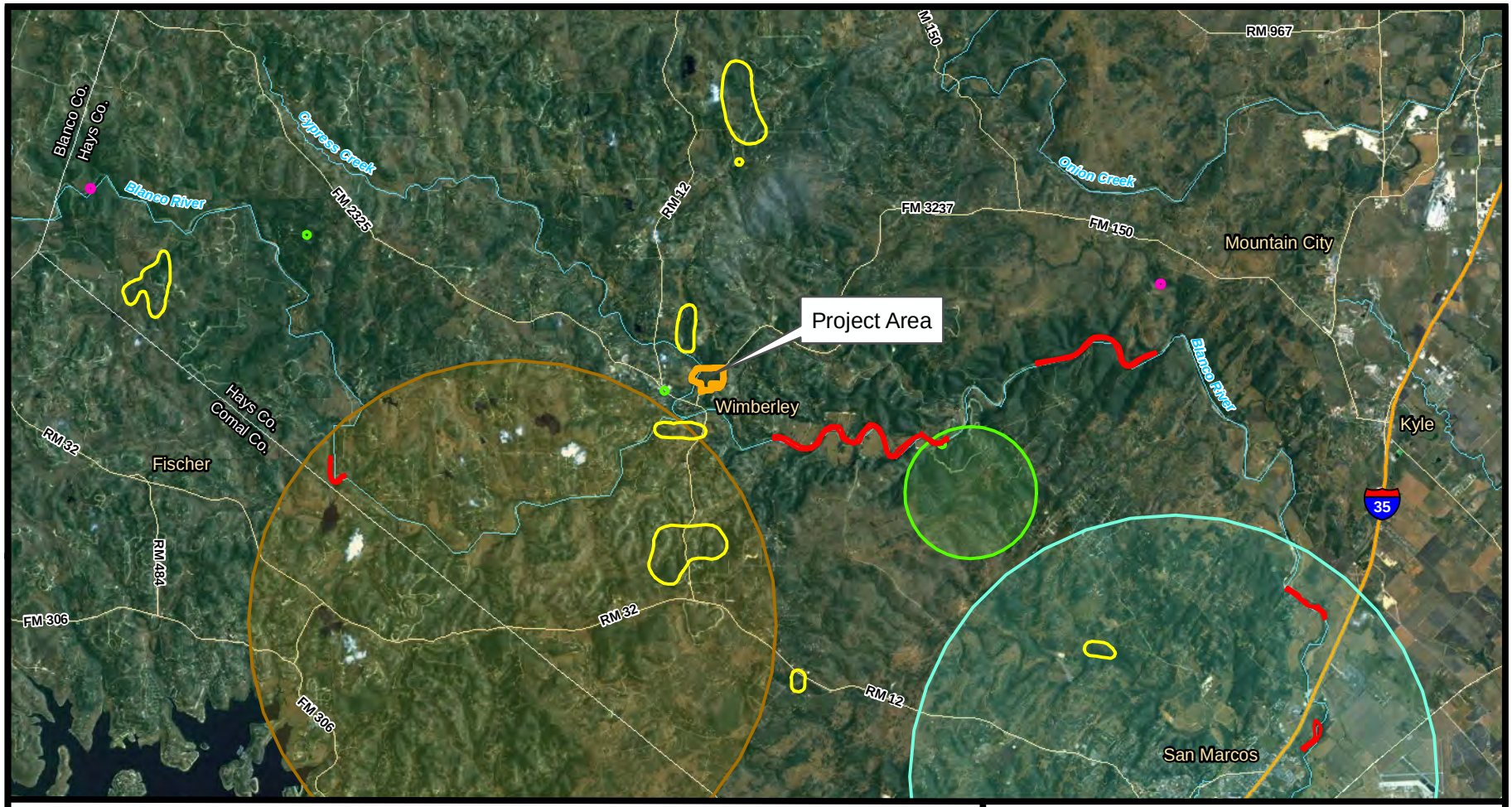
Figure 2
Vegatative Communities and Habitat Types
Blue Hole Regional Park Habitat Assessment
City of Wimberley, Hays County

Prepared for: City of Wimberley	
Job No.: 100010045	Scale: 1" = 600'
Prepared by: CW	Date: 09/18/2010
File: N:/Clients/U_Z/Wimberley_City/Blue_Hole/100010045/geo/figs/vegatation.mxd	



Project Area

Blanco River springs salamander (0.5 miles to project area)

Cagle's map turtle (1.35 miles to project area)

Canyon mock-orange (8.3 miles to project area)

Golden-cheeked warbler (0.35 miles to project area)

Hill Country wild-mercury (6.35 miles to project area)

Warnock's coral-root (0.66 miles to project area)

N W E S

0 1.5 3 6 Miles

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Austin, Texas 78730
Phone: (512) 329-8342 Fax: (512) 327-2453

Figure 3
TXNDD Species Occurences
Blue Hole Regional Park Habitat Assessment
City of Wimberley, Hays County

Job No.: 100010045	Scale: 1" = 3 miles
Prepared by: CW	Date: 9/18/2010

File: N:/Clients/U_Z/Wimberley_City/Blue_Hole/100010045/geo/figs/NDD.mxd

lots near human habitation (TPWD, 2010b). There is minimal open grassland habitat within the proposed project area and no TXNDD records exist for this species in Hays County; therefore, Western burrowing owl is unlikely to occur. The proposed park improvement project may effect, but is unlikely to adversely affect, this species.

The zone-tailed hawk is a rare to uncommon breeding bird in the mountains and canyon lands of the Trans-Pecos and Edwards Plateau regions of Texas and is a rare migrant and winter resident in the Lower Rio Grande Valley (Johnson et al., 2000; Lockwood and Freeman, 2004). Oberholser (1974) shows a questionable Hays County record. According to TXNDD (TPWD, 2010), no documented records of the species exist from the study area. According to Lockwood and Freeman (2004), no occurrences have been recorded by for Hays County; however, sightings have been recorded in neighboring Kendall and Blanco counties. Suitable habitat is present within the park and this species may occur; however, the proposed park improvement project may affect, but is unlikely to adversely affect, the zone-tailed hawk.

The state-listed threatened Texas fatmucket (*Lampsilis bracteata)* occurs in streams and rivers on sand, mud, and gravel in the San Antonio, Guadalupe, and Colorado river systems, with the Colorado River populations occurring at least as far west as Concho River tributaries in Tom Green County (Howells et al., 1996). In the past 30 years, natural and human-induced stressors have lead to the dramatic decline of this species and remaining populations are at risk from scouring floods, dewatering, and poor land management (TPWD, 2009). As mentioned above, Deer Creek is an ephemeral drainage and does not provide habitat for this species and no mussels were observed within the portion of Cypress Creek in the study area during the aquatic survey. This species may be present downstream of the project area; however, it is unlikely to occur within the study area. The proposed park improvement project will have no effect on the Texas fatmucket.

The state-listed threatened golden orb (*Quadrula aurea)* occurs in the San Antonio, Guadalupe, Colorado, Brazos, Nueces, and Frio River systems (Howells et al., 1996). Individuals have been reported being found in sand and gravel in some locations and mud at others, while having an intolerance of impoundment in most instances (TPWD, 2009). As mentioned above, Deer Creek is an ephemeral drainage and does not provide habitat for this species and no mussels were observed within the portion of Cypress Creek in the study area during the aquatic survey. This species may be present downstream of the project area; however, it is improbable that the species would be found within the study area. The proposed park improvement project will have no effect on the golden orb.

The state-listed threatened false spike (*Quadrula mitchelli*) is known from only two disjunct populations, one in the Brazos, Colorado, and Guadalupe river basins of central Texas and the other in the Rio Grande drainage (TPWD, 2009). It is found in substrates varying from mud to mixtures of sand, gravel, and cobble, with water lilies present at one study site (Wurtz, 1950). This species may possibly be extirpated in Texas. Deer Creek is an ephemeral drainage and does not provide habitat for this species. During the aquatic survey, no mussels were observed within the portion of Cypress Creek in the study area. This species may be present downstream of the project area; however, it is unlikely that the species would be

found within the study area. The proposed park improvement project will have no effect on the false spike mussel.

The state-listed threatened Texas pimpleback (*Quadrula petrina)* occurs in the Guadalupe and Colorado river systems, including reports from the Llano, San Saba, and Pedernales rivers, and is found in mud and gravel, at slow flow rates (Howells et al., 1996). The only confirmed significant population in the Concho River persists, but has been badly reduced by dewatering (TPWD, 2009). Consequently, it is unlikely that this species would be present within the study area. The proposed park improvement project will have no effect on the Texas pimpleback.

Species having a high potential to occur within the project area include the Blanco River springs salamander, plains spotted skunk, Cagle's map turtle, spot-tailed earless lizard, Texas horned lizard, and Texas garter snake. These species are discussed below.

The Blanco River springs salamander is a subaquatic species endemic to the springs and caves associated with the Blanco River drainage. TXNDD records show an occurrence in Cypress Creek Springs, approximately 0.5 mile southwest of the project area in. This species has potential to occur within the project area; however, the proposed park improvement project will have no effect on this species.

The spot-tailed earless lizard is believed to be areas that are sparsely vegetated with some bare ground. It is found on a variety of soil types, though never on pure sand. It is known to occur in upland savannas, plowed fields in places that originally were grasslands, thinly vegetated mesquite shrublands, semi-xeric mesquite and prickly pear brushlands, and coastal prairie. Although no TXNDD sightings have been recorded within Hays County, this species has potential to occur within the project area. The proposed project may affect, but is unlikely to adversely affect, this species.

The Texas horned lizard occurs throughout the western half of the state in a variety of habitats, but prefers arid and semi-arid habitats in sandy loam or loamy sand soils that support patchy bunch-grasses, cacti, yucca, and various shrubs (Henke and Fair, 1998). It historically occurred throughout Texas, but over the past 20 years, it has almost vanished from the eastern half of the state, although it still maintains relatively stable numbers in west Texas. While TXNDD (TPWD, 2010a) shows no documented records from the study area, the species occurs or has occurred in all study area counties (Dixon, 2000). The proposed project may affect, but is unlikely to adversely affect, the Texas horned lizard.

Appropriate habitat exists within the park for plains spotted skunk, Cagle's map turtle and Texas garter snake and these species have potential to occur within the project area. TXNDD (TPWD, 2010a) has recorded occurrences for Cagle's map turtle approximately 1.35 miles southeast of the project area within the Blanco River (see Figure 3), and an occurrence of Texas garter snake approximately 15.5 miles east of the project area. The proposed park improvement project may affect, but is unlikely to adversely affect, the plains spotted skunk and Texas garter snake. The proposed park improvement project will have no effect on Cagle's map turtle.

5.0 CONCLUSION

The proposed park improvement project is unlikely to adversely affect any of the 17 species evaluated in this report. As noted during a December 1, 2009 telephone conversation between Steven Spears from Design Workshop and Jill Seed from PBS&J, the City of Wimberley will utilize Cliff Ladd (Loomis Consulting) to further consult with USFWS regarding GCWA and attain the appropriate permits, if any, that may be required.

A major design parameter of park improvements is that the impervious cover total does not exceed 10% of the site to avoid potentially impacting groundwater and aquifer recharge. Additionally, design features adjacent to the Blue Hole swimming area within Cypress Creek do not result in discharge of fill material; rather, the improvements in this area will stabilize areas to reduce erosion and provide bank stabilization. For these reasons, downstream impacts to any mussels and Blanco River springs salamander are not expected.

The Blue Hole park improvement project is designed to minimize impacts to the surrounding habitat while enhancing usability of the site. As previously mentioned, the major design component of the project is to keep the impervious cover to under 10%, which further reduces the possibility for water quality degradation in Cypress Creek and Deer Creek. The mission of the proposed improvement project is to "protect, restore, and develop Blue Hole Regional Park as a recreational, educational, and ecological resource for present and future generations." With this in mind, Design Workshop established and will implement the project vision, which aims "to create an ecologically and economically sustainable regional park which celebrates the character of the Wimberley Valley and thoughtfully considers the environmental and recreational needs of the community. The park invites people to experience, respect, and enjoy the uniqueness and beauty of the Texas Hill Country."

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Appendix A

Texas Parks and Wildlife Department Environmental Addendum

ENVIRONMENTAL ADDENDUM

Project Name/Number: WIMBERLEY Blue Hole Regional Park II, Project Number 50-000419

Pursuant to requirements of the National Environmental Policy Act of 1969 (Public Law 91-190) and the Endangered Species Act of 1973, as amended (Public Law 93-205), this addendum is hereby incorporated into the grant agreement.

The **Village of Wimberley** (sponsor) is hereby advised that based on the project description, **the following is required:**

On-the-ground surveys by qualified biologists should be performed to determine if habitat is present within the project area and adjacent to and/or downstream of the project for the following species:

Federal and State-listed Endangered:
Golden-cheeked Warbler (*Dendroica chrysoparia*)

State listed Threatened
Zone-tailed Hawk (*Buteo albonotatus*)
Texas horned lizard (*Phrynosoma cornutum*)

Rare Species:
***Amphibians*:**
Blanco River Springs Salamander *(Eurycea pterophila)*

Reptiles:
Cagles' map turtle (*Graptemys caglei*)

Birds:
Western Burrowing Owl (*Athene cunicularia hypugaea*)

Mammals:
Plains spotted skunk (*Spilogale putorius interrupta*)

Reptiles:
Spot-tailed earless lizard (*Holbrookia lacerata*)
Texas garter snake (*Thamnophis sirtalis annectens*)

Mollusks (Mussels):
Creeper (squawfoot) (*Strophitus undulatus*)
False spike mussel (*Quincuncina mitchelli*)
Golden orb (*Quadrula aurea*)
Pistolgrip (*Tritogonia verrucosa*)
Texas fatmucket (*Lampsilis bracteata*)
Texas pimpleback (*Quadrula petrina*)

Plants:
Canyon mock-orange (*Philadelphus ernestii*)
Hill Country wild-mercury (*Argythamnia aphoroides*)
Warnock's coral root (*Hexalectris warnockii*)

If habitat for any of the species listed above is present, then presence-absence surveys should be performed to determine if the species are present on site and would be impacted by the project. If the habitat assessments determine the need for presence-absence surveys, Federal and State permits and special protocols may be required. If adverse impacts are anticipated or presence-absence surveys are needed, contact the USFWS and TPWD for further guidance.

Prior to any cedar tree removal, a determination should be made that the GCW would not be affected by this action, since GCW reside in oak-cedar woodlands and use cedar bark to construct their nests. Additional information on characteristics of GCW habitat may be found at: http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_w7000_0013_golden_cheeked_warbler_mgmt.pdf. If adverse effects to GCW may occur, then consultation with the U.S. Fish and Wildlife Service (USFWS) will be required. These consultations may take six months to a year to complete.

* * * * * * * * * *

I have read this addendum and understand that the political subdivision (sponsor) which I represent will be responsible for compliance with the above as a result of receiving grant assistance from the Texas Parks & Wildlife Department. It is also understood that the Environmental Addendum is a part of the Project Agreement.

Signature of Official Authorized in Resolution

10/20/09
Date

Mr. Don Ferguson, City Administrator
Name and Title

Appendix B

Plant Species Observed

Species Observed at Blue Hole Regional Park				
Scientific name	**Common name**	**Habitat (1)**	**Growth Habit**	**Abundance (2)**
Abutilon fruticosum	Indian mallow	W	Herbaceous: Forb	U
Aesculus pavia var. *pavia*	Red buckeye	C/B	Shrub	U
Acer negundo	Boxelder	C/B	Tree	S
Adiantum capillus-veneris	Maidenhair fern	C/B	Herbaceous:Fern	S
Ageratina havanensis	Shrubby snakeroot	C/B,W	Shrub	U
Allium sp.	Wild onion	C/B	Herbaceous: Forb	S
Argemone albiflora subsp. *texas*	Texas white prickly poppy	G	Herbaceous: Forb	U
Arisaema dracontium	Green dragon	C/B	Herbaceous: Forb	U
Aristida oligantha	Oldfield three-awn	G	Herbaceous: Grass	C
Aristida purpurea	Purple three-awn	G	Herbaceous: Grass	C
Asclepias asperula	Antelopehorns	G	Herbaceous: Forb	S
Baccharis neglecta	Rooseveltweed	G	Shrub	U
Berberis swaseyi	Texas barberry	C/B,W	Shrub	U
Berberis trifoliata	Agarito	G,C/B,W	Shrub	U
Bothriochloa ischaemum	King Ranch bluestem	G	Herbaceous: Grass	C
Bothriochloa laguroides ssp. *torreyana*	Silver bluestem	G	Herbaceous: Grass	S
Bouteloua curtipendula	Side-oats grama	G	Herbaceous: Grass	U
Bouteloua hirsuta	Hairy grama-grass	G,W	Herbaceous: Grass	C
Bouteloua rigidiseta	Texas grama	G	Herbaceous: Grass	C
Bromus catharticus	Rescue grass	G	Herbaceous: Grass	S

Species Observed at Blue Hole Regional Park				
Scientific name	**Common name**	**Habitat (1)**	**Growth Habit**	**Abundance (2)**
Bromus japonicus	Japanese brome	C/B	Herbaceous: Grass	S
Callicarpa americana	American beautyberry	C/B,W	Shrub	U
Calyptocarpus vialis	Prostrate lawnflower	G,C/B,W	Herbaceous: Forb	C
Carex planostachys	Cedar sedge	C/B,W	Herbaceous: Forb	C
Carex spp.	Sedges	G,G2,C/B,W	Herbaceous: Forb	S
Carya illinoinensis	Pecan	C/B	Tree	C
Celtis laevigata var. *laevigata*	Sugar hackberry	C/B,G	Tree	C
Celtis lavigata var. *reticulata*	Netleaf hackberry	C/B,W	Tree	U
Centaurium texense	Lady Bird's centaury	G	Herbaceous: Forb	C
Cercis canadenseis var. *texensis*	Texas redbud	C/B,W	Shrub/Tree	S
Chaerophyllum tainturieri	Chervil	G	Herbaceous: Forb	S
Chasmanthium latifolium	Broadleaf woodoats	C/B,W	Herbaceous: Grass	A
Cirsium texanum	Texas thistle	G	Herbaceous: Forb	A
Clematis sp.	Clematis	C/B	Vine: Herbaceous	U
Cnidoscolus texanus	Bullnettle	G	Herbaceous: Forb	S
Cornus drummondii	Roughleaf dogwood	C/B	Shrub	S
Cooperia pedunculata	Prairie rainlily	G	Herbaceous: Forb	C
Coryphantha sulcata	Nipple cactus	G	Cactus	S
Croton capitatus	Woolly croton	G	Herbaceous: Forb	C
Croton	Bush croton	C/B	Shrub	S

Species Observed at Blue Hole Regional Park				
Scientific name	**Common name**	**Habitat (1)**	**Growth Habit**	**Abundance (2)**
fruticulosus				
Croton monanthogynus	Prairie tea	C/B	Herbaceous: Forb	S
Cynodon dactylon	Bermudagrass	G	Herbaceous: Grass	C
Dasyochloa pilosum	Low woolly-grass	G	Herbaceous: Grass	S
Dasylirion texanum	Texas sotol	G,C/B	Shrub	C
Desmanthus virgatus var. *acuminatus*	Sharp-pod bundle flower	G	Herbaceous: Forb	S
Dichanthelium spp.	Rosettegrass	G	Herbaceous: Grass	S
Dichondra sp.	Ponyfoot	C/B	Herbaceous: Forb	S
Diospyros texana	Texas persimmon	C/B,W	Shrub	C
Eleocharis sp.	Spikerush	G	Herbaceous: Forb	S
Elymus canadensis	Canada wildrye	C/B	Herbaceous: Grass	S
Epipactis gigantea	Chatterbox orchid	C/B	Herbaceous: Forb	R
Erigeron sp.	Fleabane	G	Herbaceous: Forb	U
Eragrostis intermedia	Plains lovegrass	G	Herbaceous: Grass	S
Eupatorium serotinum	Late thoroughwort	C/B	Herbaceous: Forb	U
Euphorbia sp.	Spurge	C/B	Herbaceous: Forb	U
Evax prolifera	Big-head evax	G	Herbaceous: Forb	A
Evolvulus sericeus	Silky dwarf morning glory	G	Herbaceous: Forb	S
Festuca versuta	Texas fescue	C/B	Herbaceous: Grass	S
Forestiera pubescens	Elbowbush	C/B,W	Shrub	C
Fraxinus texensis	Texas ash	C/B	Tree	U
Gaillardia pulchella	Southern Indian blanket	G	Herbaceous: Forb	S

Species Observed at Blue Hole Regional Park				
Scientific name	**Common name**	**Habitat (1)**	**Growth Habit**	**Abundance (2)**
Galium aparine	Catchweed bedstraw	G	Herbaceous: Forb	U
Galphimia angustifolia	Narrowleaf goldshower	G	Herbaceous: Forb	U
Garrya ovata subsp. *lindheimeri*	Lindheimer's Mexican silk-tassel	C/B	Shrub	S
Geranium carolinianum	Carolina geranium	G	Herbaceous: Forb	S
Gilia incisa	Cut-leaf gilia	W	Herbaceous: Forb	S
Glandularia bipinnatifida	Prairie mock vervain	G	Herbaceous: Forb	S
Hedeoma acinoides	Slender mock pennyroyal	G	Herbaceous: Forb	A
Hedeoma drummondii	Drummond's mock pennyroyal	G	Herbaceous: Forb	C
Hedera helix	English ivy	C/B	Vine: Woody	U
Helenium elegans	Elegant sneezeweed	G	Herbaceous: Forb	U
Helitropium tenellum	Wild white heliotrope	W	Herbaceous: Forb	A
Hymenopappus scabiosaeus	Old plainsman woolly white	G	Herbaceous: Forb	U
Indigofera miniata	Scarlet scurf pea	G	Herbaceous: Forb	U
Ilex decidua	Deciduous holly	C/B	Shrub	U
Ilex vomitoria	Yaupon holly	C/B,W	Shrub	S
Juglans microcarpa	Little walnut	C/B	Shrub/Tree	U
Juglans nigra	Black walnut	C/B	Tree	U
Juniperus ashei	Ashe juniper	G C/B,W	Shrub/Tree	A
Krameria lanceolata	Ratany	G	Herbaceous: Forb	U
Krigia sp.	Dwarf dandelion	G	Herbaceous: Forb	S
Lepidium sp.	Pepperweed	G	Herbaceous: Forb	S
Lesquerella	Texas bladderpod	G	Herbaceous: Forb	U

Species Observed at Blue Hole Regional Park				
Scientific name	**Common name**	**Habitat (1)**	**Growth Habit**	**Abundance (2)**
engelmannii				
Ligustrum sinense	Chinese privet	C/B	Shrub	S
Limnodea arkansana	Ozark-grass	G	Herbaceous: Grass	S
Lindheimera texana	Yellow Texas star	G	Herbaceous: Forb	U
Lindera benzoin	Spicebush	C/B	Shrub	S
Lonicera japonica	Japanese honeysuckle	C/B	Vine: Woody	S
Lupinus texensis	Texas bluebonnet	G	Herbaceous: Forb	S
Lygodesmia texana	Texas skeleton plant	G	Herbaceous: Forb	U
Maclura pomifera	Osage orange	W	Tree	U
Malvaviscus drummondii	Drummond's waxmallow	C/B	Shrub	U
Marshallia caespitosa	Barbara's buttons	G	Herbaceous: Forb	S
Matelea reticulata	Pearl netleaf milkvine	C/B,W	Vine: Herbaceous	S
Melampodium leucanthum	Plains blackfoot daisy	G	Herbaceous: Forb	U
Melia azedarach	Chinaberry	G,W	Tree	U
Menodora sp.	Menodora	G	Herbaceous: Forb	U
Mimosa nuttallii	Nuttall's sensitivebrier	G	Herbaceous: Forb	C
Morus alba	white mulberry	C/B	Tree	U
Muhlenbergia lindheimera	Lindheimer's muhly	G,C/B	Herbaceous: Grass	S
Muhlenbergia reverchonii	Seep muhly	G	Herbaceous: Grass	A
Nandina domestica	Heavenly bamboo	C/B,W	Shrub	U
Nassella leucotricha	Texas spear grass	G	Herbaceous: Grass	S
Nolina texana	Texas beargrass	G, C/B	Shrub	S

Species Observed at Blue Hole Regional Park				
Scientific name	**Common name**	**Habitat (1)**	**Growth Habit**	**Abundance (2)**
Nothoscordum bivalve	Crow poison	G	Herbaceous: Forb	S
Onosmodium bejariense	Marbleseed	C/B,W	Herbaceous: Forb	S
Oplismenus hirtellus	Basketgrass	W	Herbaceous: Grass	S
Opuntia engelmannii var. *lindheimeri*	Texas prickly pear	G,W	Cactus	C
Opuntia macro-rhiza	Plains prickly pear	G	Cactus	S
Oxalis sp.	Woodsorrel	G,W	Herbaceous: Forb	U
Packera obovata	Golden groundsel	C/B	Herbaceous: Forb	S
Panicum hallii	Hall's panic grass	W	Herbaceous: Grass	S
Panicum virgatum	Switchgrass	C/B	Herbaceous: Grass	U
Parietaria pensylvanica	Pennsylvania pellitory	G, C/B,W	Herbaceous: Forb	C
Parthenocissus quinquefolia	Virginia creeper	C/B	Vine: Woody	U
Paspalum pubiflorum var. *glabrum*	Smooth spikelet paspalum	W	Herbaceous: Grass	S
Pellaea atropurpurea	Purple Cliff-brake fern	C/B	Herbaceous: Fern	U
Photinia sp.	Photinia	C/B	Shrub	U
Phyla sp.	frogfruit	C/B	Herbaceous: Forb	S
Phyllanthus polygonoides	Knotweed leaf flower	G	Herbaceous: Forb	U
Physalis sp.	Ground cherry	G	Herbaceous: Forb	U
Plantago aristata	Large-bracted plantain	G	Herbaceous: Forb	C
Plantago spp.	Plantain	G	Herbaceous: Forb	A
Plantanus occidentalis	American sycamore	C/B	Tree	C
Prosopis	Honey mesquite	G	Shrub/Tree	S

Species Observed at Blue Hole Regional Park				
Scientific name	**Common name**	**Habitat (1)**	**Growth Habit**	**Abundance (2)**
glandulosa				
Prunus serotina	Black cherry	C/B	Tree	U
Ptelea trifoliata	Hop tree	C/B	Shrub	U
Quercus buckleyi	Texas red oak	C/B	Tree	C
Quercus sinuata var. *breviloba*	White shin oak	W	Tree	U
Quercus virginiana var. *fusiformis*	Texas live oak	G,C/B,W	Tree	C
Ratibida columnifera	Prairie coneflower	G	Herbaceous: Forb	C
Rhus lanceolata	Lance-leaf sumac	G,C/B	Shrub	U
Rubus trivialis	Southern dewberry	G,W	Shrub	S
Ruellia nudiflora	Wild petunia	W	Herbaceous: Forb	S
Salvia lyrata	Lyre-leaf sage	C/B,W	Herbaceous: Forb	S
Salvia farinacia	Mealy sage	G	Herbaceous: Forb	U
Salvia engelmannii	Engelmann's sage	G	Herbaceous: Forb	U
Salvia roemeriana	Cedar sage	C/B,W	Herbaceous: Forb	C
Sambucus canadensis	Elderberry	C/B	Shrub	S
Sapindus saponaria var. *drummondii*	Soapberry	C/B,W	Tree	U
Schoenocaulon texanum	Texas green lily	G	Herbaceous: Forb	U
Schizachyrium scoparium	Little bluestem	G	Herbaceous: Grass	C
Scutellaria drummondii	Drummond's scullcap	G	Herbaceous: Forb	C
Senna roemeriana	Roemer's senna	G	Herbaceous: Forb	S
Sideroxylon lanuginosum	Bumelia	C/B,W	Tree	S
Smilax bona-nox	Saw greenbrier	C/B	Vine: Woody	S

Species Observed at Blue Hole Regional Park				
Scientific name	**Common name**	**Habitat (1)**	**Growth Habit**	**Abundance (2)**
Smilax rotundifolia	Common greenbrier	C/B	Vine: Woody	U
Solanum eleagnifolium	Silver leaf nightshade	G	Herbaceous: Forb	S
Solanum rostratum	Buffalo bur	G	Herbaceous: Forb	S
Sorghum jalepense	Johnson grass	G	Herbaceous: Grass	C
Sporobolus compositus	Rough dropseed	G	Herbaceous: Grass	S
Stenotaphrum secundatum	St.Augustine grass	C/B	Herbaceous: Grass	A
Stillingia texana	Texas Queen's delight	G	Herbaceous: Forb	S
Taxodium distichum	Bald cypress	C/B	Tree	C
Tetragonotheca texana	Texas nerveray	G	Herbaceous: Forb	A
Tetraneuris linearifolia	Slender leaf fournerve	G	Herbaceous: Forb	S
Thamnosma texana	Dutchman's breeches	G	Herbaceous: Forb	U
Thelypteris kunthii	Southern shield fern	C/B	Herbaceous: Fern	U
Thelesperma simplicifolium	Slender greenthread	G	Herbaceous: Forb	C
Tinantia anomala	False dayflower	C/B	Herbaceous: Forb	C
Torilis arvensis	Hedge-parsley	C/B	Herbaceous: Forb	S
Toxicodendron radicans	Poison ivy	G, C/B,W	Vine: Woody	C
Triodanis coloradoensis	Colorado venus' looking-glass	G	Herbaceous: Forb	U
Ugnadia speciosa	Mexican buckeye	C/B	Shrub	U
Ulmus americana	American elm	C/B	Tree	U
Ulmus crassifolia	Cedar elm	C/B,W	Tree	C

Species Observed at Blue Hole Regional Park				
Scientific name	**Common name**	**Habitat (1)**	**Growth Habit**	**Abundance (2)**
Verbena halei	Texas verbain	G	Herbaceous: Forb	S
Verbesina virginica var. *virginica*	Virginia frostweed	C/B,W	Herbaceous: Forb	S
Viburnum rufidulum	Rusty blackhaw	C/B	Shrub	U
Vicia ludovicianus	Deerpea vetch	G	Herbaceous: Forb	C
Vicia sp.	Vetch species	G	Herbaceous: Forb	C
Vitis mustangensis	Mustang grape	G,C/B,W	Vine: Woody	C
Warnockia scutellarioides	Scull-cap warnockmint	G	Herbaceous: Forb	S
Wedelia texana	Texas wedelia	G	Herbaceous: Forb	C
Yucca rupicola	Twist-leaf yucca	G,C/B	Shrub	S
(1) Habitat: G – grasslands; C/B – creekside and bluff; W- Juniper/Oak Woodland				
(2) Abundance: R – rare; U – uncommon; S – scattered; C – common; A - abundant				

APPENDIX E

ARCHAEOLOGICAL REPORT

AR Consultants, Inc.

Archaeological and Environmental Consulting
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An Addendum to the

CULTURAL RESOURCES EVALUATION

OF THE PROPOSED

WIMBERLEY WATER TREATMENT PROJECT

HAYS COUNTY, TEXAS

S. Alan Skinner, PhD

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February 20, 2014

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February 20, 2014

ABSTRACT

The Village of Wimberley is proposing to construct a wastewater collection and treatment system in the uplands adjacent to the Cypress Creek valley in Hays County, Texas. The project includes construction of a new water treatment plant and associated drip irrigation fields. Water will be delivered to the treatment plant through gravity and force mains and three lift stations. Archaeological survey of the northern part of the project area was previously done and no significant cultural resources were recorded along Old Kyle Road or within the limits of the Blue Hole Recreation Area. Two changes in this northern area have been made. A pipeline is proposed that begins on the east side of the Wimberly Cemetery and follows the road north and then west into the Cypress Creek valley. The second is the relocation of the treatment plant. These areas were inspected as part of this investigation but were essentially surveyed for cultural resources by Texas State University in 2006.

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INTRODUCTION

The Village of Wimberley in Hays County, Texas is proposing to construct a new water treatment plant in the upland midway between the Blue Hole and FM 3237 (Figure 1). The entire project is to be situated in the upland on the northeast and will extend almost to the bank of Cypress Creek south of FM 12. Most of the project area north of Old Kyle Road and FM 3237 is included within the limits of the Blue Hole Recreation Area (Lady Bird Johnson Wildflower Center 2007; Stroker and Leezer 2006). The following report describes the settings and archaeological potential of the two additions to the project. This is a project of the Guadalupe-Blanco River Authority and the Village of Wimberley. Alan Plummer Associates, Inc. is managing the environmental permitting for the city. The purpose of this records review and drive by reconnaissance was to evaluate the potential of the need for further cultural resource investigations within the project area prior to construction.

The study area is situated in the Texas Hill Country in the Edwards Plateau physiographic region with the Llano Uplift to the north and the lower Blackland Prairie to the east. The area overlies the upper part of the Glen Rose Geological Formation that is Lower Cretaceous in age (Bureau of Economic Geology 1981). The Glen Rose consists of alternating beds of limestone, dolomite, and marl; these conditions result in the creation of a stair-step topography. The soils along Blue Hole Road include are primarily mapped as Gruene clay with 1-5% slopes (Batte 1984:Sheet 35, pg 24). The areas of this soil are generally long and narrow in shape and have very dark grayish brown clay A-horizon that is 13 inches thick. Below this is strongly cemented and massive caliché with embedded gravels. The western part of the road crosses Sunev clay loam and the eastern edge of the frequently flooded Oakalla soils. The northern and eastern parts of the study area are Brackett Rock outcrop-Comfort complex soils. Bracket soils have A and B-horizons generally to a depth of 14 inches resting on weakly cemented limestone interbedded with thin strata of calcareous shaly clay (Batte 1984:Sheet 35, pp. 18 and 68).

Cypress Creek has a level floodplain that averages fifty meters wide. A limestone outcrop forms the first elevation south of the creek and there is a first terrace at the same level as the creek swings to the north. The limestone “terrace” averages thirty meters above the creek level. The immediate region includes plant communities of forests, woodlands, grasslands, and farmland (Weaver and Schroeder 2004). Major trees in the area include Texas oak, shin oak, cedar elm, netleaf hackberry, flameleaf sumac, Mexican persimmon, and Texas kidneywood. Dominant shrubs and wood vines are agarita, Texas Prickly pear, mat euphorbia, and saw greenbriar. A variety of grasses is also common. Native fauna include white-tailed deer, armadillos, raccoons, ringtail cats, rabbits, rodents, and various reptiles. Endangered native animals include two species of salamanders, the black-capped vireo, and the golden-cheeked warbler.

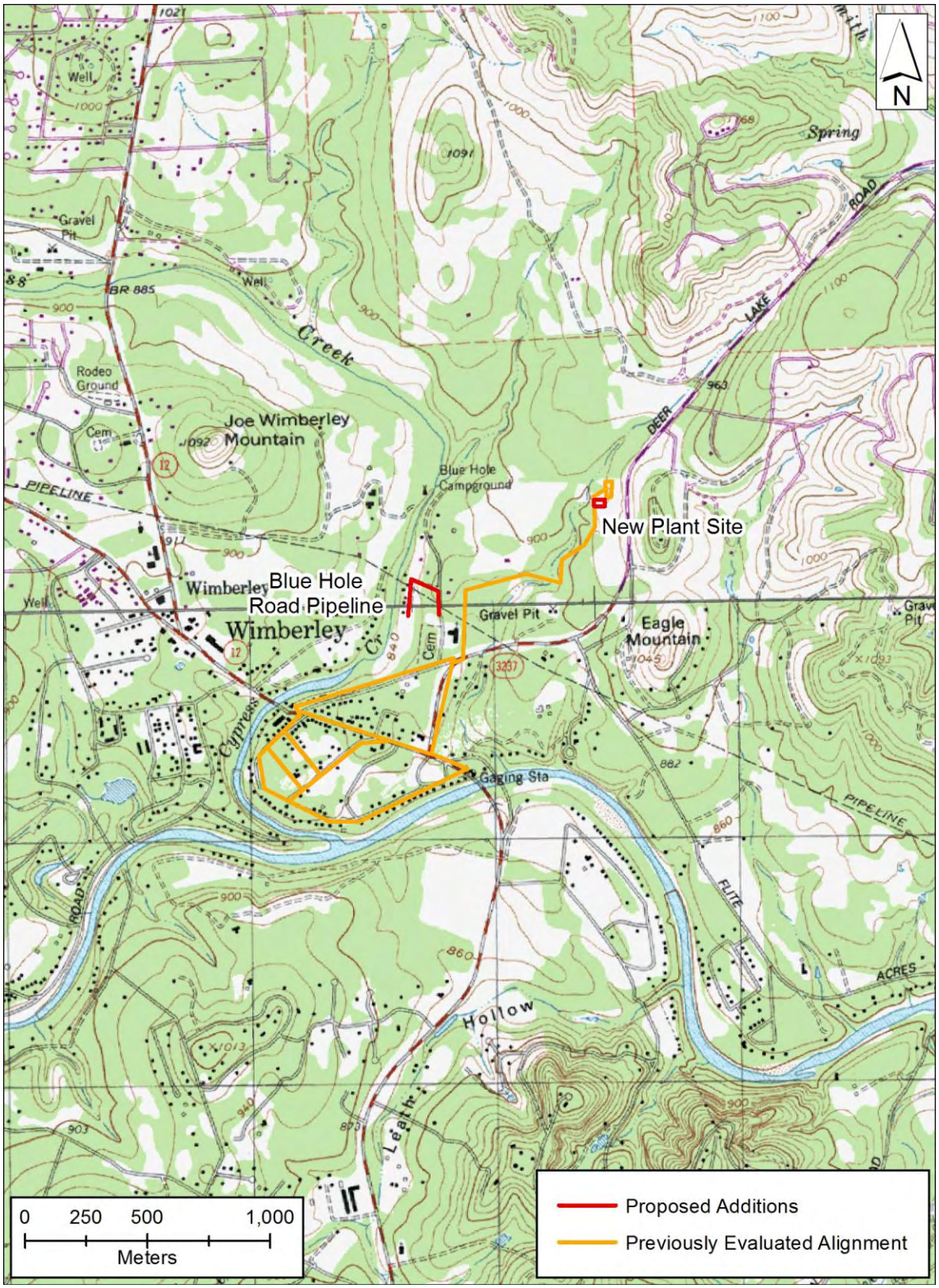

Figure 1. Proposed Wimberley Water Treatment Project showing the additions in red.

CULTURE HISTORY

The culture history of the Central Texas Archeological Area is constantly being refined and the most recent syntheses for this area are contained in the book "The Prehistory of Texas" (Perttula 2004) and was written by Michael B. Collins (2004). Other recent syntheses are by Steve Black (1995) and by LeRoy Johnson and Glenn Goode (1994). The following discussion relies on the summary of Stoker and Leezer (2006:4-9). Five basic periods are used and dates are presented using the Roman calendar.

The Paleoindian is the first stage of the Prehistoric period and includes all occupation prior to 6,000 B.C. Clovis, Folsom, and subsequent Late Paleoindian cultures occupied this region (Bousman et al. 2004). Five Clovis points have been reported from Hays County although none are from the Wimberley area (Bever and Meltzer 2007:68). Hunting of subsequently extinct species of large mammals occupied during this period and there appears to have been widespread trade in knappable lithic materials.

The Archaic follows the Paleoindian stage and lasts for approximately 7,500 years, ending about A.D. 700-800. During this time period, there were major changes in hunting as smaller and modern species were consumed. There is more evidence that plants were prepared as foods and that stone cooking technology became common. A wide variety of chipped and ground stone tools were used and there was a shift toward the increased use of local lithic resources, although the local resources were of high quality and were traded outside the area. Climatic changes occurred and the climate is characterized as being wetter than during the Paleoindian times. The population was at its highest density during this period.

The bow and arrow represent the main technological change that characterizes the Late Prehistoric stage, which lasted until about 500 years ago. The atlatl was replaced and the bow and arrow made it possible to develop a more mobile hunting technology. Pottery and evidence of some domesticated plants are found in Late Prehistoric site deposits but neither artifact type is abundant. The climate became drier during the second part of this time period and there seems to be a decrease in population numbers based on the number of sites and the density of site deposits.

The following Protohistoric Period is also known as the Spanish Entrada Period and is related to formal expeditions from Northern Mexico into Central Texas in the late seventeenth and early eighteenth centuries. The period covers the period from A.D. 1500 to 1700 and towards the end the indigenous tribes were being displaced by tribes such as the Tonkawa from Oklahoma and the Lipan Apache and Comanches from the high plains. Sites of this period generally have a mix of traditional Native American artifacts along with metal objects and glass beads that were obtained from traders.

The Historic Period began with the settlement of the Mission of San Antonio de Valero [the Alamo] in 1718. In the subsequent century, there were dramatic reductions in the number of Native Americans due to European diseases. After Texas Independence and

then admission into the United States, a trading post was established in Wimberley. The community was then called Glendale and remained a small rural setting until paved roads and electricity made their way to what had become Wimberley in the 1940s.

Previous investigations in the area have recorded prehistoric rock shelters, burned rock middens, and lithic scatters (TASA 2014; Bement 1990; Harris 1985; Oksanen et al. 2003; Weaver and Schroeder 2004; Stroker and Leezer 2006). Historic sites in the form of dry-stacked nineteenth century rock walls and an early twentieth century structure were recorded at Blue Hole 41HY414. Prehistoric sites 41HY10, 41HY137, and 41HY138 are recorded on TASA and the latter two sites contain burned rock middens in the terrace soils that are present. Site 41HY10 is in the vicinity of the Phase 11A Gravity Main along Rio Bonito Road. A historic marker marks the Wimberley Mill and millrace, which is located at the intersection of FM 12 and River Road in Wimberley.

The TASA review confirmed that all of the Blue Hole Recreation Area [an area of 128.92 acres] had been thoroughly surveyed for archaeological sites by the Center for Archaeological Studies at Texas State University-San Marcos (Stoker and Leezer 2006) and that a multi-component site that included a surface lithic scatter, two nineteenth-century dressed limestone features, four dry-stacked rock walls, and eight rock piles were located and evaluated. No diagnostic artifacts or unique examples of historic architecture were located and it was recommended that the site not be considered eligible for nomination to the National Register of Historic Places or as a State Archeological Landmark.

RESULTS

The overall original project plan is shown on Figure 2 but changes to the plan include the addition of a pipeline in the Blue Hole Road and the relocation of the plant site to the south into the area mapped as being the drip irrigation area (Figure 3). An on-site visit to inspect the additional areas was made in order to relate the plans to the topography, geology, and to the present landuse. The following photographs provide a visual impression of the conditions along Blue Hole Road and in the plant site area.

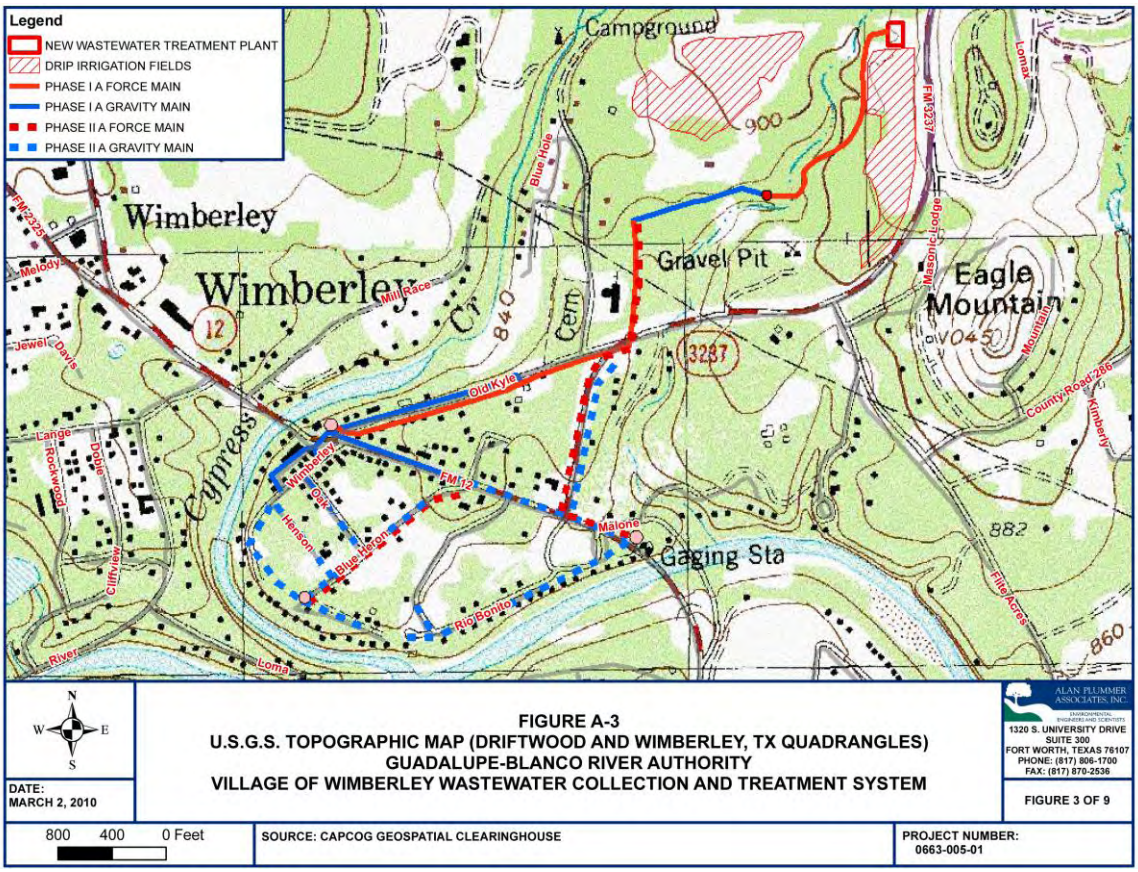

Figure 2. The original Wimberley Wastewater Collection and Treatment System shown on sections of the Driftwood and Wimberley, TX 7.5' USGS maps. Map prepared by Alan Plummer Associates, Inc.

The Blue Hole Road pipeline will be placed in the road starting at the mid-wall entrance into the east side of the Wimberley Cemetery (Figures 4 and 5) and will proceed north to the entrance to the Blue Hole Recreation Area where it will turn west down the road (Figure 6). It will continue in the road past the northwest corner of the cemetery and down the limestone valley edge (Figure 7) and across the Cypress Creek bench (Figure 8). At this point the pipeline will turn south as does the road and continue until it reaches

the southernmost residence where it will terminate (Figure 9). The full length of this pipeline route will be under the existing road.

The plant site has been moved south into the area of the proposed drip irrigation area. As shown on Figure 3 the new plant site is in an area that was once cleared of brush and has been allowed to be invaded by juniper (Figure 10). No doubt this area served as pasture or farmland after it was cleared. As shown in Figure11, the limestone is very shallow in the area and there is little potential of there being buried historic or prehistoric cultural materials.

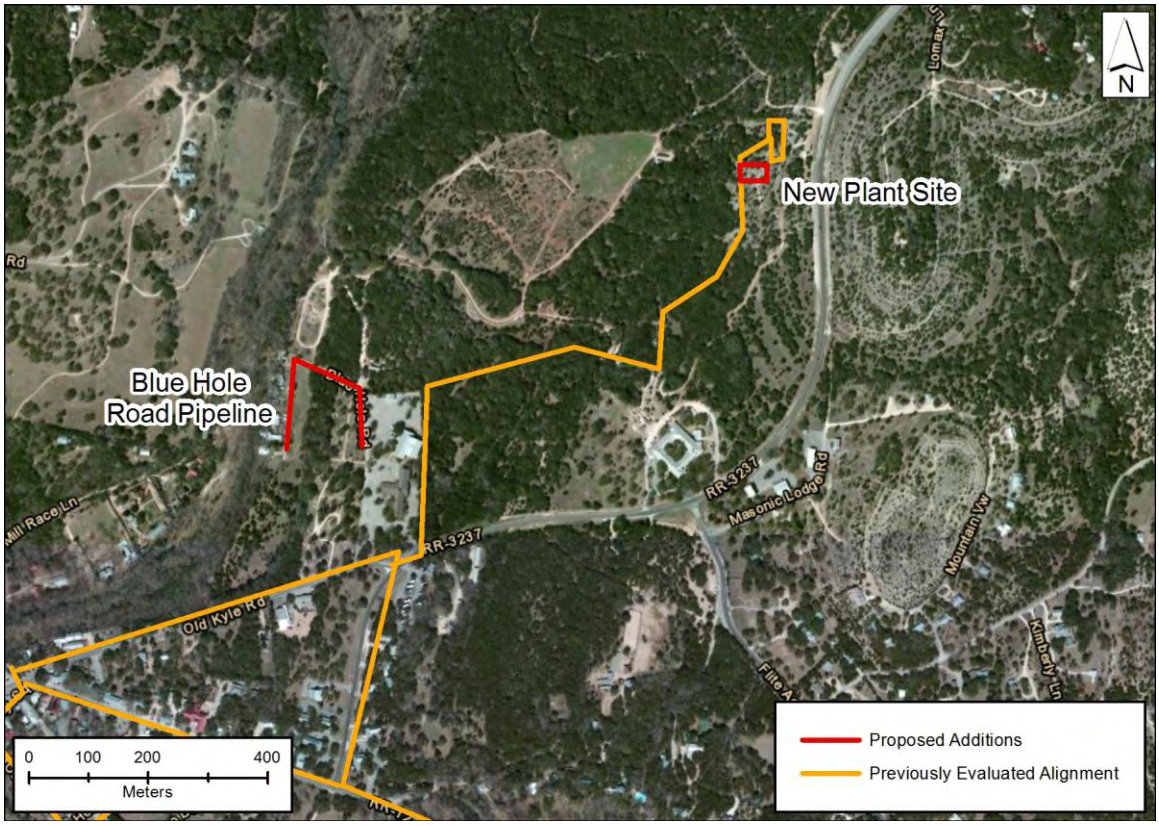

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Figure 4. Eastern entrance to Wimberley Cemetery. Pipeline will be in the road to the right.

Figure 5. Pipeline route will be in the road along the northeast side of the cemetery. View is looking south from the northeast corner.

Figure 6. Looking west across the level upland from the northeast corner of the Wimberley Cemetery. The pipeline route will be in the road.

Figure 7. Looking east upslope at the toe of the level bedrock upland from midway across the bench.

Figure 8. View is looking north from the south end of the pipeline route which will be in the road to the left. The upland slope is covered with junipers.

Figure 9. Looking north up the road in front of the residences situated on the bench adjacent to Cypress Creek.

Figure 10. New plant site setting showing the exposed surface soil and confirming the low archaeological potential. View is to the northeast.

Figure 11. The juniper tree is anchored in the eroded bedrock surface deposits and shows the shallow nature of sediment in the new plant site.

CONCLUSIONS AND RECOMMENDATIONS

As indicated in the previous report (Skinner 2010) virtually all parts of the Wimberley Wastewater Collection and Treatment System north of FM 12 have been surveyed for cultural resources and no significant resources were recorded. The addition of the Blue Hole Pipeline segment in a roadway and the relocation of the treatment plant remain in the previously surveyed areas where there is a low potential of finding preserved prehistoric or historic cultural resources and none were found.

AR Consultants recommends that further cultural resource investigations are unwarranted north of FM 12 prior to construction of the added pipeline segment and the relocation of the treatment plant.

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CULTURAL RESOURCES EVALUATION

OF THE PROPOSED

WIMBERLEY WATER TREATMENT PROJECT

HAYS COUNTY, TEXAS

S. Alan Skinner, PhD.

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Cultural Resources Report 2010-Draft
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ABSTRACT

The Village of Wimberley is proposing to construct a wastewater collection and treatment system in the uplands adjacent to the Cypress Creek valley in Hays County, Texas. The project includes construction of a new water treatment plant and associated drip irrigation fields. Water will be delivered to the treatment plant through gravity and force mains and three lift stations. Archaeological survey of the northern part of the project area was previously done and no significant cultural resources were recorded along Old Kyle Road or within the limits of the Blue Hole Recreation Area. The remaining parts of the water system will be located within or adjacent to the road system within the village; these areas have not been surveyed for cultural resources but they should be expected to be present. Based on the results of these surveys and the soils/bedrock described in the project area, it is concluded that the northern parts of the project area have a low archaeological potential for containing significant archaeological sites. The absence of surveys south of FM 12 and the proximity to the Cypress Creek and Blanco River terrace sediments and the presence of site 41HY10 indicate that sites might be present in this area. AR Consultants recommends that cultural resource surveys be done south of FM 12 if the pipelines are to be installed outside of the existing roadways.

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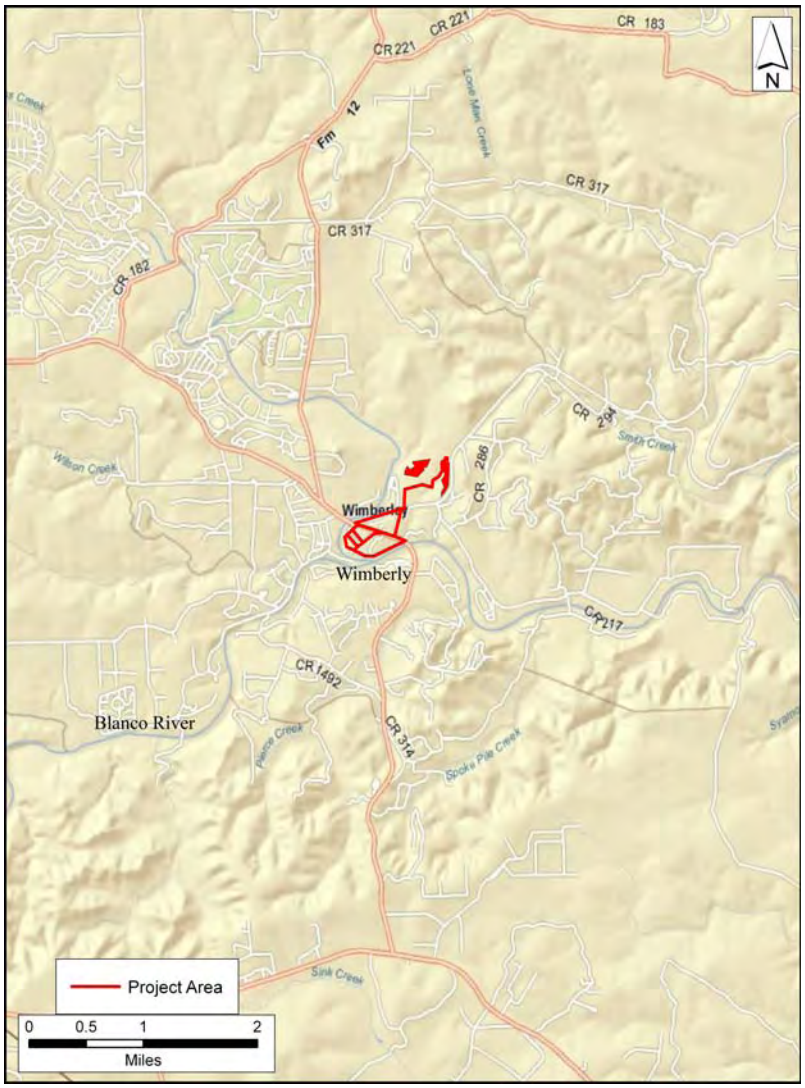
INTRODUCTION

The Village of Wimberley in Hays County, Texas is proposing to construct a new water treatment plant in the upland midway between the Blue Hole and FM 3237 (Figure 1). The entire project is to be situated in the upland on the northeast and will extend almost to the bank of Cypress Creek south of FM 12. Most of the project area north of Old Kyle Road and FM 3237 is included within the limits of the Blue Hole Recreation Area (Lady Bird Johnson Wildflower Center 2007; Stroker and Leezer 2006). Once the sewer line exits the recreation center area, it will be placed within Old Kyle Road or immediately adjacent to the paved road but not on private property. To the south of FM 12, the force main routes will be within or immediately adjacent to existing roadways. This is a project of the Guadalupe-Blanco River Authority and the Village of Wimberley. Alan Plummer Associates, Inc. is managing the environmental permitting for the city. The purpose of this records review and drive by reconnaissance was to evaluate the potential of the need for further cultural resource investigations within the project area prior to construction.



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then admission into the United States, a trading post was established in Wimberley. The community was then called Glendale and remained a small rural setting until paved roads and electricity made their way to what had become Wimberley in the 1940s.

Previous investigations in the area have recorded prehistoric rock shelters, burned rock middens, and lithic scatters (Bement 1990; Harris 1985; Oksanen, Weaver, Schroeder, and Clamann 2003; Weaver and Schroeder 2004; Stroker and Leezer 2006). Historic sites in the form of dry-stacked nineteenth century rock walls and an early twentieth century structure were recorded at Blue Hole. Prehistoric sites 41HY10, 41HY137, and 41HY138 are recorded on TASA and the latter two sites contain burned rock middens in the terrace soils that are present. Site 41HY10 is in the vicinity of the Phase 11A Gravity Main along Rio Bonito Road. A historic marker marks the Wimberley Mill and millrace, which is located at the intersection of FM 12 and River Road in Wimberley.

RESULTS

The overall project plan is shown on Figure 2 and specific areas are illustrated by the included photographs. An on-site visit to the project area was made in order to relate the plans to the topography, geology, and to the present landuse. This was further supplemented by a thorough review of the Wimberley, Texas 7.5' USGS map as shown on the Texas Archeological Sites Atlas (TASA).

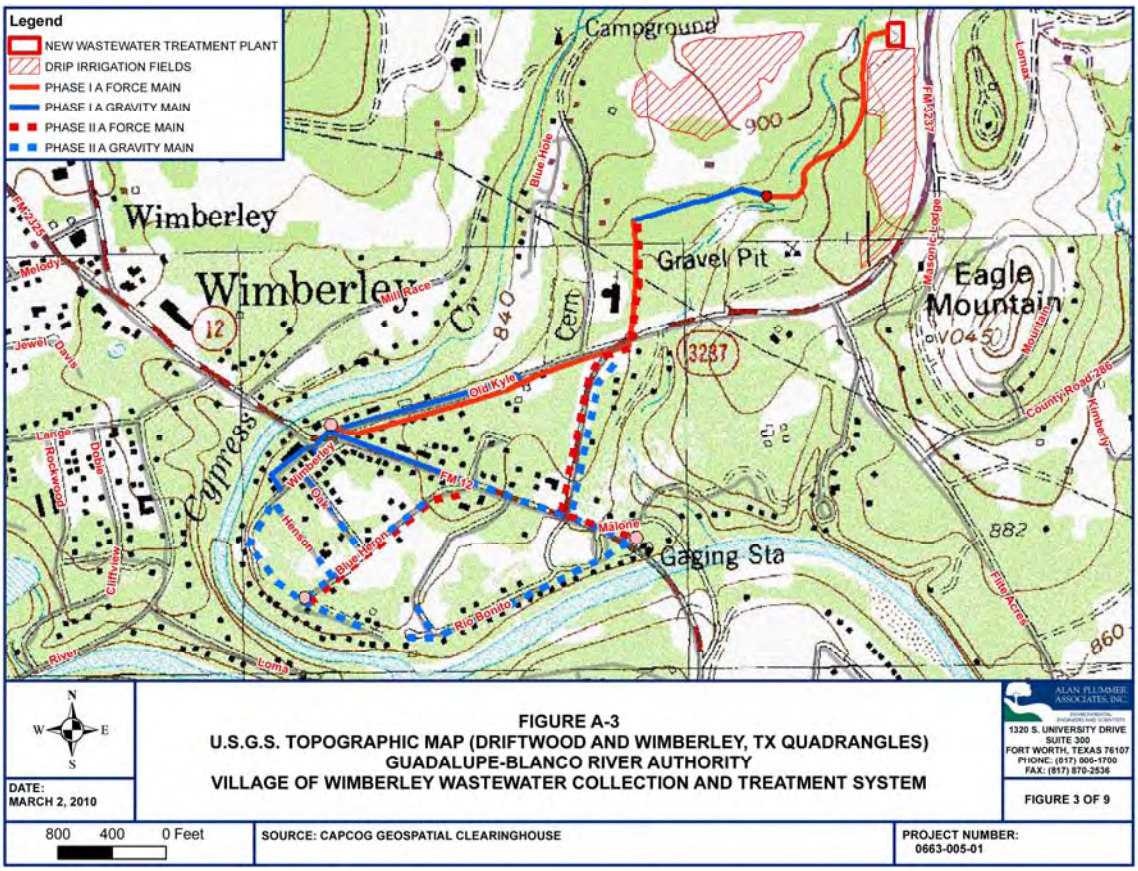

Figure 2. The proposed Wimberley Wastewater Collection and Treatment System shown on sections of the Driftwood and Wimberley, TX 7.5' USGS maps. Map prepared by Alan Plummer Associates, Inc.

The TASA review confirmed that all of the Blue Hole Recreation Area [an area of 128.92 acres] had been thoroughly surveyed for archaeological sites by the Center for Archaeological Studies at Texas State University-San Marcos (Stoker and Leezer 2006) and that a multi-component site that included a surface lithic scatter, two nineteenth-century dressed limestone features, four dry-stacked rock walls, and eight rock piles were located and evaluated. No diagnostic artifacts or unique examples of historic architecture were located and it was recommended that the site not be considered eligible for

nomination to the National Register of Historic Places or as a State Archeological Landmark.

Although not directly part of the project, the survey of the nearby Cypress Creek Nature Trail and Preserve failed to find any cultural resources in the immediate project area (Weaver and Schroeder 2004). Likewise, survey of the Old Kyle Road (TASA 2010) failed to record any archaeological sites and as shown on the Atlas. Consequently, it appears that virtually all of the proposed Wimberley Wastewater Treatment Plant Project area north of Old Kyle Road and of FM 3237 has been surveyed for cultural resources but no significant ones have been found. A pipeline survey done in 1977 for the Texas Water Quality Board located two prehistoric sites with burned rock middens near the intersection of Cypress Creek and the Blanco River. These sites will not be impacted by construction but serve to emphasize the potential of finding sites in the unsurveyed area south of FM 12 and along Cypress Creek.

The following figures serve to amplify the results of the records review and are the results of a brief drive-by reconnaissance to determine if an archaeological survey is warranted.

Figure 3. The upslope edge of the Cypress Creek Nature Trail and Preserve is approximately indicated by the brown bench in the right foreground. The view is to the north and the north side of the floodplain is at the landing of the rock steps shown in the back center of the picture.

Figures 3 and 4 show the area just upstream from the proposed Cypress Creek Nature Trail Lift Station which is near FM12 and Cypress Creek. As shown, the nature trail and associated starting point are located on the south side of Cypress Creek and north of Old Kyle Road. The trail has been constructed and is shown in the floodplain heading upstream (Figure 4). Two additional lift stations will be installed, one at the southwest end of Blue Heron Run and the other at the southeast corner of the expanded system near the gaging station shown on Figure 2.

Figure 4. The nature trail is shown angling across the picture and continuing into the forest in the center of the picture. View is to the northeast.

Figure 5 shows Old Kyle Road looking northeast from its intersection with FM12. The entire route in this area is paved and pipelines will have to be placed into the bedrock which underlies this relatively low area just upslope from the creek. The lumber yard (Figure 6) is on the north side of the Old Kyle Road just east of the Cypress Creek Nature Area and on the left the pipeline will have to be placed under the pavement and to the right of it will have to be placed along the edge of the pavement. The roadway has been surveyed for cultural resources based on a review of TASA and no significant cultural resources were recorded.

FM 3237 from the intersection with Old Kyle Road and FM 12 have not been surveyed but construction has provided a wide area on either side of the road where a pipeline can be installed. The bedrock is shallow in this area and the pipeline will be located in areas which have been primarily cleared of brush that are similar in appearance to the Blue Hole Recreation Area surveyed by Texas State and found to have very low potential.

Figure 5. Old Kyle Road looking east from south of the road opposite the Cypress Creek Nature Area and Preserve. Pipelines will parallel the road east.

Figure 6. The upland edge is almost at the edge of Old Kyle Road east of the parking lot and a tree line is set back from the road to the right of the road.

The Wimberley Cemetery (Figure 7) is near the eastern end of the pipeline routes along Old Kyle Road where both routes are on the south side of the road, which is shown as Figure 8. West of the cemetery, the proposed gravity sewer along Old Kyle Road will have crossed to the south side of the road (Figure 9).

Figure 7. Looking east along the fence that bounds Wimberley Cemetery. Old Kyle Road and a setback row of trees are on the south of the road while an unmaintained parking area is situated near the cemetery entrance between the road and the fence.

The remainder of the pipeline routes and development areas are located on property that was not readily accessible and is primarily undeveloped and tree/grass covered. Bedrock is generally shallow below a thin cover of loamy and clayey soils. This is not a setting where vertically stratified site deposits are likely to be encountered and that was certainly the conclusion of Texas State's investigation of site 41HY414.

Figure 8. Old Kyle Road looking west from the edge of the Wimberley Cemetery. North of the road is largely undeveloped and was already surveyed for sites. Commercial and residential properties are south of the road.

Figure 9. Texas Historical Commission marker at Wimberley Cemetery.

CONCLUSIONS AND RECOMMENDATIONS

Virtually all parts of the Wimberley Wastewater Collection and Treatment System north of FM 12 have been surveyed for cultural resources and no significant resources have been recorded. The longest part of the route and the new plant site and subsurface irrigation areas are included within the Blue Hole Recreation Area, which has been cleared for development by the Center for Archaeological Studies at Texas State University-San Marcos. The pipeline routes along Old Kyle Road have also been cleared for construction by a TxDOT survey as indicated on the Texas Archeological Sites Atlas. Furthermore, the pipeline routes along the road will be built in areas which have been disturbed by past construction of houses, stores, parking lots, and other commercial facilities and it is unlikely that significant cultural resources have been preserved. The likelihood of finding undisturbed cultural resources is further reduced because the pipelines along Old Kyle Road will be situated on Gruene series soils, which are very shallow to shallow and formed in clayey sediment over caliché that includes siliceous and limestone gravel.

In contrast, there is a potential of encountering unrecorded prehistoric archaeological sites in the Lewisville silty clay terrace deposits along Cypress Creek south of downtown Wimberley and FM 12. These sites are likely to have shallowly buried deposits that contain vertically stratified cultural deposits in the top meter of the silty clay.

AR Consultants recommends that further cultural resource investigations are unwarranted north of FM 12 prior to project construction but survey should be conducted south of FM 12 if the pipelines are to be constructed outside of the paved roadway.

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APPENDIX F

FLOODPLAIN AND WETLAND MANAGEMENT NOTICE

(TO BE INCLUDED IN THE FINAL EID)

APPENDIX G

PUBLIC HEARING RECORD

(TO BE INCLUDED IN THE FINAL EID)

APPENDIX H

COMMENTS FROM REVIEWING AGENCIES AND PUBLIC

(TO BE INCLUDED IN THE FINAL EID)